

Operation Manual

DYNAMIC MEASUREMENT SOFTWARE

TMR-7300
Ver.1.2



Introduction

This software is general-purpose dynamic measurement software that controls our instrument TMR-211 or TMR-311 to enable data monitoring, data collection, data edition (tabulation and drawing figures) and data processing by using the Microsoft Windows OS.

To use this software effectively, read this operation manual thoroughly and understand the functions and operations sufficiently.

This operation manual is written based on the basic operation method of Windows. For the basic operation of Windows, refer to the user's guide supplied to the Windows OS.

In order to use the frequency analysis function described in this operation manual, installation of optional software on the instrument TMR-211 is required. For details, see the operation manual of the instrument.

Option Name :Histogram analysis library
TMR-211-01/TMR-311-01

Notational system of this manual

This manual uses the notational system shown below in the body text for simplifying the description of operation.

Examples : Description
File menu : Names of the menu and menu items are indicated in block letters.

"Set" button : Names of the buttons are shown in block letters in quotation marks.

Ctrl+N : It denotes a shortcut: The sign in the left means that you press the alphabet "N" while holding the Ctrl key.



: Describes the referential item for operation.



: Describes the caution on operation. The body text is indicated in italic type.



: Describes the referential page for operation.

Setting Items : Item titles are indicated in block letters.

Pictorial cuts in the text

: For the pictorial cuts in this manual, the screens of Windows 10 are used.

The pictorial cuts used for this manual are the pictorial cuts of software under development. Note that the screens may be different from those of actual product.

Contents

Introduction
Notational system of this manual

Chapter 1 Setup

1 What you need for setup	1-1
2 Setting up the measurement system	1-2
2-1 Connection using a LAN interface	1-2
2-2 Connection using a USB interface	1-3
3 Setup of this software	1-5

Chapter 2 Overview

1 Check of the system configuration	2-1
2 Basic specification	2-2
3 Measurement project	2-8
3-1 Meter setting	2-8
3-2 A/D setting	2-8
3-3 Channel setting	2-9
3-4 Automatic measurement setting	2-10
3-5 Measurement data	2-12
3-6 History	2-13
4 Data file	2-14
4-1 Where to store data files	2-14
4-2 Channel setting	2-15
4-3 Measurement data	2-16
4-4 Frequency data	2-17
5 Chart	2-18
5-1 Monitor chart	2-18
5-2 Data chart	2-19

Chapter 3 Start-up and Exit

1 Icons of this software	3-1
2 Start of this software	3-2
3 Start-up	3-3
4 Exit this software	3-4

Chapter 4 Setting of a Measurement project

1 Switching the setting item of Measurement project	4-1
2 Setting of the instrument	4-2
2-1 Setting of connection conditions	4-2
2-2 Confirmation of connection	4-3
2-3 IP address change of instrument from interface	4-4
2-4 IP address change of instrument by configuration file	4-5
3 A/D setting	4-6
4 Input of the measurement title	4-8
5 Channel setting	4-9

5-1	Setting errors	4-9
5-2	How to select a setting item	4-9
6	Input Channels	4-10
6-1	How to specify measurement channels to use	4-10
6-2	How to assign a sequential number to the name	4-11
6-3	How to set the input mode	4-12
6-4	How to set the input range	4-13
6-5	How to set the cutoff frequency of the low-pass filter	4-14
6-6	How to set the frequency characteristic of the low-pass filter	4-14
6-7	How to set the cutoff frequency of the high-pass filter	4-15
6-8	How to set balance	4-15
6-9	How to set the reference junction	4-16
6-10	How to set a coefficient	4-16
6-11	Setting the coefficient by rated output and capacity of sensor	4-16
6-12	How to set the shift amount	4-17
6-13	How to set the unit	4-17
6-14	How to set the format for measurement data	4-18
6-15	Setting the alarm value	4-18
6-16	How to set option data	4-18
7	Output Channels	4-19
7-1	How to set the input channel	4-19
7-2	How to set the output voltage	4-20
7-3	Setting output sensitivity	4-20
7-4	How to set the calibration value	4-21
8	Frequency NO	4-22
8-1	How to set the input channel	4-22
8-2	How to set the analysis method	4-23
8-3	How to set the full scale	4-23
8-4	How to set the hysteresis	4-24
8-5	How to set the cross level	4-24
8-6	How to set the sampling time	4-24
8-7	How to set the slice number	4-25
9	Expanded CH	4-26
9-1	Assigning the sequential number to name	4-26
9-2	Setting the arithmetic expression	4-27
9-3	Setting the unit	4-28
9-4	Setting the format of Expanded channel data	4-28
9-5	Setting the alarm value	4-29
9-6	Setting the option data	4-29
10	Setting for Automatic measurement	4-30
11	Saving a measurement project	4-31
12	Creating instrument setting file	4-32
Chapter 5 Measurement		
1	How to display the Measurement panel	5-1
1-1	Memory card state indicator	5-2

2	How to balance.....	5-3
3	Monitor measurement	5-4
3-1	Setting of the monitor data on the Measurement panel	5-4
3-2	Setting of the monitor display position	5-5
3-3	Setting of the monitor display color.....	5-5
3-4	Setting of the peak data.....	5-6
3-5	Start of monitor measurement	5-6
4	How to set the recording data.....	5-7
5	Manual measurement.....	5-8
5-1	Start of manual measurement	5-8
6	Stop of manual measurement	5-9
7	Free run measurement.....	5-10
7-1	Start of free run measurement.....	5-10
7-2	Stop of free run measurement	5-10
8	Data trigger measurement.....	5-11
8-1	Setting of the trigger mode and trigger level	5-11
8-2	Example of Data trigger measurement	5-12
8-3	Start of Data trigger measurement	5-14
8-4	Stop of Data trigger measurement.....	5-14
9	Program measurement.....	5-15
9-1	Setting the program measurement	5-15
9-2	Example of Program measurement setting.....	5-16
9-3	Start of Program measurement	5-17
9-4	Stop of Program measurement.....	5-17
10	Interval measurement	5-18
10-1	Setting the interval measurement time	5-18
10-2	Example of Interval measurement setting	5-19
10-3	Start of Interval measurement	5-20
10-4	Stop of Interval measurement	5-20
11	Data comparator measurement	5-21
11-1	Setting the data comparator measurement	5-21
11-2	Example of Data comparator measurement.....	5-22
11-3	Start of Data comparator measurement	5-23
11-4	Stop of Data comparator measurement	5-23
12	Offline measurement.....	5-24
12-1	Start of Offline measurement.....	5-24
12-2	Obtain the data of Offline measurement.....	5-24
13	Alarm function	5-25
13-1	Setting the alarm level.....	5-25
13-2	Starting the alarm display.....	5-26
13-3	Changing the alarm operation	5-27
14	Disabling the automatic save of data	5-28
15	Auto-deletion of memory card data	5-29
16	Reading memory card data.....	5-30
17	Deletion of selected memory card data.....	5-31
18	Calibration of the voltage output	5-32

Chapter 6 Charts

1 Monitor chart	6-1
1-1 Drawing the Line monitor chart	6-2
1-2 Drawing the Elapse monitor chart	6-4
1-3 Drawing the Vertical bar monitor chart	6-6
1-4 Drawing the Horizontal bar monitor chart	6-8
1-5 Drawing the X-distribution monitor chart	6-10
1-6 Drawing the Y-distribution monitor chart	6-12
1-7 Drawing the Frequency monitor chart	6-14
2 Data chart	6-16
2-1 Drawing the Line chart	6-17
2-2 Drawing the Scatter chart	6-19
2-3 Drawing the Elapse diagram	6-21
2-4 Drawing the History chart	6-23
2-5 Drawing the Frequency chart	6-25
2-6 Drawing the Spectral chart	6-27
3 Note on drawing of measurement data	6-29
3-1 Drawing the measurement data referencing the measurement project	6-29
3-2 Drawing the measurement data referencing the measurement file	6-30
4 Creating the Blank form	6-31
5 Editing the Chart sheet and Blank form	6-31
5-1 Adding the data to chart	6-31
5-2 Making a copy of a chart sheet	6-33
5-3 Specifying the chart scale	6-34
5-4 Specifying the drawing range to update data	6-35
5-5 Changing a reference file	6-36
6 Drawing the regression line	6-37
7 Creating the numeric monitor	6-38
8 Checking and changing the setting of parts	6-39
9 Saving a chart sheet	6-40

Chapter 7 Data Processing

1 How to display the Data list	7-1
1-1 How to edit the measurement data	7-1
1-2 How to set the column width	7-2
2 How to display the list of progression charts	7-3
2-1 How to change coordinate axes of a chart list	7-4
2-2 How to change the label of the Chart list	7-6
3 History	7-7
3-1 How to display the Measurement history	7-8
3-2 How to display a data file	7-9
3-3 How to change the file name of a measurement data file	7-10
3-4 How to convert a data file into text	7-11
3-5 How to change the measurement title	7-13
3-6 How to update the Measurement history	7-14
4 How to display the Maximum/Minimum/Average	7-15

5	How to display the Frequency history	7-16
5-1	How to display frequency data file	7-17
5-2	How to change the file name of frequency data file	7-17
5-3	How to convert a frequency data file into text	7-18
5-4	How to change the test title	7-19
5-5	How to update the Frequency history	7-19
6	Reading instrument data	7-20
7	Processing of a measurement data file	7-22
7-1	Thinning out of data	7-23
7-2	Range selection	7-24
7-3	Display of the cursor information	7-26
7-4	Searching the maximum and minimum values	7-26
7-5	Display and editing of marker	7-28
7-6	Operation of the axis of coordinates	7-31
7-7	Data deletion	7-33
7-8	Deletion of the first and last parts of data	7-34
7-9	Change of the time unit.....	7-35
7-10	Operation of measurement data.....	7-35
7-11	Save as text	7-36
8	Processing of a frequency data file	7-41
8-1	Displaying the Input CH.....	7-41
8-2	Displaying frequency data	7-42
8-3	Changing the format	7-43
8-4	Displaying the physical quantity.....	7-43
8-5	Save frequency data as text	7-44
8-6	Outputting the frequency data in HR7916CSV format.....	7-45
 Chapter 8 Print		
1	Selection of the printer and paper	8-1
2	How to set the printing format.....	8-1
3	How to print out	8-2
4	How to check before printing	8-3
5	Printing the chart sheets collectively	8-4
 Chapter 9 Overview of Menus		
1	File menu.....	9-1
1-1	New Ctrl+N	9-2
1-2	Open... Ctrl+O	9-3
1-3	Close	9-4
1-4	Save Ctrl+S.....	9-5
1-5	Save As...	9-5
1-6	Save as text.....	9-6
1-7	Reading instrument data.....	9-13
1-8	Creating instrument setting file...	9-16
1-9	Outputting HR7916 in CSV format.....	9-17
1-10	Save pictures.....	9-18
1-11	Print... Ctrl+P	9-19
1-12	Print preview	9-20

1-13	Print option.....	9-21
1-14	Printer setup.....	9-22
1-15	Print all charts.....	9-23
1-16	Exit application.....	9-24
2	Edit menu.....	9-25
2-1	Undo Ctrl+Z.....	9-26
2-2	Cut Ctrl+X.....	9-26
2-3	Copy Ctrl+C.....	9-26
2-4	Paste Ctrl+V.....	9-26
2-5	Clear Ctrl+B.....	9-26
2-6	Select All Ctrl+A.....	9-27
2-7	Insert.....	9-27
2-8	Delete.....	9-27
2-9	Fill Down Ctrl+D.....	9-28
2-10	Superscript.....	9-28
2-11	Default.....	9-29
2-12	Not editable.....	9-29
2-13	Selection.....	9-30
2-14	Recalculation F5.....	9-31
2-15	Deletion before/after.....	9-31
2-16	Thin out.....	9-32
2-17	Duplicate charts.....	9-32
2-18	Move to the top face Ctrl+T.....	9-33
2-19	Move to the back face Ctrl+R.....	9-33
2-20	Create and paste a new object.....	9-34
2-21	Link Setup.....	9-35
2-22	Linked Bitmap Image Object.....	9-35
2-23	Paste image.....	9-36
3	Project menu.....	9-37
3-1	Meter setting.....	9-38
3-2	A/D setting.....	9-39
3-3	Switch to.....	9-41
3-4	SET.....	9-42
3-5	Input mode.....	9-42
3-6	Input range.....	9-43
3-7	Low-pass filter.....	9-44
3-8	Characteristics.....	9-44
3-9	High-pass filter.....	9-44
3-10	Balance.....	9-45
3-11	Reference junction.....	9-45
3-12	Output voltage.....	9-45
3-13	Analysis method.....	9-46
3-14	Sampling.....	9-46
3-15	Paste function.....	9-47
3-16	ON/OFF.....	9-47
3-17	Trigger mode.....	9-48
3-18	Control.....	9-48

3-19	Select data...	9-49
3-20	Name.....	9-50
3-21	Unit.....	9-51
3-22	Format.....	9-51
3-23	Column width.....	9-52
3-24	Chart column width.....	9-52
3-25	Legend column width... ..	9-53
3-26	Row height... ..	9-53
3-27	Show data file.....	9-54
3-28	Change data file name... ..	9-54
3-29	Convert data file to text... ..	9-55
3-30	Convert frequency file to text.....	9-57
3-31	Change the title of test... ..	9-58
3-32	Update the Measurement history.....	9-59
4	Measurement data menu.....	9-60
4-1	Switch to	9-60
4-2	Name... ..	9-61
4-3	Paste function.....	9-62
4-4	Unit	9-62
4-5	Format	9-63
4-6	Column width.....	9-63
4-7	Chart column width.....	9-64
4-8	Legend column width.....	9-64
4-9	Row height.....	9-65
4-10	Cursor information display.....	9-65
4-11	Search.....	9-66
4-12	Clear.....	9-67
4-13	Indication of marker.....	9-67
4-14	Create marker on cursor 1, Create marker on cursor 2, Create marker on both cursors.....	9-67
4-15	Select marker	9-68
4-16	Delete marker.....	9-68
4-17	Time unit.....	9-68
5	Chart menu.....	9-69
5-1	Line monitor... ..	9-70
5-2	Elapse monitor... ..	9-71
5-3	Vertical bar monitor... ..	9-73
5-4	Horizontal bar monitor.....	9-75
5-5	X-distribution monitor... ..	9-77
5-6	Y-distribution monitor... ..	9-79
5-7	Line.....	9-81
5-8	Scatter... ..	9-83
5-9	Elapse diagram.....	9-85
5-10	History chart... ..	9-87
5-11	Frequency chart... ..	9-89
5-12	Spectral chart... ..	9-90
5-13	Blank form	9-91

5-14	Add numeric value monitor.....	9-91
5-15	Add text.....	9-92
5-16	Construction data Setup... ..	9-93
5-17	Construction line Setup.....	9-97
5-18	Grid setting.....	9-98
5-19	Regression expression... ..	9-99
5-20	Coordinate axis.....	9-100
5-21	Reset of coordinate axis	9-106
5-22	Label Setup.....	9-106
5-23	Add legend.....	9-107
5-24	Legend Setup.....	9-108
5-25	Construction area lock	9-109
5-26	Update construction area.....	9-110
5-27	Change reference file.....	9-111
5-28	Font.....	9-112
5-29	Line and color.....	9-113
5-30	Property... Alt+Enter	9-114
5-31	Reset size	9-114
6	Measurement menu	9-115
6-1	Show measurement panel.....	9-116
6-2	Show measurement project.....	9-116
6-3	Balance... ..	9-117
6-4	Calibration output... ..	9-118
6-5	Monitor setting.....	9-119
6-6	Setting recording data... ..	9-121
6-7	Monitoring	9-122
6-8	Peak reset	9-122
6-9	Start measurement F1	9-122
6-10	Free run... ..	9-123
6-11	Data trigger... ..	9-124
6-12	Program	9-124
6-13	Interval.....	9-125
6-14	Data comparator... ..	9-125
6-15	Alarm setting... ..	9-126
6-16	Show alarm.....	9-127
6-17	Automatically save data... ..	9-128
6-18	Automatically deleting memory card data... ..	9-129
6-19	Reading memory card data.....	9-130
6-20	Deleting selection of memory card data.....	9-131
6-21	Volume.....	9-132
6-22	Upgrading instrument.....	9-133
7	Window menu	9-134
7-1	Open a new window	9-134
7-2	Cascade	9-135
7-3	Tile horizontally.....	9-135
7-4	Tile vertically.....	9-136
7-5	Arrange icons	9-136

7-6 Selection of windows	9-137
8 Help menu	9-137
8-1 About TMR-7300.....	9-137
9 Frequency data menu	9-138
9-1 Switch to	9-138
9-2 Format	9-139
9-3 Displaying the physical quantity.....	9-139
9-4 Column width.....	9-140
 Chapter 10 CAN unit	
1 CAN Unit Selection.....	10-1
2 Timing of data recording	10-2
3 Data Recording	10-2
4 CAN unit settings.....	10-3
4-1 Displaying the Basic setting screen	10-3
4-2 Setting of sent/received data	10-6
5 CAN file processing.....	10-11
5-1 Reading memory card data	10-11
5-2 Display of CAN data	10-13
5-3 Displaying CAN chart list	10-14
 Chapter 11 GPS unit	
1 GPS Unit Selection.....	11-1
2 Data Recording	11-2
3 GPS unit settings.....	11-3
3-1 Displaying the Basic setting screen	11-3
3-2 GPS data measurement settings	11-4
4 Processing GPS measurement data	11-7
4-1 Reading memory card data	11-7
4-2 Display of GPS data	11-9
4-3 Displaying the GPS raw data	11-12
4-4 Display of GPS map	11-13
 Chapter 12 CAN/Voice/GPS unit	
1 Selecting CAN/Voice/GPS unit	12-1
2 Note on the timing for recording the data	12-2
3 Note on the recording of data	12-2
4 Setting the CAN/Voice/GPS unit.....	12-3
4-1 Displaying the Basic setting screen	12-3
4-2 Setting the GPS data measurement	12-4
4-3 Setting the CAN data measurement	12-7
4-4 Setting the CAN transmission/reception data	12-10
4-5 Setting the Voice recording	12-16
5 Processing CAN/Voice/GPS measurement data	12-17
5-1 Reading memory card data	12-17
5-2 Displaying the GPS data.....	12-19
5-3 Displaying the GPS raw data	12-22
5-4 Display of GPS map	12-23
5-5 Displaying the CAN data.....	12-25

5-6	Displaying the CAN chart list	12-26
5-7	How to draw the chart	12-27
5-8	Playing the Voice data	12-29

Chapter 13 Digital I/O unit

1	Selecting the Digital I/O unit	13-1
2	Setting the Digital I/O unit	13-2
2-1	Displaying the Digital I/O screen	13-2
2-2	Input mode	13-3
2-3	Input range	13-4
2-4	Threshold value	13-4
3	External sampling	13-5
4	Cycle trigger measurement	13-6
4-1	Setting the cycle trigger measurement	13-6
4-2	Example of Cycle trigger measurement	13-7
4-3	Start of Cycle trigger measurement	13-8
4-4	Stop of Cycle trigger measurement	13-8
5	Processing Cycle trigger measurement data	13-9
5-1	Drawing the Cycle chart	13-10

Chapter 14 Function

1	Inputting function formula	14-1
1-1	Argument	14-1
1-2	Description of function	14-1
2	List of function	14-2
3	Function reference	14-4

Chapter 1

Setup

This section explains setup and connection of the hardware, and setup of the software.

1 What you need for setup

You need followings before starting the setup procedure.

- TMR-7300 Setup CD: 1 disc
- OS: Microsoft Windows 7 (SP1) / 8.1 / 10/ 11
- Computer with the above OS installed and a CD drive

2 Setting up the measurement system

Connect the instrument to a computer using a LAN or USB interface.

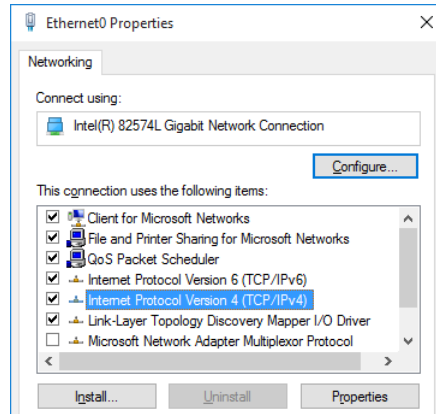
2-1 Connection using a LAN interface

If you are connecting the instrument using a LAN interface, setting of the LAN (Ethernet) is necessary on your computer.

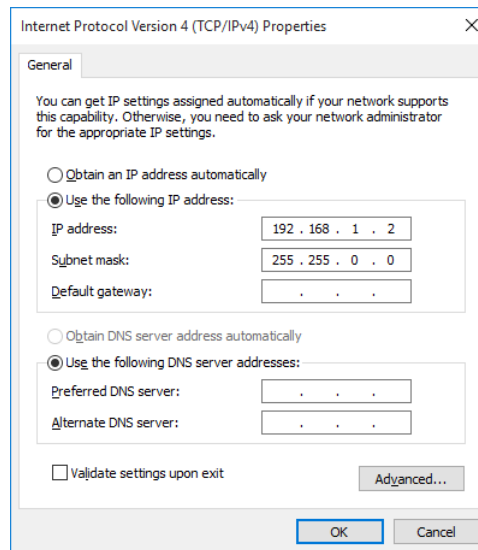


For the IP address settings of the measurement system, refer to "Chapter 4: 2-3 IP address change of instrument" (Page 4-4).

Perform setting of the computer from Property of the Network connections or Ethernet.



Select Internet Protocol Version 4 (TCP/IP), and click the "Properties" button.



When setting the Internet Protocol for the first time, refer to the IP address of the instrument and change only the rightmost number from it.

For example, if the IP address of the instrument is 192.168.1.1, set the computer to 192.168.1.2. Set the subnet mask to 255.255.0.0. If, however, this number has been already assigned to any other device, you have to set a different number.

If a LAN environment is already established, set an IP address of the instrument which is different from any addresses used already.

If your LAN is administered organizationally, consult with the network administrator of the organization.

2-2 Connection using a USB interface

If you are connecting the instrument using a USB interface, you have to install a USB driver. You should install USB driver before connecting the instrument and your PC.

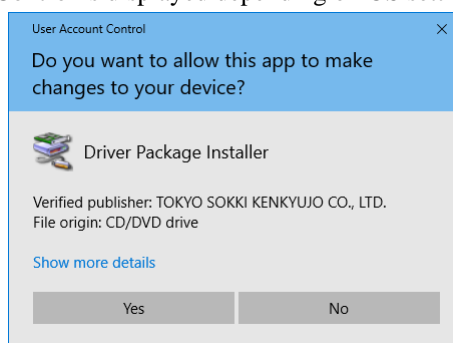
1. Insert the Setup CD into the CD drive.
2. When the TMR-211 is used, open "Driver\TMR-211" folder in the Setup CD.

When the TMR-311 is used, open "Driver\TMR-311" folder in the Setup CD.

3. Double click the "Driver Install" to execute it.

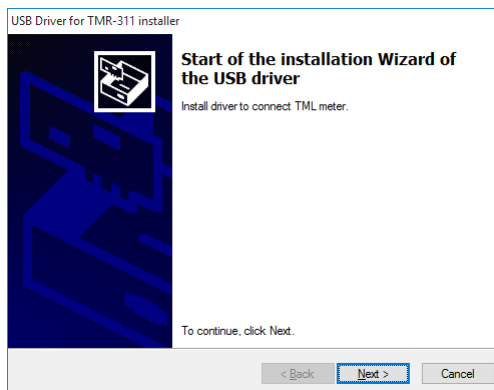
Name	Date modified	Type	Size
Driver	4/19/2017 4:40 PM	File folder	
Driver Install	8/30/2016 3:49 PM	VBScript Script File	3 KB

4. User Account Control is displayed depending on OS setting.



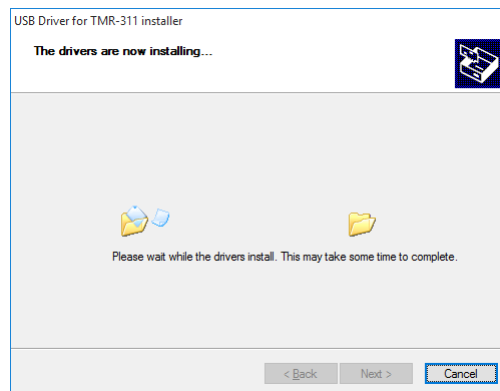
Click the "Yes" button.

5. "Start of the installation Wizard of the USB driver" will be started.

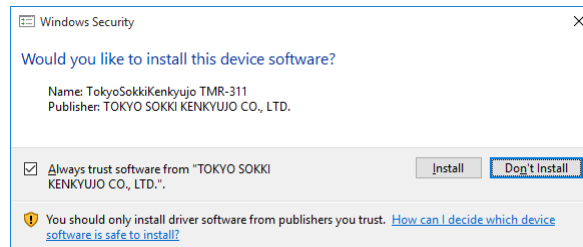


Click the "Next>" button to start the installation of the USB driver.

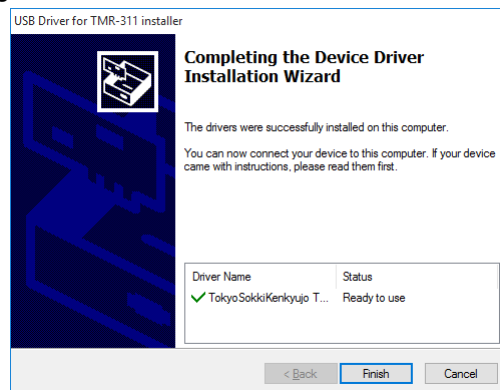
6. Installation of the driver starts.



7. Windows Security window is displayed depending on OS setting.
Click the "Install" button.



8. "Completing the Device Driver Installation Wizard" is displayed.



Click the "Finish" button to complete the installation.

3 Setup of this software

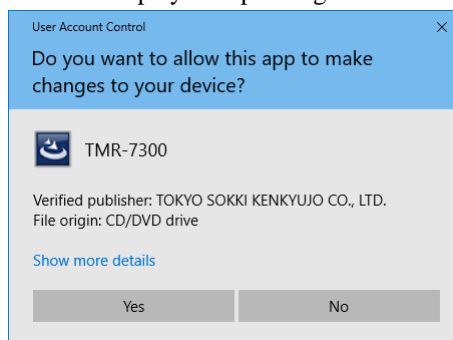
Here the setup procedure of this software is described.



Log in as the user with the administrator privilege.

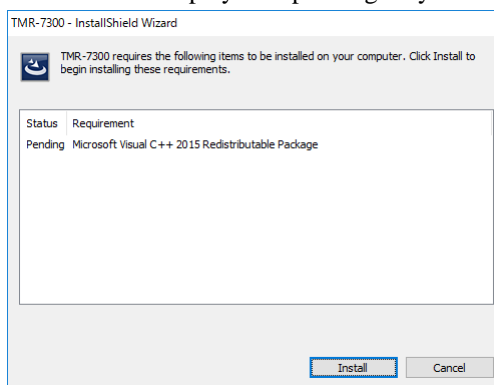
Ensure all other applications are closed prior to installing the software.

1. Open "TMR-7300\English" folder in the Setup CD, and double click the setup.exe.
2. User Account Control is displayed depending on OS setting.



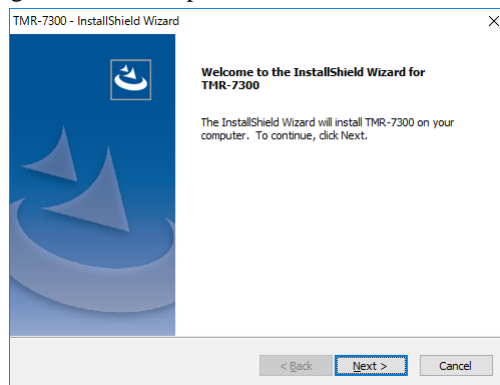
Click the "Yes" button.

3. The screen shown below is displayed depending on your PC.



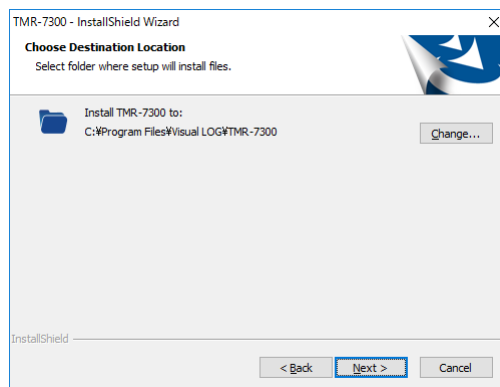
Click the "Install" button.

4. The setup program will start up.



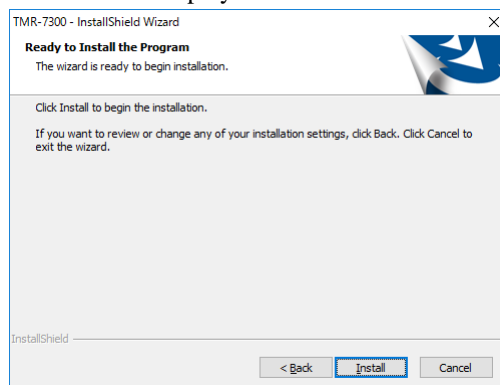
Click the "Next>" button.

5. Select where to install.



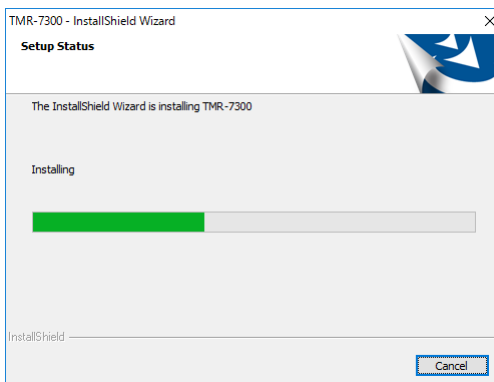
If you want to change where to install, click the "Change..." button.
Click the "Next>" button.

6. The confirmation screen is displayed.

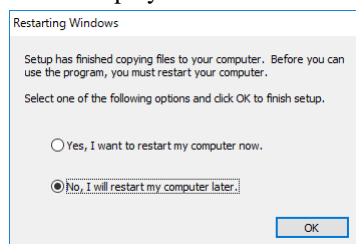


Click the "Install >" button.

7. Setup is started.

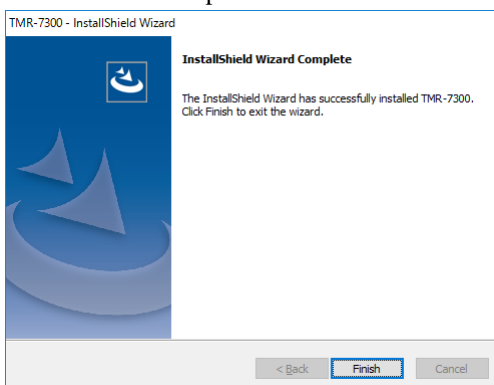


8. "Restarting Windows" is displayed.



If possible, select "Yes, I want to restart my computer now." and click the "OK" button.

9. Setup of TMR-7300 is now completed.



Click the "Finish" button to complete the setup procedure.

Chapter 2

Overview

This section explains basic specification of this software and functions of each part of the screen.

1 Check of the system configuration

The standard system configuration is shown below. Please check your system against it.

- OS Microsoft Windows 7(SP1)/8.1/10/11
- Computer Meet the system requirements of the above OS.
CD drive and USB port. And if LAN interface is used,
LAN port is needed.

- Interface

One of the following interfaces is necessary

- LAN 100BASE-TX
- USB USB 2.0

- Printer The model which can be worked on above OS.

- Multi-recorder

- | | |
|---|----------|
| TMR-311 (Control Unit) | Ver.1.0A |
| TMR-321 (Strain Full Bridge Unit) | |
| TMR-322 (Strain 1G2G4G Unit) | |
| TMR-323 (Carrier type Strain Unit) | Ver.1.2A |
| TMR-331 (Voltage Input Unit) | Ver.1.1A |
| TMR-332 (Thermocouple/Voltage Unit) | Ver.1.4A |
| TMR-341 (Voltage Output Unit) | Ver.1.3A |
| TMR-351 (CAN Unit) | Ver.2.0A |
| TMR-353 (Digital I/O Unit) | Ver.1.6A |
| TMR-354 (GPS Unit) | Ver.2.1A |
| TMR-361 (Charge Amplifier Unit) | Ver.1.7A |
| TMR-362 (IEPE Unit) | Ver.2.3A |
| TMR-311-01
(Histogram analysis library/Option) | Ver.1.9A |

- | | |
|---|----------|
| TMR-211 (Control Unit) | Ver.1.1B |
| TMR-221 (Strain Full Bridge Unit) | |
| TMR-222 (Strain 1G2G4G Unit) | |
| TMR-223 (Carrier type Strain Unit) | |
| TMR-231 (Voltage/Thermocouple Unit) | |
| TMR-241 (Voltage Output Unit) | Ver.1.5A |
| TMR-251 (CAN/Voice/GPS Unit) | |
| TMR-252 (Telemetry I/F Unit) | |
| TMR-253 (Digital I/O Unit) | |
| TMR-261 (Charge Amplifier Unit) | |
| TMR-211-01
(Histogram analysis library/Option) | |



For the TMR-351, refer to
"Chapter 10: CAN Unit"
For the TMR-354, refer to
"Chapter 11: GPS Unit"
For the TMR-353, refer to
"Chapter 13: Digital I/O Unit"



For the TMR-251, refer to
"Chapter 11: CAN/Voice/GPS
Unit".
For the TMR-253, refer to
"Chapter 12: Digital I/O Unit"



If the control unit is older than the above version, it is necessary to upgrade the firmware of the control unit.

2 Basic specification

Measurement conditions

■ Number of units which can be used simultaneously

Up to 10 units by selecting input units

■ Measurement points

80 points maximum (with 10 units)

■ Maximum number of arithmetical expressions

1000

■ Setting of the Measurement Project

• Meter setting

Selection of the units to use and setting of the interface

• A/D setting

Perform setting of the A/D conversion by specifying the number of data and sample clock.

• Channel setting

Input CH

SET : Set measurement channels to use.

Name : Set the name of the measurement point.

Input mode : Set the type of the input signals.

Input range : Set the range for A/D input.

Low-pass filter : Set the cutoff frequency and filter property (Vessel / Butterworth) of the low-pass filter

High-pass filter : Set the cutoff frequency of the filter.

Balance : Set Valid/Invalid of zero-adjustment function.

Reference Junction

: Set the reference junction to use the thermocouple

Coefficient : Set coefficients for measurement data.

Rated output : Set the rated output of sensor.

Capacity : Set the capacity of sensor.

Shift : Set the shift amount of measurement data.

Unit : Set the unit of measurement data.

Format : Set the display format of measurement data.

Alarm : Set the alarm generation condition for measurement data.

Option : Up to three points of coordinate for creating distribution chart can be set for one data.

Output CH

Input CH. : Set the input channel.

Output voltage : Set the maximum value for the output voltage.

Input Value : Set an input value at the rated output.

Rated output : Set a voltage corresponding to the input value.

Calibration : Set the calibration value.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

Frequency NO

Input CH.	: Set the input channel.
Analysis method	: Set the method for frequency analysis.
Full scale	: Set the full scale.
Hysteresis	: Set the invalid amplitude.
Sampling/Cross level	: Set the sampling time if you use a time-based analysis method, and set the cross level, if you use the maximum/minimum value method.
Slice	: Set the slice numbers of the positive and negative sides, respectively.

Expanded CH

Name	: Set the names of measurement system and result of calculation.
Function	: Set the function of four arithmetic operation, power, trigonometric function, log, average, sum, rosette analysis and correction for temperature.
Unit	: Set the unit of expanded CH data.
Format	: Set the display format of expanded CH data.
Alarm	: Set the alarm generation condition for expanded CH data.
Option	: Up to three points of coordinate for creating distribution chart can be set for one data.

• Setting for Automatic Measurement

Data Trigger Measurement:

ON/OFF	: Specify channels to perform data trigger measurement.
Trigger level	: Set the trigger level using a physical quantity
Trigger mode	: Select the trigger mode from [Relative], [Upper], and [Lower].

Program Measurement:

Date/Time of start	: Set the date and time to start program measurement.
Measurement time	: Set the duration of the program measurement.
Halting time	: Set the duration of the pause during program measurement.
Number of measurements	: Set the number of measurements in program measurement.

Interval Measurement:

Date/Time of start

: Set the date and time to start interval measurement.

Interval

: Set the interval for measurement.

Condition

: Set the control (infinity, repetition, GOTO) and number of times of repetition.

Data Comparator Measurement:

Name (CH/NO)

: Set the channel number of input CH or data number of expanded CH setting.

Variation

: Measurement is performed every time when the relative variation is surpassed for previous measurement data.

Condition

: Set the control (infinity, repetition, GOTO) and number of times of repetition.

■ Measurement data

Data list

: A data list for single measurement is displayed.

Chart list

: A list of elapse diagram for single measurement is displayed.

■ History

Measurement history

: File name of waveform data, date and time of measurement, test title and measurement time are displayed.
You can edit the file name and test title on the sheet.

Max/Min/Average

: The maximum, minimum and average values of each measurement data are displayed.

Frequency history

: The frequency data file name, file name on the Memory card, date and time of start and stop of measurement, and test title are displayed.

■ Storage and loading of the Measurement project

Measurement projects can be stored. You can load a stored measurement project to resume the measurement, or to use it for similar measurement.

■ Printing the Measurement project

You can print out the data of channel setting (Input CH / Output CH / Frequency NO / Expanded CH), automatic measurement setting (Data trigger measurement / Program measurement/Interval measurement/Data comparator measurement), measurement data (data list / chart list), and history (measurement history / max/min/average values / frequency history / voice history) in the same format as they are displayed.

During Measurement:

■ Balance

Perform zero-adjustment of the sensor. You can also select any channel to balance.

The channel with balance invalid in the instrument setting cannot be balanced.

■ Setting of the Measurement mode

You can choose from Manual measurement, Monitor measurement, Free run measurement, Data trigger measurement, Program measurement, Interval measurement and Data comparator measurement.

■ Offline measurement

After the Free run measurement, Data trigger measurement, or Program measurement is started, you can close this software to perform offline measurement. You can obtain the data by online after the measurement.

■ Storage of Measurement data

After measurement, measurement data are stored automatically at the same location as the stored measurement project file, in a data-storage folder of the name of the Project File name followed by "_DATA".

For waveform data, the name of the measurement data file will be the capital "D" followed by the date data and time data. The extension is "tmd".

For frequency data, the file name will be the capital "H" followed by the date data and time data, with the extension of "tmr".

You can change multiple file names of serial measurement data in one operation from the setting screen for measurement history.

■ The maximum number of Measurement data

A measurement project can manage up to 50,000 measurement data. If the number of measurement data reached 50,000, user cannot measure anymore in that measurement project. In this case user has to make another measurement project.

■ Stopping storage of Measurement data

It is possible not to store the measurement data.

Even if measurement data is not stored, maximum, minimum and average values can be recorded in history.

■ Auto-deletion of memory data

Data is deleted from the memory card after the data is acquired from the card during measurement.

This prevents running out of free space on the memory card.

Data Processing

■ Tabulation

You can display measurement data in a spread sheet format on the screen.

■ Chart plotting

The scale can be changed. And there is an automatic scaling function.

The chart can be drawn overlapping on other chart.

• Chart types:

- | | |
|-----------------|--|
| Monitor chart | : A chart of Monitor measurement data is plotted.
You can plot the following charts: line monitor, elapse monitor, vertical-bar monitor, horizontal-bar monitor, X-distribution monitor, Y-distribution monitor, and frequency chart. |
| Data chart | : The chart of measurement data is drawn.
Line chart, scatter chart and elapse diagram can be drawn. |
| Frequency chart | : The chart of frequency data is drawn. |
| History chart | : Figures are drawn by setting the measurement date and time to horizontal axis and selecting maximum value, minimum value and average value. |
| Spectrum chart | : The chart of power spectrum or amplitude spectrum is drawn by selecting arbitrary one channel and implementing FFT analysis.
The preparations for DC cut, trend cut, hamming window and hanning window are available. |
| Blank form | : The image, drawing and value monitor data can be laid out freely on a chart. |

■ Data file processing (edit, cutout, thinning out, conversion)

Data editing : You can edit measurement data files freely.

Data cutout : You can specify a range of the measurement data on the chart list using a cursor, in order to delete any unnecessary part or cutout any necessary part to use it.

Thinning out of data

: You can thin out the data with any interval you wish.

Data conversion : Data in a measurement data file can be converted into a text file.

You can convert data into a text file of this software's original format, CSV file, DRA-7610-compatible text file, or DADiSP-compatible text file. You can also convert more than one file continuously.

Maximum/Minimum value search

: The maximum and minimum values among all data or within a selected range are searched.

■ Printing

Measurement results can be printed out in a form of a table or chart list.

You can print also charts.

Charts can be printed in different sizes to suit the paper size.

■ Data restriction

Maximum displayable floating-point number

: 3.402823466E+38

Minimum normalized positive floating-point number

: 1.175494351E-38

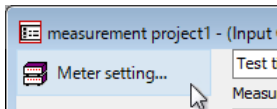
3 Measurement project

The Measurement project enables you to control various measurement settings and measurement results.

Settings for measurement are categorized into the following four groups; Meter setting, A/D setting, Channel setting, and Automatic measurement setting.

Control items of measurement results fall into two categories; Measurement data and History.

3-1 Meter setting



Specify the type and number of units and the interface to be used for measurement.

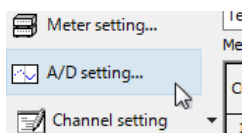
You have to perform this setting always before starting measurement.

Unit port	Channel	Type	Name
Port 1	1 - 8	TMR-321	Strain Full Bridge
Port 2	9 - 16		Not used
Port 3	17 - 24		Not used
Port 4	25 - 32		Not used
Port 5	33 - 40		Not used
Port 6	41 - 48		Not used
Port 7	49 - 56		Not used
Port 8	57 - 64		Not used
Port 9	65 - 72		Not used
Port 10	73 - 80		Not used

Interface Type: USB

Connection: ☐ Acquisition of unit name, ☐ IP address change

3-2 A/D setting



Specify the interval of data recording and the amount of data.

You have to perform this setting always before starting measurement.

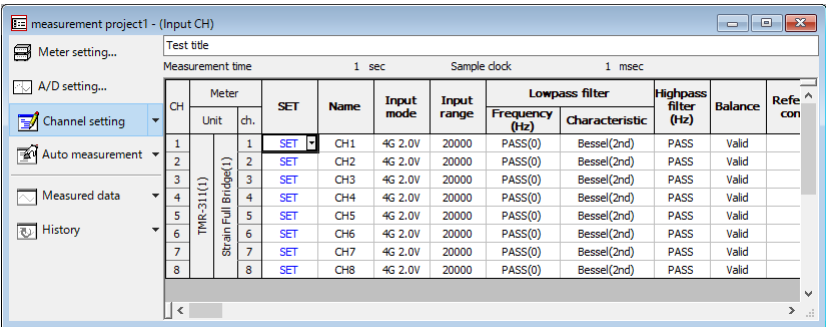
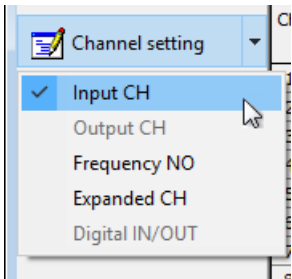
Data words: 16000001
Pre data words: 0
Sample clock: 0.01 msec
Measurement time: 160 sec
Time before trigger:
Phenomenal: 100000 Hz
External sampling: ☒ Invalidity, ☐ More than 1 msec
Find from measuring time: ☐
Calculation:
(Note)
Time before trigger (Pre data words) become enabled when data trigger measurement or external trigger measurement is performed.
In high speed mode or memory card is not inserted, the number of data records is restricted depending on the number of channels as follows:
Up to 2CH 64,000,000 Up to 4CH 32,000,000 Up to 8CH 16,000,000 Up to 16CH 8,000,000 Up to 32CH 4,000,000 Up to 64CH 2,000,000 Up to 80CH 1,600,000
When the sample clock is less than 0.01 msec, the following additional limitations apply.
Available units are limited to TMR-362
The number of data records is restricted by the number of channels per unit as follows.
1CH 16,000,000 2CH 8,000,000 Up to 4CH 4,000,000
In case the number of channels in use is several tens channels or the number of data is in unit of mega-words, it will take much time for processing such as graphing. (several tens minutes)

3-3 Channel setting

Perform setting of each channel of the instrument and setting for data operation. Channel setting is composed of Input CH, Output CH, Frequency No and Expanded CH, which is selected depending on the content of setting.

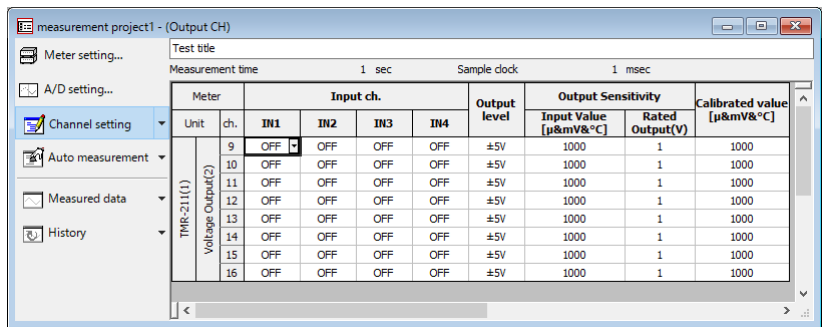
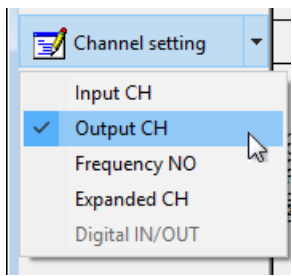
■ Input CH

Specify conditions for instrument to record data for each channel. You have to perform this setting before starting measurement.



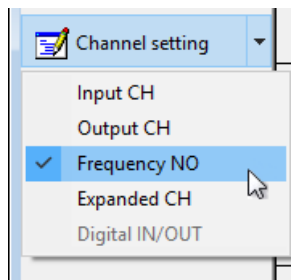
■ Output CH

Specify the voltage output for each channel when the voltage is output from the measurement instrument. Perform this setting only when you use a voltage output unit.

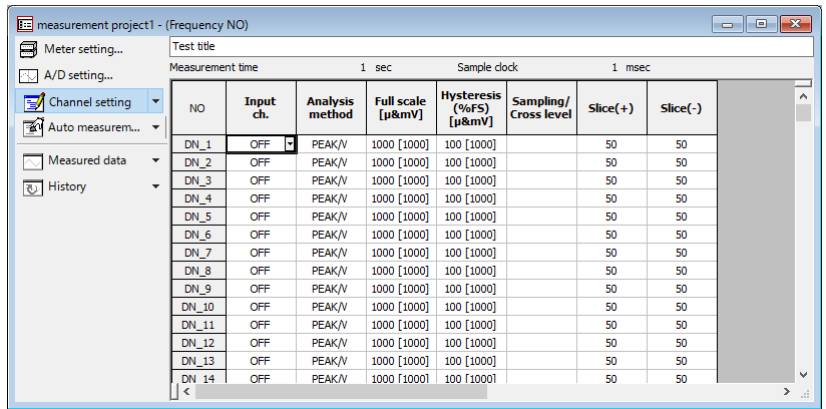


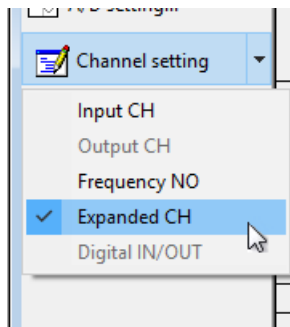
■ Frequency NO

When frequency analysis is performed, you have to specify various items for each frequency number, including the channel number for frequency processing, analysis method, full scale, hysteresis, and slice number. The maximum frequency number is 80.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

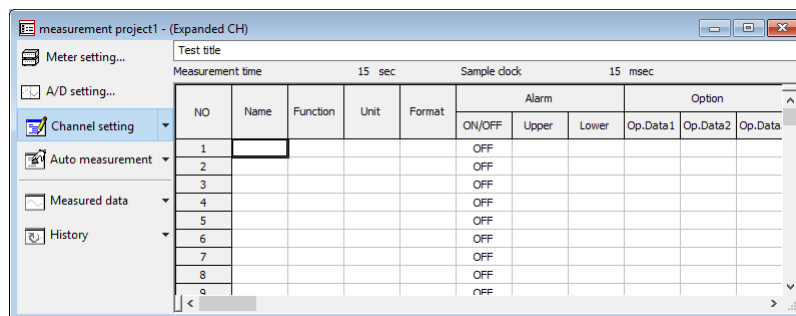




■ Expanded CH

Make a setting for implementing calculation using recorded data.

The functions such as four arithmetic operations, arithmetical function and rosette calculation can be used.



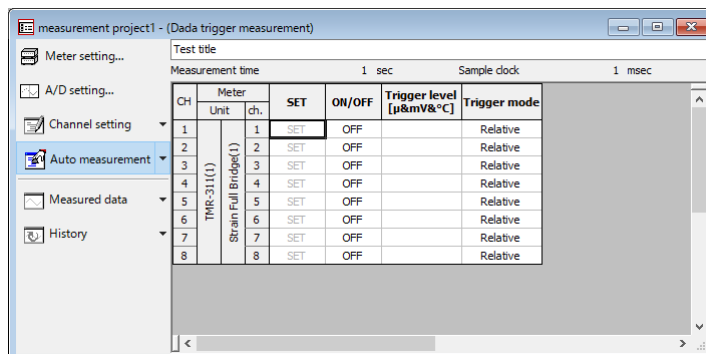
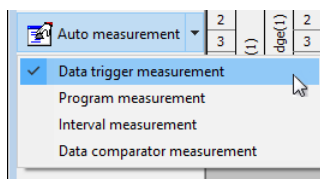
3-4 Automatic measurement setting

Perform setting for automatic measurement and data recording.

According to the condition to start measurement, it is divided in data trigger measurement, program measurement, interval measurement and data comparator measurement.

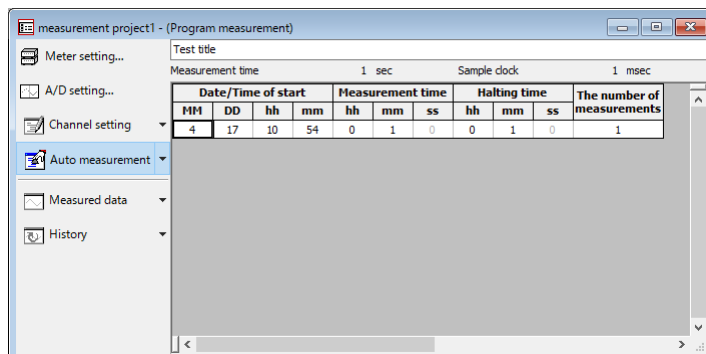
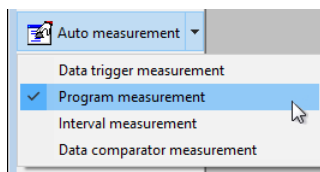
■ Data trigger measurement

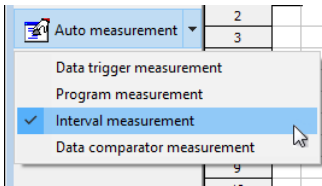
Specify the input signal level for the instrument to start measurement.



■ Program measurement

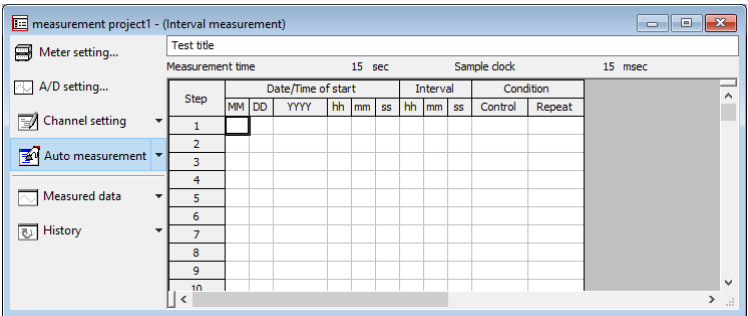
Perform setting for program measurement.





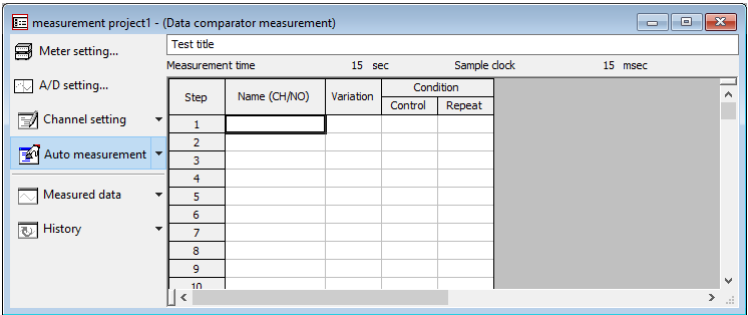
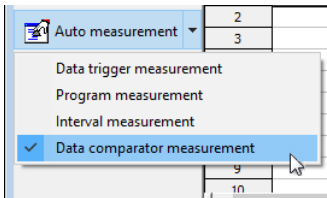
■ Interval measurement

Make a setting for starting measurement at certain intervals using time of computer.



■ Data comparator measurement

Make a setting for starting measurement with variation of specific channel (including expanded CH).

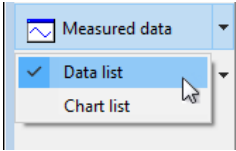


3-5 Measurement data

A table list and an elapse chart list for the last-measured waveform are displayed.

■ Data list

A table is generated including all the channels.
Maximum, minimum, and average values are also shown.



measurement project1 - (Data List)

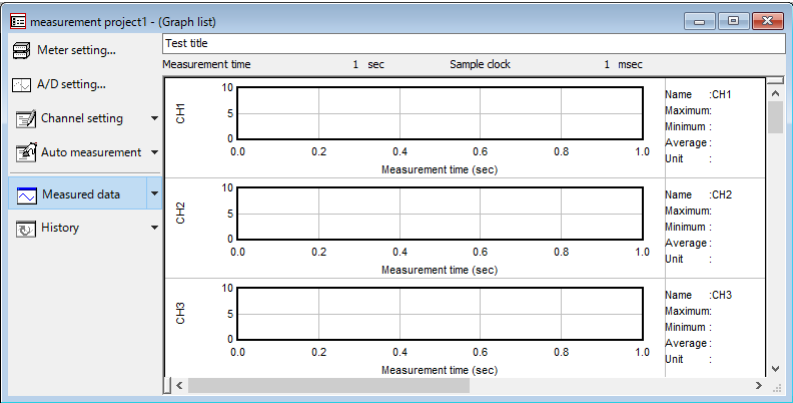
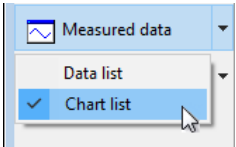
Test title

Measurement time 1 sec Sample clock 1 msec

Name	Measurement time	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Unit	sec								
Maximum	1.000								
Minimum	0.000								
Average									
1	0.000								
2	0.001								
3	0.002								
4	0.003								
5	0.004								
6	0.005								
7	0.006								
8	0.007								

■ Chart list

An elapse chart is generated for each channel.
Maximum, minimum, and average values are also shown.

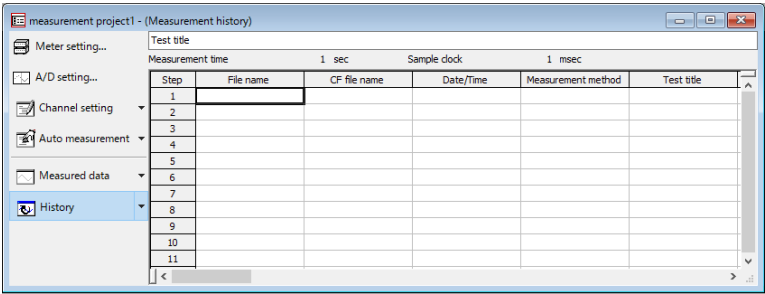
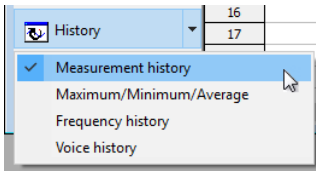


3-6 History

The history of the measurement result and the history of the maximum, minimum, and average values are displayed.

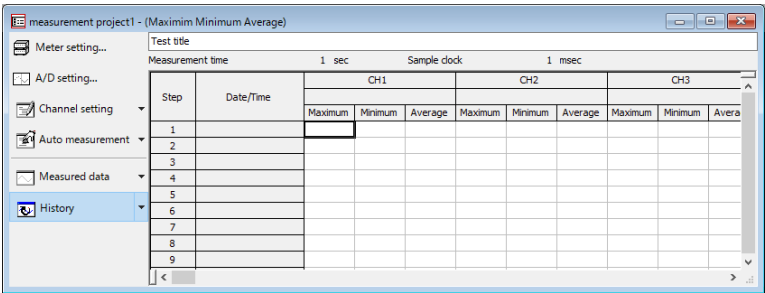
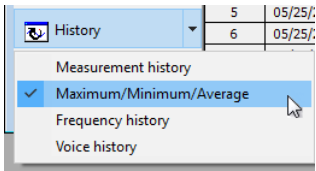
■ Measurement history

The file information of waveform measurement are displayed in a list. You can change the file name or the test title collectively. Display of a data file as well as data conversion into a text file is possible.



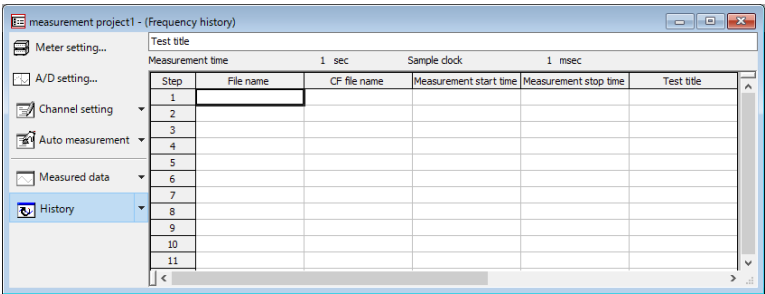
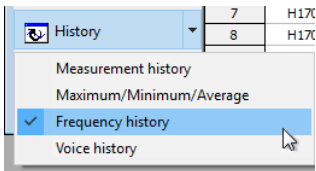
■ Maximum/Minimum/Average

The maximum, minimum, and average values of the past data are displayed in a list.



■ Frequency history

The file information of frequency measurement are displayed in a list. You can change the file name or the test title collectively. Display of a data file as well as data conversion into a text file is possible.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

4 Data file

When you perform measurement using the measurement project, the result is recorded as a measurement data file automatically.

You can perform the following processing:

- Data editing : You can edit measurement data files freely.
- Data cutout : You can specify a range of the measurement data on the chart list using a cursor, in order to delete any unnecessary part or cutout any necessary part to use it.
- Thinning out of data : You can thin out the data with any interval you wish.
- Data conversion : Data in a measurement data file can be converted into a text file.
- Calculating data : It is possible to set the expanded CH to calculate the data.

4-1 Where to store data files

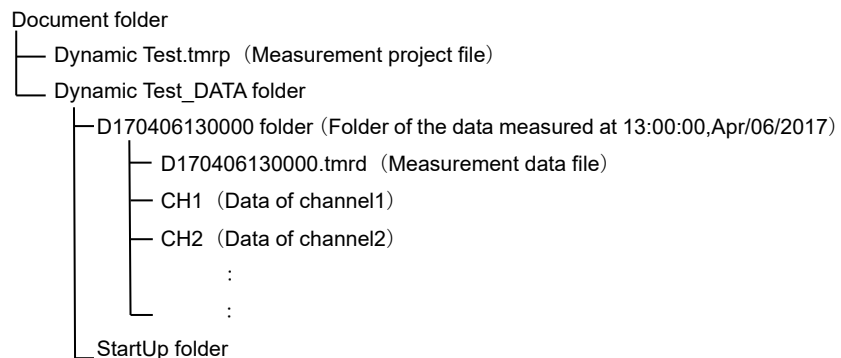
When you save a measurement project file, a folder is created automatically at the same place as the "measurement project file_DATA".

In this "_DATA" folder, a new folder will be created with "D" and time stamp every time waveform measurement is performed.

(ex. 2017/Apr/06 13:00:00 → D170406130000)

In this new folder, a measurement data file with the same name as the folder (with the extension of "tmrd") is saved.

Two or more files would have the same file name if the measurement is started at the same time. Therefore, a serial number (_1, _2....) is added at the end of the file name, in such a case.



StartUp folder is created at the same time with the DATA folder. Chart files saved in this folder are displayed at the same time when the measurement project is loaded with this software.

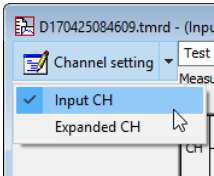
In case of frequency data, the file name will be a string consisting of a capital "H" followed by the date and time of measurement. The extension is "tmrh".

4-2 Channel setting

Setting of each channel at the time of measurement is recorded.

■ Input CH

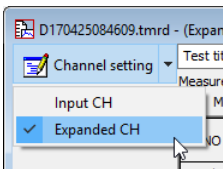
You can change the name, unit, and format only.

A screenshot of the 'Input CH' window. It displays a table with 11 columns: CH, Meter, Unit, ch., SET, Name, Input mode, Input range, Lowpass filter (Frequency (Hz) and Characteristic), Highpass filter (Hz), and Balance. The table contains 8 rows of data for channels CH1 through CH8. The 'Meter' column has a value of 'Strain Full Bridge(1)' for all channels. The 'SET' column has a value of 'SET' for all channels. The 'Name' column has values CH1 through CH8. The 'Input mode' column has a value of '4G 2.0V' for all channels. The 'Input range' column has a value of '20000' for all channels. The 'Lowpass filter' column has values 'PASS(0)' and 'Bessel(2nd)'. The 'Highpass filter' column has a value of 'PASS' for all channels. The 'Balance' column has a value of 'Valid' for all channels.

CH	Meter	Unit	ch.	SET	Name	Input mode	Input range	Lowpass filter	Highpass filter	Balance
								Frequency (Hz)	Characteristic	
1	Strain Full Bridge(1)		1	SET	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid
2			2	SET	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid
3			3	SET	CH3	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid
4			4	SET	CH4	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid
5			5	SET	CH5	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid
6			6	SET	CH6	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid
7			7	SET	CH7	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid
8			8	SET	CH8	4G 2.0V	20000	PASS(0)	Bessel(2nd)	Valid

■ Expanded CH

The setting of expanded CH can be edited even if a measurement was done. Its result will be reflected by performing recalculation. Each data file saves own calculation. Therefore if you want to change calculation of all files, you should change every files independently.

A screenshot of the 'Expanded CH' window. It displays a table with 5 columns: NO, Name, Function, Unit, and Format. The table contains 12 rows of data, numbered 1 through 12. The 'Name' column is currently empty for all rows.

NO	Name	Function	Unit	Format
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

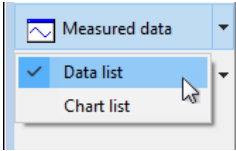
4-3 Measurement data

The stored data is confirmed by data list and chart list. Editing, deleting and thinning-out of data are possible.

■ Data list

A table is created including all the channels.

Maximum, minimum, and average values are also shown.



D170420090140 - (Data List)

Channel setting: Test title

Measurement Date/Time: 04/20/2017 09:01:40 Measurement method: Manual

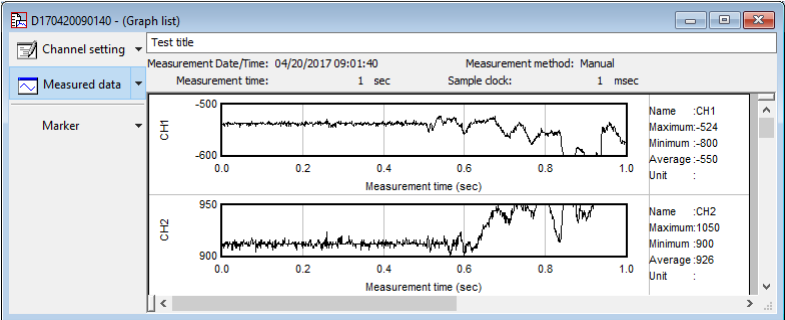
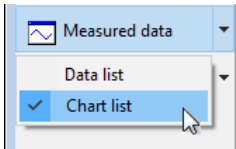
Measurement time: 1 sec Sample clock: 1 msec

Name	Measurement time	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Unit	sec								
Maximum	1.000	-524	1050						
Minimum	0.000	-800	900						
Average		-550	926						
1	0.000	-540	912						
2	0.001	-540	912						
3	0.002	-540	910						
4	0.003	-540	912						
5	0.004	-538	912						
6	0.005	-540	908						

■ Chart list

An elapsed chart is plotted for each channel.

Maximum, minimum, and average values are also shown..



4-4 Frequency data



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

Setting at the time of frequency measurement and frequency data of each channel are displayed.

■ Input CH

Conditions of the channels which were subjected to frequency analysis by the instrument are displayed.
You cannot change any data except for the format.

H170321145429												
Test title												
Measurement start 03/21/17 14:54:29 Measurement stop 03/21/17 14:54:45 Measuring time 0:00:15												
Input CH Frequency data												
NO	Input ch.	Input mode	Input range	Lowpass filter		Highpass filter (Hz)	Balance	Reference contact	Calibration			Unit
				Frequency (Hz)	Characteristic				Coefficient	Rated Output	Capacity	
DN_1	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0
DN_2	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0

■ Frequency data

Result of frequency analysis of the channel specified by the frequency number is displayed.

H170321145429												
Test title												
Measurement start 03/21/17 14:54:29 Measurement stop 03/21/17 14:54:45 Measuring time 0:00:15												
Input CH Frequency data												
NO	Input ch.	Analysis method	Full scale (mV)	Hysteresis (mV)	Sampling/ Cross level	Slice(+)	Slice(-)	Over count		Maximum Value	Date/Time	Mis
								positive side	negative side			
DN_1	CH1	PEAK/V	1000 [1000]	100 [1000]		50	50	5	0	6490	03/21/17 14:54:44	-6
DN_2	CH2	PEAK/V	1000 [1000]	100 [1000]		50	50	11	0	3992	03/21/17 14:54:44	-2

Slice	Peak	Valley	Peak/Valley	+Peak/-Valley
50	5		5	5
49				
48				
47				

5 Chart

The chart is divided in two types; monitor chart that is drawn in real time and data chart that draws measurement data.

5-1 Monitor chart

When you perform monitor measurement referring to and using a Measurement project, the monitor chart is updated based on the current data collected from the measurement instrument.

The update interval depends on the number of measurement point, number of chart and performance of the computer.

A monitor chart can be of the following type:

Line monitor : A line chart is plotted, with the data set on the horizontal and vertical axis.

Elapse monitor : A chart is plotted, with data set on the vertical axis and the elapsed time of monitoring on the horizontal axis.

Vertical-bar monitor : A bar chart is plotted, with the data set on the vertical axis and the coordinates specified on the horizontal axis.

Horizontal-bar monitor : A bar chart is plotted, with the data set on the horizontal axis and the coordinates specified on the vertical axis.

X-distribution monitor : A distribution map is plotted, with the data set on the vertical axis and the coordinates specified on the horizontal axis.

Y-distribution monitor : A distribution map is plotted, with the data set on the horizontal axis and the coordinates specified on the vertical axis.

Frequency monitor : The collected data from the measurement instrument are monitored while measuring frequency.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

5-2 Data chart

When a measurement project is referred to, data chart is drawn by the latest measurement data.

When a measurement data is referred to, data chart is drawn by its data.

The data interval is based on A/D conversion setting at the time of the measurement.

Following formats are available for data chart.

- Line : Drawn with line by setting data for horizontal axis and vertical axis.
- Scatter : Drawn with dots by setting data for horizontal axis and vertical axis.
- Elapse diagram : This diagram is drawn by setting data for vertical axis and setting lapsed time of measurement for horizontal axis.
- History chart : This chart is drawn by setting the measurement date and time for horizontal axis and selecting maximum value, minimum value or average value for vertical axis. Only a measurement project can be referred to by this chart.
- Frequency chart : The result of frequency analysis which was recorded in frequency data file is drawn.
- Spectral chart : The chart of power spectrum or amplitude spectrum for which FFT analysis is implemented is drawn by selecting arbitrary one channel. The preprocessing for DC cut, trend cut, hamming window and hanning window are available



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

Chapter 3

Start-up and Exit

This chapter explains icons which are used by this software, and start-up and exit operation of this software.

1 Icons of this software

Icons related to this software are following five types:

- Program Icon of this software

This is a program icon of this software.



- Measurement project Icon

This is an icon of a file where a Measurement project with measurement setting, A/D setting, channel setting, automatic measurement setting, etc. is stored.



- Measurement data file Icon

This is an icon of a file where measurement data (waveforms) are stored.



- Frequency data file Icon

This is an icon of a file where frequency data are stored.



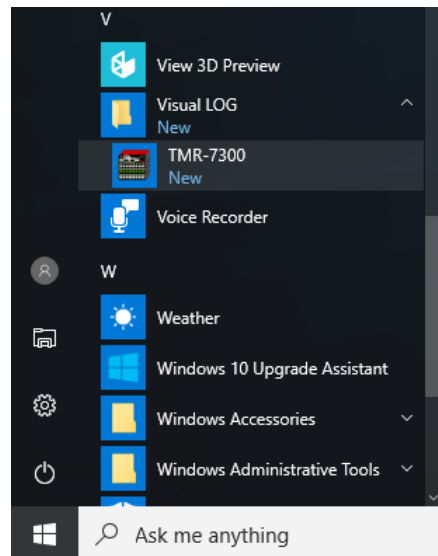
- Chart sheet Icon

This is an icon of a file where charts are stored.



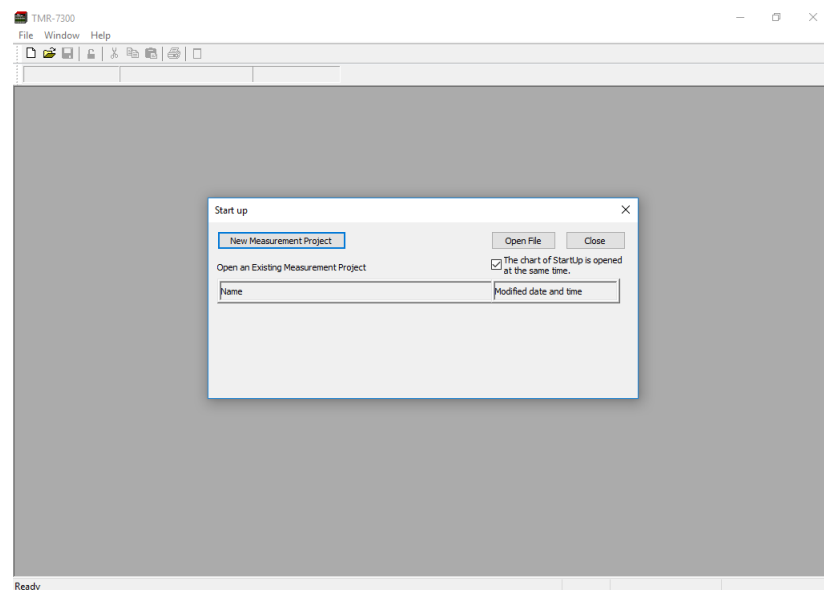
2 Start of this software

You can start this program by clicking [Visual LOG] — [TMR-7300] from the START menu, as shown below.



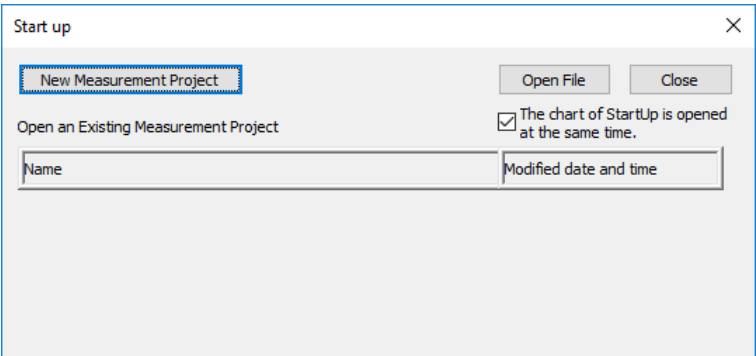
Alternatively, you can start this software by double clicking the measurement project file, measurement data file or chart sheet file and open the specified file.

When the software is started from the START menu, the Start up dialog box is displayed.



3 Start-up

The Start up dialog box is the dialog box that is displayed first when this software is started up.



You can create a new project file or open an existing file.

Item description

New Measurement Project

: New Measurement project is created.
This is selected when this software is used for the first time or the measurement is newly started.

Open File : Existing file (measurement project, measurement data, or chart) is opened.
This is selected when the measurement is continued or the measurement results are post-processed.

Open an Existing Measurement Project

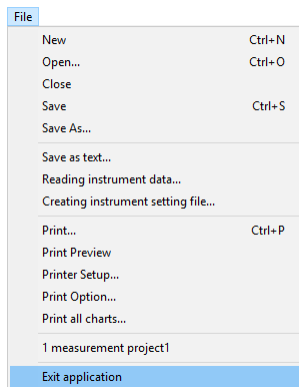
: Up to four measurement files that are previously stored are displayed in reverse chronological order of update date.
When the file name is clicked, the measurement project is displayed.

The chart of StartUp is opened at the same time.

: When this item is checked, the chart sheet file in relevant StartUp folder is displayed at the same time when the measurement project is displayed.

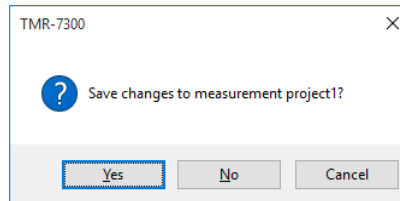
Close : The startup dialog box is closed.

4 Exit this software



You can exit this software, by selecting **Exit application** from the **File** menu.

If any change has been made after opening of the Measurement project, Measurement data file or Chart sheet, a dialog box is displayed to confirm if the changed file should be saved.



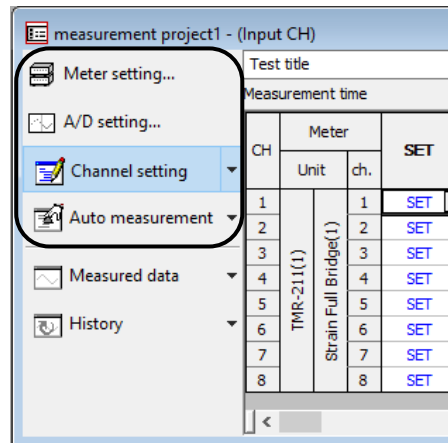
Chapter 4

Setting of a Measurement project

This chapter explains Measurement project settings, including Meter setting, A/D setting, Channel setting, Automatic measurement setting, Measurement data, and History.

1 Switching the setting item of Measurement project

Setting items can be switched by clicking the respective button located in the left side of the Measurement project.



Meter setting

: Select this to perform selecting of unit to use and selecting an interface.

A/D setting : Select this to perform setting of Analog-to-Digital conversion by the number of data and sampling clock.

Channel setting

: Select this to perform setting of input CH, output CH, frequency NO, expanded CH and/or digital input/output.

Auto measurement

: Select this to perform setting for Data trigger measurement, Program measurement, Interval measurement, and Data comparator measurement.

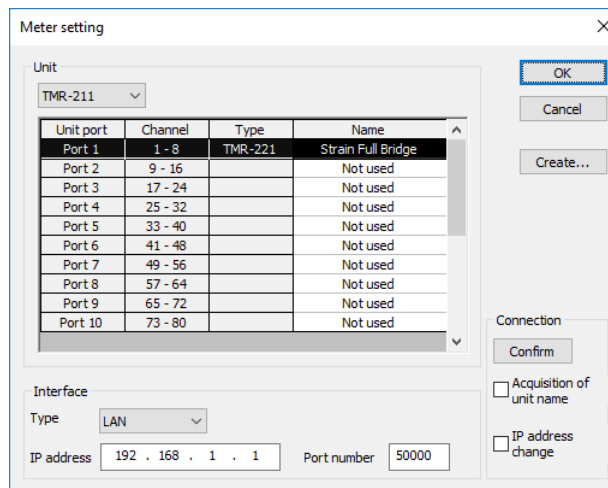
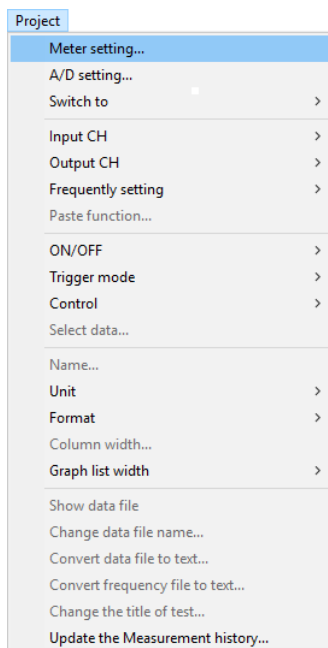
2 Setting of the instrument

Set the number of units to use, type of the interface, and IP address and port number for the LAN interface.

In addition, you can check the connection of interface, obtain information about the connected units, and/or change IP address of the instrument.

2-1 Setting of connection conditions

Click the "Meter setting..." button in the Measurement project.



Setting items

Control unit : Selects the instrument to use. (TMR-211 or TMR-311)

Interface type

: Selects the interface to use. (LAN or USB)

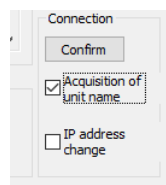
When using LAN:

IP address : Sets the IP address of the instrument to use.

Port number : Sets the port number of the instrument to use.

2-2 Confirmation of connection

Communication with the instrument is done with the set contents of interface and information of the connected unit is obtained.



Setting items

Confirm : Confirms whether connection is possible with the contents of interface that is connected to the computer and the instrument.

Acquisition of unit name

: This item is referred to when the "Confirm" button is clicked. If this checkbox is checked, unit information is updated by received data.

If this box is unchecked, the confirmation dialog is displayed when unit information is different from received data.

IP address change

: Changes LAN setting of the instrument.

Refer to "Chapter 4: 2-3 IP address change of instrument from interface" (Page 4-4) for more detail.



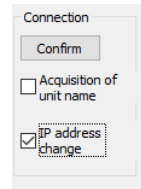
2-3 IP address change of instrument from interface



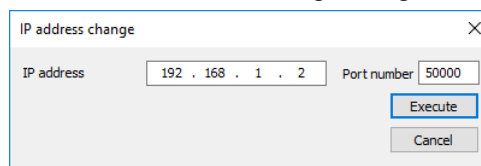
In case of using the TMR-211, if firmware is older than Ver. 2.2A, IP address cannot be changed.

To change IP address of the instrument, communication with the instrument is necessary. Therefore, it is required to use USB or to make the instrument possible to be connected with LAN.

Check "IP address change" and click the "Confirm" button.



If connection is available, the IP address change dialog box is displayed.



Setting items

IP address : Sets IP address to be set to the instrument.

Port number

: Sets port number to be set to the instrument.

Subnet mask

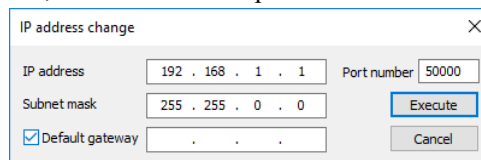
: This is a value for distinguishing network address from IP address.

Ordinarily done as well as computer setting.

Default gateway

: Set IP address of router when the computer and the instrument have different network address.

When the computer address and the instrument address are the same, communication is possible even if this option is not set.



"Execute" button

: The set content is reflected to the instrument.



When selecting the TMR-311, setting of Subnet mask and Default gateway do not exist.



In IP address, the part of 255 for subnet mask is network address and the part of 0 is host address

2-4 IP address change of instrument by configuration file

If you cannot change IP address from interface, you can change it using configuration file.

Select LAN from Interface Type, and input IP address and Port number for setting of instrument.



When selecting the TMR-311, "Create TMR_IPADDRESS" dialog is not displayed.

Unit port	Channel	Type	Name
Port 1	1 - 8	TMR-221	Strain Full Bridge
Port 2	9 - 16		Not used
Port 3	17 - 24		Not used
Port 4	25 - 32		Not used
Port 5	33 - 40		Not used
Port 6	41 - 48		Not used
Port 7	49 - 56		Not used
Port 8	57 - 64		Not used
Port 9	65 - 72		Not used
Port 10	73 - 80		Not used

Unit: TMR-211

Interface Type: LAN

IP address: 192 . 168 . 1 . 1

Port number: 50000

Buttons: OK, Cancel, Create...

Connection options: Confirm, Acquisition of unit name, IP address change

Click the "Create..." button. The following dialog box is displayed.

Creates TMR_IPADDRESS file to set LAN interface of TMR-211.

ADDRESS 192.168.1.1

PORT 50000

Subnet mask: 255 . 255 . 0 . 0

Option:

☒ Workgroup

☒ Default gateway

Network: 192 . 168 . 0 . 0

Broadcast: 192 . 168 . 255 . 255

Buttons: OK, Cancel



In IP address, the part of 255 for subnet mask is network address and the part of 0 is host address.

Setting items

Subnet mask

: This is a value for distinguishing network address from IP address. Ordinarily done as well as computer setting.

Option : Usually, communication is possible even if these items are not set.

Workgroup : Set workgroup name for Windows network.

Default gateway

: Set IP address of router when the computer and the instrument have different network address.

Network : Set the host address part of the IP address of the computer as 0.

Broadcast : Set the host address part of the IP address of the computer as 255.

"OK" button : Create configuration file with current setting.

The **Save as** dialog will be displayed. Save the file without changing the file name from TMR_IPADDRESS.

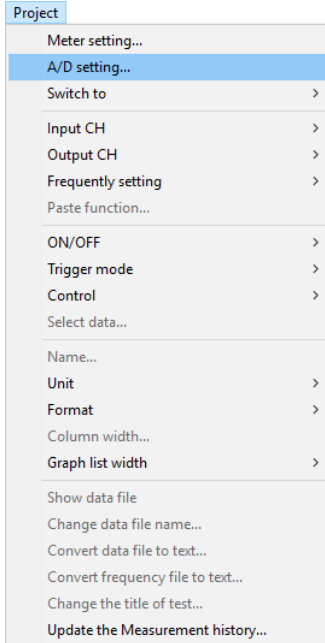
Copy the saved file into a memory card, and insert the memory card into the instrument. IP address will be changed after the instrument power is turned on again.

3 A/D setting

In A/D setting, the interval of data recording and number of data to be recorded in one measurement should be set.

Click the "A/D setting..." button in the Measurement project.

The dialog box for A/D setting is displayed.



The image shows the 'A/D conversion setting' dialog box. It contains fields for 'Data words' (16000001), 'Pre data words' (0), 'Sample clock' (0.01 msec), 'Measurement time' (160 sec), 'Time before trigger', and 'Phenomenal' (100000 Hz). There are checkboxes for 'Find from measuring time.', 'External sampling' (Invalidity selected), and 'More than 1 msec'. A 'Calculation' button is at the bottom right. A note section explains the 'Time before trigger' and provides data record restrictions for high speed mode and memory card usage.

Setting items

Data words : Specify the number of data to be recorded.

When the conditions in the table below are satisfied, the number of data must be set equal to or less than the value shown in the table.

	High speed mode and/or memory card is not used		Low speed mode and memory card is used	
	TMR-211	TMR-311	TMR-211	TMR-311
Up to 2CH	10,000,000	64,000,000	10,000,000	64,000,000
Up to 4CH		32,000,000		32,000,000
Up to 8CH		16,000,000		16,000,000
Up to 16CH		8,000,000		10,000,000
Up to 32CH		4,000,000		
Up to 64CH		2,000,000		
Up to 80CH		1,600,000		

In the TMR-311, the sample clock can be set to less than 0.01 msec.

In this case, the following restrictions are applied to the measurement conditions.

Available unit ¹	Number of channels per unit ²	Maximum number of storable data records
TMR-362	1CH	16,000,000
	2CH	8,000,000
	Up to 4CH	4,000,000



¹Only measurement units that support sampling intervals shorter than 0.01 milliseconds can perform measurements at such intervals. If a unit that does not support this sampling rate is connected, all channels of that unit must be set to off before starting the measurement.



²The maximum number of data records that can be configured is limited by the number of channels used per measurement unit.

When multiple units are connected, the unit with the highest number of channels used will be referenced to determine the limit on the maximum number of data records.

Pre data words

: For Data trigger measurement, specify the number of pre-trigger recording within the number of data words set above.

Sample clock

: Set the interval of data recording in millisecond.

The A/D conversion mode is either Low speed mode or High speed mode, depending on the setting of the sample clock and the number of measuring points.

The following combination gets Low speed mode.

TMR-211		TMR-311	
Number of measuring points	Sample clock (msec)	Number of measuring points	Sample clock (msec)
1	0.02~	1~4	0.02~
2	0.03~	5~6	0.04~
3~4	0.05~	7~8	0.05~
5~8	0.1~	9~16	0.1~
9~16	0.2~	17~32	0.2~
17~24	0.3~	33~48	0.3~
25~32	0.4~	49~64	0.4~
33~40	0.5~, 2048Hz	65~80	0.5~
41~48	0.6~	/	
49~56	0.7~		
57~64	0.8~		
65~72	0.9~		
73~80	1.0~, 1024Hz		



When using the TMR-211, if firmware is older than 2.2A, instrument becomes low speed mode when sample clock is more than 1msec regardless of the number of measuring points.



For the External sample, refer to "Chapter 12: Digital I/O unit".



External sampling

: The external sample can be used when SCLK is set in digital IN of Digital I/O unit.

External sampling

☒ Invalidity
 ☐ More than 1 msec

External sampling gets valid when using the digital I/O unit.

The external sample is valid when Digital I/O unit is used.



The unit set for the Measurement time is reflected to the unit of the elapsed time display and that of the horizontal axis of the chart displaying the progress during measurement.



If TMR-211 firmware is older than Ver. 2.2A, 1024, 2048, 4096 and 8192Hz cannot be set.

Find from measurement time.

: The A/D setting is set based on the measurement time.

Measurement time

: Specify the time of measurement. Select the unit from; millisecond / second / minute / hour.

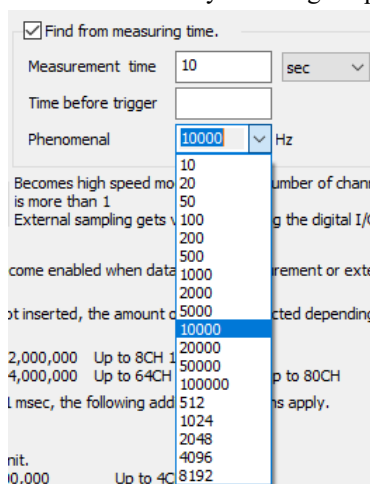
Time before trigger

: For Data trigger measurement, specify the recording time until the trigger is activated within the measurement time set above. The time unit is as per the setting of the measurement time.

The time before trigger and the pre data words are enabled only for data trigger measurement.

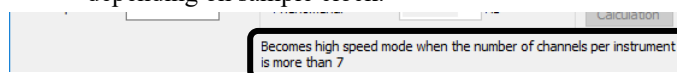
Phenomenal

: The inverse number of the sample clock time is displayed. Sample clock can be set by selecting frequency.



"Calculation" button

: Measurement time equivalent to the specified number of data is displayed. If you have specified the measurement time, the number of data equivalent to that time is displayed. The number of channels for high speed mode are indicated depending on sample clock.



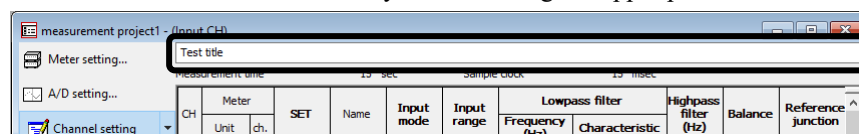
4 Input of the measurement title



Measurement title is output when printing and saving text. And it is copied to the chart when chart is made.

The title in the upper part of the Measurement project is modifiable arbitrarily. This title is used for the measurement data file.

Enter a measurement title arbitrarily after selecting the upper part.

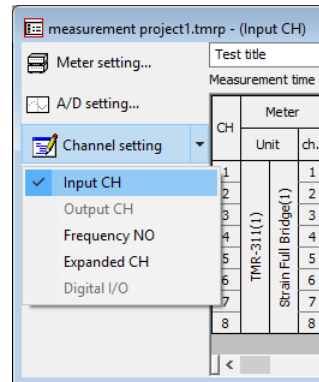
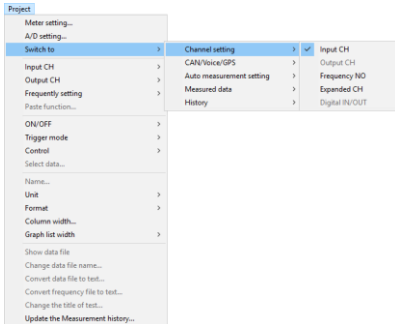


The test title of measurement project is set for measurement data file.

5 Channel setting

Perform here setting of measurement.

Click the "Channel setting" button in the Measurement project.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

Input CH : Set the following items: SET, Name, Input mode, Input range, Low-pass filter, High-pass filter, Balance, Reference junction, Calibration, Unit, Format, Alarm, and Option.

Output CH : Set the following items: Input channel, Output voltage, Input value, Rated output, and Calibration value.

Frequency NO

: Set the following items: Input channel, Analysis method, Full scale, Hysteresis, Sampling time/Cross level, and Slice number.

Expanded CH

: Set the following items: Name, Function, Unit, Format, Alarm, and Option.

5-1 Setting errors

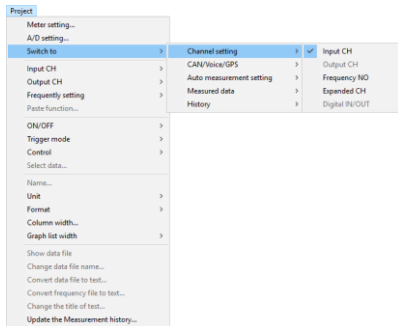
While you perform setting, the content of setting may be displayed in red. This red display denotes a setting error and occurs when you have changed the sample clock or instrument to a certain setting, though the condition does not allow such setting.

Since you cannot proceed with the instrument setting as it is, correct the setting before starting measurement.

5-2 How to select a setting item

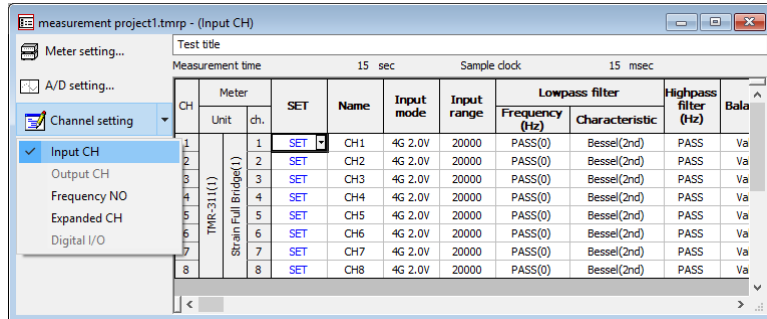
To select a setting item, move the mouse pointer on the cell which you want to set, and click ▼. After that select an item from popup menu.

6 Input Channels



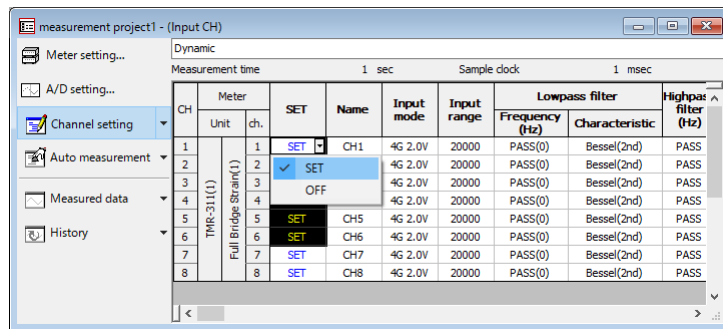
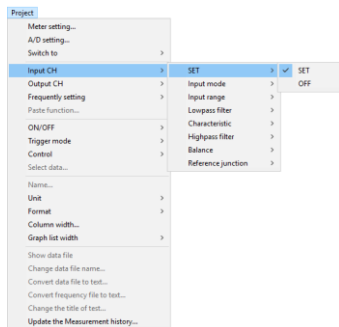
Perform here setting of the input conditions for data recording by the instrument as well as setting for the recorded data to be processed by this software, for each channel.

Select the Input CH from the "Channel setting" button menu.



6-1 How to specify measurement channels to use

Select between SET (to use) and OFF (not to use) for each channel. Channels set to SET are used for the measurement.



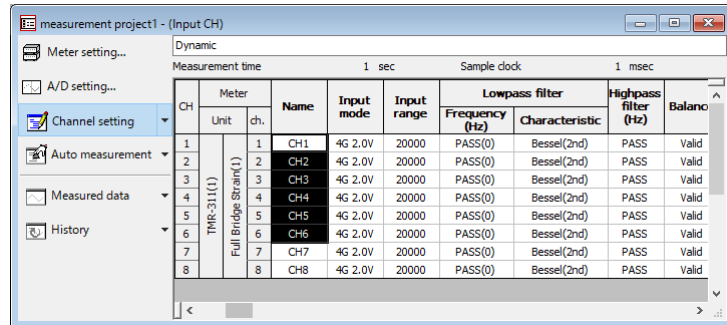
Since no settings are sent to the channels set to OFF, it is not necessary to make settings for those channels.

6-2 How to assign a sequential number to the name

You can assign sequential numbers to the names of multiple channels at one operation.

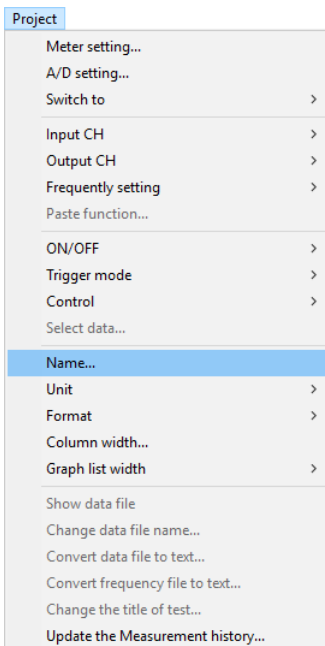
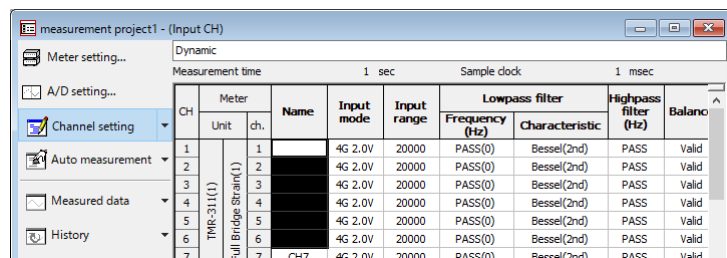
You can also specify an additional letter, which is useful for measurement with 2-axis gauge, 3-axis gauge, etc.

When a new Measurement project is opened, sequential names are already assigned as shown below:

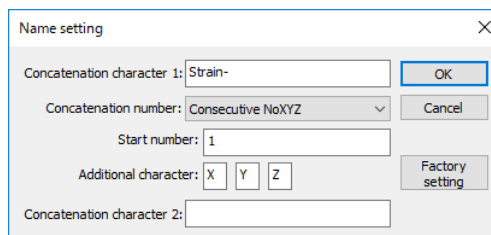


Here we explain how to specify the name for 3-axis gauges:

Select the name cells where you want to specify a name. If the cells have already a preset name, what you specify now will be added after the preset name.

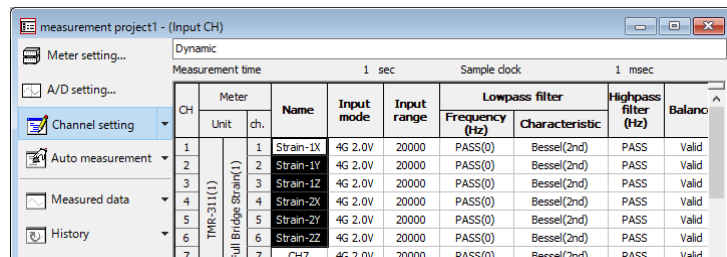


When you select Name... from the Project menu, the setting dialog box will be displayed.



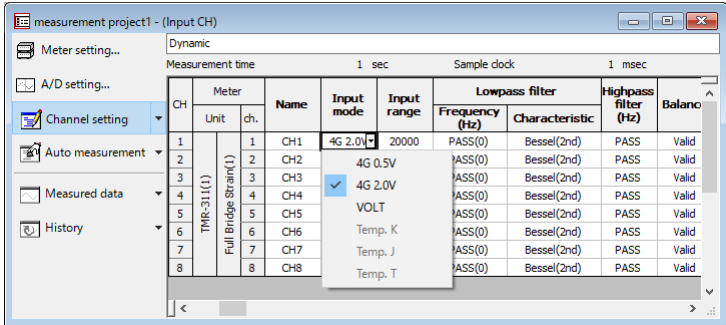
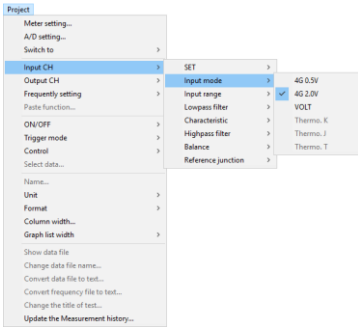
Select Consecutive NoXYZ for Concatenation number. The additional characters will be added, grouping the cells by three from the top.

Set the remaining items as shown above, and click the "OK" button.



6-3 How to set the input mode

Specify the type of the input signal (bridge voltage, voltage, or thermocouple).



Some input modes may not be selectable, depending on the connected unit. For input modes which can be set, see the operation manual of the unit.

The strain resolution will change with the setting of the bridge voltage:

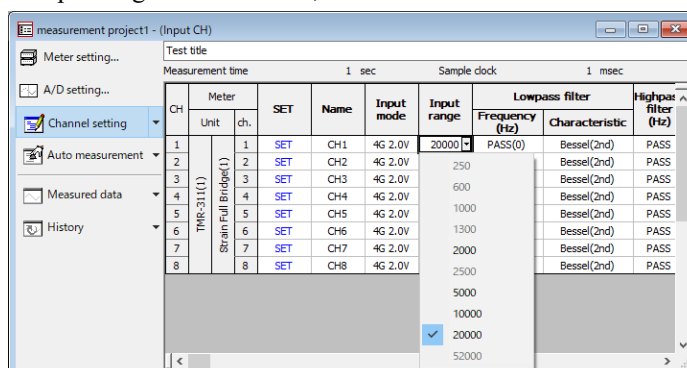
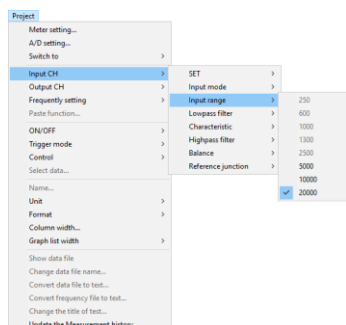
4G 0.5V : Resolution of 4×10^{-6} strain

4G 2.0V : Resolution of 1×10^{-6} strain

6-4 How to set the input range

Specify the input range.

When the input range value is lower, the measured value becomes more stable.



TMR-211 Strain Full Bridge			
Input range	Input mode		
	4G 2.0V	4G 0.5V	VOLT (CR-4010)
5000	-5,000~+5,000 (1×10^{-6})	-20,000~+20,000 (4×10^{-6})	-5,000~+5,000 (1mV)
10000	-10,000~+10,000 (1×10^{-6})	-40,000~+40,000 (4×10^{-6})	-10,000~+10,000 (1mV)
20000	-20,000~+20,000 (2×10^{-6})	-80,000~+80,000 (8×10^{-6})	-20,000~+20,000 (2mV)

TMR-211 Voltage/Thermocouple		
Input range	Input mode	
	VOLT	Thermocouple
600		-200~+600 (0.1°C)
1000	-1,000~+1,000 (0.1mV)	
1300		-200~+1,300 (0.2°C) ※Not usable with a thermocouple T.
5000	-5,000~+5,000 (0.5mV)	
10000	-10,000~+10,000 (1mV)	
20000	-20,000~+20,000 (2mV)	

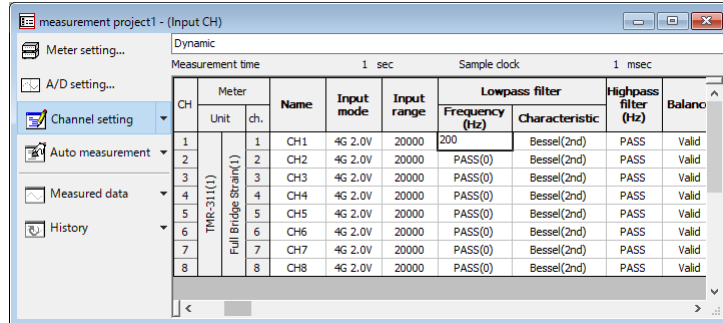
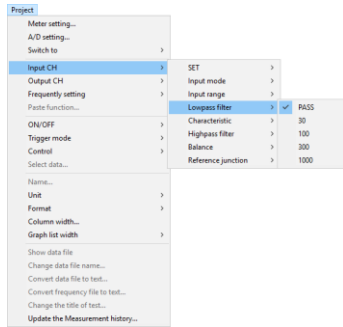
TMR-311 Strain Full Bridge			
Input range	Input mode		
	4G 2.0V	4G 0.5V	VOLT (CR-4010)
2000	-2,000~+2,000 (0.1×10^{-6})	-8,000~+8,000 (0.4×10^{-6})	-2,000~+2,000 (0.1mV)
5000	-5,000~+5,000 (1×10^{-6})	-20,000~+20,000 (4×10^{-6})	-5,000~+5,000 (1mV)
10000	-10,000~+10,000 (1×10^{-6})	-40,000~+40,000 (4×10^{-6})	-10,000~+10,000 (1mV)
20000	-20,000~+20,000 (1×10^{-6})	-80,000~+80,000 (4×10^{-6})	-20,000~+20,000 (1mV)

TMR-311 Voltage Input		
Input range	Input mode	
	VOLT	Thermocouple
600		-200~+600 (0.1°C)
1000	-1,000~+1,000 (0.1mV)	
1300		-200~+1,300 (0.2°C) ※Not usable with a thermocouple T.
5000	-5,000~+5,000 (0.5mV)	
10000	-10,000~+10,000 (1mV)	
20000	-20,000~+20,000 (2mV)	
52000	-52,000~+52,000 (5mV)	

6-5 How to set the cutoff frequency of the low-pass filter

Input signals with frequency higher than the specified frequency are attenuated by the digital filter. When the low pass filter is set to PASS(0), signals with frequency higher than 10kHz are attenuated by the analog filter.

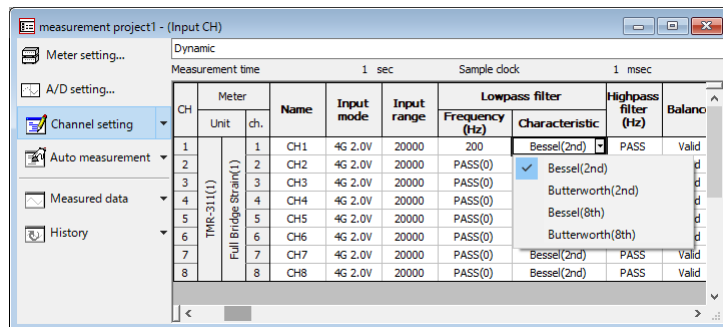
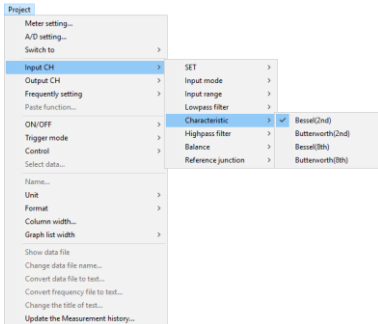
You cannot select anything other than PASS(0) for a thermocouple.



6-6 How to set the frequency characteristic of the low-pass filter

Specify the frequency characteristic for the low-pass filter from among Bessel (2nd), Butterworth (2nd), Bessel (8th), and Butterworth (8th).

When the low-pass filter cutoff frequency is set to PASS(0), you cannot select anything but Bessel(2nd).



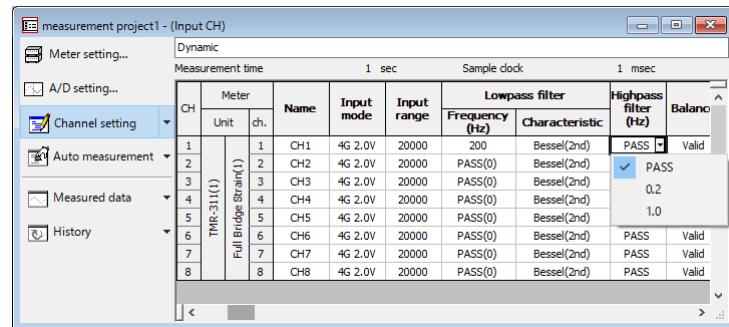
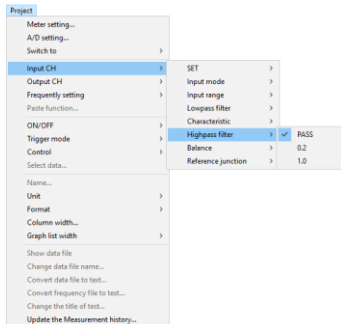
Bessel (8th)/Butterworth (8th) can be used for Strain Full Bridge unit (TMR-221/TMR-321), Strain 1G2G4G unit (TMR-222/TMR-322), and Carrier type Strain Full Bridge unit (TMR-223/TMR-323).



When the TMR-211 is used, its firmware version must be 2.2A or later and also the measurement unit (TMR-221/TMR-222) must be of version 1.2A or later.

6-7 How to set the cutoff frequency of the high-pass filter.

Input signals with frequency lower than the specified frequency are attenuated by the digital filter. Select the frequency from among PASS, 0.2Hz and 1.0Hz.



PASS : High-pass filter is not used.

0.2 : Component of DC to 0.2Hz is rejected.

1.0 : Component of DC to 1.0Hz is rejected.

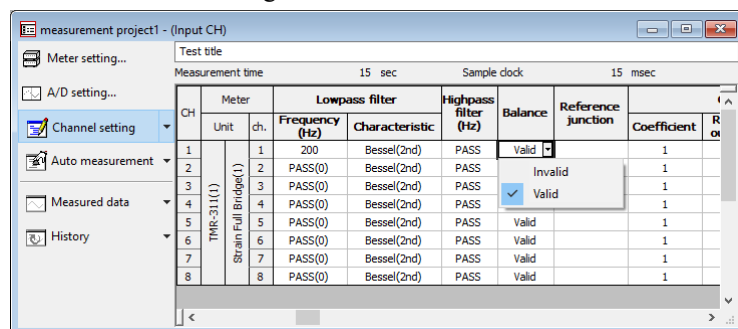
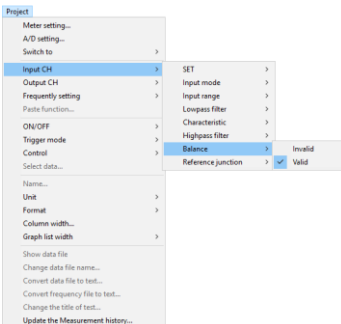
High-pass filter is available with Strain Full Bridge unit (TMR-221/TMR-321), Strain 1G2G4G unit (TMR-222/TMR-322), and Carrier type Strain Full Bridge unit (TMR-223/TMR-323).



When the TMR-211 is used, its firmware version must be 2.2A or later and also the measurement unit (TMR-221/TMR-222) must be of version 1.2A or later.

6-8 How to set balance

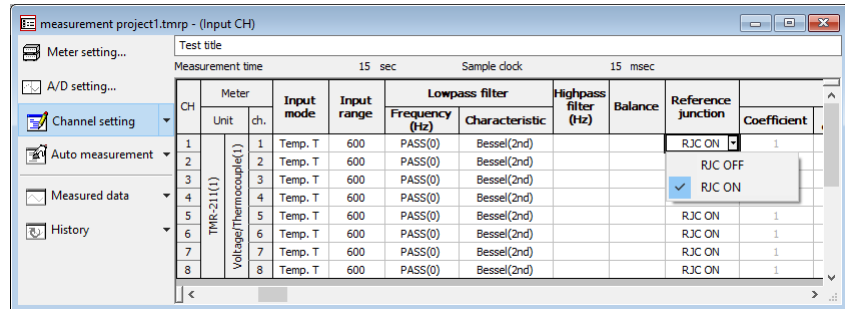
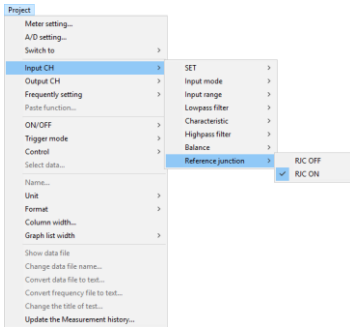
Sets valid/invalid of balancing function of instrument.



If TMR-211 firmware is older than Ver. 2.2A, Balance cannot be set.

6-9 How to set the reference junction

With the Voltage/Thermocouple unit (TMR-231) or Thermocouple/Voltage unit (TMR-332), set the reference junction for measuring temperature.



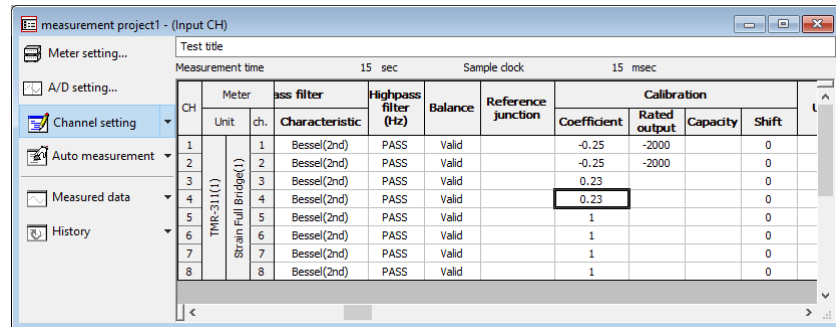
RJC OFF : An external reference junction is used.

RJC ON : Built-in reference junction of the TMR-231 is used.

6-10 How to set a coefficient

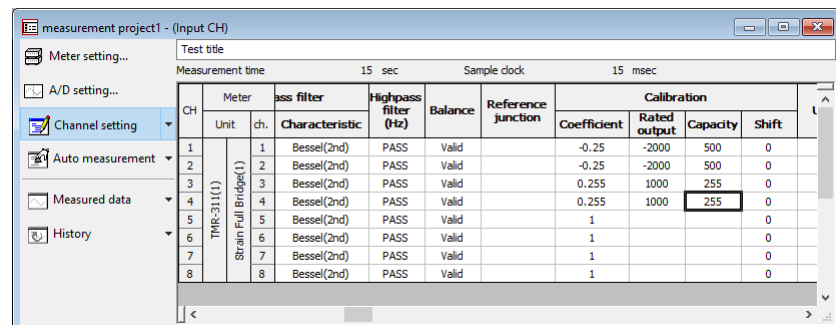
Set a coefficient for each channel.

If a value is entered in coefficient, both rated output and capacity become blank.



6-11 Setting the coefficient by rated output and capacity of sensor

You can set the sensor's rated output and capacity to set a corresponding coefficient automatically. The coefficient will be obtained by calculation "Capacity / Rated output".



6-12 How to set the shift amount



Shift amount may not be available for some functions of this software. For details, see "8 Frequency NO." (Page 4-22).

A shift amount, which is specified from the data before multiplied by the coefficient, is added.

Use this function to shift strain or voltage data beyond the balance range.

CH	Meter	Unit	dh	Characteristic	Highpass filter (Hz)	Balance	Reference junction	Coefficient	Rated output	Capacity	Shift
1	1			Bessel(2nd)	PASS	Valid		-0.25	-2000	500	0
2	2			Bessel(2nd)	PASS	Valid		-0.25	-2000	500	0
3	3			Bessel(2nd)	PASS	Valid		0.255	1000	255	0
4	4			Bessel(2nd)	PASS	Valid		0.255	1000	255	0
5	5			Bessel(2nd)	PASS	Valid		1			0
6	6			Bessel(2nd)	PASS	Valid		1			0
7	7			Bessel(2nd)	PASS	Valid		1			0
8	8			Bessel(2nd)	PASS	Valid		1			0

6-13 How to set the unit

A unit should be set for each channel.

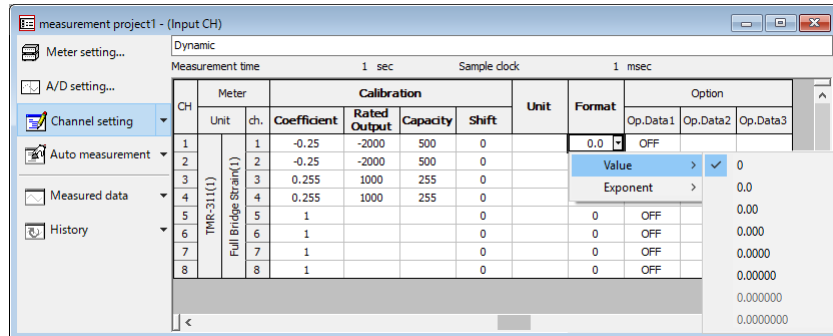
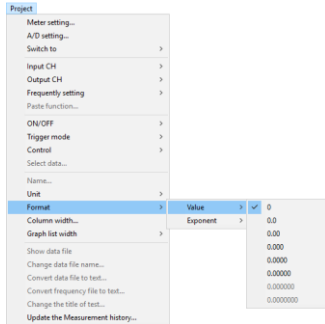
When the TMR-311 is used, you can set any string up to 10 characters.

Project	Unit
Meter setting...	
A/D setting...	
Switch to	
Input CH	
Output CH	
Frequently setting	
Paste function...	
ON/OFF	
Trigger mode	
Control	
Select data...	
Name...	
Unit	μStrain
Format	mm
Column width...	cm
Graph list width	m
Show data file	°C
Change data file name...	F
Convert data file to text...	deg
Convert frequency file to text...	gf
Change the title of test...	kgf
Update the Measurement history...	tf
	N
	kN
	MN
	kg/mm²
	kPa
	MPa
	kgm
	mV
	V
	mA
	A
	ohm
	M-ohm
	+

CH	Meter	Unit	dh	Reference junction	Coefficient	Rated output	Capacity	Shift	Unit	Format	Alarm
1	1				-0.25	-2000	500	0			OFF
2	2				-0.25	-2000	500	0			OFF
3	3				0.255	1000	255	0			OFF
4	4				0.255	1000	255	0			OFF
5	5				1			0			OFF
6	6				1			0			OFF
7	7				1			0			OFF
8	8				1			0			OFF

6-14 How to set the format for measurement data

Set the display format and display digit number of the measurement data shown in the measurement data list and numeric value monitor.

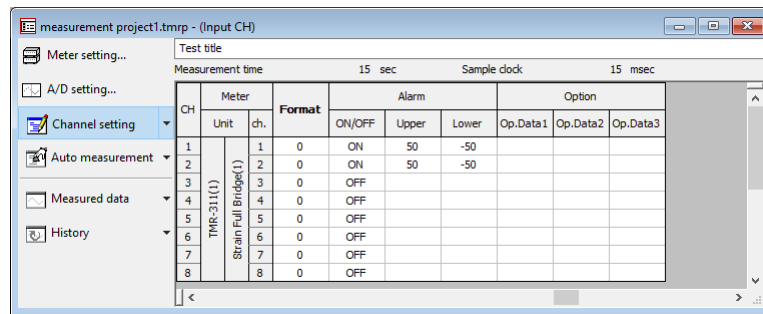


Value : Display measurement data as decimal representation.

Exponent : Display measurement data as floating point representation.

6-15 Setting the alarm value

By configuring the alarm settings, you can output alarm sound or change the color of the value monitor during monitoring.



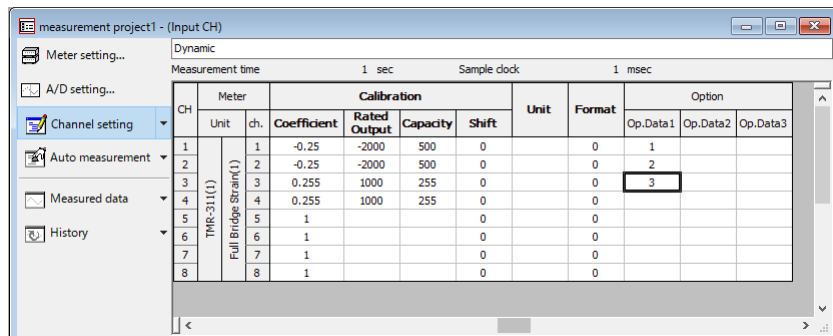
ON/OFF : ON enables the alarm, and OFF disables it.

Upper : Set upper-limit threshold

Lower : Set lower-limit threshold

6-16 How to set option data

Option data are used as coordinate data for measurement data when plotting a distribution chart. If distribution chart is not plotted, you do not need to set this.

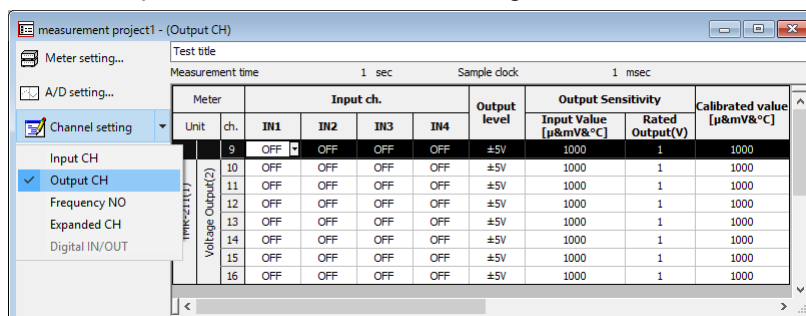
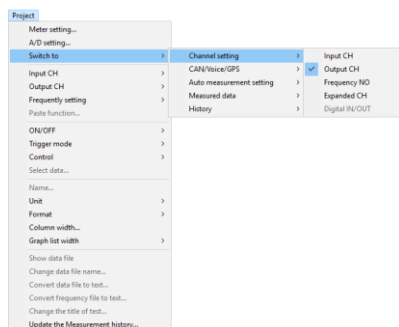


7 Output Channels

With the Voltage Output unit (TMR-241/TMR-341), the measured data of any channels can be output as a voltage value.

If the Voltage Output unit (TMR-241/TMR-341) is not used, settings for analog output are not necessary.

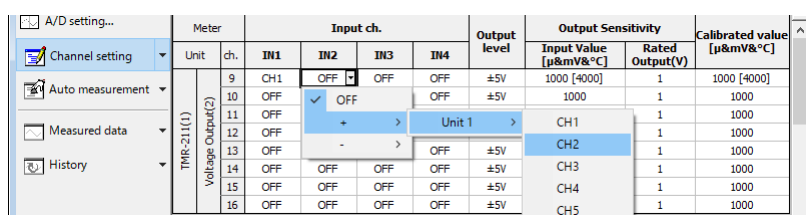
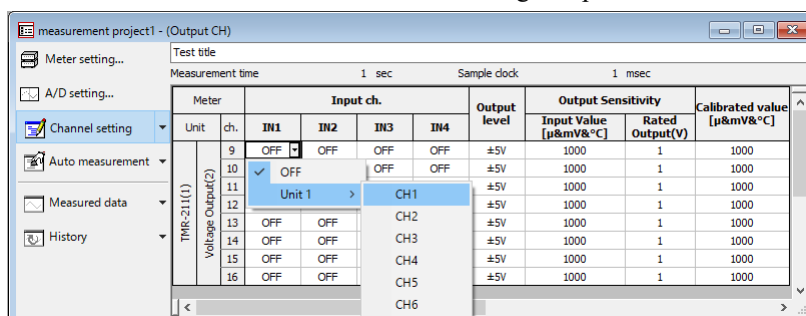
Select the Output CH from the "Channel setting" button menu.



When using the Voltage Output unit with this software, version 1.5A or later is needed in case of TMR-211, otherwise version 1.3A or later is needed in case of TMR-311.

7-1 How to set the input channel

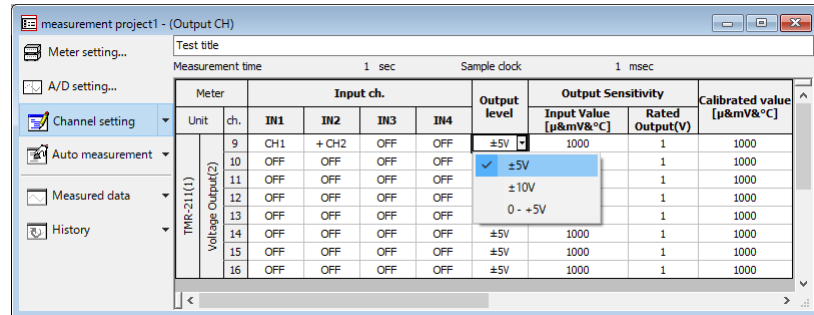
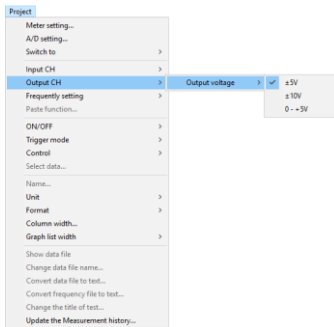
Set channels of measurement data to use for voltage output.



- IN1** : Select channel for voltage output.
If you don't need to output, set OFF to this option.
- IN2 to IN4** : When outputting voltage by adding or subtracting channels, select the channels for operation.
If you don't need the operation, set OFF to this option.

7-2 How to set the output voltage

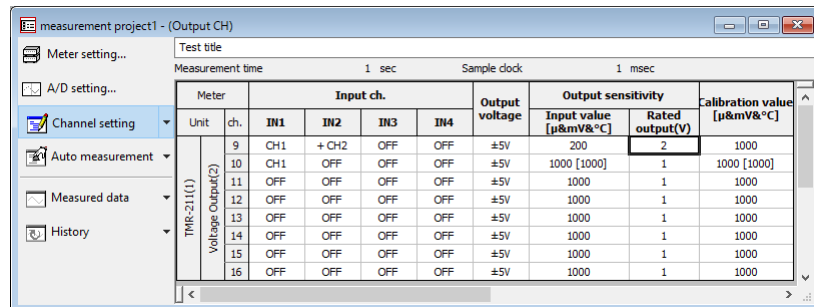
Select the range of output voltage from among $\pm 5V$, $\pm 10V$, and $0 - +5V$.



The output voltage is set for each unit. And thus, if you change the voltage for one channel, the same setting applies not only to that channel but also to all the channels of the unit.

7-3 Setting output sensitivity

Set the sensitivity of voltage output by input value and rated output.



Input value : When a value in the Input ch. becomes the value set in the Input Value, the value set in the Rated Output is output.
The Input Value is set in physical quantity.
When only the IN1 is set, the value of input signal is indicated in [].

Rated output : Set a voltage output value for the input value by V unit.

7-4 How to set the calibration value

Set a calibration value in physical quantity.

measurement project1 - (Output CH)

Meter setting...

A/D setting...

Channel setting

Auto measurement

Measured data

History

Test title

Measurement time1 secSample clock1 msec

Meter	Input ch.				Output level	Output Sensitivity		Calibrated value	
Unit	ch.	IN1	IN2	IN3	IN4		Input Value [μmV&°C]	Rated Output(V)	[μmV&°C]
THS-211(L) Voltage Output(2)	9	CH1	+CH2	OFF	OFF	±5V	200	2	100
	10	CH1	OFF	OFF	OFF	±5V	2000 [8000]	1	2000 [8000]
	11	OFF	OFF	OFF	OFF	±5V	1000	1	1000
	12	OFF	OFF	OFF	OFF	±5V	1000	1	1000
	13	OFF	OFF	OFF	OFF	±5V	1000	1	1000
	14	OFF	OFF	OFF	OFF	±5V	1000	1	1000
	15	OFF	OFF	OFF	OFF	±5V	1000	1	1000
16	OFF	OFF	OFF	OFF	±5V	1000	1	1000	

In the [], a value corresponding to the input signal is displayed.

If the input mode is Thermocouple, the display in the [] denotes a value in the unit of 0.1°C. For example, in case the display is [25], it shows a value corresponding to 2.5°C.



For the output calibration, refer to "Chapter 5: 18 Calibration of the voltage output". (Page 5-32)

Supposing that the Input Value is 200 and the Rated Output is 2V, when the Calibration value is set to 100 for example, calibration voltage of 1V is output by "plus calibration" and -1V is output by "minus calibration".

8 Frequency NO.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

You can perform frequency measurement, by using the Histogram analysis library TMR-211-01/TMR-311-01.

This software defines new frequency numbers from DN_1 to DN_80 for frequency measurement as Frequency NO. In order to perform a frequency measurement, you have to set an input channel, analysis method, hysteresis, sampling/cross level, and slice number for each frequency number.

Frequency analysis requires that the sample clock is 1ms or longer. When 17 or more Frequency NO are used in a TMR-211 with firmware version of 1.2A or older, pay attention to the following restriction:

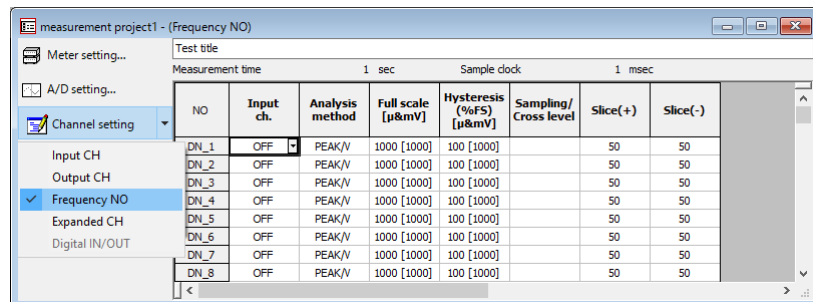
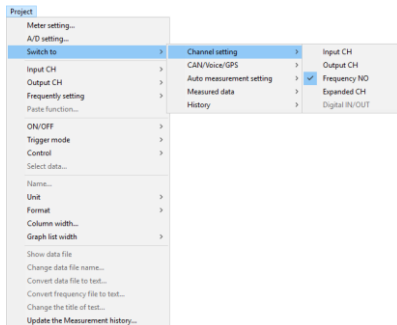
1. The sample clock for A/D conversion should be 10ms or longer.
2. The analysis method should be peak/valley method (PEAK/V) for all frequency numbers.

If you do not perform any frequency measurement using the Histogram analysis library TMR-211-01/TMR-311-01, setting of the frequency NO is not necessary.



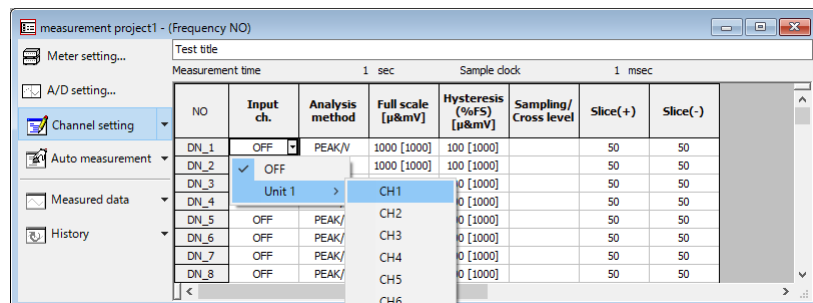
Since the input CH shift amount is a software-specific function, the shift amount cannot use with this function, which performs frequency measurement in the measuring instrument. Please reset the shift amount of the input channel to 0 or set another input channel.

Select the Frequency NO from the "Channel setting" button menu.



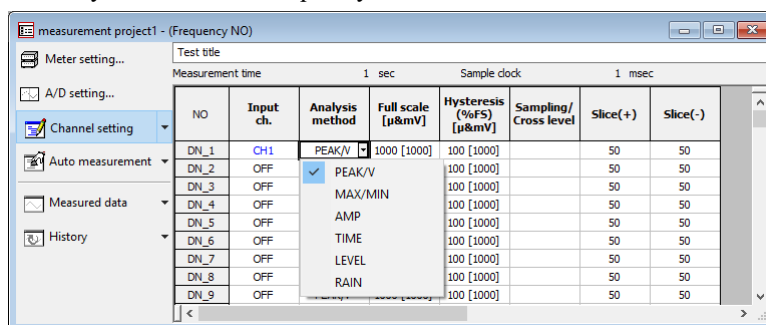
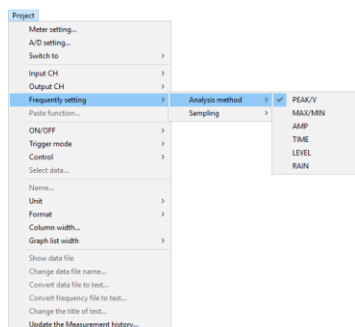
8-1 How to set the input channel

Select a channel to perform frequency measurement from among input channels, for each frequency number.



8-2 How to set the analysis method

Set the analysis method for frequency measurement.

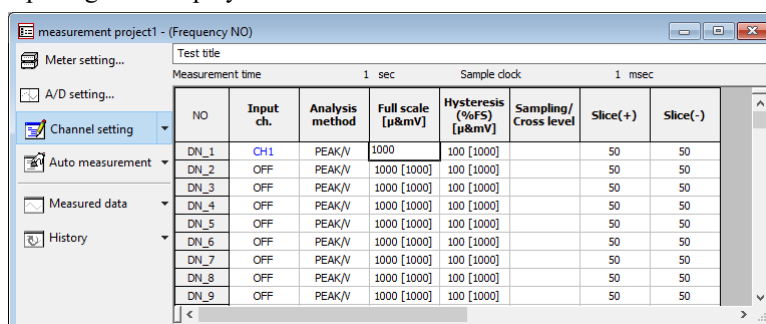


For the details of analysis method, refer to the operation manual of "Histogram analysis library".

PEAK/V : Peak/valley method
 MAX/MIN : Maximum/minimum method
 AMP : Amplitude method
 TIME : Time method
 LEVEL : Level-crossing method
 RAIN : Rain-flow method

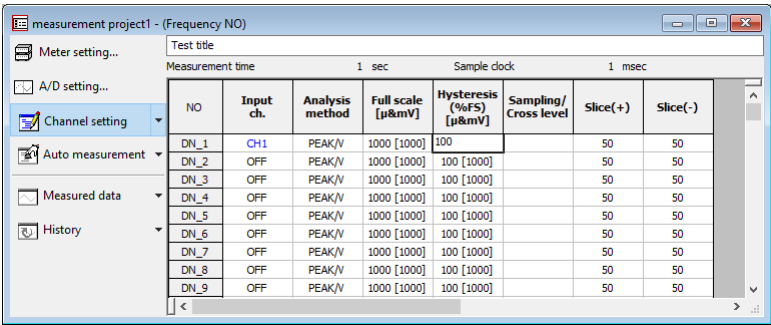
8-3 How to set the full scale

Input the full scale in physical quantity. Inside the [], a value corresponding to the input signal is displayed.



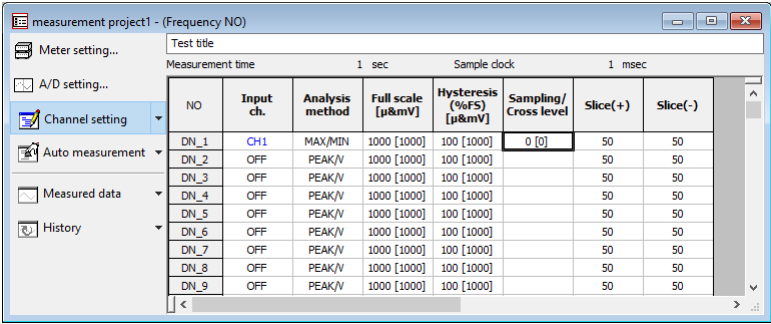
8-4 How to set the hysteresis

Input invalid amplitude in terms of the ratio to the full scale at one side (%FS).
Inside the [], a value corresponding to the input signal is displayed.



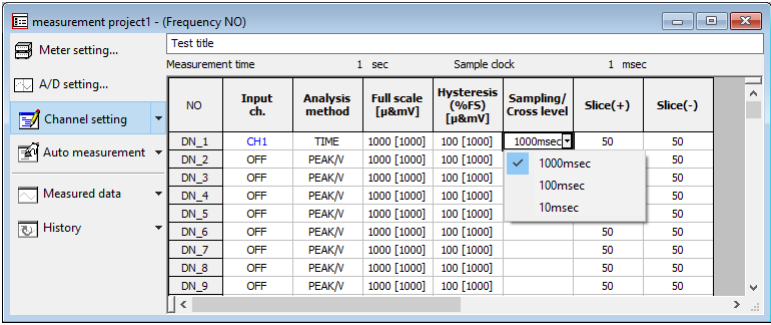
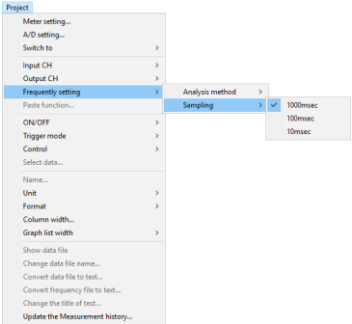
8-5 How to set the cross level

If you use the maximum/minimum method for analysis, input a cross level in physical quantity.
Inside the [], a value corresponding to the input signal is displayed.



8-6 How to set the sampling time

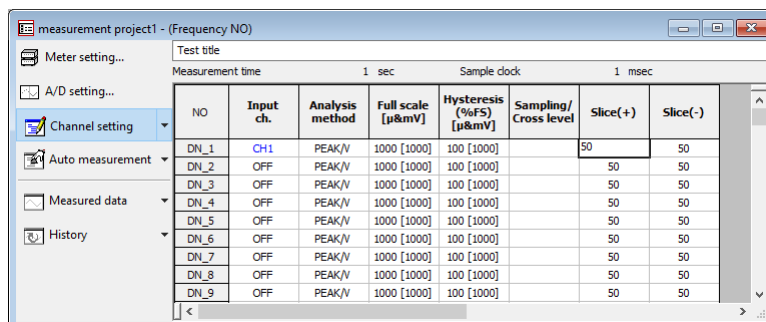
If you use the time method for analysis, set the sampling time.



8-7 How to set the slice number

Set the slice number for the positive side and for the negative side, respectively. You cannot set such slice numbers which result in the total exceeding 100.

In the Amplitude method and Rain-flow method, the slice number of the negative side is fixed at 0.



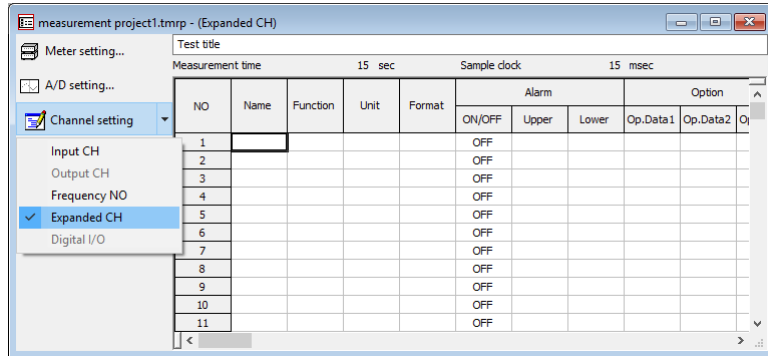
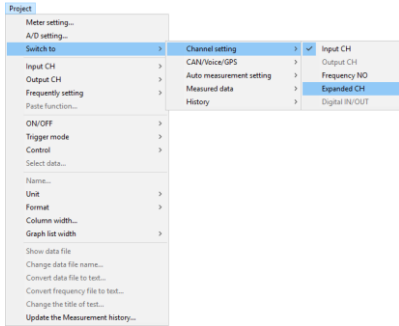
9 Expanded CH

It is possible to execute the calculation for each measurement based on the arbitrary set arithmetic expression. The calculation result can be processed as a measurement data.

The maximum number of Expanded channel is 1000 points.

Set the name, arithmetic expression, unit, format, alarm, and option data.

Select Expanded CH from the "Channel setting" button menu.



9-1 Assigning the sequential number to name

You can assign sequential numbers to the names of multiple channels at one operation.

You can also specify an additional letter, which is useful for measurement with 2-axis gauge, 3-axis gauge, etc.



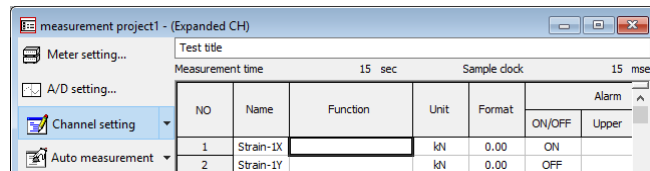
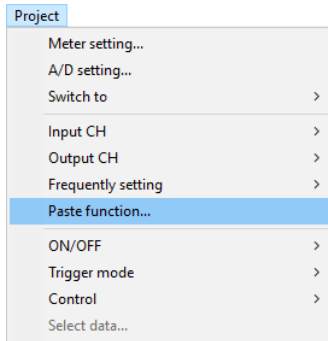
Refer to "Chapter 4: 6-2 How to assign a sequential number to the name" (Page 4-11) for more detail.

9-2 Setting the arithmetic expression

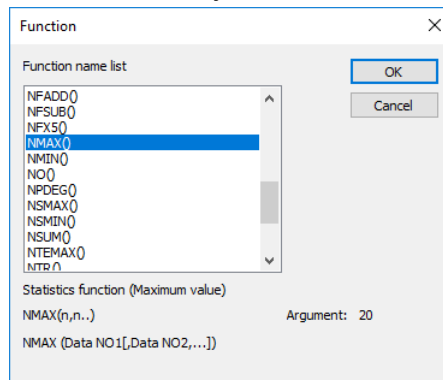
For setting the arithmetic expression of measurement data, a function is used. It is set by inputting from keyboard or pasting function.

■ How to input it by pasting function

Click the cell for which the function is input.

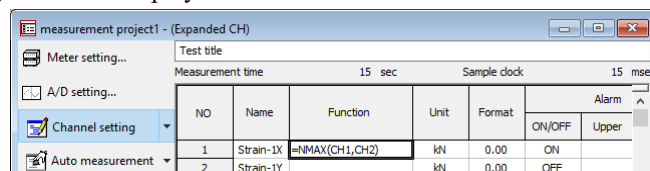


Select the Paste function... of Project menu.



Select the function from Function name list. When "OK" button is clicked, the selected function is set to Measurement project.

At this time, for the function that requires argument, move the cursor within the bracket and set the argument. When there is an error for input, display is changed to error display.



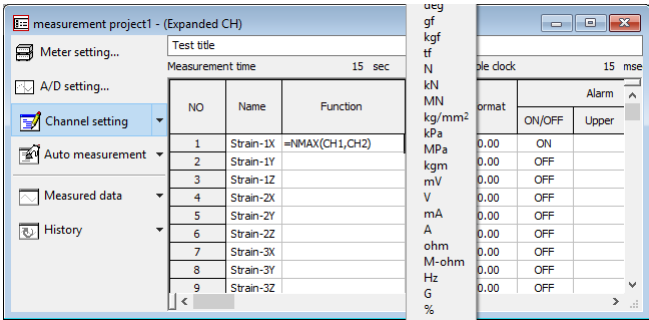
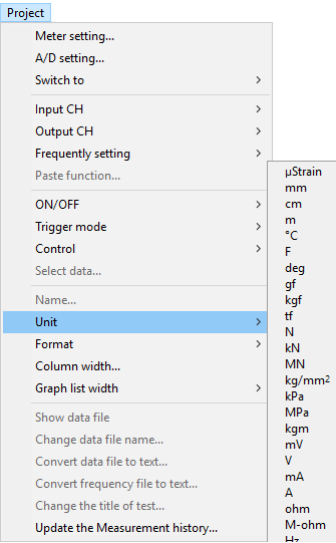
[List of arithmetic expression error]

Error1	Function is not correct. Or, arithmetic expression is not correct
Error2	- - -
Error3	() is not matched
Error4	Input of argument is not matched with specification (exceeding maximum or minimum value)
Error5	The data No. of cell that is set when the data No. is used by argument is used as argument
Error6	The number of argument is different
Error7	Argument is not proper (for example, character etc.)

Trigonometric function, log, time, 2-axis and 3-axis calculation etc. can be used in arithmetic expressions in addition to the four arithmetic operations (+, -, *, /), power (^), and bracket.

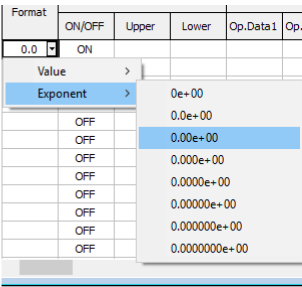
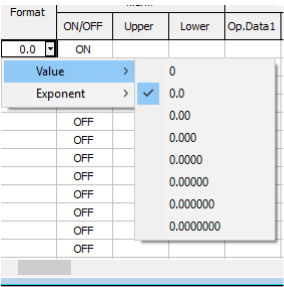
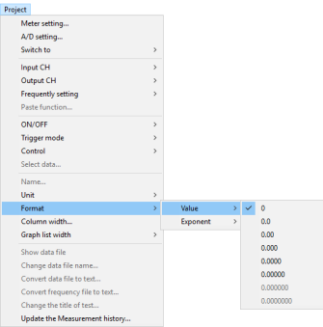
9-3 Setting the unit

Select a unit for an Expanded CH from menu. Also it can be entered directly from the keyboard.



9-4 Setting the format of Expanded channel data

Set the display format and display digit number of the Expanded channel data shown in the measurement data list and numeric value monitor.

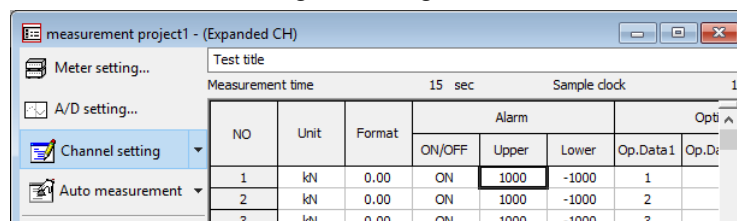


Value : Display Expanded channel data as decimal representation.

Exponent : Display Expanded channel data as floating point representation.

9-5 Setting the alarm value

By configuring the alarm settings, you can output alarm sound or change the color of the value monitor during monitoring.



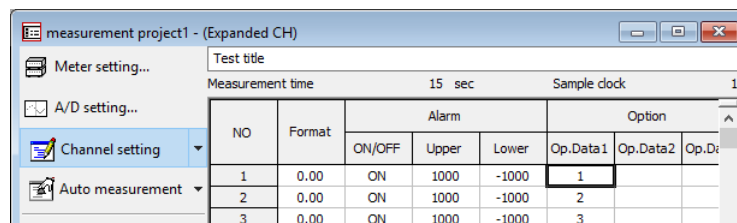
ON/OFF : ON enables the alarm, and OFF disables it.

Upper : Set upper-limit threshold

Lower : Set lower-limit threshold

9-6 Setting the option data

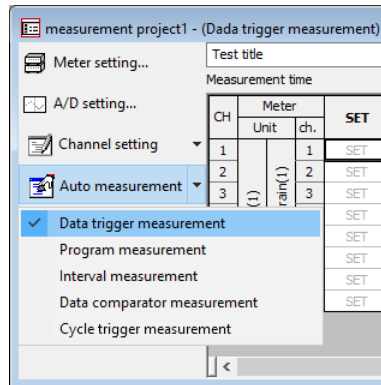
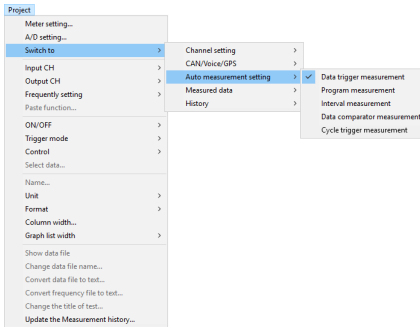
The option data are used as coordinate data for Expanded channel data when plotting a distribution chart. If distribution chart is not plotted, you do not need to set this.



10 Setting for Automatic measurement

Perform setting for automatic measurement.

Click the "Auto measurement" button in the Measurement project.



This software supports four kind of automatic measurement; Data trigger measurement, Program measurement, Interval measurement, and Data comparator measurement. If these measurements are not used, you do not need to set anything for them.



For more information of each automatic measurement:

Refer to "Chapter 5: 8 Data trigger measurement" (Page 5-11).

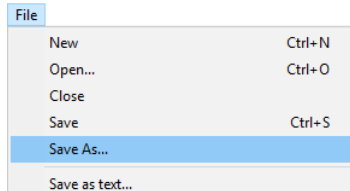
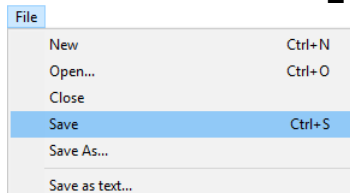
Refer to "Chapter 5: 9 Program measurement" (Page 5-15).

Refer to "Chapter 5: 10 Interval measurement" (Page 5-18).

Refer to "Chapter 5: 11 Data comparator measurement" (Page 5-21).

Refer to "Chapter 12: 4 Cycle trigger measurement" (Page 12-6).

11 Saving a measurement project



You can save a measurement project by selecting **Save** or **Save As...** from the File menu.

Save : When a project is saved for the first time, a dialog box appears to input the measurement project name and to specify where to store it. Once saved, a Measurement project is overwritten with the same name.

Save As... : A dialog box appears always so as to enable input of the measurement project name and specification of the location to store it.



When saving with a different name, the project cannot be saved if there is already the same name in the specified folder. Rename it or change the location to save it.



Use a storage with sufficient free space, because measurement data requires a big capacity.

Rough size of a measurement data file can be calculated as follows, as a guideline:

(Number of channels used) x Number of data in single measurement x 4byte

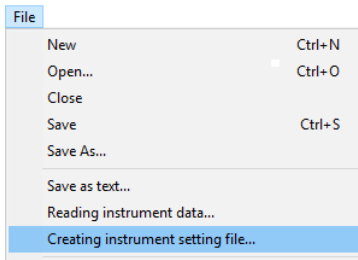
For example, if you set the [channels to use] to "20 channels" and perform measurement of 500,000 words, the size will be:

$$20 * 500,000 * 4 = 40,000,000\text{bytes}$$

i.e. about 38 megabytes.

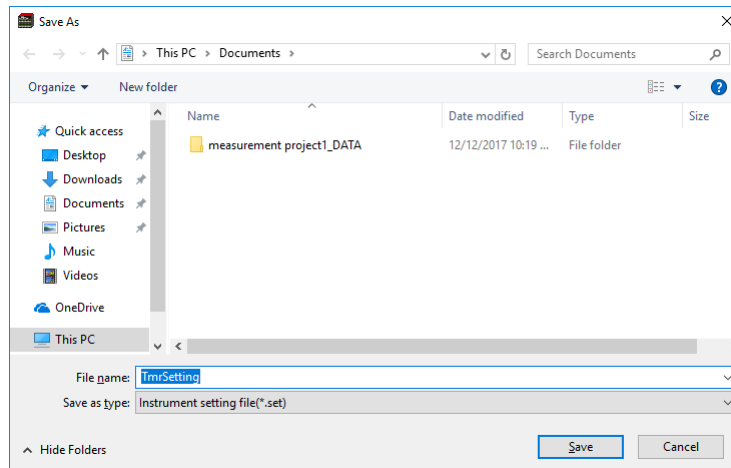
Actual size may be a little larger because settings and some other information are recorded.

12 Creating instrument setting file



Setting on instrument can be saved in a file and then reflected to the instrument using a display unit of the instrument.

Select **Creating instrument setting file...** from **File** menu. A dialog box is displayed. Save the file with file name designated by alphanumeric characters.



You cannot use a double-byte character set (i.e. Chinese, Japanese, Korean, etc.) in file name.

■ Instructions for TMR-211

Move the saved file to memory card, and insert the memory card into the instrument.

Touch the button on the display unit in the following order.

[To menu] > [ETC] > [Loading and saving of setting file]

Select the moved setting file, and touch the [Load] button to start to read the file.

■ Instructions for TMR-311

Move the saved file to the "Lot number/SET" folder of the memory card, and insert the memory card into the instrument.

Touch the button on the display unit in the following order.

[MENU] > [etc.] > [Setting file]

Select the moved setting file, and touch the [START] button to start to read the file.



If the firmware version of TMR - 211 is older than 2.2A or the firmware version of TMR - 311 is older than 1.4A, then it cannot load the setting file.

Chapter 5

Measurement

This chapter explains each measurement method.

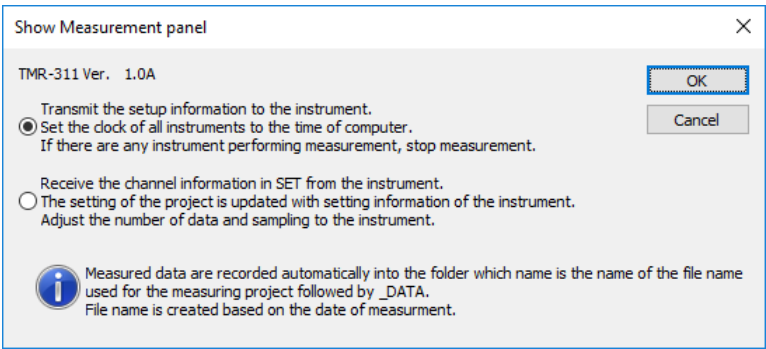
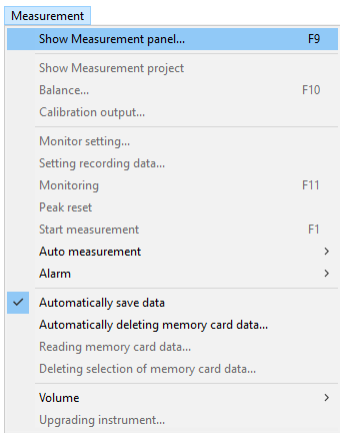
1 How to display the Measurement panel

By displaying the measurement panel, communication with instrument is established, and measurement data acquisition and real time data monitoring become possible.



Save the Measurement project before displaying the Measurement panel. If you try to display the Measurement panel without saving, the saving dialog box is displayed.

Select Show Measurement panel... from the Measurement menu, the following dialog box is displayed.



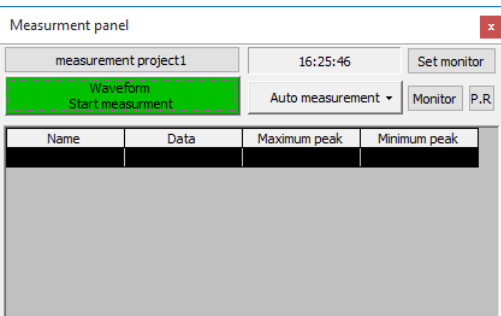
"Transmit the setup information to the instrument"

: The settings in measurement project are reflected to the instrument.

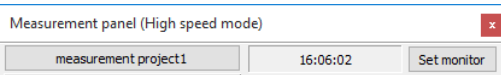
"Receive the channel information in SET from the instrument"

: The settings set in the instrument such as channel condition and A/D setting are imported into the measurement project.

Select either one of above, and click the "OK" button to display the Measurement panel.



When a High-speed mode instrument is connected, the title of the Measurement panel is displayed as follows.

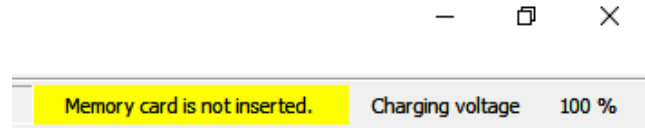


1-1 Memory card state indicator

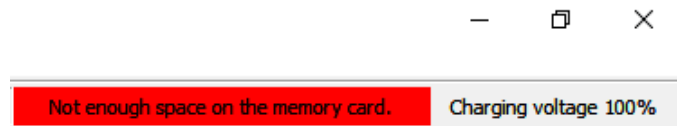
When the Measurement panel is displayed, the state of memory card which is inserted in instrument appears on the tool bar.

If the memory card has enough space for measurement, it displays the percentage of free space.

- The yellow message appears when no memory card is installed.



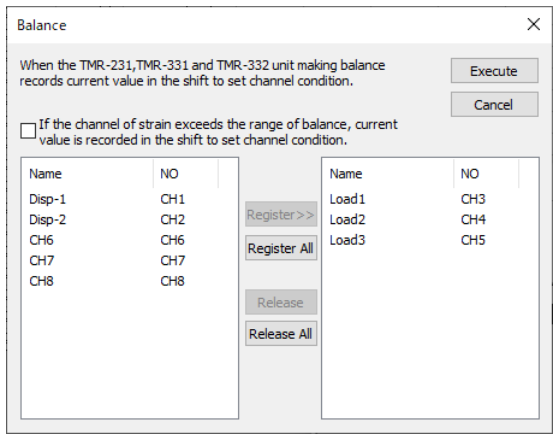
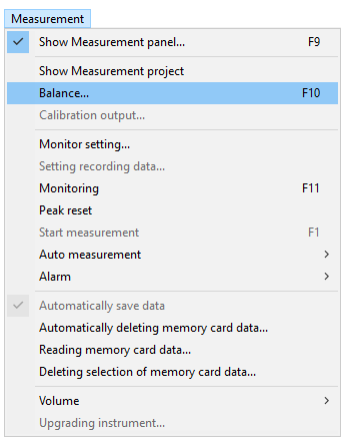
- The red message appears when a memory card is installed but unable to record data.



2 How to balance

Before starting measurement, you can execute zero balancing of the sensor.

Select Balance... from the Measurement menu. The confirmation dialog box is displayed.



Setting items

If the channel of strain exceeds the range of balance, current value is recorded in the shift to set channel condition.

: For the channel of strain that exceeds the balance range of measurement system, the value does not become 0. When this item is enabled, the current value is recorded in the shift cell of the input CH of the Measurement project that is referenced, and it becomes 0 by calculation.

Left list : The list of channels for which balancing is possible is displayed. The channel set invalid in the input CH setting is not indicated.

Right list : The list of channels for which balancing is executed is displayed.

"Register>>" button
: The data selected from left data is registered in right list.

"Register All" button
: Every data in left list is registered in right list.

"Release" button
: The data selected from right list is deleted from list.

"Release All" button
: Every data registered in right list is deleted.

When the data to be balanced is selected from left list and "Register>>" button is clicked, it is displayed in right list.

When the zero balancing can be implemented, click "Execute" button.



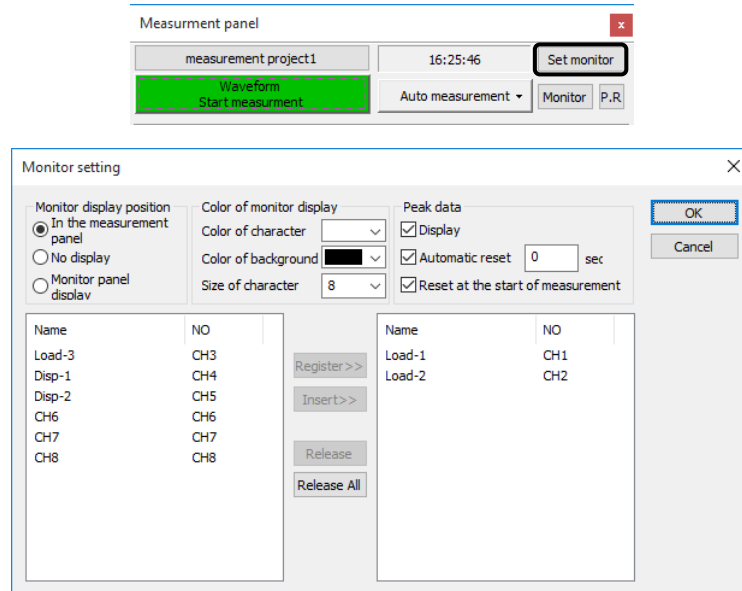
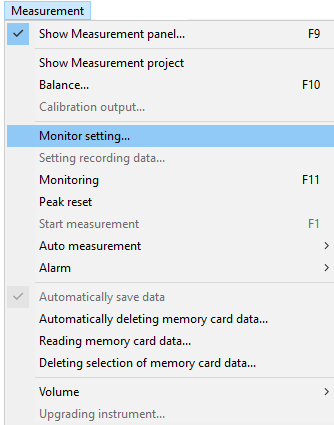
If you execute zero balancing for channels in Voltage/Thermocouple unit (TMR-231), Voltage Input unit (TMR-331) or Thermocouple/Voltage unit (TMR-332), current value is recorded in the Shift cell of each input channel of the referring Measurement project.

3 Monitor measurement

Current data are displayed on the Measurement panel during measurement on real time.

3-1 Setting of the monitor data on the Measurement panel

Click the "Set monitor" button on the Measurement panel for selecting monitor channels.



Setting items

Left list : The list of channels for which monitor measurement is possible is displayed.

Right list : A list of data to be monitored is displayed.
The "Register>>", "Register All", "Release", and "Release All" buttons are used for selecting channels.

"Register>>" button

: The data selected from left data is registered in right list.

"Register All" button

: Every data in left list is registered in right list.

"Release" button

: The data selected from right list is deleted from list.

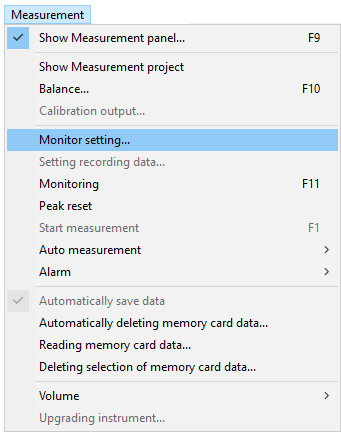
"Release All" button

: Every data registered in right list is deleted.

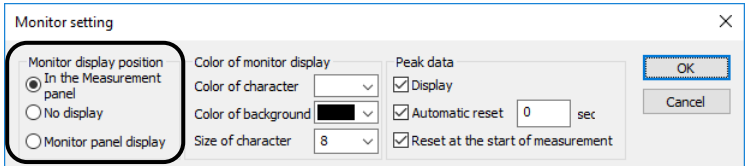
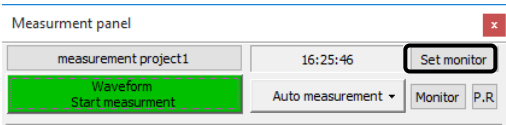
When the data for which monitor measurement is implemented is selected from left list and "Register>>" button is clicked, it is displayed in right list.

After the registration is implemented, click "OK" button.

3-2 Setting of the monitor display position



Click the "Set monitor" button on the Measurement panel for specifying the monitor display position.



Setting items

In the Measurement panel

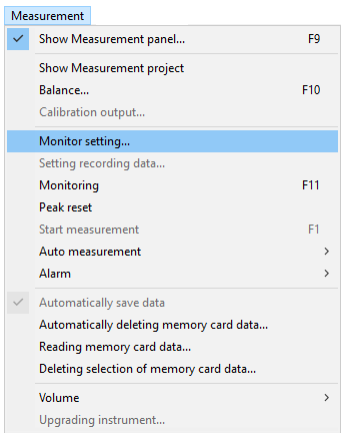
: The monitor value is displayed in Measurement panel.

No display : The monitor value is not displayed. The size of Measurement panel gets smaller.

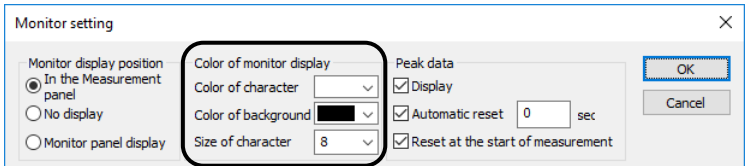
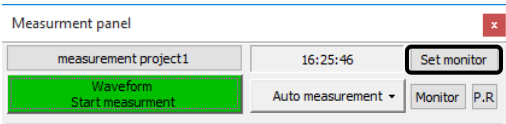
Monitor panel display

: Monitor panel is displayed in addition to the Measurement panel. Monitor value is displayed in the Monitor panel and the size of Measurement panel gets smaller.

3-3 Setting of the monitor display color



Click the "Set monitor" button on the Measurement panel for specifying the color of monitor display.



Setting items

Color of character

: Specify the color of character of monitor display.

Color of background

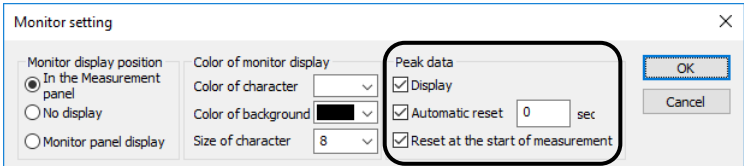
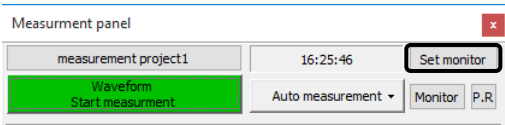
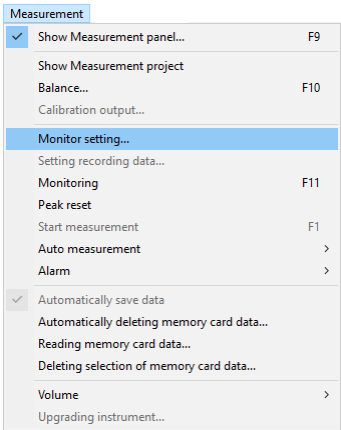
: Specify the background color of monitor display.

Size of character

: Specify the character size when the monitor is displayed in monitor panel.

3-4 Setting of the peak data

Click the "Set monitor" button on the Measurement panel for setting a peak data.



Setting items

Display : The maximum and minimum peak data is displayed.

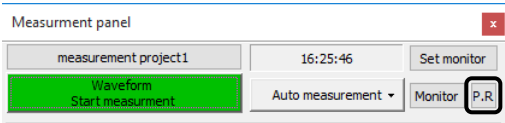
Automatic reset

: The peak data is reset in the specified time intervals.

Reset at the start of measurement

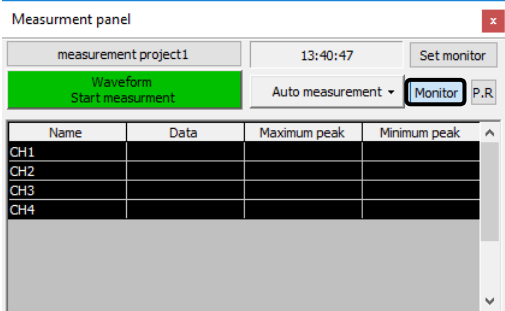
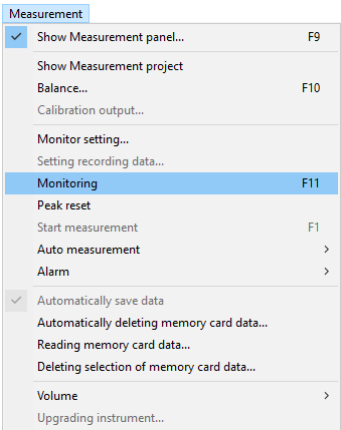
: The peak data is reset when the measurement is started.

When you want to reset the peak data manually, click the "P.R" (Peak Reset) button on the Measurement panel.




3-5 Start of monitor measurement

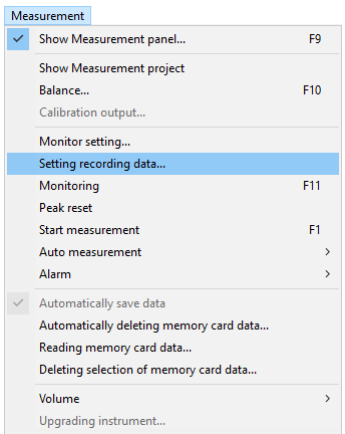
Click the "Monitor" button on the Measurement panel for starting the monitor measurement.



Click the "Monitor" button once again to cancel the monitor measurement status.

4 How to set the recording data

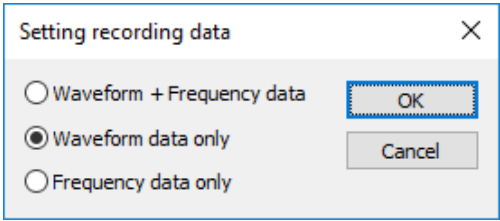
 To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).



Select which data to record on the memory card during measurement from; Waveform + Frequency data, Waveform data only, and Frequency data only.

Selection is not possible, if no input channel is set for the frequency No. in the Measurement project setting, or if sample clock restriction, etc. prevents frequency analysis.

Select Setting recording data... from the Measurement menu for selecting recording data.



Setting items

Waveform + Frequency data

: Waveform and frequency data are recorded simultaneously.

Waveform data only

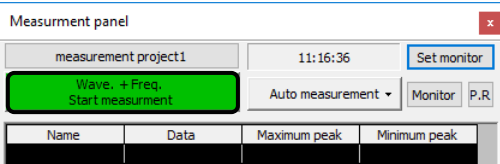
: Only waveform data are recorded.

Frequency data only

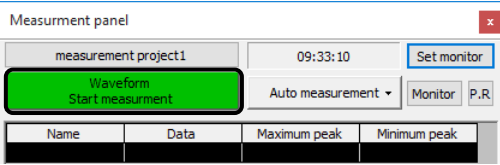
: Only frequency data are recorded.

The display of the "Start measurement" button on the Measurement panel changes depending on the selected recording data.

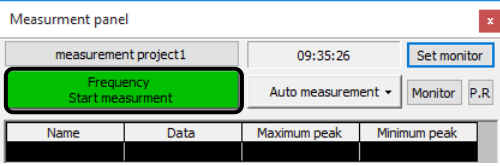
■ When Waveform + Frequency data is selected



■ When Waveform data only is selected



■ When Frequency data only is selected

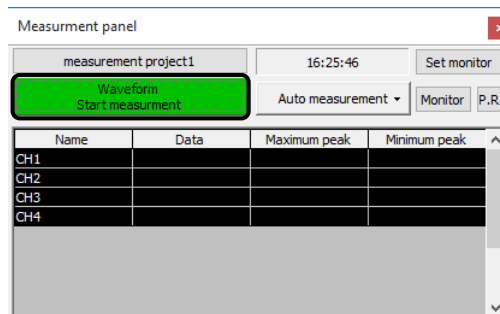
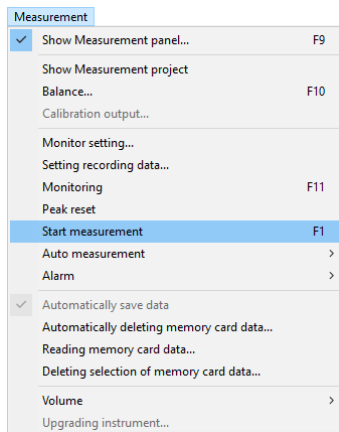


5 Manual measurement

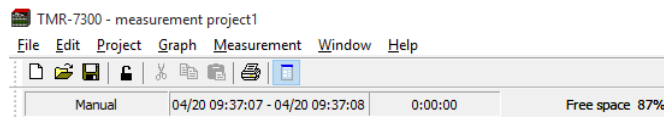
A measurement is performed once at any time you wish.

5-1 Start of manual measurement

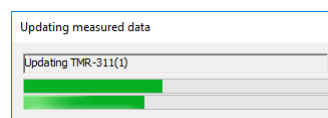
Click the "Start measurement" button on the Measurement panel for starting the manual measurement.



The start time, finish time, and elapsed time of the measurement are displayed on the Trigger status bar.



On completion of the measurement, the measurement data is transmitted from the instrument to computer.



When all data processing is completed, a data file is created.

■ Measurement time in case the setting requires recording of frequency data

Waveform + frequency data

: Waveforms and frequency are measured during the measurement time set in A/D setting.

Frequency data only

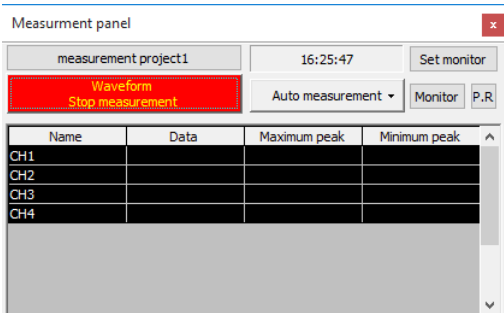
: Frequency measurement is during the measurement time set in A/D setting.



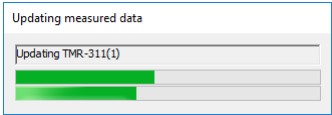
To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

6 Stop of manual measurement

To stop manual measurement, click the "Stop measurement" button on the Measurement panel.

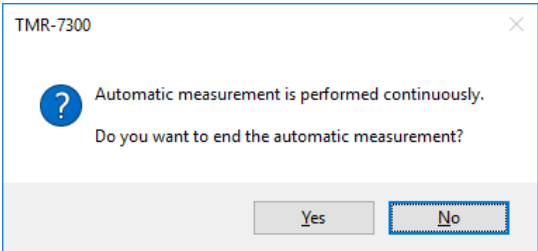


When measurement is stopped, the measurement data is transmitted from the instrument to computer.



When all data processing is completed, a data file is created.

When some automatic measurement is performed, the dialog box to confirm whether the automatic measurement is continued is displayed.



When "Yes" button is clicked, every automatic measurement is terminated.

When "No" button is clicked, the automatic measurement continues.

By closing the measurement panel during measuring, Offline measurement will be started.



Refer to "Chapter 5: 12 Offline measurement" (Page 5-24) for offline measurement.



Interval measurement and Data comparator measurement are unavailable to use as offline measurement.

7 Free run measurement

Measurement is repeated until the "Stop measurement" button is clicked or the capacity of the memory card is reached.

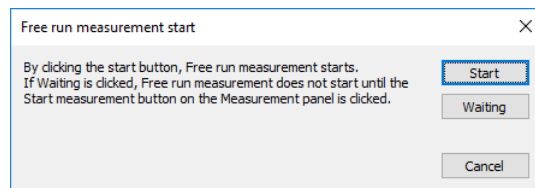
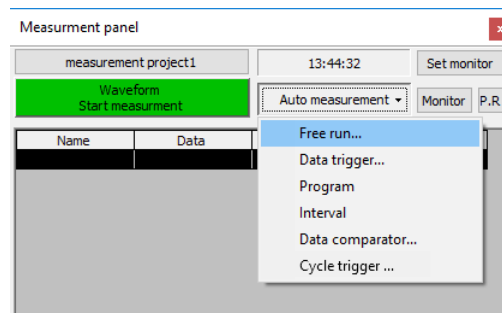
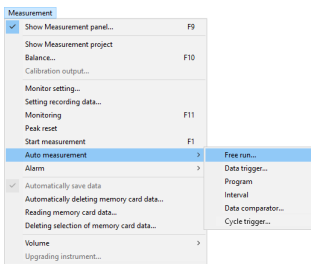


You cannot perform free run when measuring in High-speed mode, or when a memory card is not inserted.

Measurement time must be at least 10 seconds.

7-1 Start of free run measurement

Click the Free run... from "Auto measurement" button menu on the Measurement panel.



Click the "Start" button to start free run measurement.

If you click the "Waiting" button, the instruments waits to start measurement until the "Start measurement" button on the Measurement panel is clicked.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).



When recording the frequency data, the frequency data file will be created only once because frequency analysis works until measurement is stopped.

■ Measurement time in case the setting requires recording of frequency data

Waveform + frequency data

: Frequency analysis is performed continuously till free-run measurement is stopped. That means, one free-run measurement creates one frequency data file.

Frequency data only

: Frequency measurement is continued till you stop it manually.

7-2 Stop of free run measurement

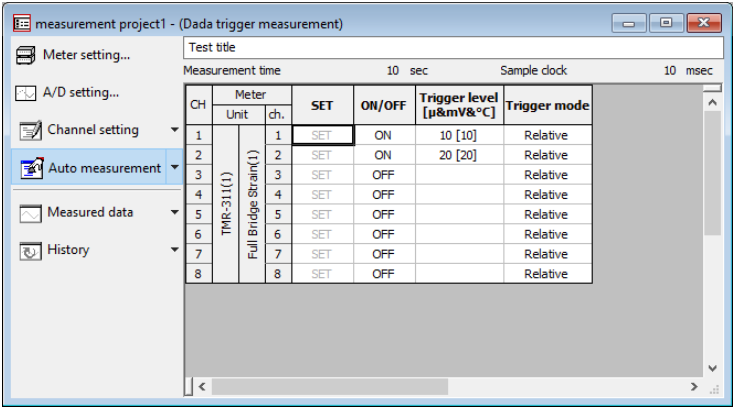
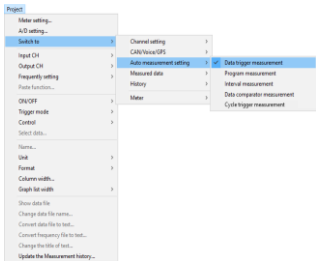
To stop free run measurement, click the "Stop measurement" button on the Measurement panel.

8 Data trigger measurement

The instrument judges input signals based on the setting of the trigger level and trigger mode of the channel to perform automatic measurement.

8-1 Setting of the trigger mode and trigger level

Click the Data trigger measurement from "Auto measurement" button menu on the Measurement panel.



Setting items

ON/OFF : Turn ON the channel that is the target of data trigger measurement.
When the SET is set to OFF, trigger measurement is not started even if the channel is set to ON.

Trigger level : Input the trigger level by physical quantity. In [], the value equivalent to input signal is displayed.

Trigger mode : Select the trigger mode from Relative, Upper and Lower.
Relative : The measured value when starting the data trigger measurement is taken as a reference value. Trigger measurement is started when the measured value changes by the trigger level from the reference value.
Upper : When the measurement value exceeds the trigger level, trigger measurement is started.
Lower : When the measurement value drops below the trigger level, trigger measurement is started.



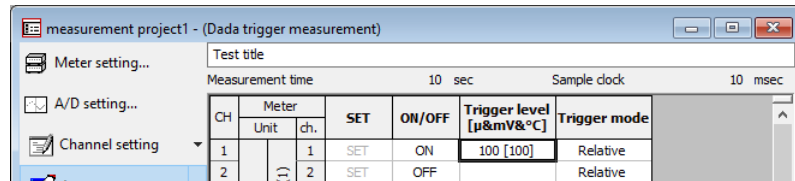
If a - (negative) polarity is set as a calibration coefficient, the polarity of the physical quantity of the trigger level and that of the value in [] is reversed. If you perform data trigger measurement in this condition, the trigger value that is judged from input signal by instrument does not correspond to the value that is judged from data of physical quantity. Please pay sufficient attention to it in setting.



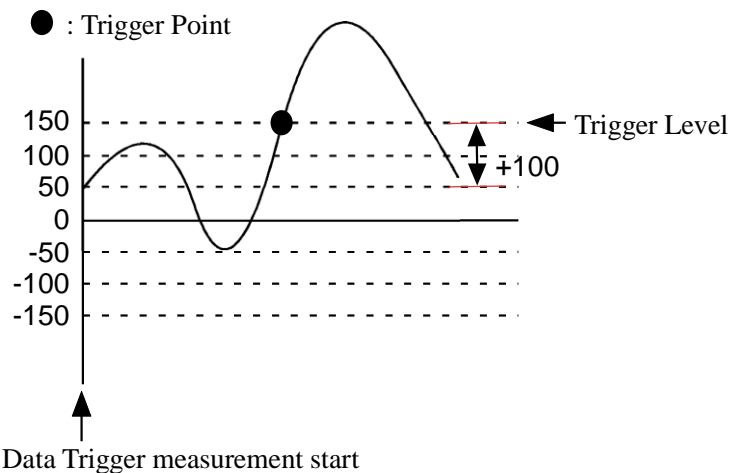
If frequency data are included in the recording data, data trigger measurement cannot be performed.

8-2 Example of Data trigger measurement

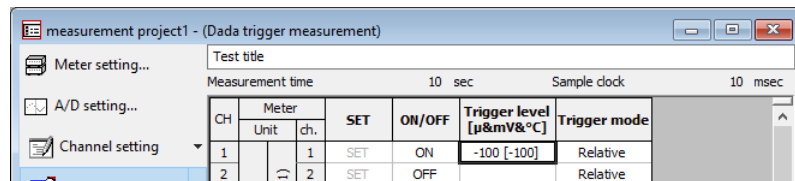
- When the trigger mode is set to Relative and the trigger level is set to a positive value.



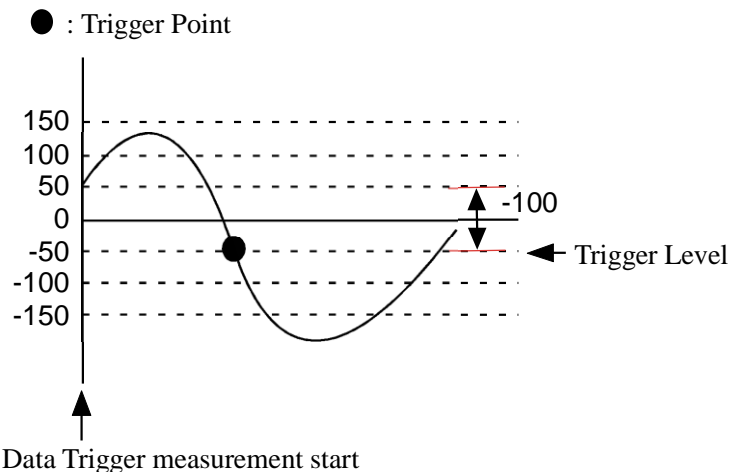
In the above setting, measurement is performed, when the measurement data has changed by +100 from the measurement value at the start of data trigger measurement.



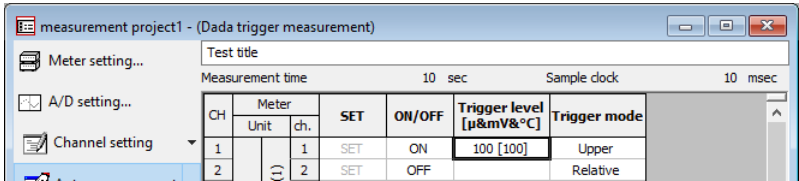
- When the trigger mode is set to Relative and the trigger level is set to a negative value.



In the above setting, measurement is performed, when the measurement data has changed by -100 from the measurement value at the start of data trigger measurement.

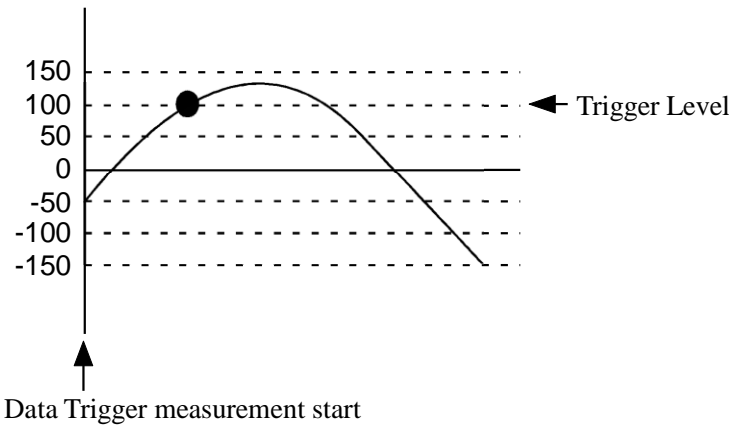


■ When the trigger mode is set to Upper

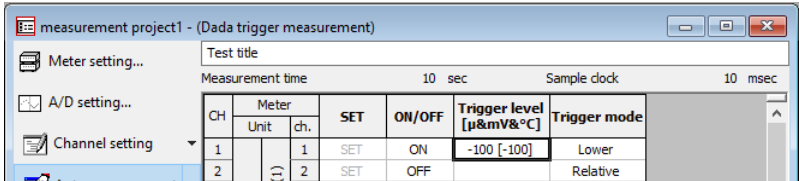


In the above setting, measurement is performed when the measurement data has exceeded +100.

● :Trigger Point

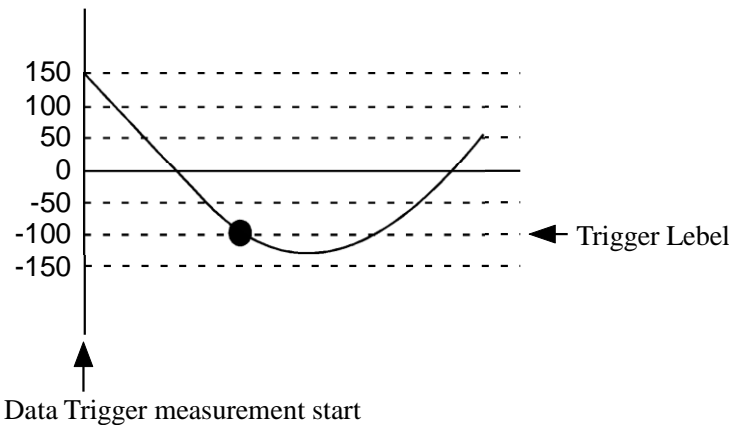


■ When the trigger mode is set to Lower



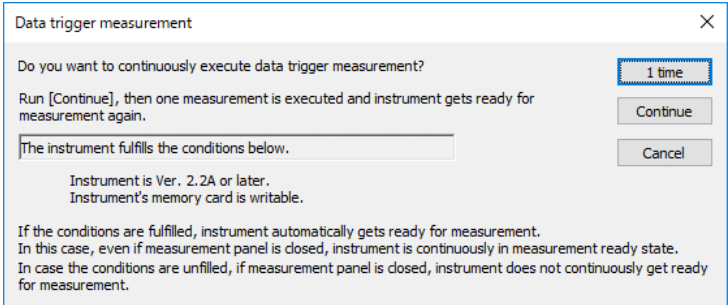
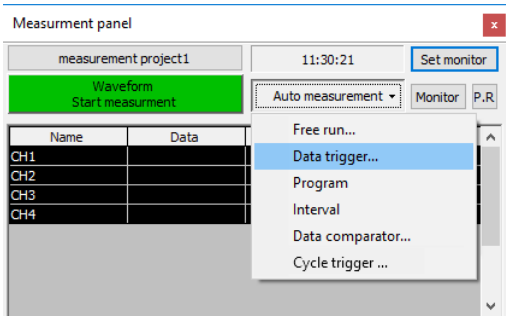
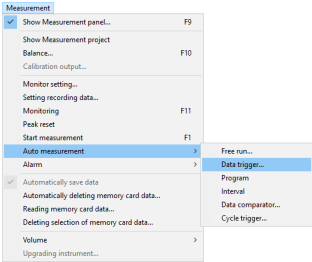
In the above setting, measurement is performed when the measurement data has gone below -100.

● :Trigger Point



8-3 Start of Data trigger measurement

Click the Data trigger... from "Auto measurement" button menu on the Measurement panel.

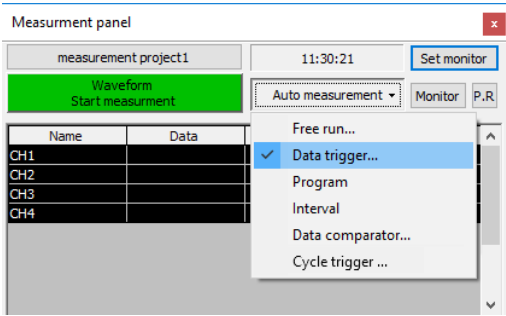


In case of clicking the "1 time" button, the data trigger measurement will be executed only once.

In case of clicking the "Continue" button, the data trigger measurement will be executed, then becomes waiting state.

8-4 Stop of Data trigger measurement

To stop data trigger measurement, click the Data trigger... from "Auto measurement" button menu on the Measurement panel.



Refer to "Chapter 5: 6 Stop of manual measurement" (Page 5-9) for stopping the measurement.

9 Program measurement

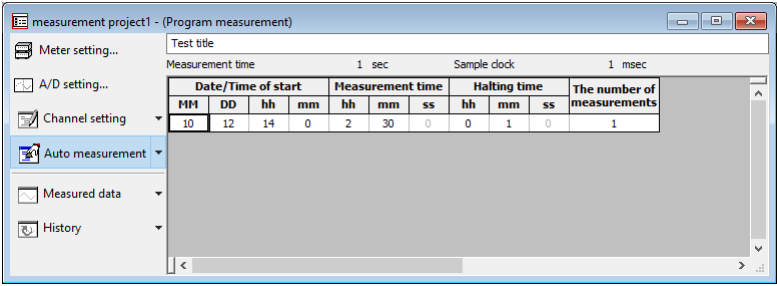
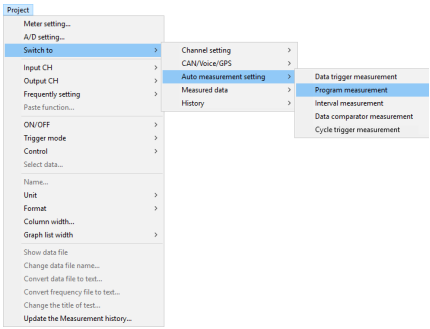
Program measurement is performed at the specified time and with the specified interval.



If no memory card is inserted, you cannot start program measurement.

9-1 Setting the program measurement

Select the Program measurement in Auto measurement setting of the Measurement project.



Setting items

Date/Time of start

: Set the date and time to start measurement.

Measurement time

: Set the measurement time.

If this setting time is longer than the one set for the A/D conversion setting:

In low-speed mode, measurement is performed in the same way as free run measurement.

In high-speed mode, measurement is performed only for the time of A/D conversion setting.

Halting time : Set the time to pause measurement until the next measurement is started.

The number of measurements

: Set the number to repeat measurement.

■ In case the setting requires recording of frequency data

Waveform + frequency data and Frequency data only

: Frequency analysis is performed from the measurement start time for the duration of the measurement time. As many frequency data files as necessary for the specified number of measurements are created.



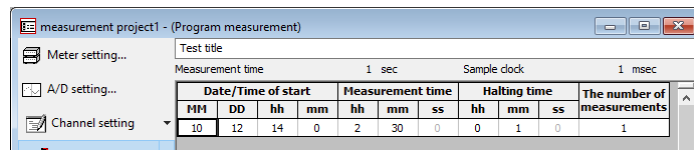
If lack of space on memory card occurs, waveform data will not be recorded. However frequency data will be created continuously until the memory card becomes full.



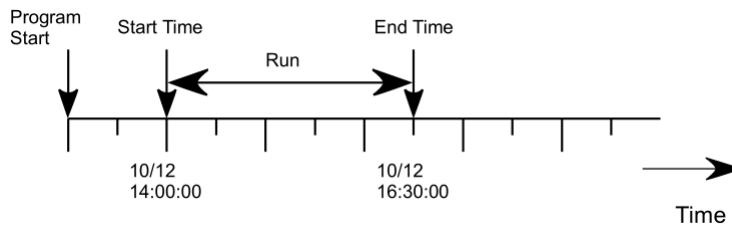
Even if the time has come to start the next measurement while the measurement instrument is writing data to memory card, new measurement will not be started.

9-2 Example of Program measurement setting

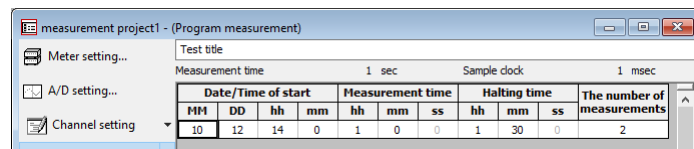
- If measurement is performed from the specified start date/time for the specified measurement time:



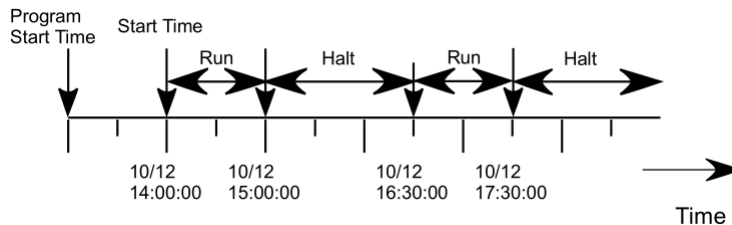
Measurement is started at 14:00:00 on October 12, and finished at 16:30:00 on October 12.



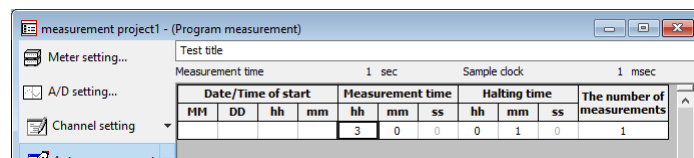
- If interval measurement is performed from the specified start date/time for a specified number of times



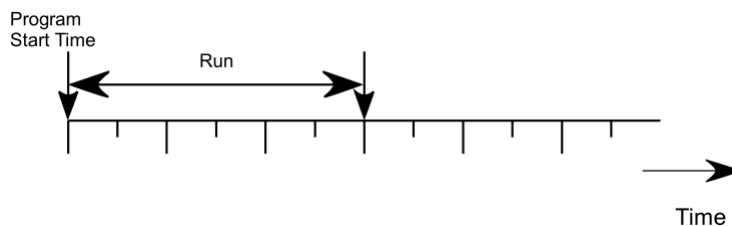
One hour measurement is performed from 14:00:00 on October 12, and pauses 1 hour and 30 minutes. This series of operation is repeated twice.



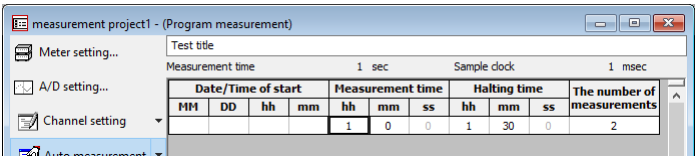
- If measurement is performed for the specified time from the start of program measurement



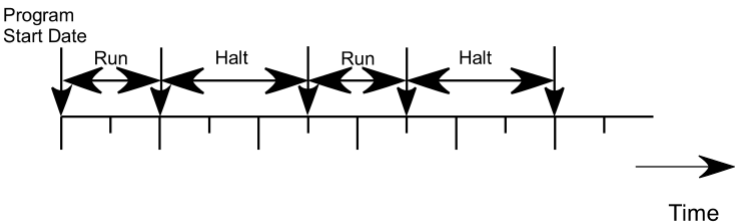
Measurement is performed for three hours from the start of program measurement.



If interval measurement is performed from the start of program measurement.

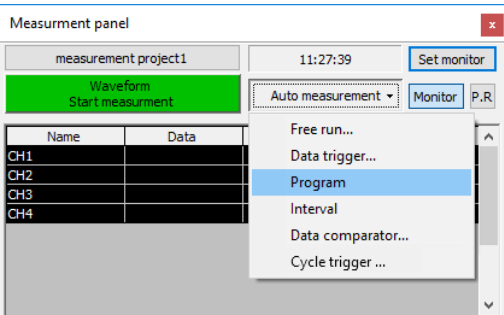
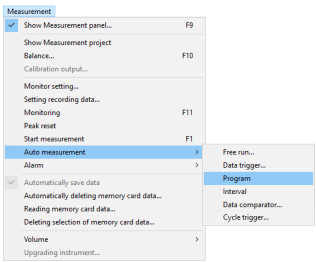


One hour measurement is performed at the start of program measurement, and then comes a pause of 1 hour and 30 minutes. This series of operation is repeated twice.



9-3 Start of Program measurement

To start program measurement, click the Program from "Auto measurement" button menu on the Measurement panel.



9-4 Stop of Program measurement

To stop program measurement, click the "Stop measurement" button on the Measurement panel.



Refer to "Chapter 5: 6 Stop of manual measurement" (Page 5-9) for stopping the measurement.

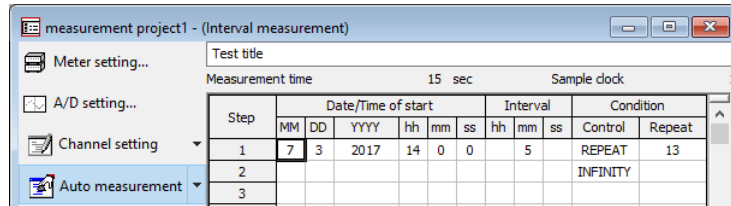
10 Interval measurement

The measurement is automatically performed with set time and interval.

The interval measurement is executed in order from step 1 to step 100. If the next interval cannot be calculated, the measurement is terminated.

10-1 Setting the interval measurement time

Click the Interval measurement from "Auto measurement" button menu on the Measurement panel.



Setting items

Date/Time of start

: Set the year, month, day and time to start the interval measurement.

When it is not set, the time when the interval measurement is started or when the previous step is terminated is the measurement start time.

When the year, month and day are omitted, the measurement is started from the set time.

Interval : Set it within hour (1 to 1000), minute (1 to 59) and second (1 to 59). If the measurement start time has already passed, measurement is performed at the relevant time calculated from the measurement start time.

Condition : The control is selected from INFINITY, REPEAT and GOTO.

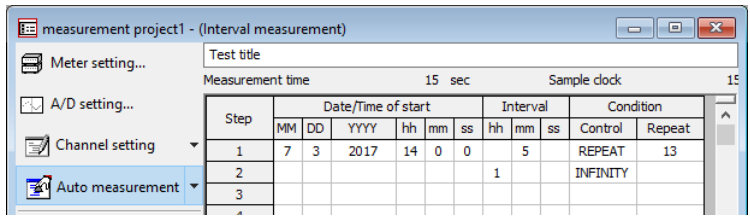
INFINITY : Measurement is performed until the measurement is stopped manually.

REPEAT : Measurement is repeated for the number of times that is specified by Repeat.

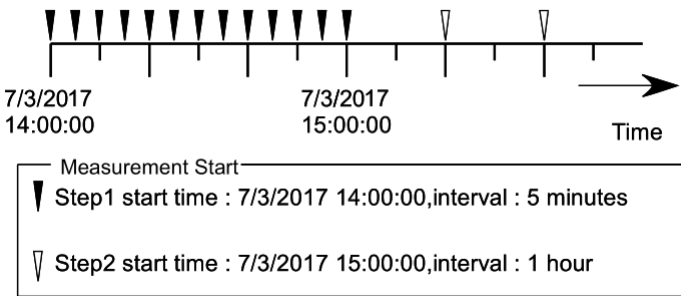
GOTO : It shifts to the step that is specified by Repeat. Measurement start time and measurement interval are ignored.

10-2 Example of Interval measurement setting

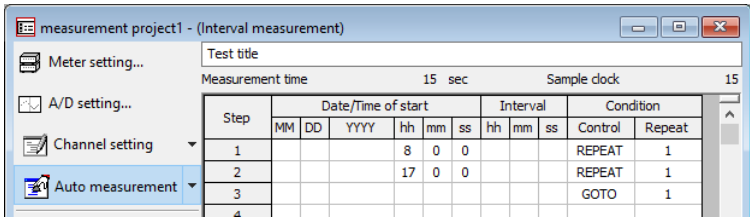
- When the measurement is performed at specified intervals from the start time



With the setting shown in the figure above, the measurement is performed 13 times at 5 minutes intervals from 14:00:00 on 2017/7/3, and the measurement is performed at one hour intervals from 15:00:00 on 2017/7/3.



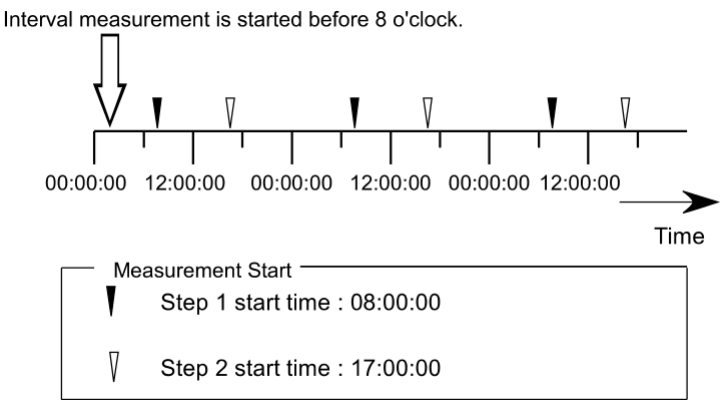
- When the measurement is performed twice a day at fixed time



With the setting shown in the figure above, the measurement is performed once at 08:00:00 after starting interval measurement, and next, measurement is performed once at 17:00:00, then returning to step 1 again and the measurement is performed at next 08:00:00. After that, the measurement is repeated until the interval measurement is terminated manually.

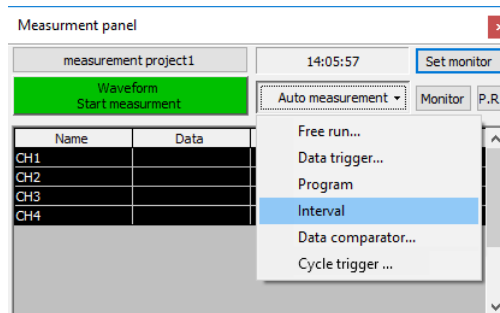
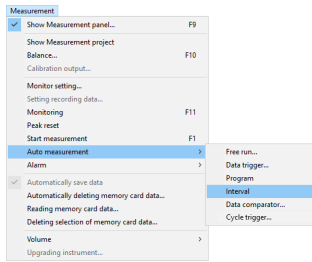


When the interval measurement is started at between 8:00 and 17:00, take note that the measurement is not performed at 17:00 on that day. In that case, set 17:00:00 and 8:00:00 to step 1 and step 2, respectively.



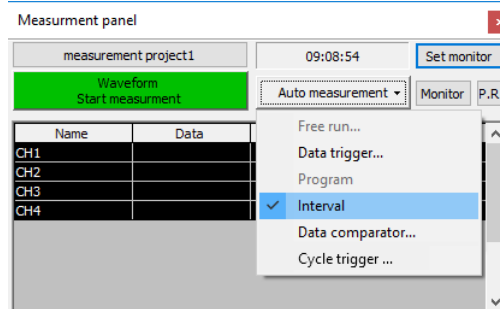
10-3 Start of Interval measurement

For starting the interval measurement, click the Interval from "Auto measurement" button menu of Measurement panel.



10-4 Stop of Interval measurement

To stop the interval measurement, click the Interval from "Auto measurement" button menu on the Measurement panel.



Refer to "Chapter 5: 6 Stop of manual measurement" (Page 5-9) for stopping the measurement.

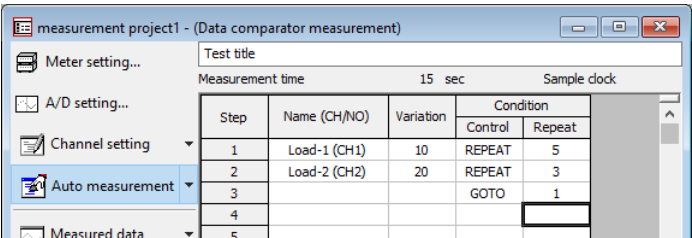
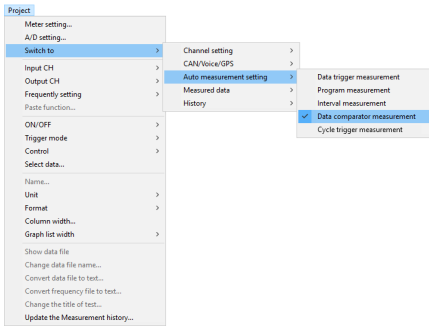
11 Data comparator measurement

Every time when the measurement data for which relative variation is set reaches the relative variation, the automatic measurement is performed.

The data comparator measurement is executed in order from step 1 to step 100. When the next variation cannot be calculated, the measurement is terminated.

11-1 Setting the data comparator measurement

Click the Data comparator measurement from "Auto measurement" button menu on the Measurement panel.

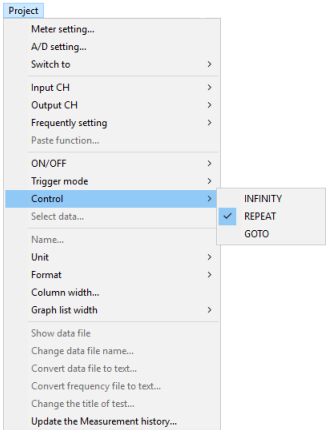
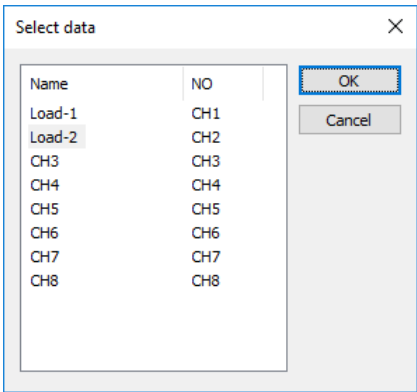


Setting items

Name (CH/NO)

: Input the channel number which is used for the data comparator measurement. Or select data from the dialog box which is displayed by double clicking.

When inputting the number of extended CH, input it by adding 500 to number of NO. For example, NO1 is input as 501.



Variation : Input the relative variation in physical quantity.

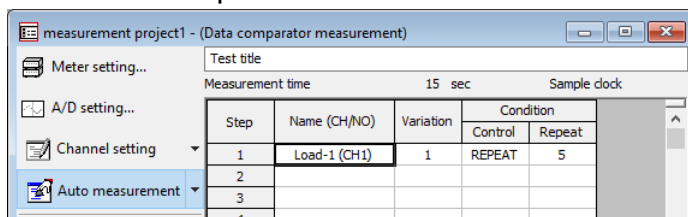
Condition : The control is selected from INFINITY, REPEAT and GOTO.

INFINITY : The measurement is performed until the measurement is stopped manually.

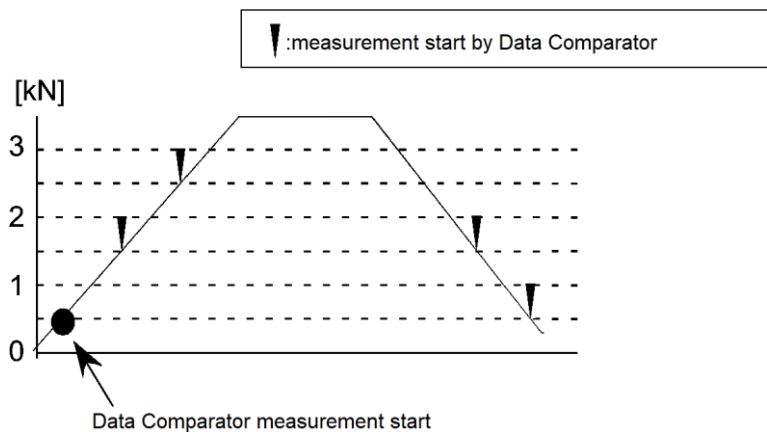
REPEAT : The measurement is repeated for the number of times that is specified by Repeat.

GOTO : It shifts to the step that is specified by Repeat. The Name and Variation are ignored.

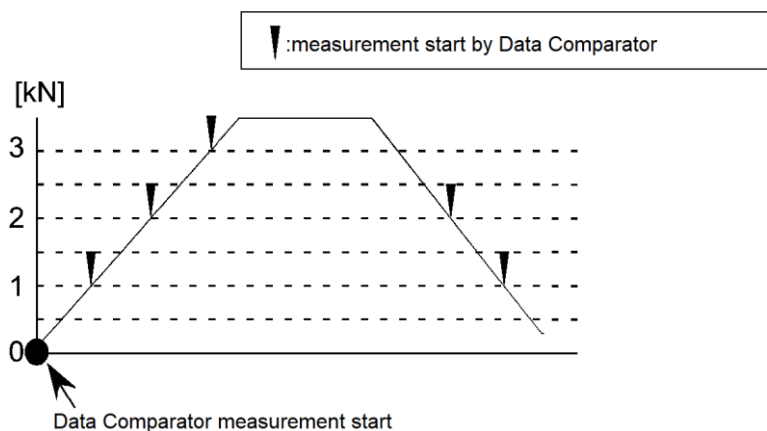
11-2 Example of Data comparator measurement



■ When [Setting the current value to reference value]



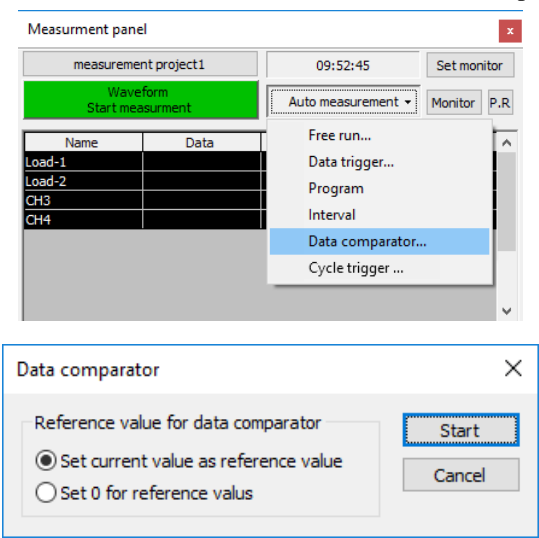
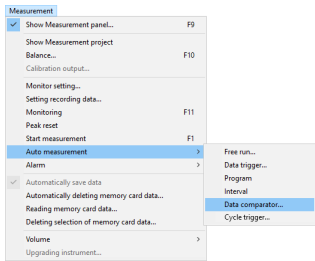
■ When [Setting the reference value to 0]



When the variation of measurement data is greater than variation that is set for data comparator, the measurement may be skipped. When the measurement value exceeds 2kN immediately after the measurement shown in the figure above is started, the measurement with 1kN is not performed and the measurement with 2kN is performed. At this time, the number of repetitions is judged as twice measurements, so measurements are performed three times after that, and the data comparator measurement is terminated.

11-3 Start of Data comparator measurement

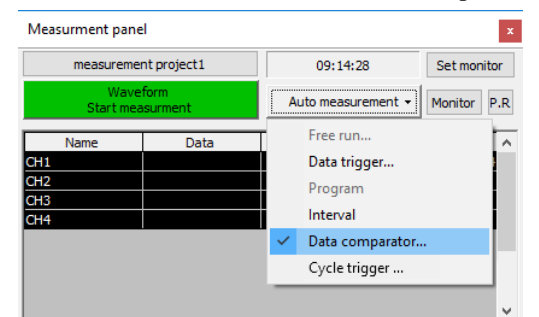
For starting the data comparator measurement, click the Data comparator... from "Auto measurement" button menu on the Measurement panel.



Select either "Set current value as reference value" or "Set 0 for reference value" for reference value, then click "Start" for starting Data comparator measurement.

11-4 Stop of Data comparator measurement

To stop the data comparator measurement, click the Data comparator... from "Auto measurement" button menu on the Measurement panel.



Refer to "Chapter 5: 6 Stop of manual measurement" (Page 5-9) for stopping the measurement.

12 Offline measurement

After automatic measurement is started, measurement continues by instrument itself even if a connection between computer and instrument is disconnected. This is called "Offline measurement".



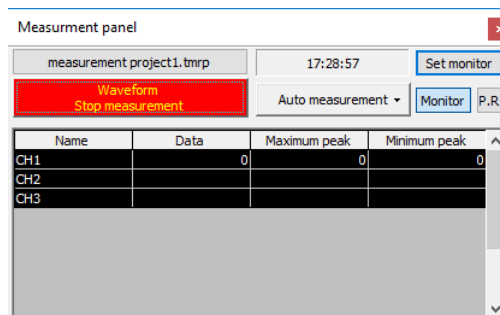
Interval measurement and Data comparator measurement are unavailable to use as offline measurement.

In case of using TMR-211, its firmware should be 2.2A or later. If not so, Data trigger measurement cannot be used for this function.

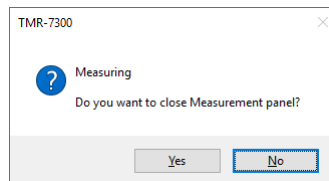
Offline measurement needs a memory card inserted into the instrument.

12-1 Start of Offline measurement

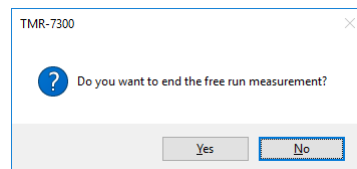
Start automatic measurement of Free run measurement, Data trigger measurement, or Program measurement.



The connection between computer and instrument is disconnected by closing the Measurement panel. The first dialog box appears for closing panel. Select "Yes". Then next dialog box appears for stopping the current measurement. Select "No".



Select "Yes"



Select "No"

12-2 Obtain the data of Offline measurement

The measurement data is recorded to the memory card by offline measurement. You can obtain this data by two ways of following methods.



■ Reads memory card data via interface

Refer to "Chapter 5: 16 Reading memory card data" (Page 5-30) for more detail.



■ Reads memory card data directly

Refer to "Chapter 7: 6 Reading instrument data" (Page 7-20) for more detail.

13 Alarm function

When the measurement data exceeds the alarm upper or lower limits, the alarm is sounded and the data name is displayed in alarm panel.

13-1 Setting the alarm level

The alarm upper and lower limits are set in Input CH or Expanded CH in the Measurement project.



Refer to "Chapter 4: 6-15 Setting the alarm value" (Page 4-18) or "Chapter 4: 9-5 Setting the alarm value" (Page 4-29) for setting.

measurement project1.tmp - (Input CH)

Meter setting...

A/D setting...

Channel setting

Auto measurement

Measured data

History

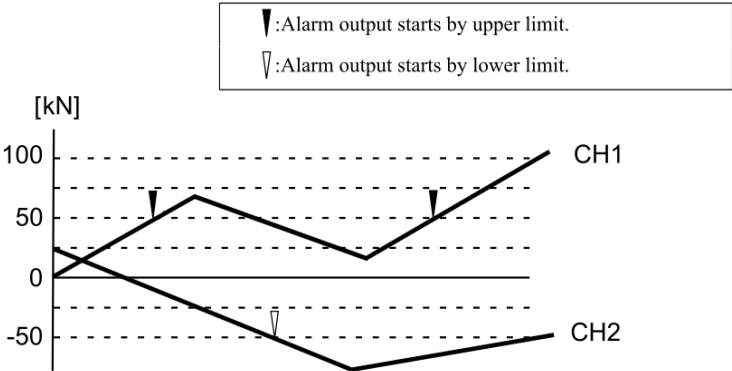
Test title

Measurement time 15 sec Sample dock 15 msec

CH	Meter		Format	Alarm			Option		
	Unit	ch.		ON/OFF	Upper	Lower	Op.Data1	Op.Data2	Op.Data3
1	TMR-311(1) Strain Full Bridge(1)	1	0	ON	50	-50			
2		2	0	ON	50	-50			
3		3	0	OFF					
4		4	0	OFF					
5		5	0	OFF					
6		6	0	OFF					
7		7	0	OFF					
8		8	0	OFF					

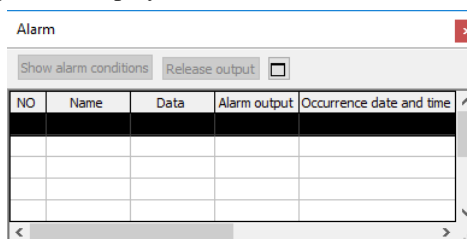
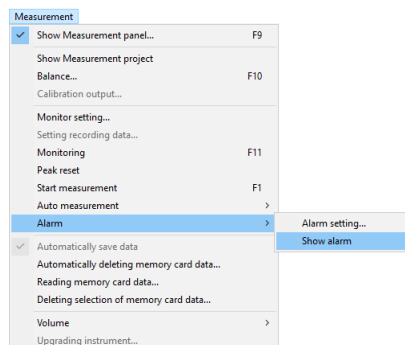
With the setting shown in the figure above, the alarm is generated when the value of measurement data of either CH1 or CH2 exceeds +50 or drops below -50.

- The example of behavior that has been set +50 for upper limit and -50 for lower limit.

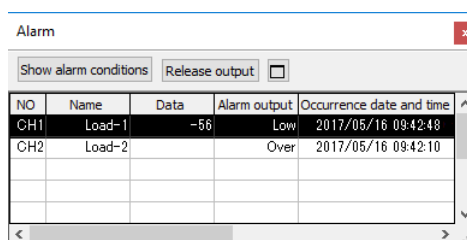


13-2 Starting the alarm display

When Show alarm is selected from the Alarm submenu of the Measurement menu, the alarm panel is displayed.



When monitor measurement is started, the alarm judgement is also started. If the measurement data exceeds the limit, channel information will be displayed on the alarm panel.



Setting items

"Show alarm condition" button

: The alarm condition of selected row is displayed.

"Release output" button

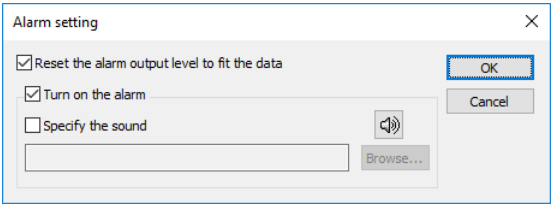
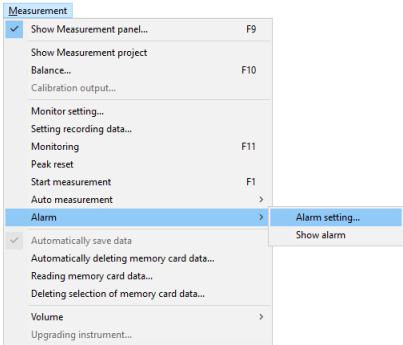
: All alarm outputs are released.

Even if the alarm outputs are released, an alarm is output again during a monitor measurement if the alarm condition is met.

13-3 Changing the alarm operation

It is possible to change the method to reset the alarm output and alarm sound that is sounded when the alarm is generated.

Select Alarm setting... from Alarm submenu of Measurement menu.



Setting items

Reset the alarm output level to fit the data


: When the monitor data changes to the value out of the alarm judgment, the alarm is released.
If not checked, user should stop the alarm manually by clicking the "Release output" button.



When an input signal exceeds the limit and returns immediately, displayed alarm data may not exceed the alarm level.

Turn on the alarm

: It enables to play alarm from computer.

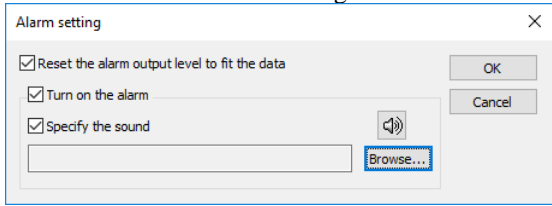
 **Button** : Sound is played.

Specify the sound

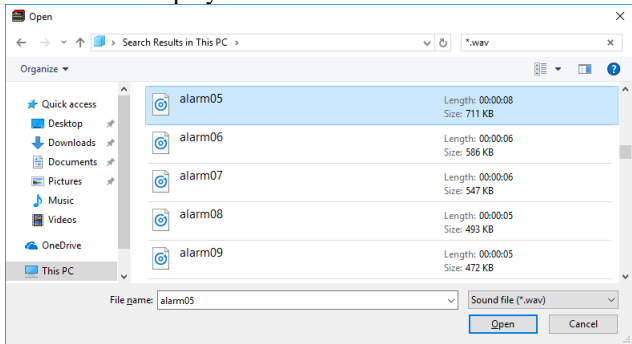
: The sound file specified by "Browse..." button is set to alarm sound.

"Browse..." button

: Click this button when selecting the sound file to be used.



When "Browse..." button is clicked, the dialog box to select sound file is displayed.



Select the sound file to be used and click "Open" button.
Measurement

14 Disabling the automatic save of data

When it is not necessary to record the measurement data to computer, it is possible to disable the function of automatic save.



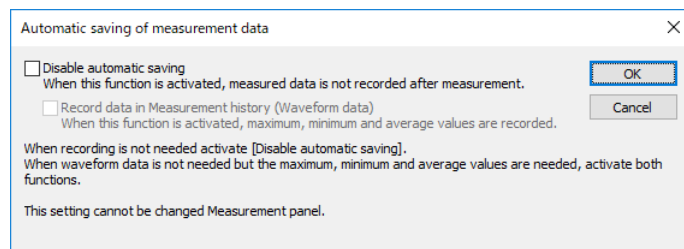
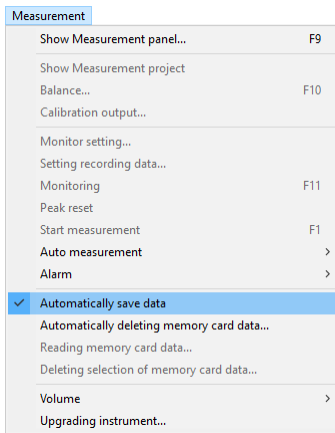
It is not possible to change the setting of measurement data automatic save while the measurement panel is displayed.

Even if you disable the automatic save, the measurement data will be saved to the memory card in the instrument.



If "Auto-deletion of memory card data" function is enabled, the measurement data will not be saved to the memory card.

Select Automatically save data from the Measurement menu.



Setting items

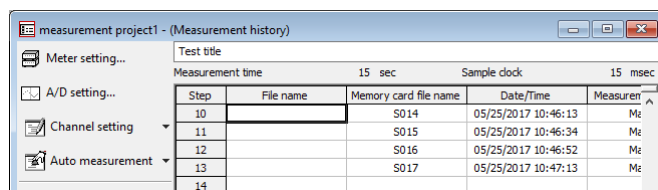
Disable automatic saving

: After measurement, the data is not saved to computer.

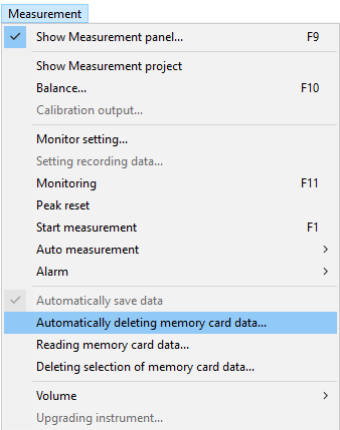
Record data in Measurement history (Waveform data)

: When the automatic save is disabled, the maximum, minimum and average values are recorded in measurement history.

If both "Disable automatic saving" and "Record data (Wave data) in Measurement history" are checked, the column of file name of measurement history will become blank.

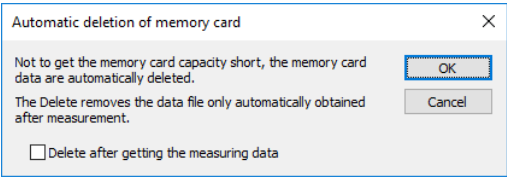


15 Auto-deletion of memory card data



The data file which is automatically acquired after measurement is deleted from the memory card to prevent running out of free space on the card.

Select Automatically deleting memory card data... from the Measurement menu.

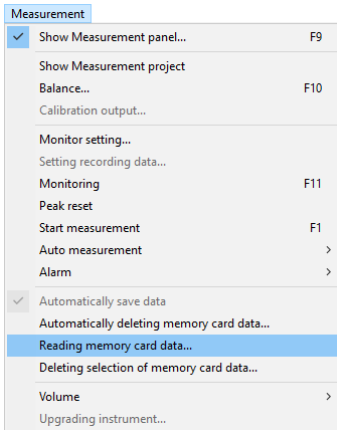


Setting items

Delete after getting the measuring data

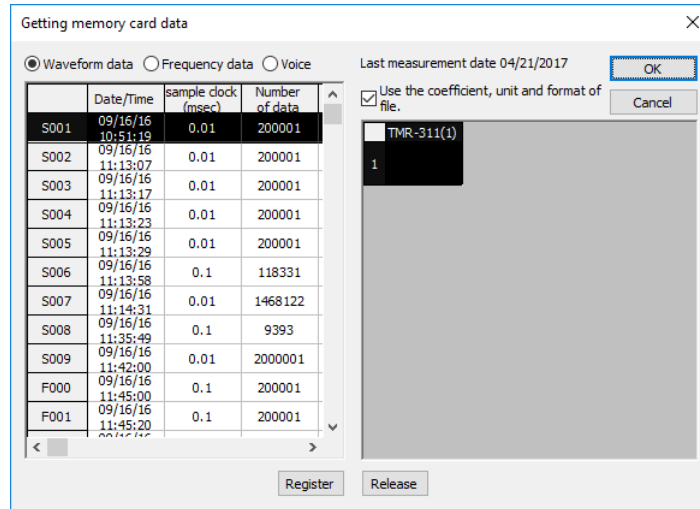
: The data file which is automatically acquired after measurement is deleted from the memory card.

16 Reading memory card data



You can load the measurement data from memory card to computer via interface.

Select Reading memory card data... from the Measurement menu.



Setting items

Waveform data / Frequency data / Voice

: Select the type of data file to display in list.

Use the coefficient, unit and format of file

: If you check this box, the settings of coefficient, unit and format included in the specified folder are applied for reading waveform data. If there are no such data, the setting of the Measurement project is used.

Left list : The measurement data which are recorded in the memory card are listed.

Right list : The measurement data to read are listed. Select the data to read using Register button and Release button.

"Register" button

: The data selected from left data is registered in right list.

"Release" button

: The measurement data selected from right list is deleted from list.

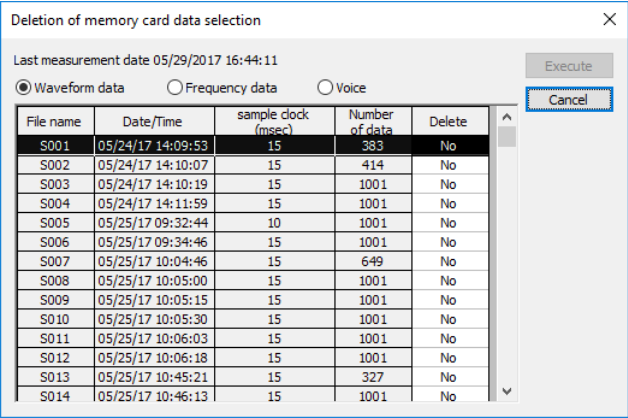
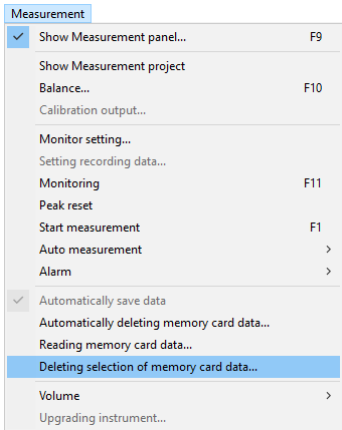


To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

17 Deletion of selected memory card data

Delete the recorded measurement data in the memory card in the instrument.

Select Deleting selection of memory card data... from the Measurement menu.



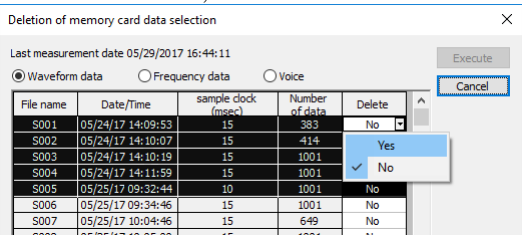
Setting items

Waveform data / Frequency data / Voice

: Select the type of data file to display in list.

Delete

: If "Yes" is selected, its file will be deleted.



"Execute" button

: Selected file is deleted from the memory card.

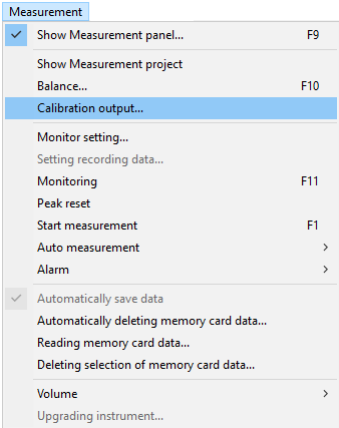


To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

18 Calibration of the voltage output

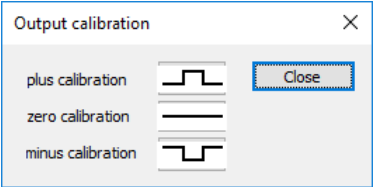


For setting of the calibration values to output, see "Chapter 4: 7-4 How to set the calibration value" (Page 4-21).



The Voltage Output Unit (TMR-241/TMR-341) can output voltage for calibration.

Select Calibration output... from the Measurement menu.



Setting items

"plus calibration" button

: The positive calibration is output.

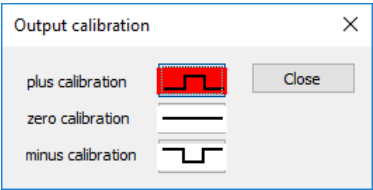
"zero calibration" button

: The 0mV calibration is output.

"minus calibration" button

: The negative calibration is output.

The Output calibration dialog box cannot be closed during output. Click the red button to stop output before closing.



Chapter 6

Charts

This chapter explains how to draw and edit a chart sheet.

The chart is divided into a monitor chart that is drawn in real time, and a data chart that draws already measured data.

1 Monitor chart

A monitor chart is drawn in succession while you are performing monitor measurement.

The interval of data collection differs depending on the number of measurement points, the number of chart, and the computer performance.

A monitor chart can be of the following type:

Line monitor : A line chart is plotted, with the data set on the horizontal and vertical axis.

Elapse monitor: A chart is plotted, with data set on the vertical axis and the elapsed time of monitoring on the horizontal axis.

Vertical-bar monitor

: A bar chart is plotted, with the data set on the vertical axis and the coordinates specified on the horizontal axis.

Horizontal-bar monitor

: A bar chart is plotted, with the data set on the horizontal axis and the coordinates specified on the vertical axis.

X-distribution monitor

: A distribution map is plotted, with the data set on the vertical axis and the coordinates specified on the horizontal axis.

Y-distribution monitor

: A distribution map is plotted, with the data set on the horizontal axis and the coordinates specified on the vertical axis.

Frequency monitor

: The collected data from the measurement instrument are monitored while measuring frequency.

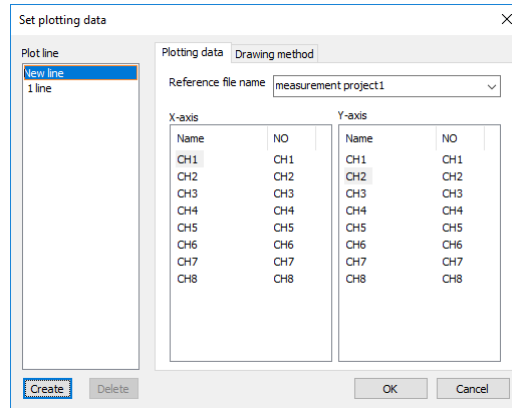
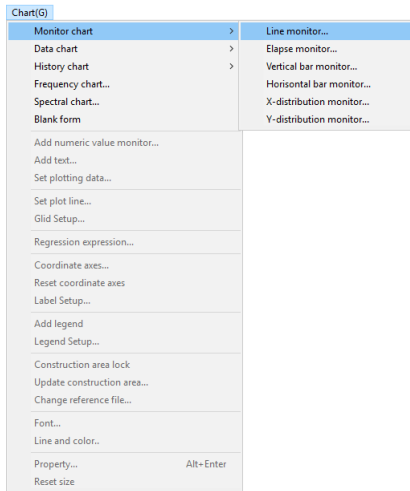


To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

1-1 Drawing the Line monitor chart

A line monitor chart is drawn using lines, with the data set on the horizontal and vertical axes.

When you select Line monitor... from the Monitor chart submenu of Chart menu after selecting a Measurement project, the dialog box is displayed for setting of a chart.



Setting items

New line : Select this to create a new line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

"OK" button : The monitor chart is displayed.

"Cancel" button

: Plotting is canceled.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list / Y-axis list

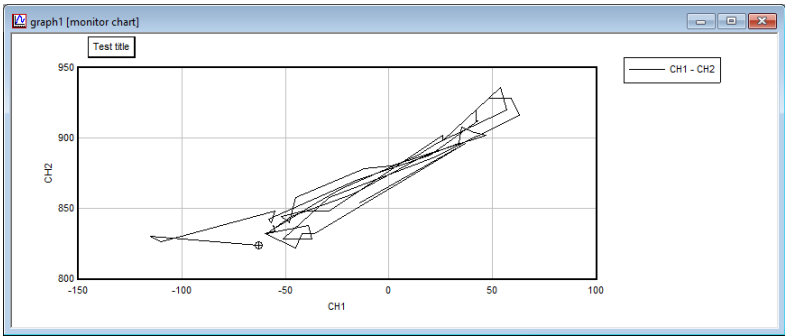
: Select data for plotting.



When creating a new line, if two or more data are selected from either X-axis list or Y-axis list, only one data can be selected from another list.

When changing an existing line, only one data can be selected from either list.

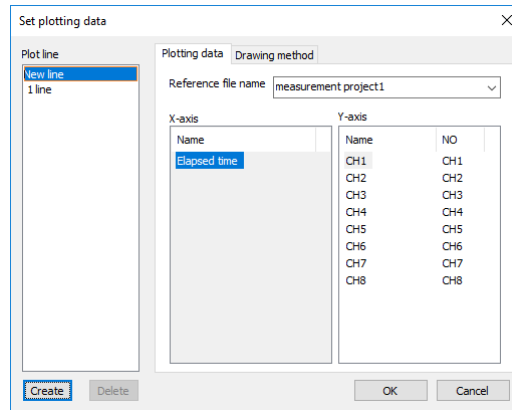
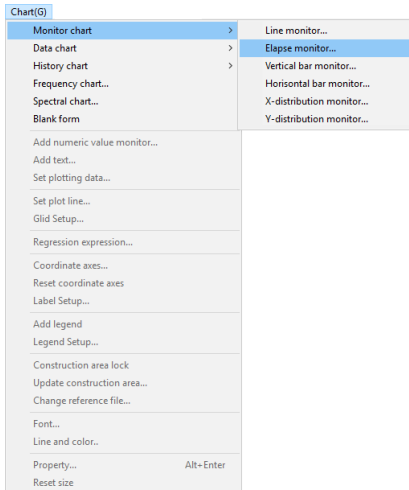
When you click the "OK" button after completion of setting, a line monitor chart is displayed, where data plotting is started simultaneously with start of monitor measurement.



1-2 Drawing the Elapse monitor chart

An Elapse monitor chart is drawn, with the data set on the vertical axis and the elapsed time on the horizontal axis. You can also plot this chart with a fixed plot range on the horizontal axis, so as to shift the plot range automatically, if the specified range is exceeded.

When you select Elapse monitor... from the Monitor chart submenu of Chart menu after selecting a Measurement project, the dialog box is displayed for setting of a chart.



Setting items

New line : Select this to create a new line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

"OK" button : The monitor chart is displayed.

"Cancel" button

: Plotting is canceled.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list : Fixed to Elapsed time.

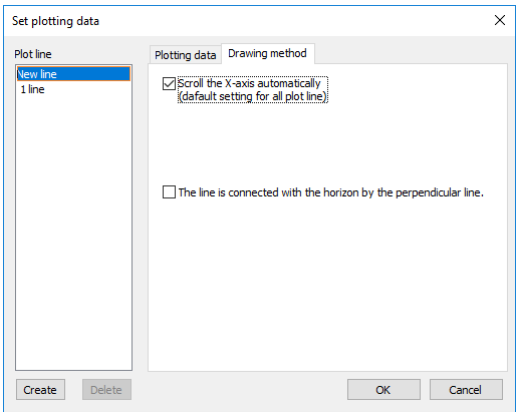
Y-axis list : Select data for plotting.

When creating a new line, two or more data can be selected from Y-axis list.

When changing an existing line, only one data can be selected from the list.



Click the Drawing method tab to specify how to plot.



Drawing method

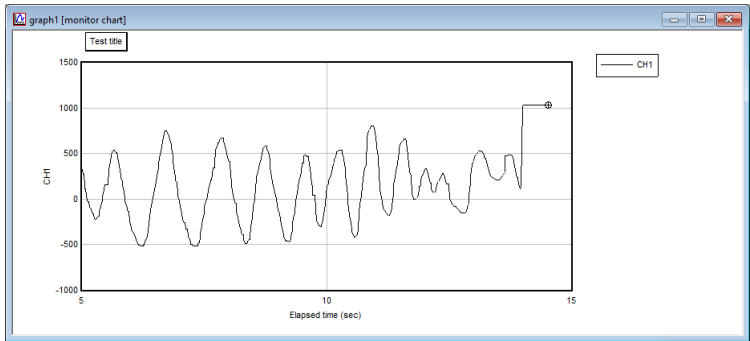
Scroll the X-axis automatically

: When this is enabled, the construction area of X-axis is fixed and when the construction area is exceeded, X-axis is automatically scrolled, and the latest monitor value is always displayed.

The line is connected with the horizon by the perpendicular line.

: The chart is drawn in step-wise pattern by linking the interval between data by horizontal and vertical lines.

When you click the "OK" button after completion of setting, an Elapse monitor chart is displayed, where data plotting is started simultaneously with the start of monitor measurement.



While "Scroll the X-axis automatically" is activated, the plotting range remains fixed, and latest monitor values area displayed there.

1-3 Drawing the Vertical bar monitor chart

In a vertical bar monitor chart, a bar chart is drawn, with the data set on the vertical axis and the coordinates specified on the horizontal axis.

Op. Data 1, 2, and 3 of a Measurement project are used as coordinate data of the X-axis.

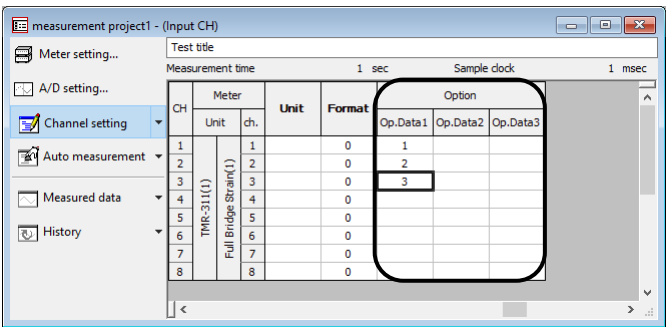
■ How to set the Op. Data (coordinates data)

Op. Data allows you to set coordinate data of up to three patterns.

Select Input CH of Channel Setting in the Measurement project where you plot a chart.

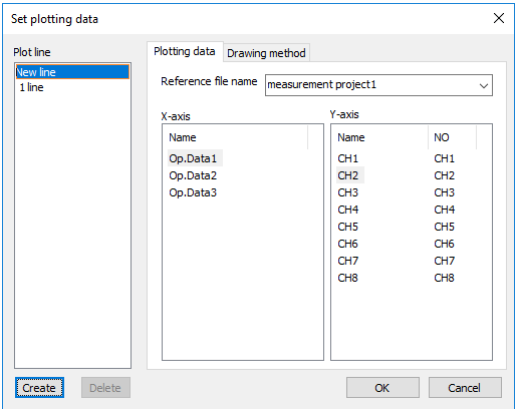
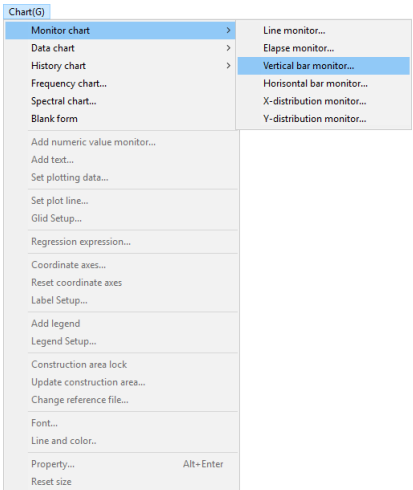
Select the cell to input Op. Data, and then input a numeric value from the keyboard.

Setting Example



■ How to plot a Vertical bar monitor chart

When you select Vertical bar monitor... from the Monitor chart submenu of Chart menu after selecting a Measurement project, the dialog box is displayed for setting of a chart.



Setting items

New line : Select this to create a new line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

"OK" button : The monitor chart is displayed.

"Cancel" button

: Plotting is canceled.

Plotting data

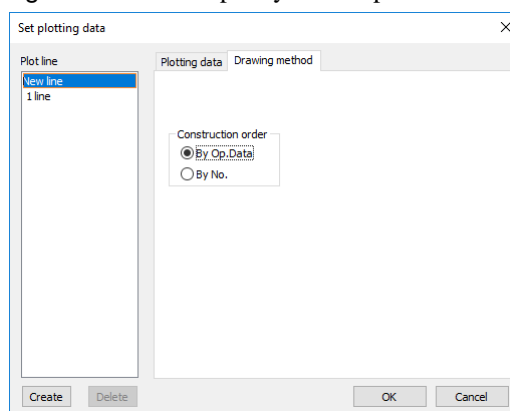
Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list : Select Op. Data for plotting.

Y-axis list : Select data for plotting.

Click the Drawing method tab to specify how to plot.



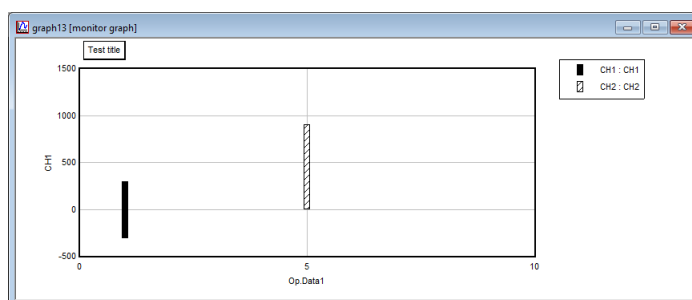
Drawing method

Construction order

By Op.Data : The order of line connection is by Op.Data.

By No. : The order of line connection is by NO of Input CH and Expanded CH.

When you click the "OK" button after completion of setting, a vertical bar monitor chart is displayed, where data plotting is started simultaneously with the start of monitor measurement.

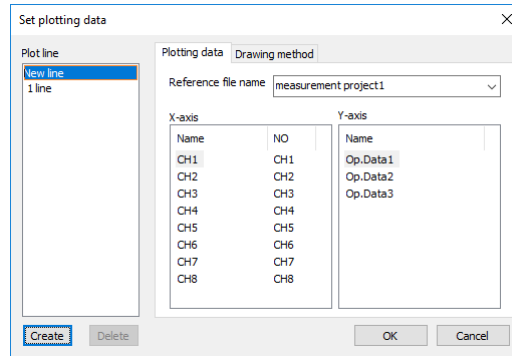
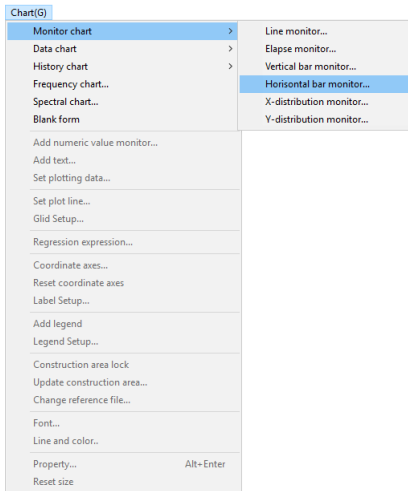


1-4 Drawing the Horizontal bar monitor chart

In a horizontal bar monitor chart, a bar chart is drawn, with the data set on the horizontal axis and the coordinates specified on the vertical axis.

Op. Data 1, 2, and 3 of a Measurement project are used as coordinate data of the Y-axis.

When you select Horizontal bar monitor... from the Monitor chart submenu of Chart menu after selecting a Measurement project, the dialog box is displayed for setting of a chart.



Setting items

New line : Select this to create a new line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

"OK" button : The monitor chart is displayed.

"Cancel" button

: Plotting is canceled.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

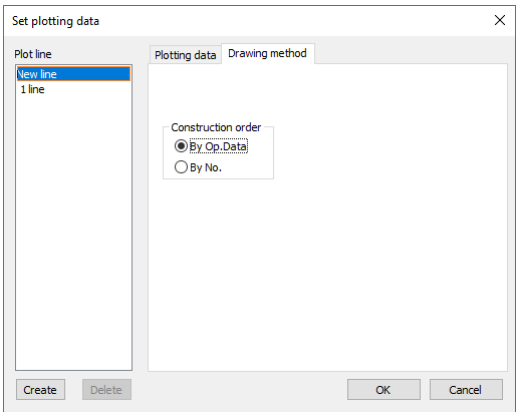
X-axis list : Select data for plotting.

Y-axis list : Select Op. Data for plotting.



For the Op.Data, refer to "1-3 Drawing the Vertical bar monitor chart ■How to set the Op. Data (coordinates data) (Page6-6)".

Click the Drawing method tab to specify how to plot.



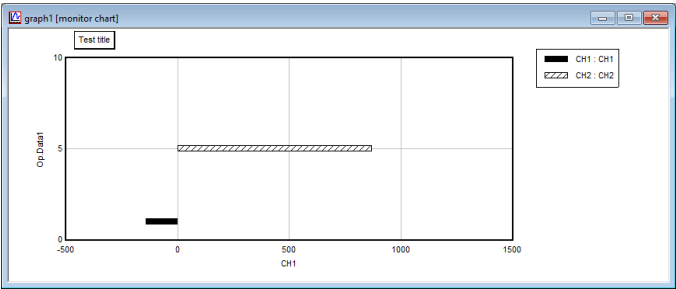
Drawing method

Construction order

By Op.Data : The order of line connection is by Op.Data.

By No. : The order of line connection is by NO of Input CH and Expanded CH.

When you click the "OK" button after completion of setting, a horizontal bar monitor chart is displayed, where data plotting is started simultaneously with the start of monitor measurement.

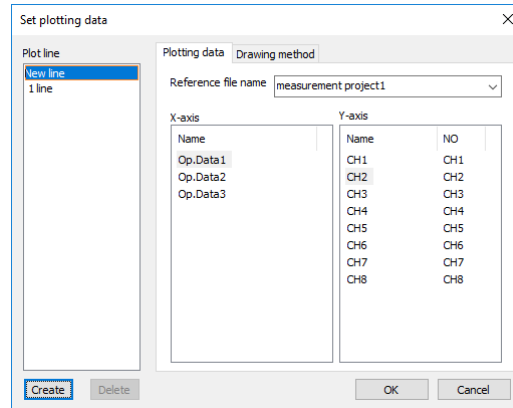
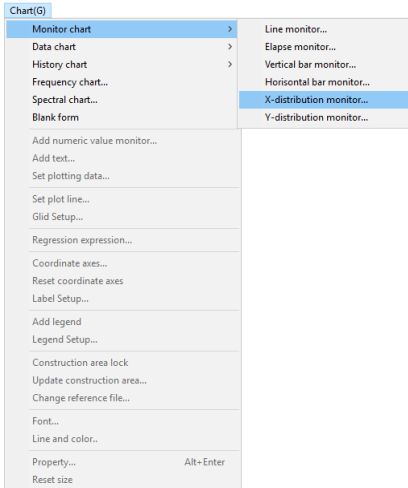


1-5 Drawing the X-distribution monitor chart

In an X-distribution monitor chart, a distribution map is drawn, with the data set on the vertical axis and the coordinates specified on the horizontal axis.

Op. Data 1, 2, and 3 of a Measurement project are used as coordinate data of the X-axis.

When you select X-distribution monitor... from the Monitor chart submenu of Chart menu after selecting a Measurement project, the dialog box is displayed for setting of a chart.



Setting items

New line : Select this to create a new line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

"OK" button : The monitor chart is displayed.

"Cancel" button

: Plotting is canceled.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

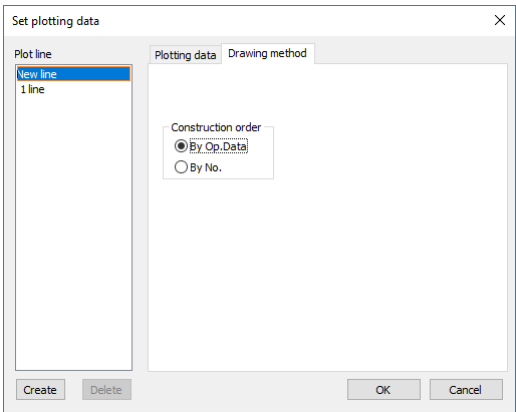
X-axis list : Select Op. Data for plotting.

Y-axis list : Select data for plotting.



For the Op.Data, refer to "1-3 Drawing the Vertical bar monitor chart ■How to set the Op. Data (coordinates data) (Page6-6)".

Click the Drawing method tab to specify how to plot.



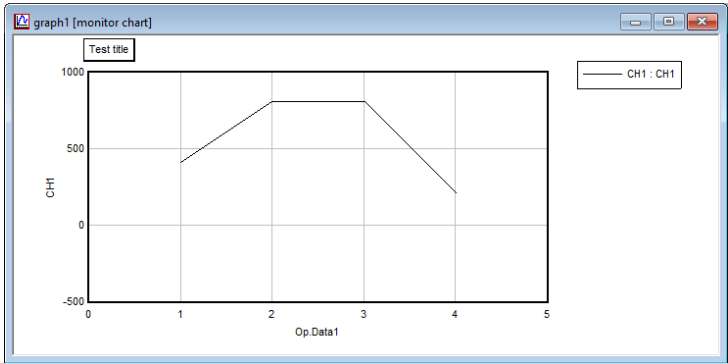
Drawing method

Construction order

By Op.Data : The order of line connection is by Op.Data.

By No. : The order of line connection is by NO of Input CH and Expanded CH.

When you click the "OK" button after completion of setting, an X-distribution monitor chart is displayed, where data plotting is started simultaneously with the start of monitor measurement.

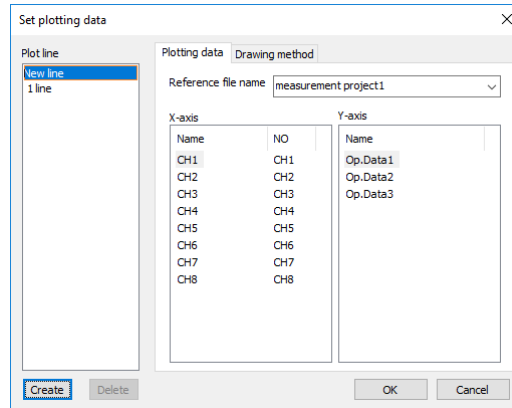
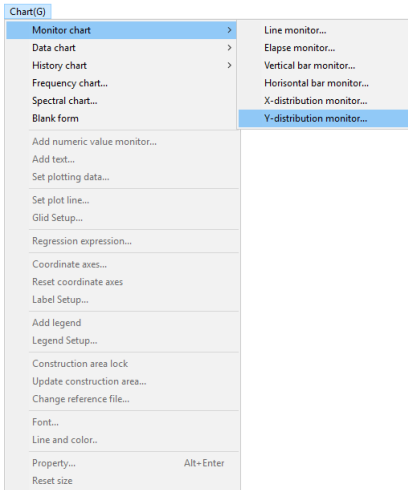


1-6 Drawing the Y-distribution monitor chart

In a Y-distribution monitor chart, a distribution map is drawn, with the data set on the horizontal axis and the coordinates specified on the vertical axis.

Op. Data 1, 2, and 3 of a Measurement project are used as coordinate data of the Y-axis.

When you select Y-distribution monitor... from the Monitor chart submenu of Chart menu after selecting a Measurement project, the dialog box is displayed for setting of a chart.



Setting items

New line : Select this to create a new line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

"OK" button : The monitor chart is displayed.

"Cancel" button

: Plotting is canceled.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

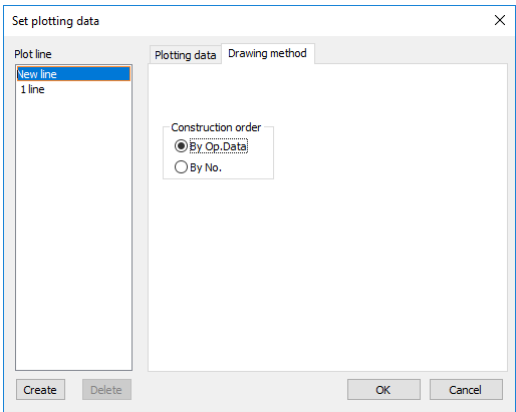
X-axis list : Select data for plotting.

Y-axis list : Select Op. Data for plotting.



For the Op.Data, refer to "1-3 Drawing the Vertical bar monitor chart ■How to set the Op. Data (coordinates data) (Page6-6)".

Click the Drawing method tab to specify how to plot.



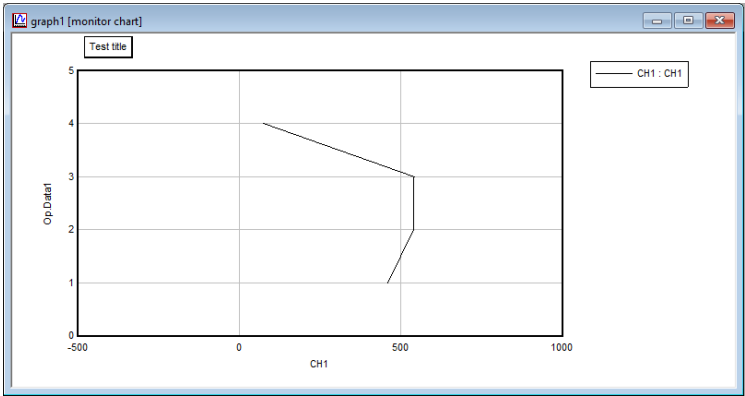
Drawing method

Construction order

By Op.Data : The order of line connection is by Op.Data.

By No. : The order of line connection is by NO of Input CH and Expanded CH.

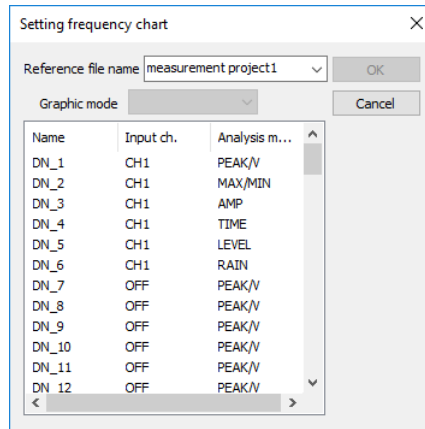
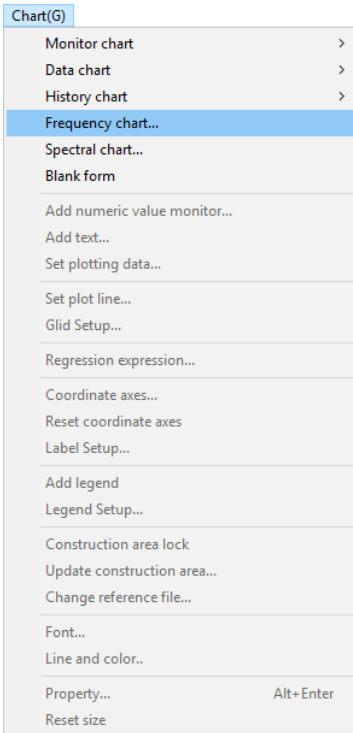
When you click the "OK" button after completion of setting, a Y-distribution monitor chart is displayed, where data plotting is started simultaneously with the start of monitor measurement.



1-7 Drawing the Frequency monitor chart

In a frequency chart, monitor chart is displayed while frequency is measured.

When you select **Frequency chart...** from the **Chart** menu after selecting a Measurement project, the dialog box is displayed for setting of a chart.



Setting items

Reference file name

: Select the file name which is referred to.

When the measurement project is selected, monitor chart is plotted.

However if you use the level-crossing method as the analysis method, no monitor display is shown.

Graphic mode

: Select count data to plot a chart for each analysis method.

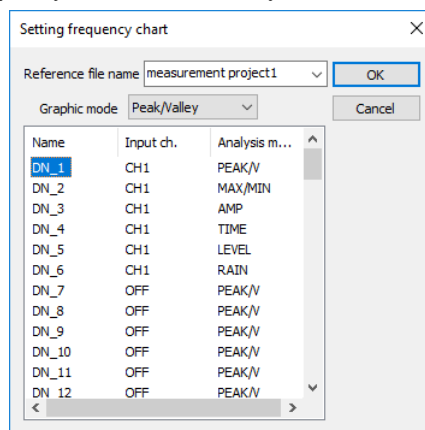
List

: Select frequency data to plot a chart.

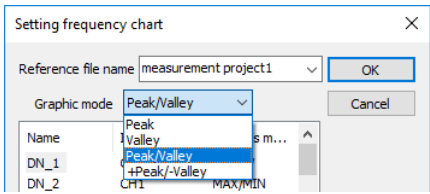
After selecting frequency data from the list, you can select the Graphic mode.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

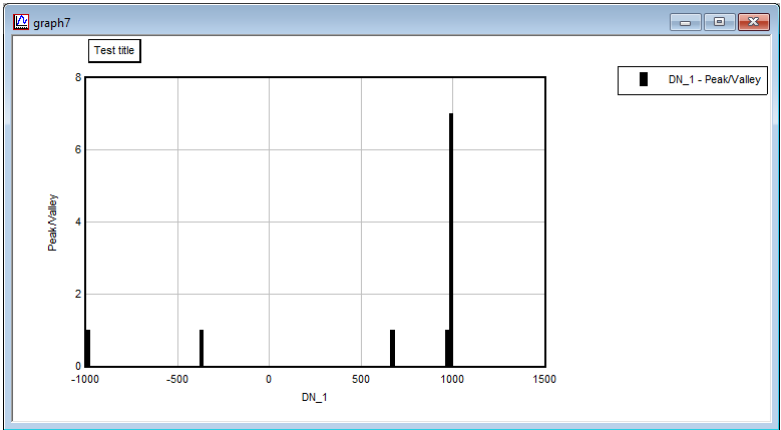


Select count data to plot a chart.



When you click the "OK" button after completion of setting, a frequency chart is displayed.

The measured value is displayed on the X-axis, and the count data is displayed on the Y-axis.



2 Data chart

When a measurement project is referred to, data chart is drawn by the latest measurement data.

When a measurement data is referred to, data chart is drawn by its data.

The data interval is based on A/D conversion setting at the time of the measurement.

Following formats are available for data chart.

- | | |
|-----------------|--|
| Line | : Drawn with line by setting data for horizontal axis and vertical axis. |
| Scatter | : Drawn with dots by setting data for horizontal axis and vertical axis. |
| Elapse diagram | : This diagram is drawn by setting data for vertical axis and setting lapsed time of measurement for horizontal axis. |
| History chart | : This chart is drawn by setting the measurement date and time for horizontal axis and selecting maximum value, minimum value or average value for vertical axis.
Only a measurement project can be referred to by this chart. |
| Frequency chart | : The result of frequency analysis which was recorded in frequency data file is drawn. |
| Spectral chart | : The chart of power spectrum or amplitude spectrum for which FFT analysis is implemented is drawn by selecting arbitrary one channel.
The preprocessing for DC cut, trend cut, hamming window and hanning window are available |
| Cycle chart | : This chart is drawn by setting the measurement date and cycle count for horizontal axis and selecting maximum value, minimum value or average value for vertical axis.
Only a measurement project can be referred to by this chart.
Refer to "Chapter 12: 5-1 Drawing the Cycle chart" (Page 12-10) for more detail. |



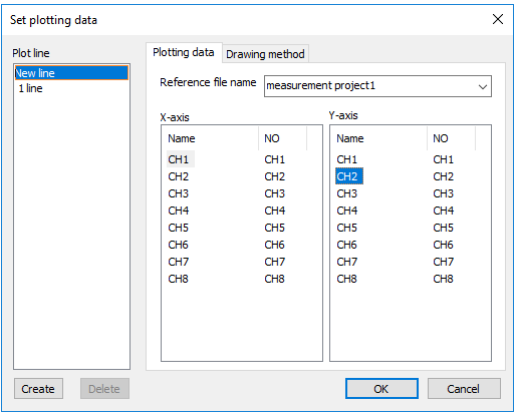
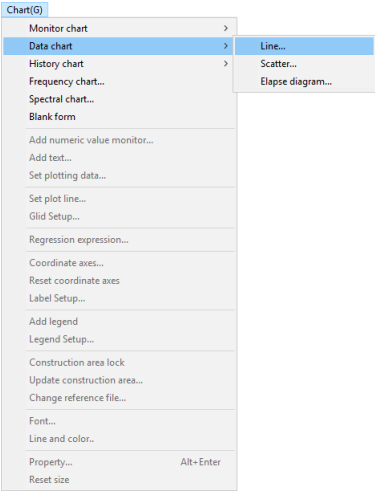
To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).



2-1 Drawing the Line chart

The line chart is drawn with line by setting data for horizontal axis and vertical axis.

When Line... is selected from Data chart submenu of Chart menu with the Measurement project or Measurement data file selected, the dialog box for setting chart is displayed.



Setting items

- New line : Select this to create a new line.
- 1 line ~ : Select this to change current setting of the existing line.
- "Create" button : A new plot line is added.
- "Delete" button : A selected line is deleted.
- "OK" button : The data chart is displayed.
- "Cancel" button : Drawing is canceled.

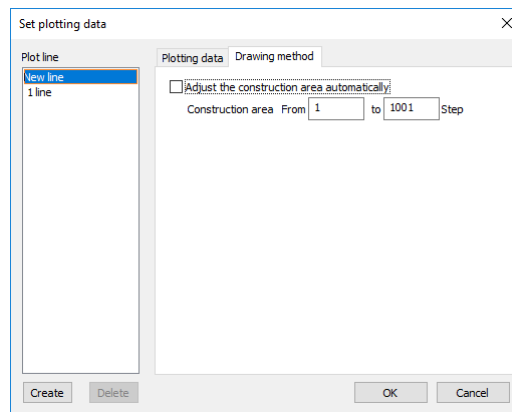
Plotting data

- Reference file name : When multiple Measurement projects are opened, select the Measurement project or Measurement data file to be drawn.
- X-axis list/Y-axis list : Select data for plotting.



When creating a new line, if two or more data are selected from either X-axis list or Y-axis list, only one data can be selected from another list.
When changing an existing line, only one data can be selected from either list.

Click the Drawing method tab to specify how to plot.



Drawing method

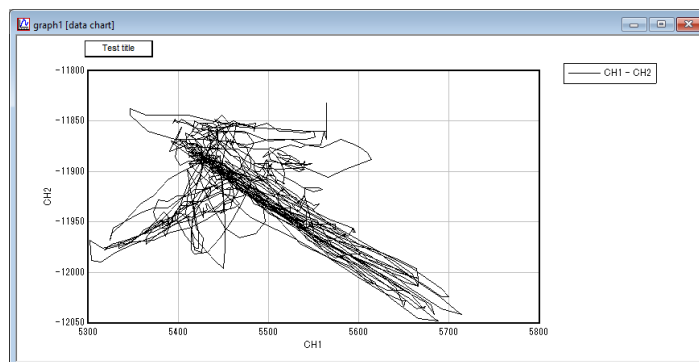
Adjust the construction area automatically

: When this is enabled, all data are plotted. If this is disabled, construction area needs to be specified.

Construction area

: Specify the step of data to be drawn.

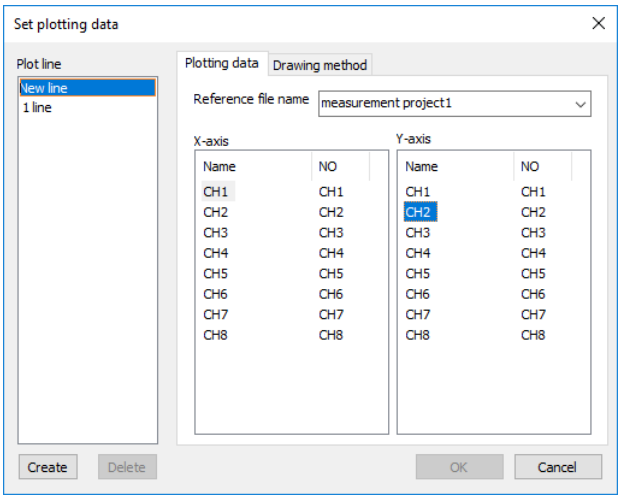
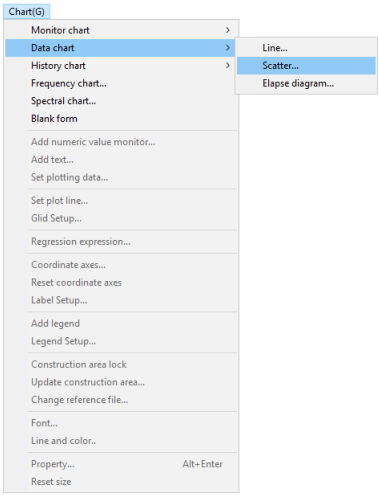
When "OK" button is clicked after setting, the line chart is drawn.



2-2 Drawing the Scatter chart

The scatter chart is drawn with dots by setting data for horizontal axis and vertical axis.

When Scatter... is selected from Data chart submenu of Chart menu with Measurement project or Measurement data file selected, the dialog box for setting chart is displayed.



Setting items

- New line : Select this to create a new line.
- 1 line ~ : Select this to change current setting of the existing line.
- "Create" button : A new plot line is added.
- "Delete" button : A selected line is deleted.
- "OK" button : The data chart is displayed.
- "Cancel" button : Drawing is canceled.

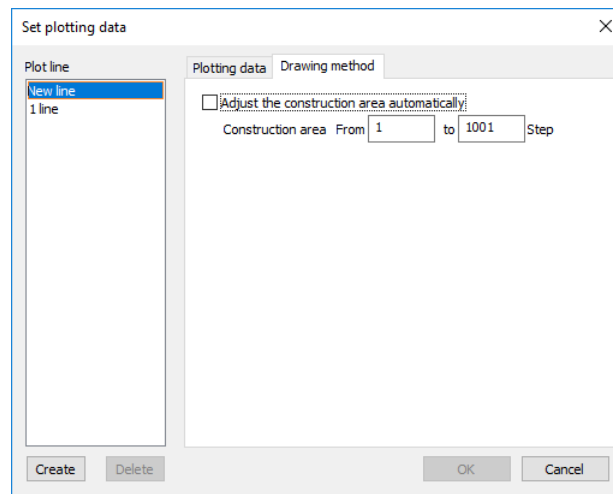
Plotting data

- Reference file name : When multiple Measurement projects are opened, select the Measurement project or Measurement data file to be drawn.
- X-axis list/Y-axis list : Select data for plotting.



When creating a new line, if two or more data are selected from either X-axis list or Y-axis list, only one data can be selected from another list.
When changing an existing line, only one data can be selected from either list.

Click the Drawing method tab to specify how to plot.



Drawing method

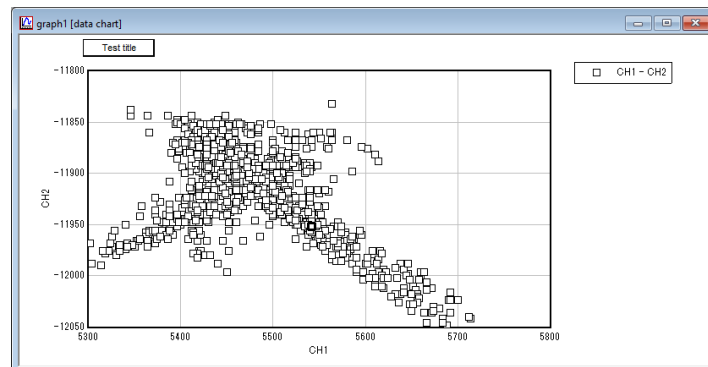
Adjust the construction area automatically

: When this is enabled, all data are plotted. If this is disabled, construction area needs to be specified.

Construction area

: Specify the step of data to be drawn.

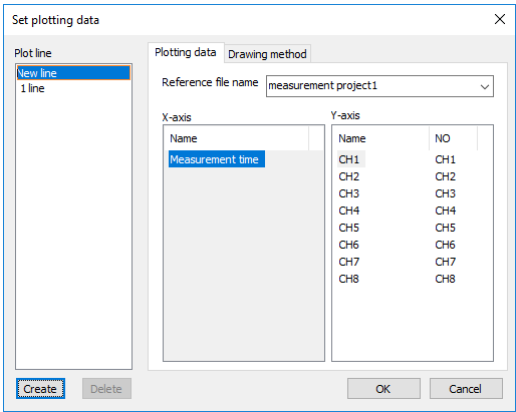
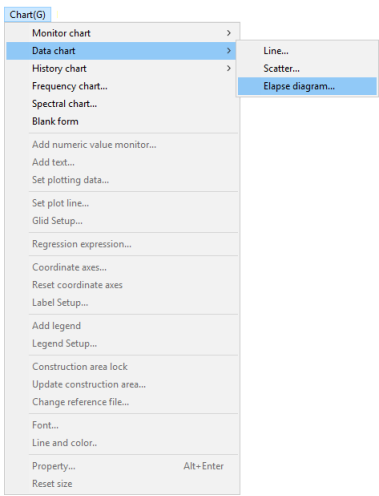
When "OK" button is clicked after setting, the scatter chart is drawn.



2-3 Drawing the Elapse diagram

The elapse diagram is drawn by setting data for vertical axis and setting measurement time for horizontal axis.

When Elapse diagram... is selected from Data chart submenu of Chart menu with the Measurement project or Measurement data file selected, the dialog box for setting chart is displayed.



Setting items

- New line : Select this to create a new line.
- 1 line ~ : Select this to change current setting of the existing line.
- "Create" button : A new plot line is added.
- "Delete" button : A selected line is deleted.
- "OK" button : The data chart is displayed.
- "Cancel" button : Drawing is canceled.

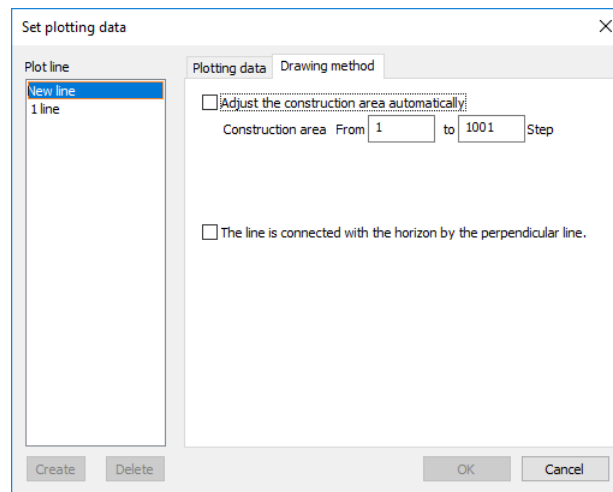
Plotting data

- Reference file name : When multiple Measurement projects are opened, select the Measurement project or Measurement data file to be drawn.
- X-axis list : Fixed to measurement time.
- Y-axis list : Select data for plotting.



When creating a new line, multiple data can be selected from Y-axis list.

Click the Drawing method tab to specify how to plot.



Drawing method

Adjust the construction area automatically

: When this is enabled, all data are plotted. If this is disabled, construction area needs to be specified.

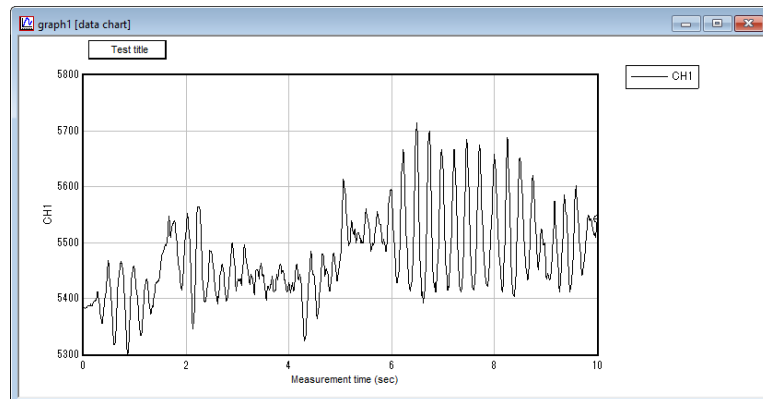
Construction area

: Specify the step of data to be drawn.

The line is connected with the horizon by the perpendicular line.

: The chart can be drawn by linking the interval between data by horizontal and vertical lines.

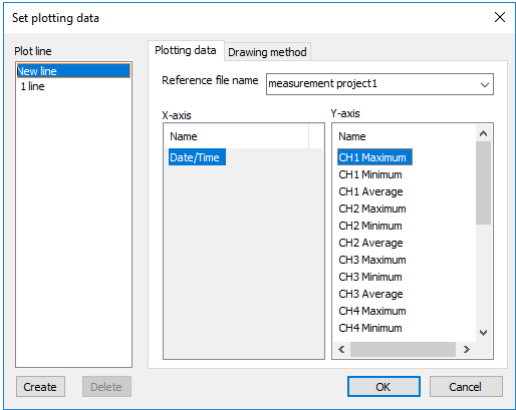
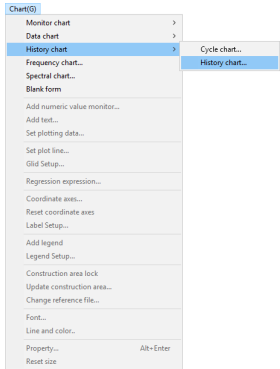
When "OK" button is clicked after setting, the data chart is drawn.



2-4 Drawing the History chart

The history chart is drawn by setting data maximum value, minimum value, and average for vertical axis and setting measurement time for horizontal axis.

When History chart... is selected from History chart submenu of Chart menu with Measurement project selected, the dialog box for setting chart is displayed.



Setting items

- New line : Select this to create a new line.
- 1 line ~ : Select this to change current setting of the existing line.
- "Create" button : A new plot line is created.
- "Delete" button : Selected plot line is deleted.
- "OK" button : The data chart is displayed.
- "Cancel" button : Drawing is canceled.

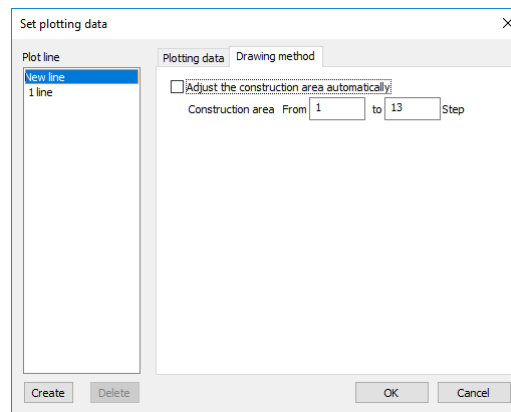
Plotting data

- Reference file name : When multiple Measurement projects are opened, select the Measurement project to be drawn.
- X-axis list : Fixed to measurement time.
- Y-axis list : Select data for plotting.



When creating a new line, multiple data can be selected from Y-axis list.

Click the Drawing method tab to specify how to plot.



Drawing method

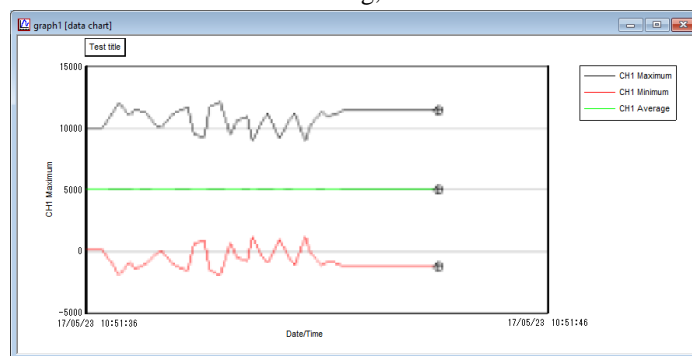
Adjust the construction area automatically

: When this is enabled, all data are plotted. If this is disabled, construction area needs to be specified.

Construction area

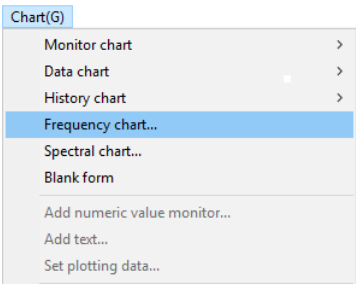
: Specify the step of data to be drawn.

When "OK" button is clicked after setting, the data chart is drawn.

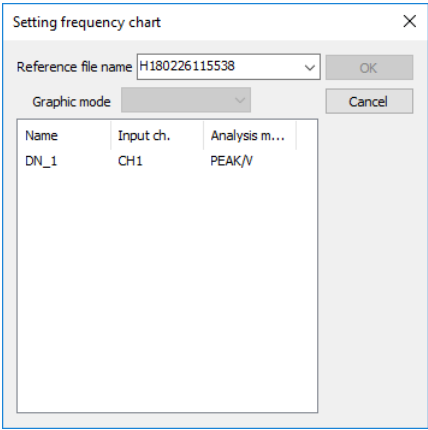


2-5 Drawing the Frequency chart

In a frequency chart, frequency data is displayed.



When you select Frequency chart... from the Chart menu after selecting a Frequency data, the dialog box is displayed for setting of a chart.



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

Setting items

Reference file name

- : Select a file which is referred to.
- When the Frequency data file is selected, a data chart is plotted.

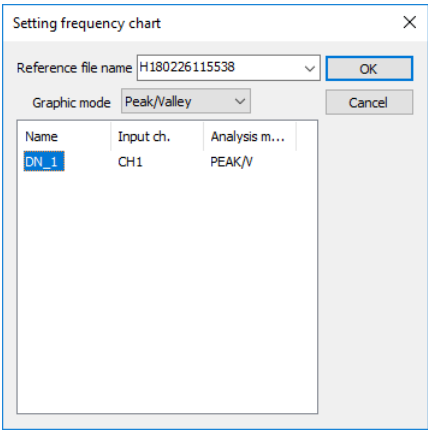
Graphic mode

- : Select count data to plot a chart for each analysis method.

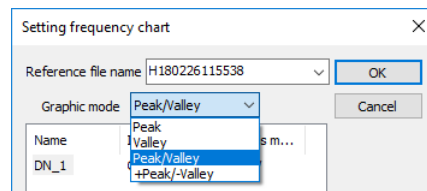
List

- : Select frequency data to plot a chart.

After selecting frequency data from the list, you can select the Graphic mode.

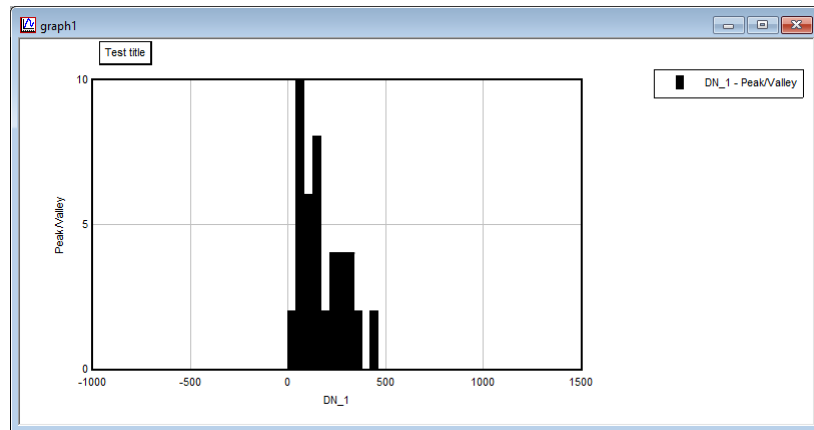


Select count data to plot a chart.



When you click the "OK" button after completion of setting, a frequency chart is displayed.

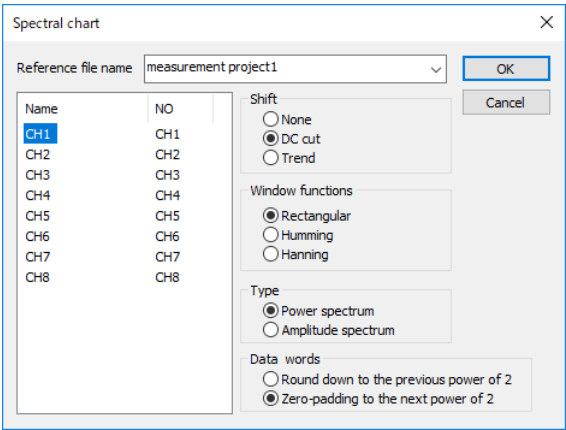
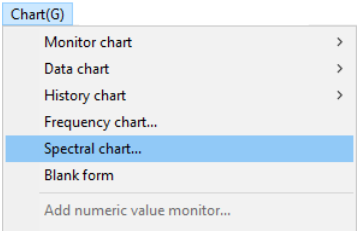
The measured value is displayed on the X-axis, and the count data is displayed on the Y-axis.



2-6 Drawing the Spectral chart

Select one channel for FFT analysis. The power spectrum or amplitude spectrum is drawn.

When Spectral chart... is selected from Chart menu with Measurement project selected, the dialog box for setting chart is displayed.



Setting items

Referential file name

: When multiple Measurement projects are opened, select the Measurement project or Measurement data file to be drawn.

Name list : Data to be drawn is selected.

Shift

None : The process of shift is not implemented.

DC cut : The DC component (direct current component) of measurement data is removed.

Trend : The trend (least square) of measurement data is removed.

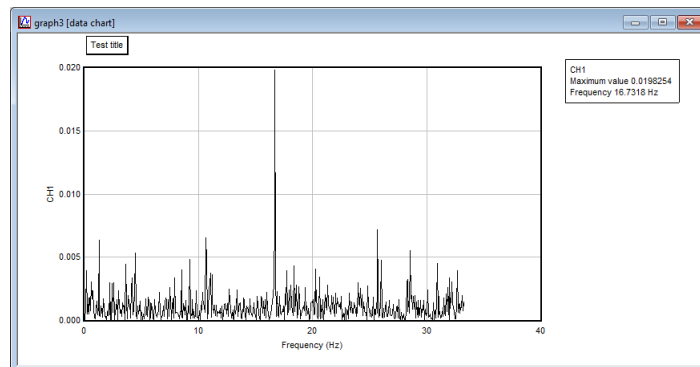
Window function

: Window function is selected from Rectangular, Hamming and Hanning.

Type : Select one of Power spectrum and Amplitude spectrum.

Data words : Select the way to make the number of data to be a power of 2.
Round down to the previous power of 2.
Zero-padding to the next power of 2.

When "OK" button is clicked after the setting, the spectrum chart is drawn.
The X-axis displays frequency, and the Y-axis displays the maximum value for the frequency.




In the upper right of the screen, the maximum value of the spectrum and the frequency corresponding to the maximum value are displayed.

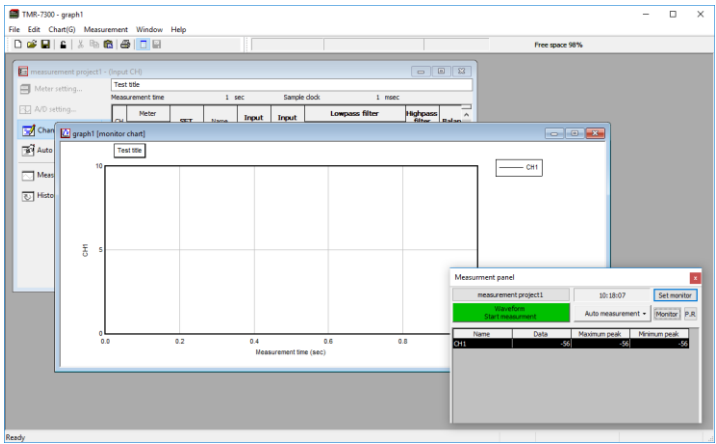
3 Note on drawing of measurement data

For drawing the measurement data, the measurement data is drawn by referencing the measurement project or the measurement data of measurement result is drawn by referencing the measurement data file.

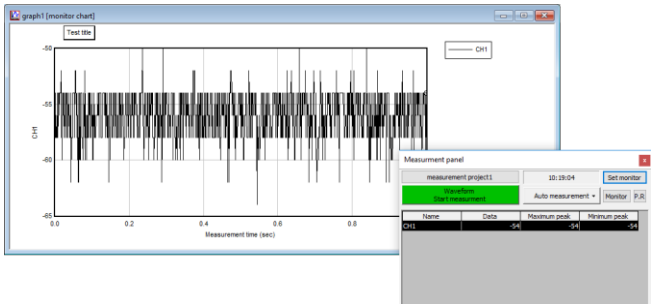
3-1 Drawing the measurement data referencing the measurement project

 For the elapse diagram, refer to "2-3 Drawing the Elapse diagram (Page 6-21)".

Here explains the example of elapse diagram.
Open the elapse diagram data chart when the measurement project is opened.
Open the measurement panel and start the measurement.



Nothing is plotted during the measurement but when the measurement data is acquired after the measurement, a chart of the data is drawn.



3-2 Drawing the measurement data referencing the measurement file

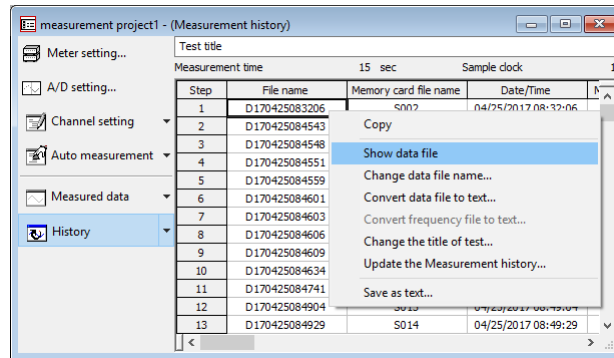
The measurement data file can draw the line chart, scatter chart, elapse diagram and spectral chart.



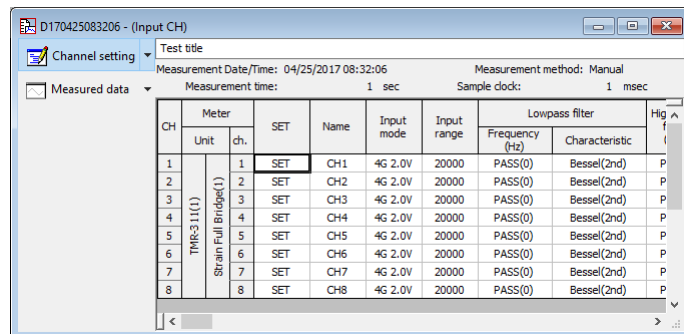
The measurement data file cannot be referred to by the history chart.

Display the measurement history from measurement project.

Select the cell of measurement data for drawing. Right click it and select "Show data file" from menu.



The measurement data file is displayed.



For more information of drawing other chart:

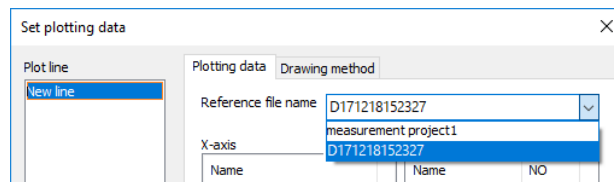
Refer to "Chapter 6: 2-1 Drawing the Line chart" (Page 6-17).

Refer to "Chapter 6: 2-2 Drawing the Scatter chart" (Page 6-19).

Refer to "Chapter 6: 2-3 Drawing the Elapse diagram" (Page 6-21).

Refer to "Chapter 6: 2-6 Drawing the Spectral chart" (Page 6-27).

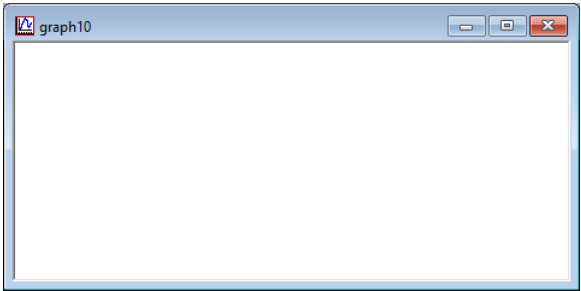
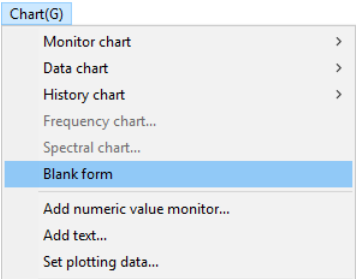
Select the measurement data file in reference file name when drawing a chart.



4 Creating the Blank form

You can add numeric monitor, text, and picture to the blank sheet freely.

When Blank form is selected from Chart menu, the blank form is created.



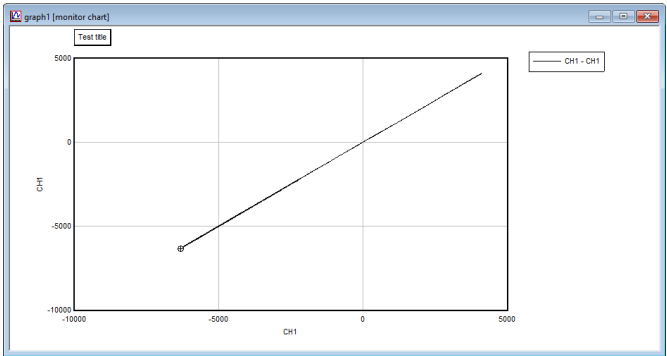
5 Editing the Chart sheet and Blank form

This section explains how to edit a chart sheet.

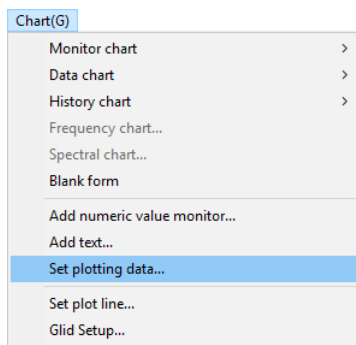
5-1 Adding the data to chart

For example, when comparing the previous data or design predicted value for the test of same content, the multiple data of Measurement projects or Measurement data files are added on one chart sheet.

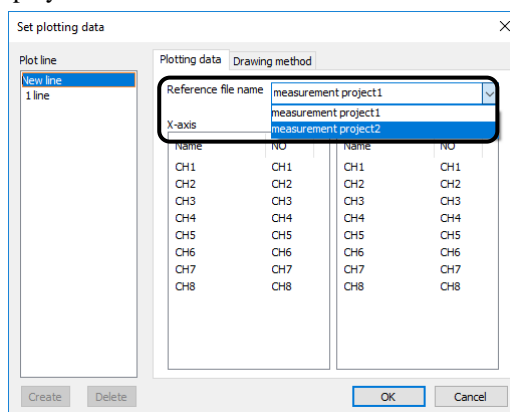
Open a chart sheet which data will be added to.



Open a Measurement project or Measurement data file which contains the adding data.

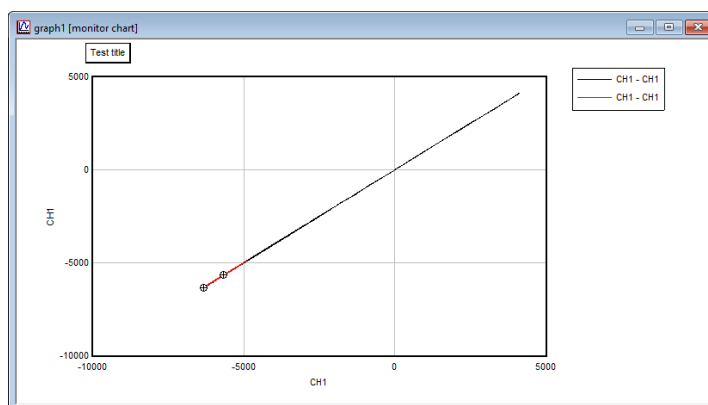


Select the chart sheet, and select **Set plotting data...** from Chart menu. The dialog box is displayed.



Select the Measurement project or Measurement data file which contains the adding data from Reference file name. And click the "Create" button.

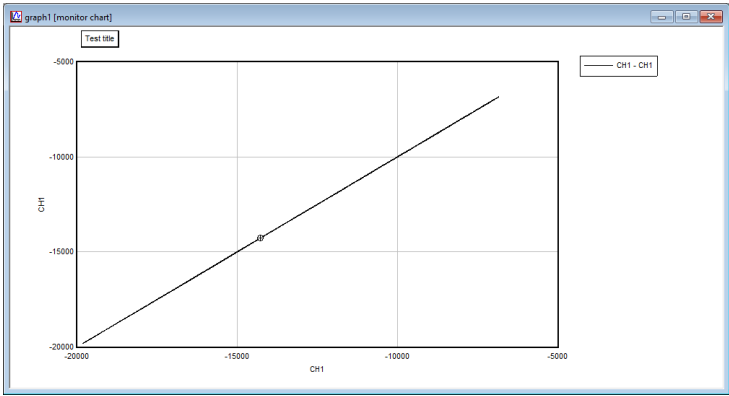
When the "OK" button is clicked after checking the setting, the data is added to the selected chart sheet.



5-2 Making a copy of a chart sheet

The selected chart sheet or blank form is duplicated.

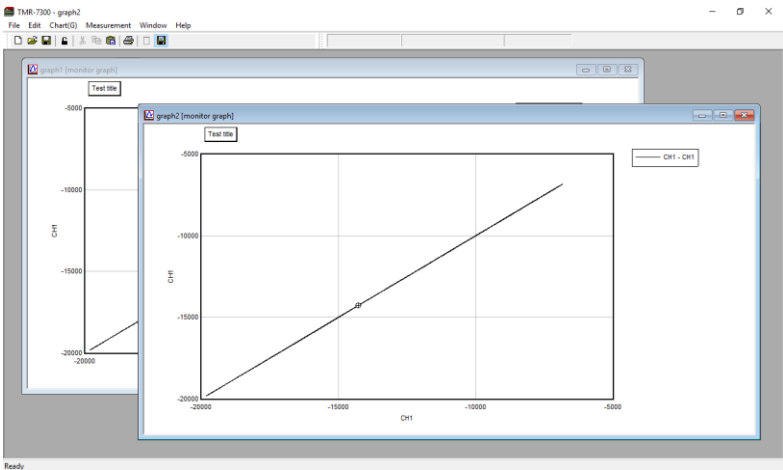
Select a chart sheet which will be duplicated.



Select Duplicate charts from Edit menu.

Edit

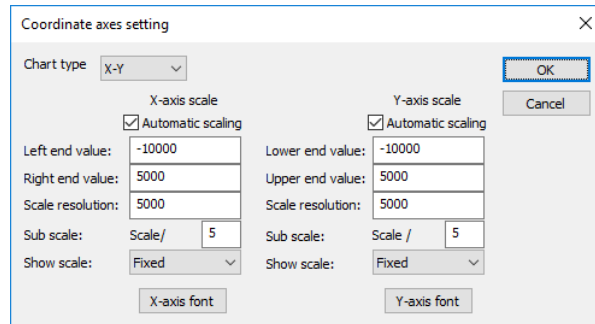
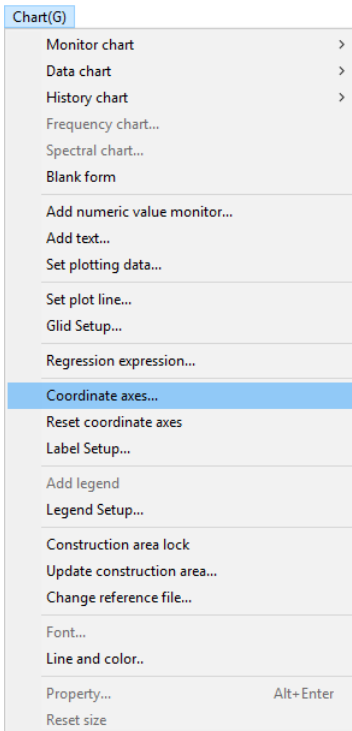
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Duplicate charts	
Copying chart	>
Move to the top face	Ctrl+T
Move to the back face	Ctrl+R
Not editable	
Create and paste a new object ...	
Link Setup...	
Object	



5-3 Specifying the chart scale

You can specify the chart scale, sub scale, automatic scaling, and chart type.

When **Coordinate axes...** is selected from **Chart** menu, the dialog box for setting axes is displayed.



Setting items

Chart type

X-Y : The X-Y correlation chart is drawn.

Log-Log : The XY chart of both logarithms is drawn.

LogX-Y : Semi-logarithmic chart with the logarithm of X-axis is drawn.

X-LogY : Semi-logarithmic chart with the logarithm of Y-axis is drawn.

Automatic scaling

: When the measurement data exceeds the set chart scale during measurement, the chart scale is automatically updated depending on the measurement data.

Left end value/Right end value

: The scale of X-axis when the automatic scale is not set.

Lower end value/Upper end value

: The scale of Y-axis when the automatic scale is not set.

Scale resolution

: The main scale intervals are set when the automatic scale is not selected.

Sub scale

: The number of division of the sub-scales is set when the automatic scale is not selected.
Scale intervals or sub-scale intervals in a logarithmic chart is automatically set.

Show scale

None : Scales are not displayed.

Fixed : Scales are displayed in fixed-point arithmetic.

Float : Scales are displayed in floating-point arithmetic.

"X-axis font" button

: The font for the X-axis scale is set.

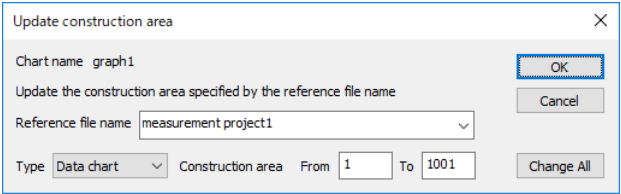
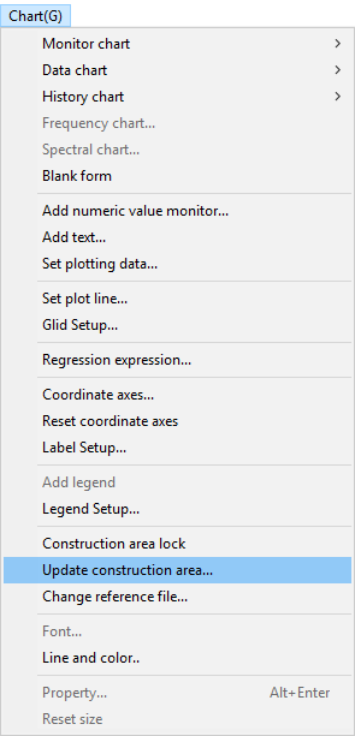
"Y-axis font" button

: The font for the Y-axis scale is set.

5-4 Specifying the drawing range to update data

Specify the drawing range and re-draw the chart.

When the chart sheet to be re-drawn is selected and **Update construction area...** is selected from **Chart** menu, the dialog box for making a setting is displayed.



Setting items

Reference file name

: When multiple data is displayed on selected chart sheet, select Measurement project or Measurement data file to be updated.

Type

: Select the type from Data chart and History chart.
The chart of selected type is updated.

Construction area

: Specify the step of data to be updated.

"OK" button : The data is updated to that of specified drawing range for the chart sheet for which chart name is displayed.

"Change All" button

: Update every opened sheet which relate to reference file.

After the setting, click the "OK" button or "Change All" button.

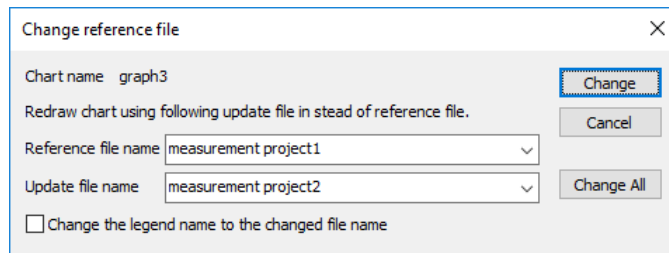
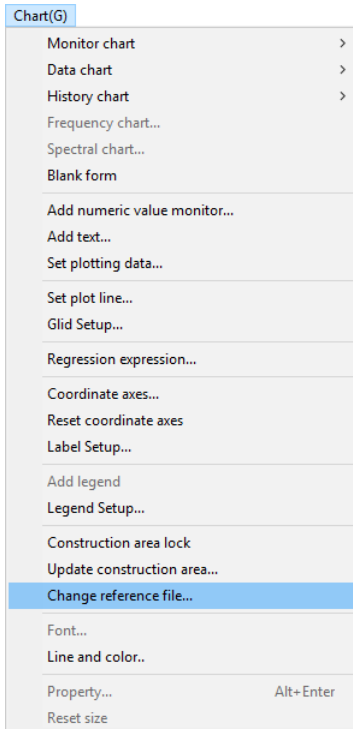
5-5 Changing a reference file

You can change the Measurement project which you are referring to for the chart plotted on the chart sheet.

For example, if you perform a test with the same content as a previous test, you can use the chart sheet of the previous test, by referring to and then modifying it.

First, open a Measurement project or Measurement data file you want to refer to.

When you select the chart sheet to make changes and then **Change reference file...** from the **Chart** menu, the dialog box is displayed for setting.



Setting items

Reference file name

: If multiple data are displayed on the selected chart sheet using multiple Measurement projects, select the Measurement project or Measurement data file to be changed.

Update file name

: Specify the opened Measurement project or Measurement data file for replacing by referential file.

Change the legend name to the changed file name

: The legend name is replaced by the name that is set for referential file.

"Change" button

: The referential file is changed for the chart sheet that has the chart name displayed.

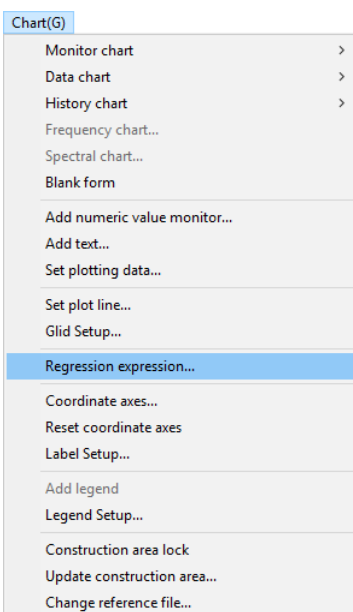
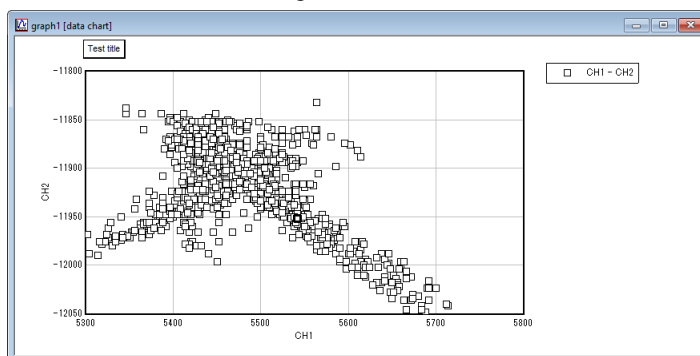
"Change All" button

: The referential file is changed for every opened chart sheet.

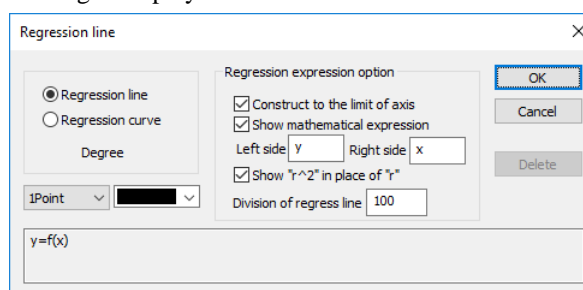
Specify the fine name to be changed and click the "Change" button or "Change All" button.

6 Drawing the regression line

Select the chart sheet for which regression line is drawn.



When Regression expression... is selected from Chart menu, the dialog box for making a setting is displayed.



Setting items

Regression line/Regression curve

: Select regression line or regression curve. For regression curve, set the order of polynomial. Set it within the range of 2 to 9.

Construction to the limit of axis

: The regression line is drawn up to the limit of axis.

Show mathematical expression

: The mathematical expression of regression line is displayed on chart sheet.

Left side/Right side

: Specify the left-hand member and right-hand member of formula.

Show r^2 in place of r

: The linear correlation coefficient r and deviation coefficient r^2 can be switched.

Division of regress line

: Specify the division number within X-axis range where the regression line is drawn.

Regression expression

: The mathematical expression of regression line is displayed.

Point

: Specify the line thickness.
1 point / 2 points / 3 points

Color

: Specify the color of line.

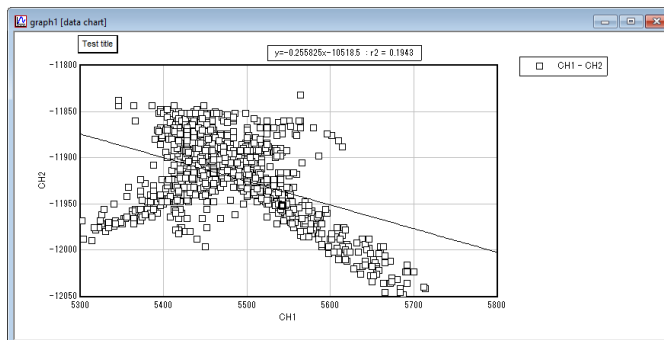
"Delete" button

: The drawn regression line is deleted.



When the number of measurement data is large, it takes time to start the drawing. It is recommended not to implement it during the measurement.

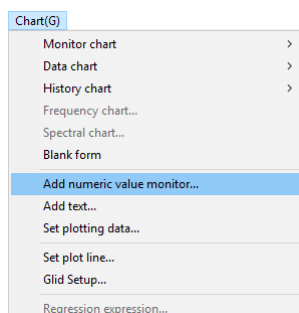
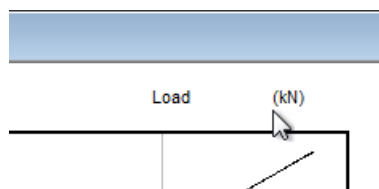
After the setting, click the "OK" button.



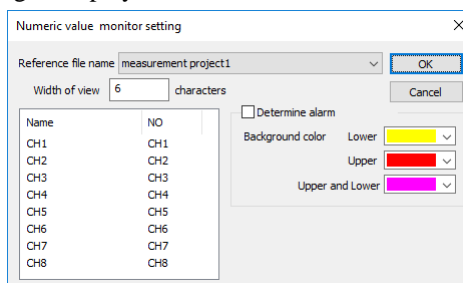
7 Creating the numeric monitor

The numeric monitor is the parts to display monitor data on chart sheet and blank form. During the monitor measurement, the current value is displayed in real time. The color within frame changes when the condition of alarm value is fulfilled.

Click where you want to add the value monitor on chart sheet.



When Add numeric value monitor... of Chart menu is clicked, the dialog box for making a setting is displayed.



When the value monitor is clicked while holding down the Ctrl key, a copy of value monitor is created.

Setting items

Reference file name

: When multiple Measurement projects are opened, select the Measurement project to create the numeric monitor.

Width of view

: Input the number of characters of the numeric monitor.

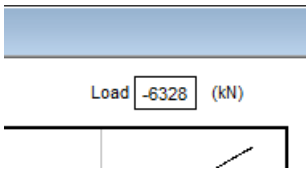
Determine alarm

: When the condition of alarm level that is set by Measurement project is fulfilled, the color of inside of frame changes to the selected background color.



For the setting of alarm, please read "Chapter 5 13 Alarm function"(Page 5-25).

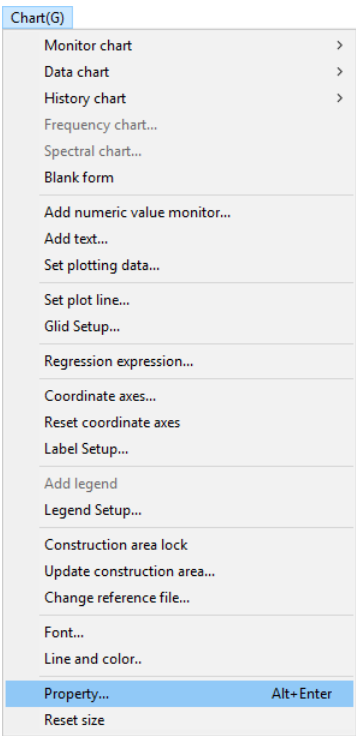
Select the measurement data to be created from name list.
After the setting, click the "OK" button. The numeric monitor is created at the clicked position.




8 Checking and changing the setting of parts

When you check or change setting of a chart, legend, title, or any other part, you should double-click on the relevant part, or select Property... of the Chart menu.

Dialog box for setting the relevant part will be opened. Perform setting in the dialog box.



9 Saving a chart sheet

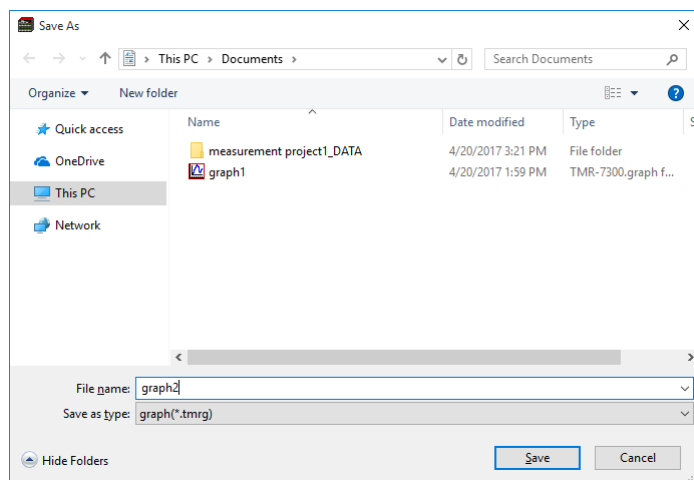
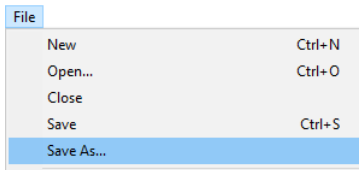
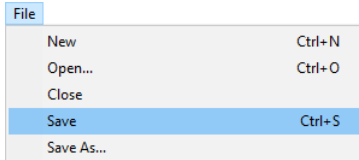
You can save a chart sheet either by selecting **Save** or **Save AS...** from the **File** menu, or by clicking the  "Save" button on the tool bar.

Setting items

Save : If you are saving a file that has not been saved before, the dialog box appears for you to input the sheet name and to specify where to store it. Once saved, the sheet is overwritten with the same name.

Save As... : The dialog box appears always so as to enable input of the sheet name and specify where to store it.

The dialog box appears for you to input the sheet name and to specify where to store it.



Specify the name of the sheet and where to store it, and click the "Save" button.

The name of the sheet is changed to the new name you specified.

Chapter 7

Data Processing

This chapter explains functions related to data processing which you can perform using a Measurement project or a Measurement data file.

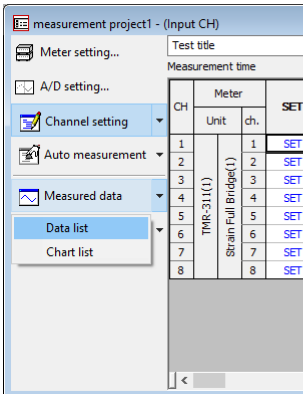
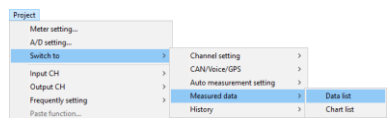
1 How to display the Data list

You can display a data list in the window of a Measurement project and of a Measurement data file.

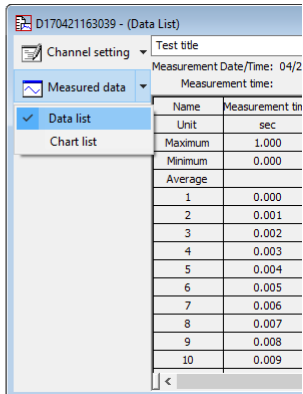


Being a list to show data of the last measurement, the Measurement project's data list is updated every time you perform measurement.

Select Data list from the "Measurement data" button menu.

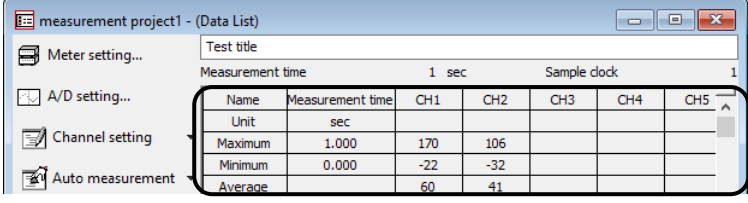


Measurement project



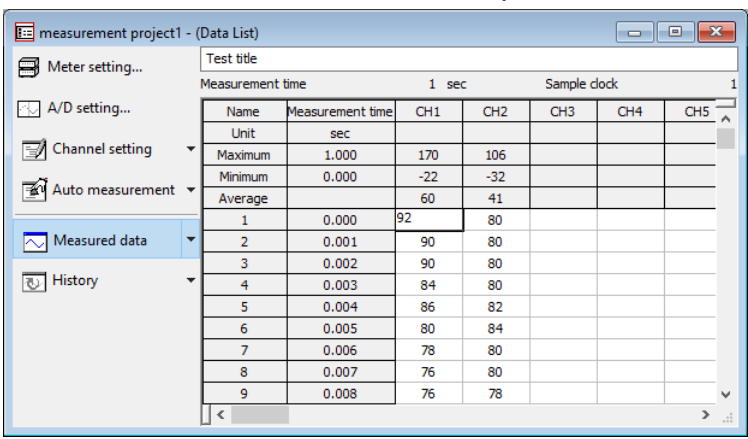
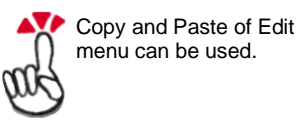
Measurement data file

A data list is displayed. The maximum value, minimum value, and average of each channel are shown in the upper section of this list.



1-1 How to edit the measurement data

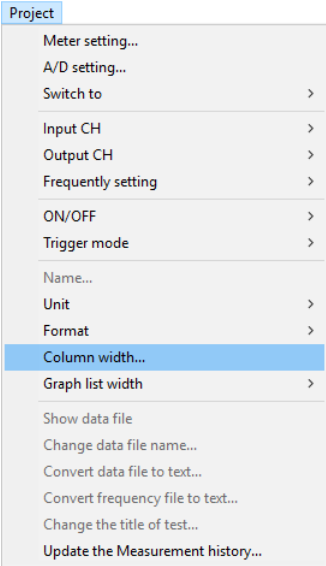
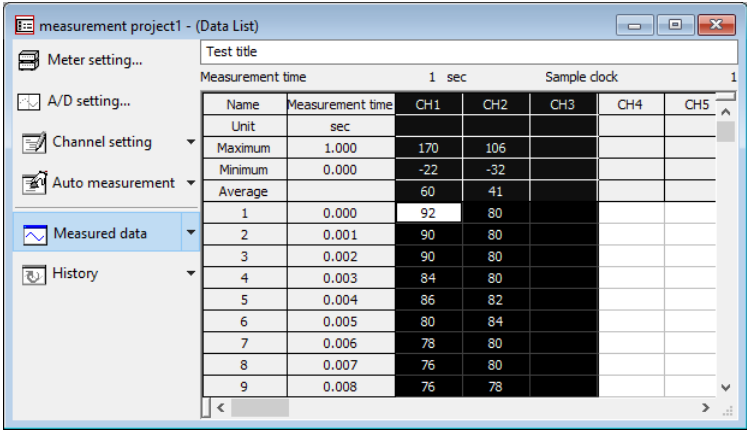
Data shown in the data list can be edited individually.



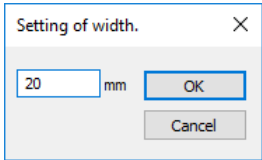
1-2 How to set the column width

The column width can be changed column by column.

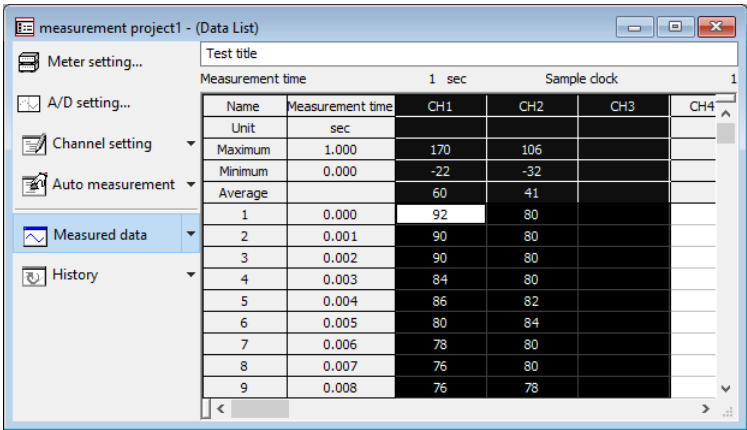
Select a column or a cell included in it. If you want to select more than one column, drag the pointer across cells.



When you select Column width... from Project menu, a dialog box is displayed for setting of the column width.



Set the column width in mm. Input a numeric value and click the "OK" button. The column width is changed into the size you specified.



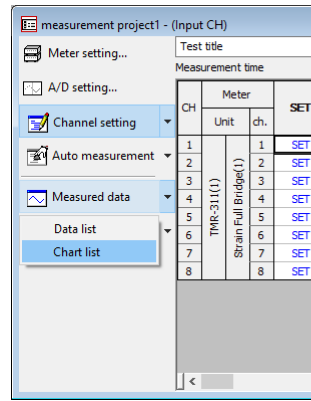
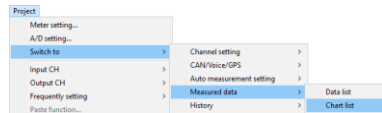
2 How to display the list of progression charts

You can display progression charts in the window of a Measurement project and of a Measurement data file.

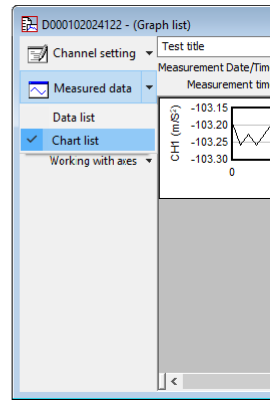


Being a list to show data of the last measurement, the Measurement project's data list is updated every time you perform measurement.

Select Chart list from the "Measurement data" button menu.

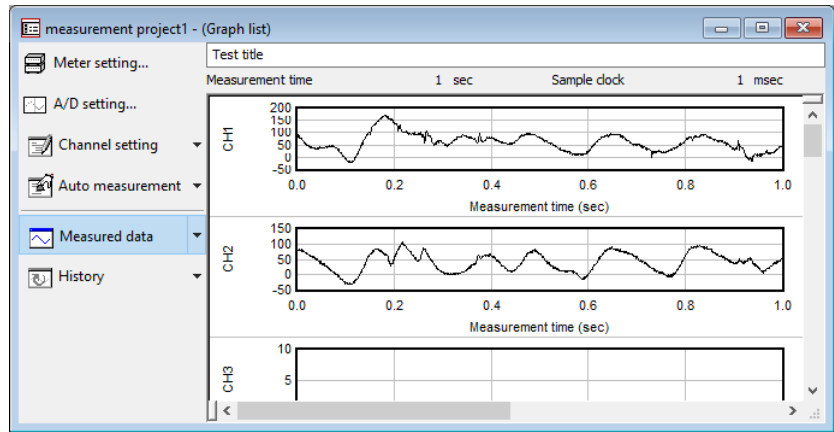


Measurement project



Measurement data file

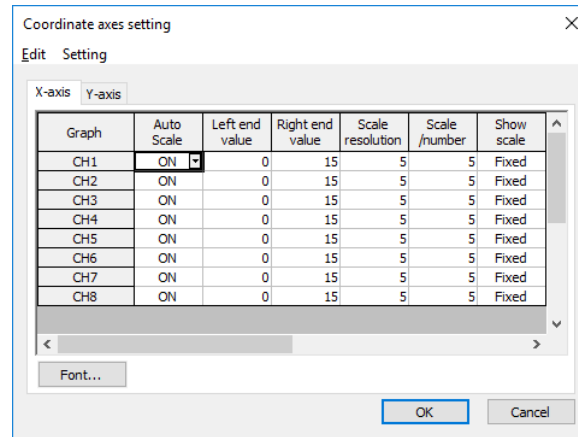
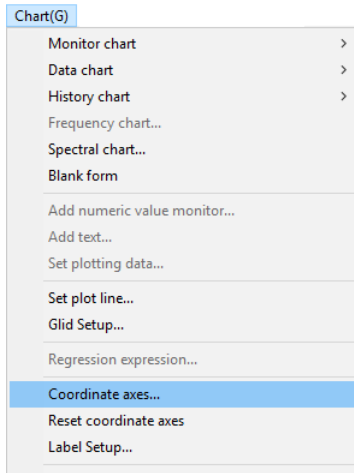
A Chart list is displayed.



2-1 How to change coordinate axes of a chart list

Coordinate axes of a chart list can be changed.

When you select **Coordinate axes...** from the **Chart** menu, a dialog box for setting of the coordinate axes is displayed.



Click the X-axis tab or Y-axis tab depending on for which you want to change the coordinate.

The scale and scale resolution can be set channel by channel.

Setting items

Auto Scale : ON/OFF of automatic scaling is set.

If you change the value or scale, Auto Scale is turned OFF.

Left end value

: The left end value of chart when the Auto Scale is OFF is set.

Right end value

: The right end value of chart when the Auto Scale is OFF is set.

Upper end value

: The upper end value of chart when the Auto Scale is OFF is set.

Lower end value

: The lower end value of chart when the Auto Scale is OFF is set.

Scale resolution

: The scale resolution value of chart when the Auto Scale is OFF is set.

Scale/number

: The number of divisions of chart when the Auto Scale is OFF is set.

Show scale

None : Scale is not displayed.

Fixed : Displayed by fixed-point arithmetic.

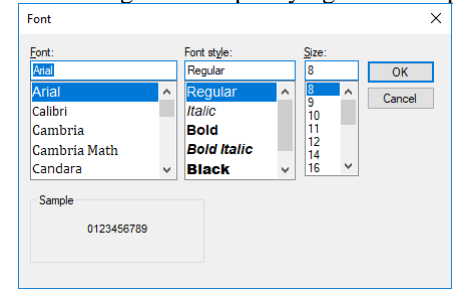
Float : Displayed by floating-point arithmetic.



"Font..." button

: Specify the font of axis.

The dialog box for specifying font is displayed.



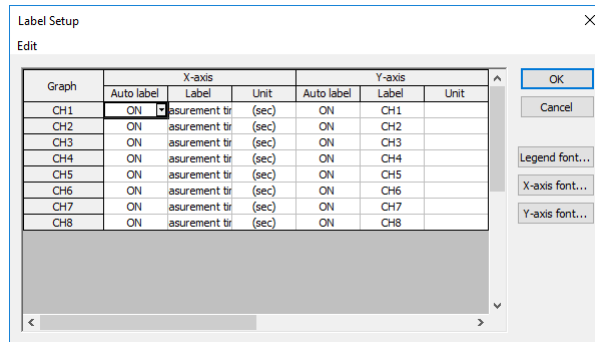
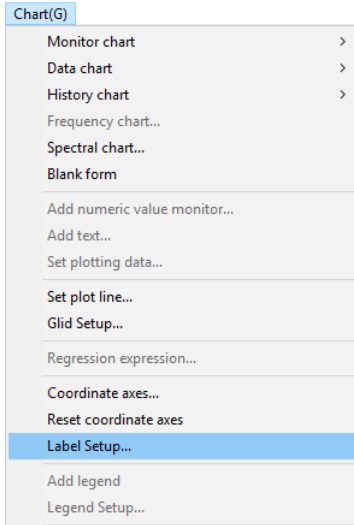
Specify the font, style and size, and click the "OK" button.

Click the "OK" button after checking the setting. The Chart list is then updated.

2-2 How to change the label of the Chart list

You can change the label of the Chart list.

When you select **Label setup...** from the **Chart** menu, a dialog box is displayed for setting of a label.



Setting items

Auto label : If you set Auto label to ON, the name and unit of the channel are displayed in the Label and Unit respectively.

If you change the Label or Unit, Auto label is turned OFF.

Label : Specify the label when Auto label is OFF.

Unit : Specify the unit when Auto label is OFF.

"Legend font" button

: Specify the font for the legend which is displayed on the right-side of the Chart list.

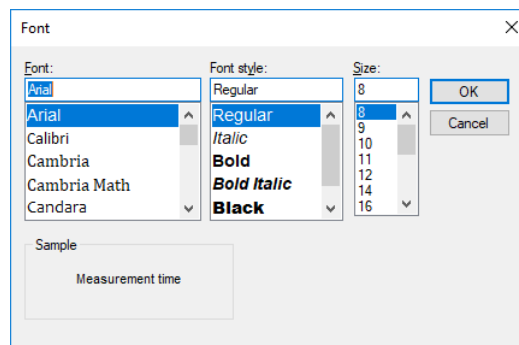
"X-axis font..." button

: Specify the font for the horizontal axis.

"Y-axis font..." button

: Specify the font for the vertical axis.

When you click each font button, a dialog box is displayed for setting of the relevant font.



Specify the font, style and size, and click the "OK" button.

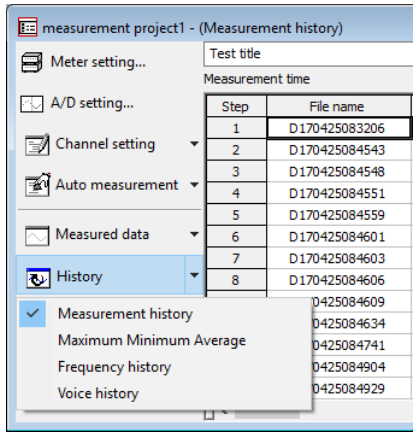
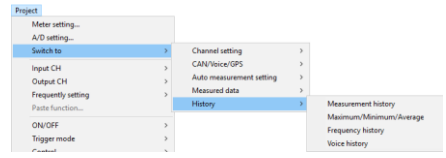
Click the "OK" button after checking the setting. The Chart list is then updated.



3 History

A Measurement project controls the history of measurements for which the project was used.

The history consists of the following items; Measurement history, Maximum/Minimum/Average, Frequency history, and Voice history. Click the "History" button in the Measurement project.



Measurement history

: File names of measurement data (waveforms), memory card file names, date and time of measurement, measurement methods, measurement titles, measurement time and units are shown for all measurements performed.

Maximum/Minimum/Average

: Maximum, minimum, and average values for each channel are shown for all measurements performed.

Frequency history

: File names of frequency data, memory card file names, start time and stop time of measurement, and test titles are shown for all measurements performed.

Voice history

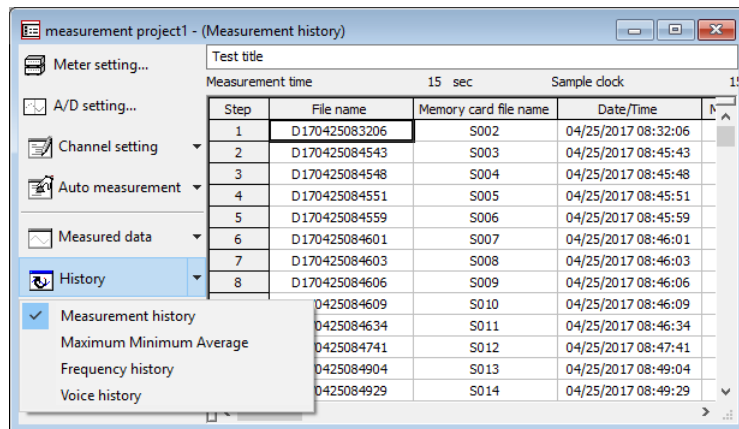
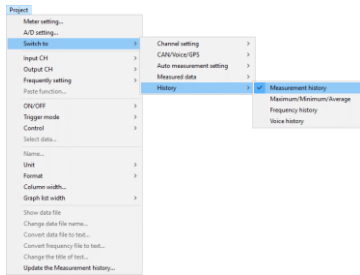
: Voice files which were recorded in measurement are listed. Refer to "Chapter 11: 5-8 Playing the Voice data" (Page 11-29) for more detail.



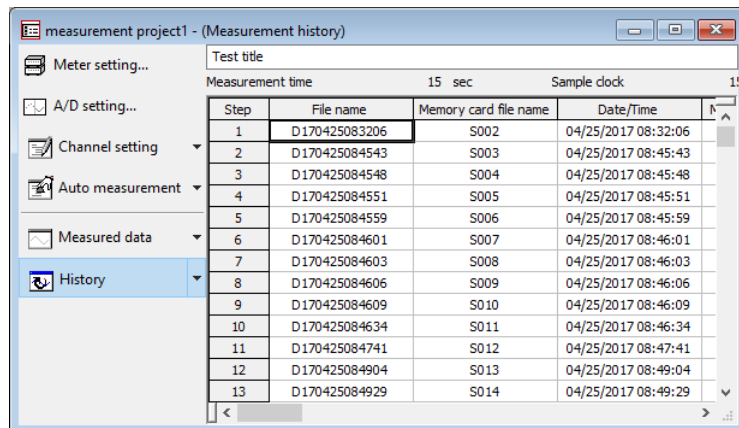
3-1 How to display the Measurement history

Measured data are displayed in a list.

Select Measurement history from the "History" button menu.



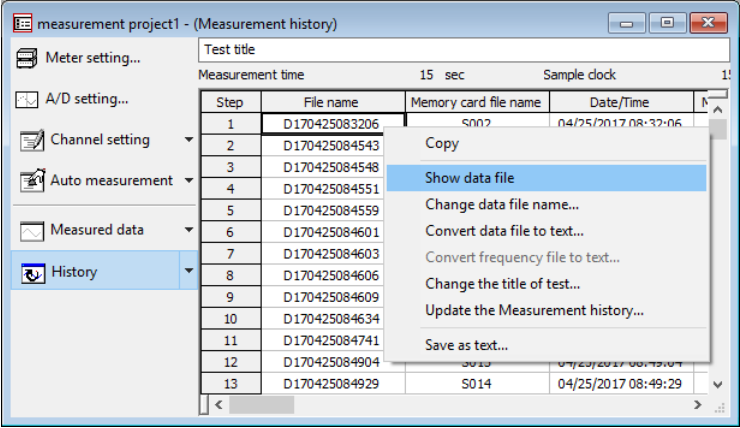
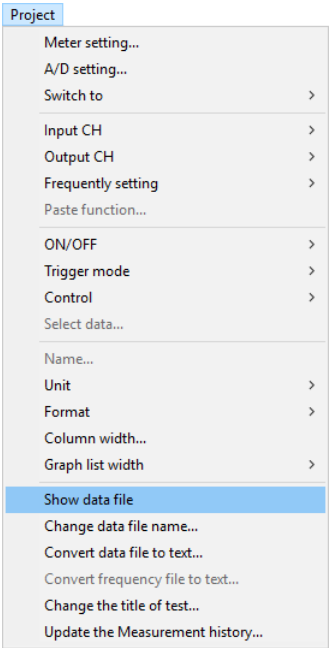
Measurement history is displayed.



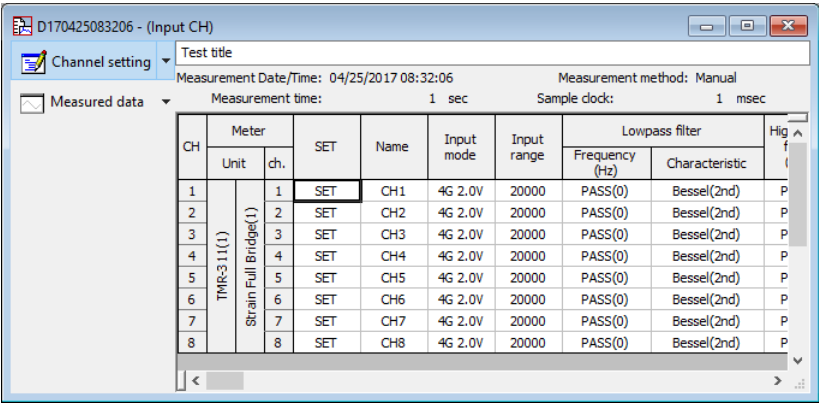
3-2 How to display a data file

You can specify a certain measurement data file from the Measurement history to display it.

Select the measurement data cell you want to display, and right-click it. Select Show data file from the pop-up menu.



The data file of the measurement data is displayed.

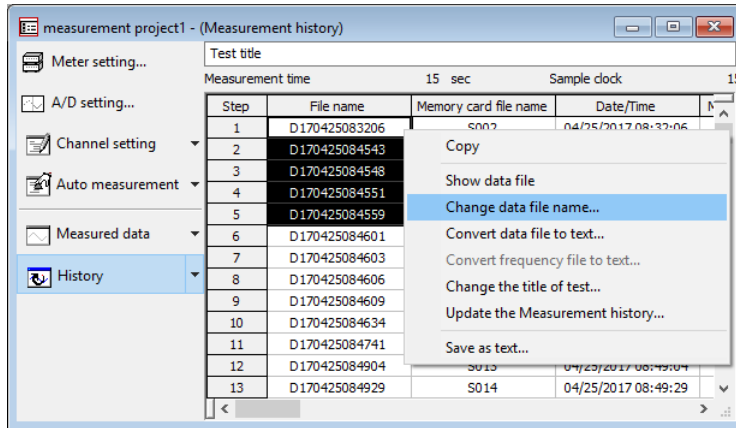
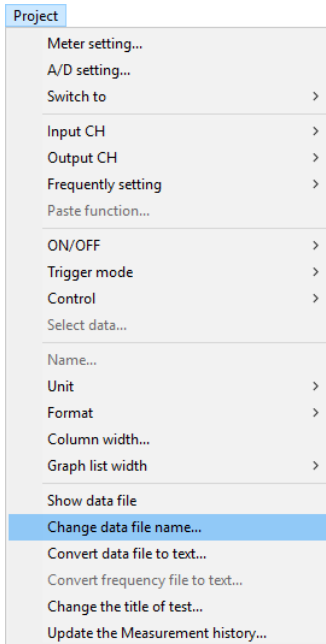


You can also specify and display more than one measurement data files simultaneously. However, it may take time if measurement data to be displayed contain a large amount of data and consume a large volume of the capacity of the hard disk where OS is installed. Please take this into consideration when displaying multiple measurement data files.

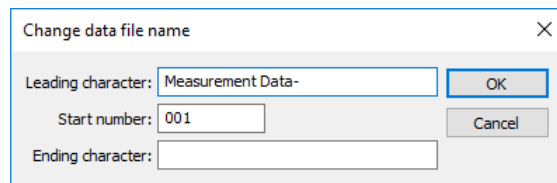
3-3 How to change the file name of a measurement data file

You can specify a certain measurement data file from the Measurement history to change its name.

Select the measurement data cells you want to rename, and right-click it. Select **Change data file name...** from the pop-up menu.

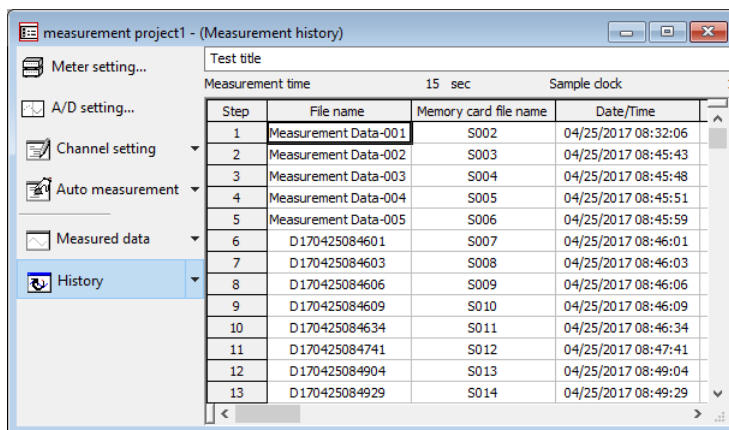


A dialog box is displayed for change of the data file name.



If you add a "0" in front of the Start number, each serial number will have "0s" in the front so as to have the specified number of characters.

Input the Leading character, Start number, and Ending character, and click the "OK" button.



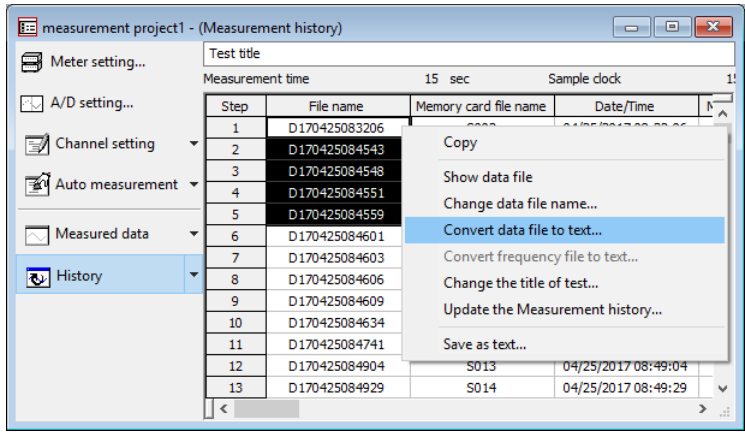
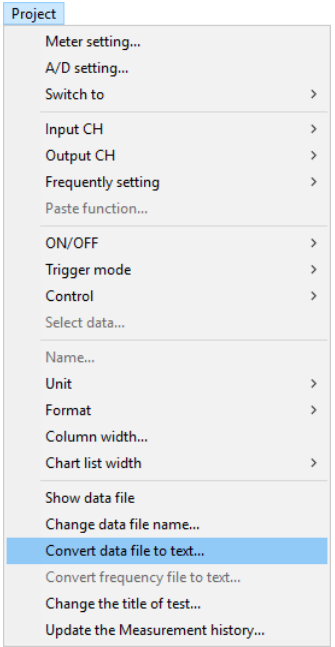
The data file names are changed by sequential numbers.

If a new name is same as existing name while a progress, conversion is stopped.

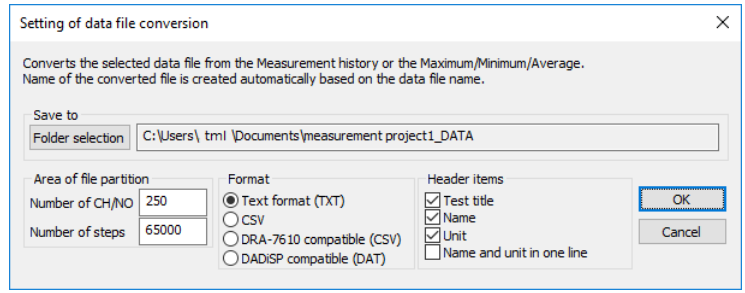
3-4 How to convert a data file into text

You can specify certain measurement data files from the Measurement history to change them into text.

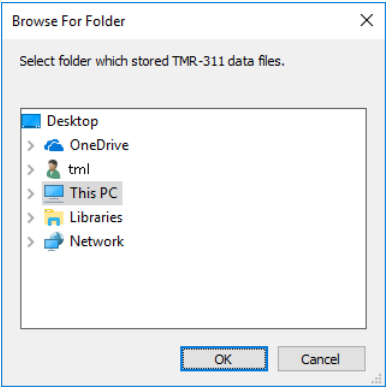
Select the measurement data cells you want to convert into text, and right-click it. Select **Convert data file to text...** from the pop-up menu.



A dialog box is displayed to allow you to perform setting for text conversion of the specified measurement data files.



The folder in which measurement data file is recorded is set for destination to save. When changing the destination to save, click the "Folder selection" button to display the dialog box for specifying the destination to save.



Specify the destination to save and click the "OK" button.



As for commercially available waveform analysis software, the DADiSP and the FlexPro can load the converted data.

Select the format of text file from format.

Text format (TXT)

: Original format with tab-delimited text file.

CSV : Original format with comma (,) -delimited text file.

DRA-7610 compatible (CSV)

: The format is same as that of CSV file for which text conversion is implemented by DRA-7610. When this format is used, the name of channel is not converted.

DADiSP compatible (DAT)

: The file is converted to the text file that can be read the waveform analysis software DADiSP. For one data file, two files whose extensions are .HED and .DAT are created.

Select items to be included in the header. The selectable item varies depending on the format.

Test title : The title of measurement is inserted into text data.

Name : The name of each channel is inserted into text data.

Unit : The unit of each channel is inserted into text data.

Name and unit in one line

: The name and unit of each channel are inserted into text data in one line.

If this is not checked, unit is added to the line succeeding to the name.

When the "OK" button is clicked, conversion is started.

The text files will have the same file name as the data file.

If the number of measurement data in the measurement data file is more than the number of steps, the text file is divided into some files by the number of steps. If the number of channels is more than CH/NO, the text file is divided into some files by the number of CH/NO.

D040710000000_1_1

File name of measurement data file

Serial number when divided by CH/NO

Serial number when divided by step

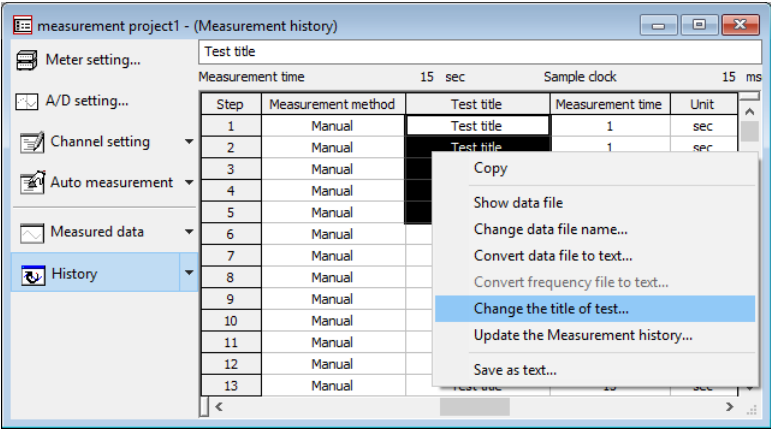
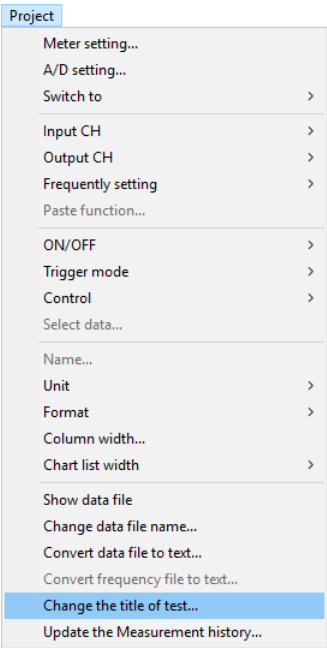


If there already is a file with the same name, it is overwritten during conversion.

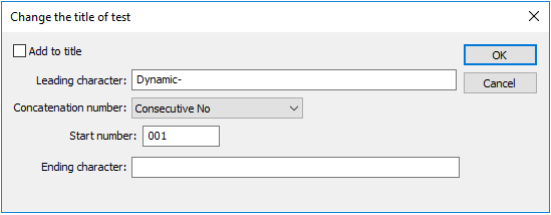
3-5 How to change the measurement title

You can specify a certain measurement data file from the Measurement history to rename its measurement title.

Select the measurement data cells you want to rename the measurement title, and right-click it. Select **Change the title of test...** from the pop-up menu.



A dialog box is displayed to allow you to rename the title.

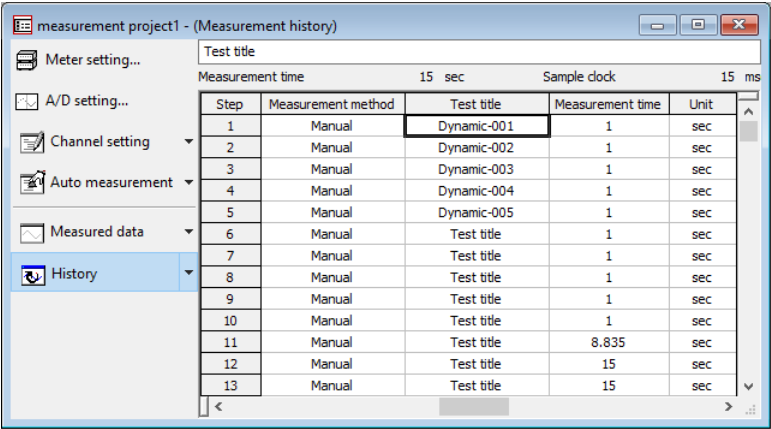


When deleting the existing title and defining it with new title, deselect "Add to title".

When changing it in sequential number, change the Concatenation number to Consecutive No.

If you add a "0" in front of the Start number, each serial number will have "0s" in the front so as to have the specified number of characters.

Input the Leading character, Start number and Ending character, and click the "OK" button.



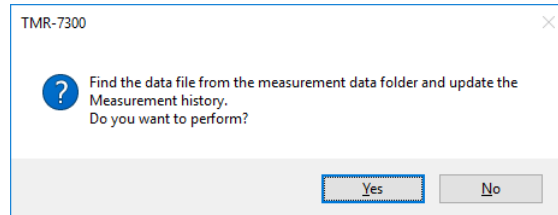
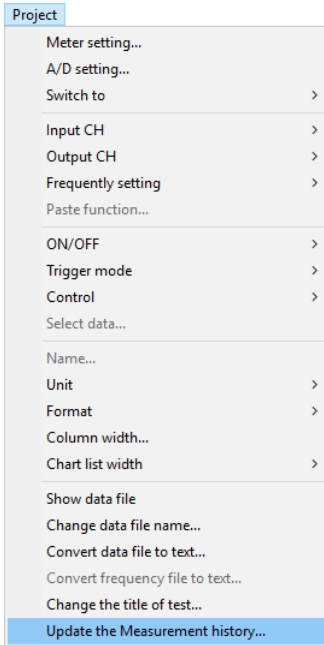
The titles are changed so as to have sequential numbers.

3-6 How to update the Measurement history

Data files are searched from the measurement data folder, and the Measurement history is updated.

Normally, the history is automatically updated when a Measurement project is displayed. If you have moved or edited a measurement data file after displaying it, you have to update the Measurement history, because it is not automatically updated in such a case.

When you select **Update the Measurement history...** from the **Project** menu, the following message is displayed for confirmation.

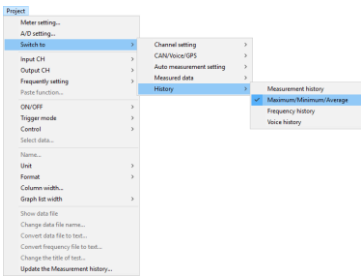


Click the "Yes" button, and the Measurement history is updated.

4 How to display the Maximum/Minimum/Average

The maximum, minimum, and average of each channel or each data number are shown for all the measurement data.

Select Maximum/Minimum/Average from the "History" button menu.



The screenshot shows the 'measurement project1 - (Maximim Minimum Average)' window. The 'History' menu is open, and the 'Maximum/Minimum/Average' option is selected. The table displays measurement data for steps 1 through 6.

Step	Date/Time	CH1			CH2	
		Maximum	Minimum	Average	Maximum	Minimum
1	04/25/2017 08:32:06	170	-22	60	106	-3
2	04/25/2017 08:45:43	60	4	35	76	-4
3	04/25/2017 08:45:48	98	-16	29	50	-2
4	04/25/2017 08:45:51	60	2	29	62	-3
5	04/25/2017 08:45:59	76	-12	28	68	-4
6	04/25/2017 08:46:01	94	-62	21	138	-7

The maximum, minimum, and average of the measurement data are displayed for each channel or each data number.

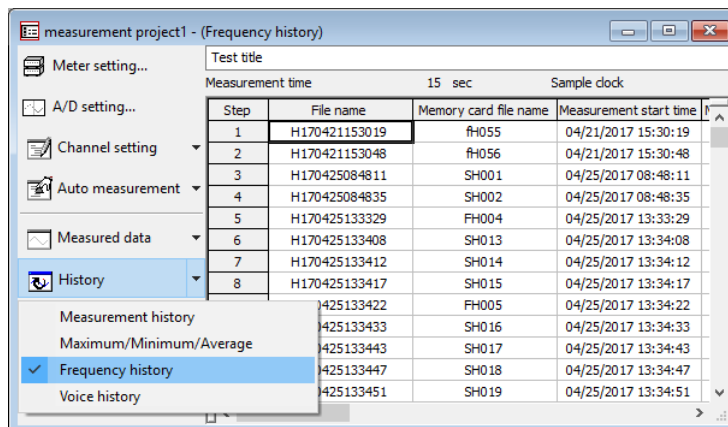
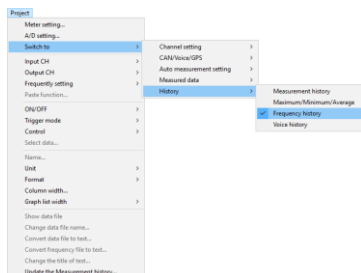
The screenshot shows the 'measurement project1 - (Maximim Minimum Average)' window. The 'History' menu is open, and the 'Maximum/Minimum/Average' option is selected. The table displays measurement data for steps 1 through 11.

Step	Date/Time	CH1			CH2	
		Maximum	Minimum	Average	Maximum	Minimum
1	04/25/2017 08:32:06	170	-22	60	106	-3
2	04/25/2017 08:45:43	60	4	35	76	-4
3	04/25/2017 08:45:48	98	-16	29	50	-2
4	04/25/2017 08:45:51	60	2	29	62	-3
5	04/25/2017 08:45:59	76	-12	28	68	-4
6	04/25/2017 08:46:01	94	-62	21	138	-7
7	04/25/2017 08:46:03	70	-96	1	72	-11
8	04/25/2017 08:46:06	64	-150	-20	76	-21
9	04/25/2017 08:46:09	84	-40	12	132	-4
10	04/25/2017 08:46:34	12	-122	-31	86	-8
11	04/25/2017 08:47:41	46	-94	-32	108	-8

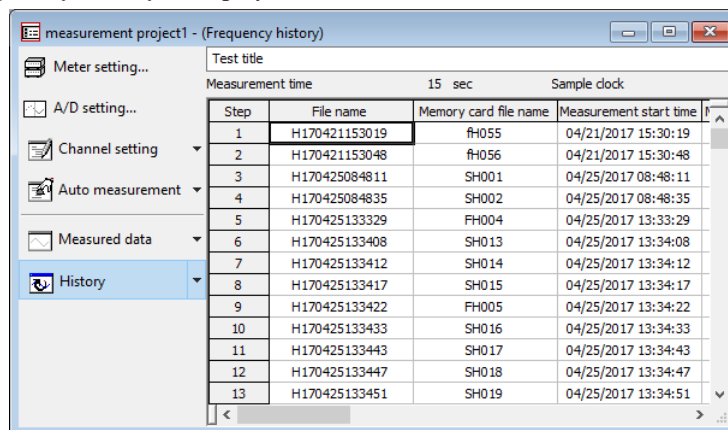
5 How to display the Frequency history

File names, start time and stop time of measurement, and measurement title are shown for all frequency data which have been measured.

Select Frequency history from the "History" button menu.



Frequency history is displayed.

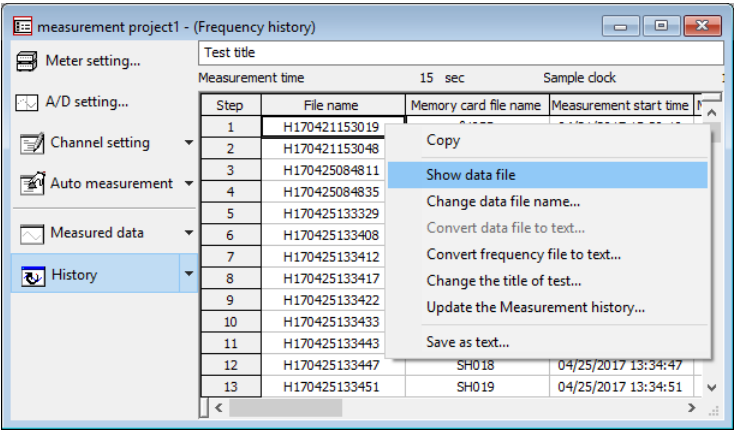
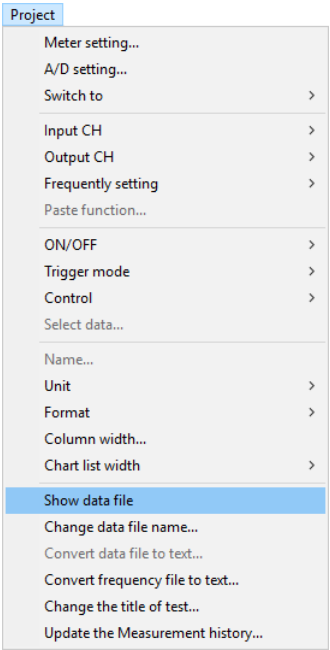


5-1 How to display frequency data file

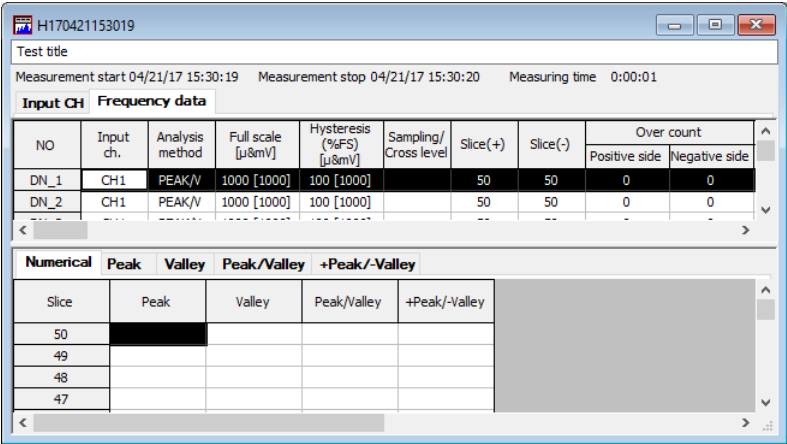
You can specify a certain frequency data file from the Frequency history to display it.

Select the frequency data cell you want to display, and right-click it.

Select **Show data file** from the pop-up menu.



The data file of the frequency data is displayed.



5-2 How to change the file name of frequency data file

You can change the file name of frequency data file.

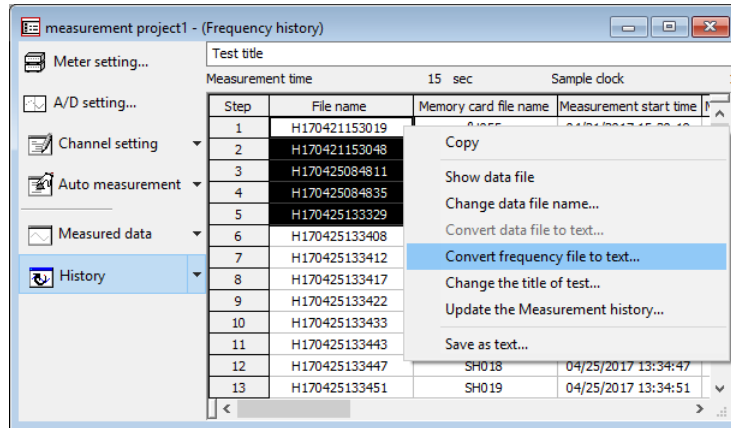
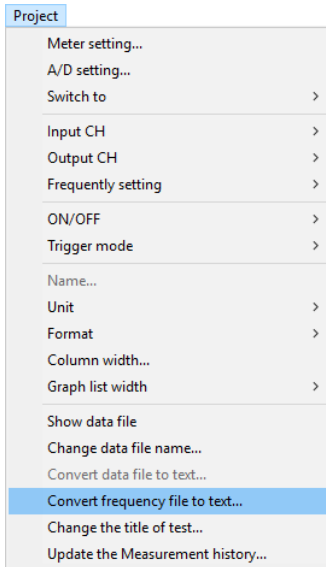


Refer to "Chapter 7: 3-3 How to change the file name of a measurement data file" (Page 7-10) for more detail.

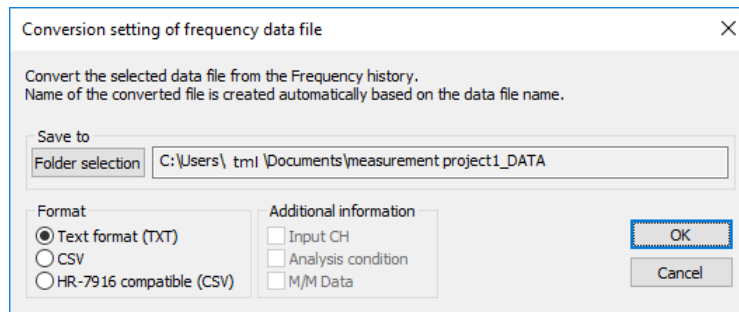
5-3 How to convert a frequency data file into text

You can specify certain frequency data files from the Frequency history to change them into text.

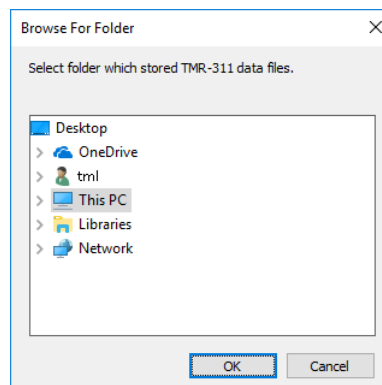
Select the frequency data cells you want to convert into text, and right-click it. Select Convert frequency file to text... from the pop-up menu.



A dialog box is displayed to allow you to perform setting for text conversion of the specified measurement data file.



The folder in which measurement data file is recorded is set for destination to save. When changing the destination to save, click the "Folder selection" button to display the dialog box for specifying the destination to save.



Specify the destination to save and click the "OK" button.

Select the format of text file from Format.

Text format (TXT)

: Original format with tab-delimited text file.

CSV : Original format with comma (,) -delimited text file.

HR-7916 compatible (CSV)

: The format is same as the CSV file which is implemented by HR-7916 for text output of frequency data.

If you select HR-7916 Compatible (CSV) format, you can select an item to add to the text file:

Input CH : The settings of the Input CH used for the frequency analysis are added.

Analysis condition

: The settings of the frequency number are added.


M/M Data : The maximum and minimum values of the frequency number are added.


When the "OK" button is clicked, conversion is started.


The text files will have the same file name as the data file.

In case of text format (TXT) or CSV format, a separate file is created for each frequency number, and the file name will be followed by underscore (_) and the frequency number.

D040710000000_1_1


 File name of measurement
data file


 Serial number when
divided by CH/NO


 Serial number when
divided by step



If there already is a file with the same name, it is overwritten during conversion.

5-4 How to change the test title

You can change the measurement title of frequency data file.



Refer to "Chapter 7: 3-5 How to change the measurement title" (Page 7-13) for more detail.

5-5 How to update the Frequency history

You can update the frequency history of frequency data files.

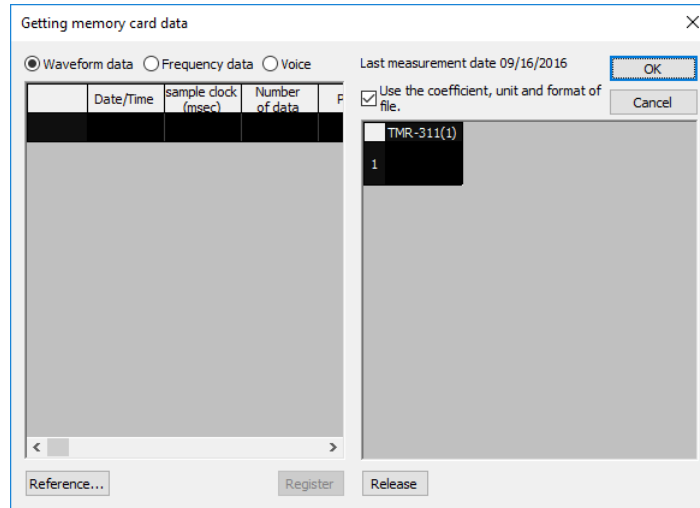
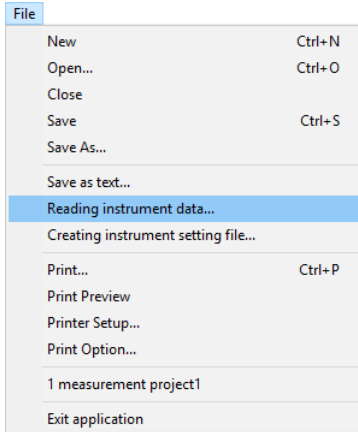


Refer to "Chapter 7: 3-6 How to update the Measurement history" (Page 7-14) for more detail.

6 Reading instrument data

This software can load both waveform data and frequency data which were saved on a memory card or on the shared folder in an instrument. Therefore, even if measurement was performed by offline, you can display its result by a measurement data file.

When you select **Reading instrument data...** from the **File** menu, the following dialog box is displayed



Setting items

Waveform data / Frequency data / Voice

: Select the type of data file to display.

Selected files are read even if you have switched the display.

Use the coefficient, unit and format of file.

: If you check this box, the settings of coefficient, unit and format included in the specified folder are applied for reading waveform data. If there are no such data, the setting of the Measurement project is used.

"Reference..." button

: Select the folder that contains the data.

Left list : For the measurement data that is in the referenced folder, the measurement date and time, sampling clock, number of data, etc. are displayed.

Right list : The list of the measurement data to read is displayed.

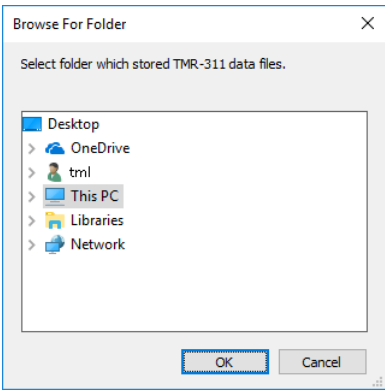
"Register" button

: The data selected from left list is registered in right list.

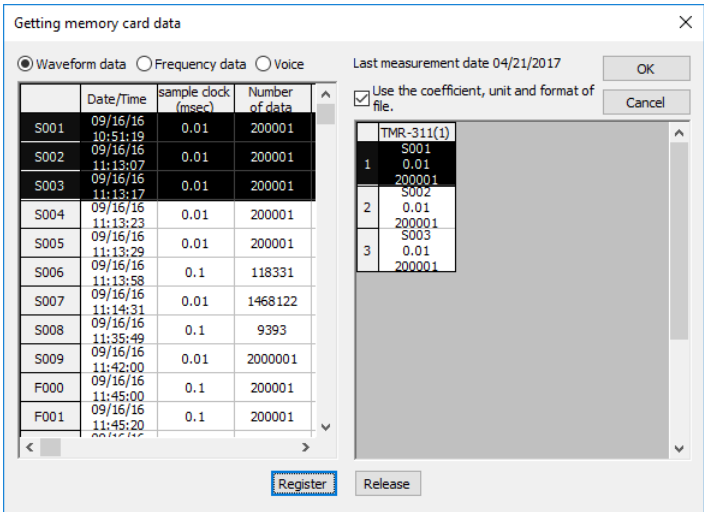
"Release" button

: The data selected from right list is deleted from list.

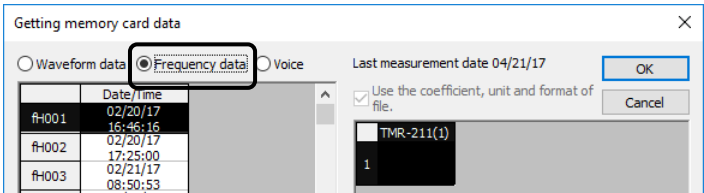
When you click the "Reference" button, a dialog box appears to allow you to select the folder.
Select a folder that contains the data.



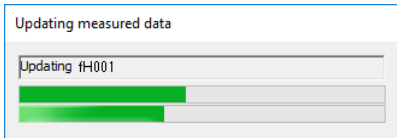
When you select the measurement data to be loaded from the left list and click the "Register" button, they will be displayed in the right list.



If you want to load frequency data, click the Frequency data option button.



Click the "OK" button, then the registered data are loaded.



For reading voice data, refer to "Chapter 11: 5-1 Reading memory card data" (Page 11-17).

7 Processing of a measurement data file

A measurement data file contains all data of one measurement. You can execute the following processes for all channels in the file:

Thinning out of data

: Thin out data steps at regular intervals in order to decrease the number of data. Use this function when the sampling interval is too short for the phenomenon frequency.

Display of the data cursor

: Display data cursors on the chart list in order to refer to the value for the same time point in each channel.

Searching maximum and minimum values

: The maximum and minimum values within the specified range are searched.

Display of the marker

: Display marker on the chart list.

Deletion of data

: Delete unnecessary parts of the phenomenon waveform.
Use this function when there is any unnecessary section at the beginning or at the end of the measurement data.

Deletion of the first and last parts

: Take out only a certain part of the phenomenon waveform to use it.
Use this function when there is any unnecessary section at the beginning and at the end of the measurement data.

Change of the time unit

: Change the unit of the measurement time.
Use this function when the measurement time has become short after data deletion or the like.

Operation of measurement data

: Re-calculation is carried out based on the measurement data defined by input CH setting by defining Expanded CH.

Text conversion

: Convert measurement data into a text file which can be read by any other software. You can also select any channel to convert its data.

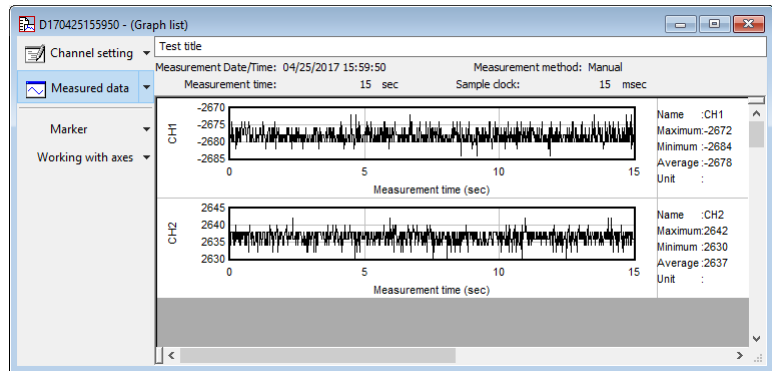
7-1 Thinning out of data



For the details of display of Data list and Chart list, refer to "Chapter 7: 1 How to display the data list" (page7-1) and "Chapter 7: 2 How to display the list of progression charts" (page7-3).

Thin out data steps at regular intervals in order to decrease the number of data. Use this function when the sampling interval is too short for the phenomenon frequency.

Display the Data list or Chart list of the measurement data file.



Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Selection...	
Recalculation	F5
Insert	
Delete	
Delete before/after	
Thin out...	
Fill Down	Ctrl+D
Superscript	
Default	
Not editable	

When you select Thin out... from the Edit menu, a dialog box is displayed for setting.

Thin out

The number of thinning out

4

Point

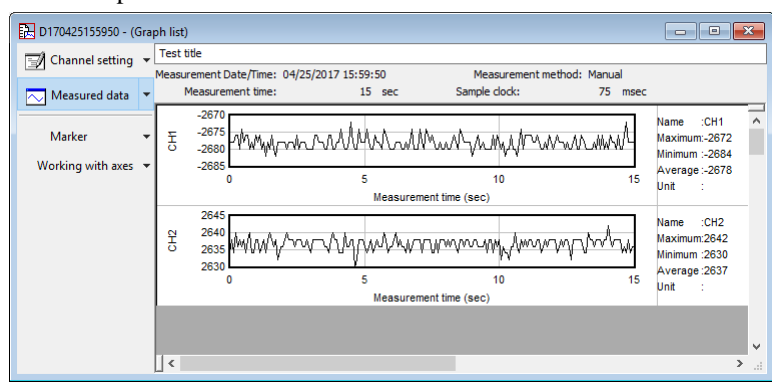
OK

Cannot undo the result of this operation.

Cancel

Specify the number of thinning out. The data of steps for which 1 is added to the set number are remained. If 4 is set for example, the data of steps 1, 6, 11 and so on are remained as data. The new sampling time is "sampling time x (the number of thinning out + 1)", and the measurement time is "(the number of remained data - 1) x new sampling time".

Click the "OK" button after confirmation of the setting, and the data of all the channels are updated.



You cannot undo this process. Please confirm the setting sufficiently before executing the process.



If the update was processed with incorrect settings, close the measurement data file without saving it, and then display it again.

7-2 Range selection

In order to delete data, you have to select the range to delete first.

You can select the range from the Data list or Chart list.

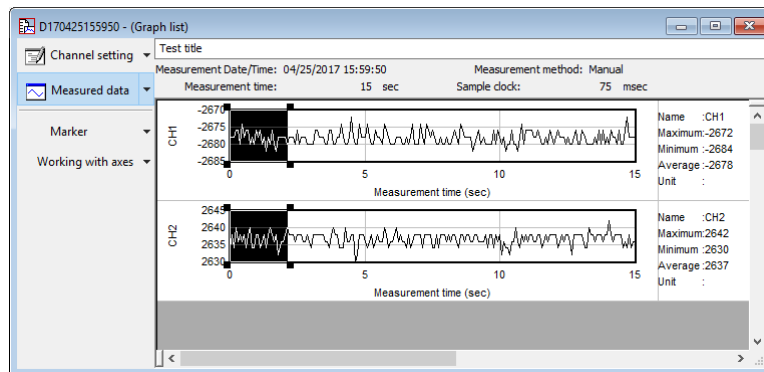
■ Range selection from the Data List

Select the data steps or data in Measurement time cells.

Name	Measurement time	CH1	CH2
Unit	sec		
Maximum	15.000	-2672	2642
Minimum	0.000	-2684	2630
Average		-2678	2637
1	0.000	-2678	2634
2	0.075	-2678	2638
3	0.150	-2678	2634
4	0.225	-2676	2640
5	0.300	-2676	2636
6	0.375	-2680	2638
7	0.450	-2674	2636
8	0.525	-2678	2638
9	0.600	-2676	2634

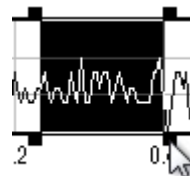
■ Range selection from the Chart list

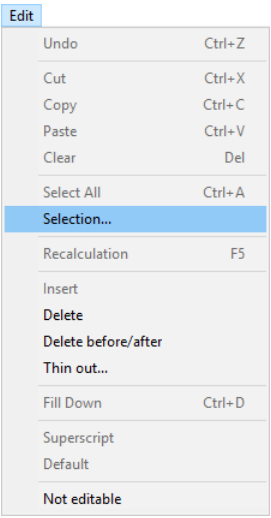
Select the relevant portion of data in one of the charts.



The same range is selected for all the charts.

In order to change the selected range, drag the ■ mark shown on the four corners of the selected range using the pointer.

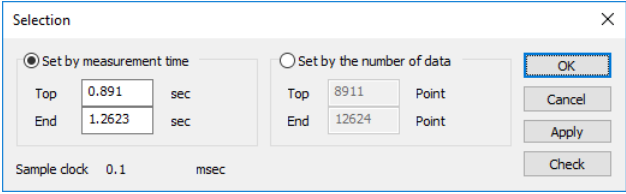




■ Range selection by a numeric value

You can select the range by inputting the number of data steps or measurement time.

When you select **Selection...** from the **Edit** menu, a dialog box is displayed for range setting.



There are two ways to specify the range: Set by measurement time and Set by the number of data.

Setting items

Set by measurement time, Set by the number of data

: Select whether the range is set by measurement time or the number of data.

Top : Set the beginning part to be selected. The unit when the range is set by measurement time depends on the unit of measurement time of measurement data file.

End : Set the last part to be selected. The unit when the range is set by measurement time depends on the unit of measurement time of measurement data file.

"Apply" button

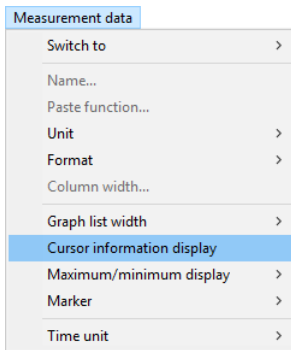
: Apply the range without closing the dialog box.

"Check" button

: When it is set by the measurement time, the number of data equivalent to the set value is displayed. When it is set by the number of data, the measurement time equivalent to the set value is displayed.

When "OK" button is clicked, the set range is selected.

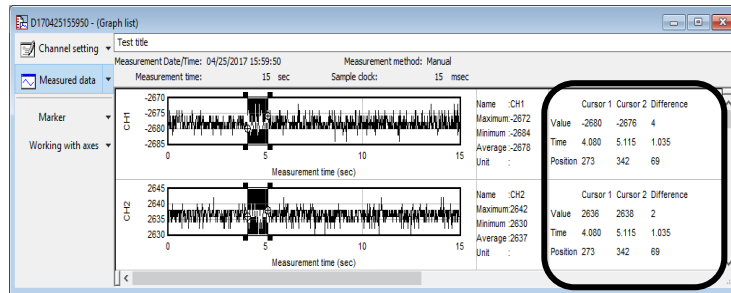
7-3 Display of the cursor information



When the range is selected on the chart list, the ■ marks on the left end of the selected range are cursor 1 while the ■ marks on the right end of the selected range are cursor 2. The elapsed time and the measurement values at those positions are displayed. In addition, values subtracting cursor 1 values from cursor 2 values are also displayed.

For display of the cursor information, select **Cursor information display** from the **Measurement data** menu.

A third column is added to the Chart list to show the cursor information.



The cursor 1 and cursor 2 can be moved by ← → keys and ↑ ↓ keys on keyboard, respectively.

For closing the cursor information, select **Cursor information display** from **Measurement data** menu again.

7-4 Searching the maximum and minimum values

The specified data range is searched for the maximum and minimum values for each channel, and the positions and values are displayed. For the chart list, average value in the specified data range is also displayed.

The chart list or data list of a measurement data file is used for this search.

■ How to search

If you do not set any search range, all data will be the search range.

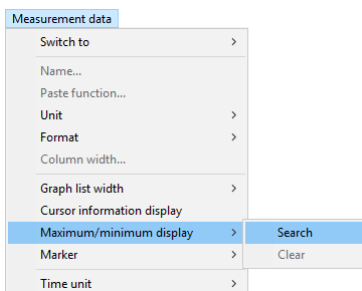
In the data list, select data from the desired channels in the row direction.

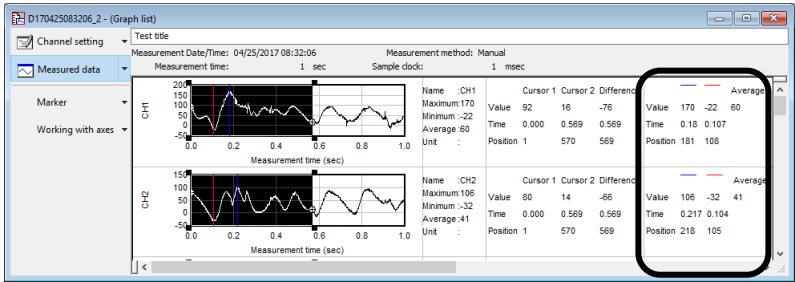
The search is performed on the selected rows. If you select only one row, all data will be the search range.

To start the search, select **"Search"** from the **"Maximum/minimum display"** sub menu of the **"Measurement data"** menu.

In the chart list, the maximum and minimum values are indicated by blue and red lines, respectively.

The maximum, minimum and average values within the range are indicated in the fourth column of the chart list.





In the data list, the maximum and minimum value are indicated by cell color; light blue and light red, respectively.

Name	Measurement time	CH1	CH2
Unit	sec		
Maximum	1.000	170	106
Minimum	0.000	-22	-32
Average		60	41
97	0.096	4	-22
98	0.097	6	74
99	0.098	0	78
100	0.099	-6	80
101	0.100	-8	82
102	0.101	-6	84
103	0.102	-12	92
104	0.103	-14	92
105	0.104	-14	96
106	0.105	-14	94
107	0.106	-18	100
108	0.107	-22	102
109	0.108	-18	106

Measurement data

- Switch to >
- Name...
- Paste function...
- Unit >
- Format >
- Column width...
- Graph list width >
- ✓ Cursor information display
- Maximum/minimum display >
 - Search
 - Clear
- Marker >
- Time unit >

■ Clearing the search results

To clear the search results, select **Clear** from the **Maximum/minimum display** sub menu of the **Measurement data** menu.

In the chart list, the blue and red lines disappear and the columns reduced back to two.

In the data list, the cell color returns to white.

7-5 Display and editing of marker

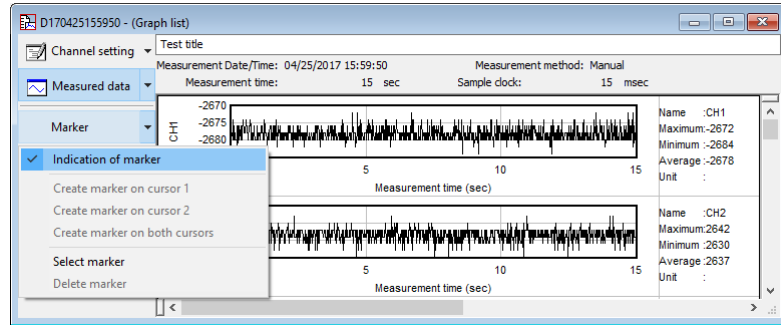
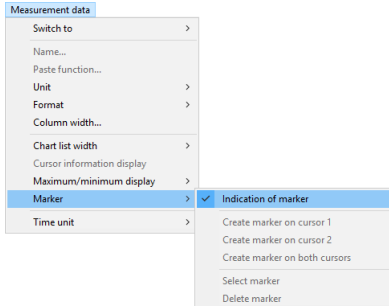


When the TMR-251 is recording GPS data, a marker can be displayed on GPS trajectory and on GPS map.

A specific location can be indicated on the chart list by the marker.

This software creates a marker on the chart list; however, if a marker has been inserted into the measurement data by using a TMR-281 (which is the display unit for the TMR-211) during the measurement, the marker is automatically created when the measurement data are read by this software.

To switch the display or non-display of the marker, click Indication of marker from the "Marker" button menu.



There are two kinds of marker: One indicates ordinary location and another indicates recording start location of voice memo file.

Ordinary marker

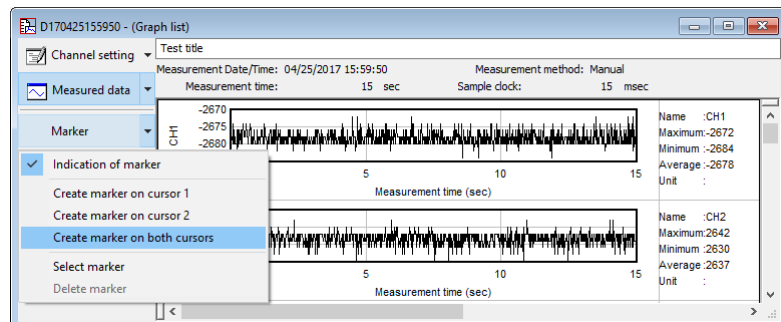
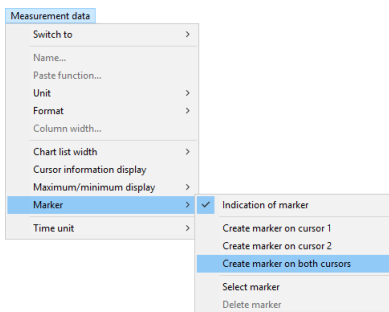


Voice memo marker



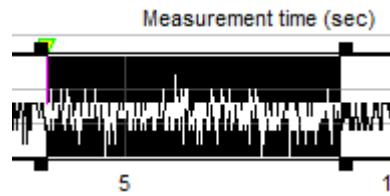
The voice memo marker is painted out in red and the voice memo is played by double-clicking on the marker.

The marker can be created at the location of cursor for range selection.

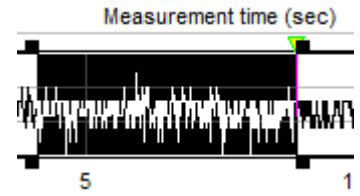


Move the cursor to the location where the marker is created. Select one from Create marker on cursor 1, Create marker on cursor 2 and Create marker on both cursors. The marker is created.

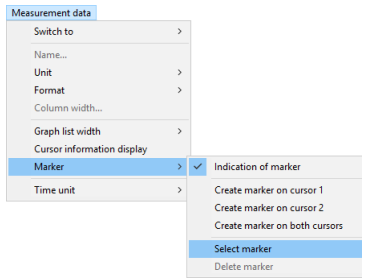
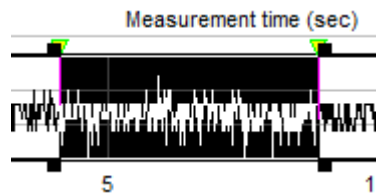
■ In case of Create maker on cursor 1



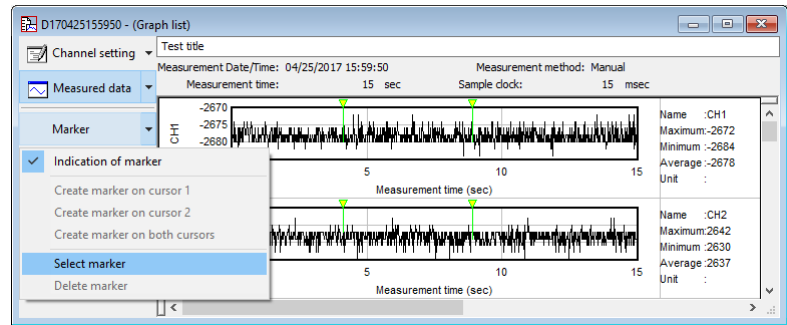
■ In case of Create maker on cursor 2





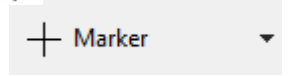
■ In case of Create maker on both cursors



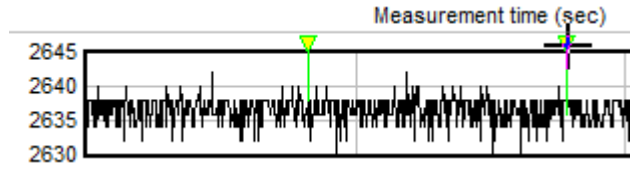
To delete the unnecessary marker, click the Select marker from the "Marker" button menu at first.



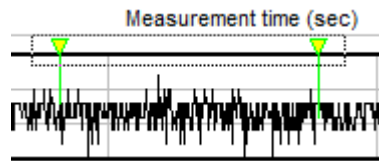
If the mouse cursor is moved on the chart list while selecting marker, the cursor changes to . In addi  a cursor is indicated on the "Marker" button.



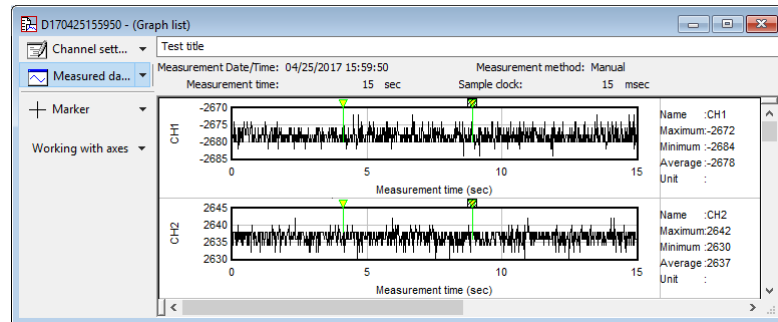
In case of selecting the marker one by one, click on the marker.



In case of selecting more than one marker together, drag the mouse and surround markers to be selected

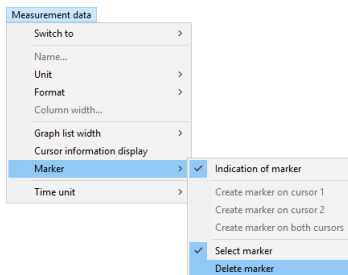


The selected markers are shaded.

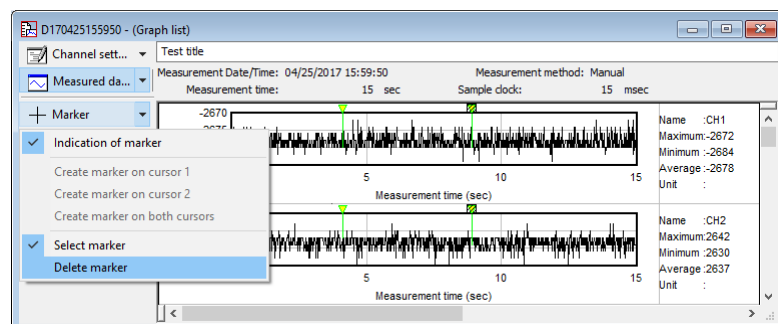


If the shift key on the keyboard is pressed when selecting, additional selection or the release of the selected marker becomes possible.

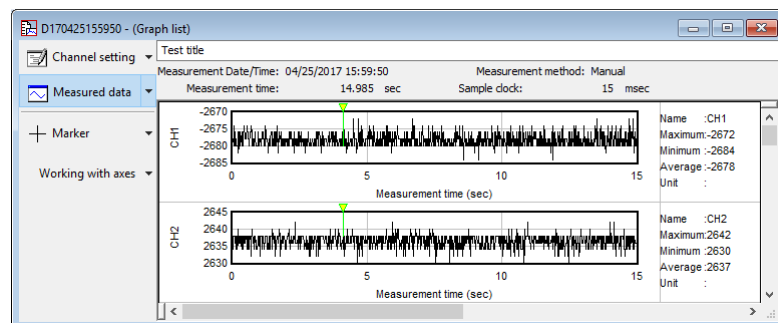
For releasing all, click at a position without marker.



For deleting the selected markers, click Delete marker from the "Marker" button menu.



The selected markers are deleted.

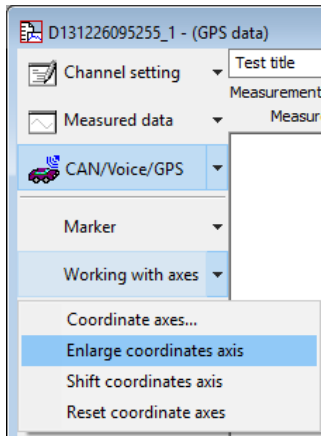


For the release of marker selection, click Select marker from the "Marker" button menu.

7-6 Operation of the axis of coordinates



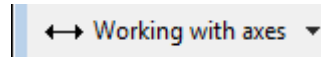
About the trajectory display of GPS data, read "Chapter 11: 5 Processing CAN/Voice/GPS measurement data".



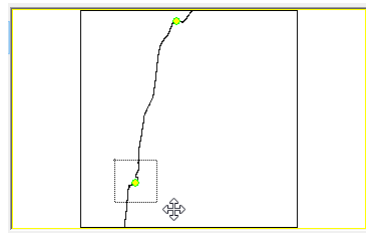
The magnification of display area and movement by mouse can be done for the chart list and the trajectory display of GPS data.

For the magnification of the axes, select **Enlarge coordinates axis** from the "Working with axes" button which appears when the chart list is displayed.

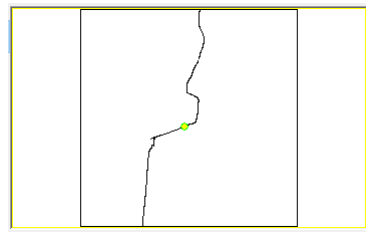
During operation of the axis, the cursor is changed into \leftrightarrow by moving the cursor to the chart list, and changed into \updownarrow by moving to the trajectory display of GPS data. Also, the cursor is displayed on the "Working with axes" button.



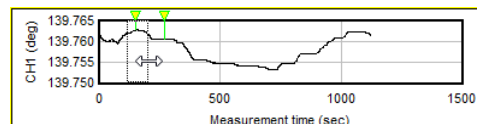
By dragging the mouse on the trajectory display of GPS data, an area to be magnified is selected in square.



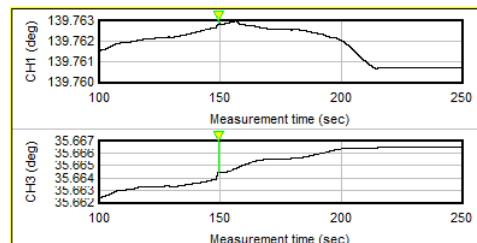
The selected area is magnified by releasing the mouse button.



By dragging the mouse on the chart list, an area to be magnified is selected in square.

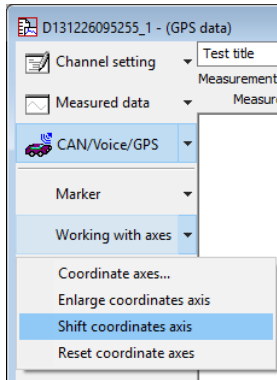


The selected area is magnified by releasing the mouse button.




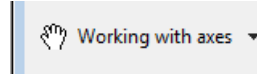
In the chart list, the time axis for all channels is changed to the selected area, and the vertical axis is so adjusted that the data within the area are shown for every channel.


For releasing the magnification of the coordinate axis, select the **Enlarge coordinates axis** from the "Working with axes" button.



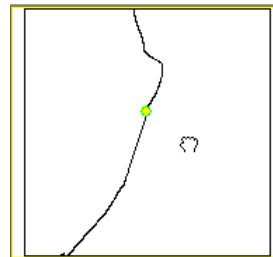
For the movement of the axis, select **Shift coordinates axis** from the "Working with axes" button.

During operation of the axis, the cursor is changed into  by moving the cursor to the chart list or the trajectory display of GPS data. Also, the cursor is displayed on the "Working with axes" button.

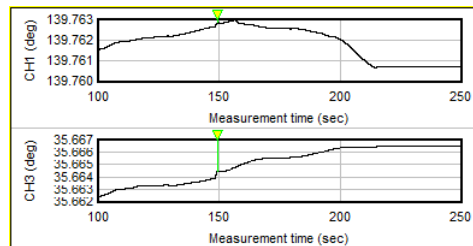


By dragging the mouse on the chart list or the trajectory display of GPS data, the cursor is changed into  and the display area moves.

The display area can be moved up or down and from side to side on the trajectory display of GPS data.

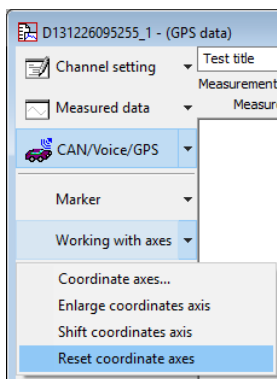


The area can be moved from side to side on the chart list.

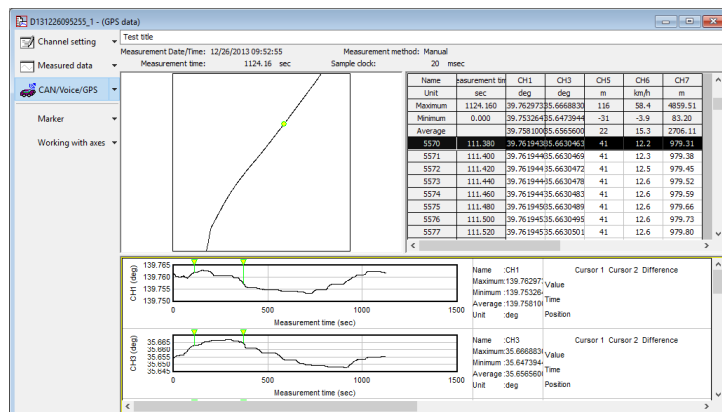


The vertical axis is adjusted for each channel so that the data within the area are shown.

For releasing the movement of the axis, select the **Shift coordinates axis** from the menu once more.



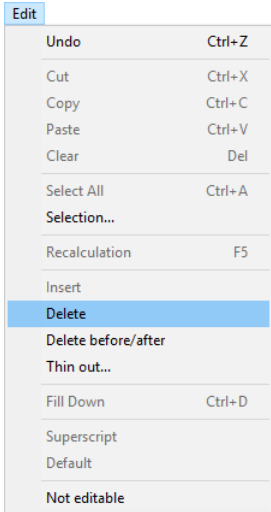
For displaying all the data, click the "Working with axes" button and select **Reset coordinate axis** from the menu. In the chart list or the trajectory display of GPS data, the chart in the screen which is in operation (displayed with yellow frame) is reset.



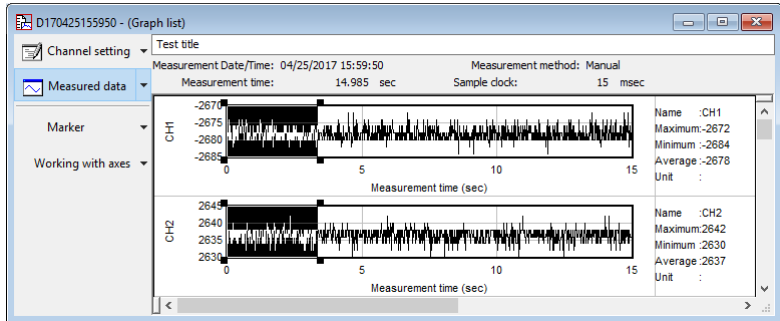
7-7 Data deletion

Delete unnecessary part of the phenomenon waveform.

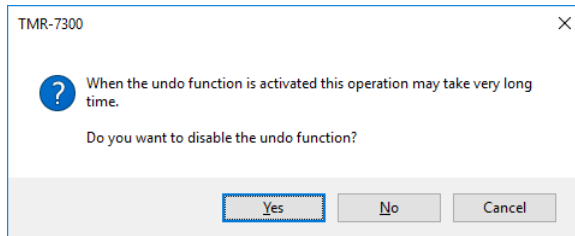
At first, select the unnecessary part of the measurement data.



If you find any mistakes after performing the deletion by clicking "Yes" button, close the measurement data file without saving it. Then open the file again.



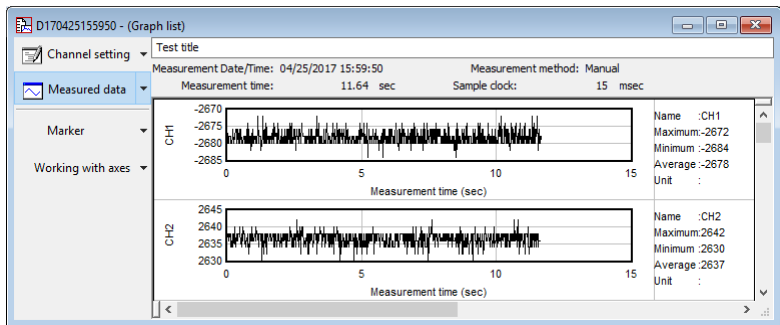
When you select Delete from the Edit menu, a dialog box appears for confirmation.



Delete operation can be canceled by selecting Undo from the Edit menu. However, if the delete range or the number of channels is large, it may take very long time (several to dozens of minutes).

If it is not necessary to undo the operation, or if it seems to take long time, click the "Yes" button.

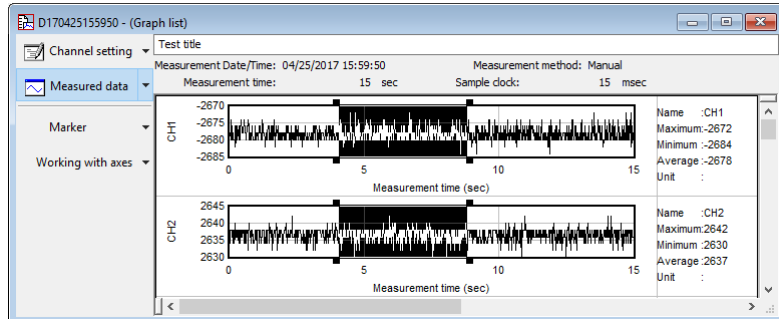
By clicking the "Yes" button or "No" button, the waveform within selected range is deleted.



7-8 Deletion of the first and last parts of data

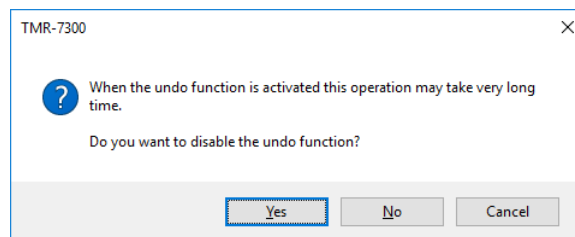
You can cut out only a necessary part of the phenomenon waveform.

At first, select the necessary part of the measurement data.



Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Selection...	
Recalculation	F5
Insert	
Delete	
Delete before/after	
Thin out...	
Fill Down	Ctrl+D
Superscript	
Default	
Not editable	

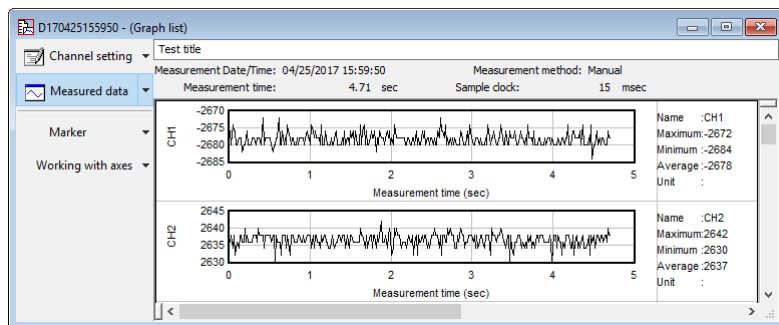
When you select **Delete before/after** from the **Edit** menu, a dialog box appears for confirmation.



Delete before/after operation can be canceled by selecting **Undo** from the **Edit** menu. However, if the delete range or the number of channels is large, it may take very long time (several to dozens of minutes).

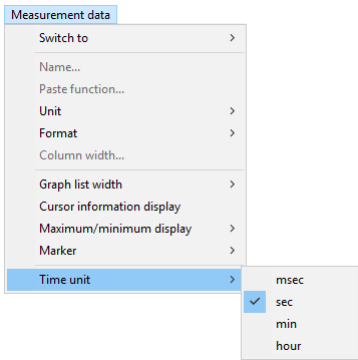
If it is not necessary to undo the operation, or if it seems to take long time, click the "Yes" button.

By clicking the "Yes" button or "No" button, the waveform out of the selected range is deleted.



If you find any mistakes after performing the deletion by clicking "Yes" button, close the measurement data file without saving it. Then open the file again.

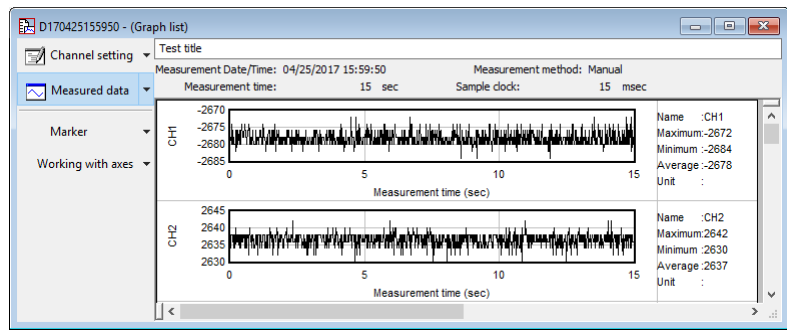
7-9 Change of the time unit



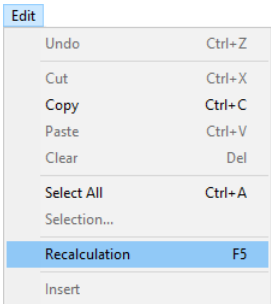
Use this function when the measurement time has become short after data deletion or the like.

In order to change the unit of measurement time, select Time unit of the Measurement data menu.

When the time unit is changed, the measurement time on the data list, chart list and the progression charts referring to the Measurement data file are displayed in the new unit.



7-10 Operation of measurement data




Re-calculation is carried out according to the definition of the Expanded channel using the measurement data allocated to each input channel.

It is also possible to set the formula of already defined sequence of functions again or to make a setting newly for the number that is not set. The measurement data that is defined by input CH does not carry out an operation.

The Expanded CH of Measurement data file is displayed.

NO	Name	Function	Unit	Format
1				
2				
3				
4				
5				
6				
7				

 For details on function, please read "Chapter 13: Function".



As the setting method of Expanded CH is same as that of the Measurement project, refer to "Chapter 4: 9 Expanded CH" (Page 4-26). (There is no optional data)

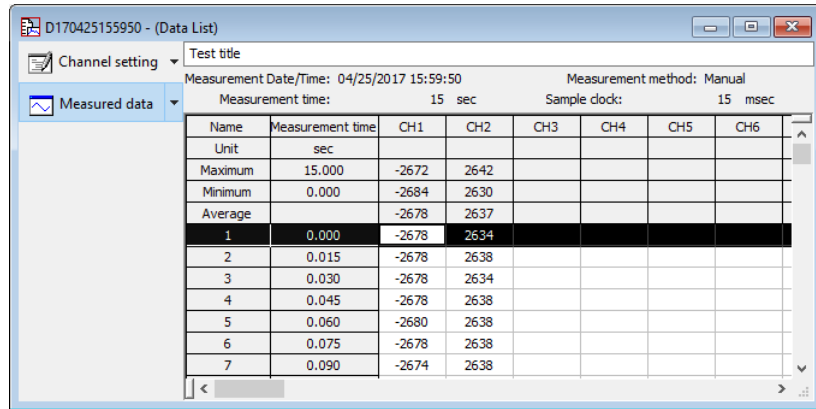
Set the Expanded CH, and select Recalculation from Edit menu.

Every data of Expanded CH is calculated again.

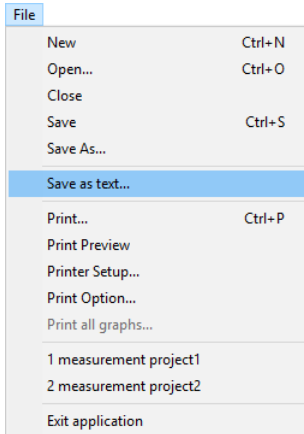
7-11 Save as text

Convert measurement data into a text file which can be read by any other software, and save the file. You can also select any channel to convert its data only.

Display the Data list of the Measurement data file.

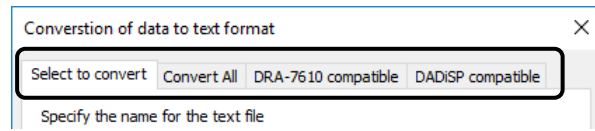


Name	Measurement time	CH1	CH2	CH3	CH4	CH5	CH6
Unit	sec						
Maximum	15.000	-2672	2642				
Minimum	0.000	-2684	2630				
Average		-2678	2637				
1	0.000	-2678	2634				
2	0.015	-2678	2638				
3	0.030	-2678	2634				
4	0.045	-2678	2638				
5	0.060	-2680	2638				
6	0.075	-2678	2638				
7	0.090	-2674	2638				



When you select **Save as text...** from the File menu, a dialog box is displayed to allow you to perform setting for text conversion.

Select a conversion method from the tabs in the upper section.



Selection items

Select to convert

: The arbitrarily selected channel and range of specified step are converted.

Convert All : The data of every channel is converted.

DRA-7610 compatible

: The format is same as that of CSV file for which text conversion is implemented by DRA-7610. When this format is used, the name of channel is not converted.

DADiSP compatible

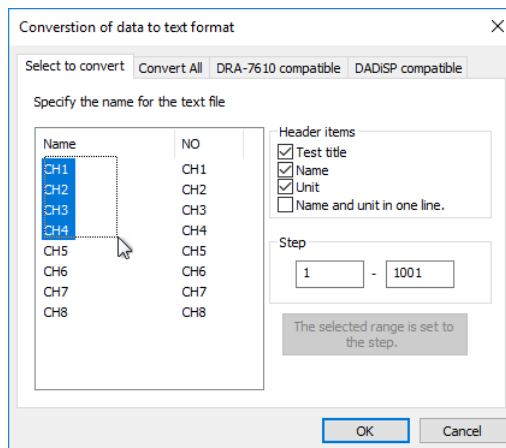
: The file is converted to the text file that can be read by the waveform analysis software DADiSP. For one data file, two files whose extensions are .HED and .DAT are created.



As for commercially available waveform analysis software, the DADiSP and the FlexPro can load the converted data.

■ Select to convert

The channel and step range you selected are converted in the basically same format as the Data list which is displayed on the screen.

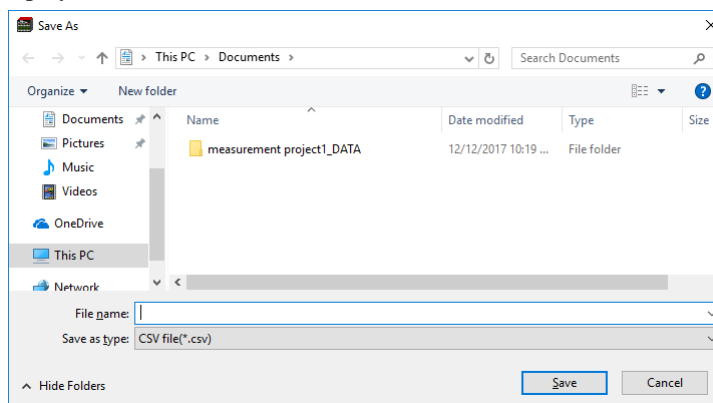


In order to select channels, drag the pointer in such a way to enclose the names of channels. Or, click the name while pressing the Shift key or Ctrl key.

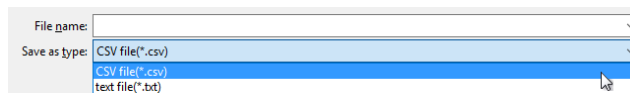
If you wish to save a selected range in data list or chart list (data file only), you can change the step by clicking on "The selected range is set to the step" button.

Select items to be included in the header, specify the range of the data steps, and click the "OK" button.

The dialog box for setting the target folder and the file name of the text file is displayed.



Select the destination to save and input the file name. For the type of file, CSV file (comma-separated) or text file (tab-separated) can be selected.

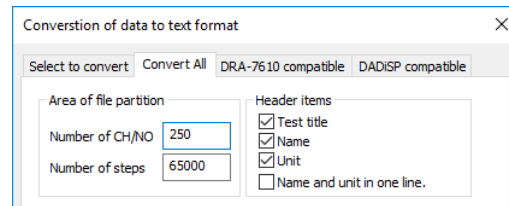


Click the "Save" button after confirming the setting.

A text file with the specified file name is created.

■ Convert all

Data of all the channels are converted in the basically same format as the Data list displayed on the screen.

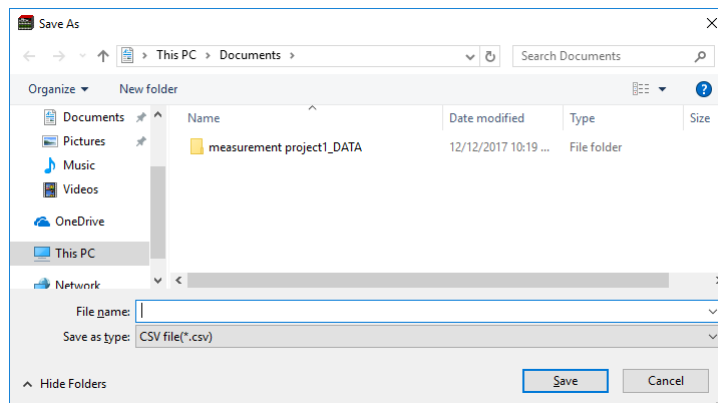


If the number of measurement data is bigger than the number of steps, the text file is divided into some files by the number of steps.

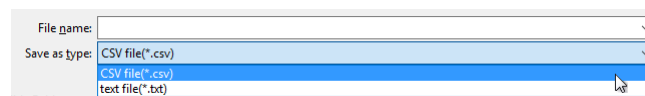
In addition, if the number of channels is bigger than the number of CH/NO, the text file is divided into some files by the number of CH/NO.

Select items to be included in the header, and click the "OK" button.

The dialog box for setting the target folder and the file name of the text file is displayed.

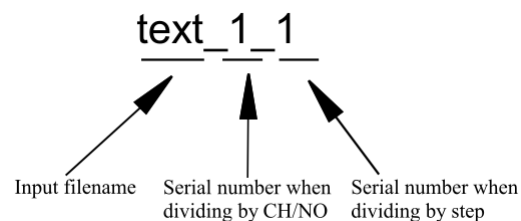


Select the destination to save and input the file name. For the type of file, CSV file (comma-separated) or Text file (tab-separated) can be selected.



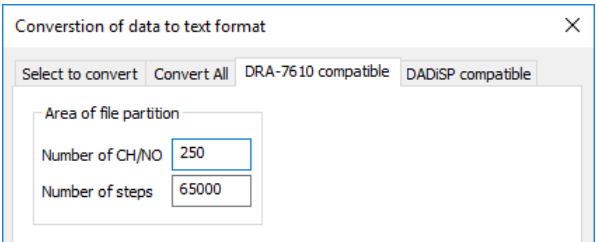
Click the "Save" button after confirming the setting.

The file name will be the string you input followed by a serial number.

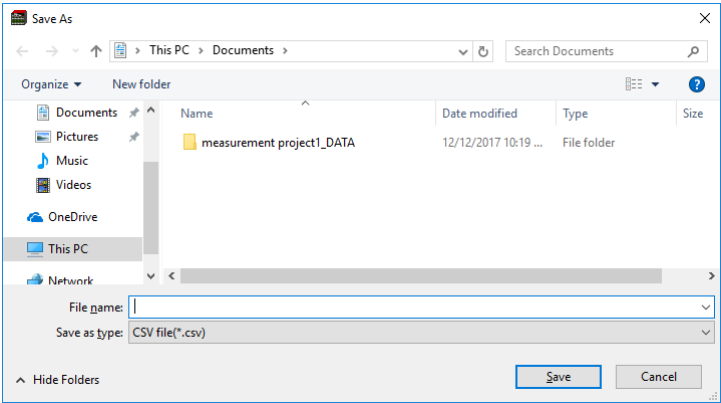


■ DRA-7610 compatible

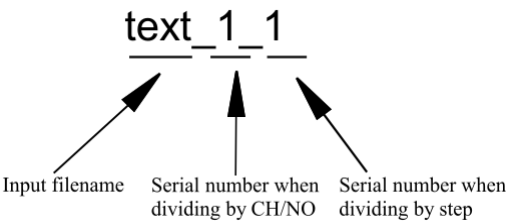
The format is same as that of CSV file for which text conversion is implemented by DRA-7610. When this format is used, the name of channel is not converted.



If the number of measurement data is bigger than the number of steps, the text file is divided into some files by the number of steps.
In addition, if the number of channels is bigger than the number of CH/NO, the text file is divided into some files by the number of CH/NO.
Set area of file partition, and click the "OK" button.
The dialog box for setting the target folder and the file name of the text file is displayed.



Select the destination to save and input the file name. For the type of file, only CSV file (comma-separated) can be selected.
Click the "Save" button after confirming the setting.
The file name will be the string you input followed by a serial number.

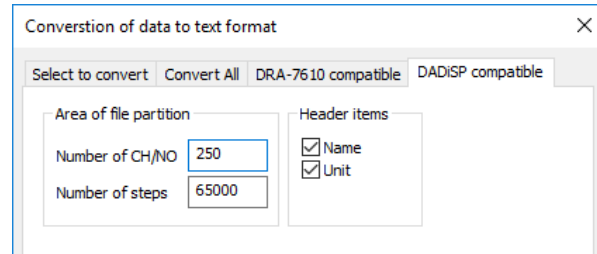




As for commercially available waveform analysis software, the DADiSP and the FlexPro can load the converted data.

■ DADiSP compatible

The file is converted to the text file that can be read by the waveform analysis software DADiSP. For each data file, two text files are created, with an extension of .HED and .DAT, respectively. Maximum, minimum, and average values are not converted.

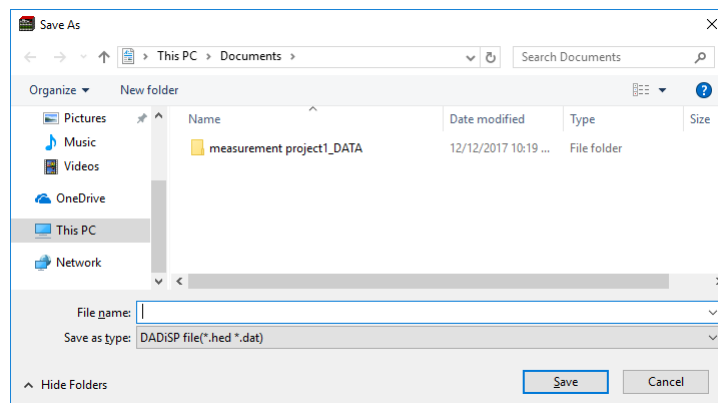


If the number of measurement data is bigger than the number of steps, the text file is divided into some files by the number of steps.

In addition, if the number of channels is bigger than the number of CH/NO, the text file is divided into some files by the number of CH/NO.

Select items to be included in the header, and click the "OK" button.

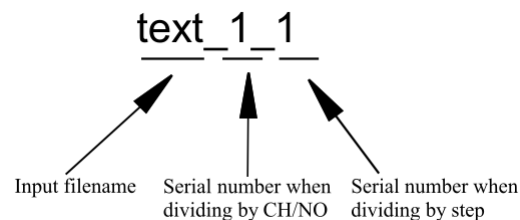
The dialog box for setting the target folder and the file name of the text file is displayed.



Select the destination to save and input the file name. For the type of file, only DADiSP can be selected.


Click the "Save" button after confirming the setting.

The file name will be the string you input followed by a serial number.



Files with the extensions of .HED and .DAT having the same name are created.

8 Processing of a frequency data file

 To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

One frequency data file is created every time you perform frequency measurement. You can execute following processes of data of all the channels in the file:

Change of the format

: The number of displayed digits for the maximum and minimum values of frequency data is changed.

Display the physical quantity

: To switch the display or non-display of the physical quantity for each slice is available.

Text conversion

: List and count data of frequency analysis are converted into a text file, so that they can be read by other software.

Output in the HR7916CSV format

: The format is same as CSV file for text conversion which is implemented by HR-7916. You can also select any frequency number to convert its data.

H170426140029

Test title

Measurement start 04/26/17 14:00:29

Measurement stop 04/26/17 14:00:45

Measuring time 0:00:15

Input CH

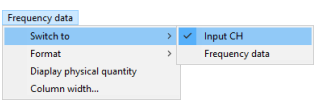
Frequency data

NO	Input ch.	Input mode	Input range	Lowpass filter		Highpass filter (Hz)	Balance	Reference contact	Calibration			Unit	Format
				Frequency (Hz)	Characteristic				Coefficient	Rated Output	Capacity		
DN_1	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_2	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_3	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_4	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_5	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_6	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_7	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_8	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	

Frequency data file

8-1 Displaying the Input CH

Display the setting conditions of each channel at the time of frequency measurement:



Click the Input CH tab, or click Input CH from the Switch to submenu of Frequency Data menu.

Setting conditions of each channel are displayed.

H170426140029

Test title

Measurement start 04/26/17 14:00:29 Measurement stop 04/26/17 14:00:45 Measurement time 0:00:15

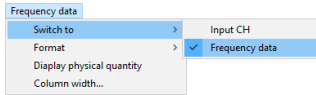
Input CH1

Frequency data

NO	Input ch.	Input mode	Input range	Lowpass filter		Highpass filter (Hz)	Balance	Reference contact	Calibration			Unit	Format
				Frequency (Hz)	Characteristic				Coefficient	Rated Output	Capacity		
DN_1	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_2	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_3	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_4	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_5	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_6	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_7	CH1	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	
DN_8	CH2	4G 2.0V	20000	PASS(0)	Bessel(2nd)	PASS	Valid		1			0	

8-2 Displaying frequency data

Display the setting conditions and frequency data of each frequency number at the time of frequency measurement.



Click the Frequency data tab, or click Frequency data from the Switch to submenu of Frequency data menu.

H170426140029

Test title

Measurement start 04/26/17 14:00:29 Measurement stop 04/26/17 14:00:45 Measuring time 0:00:15

Input CH **Frequency data**

NO	Input ch.	Analysis method	Full scale [μmV]	Hysteresis (%FS) [μmV]	Sampling/ Cross level	Slice(+)	Slice(-)	Over count		Maximum		Min	
								Positive side	Negative side	Value	Date/Time		Value
DN_1	CH1	PEAK/V	1000 [1000]	100 [1000]		50	50	0	0	-2430	04/26/17 14:00:37	-2626	04
DN_2	CH2	PEAK/V	1000 [1000]	100 [1000]		50	50	0	0	2820	04/26/17 14:00:44	2632	04

< >

Numerical	Peak	Valley	Peak/Valley	+Peak/-Valley
Slice	Peak	Valley	Peak/Valley	+Peak/-Valley
50				
40				

< >

■ Numerical display

Select Numerical tab in lower table, frequency data is displayed in number.

Slice	Value	Peak	Valley	Peak/Valley	+Peak/-Valley
50	1000				
49	980				
48	960				
47	940				
46	920				
45	900				
44	880				
43	860	3		3	3
42	840				
41	820				
40	800	2		2	2
39	780	5		5	5
38	760	5		5	5
37	740	2		2	2

■ Horizontal bar display

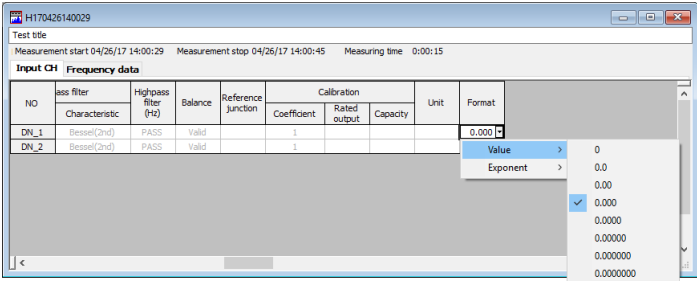
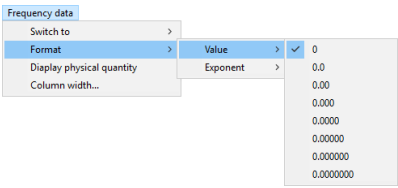
Select other than Numerical tab in lower table, frequency data is displayed by horizontal bar.

Slice	Value	Peak	Valley	Peak/Valley	+Peak/-Valley
50	1000				
49	980				
48	960				
47	940				
46	920				
45	900				
44	880				
43	860				
42	840				
41	820				
40	800				
39	780				
38	760				
37	740				

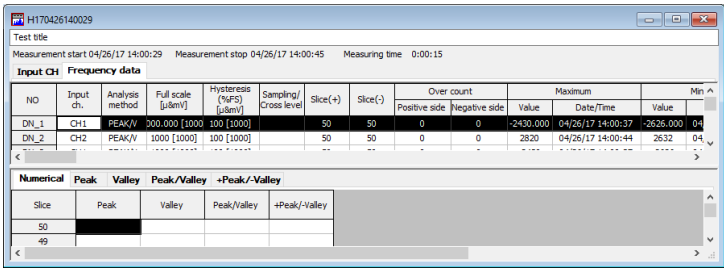
8-3 Changing the format

Change the number of displayed digits for the full scale, maximum value, minimum value and physical quantity of the frequency data.

Select the number of displayed digits from format.

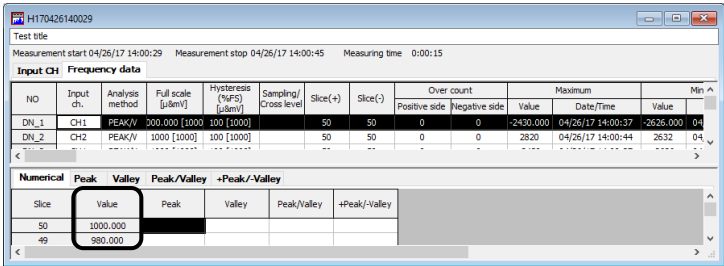
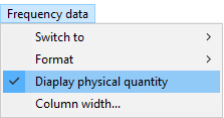


The number of displayed digits for the full scale, maximum value, minimum value and physical quantity of the frequency data is changed.



8-4 Displaying the physical quantity

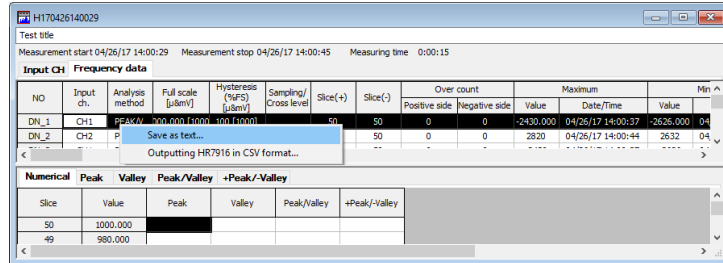
To switch the display or non-display of the physical quantity for each slice is available.



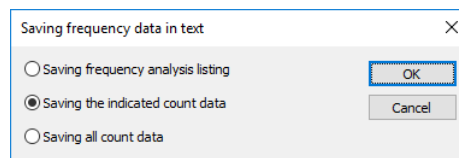
8-5 Save frequency data as text

Convert list and count data of frequency analysis into a text file which can be read by other software, and save the file.

Right-click on the frequency data, and select **Save as text...** in the menu.



A dialog box is displayed to allow you to perform setting for text conversion of the specified frequency data file.



Selection items

Saving frequency analysis listing

: The list of settings, including the frequency data analysis method, full scale, hysteresis, and number of slices, is converted.

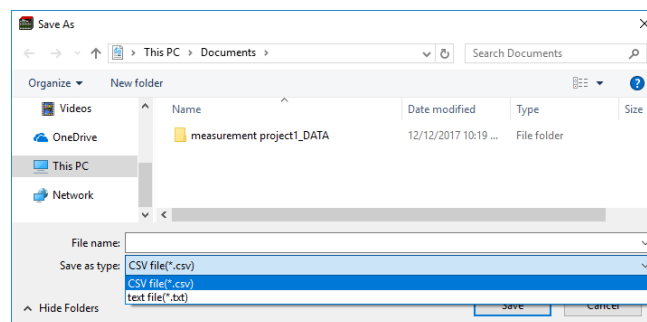
Saving the indicated count data

: Count data of the frequency number you have selected are converted.

Saving all count data

: All the count data are converted, creating a file for each frequency number.

After selecting a text conversion method, click the "OK" button. A dialog box is displayed to allow you to specify the destination to save the text file and file name.



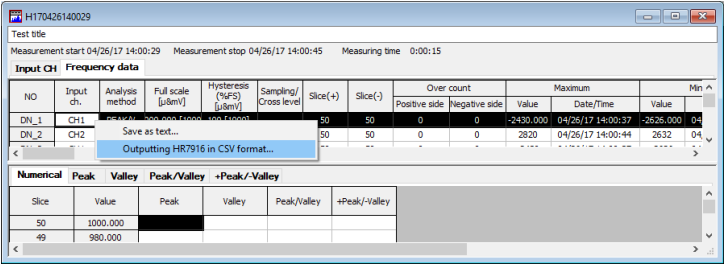
Select the destination and input the file name to save. The file type is selected between CSV file (comma-separated) and text file (tab-separated). Click the "Save" button to save the file.

When **Saving all count data** is specified, separated file is created for each frequency No., and "_" and a number showing frequency No. are appended to the end of each file name.

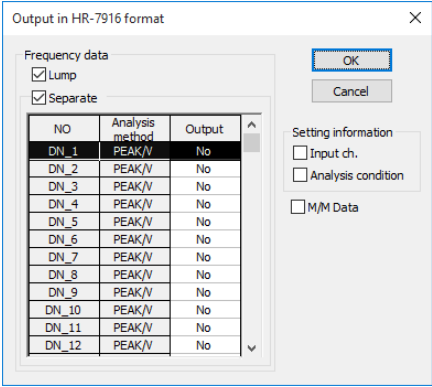
8-6 Outputting the frequency data in HR7916CSV format

Output the frequency data in the format same as a CSV file which is obtained by text conversion in HR-7916. You can also convert data of a selected frequency number.

Right-click on the frequency data, and select Outputting HR7916 in CSV format... from the menu.



A dialog box is displayed to allow you to perform setting for text conversion of the specified frequency data file in HR7916CSV format.



Setting items

Setting information

Input ch. : The settings of the input CH used for the frequency analysis are added.

Analysis condition

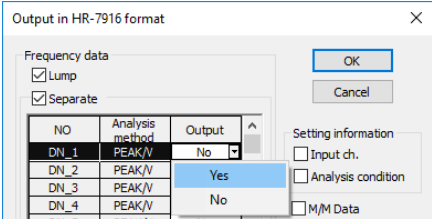
: The setting contents of the frequency number are added.

M/M data : The maximum and minimum values of the frequency number are added.

Frequency data

Lump : If you check this box, frequency data of all the frequency number are stored in a horizontal structure.

Separate : If you check this box, frequency data of the frequency number which was specified for the output are stored separately in a vertical structure.
Select "Yes" in the Output column.



Chapter 8

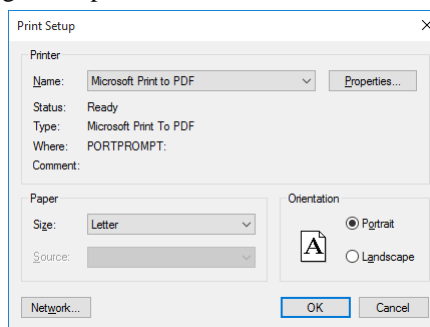
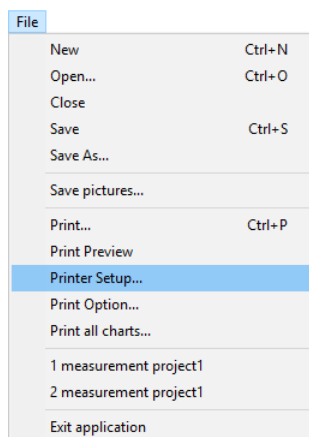
Print

This chapter explains how to print each file.

1 Selection of the printer and paper

Specify the printer to use and paper before starting printing.

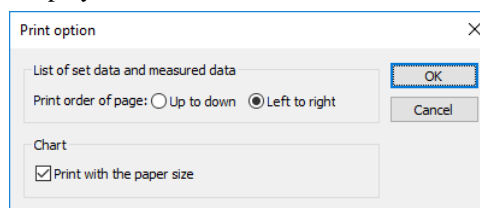
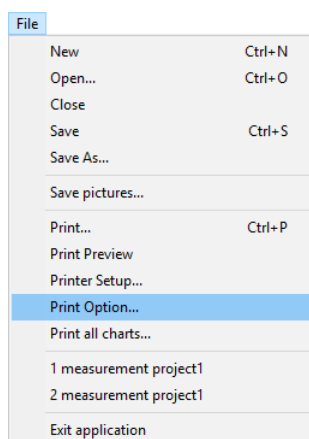
When you select **Printer Setup...** from the **File** menu, the dialog box is displayed for setting of the printer.



Specify the printer to use and size and orientation of the paper, and click the "OK" button.

2 How to set the printing format

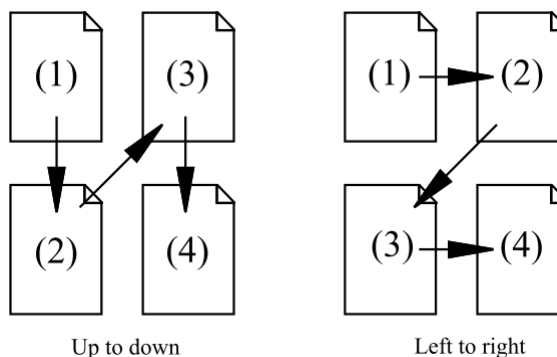
In order to set conditions for printing, select **Print Option...** from the **File** menu. The dialog box is displayed.



Setting items

Print order of page

: For the setting and the data of Measurement project or Measurement data file, the print area on one sheet is determined in accordance with the size and direction of the paper. Specify the printing page order for the case where the content cannot be fitted in one sheet.



Print with the paper size

: If you put a checkmark here, you can print out chart sheets in adjusting their size to the specified paper size.



For the lock of plotting area, refer to "Chapter 9: 5-25 Construction area lock" (Page 9-109),

Chart sheet is printed in a different manner, depending on the lock status of the plotting area and the size of the paper:

Plotting area	Print with the paper size	Plotting area is smaller than the specified paper size	Plotting area is larger than the specified paper size
Locked	ON	The chart is printed in the same size as it is.	The chart is printed on a reduced scale, with its part layout arranged with equal scaling in the horizontal and vertical directions.
	OFF		The chart is printed on multiple sheets.
Not locked	ON	The chart is printed with its parts layout arranged to fit in the specified paper size.	
	OFF	The chart is printed in the same size as it is.	The chart is printed on multiple sheets.




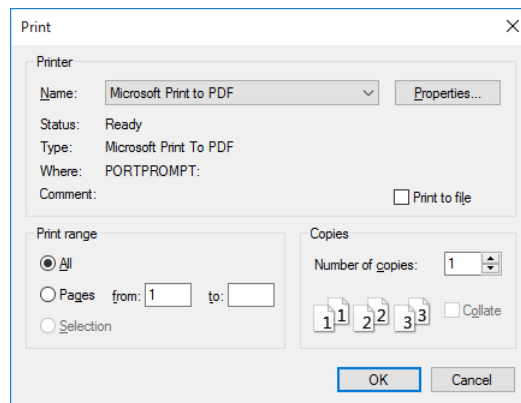
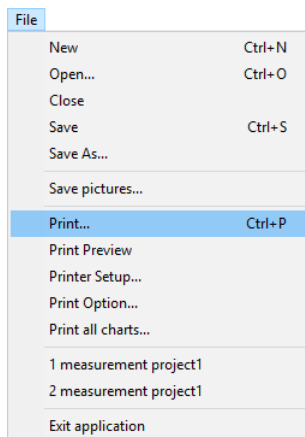
When the parts layout is arranged to fit in the paper size, a section of parts may stick out of the printing area, because the size of parts are not changed.

Click the "OK" button after completion of setting.

3 How to print out

Before you start to print out, the target window should be selected. For Measurement project, display the screen to print from among Channel setting, Automatic measurement setting, Measured data and History. Likewise, from among Channel setting and Measurement data for Measurement data file, and from among Input channel and Frequency data for Frequency data file.

Select Print... from the File menu. Or click the  "Print" button on the tool bar. A dialog is displayed for setting of the print range.



Setting item

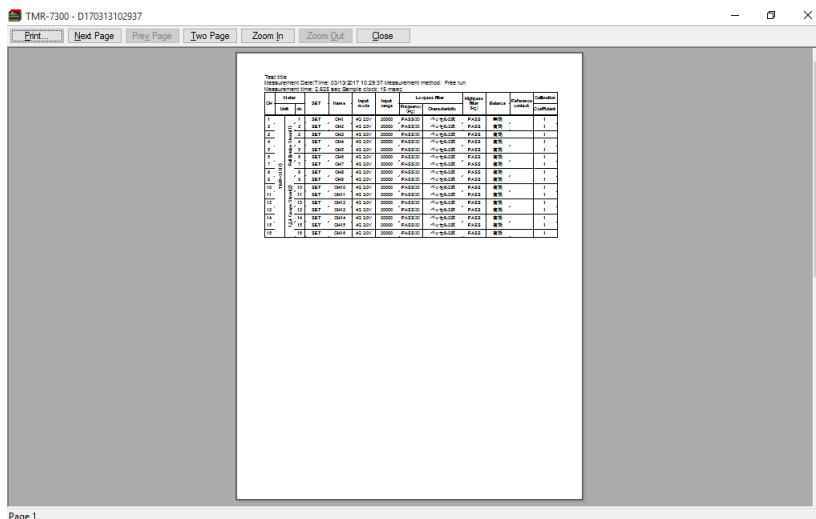
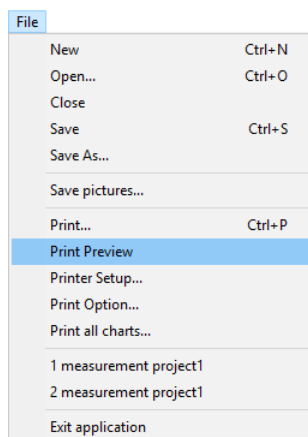
Print range : Set the page number to be printed.
When the All is selected, all pages are printed.

Click the "OK" button after completion of setting.

4 How to check before printing

In order to check the sheet on the screen before printing on the paper, select Print Preview from the File menu.

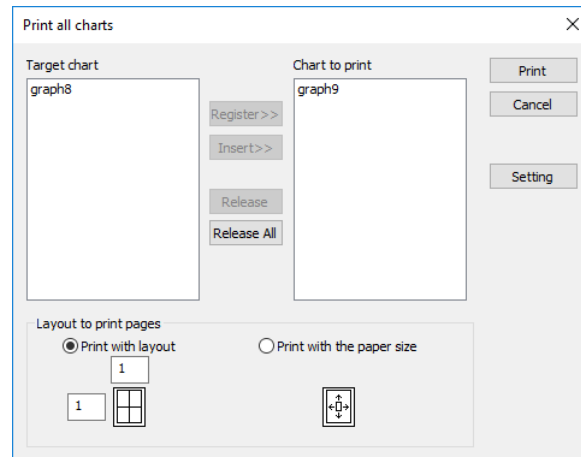
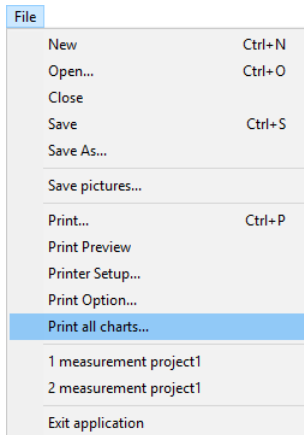
Image of a print is displayed on the screen, according to the specified paper size and print option.



5 Printing the chart sheets collectively

Select the sheets to be printed from opened chart sheets, and print them collectively.

When Print all charts... from File menu is selected, the dialog box for making a setting is displayed.



Setting items

Target chart : The list of opened chart sheets is displayed.

Chart to print

: The list of chart sheets to be printed is displayed.

"Register>>" button

: The sheet selected from the Target chart list is registered in the Chart to print list.

"Insert>>" button

: The sheet selected from the Target chart list is inserted between sheets registered in the Chart to print list.

"Release>>" button

: The sheet selected from the Chart to print list is deleted from list.

"Release All>>" button

: Every sheet registered in the Chart to print list is deleted.

"Setting" button

: The settings of the Chart to print and the Layout to print pages are recorded. When you open this dialog box again, recorded setting is retrieved. The setting will be canceled by restarting this software.

Layout to print pages

Print with layout

: Multiple sheets are printed in one piece of paper.
Set the vertical and horizontal division number and decide the printing area of sheet.
When the drawing area is larger than paper size, the parts allocation is adjusted according to the printing area and it is printed.

Print with the paper size

: One sheet is printed by adjusting it to the specified paper size and adjusting the parts allocation.



When the parts layout is arranged to fit in printing area or in the paper size, a section of parts may stick out of the printing area, because the size of parts are not changed.

When the sheets to be collectively printed are selected from Target chart list and "Register>>" button is clicked, they are displayed in Chart to print list. And click the "Print" button. The sheets are printed in the order that is registered in Chart to print list.

Chapter 9

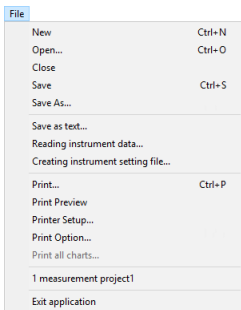
Overview of Menus

This chapter explains menus used in this software.

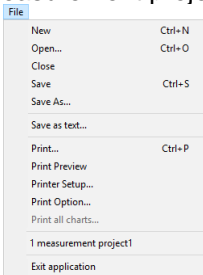
Menus displayed in the Measurement project, the Measurement data file, the Frequency data file, and the Chart sheet are different. In this chapter, the menu items specific to each project are shown with the following indications.

- Items specific to the measurement project
: "Measurement project"
- Items specific to the measurement data file
: "Measurement data"
- Items specific to the frequency data file
: "Frequency data"
- Chart sheet : "Chart sheet"

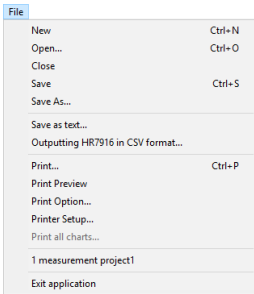
1 File menu



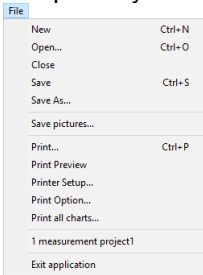
"Measurement project"



"Measurement data"



"Frequency data"

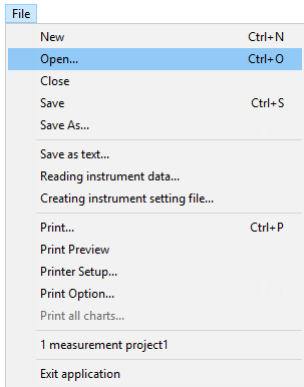


"Chart sheet"

Overview

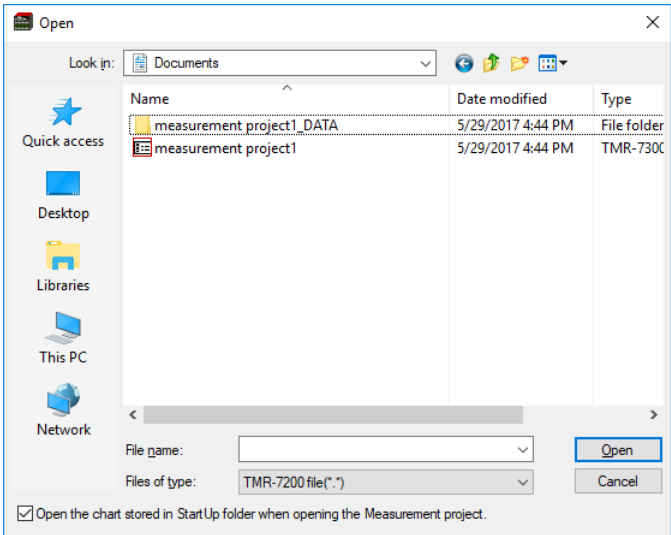
- Creating a new measurement project
- Opening the existing file
- Closing the selected window
- Saving the selected window
- Saving the selected window as other file
- Saving as standard text format
- Saving a chart as picture
- Reading the data file saved in instrument
- Creating setting file for instrument
- Setting the paper size
- Printing the selected window
- Printing the specified chart sheets and blank forms collectively
- Exit from this software

1-2 Open... Ctrl+O



Function Opens the existing file. The number of files that can be opened depends on the available memory and hard disk space. When the measurement project is opened, all the chart sheets stored in the StartUp folder are opened concurrently.

Screen



Description The four kinds of files for the Measurement project, Measurement data file, Frequency data file and Chart sheet can be opened.



"Measurement project"



"Measurement data file"



"Frequency data file"



"Chart sheet"

By removing the checkmark placed in the box for "Open the chart stored in StartUp folder when opening the measurement project.", only the measurement project is displayed.

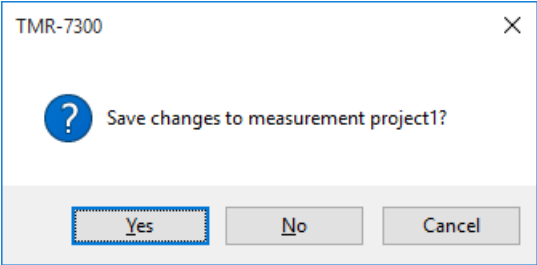
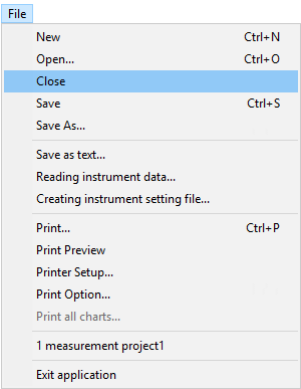
Operation

1. Select **Open...** from the **File** menu. The dialog box for selection is displayed.
2. Select the target file from the file list.
3. Click the **"Open"** button.
The file selected in the step 2. will be displayed.

1-3 Close

Function Closes the selected window.

Screen



Description

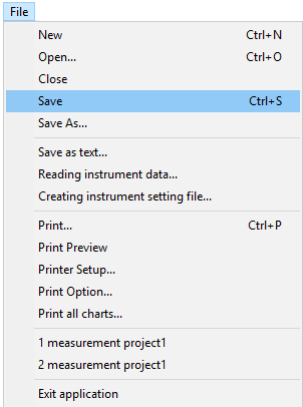
"Yes" button : The file is saved under the current name and the window is closed. If the file has never been saved, the **Save As** dialog box is displayed. Type the file name, specify the target folder and click the "Save" button.
The file is saved and the window is closed.

"No" button : Without saving the file, the window is closed.

Operation

1. Select **Close** from the **File** menu.
If the file has been changed, the dialog box is displayed.
2. To save the file, click the "Yes" button.
If you don't save the file, click the "No" button.

1-4 Save Ctrl+S

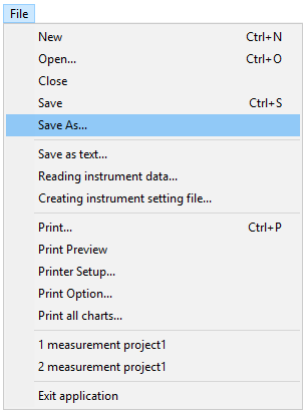


Function Saves the selected window.

Description The file saved once is saved with the same name. As for any Measurement project or Chart sheet that has not been saved, the **Save As...** operation is executed.

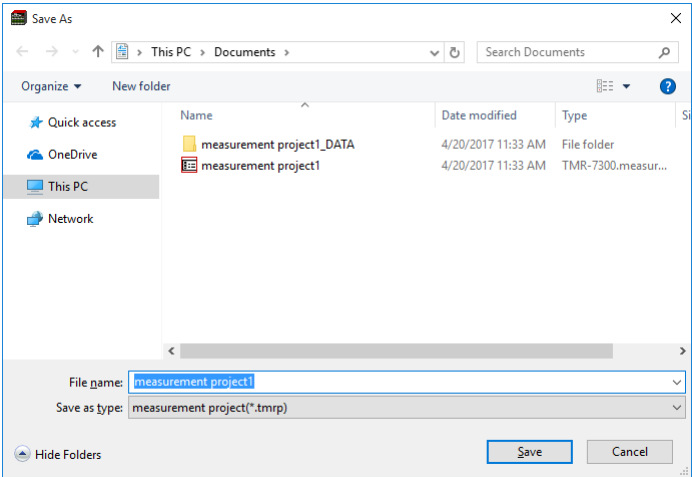
- Operation
1. Select **Save** from the **File** menu to save the file.
 2. If the file has never been saved, the **Save As...** dialog box is displayed.

1-5 Save As...



Function Saves the selected window as other name.

Screen

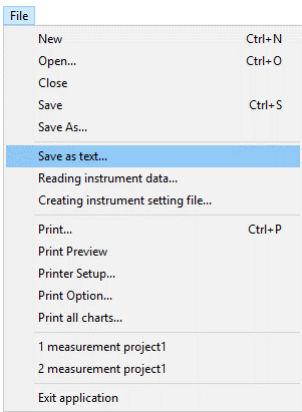


- Operation
1. Select **Save As...** from the **File** menu. The **Save As** dialog box is displayed.
 2. Select the target folder in which the file should be saved from the file list.
 3. Type the file name.
 4. Click the **"Save"** button.
 5. The file is saved in the folder selected in the step 2.

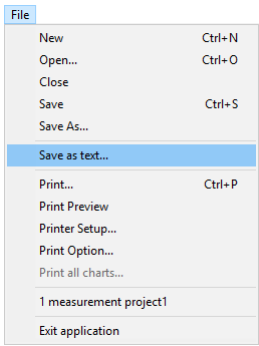
1-6 Save as text...

Function Saves the settings and the data of the Measurement project, the Measurement data file or the Frequency data file in a text format.

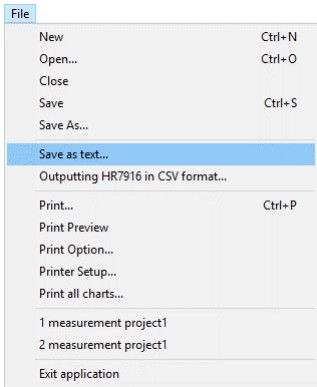
Screen



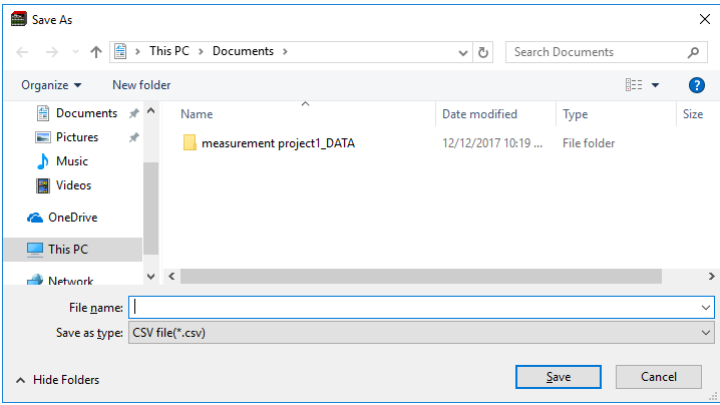
"Measurement project"



"Measurement data"



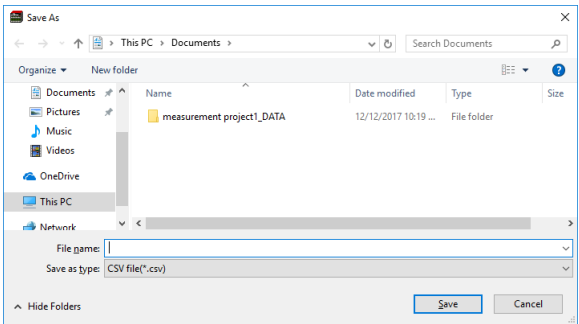
"Frequency data"



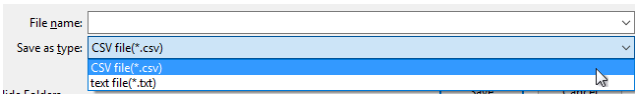
Description The settings and the data list being displayed on the selected window are saved in the standard text format. The saved text data can be used with commercially available spreadsheet and chart creating software.

Operation

1. Select Save as text... from the File menu. The dialog box for setting is displayed.
2. When the data list is being displayed, the dialog box for selecting the data to be saved and the step is displayed. Goto to step 5. When any window other than the data list is displayed, the Save dialog box is displayed.



3. Select the target folder from the file list. Input the file name. Select the type of the file from CSV (tab separation) or text (comma separation).



- 4. Click the "Save" button.
The text file is saved in the selected folder.
(Operation complete)
- 5. If the data list is being displayed, the dialog box for conversion setting is displayed.

Conversion of data to text format

Select to convert | Convert All | DRA-7610 compatible | DADiSP compatible

Specify the name for the text file

Name	NO
CH1	CH1
CH2	CH2
CH3	CH3
CH4	CH4
CH5	CH5
CH6	CH6
CH7	CH7
CH8	CH8

Header items

- ☒ Test title
- ☒ Name
- ☒ Unit
- ☐ Name and unit in one line

Step

1 - 1001

The selected range is set to the step.

OK Cancel

Select the text file conversion method from the tabs on the top.

Conversion of data to text format

Select to convert | Convert All | DRA-7610 compatible | DADiSP compatible

Specify the name for the text file

Selection items

Select to convert

: The arbitrarily selected channel and range of specified step are converted.

Convert All : The data of every channel is converted.

DRA-7610 compatible

: The format is same as that of CSV file for which text conversion is implemented by DRA-7610. When this format is used, the name of channel is not converted.

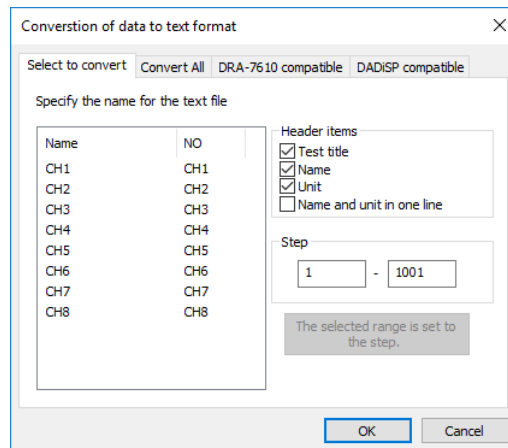
DADiSP compatible

: The file is converted to the text file that can be read by the waveform analysis software DADiSP. For one data file, two files whose extensions are .HED and .DAT are created.



Commercially available waveform analysis software can be read with the DADiSP and FlexPro.

■ Select to convert



Setting items

List of name : The data name set by measurement project and measurement data file is displayed.

Test title : The title is inserted into text data.

Name : The channel name is inserted into text data.

Unit : The unit is inserted into text data.

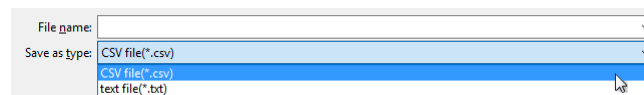
Name and unit in one line

: The channel name and unit are inserted into text data in one line.
If this item is not checked, the unit is appended to the line below the name.

Step : The range of specified step is converted to text data.

"OK" button : After the item is selected, the save dialog box is displayed.

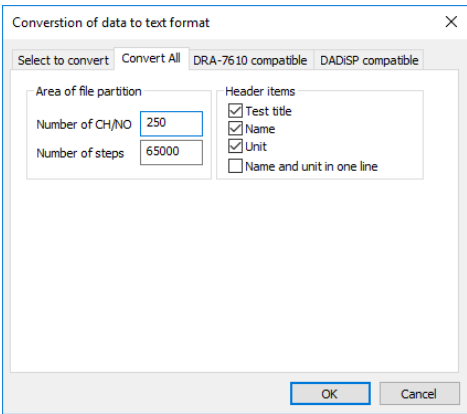
The "Save" dialog box as shown in Operation 2. is displayed. For the type of file, CSV file (comma-separated) or text file (tab-separated) can be selected.



Click the "Save" button after confirming the setting.

A text file with the specified file name is created.

■ Convert All



Setting items

Number of CH/NO

: The converted text file is divided by each specified number of columns.

Number of steps

: The converted text file is divided by each specified number of rows.

Test title : The title is inserted into text data.

Name : The channel name is inserted into text data.

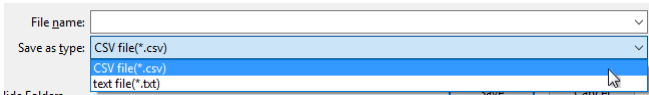
Unit : The unit set for each channel is inserted into text data.

Name and unit in one line

: The channel name and unit are inserted into text data in one line.
If this item is not checked, the unit is appended to the line below the name.

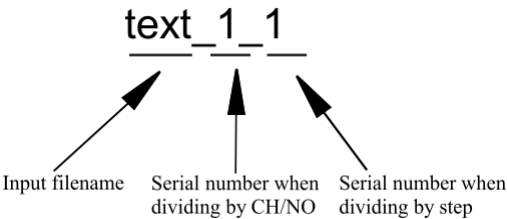
"OK" button : After the item is selected, the save dialog box is displayed.

The "Save" dialog box as shown in Operation 2. is displayed. For the type of file, CSV file (comma-separated) or text file (tab-separated) can be selected.

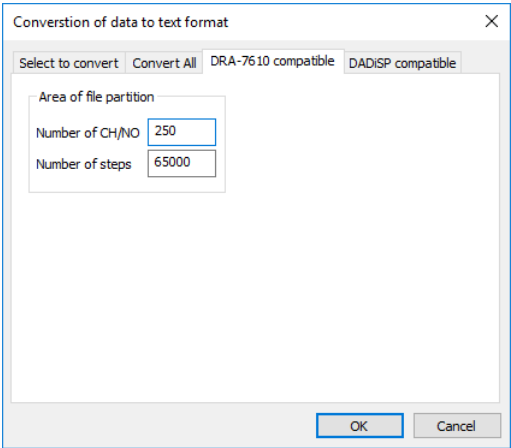


If the number of measurement data is larger than that of steps, the text file is divided by the number of steps. If the number of channels is larger than that of CH/NO, the text file is put divided by the number of CH/NO.

Serial numbers are put after the character string entered as a file name.



■ DRA-7610 compatible



Setting items

Number of CH/NO

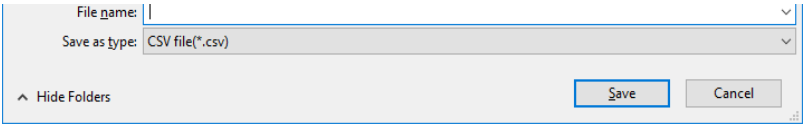
: The converted text file is divided by each specified number of columns.

Number of steps

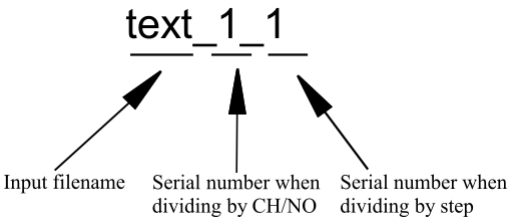
: The converted text file is divided by each specified number of rows.

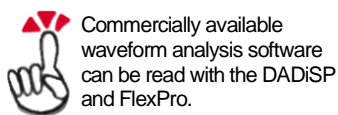
"OK" button : After the item is selected, the save dialog box is displayed.

The "Save" dialog box as shown in Operation 2. is displayed. The data separation is fixed as CSV file (comma separation).

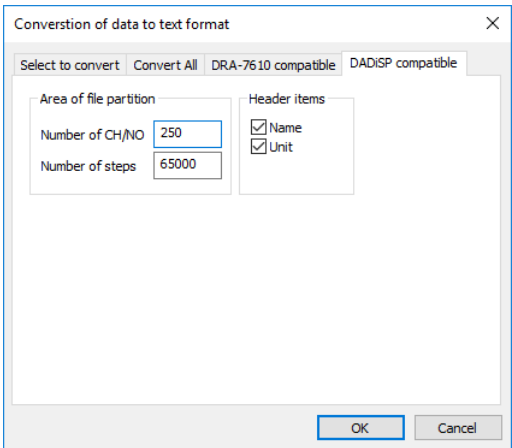


Serial numbers are put after the character string entered as a file name.





■ DADiSP compatible



Setting items

Number of CH/NO

: The converted text file is divided by each specified number of columns.

Number of steps

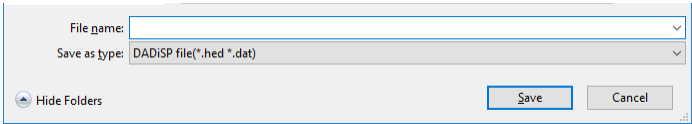
: The converted text file is divided by each specified number of rows.

Name : The channel name is inserted into text data.

Unit : The unit is inserted into text data.

"OK" button : After the item is selected, the save dialog box is displayed.

The "Save" dialog box as shown in Operation 2. is displayed. The file type is fixed as DADiSP.

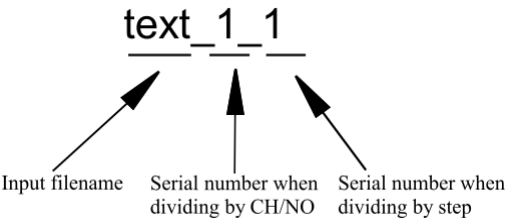


Select the target folder from the file list.

Input the file name.

Click the "Save" button.

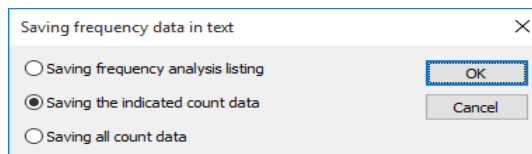
Serial numbers are put after the character string entered as a file name.



Files with the extensions of .HED and .DAT having the same name are created.

■ Frequency data file

1. When the frequency data of the frequency data file is being displayed, the dialog box for conversion setting is displayed.



Selection items

Saving frequency analysis listing

: The list of settings, including the frequency data analysis method, full scale, hysteresis, and number of slices, is converted.

Saving the indicated count data

: Count data of the frequency NO you have selected are converted.

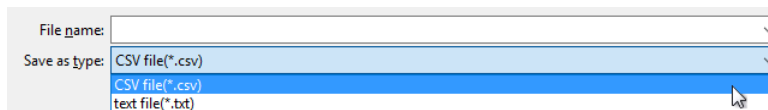
Saving all count data

: All the count data are converted, creating a file for each frequency NO.

After choosing the text conversion method, click the "OK" button.

The dialog box for setting the target folder and the file name of the text file is displayed.

Select the target folder and type the file name. For the type of file, CSV file (comma separation) or Text file (tab separation) can be selected.



After checking the setting, click the "Save" button.

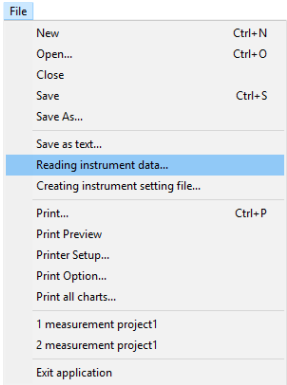
A text file with the typed file name is created.

If the **Save all count data** is selected, the files for each frequency NO are created and "_" and the frequency NO are added to the file name.

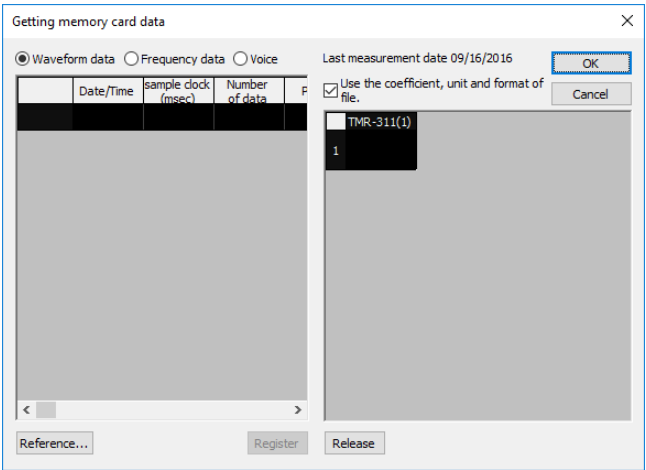
1-7 Reading instrument data...

Function This software can read the waveform data and the frequency data stored in the memory card or the shared folder of the instrument.

Screen



"Measurement project"



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

Description Data can be displayed as data file even if the measurement has been conducted off-line.
The waveform data and the frequency data can be concurrently read.

Operation

1. Select **Reading instrument data...** from the **File** menu.
The memory card data acquisition dialog box is displayed.
2. After setting, click the **"OK"** button.

Setting items

Waveform data/Frequency data/Voice

- : Select the type of data file to display.
- Selected files are read even if you have switched the display.

Use the coefficient, unit, and format of file.

- : If you check this box, the settings of coefficient, unit and format included in the specified folder are applied for reading waveform data. If there are no such data, the setting of the Measurement project is used.
- If you uncheck the box, the setting of the measurement project is used.

"Reference..." button

- : Select the folder that contains the data.

Left list : For the measurement data that is in the referenced folder, the measurement date and hour, sampling clock, number of data, etc. are displayed.

Right list : The list of the measurement data to read is displayed.

"Register" button

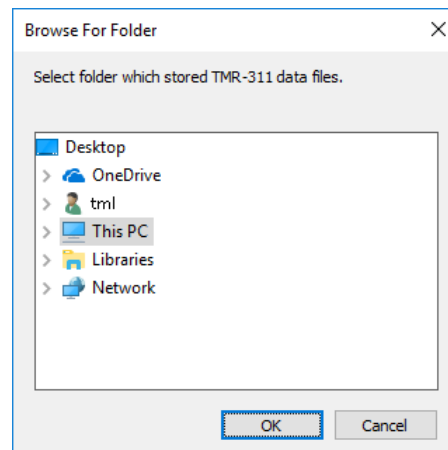
- : The data selected from left list is registered in right list.

"Release" button

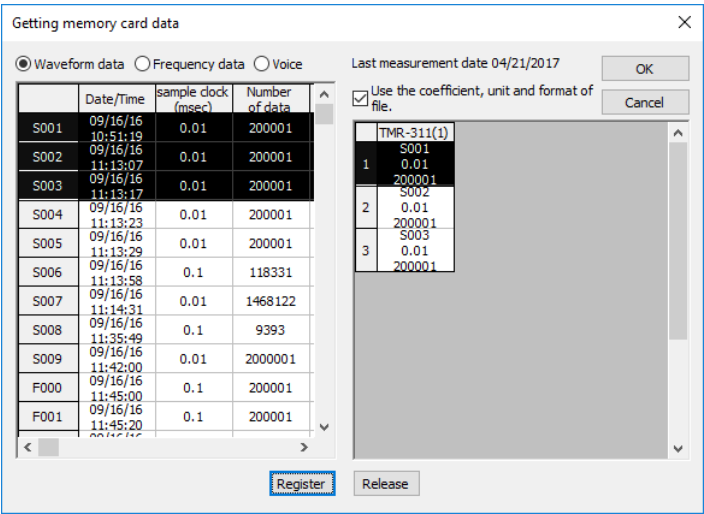
- : The data selected in the right list is deleted from the list.

When the "Reference..." button is clicked, the dialog box to select folder is displayed.

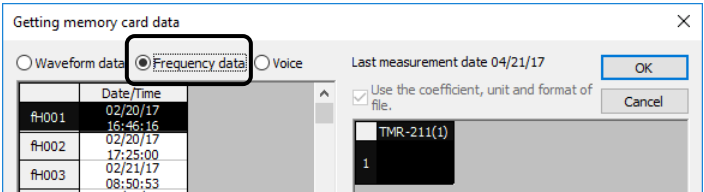
Select the folder where the data are stored.



Select the measurement data to be read from the left list and click the "Register" button. The selected data is displayed in the right list.



To read the frequency data, click the optional button for Frequency data.

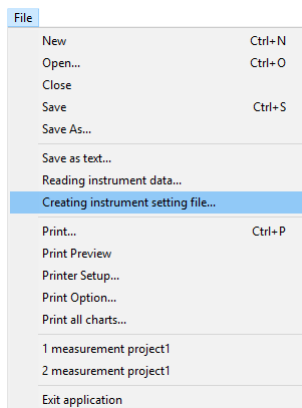


Click the "OK" button, then the registered data are loaded.

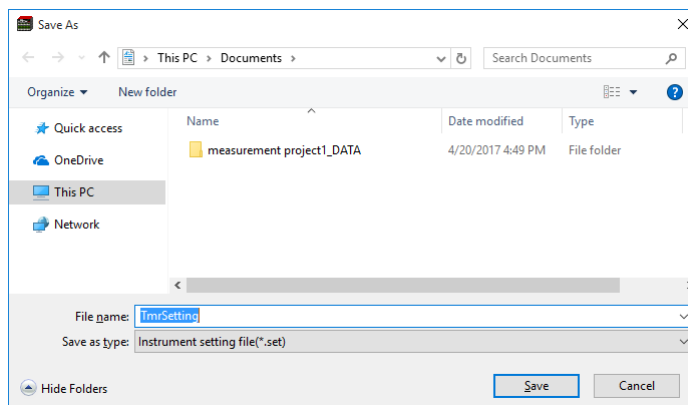
1-8 Creating instrument setting file...

Function Creates a setting file for setting the instrument using the instrument setting in the measurement project.

Screen



"Measurement project"



Description Instrument reads the setting file described in the exclusive format and performs instrument setting.
You can create the setting file from the Measurement project.

Operation

1. Select **Creating instrument setting file...** from the **File** menu to display setting dialog box.
2. Designate the name of setting file and storing place (folder) and click the **"Save"** button.



You cannot use a double-byte character set (i.e. Chinese, Japanese, Korean, etc.) in file name.

If the firmware version of TMR - 211 is older than 2.2A or the firmware version of TMR - 311 is older than 1.4A, then it cannot load the setting file.

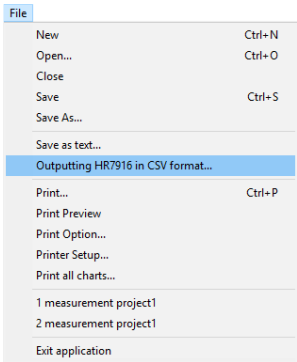
The contents stored in the setting file are as follows:

- A/D conversion setting
- Input CH
 - SET, Input mode, Input range, Low-pass filter, High-pass filter, Balance, Reference junction, Coefficient, Rated output, Capacity, Format
- Output CH
- Frequency NO
- Digital IN/OUT
- CAN/ Voice/ GPS
 - Basic setting, CAN data
- Data trigger measurement
- Program measurement

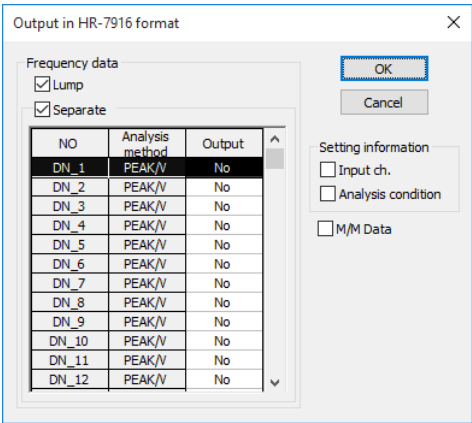
1-9 Outputting HR7916 in CSV format...

Function The converted file has the same format with that of the CSV file that was converted into a text file by HR-7916.

Screen



"Frequency data"



Description A CSV file is created in the same format with that of the CSV file of the frequency data created using the software HR-7916 for the histogram recorder HR-916.
The file also can be converted by selecting any frequency NO.

- Operation**
1. Select Outputting HR7916 in CSV format... from the File menu. The dialog box for setting is displayed.
 2. After setting, click the "OK" button.
 3. The dialog box for setting the target folder and the file name is displayed.
 4. After setting, click the "Save" button.

Setting items

Setting information

Input CH : The settings for the input CH used for the frequency analysis are added.

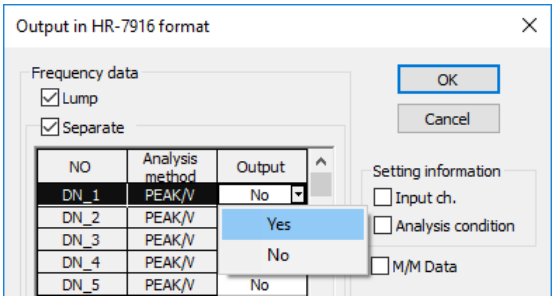
Analysis condition : The settings for the frequency number are added.

M/M Data : The maximum and minimum values for the frequency No. are added.

File menu

Frequency data

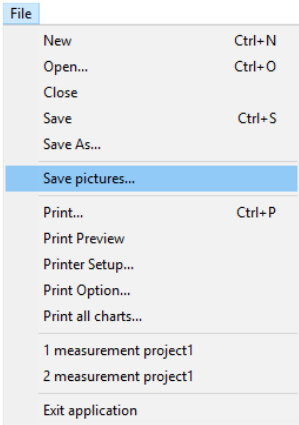
- Lump** : If you check this box, frequency data of all the frequency numbers are stored in a horizontal structure.
- Separate** : If you check this box, frequency data of the frequency number which is specified for the output are stored separately in a vertical structure.
Select "Yes" from the Output column.



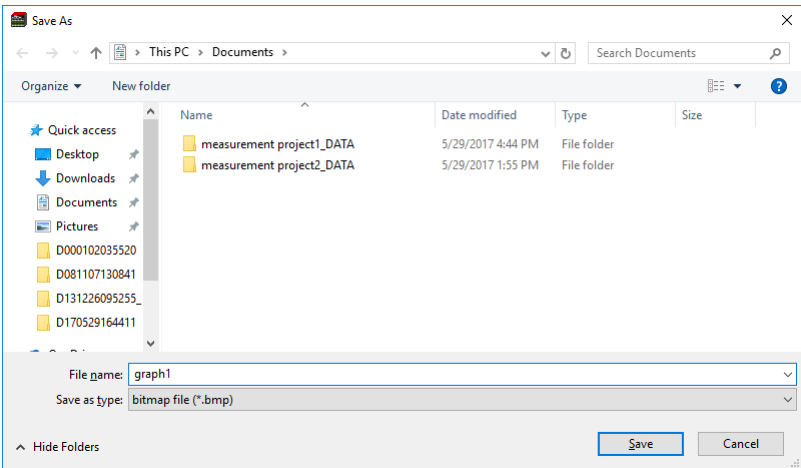
1-10 Save pictures...

Function Saves the chart sheet as bitmap (BMP), extension metafile (EMF) or PNG (png) formats.

Screen



"Chart sheet"



Description The selected chart is saved as image file. The saved image file can be used by commercially available word processor, DTP or graphic software etc, that can read the format used for the saving.

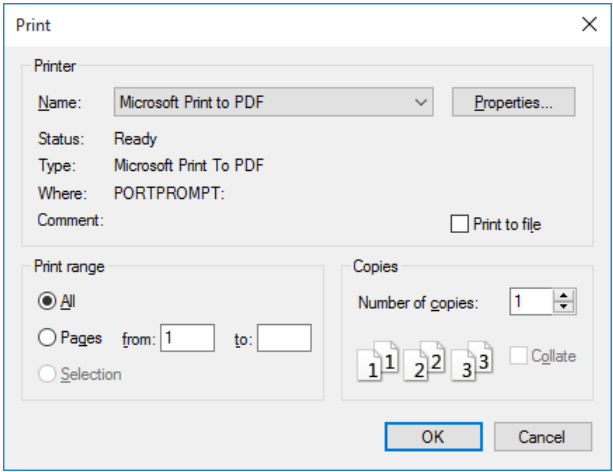
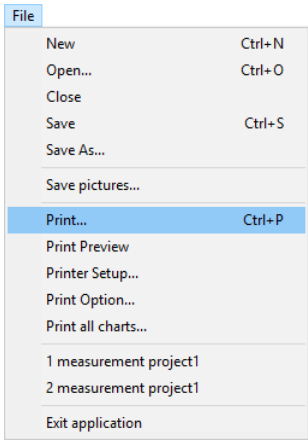
Operation

1. When **Save pictures...** is selected from **File** menu, the save dialog box is displayed.
2. Operate the file list and select the target destination to save.
3. Input the file name.
4. Select the format of image.
5. Click the **"Save"** button.
The image file is saved in the location selected by step 2.

1-11 Print... Ctrl+P

Function Prints the selected sheet.

Screen



Description Set the pages and the number of copies to be printed.

Operation

1. Select **Print...** from the **File** menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

Setting items

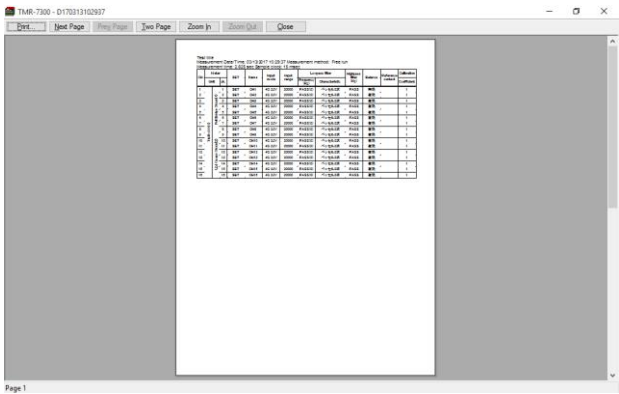
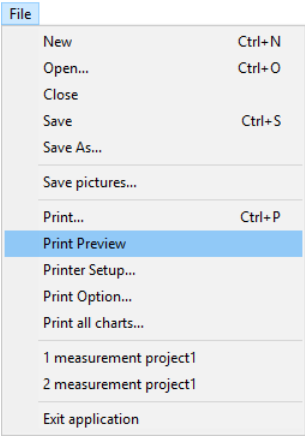
Print range : Set the page number to be printed.
When **All** is selected, every page is printed.

Copies : Set the number of copies to be printed.

1-12 Print preview

Function Displays the print image of the current window on the screen.

Screen



Description Before printing on a paper, the print image can be checked on the screen.
In the case two or more pages are printed like as a data list, you can check the page number you need before printing.

Operation

1. Select "Print preview" from the File menu. The print image is displayed.

Setting items

- Print... : The dialog box for implementing printing is displayed.
- Next page : Next page is displayed.
- Prev page : Previous page is displayed.
- Two page : Two pages are displayed on screen.
- One page : One page is displayed on screen.
- Zoom In : Displayed by enlarging it.
- Zoom out : Displayed by reducing it.
- Close : The preview is closed and the display returns to the previous screen.

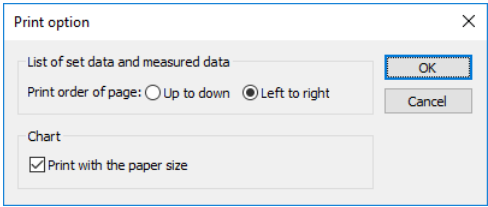
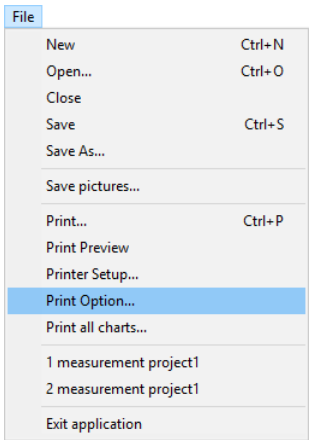


*If the print preview is executed during monitor measurement, the screen flickers.
If the flickering is annoying, stop the monitor measurement and execute the print preview.*

1-13 Print option...

Function Displays the dialog box for setting the printing conditions.

Screen



Description The print order for the measurement project or the measurement data file and the print size for the chart sheet are set.

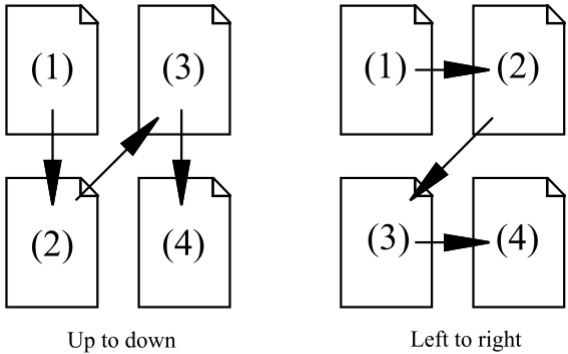
Operation

1. Select **Print option...** from the **File** menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

Setting items

Print order of page

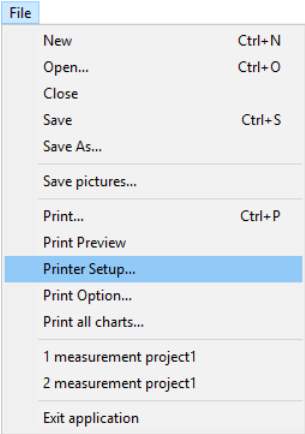
: For the setting and the data of Measurement project or Measurement data file, the print area on one sheet is determined in accordance with the size and direction of the paper. Specify the printing page order for the case where the content cannot be fitted in one sheet.



Print with the paper size

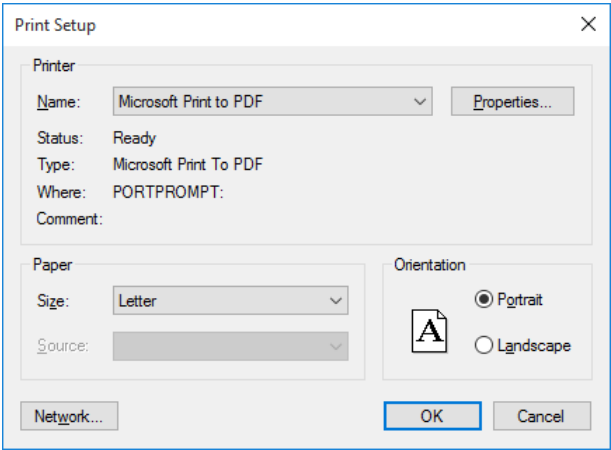
: The window size is changed according to the specified paper size and direction.

1-14 Printer setup...



Function Displays the dialog box for setting the selected printer.

Screen



Description Set the printer to be used, paper size and orientation, and click the "OK" button.

Operation

1. Select Printer setup... from the File menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

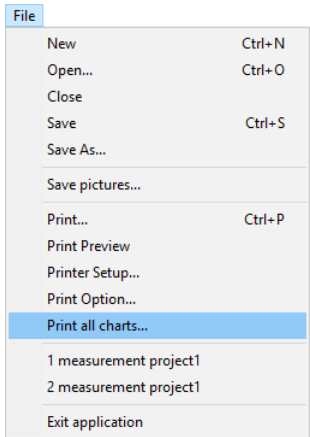
Setting items

Name : Select the used printer.

Size : Select the paper size.

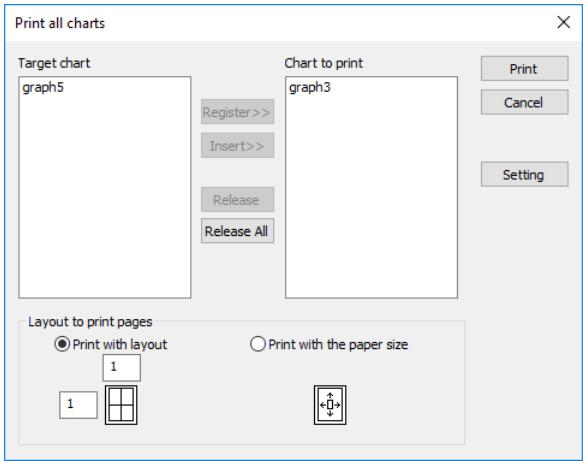
Orientation : Select the orientation of paper.

1-15 Print all charts...



Function Prints chart sheets selected from the opened chart sheets collectively.

Screen



Description It is possible to divide one paper vertically and horizontally and print the chart sheets by allocating them.

Operation

1. Open the chart sheets to be printed.
2. When **Print all charts...** is selected from **File** menu, the dialog box for making a setting is displayed.
3. After the setting, click the **"Print"** button.

Setting items

Target chart : The list of opened chart sheets is displayed.

Chart to Print

: The list of chart sheets to be printed is displayed.

"Register>>" button

: The sheet selected from the Target chart list is registered in the Chart to print list.

"Insert>>" button

: The sheet selected from the Target chart list is inserted between sheets registered in the Chart to print list.

"Release" button

: The sheet selected from the Chart to print list is deleted from list.

"Release all" button

: Every sheet registered in the Chart to print list is deleted.

"Setting" button

: The settings of the Chart to print and the Layout to print pages are recorded. When you open this dialog box again, recorded setting is retrieved. The setting will be canceled by exiting this software.

Layout to print pages

Print with layout

- : Multiple sheets are printed in one piece of paper. Set the vertical and horizontal division number and decide the printing area of sheet.
- When the drawing area is larger than paper size, the parts allocation is adjusted according to the printing area and it is printed.

Print with the paper size

- : One sheet is printed by adjusting it to the specified paper size and adjusting the parts allocation.

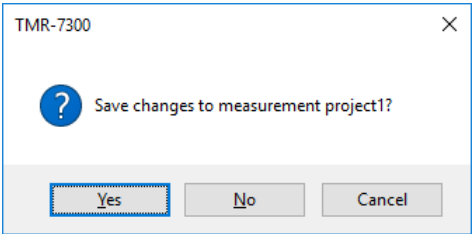


When the parts layout is arranged to fit in printing area or in the paper size, a section of parts may stick out of the printing area, because the size of parts are not changed.

1-16 Exit application

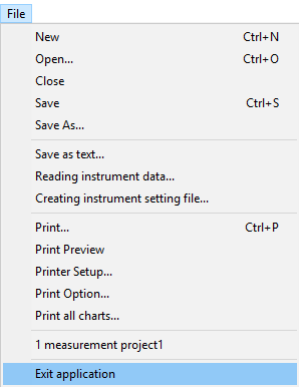
Function Closes all the open windows and exits this software.

Screen



Operation

1. Select Exit application from the File menu. The dialog box is displayed.
2. To save the sheet, click the "Yes" button. The Save process is executed and the window is closed. After closing all the windows, the software is exited.
3. If you don't save the sheet, click the "No" button. Without saving the sheet, the windows are closed and this software is exited.



2 Edit menu

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Insert	
Delete	
Fill Down	Ctrl+D
Superscript	
Default	
Not editable	

"Measurement project"

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Selection...	
Recalculation	F5
Insert	
Delete	
Delete before/after	
Thin out...	
Fill Down	Ctrl+D
Superscript	
Default	
Not editable	

"Measurement data"

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+N
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Fill Down	Ctrl+D
Not editable	

"Frequency data"

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+ C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+ A
Duplicate charts	
Copying chart	>
Move to the top face	Ctrl+ T
Move to the back face	Ctrl+ R
Not editable	
Create and paste a new object ...	
Link Setup...	
Object	

"Chart sheet"

Overview

- Canceling the last operation
- Deleting a character string or image to save it in the clipboard
- Saving the copy of character string or image in the clipboard
- Pasting the data in the clipboard
- Deleting character strings or images
- Selecting all character strings and images
- Inserting rows
- Deleting rows
- Downward copy
- Changing the selected character to superscript character
- Returning the selected superscript character to standard character
- Recalculating the operation data
- Cutting out of data
- Thinning out of data
- Duplicating chart sheets
- Moving the selected parts on a chart to front
- Moving the selected parts on a chart to back
- Disabling the change
- Displaying the OLE object which is in the selected chart or blank form
- Checking the link of OLE object
- Editing the OLE object
- Displaying images which is in the selected chart or blank form

2-1 Undo Ctrl+Z

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del

Function The last operation is canceled and the screen is returned to the previous one.

Description Cancel the last operation. If **Undo** is executed again, the screen is returned to the status before cancellation.

2-2 Cut Ctrl+X

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del

Function The selected cells or the character string in the input box are deleted and stored in the clipboard.

Description The Cut is used mainly for deleting the selected data and moving it to another place.
Only one data can be stored in the clipboard. Any old data that was cut out and copied in the clipboard is abandoned and replaced with new one.

2-3 Copy Ctrl+C

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del

Function For the measurement project or the measurement data file, the character string in the selected cell or input box is stored in the clipboard. For the chart sheet, the selected parts are stored in the clipboard.

Description The Copy is used mainly for copying any selected data.
Only one data can be stored in the clipboard. Any old data that was cut out and copied in the clipboard is abandoned and replaced with new one.

2-4 Paste Ctrl+V

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del

Function The data in the clipboard is pasted to the specified place.

Description **Measurement project, Measurement data file:**
The character string in the clipboard is pasted in the cell or the input box.
Chart sheet:
The cut or copied parts are pasted.

2-5 Clear Ctrl+B

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del

Function Selected character string in a cell or an input box on the **Measurement project**, or selected title or picture in the Chart sheet is deleted.

Description Differently from Cut, data is not stored in the clipboard.

2-6 Select All Ctrl+A

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A

- Function All characters, chart and pictures displayed on the open window are selected.
- Description This is used for moving all parts in the Chart sheet at a time.

2-7 Insert

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Selection...	
Insert	
Delete	

"Measurement project"
"Measurement data"

Screen

995	14.910	652	-407
996	14.925	604	-428
997	14.940	500	-440
998	14.955	360	-455
999	14.970	134	-477
1000	14.985	-70	-491
1001	15.000	-206	-502

Before insertion

995	14.910	652	-407
996	14.925	604	-428
997	14.940	500	-440
998	14.955	360	-455
999	14.970		
1000	14.985		
1001	15.000		
1002	15.015	134	-477
1003	15.030	-70	-491
1004	15.045	-206	-502

After insertion

- Description Rows (steps) are inserted in the data list.
In some other settings, rows can be inserted in each column.

2-8 Delete

Edit	
Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Clear	Del
Select All	Ctrl+A
Selection...	
Insert	
Delete	

"Measurement project"
"Measurement data"

Screen

994	14.895	658	-394
995	14.910	652	-407
996	14.925	604	-428
997	14.940	500	-440
998	14.955	360	-455
999	14.970	134	-477
1000	14.985	-70	-491
1001	15.000	-206	-502

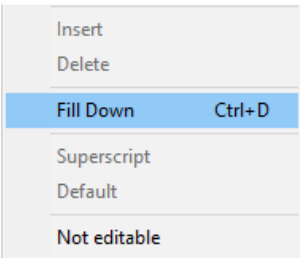
Before deletion

994	14.895	658	-394
995	14.910	652	-407
996	14.925	604	-428
997	14.940	500	-440
998	14.955	360	-455

After deletion

- Description Rows (steps) are deleted from the data list.
In some other settings, rows can be deleted from each column.

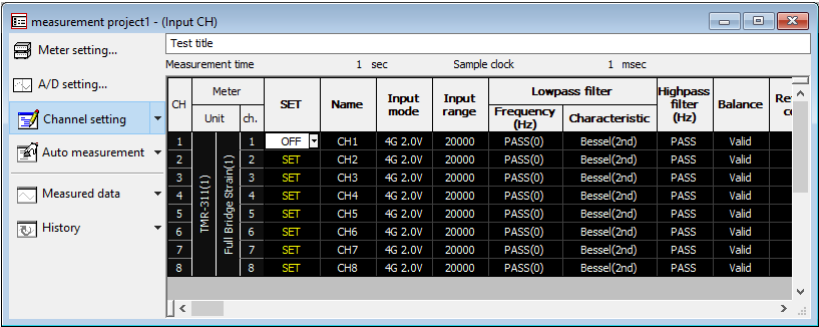
2-9 Fill Down Ctrl+D



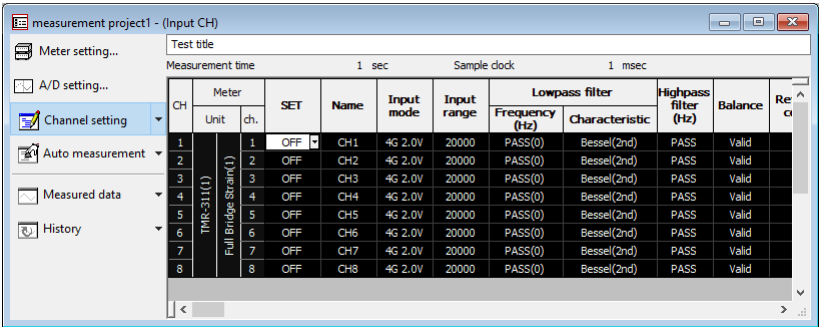
"Measurement project"
"Measurement data"

Function The data in the top row in the selected rows are copied downward to the cells in the selected rows.

Screen



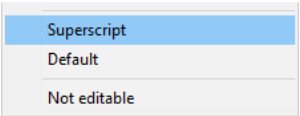
Before fill down



After fill down

Description The Fill Down is used for entering the similar settings in a series of rows.

2-10 Superscript



"Measurement data"

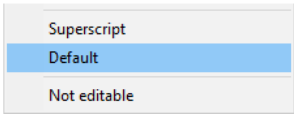
Function The selected characters are changed to superscripts.

Description This is used to change the selected character to superscript while editing the unit display.

Operation

1. Select the character to be changed to superscript from the character string of the unit using Shift key and ← or → key.
2. Select the Superscript in the Edit menu.

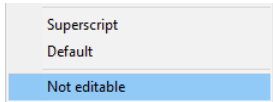
2-11 Default



"Measurement data"

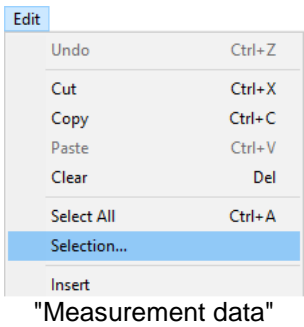
Function	Superscripts are changed to standard-size characters.
Description	This is used to change the selected character to standard-size character while editing the unit display.
Operation	<ol style="list-style-type: none">1. Select the character to be changed to standard-size from the character string of the unit using Shift key and ← or → key.2. Select the Default in the Edit menu.

2-12 Not editable



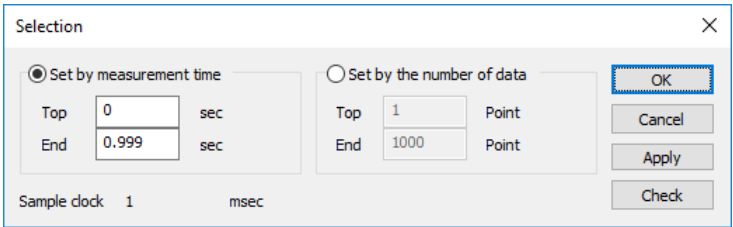
Function	This disables the change of the setting or the data in the Measurement project or the Measurement data file. It also disables the movement of the parts in the Chart sheet.
Description	If editing is disabled, it becomes impossible to enter with a keyboard and to move parts with a mouse.

2-13 Selection...



Function The dialog box for setting the field where insertion or deletion is executed in the data list or the chart list is displayed.

Screen



Description The field where insertion or deletion is executed in the data list or the chart list can be set with numeric values.

Operation

1. Select Selection... from the Edit menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.
There are two kinds of field selection methods; Setting by measurement time and setting by the number of data.

Setting items

Set by measurement time/Set by the number of data

: Select whether the range is set by measurement time or number of data.

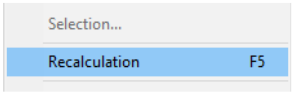
Top : Set the beginning part to be selected. The unit when the range is set by measurement time depends on the unit of measurement time of measurement data file.

End : Set the last part to be selected. The unit when the range is set by measurement time depends on the unit of measurement time of measurement data file.

"Check" button

: When it is set by measurement time, the number of data equivalent to the set value is displayed. When it is set by the number of data, the measurement time equivalent to the set value is displayed.

2-14 Recalculation F5



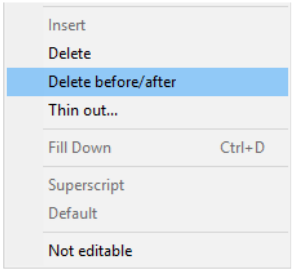
"Measurement data"



For detailed description of recalculation, refer to "Chapter 7: 7-10 Operation of measurement data" (Page 7-35).

- Function
- Re-calculation of the expanded channel is carried out. This is used when arithmetic expression is added after the measurement. The chart that is drawn with changed and added operation data is also updated.
- Description
- This is used when the arithmetic expression is changed or added for the measurement data file.

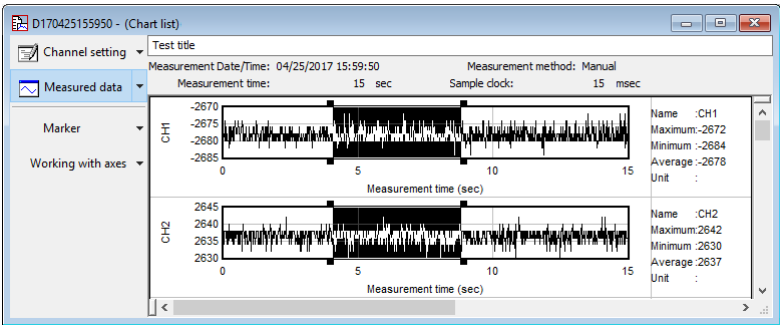
2-15 Deletion before/after



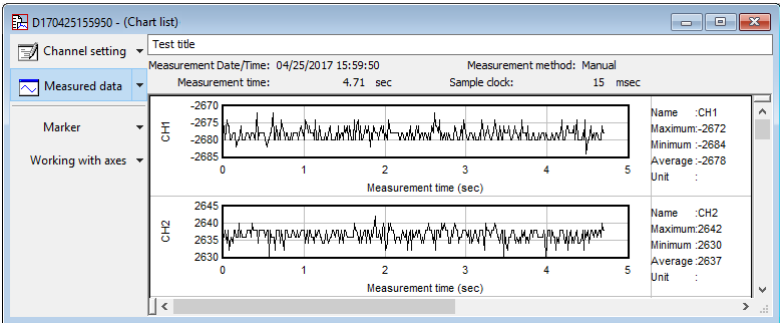
"Measurement data"

- Function
- Data is cut out in the data list or the chart list.

Screen



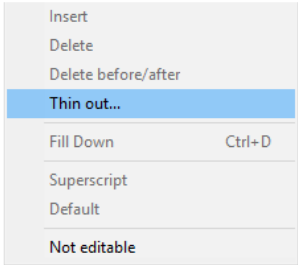
Before deletion



After deletion

- Description
- The data except the data selected in the data list or the chart list are deleted.

2-16 Thin out...



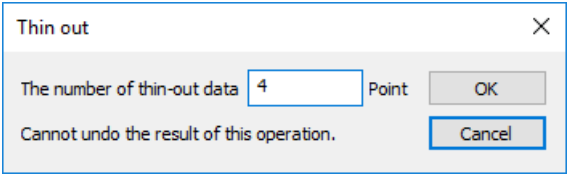
"Measurement data"



For the detailed description of thinning out, refer to "Chapter 7: 7-1 Thinning-out of the data". (Page 7-23).

Function The dialog box for setting the number of data to be thinned out at regular intervals in the data step is displayed.

Screen



Description The number of data is reduced by thinning out the data step at regular intervals.

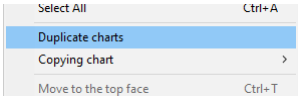
Operation

1. Select Thin out... from the Edit menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

The number of thin-out data

: The data of steps for which 1 is added to the set number are remained. If 4 is set for example, the data of steps 1, 6, 11 and so on are remained as data. The new sampling time is "sampling time x (the number of thinning out + 1)", and the measurement time is "(the number of remained data - 1) x new sampling time".

2-17 Duplicate charts



"Chart sheet"

Function The sheet same as selected chart sheet and blank form is displayed.

Description This is used for drawing a chart with different data in the same layout.

2-18 Move to the top face **Ctrl+T**

Move to the top face	Ctrl+T
Move to the back face	Ctrl+R
Not editable	

"Chart sheet"

Function The part selected in the chart sheet is moved to the front.

Description This is used in superposing parts.
The selected part is moved to the front.

Operation

1. Click a part to be selected.
2. Select **Move to the top face** from the **Edit** menu.

2-19 Move to the back face **Ctrl+R**

Move to the top face	Ctrl+T
Move to the back face	Ctrl+R
Not editable	

"Chart sheet"

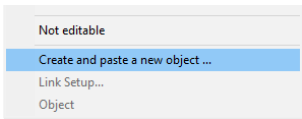
Function The part selected in the Chart sheet is moved to the back.

Description This is used in superposing parts.
The selected part is moved to the back.

Operation

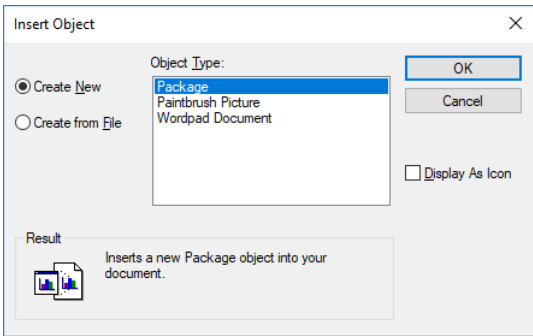
1. Click each part to select.
2. Select **Move to the back face** from the **Edit** menu.

2-20 Create and paste a new object...



"Chart sheet"

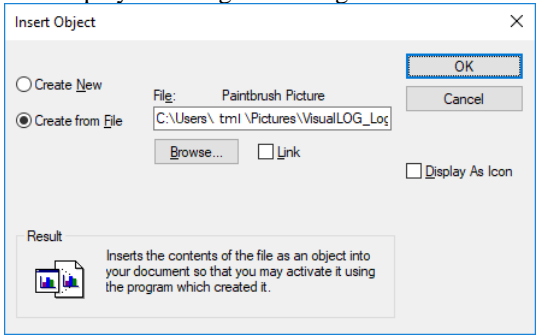
Function Picture and image etc. are displayed on chart sheet.
Screen



Description The picture or image is created or inserted on chart sheet using the software that supports OLE function of Windows, and it is displayed.

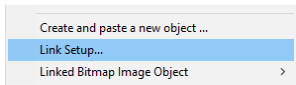
Operation

1. The chart sheet or blank sheet is activated.
2. Select **Create and paste a new object...** from **Edit** menu. The dialog box for creating the object is displayed.
3. When creating the object newly, click **Create New** and select the format of object from **Object** type.
4. When there is a file to be inserted already, click **Create from File**. The display of dialog box changes.



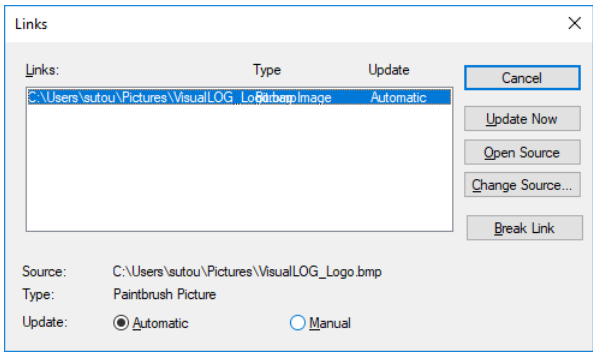
5. Input the location of file and file name for file. When the "**Browse...**" button is clicked, the dialog box for referencing file is displayed, so select the file.
6. When **Link** is checked, the file to be inserted is changed and the object created on chart sheet is also updated.
7. When the "**OK**" button is clicked, the corresponding software is started up, and the screen changes to edit screen of object.

2-21 Link Setup...



"Chart sheet"

Function Check the setting of linked object.
Screen



Description When the original file of linked file is changed or its location is moved, the link is updated.

- Operation
1. Select the object by clicking the mouse.
 2. When Link Setup... is selected from Edit menu, the dialog box for link is displayed.
 3. Click the button above and execute it.

"Update Now" button
: The linked file is read and displayed.

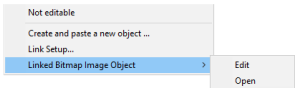
"Open Source" button
: The file is opened by corresponding software.

"Change Source..." button
: The file to be linked is changed.

"Break Link" button
: The link is released and file is not updated.

Update : Select whether the file is automatically updated when the file is changed, or it is updated by "Update Now" button.

2-22 Linked Bitmap Image Object

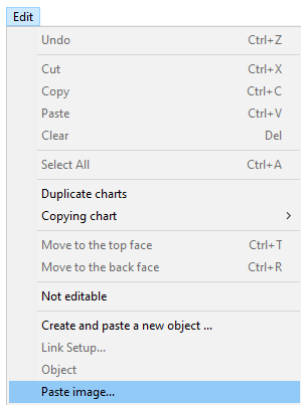


"Chart sheet"

Function The linked object is edited.

Description The content displayed for menu varies depending on the object. Generally, the Edit menu for editing the object on chart sheet and Open menu for opening the object by corresponding software are added.

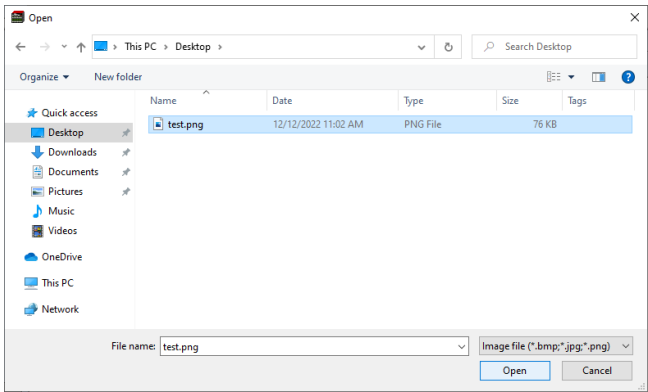
2-23 Paste image...



"Chart sheet"

Function BMP, PNG and JPG format images are displayed on chart sheet.

Screen

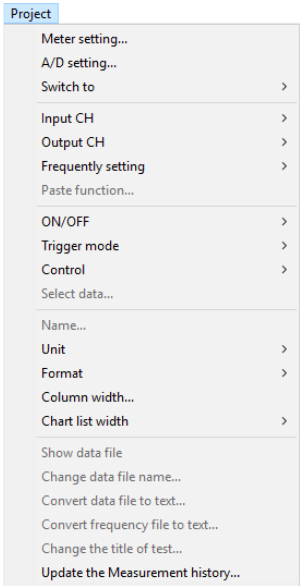


Description BMP, PNG and JPG format image are inserted on chart sheet.

Operation

1. The chart sheet or blank sheet is activated.
2. Select **Paste image...** from **Edit** menu.
The open file dialog box is displayed.
3. Select images, and click “Open” button

3 Project menu

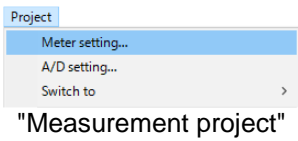


"Measurement project"

Overview

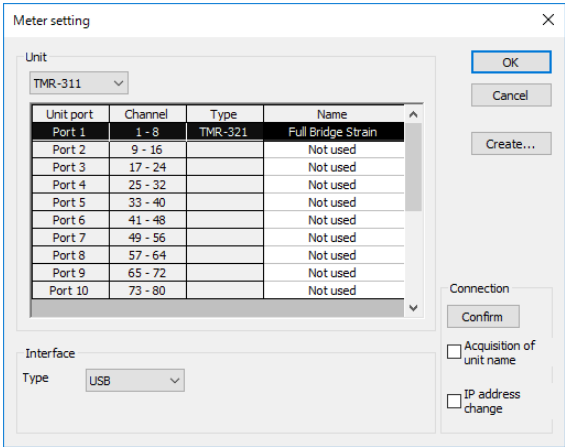
- Setting the instrument to be used
- Setting the measurement time
- Switching the display
- The submenu items for setting of Input CH is displayed
- The submenu items for setting of Output CH is displayed
- The submenu items for setting of Frequency setting is displayed
- The dialog box for inputting a function in the function column of Expanded CH is displayed
- The submenu for setting ON/OFF is displayed
- The submenu for setting the trigger mode of the data trigger is displayed
- The submenu for setting the control of automatic measurement setting is displayed.
- Selecting the data to be referred to for triggering data comparator measurement.
- Adding sequential number to the name that is input in the name column of Input CH and Expanded CH
- The submenu for making a setting for the unit column of Input CH and Expanded CH is displayed
- The display format for displaying the measurement data by value is displayed in sub menu
- Changing the width of column
- Changing the width of column of Chart list
- Displaying the data file in the history
- Changing the data file name in the history
- Converting the data file into a text file in the history
- Changing the test title of data file in the history
- Updating the history

3-1 Meter setting...



Function Sets the instrument on the measurement project.

Screen



Description Setting for the instrument and the interface to be used in the measurement project is executed.



For the Meter setting, refer to "Chapter 4: 2 Setting of the instrument" (Page4-2).

Operation

1. Select **Meter setting...** from the **Project** menu. The dialog box for setting is displayed.
2. After setting, click the **"OK"** button.

Setting items

Control Unit : Selects the control unit to use. (TMR-211 or TMR-311)

Interface type

: Selects the interface to use. (LAN or USB)

When using LAN:

IP address : Sets the IP address of the instrument to use.

Port number : Sets the port number of the instrument to use.

Connection

Confirm : Confirms whether connection is possible with the contents of interface that is connected to the computer and the instrument.

Acquisition of unit name

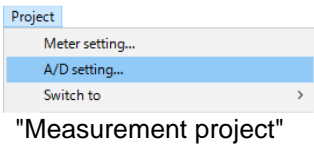
: The information of the unit in use is obtained from the instrument and the unit's setting is renewed.

IP address change

: Changes LAN setting of instrument.

Create... : Creates the TMR_IPADDRESS file for the selected instrument.

3-2 A/D setting...



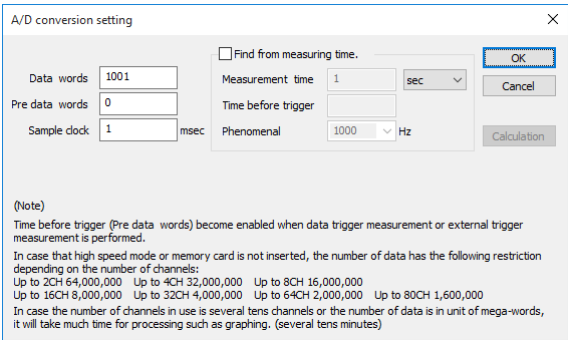
"Measurement project"



For the A/D setting, refer to "Chapter 4: 3 A/D setting" (Page4-6).

Function Sets the data intervals and the number of data to be recorded in a single measurement.

Screen



Description Setting the data intervals and the number of data to be recorded in a single measurement is executed. The settings can be obtained with the number of data based on the measurement time.

Operation

1. Select A/D setting... from the Project menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

Setting items

Data words : Specify the number of data to be recorded.

Pre data words : For Data trigger measurement, specify the number of pre-trigger recording within the number of data words set above.

Sample clock : Set the interval of data recording in millisecond.

External sample : The external sample can be used when SCLK is input to digital IN of digital I/O unit.

The external sample is valid when Digital I/O unit is used.

Find from measuring time. : Check this to set the A/D setting based on the measurement time.

Measurement time : Set the measurement time. The unit is selected from millisecond, second, minute, and hour.

Time before trigger : For Data trigger measurement, specify the recording time until the trigger is activated within the measurement time set above. The unit is same as that of measurement time.



For the External sample, refer to "Chapter 12: Digital I/O unit".



The units set for the measurement time are reflected to the units of the elapsed time display and those of the horizontal axis of the chart displaying the progress during measurement.

Phenomenal

: The inverse number of the sample clock time is displayed.
Sample clock can be set by selecting frequency.

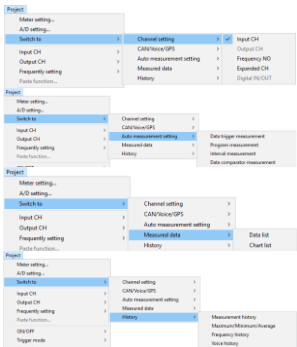
"Calculation" button

: This displays the measurement time corresponding to the number of data that you set. If you have made a setting using the Find from measuring time method, the number of data corresponding to the values you have set is displayed.



The time before trigger and the pre data words are enabled only for data trigger measurement.

3-3 Switch to



"Measurement project"

Function Changes the display items of the active measurement project.

Description

Input CH : Specify the conditions for the instrument to record data and the settings for this software to process the recorded data for each channel.

Output CH : When voltage output from the instrument is enabled, the output settings are made for each channel.

Frequency NO : Specify the frequency analysis method for each frequency number when conducting frequency analysis at the same time with measurement by the instrument.

Expanded CH : Specify the calculation using the recorded data. Arithmetic operations and functions, and functions including rosette analyses can be used.

Data trigger measurement : Specify the measurement start with the instrument according to the level of input signal.

Program measurement : Specify the measurement system automatically starts measurement at the specified measurement date and hour and continues it for the specified duration.

Interval measurement : Specify starting measurement at certain intervals using the clock of computer.

Data comparator measurement : Specify starting measurement with variation of specific channel (including Expanded CH).

Data list : Lists for all channels are created. Maximum value, minimum value and average value are displayed.

Chart list : Progress charts for all channels are created. Maximum value, minimum value and average value are displayed.

Measurement history : File name, memory card file name, measured date and time, measurement method, test title, measurement duration and unit are displayed for all waveform data measured.

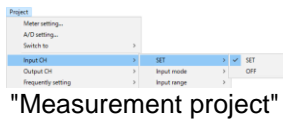
Maximum/Minimum/Average : Maximum, minimum and average values are displayed for each channel of all measurement data measured.

Frequency history : File name, memory card file name, starting and stopping time of measurement and test title are displayed for all frequency data measured.



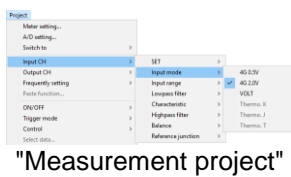
To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

3-4 SET



Function	Sets Use/Not use of channel.
Description	Set "SET" for the channel to be measured, and set "OFF" for the channel not to be measured.
Operation	<ol style="list-style-type: none">1. Select a cell in the SET column on the Input CH.2. Select SET or OFF from the SET submenu in the Input CH submenu.

3-5 Input mode

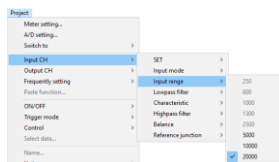


Function	Sets the type of input signals (voltage, bridge voltage, and thermocouple).
Description	<p>The resolution of strain changes depending on the setting of bridge voltage.</p> <p>4G0.5V : Resolution is 4×10^{-6} strain</p> <p>4G2.0V : Resolution is 1×10^{-6} strain</p> <p>Some input modes cannot be set depending on the unit. For the type of settable input modes, refer to the operation manual of each instrument.</p> <p>When measuring temperature using a thermocouple, a dedicated thermocouple unit (TMR-231, TMR-332) is required.</p>
Operation	<ol style="list-style-type: none">1. Select a cell in the Input mode column on the Input CH.2. Select the input mode from the Input mode submenu in the Input CH submenu.

3-6 Input range

Function Sets the resolution of fixed range.

Description Value covering the expected maximum value of input waveform is input for the measurement range.
The smaller range provides less dispersion in the measured values.



"Measurement project"

TMR-211 Strain Full Bridge			
Input range	Input mode		
	4G 2.0V	4G 0.5V	VOLT (CR-4010)
5000	-5,000~+5,000 (1×10^{-6})	-20,000~+20,000 (4×10^{-6})	-5,000~+5,000 (1mV)
10000	-10,000~+10,000 (1×10^{-6})	-40,000~+40,000 (4×10^{-6})	-10,000~+10,000 (1mV)
20000	-20,000~+20,000 (2×10^{-6})	-80,000~+80,000 (8×10^{-6})	-20,000~+20,000 (2mV)

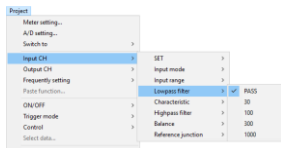
TMR-211 Voltage/Thermocouple		
Input range	Input mode	
	VOLT	Thermocouple
600		-200~+600 (0.1°C)
1000	-1,000~+1,000 (0.1mV)	
1300		-200~+1,300 (0.2°C) ※Not usable with a thermocouple T.
5000	-5,000~+5,000 (0.5mV)	
10000	-10,000~+10,000 (1mV)	
20000	-20,000~+20,000 (2mV)	

TMR-311 Strain Full Bridge			
Input range	Input mode		
	4G 2.0V	4G 0.5V	VOLT (CR-4010)
2000	-2,000~+2,000 (0.1×10^{-6})	-8,000~+8,000 (0.4×10^{-6})	-2,000~+2,000 (0.1mV)
5000	-5,000~+5,000 (1×10^{-6})	-20,000~+20,000 (4×10^{-6})	-5,000~+5,000 (1mV)
10000	-10,000~+10,000 (1×10^{-6})	-40,000~+40,000 (4×10^{-6})	-10,000~+10,000 (1mV)
20000	-20,000~+20,000 (1×10^{-6})	-80,000~+80,000 (4×10^{-6})	-20,000~+20,000 (1mV)

TMR-311 Voltage Input		
Input range	Input mode	
	VOLT	Thermocouple
600		-200~+600 (0.1°C)
1000	-1,000~+1,000 (0.1mV)	
1300		-200~+1,300 (0.2°C) ※Not usable with a thermocouple T.
5000	-5,000~+5,000 (0.5mV)	
10000	-10,000~+10,000 (1mV)	
20000	-20,000~+20,000 (2mV)	
52000	-52,000~+52,000 (5mV)	

Operation

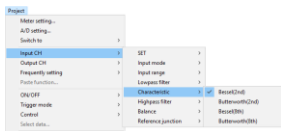
1. Select a cell in the Input range column on the Input CH.
2. Select the input range from the Input range submenu of the Input CH submenu.



"Measurement project"

3-7 Low-pass filter

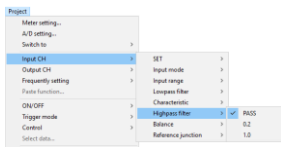
Function	Sets the frequency to be removed from the input signals.
Description	A digital filter is used as the low-pass filter. When PASS is set for the low-pass filter, an analog filter is used to remove the frequency component of 10kHz or higher. For thermocouple, only PASS can be selected.
Operation	<ol style="list-style-type: none">1. Select a cell in the Lowpass filter column on the Input CH.2. Input frequency within the range of 0 to 1000Hz or select from the Lowpass filter submenu of the Input CH submenu.



"Measurement project"

3-8 Characteristics

Function	Sets the characteristic of cut-off frequency of the digital filter.
Description	If PASS is set for the low-pass filter, Bessel is set. If Bessel is selected, the phase becomes flat. If Butterworth is selected, the amplitude becomes flat.
Operation	<ol style="list-style-type: none">1. Select a cell in the Characteristic column of Lowpass filter on the Input CH.2. Select the filter characteristic from the Characteristic submenu of the Input CH submenu.



"Measurement project"

3-9 High-pass filter

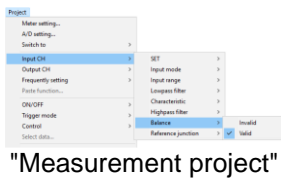
Function	Sets the frequency to be removed from the input signals.
Description	High-pass filter is available with Strain Full Bridge Unit (TMR-221/TMR-321), Strain 1G2G4G Unit (TMR-222/TMR-322) and Carrier type Strain Full Bridge unit (TMR-223/TMR-323).



When the TMR-211 is used as a control unit, its firmware must be Ver. 2.2A or later. In addition, the firmware of the measurement unit (TMR-221/TMR-222) must be 1.2A or later.

Operation	<ol style="list-style-type: none">1. Select a cell in the Highpass filter column on the Input CH.2. Select from the Highpass filter submenu of the Input CH submenu.
-----------	---

3-10 Balance

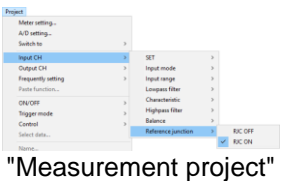


Function Sets valid/invalid of the instrument balancing function.

Description The invalid channel becomes unavailable for balancing. A value including initial unbalance value is measured.

- Operation
1. Select a cell in the **Balance** column on the Input CH.
 2. Select from the **Balance** submenu of the Input CH submenu.

3-11 Reference junction

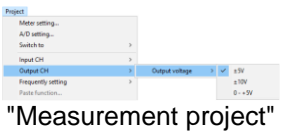


Function Sets the reference junction for thermocouple measurement

Description When RJC ON is selected, cold junction compensation is performed taking the surface temperature of the measurement unit as a reference. When an external cold junction is used, select RJC OFF.

- Operation
1. Select a cell in the **Reference junction** column on the Input CH.
 2. Select from the **Reference junction** submenu of the Input CH submenu.

3-12 Output voltage

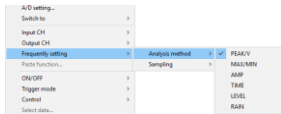


Function Sets the output voltage of the amplifier.

Description The voltage output range for each channel of the voltage output unit (TMR-241) is selected from $\pm 5V$, $\pm 10V$ and 0 to $+5V$.

- Operation
1. Select a cell in the **Output voltage** column on the Output CH.
 2. Select the output level from the **Output voltage** submenu of the Output CH submenu.

3-13 Analysis method



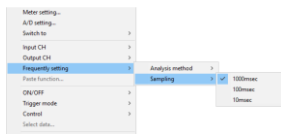
"Measurement project"



To perform the frequency analysis using this software, the measurement device shall be equipped with the function of executing the frequency analysis (option).

Function	Sets the method of the frequency analysis which is conducted at the same time with the measurement.
Description	The following 6 kinds of analysis methods can be set. PEAK/V : Peak/valley method MAX/MIN : Maximum/minimum method AMP : Amplitude method TIME : Time method LEVEL : Level-crossing method RAIN : Rain-flow method
Operation	<ol style="list-style-type: none">1. Select a cell in the Analysis method column on the Frequency NO2. Select the analysis method from the Analysis method submenu of the Frequency setting submenu.

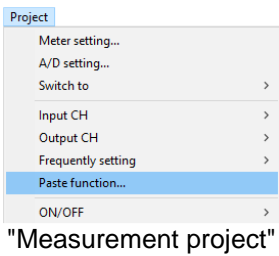
3-14 Sampling



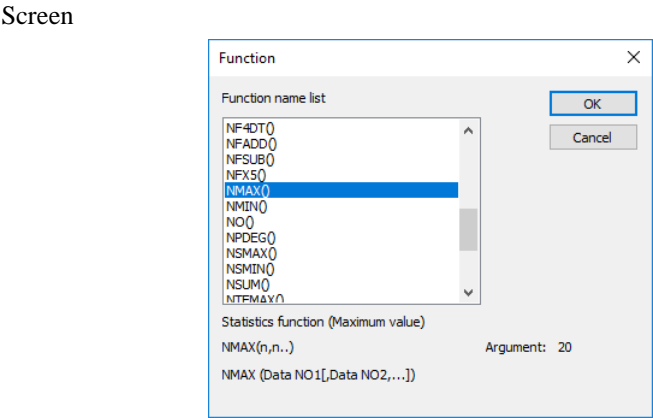
"Measurement project"

Function	If the time method is used for the analysis method, sets the sampling time.
Description	If the time method is used for the analysis method, the input signal is sampled and counted at every sampling interval set by this operation.
Operation	<ol style="list-style-type: none">1. Select a cell in the Sampling/Cross level column on the Frequency NO2. Select the sampling time from the Sampling submenu of the Frequency setting submenu.

3-15 Paste function...



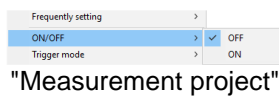
Function Pastes the function into a cell. When a cell has been selected, the selected function is overwritten to the cell. When you are editing a cell, selected function is inserted into the editing position.



Description When the function is input using Paste function..., the function can be input more correctly than it is input from keyboard. And the comment is displayed for necessary argument.

- Operation**
1. Select a cell in the Function column on the Expanded CH.
 2. When Paste function... is selected from Project menu, the dialog box of function list is displayed.
 3. Select the function to be set and click the "OK" button.

3-16 ON/OFF

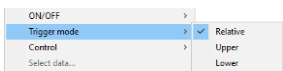


Function Sets the trigger ON/OFF of the Data trigger measurement.

Description To enable the trigger of the Data trigger measurement, set ON. To disable it, set OFF.

- Operation**
1. Select a cell in the ON/OFF column on the Data trigger measurement.
 2. Select ON or OFF from the ON/OFF submenu of the Project menu.

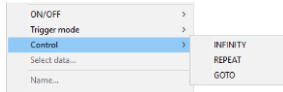
3-17 Trigger mode



"Measurement project"

Function	Sets the trigger level judgment method of the Data trigger measurement.
Description	The trigger level judgment method of the Data trigger measurement is selected from Relative, Upper and Lower.
Setting items	
Relative	: The trigger is executed when the value changes by the set value for the trigger level from the value measured at the start of the data trigger measurement.
Upper	: The trigger is executed when the current value becomes larger than the trigger level.
Lower	: The trigger is executed when the current value becomes smaller than the trigger level.
Operation	<ol style="list-style-type: none">1. Select a cell in the Trigger mode column on the Data trigger measurement.2. Select the trigger mode from the Trigger mode submenu of the Project menu.

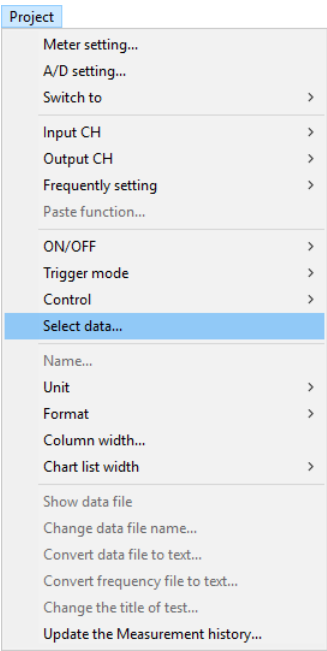
3-18 Control



"Measurement project"

Function	Sets the measurement condition for a step of interval measurement and data comparator measurement.
Description	The measurement is performed for each step for interval measurement and data comparator measurement. Set the termination condition for each step.
Operation	<ol style="list-style-type: none">1. Select a cell of the control row of interval trigger measurement or data comparator measurement.2. Select from the Control submenu of the Project menu.
Setting item	
INFINITY	: Measurement is performed until the measurement is stopped manually.
REPEAT	: Measurement is repeated for the number of times that is specified by Repeat.
GOTO	: It shifts to the step that is specified by Repeat. Measurement start time and measurement interval are ignored.

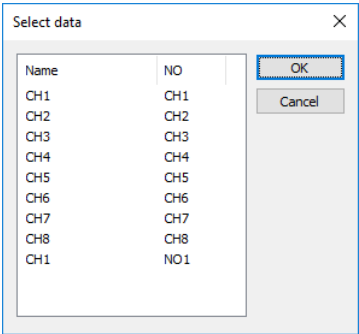
3-19 Select data...



"Measurement project"

Function Sets the data of data comparator measurement.

Screen

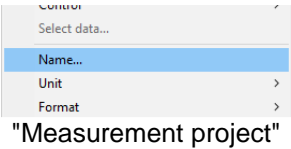


Description It is possible to set the data by selecting name using Select data...

Operation

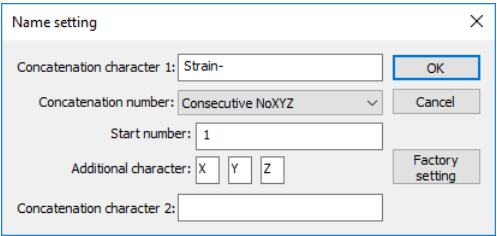
1. Select a cell in the Name (CH/NO) column on the Data comparator measurement.
2. When Select data... is selected from Project menu, the dialog box of name is displayed.
3. Select the name to be set and click the "OK" button.

3-20 Name...



Function Adds serial numbers to the character string of the name.

Screen



Description To set characters to be added to the character string of name. This is useful when changing the serial numbers or when setting names for 2-axial/3-axial strain gauges.

Operation

1. Select some cells in the Name column on the Input CH or the Expanded CH.
2. Select Name... from the Project menu. The dialog box for setting is displayed.
3. After setting, click the "OK" button.

Setting items



If the start number is set as 000, the concatenation numbers are set as 000,001,002...

Concatenation character 1		Concatenation character 2
Strain-	1	X .a
Strain-	1	Y .a
Strain-	1	Z .a
Strain-	2	X .a

Start number : Adds successive numbers starting from the specified Start number.

Additional character : The specified character will be added repetitively.

Concatenation number

Consecutive No

: Sequential number is added.

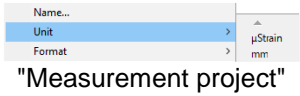
Consecutive NoXY

: Sequential number is added for each two names.

Consecutive NoXYZ

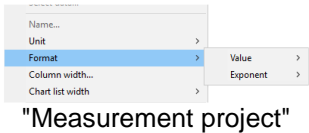
: Sequential number is added for each three names.

3-21 Unit



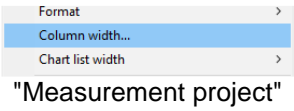
Function	Sets the unit.
Description	It is also possible to input a unit from keyboard for the Expanded channel in the Measurement project. When the TMR-311 is used, it is possible to set up to ten one-byte characters optionally for the Input CH.
Operation	<ol style="list-style-type: none">1. Select a cell in the Unit column on the Input CH or the Expanded CH.2. Select the unit from the Unit submenu of the Project menu.

3-22 Format



Function	Selects display style and digit number of measurement data (numeric value, time, and calculation data).	
Screen	<div><div><div>0</div><div><input checked="" type="checkbox"/> 0.0</div><div>0.00</div><div>0.000</div><div>0.0000</div><div>0.00000</div><div>0.000000</div><div>0.0000000</div></div><div><div>0e+00</div><div>0.0e+00</div><div>0.00e+00</div><div>0.000e+00</div><div>0.0000e+00</div><div>0.00000e+00</div><div>0.000000e+00</div></div></div> <div><div>Value</div><div>Exponent</div></div>	
Description	The format has an effect on the numerical display of data but internally keeps the accuracy. There are the following formats. 0 to 0.0000000 : Value 0e+00 to 0.0000000e+00 : Exponent	
Operation	<ol style="list-style-type: none">1. Select a cell in the Format column on the Input CH or the Expanded CH.2. Select the appropriate format from the Format submenu of the Project menu and select any of the displayed submenus.	

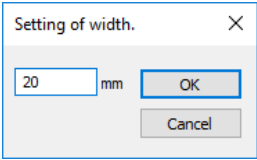
3-23 Column width...



"Measurement project"

Function Sets the width of the column including the selected cell in the unit of mm.

Screen

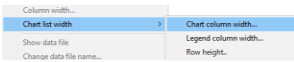


Description The width of all the columns displayed on the measurement project can be set.

Operation

1. Select a cell and select the Column width... from the Project menu. The dialog for setting is displayed.
2. After setting, click the "OK" button.

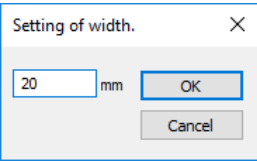
3-24 Chart column width...



"Measurement project"

Function Sets the width of the columns where the chart is displayed on the Chart List in the unit of mm.

Screen

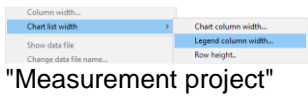


Description On the Chart List, columns cannot be selected. Therefore, by executing the Chart column width..., the width of the chart columns is changed.

Operation

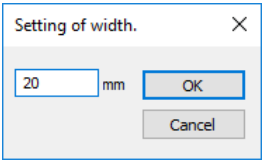
1. Select Chart column width... from the Chart list width submenu of the Project menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

3-25 Legend column width...



Function Sets the width of the column where the legends are displayed (at the right end) on the Chart list in the unit of mm.

Screen

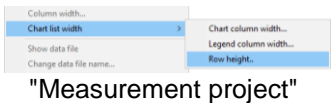


Description On the Chart list, columns cannot be selected. Therefore, by executing the Legend column width..., the width of the legend column is changed.

Operation

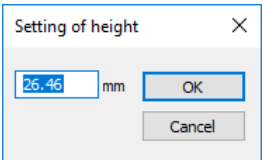
1. Select the Legend column width... from the chart list width submenu of the Project menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

3-26 Row height...



Function On the chart list, sets the height of row in the unit of mm.

Screen

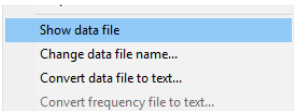


Description On the chart list, rows cannot be selected. Therefore, by executing the Row height..., the height of row is changed.

Operation

1. Select the Row height... from the Chart list width submenu of the Project menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

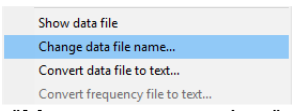
3-27 Show data file



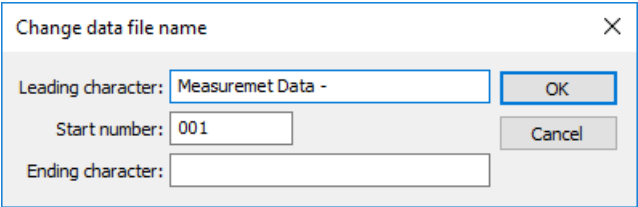
"Measurement project"

Function	Displays the data file of the selected step in the measurement history, maximum/minimum/average value or frequency history.
Description	A number of measurement data files in the history can be displayed.
Operation	<ol style="list-style-type: none">1. Select the step of the data file to be displayed in the Measurement history, the Maximum Minimum Average or the Frequency history.2. Select the Show data file from the Project menu.


3-28 Change data file name...

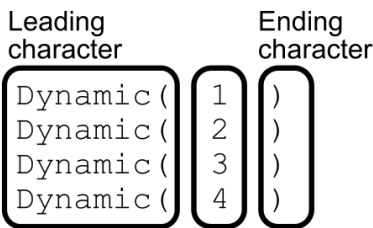


"Measurement project"

Function	Changes the data file name of the step selected in the measurement history.
Screen	
Description	The file names of multiple data files in the measurement history or the frequency history are changed by adding serial numbers.
Operation	<ol style="list-style-type: none">1. Select the step of the data files of which the file names should be changed in the Measurement history or the Frequency history.2. Select Change data file name... from the Project menu. The dialog box for setting is displayed.3. After setting, click the "OK" button.

Setting items

 If the start number is set as 000, the concatenation numbers are set as 000,001,002...



Start number :Adds successive numbers starting from the specified Start number.

3-29 Convert data file to text...

Show data file

Change data file name...

Convert data file to text...

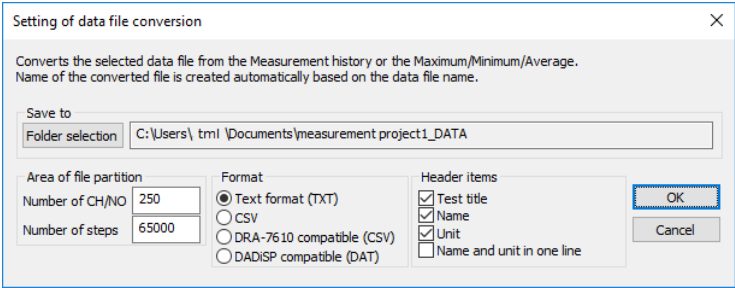
Convert frequency file to text...

Change the title of test...

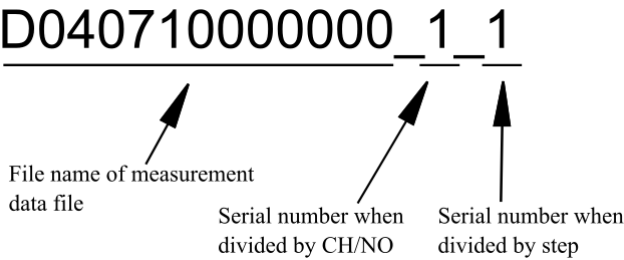
"Measurement project"

Function Converts the measurement data file of the selected step in the measurement history or the maximum/minimum/average value to text.

Screen



Description From the measurement history or the maximum/minimum/average value, the data stored in the files of two or more file names are converted to text in various styles.
The file name is made up as follows:



Operation

1. Select the step of the measurement data file to be converted to text in the Measurement history or the Maximum Minimum Average.
2. Select **Convert data file to text...** from the Project menu. The dialog box for setting is displayed.
3. After setting, click the "OK" button.



Commercially available waveform analysis software can be read with the DADiSP and FlexPro.

Setting items

"Folder selection" button

: The dialog box for specifying the destination to save is displayed.

Number of CH/NO

: When the number of channels that are converted is larger than Number of CH/NO, the text file is divided by Number of CH/NO.

Number of steps

: When the number of measurement data is larger than Number of steps, the text file is divided by Number of steps.

Text format (TXT)

: The file is converted to tab-delimited text file of unique format.

CSV

: The file is converted to comma (,)-delimited text file of unique format.

DRA-7610 compatible (CSV)

: The file is converted to a format same as that of CSV file for which text conversion is implemented by DRA-7610. When this format is used, the name of channel is not converted.

DADiSP compatible (DAT)

: The file is converted to the text file that can be read by the waveform analysis software DADiSP. For one data file, two files whose extensions are .HED and .DAT are created.

Test title

: The title of test is inserted into text data.

Name

: The channel name is inserted into text data.

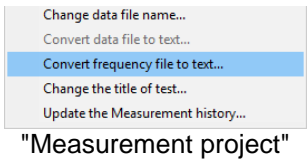
Unit

: The unit set for each channel is inserted into text data.

Name and unit in one line

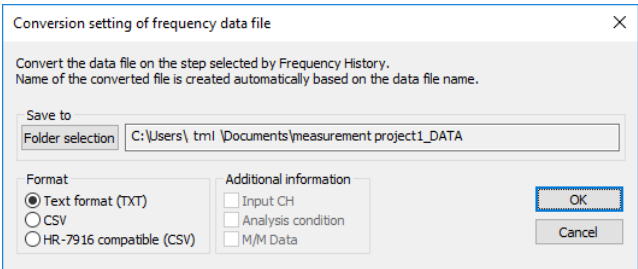
: The name and unit of each channel is added in one line. If this item is not checked, the unit is appended to the line below the name.

3-30 Convert frequency file to text...



Function By specifying the frequency data file in the frequency history, converts the specified frequency data file to text.

Screen



Description From the frequency history, the data stored in the files of two or more file names are converted to text in various styles. The file name of the text file will be the same as that of the data file.
In the text (TXT) or CSV format, separated files will be created for each frequency No, and "_" and the frequency No are added to the end of the file name.

Operation

1. Select the step of the frequency data file to be converted to text in the frequency history.
2. Select **Convert frequency file to text...** from the **Project** menu. The dialog box for setting is displayed.
3. After setting, click the "OK" button.

Setting items

"Foloder Selection" button

: The dialog box for specifying the destination to save is displayed.

Text format (TXT)

: The file is converted to tab-delimited text file of unique format.

CSV

: The file is converted to comma (,)-delimited text file of unique format.

HR-7916 compatible (CSV)

: The file is converted to a format same as the CSV file of text output of frequency data created by HR-7916.
If you select this format, you should select item(s) to be added to the text file.

Input CH

: The settings for the Input CH used for the frequency analysis are added.

Analysis condition

: The settings for the frequency NO are added.

M/M data

: The maximum and minimum values of the frequency NO are added.

3-31 Change the title of test...

Function Changes the test title of the step selected in the measurement history or the frequency history.

Convert data file to text...

Convert frequency file to text...

Change the title of test...

Update the Measurement history...

"Measurement project"

Screen

Change the title of test

☐ Add to title

Leading character:Dynamic -

Concatenation number:Consecutive No

Start number:001

Ending character:

OK

Cancel

Description The test title of the multiple measurement data files in the Measurement history or the Frequency history are changed.

Operation

1. Select the step of the measurement data file of which the test title should be changed in the Measurement history or the Frequency history.

2. Select Change the title of test... from the Project menu. The dialog box for setting is displayed.

3. After setting, click the "OK" button.

Setting items

Add to title : The set character string is added to the end of the test title that has been set for the data file.

Concatenation number

None : Sequential number is not added.

Consecutive NO

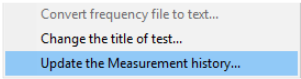
: Sequential number is added.

If the start number is set as 000, the concatenation numbers are set as 000,001,002...

Leading character	Ending character
Dynamic (001)
Dynamic (002)
Dynamic (003)
Dynamic (004)

Start number :When Consecutive No is selected, successive numbers starting from the specified Start number are added.

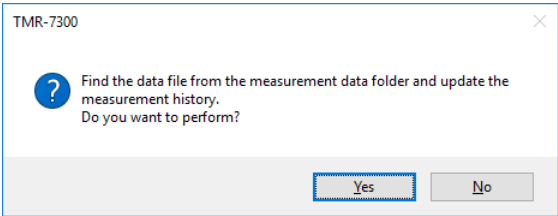
3-32 Update the Measurement history...



"Measurement project"

Function Searches data file in the measurement data folders and updates the history.

Screen

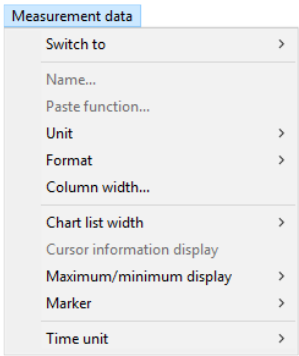


Description Usually, the history is automatically updated when the measurement project is displayed. If the measurement data file is moved or edited after the measurement project is displayed, the Measurement history is not automatically updated. In that case, execute the Update the Measurement history.

Operation

1. Display the Measurement history, the Maximum Minimum Average or the Frequency history, and select the Update the Measurement history... from the Project menu. The dialog box for confirmation is displayed.
2. Click the "Yes" button.

4 Measurement data menu



"Measurement data"

Overview

- Switching the display
- Adding sequential number to the name that is input in the name column of Input CH and Expanded CH
- The submenu for making a setting for the unit column of Input CH and Expanded CH is displayed
- The display format for displaying the measurement data by value is displayed in submenu
- Changing the width of column.
- Changing the width of column of Chart list.
- Changing the height of row of Chart list
- Displaying a cursor in Chart list
- Searching a measurement data range for the maximum and minimum values
- Displaying and editing the marker in Chart list
- The submenu for setting the unit of lapsed time of measurement data is displayed

4-1 Switch to

Function Changes the display items of the active measurement data file.

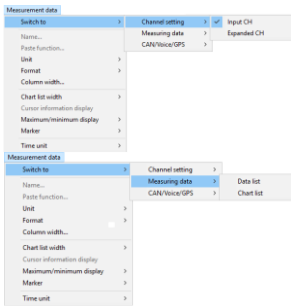
Description

Input CH : Displays the conditions of each channel which were set to the instrument for recording data during the measurement. Name, unit and format can be changed.

Expanded CH : Make a setting for implementing calculation using recorded data. The functions such as four arithmetic operations, arithmetical function and rosette calculation can be used.

Data list : Lists for all channels are created. Maximum value, minimum value and average value are displayed.

Chart list : Progress charts for all channels are created. Maximum value, minimum value and average value are displayed.

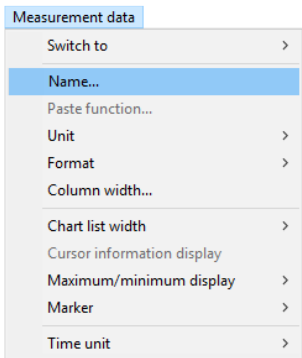


"Measurement data"

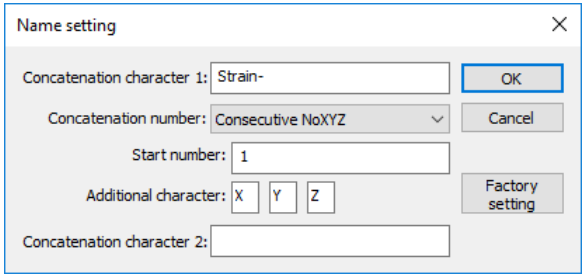
4-2 Name...

Function Adds successive numbers to the character strings of name.

Screen



"Measurement data"



Description To set characters to be added to the character string of name. This is useful when changing the serial numbers or when setting names for 2-axial/3-axial strain gauges.

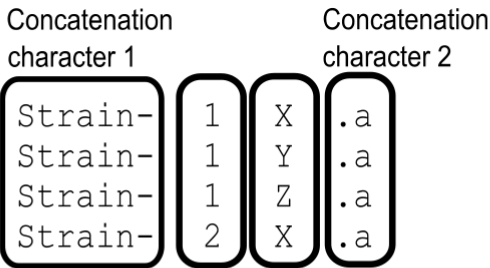
Operation

1. Select some cells in the Name column on the Input CH or the Expanded CH.
2. Select Name... from the Measurement data menu. The dialog box for setting is displayed.
3. After setting, click the "OK" button.



If the start number is set as 000, the concatenation numbers are set as 000,001,002...

Setting items



Start number : Adds successive numbers starting from the specified Start number.

Additional character : The specified character will be added repetitively.

Concatenation number

Consecutive No

: Sequential number is added.

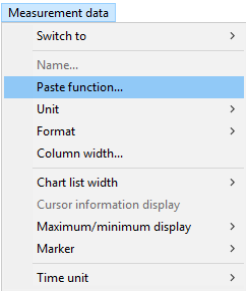
Consecutive NoXY

: Sequential number is added for each two names.

Consecutive NoXYZ

: Sequential number is added for each three names.

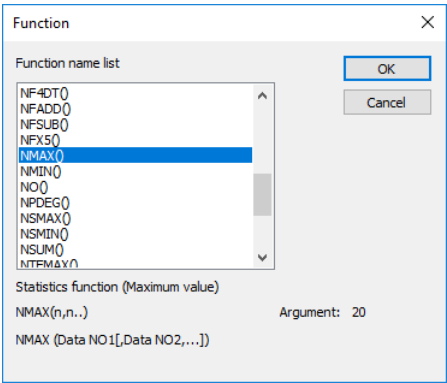
4-3 Paste function...



"Measurement data"

Function Pastes the function into a cell. When a cell has been selected, the selected function is overwritten to the cell. When you are editing a cell, selected function is inserted into the editing position.

Screen

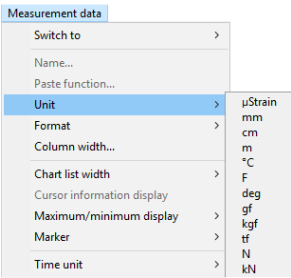


Description When the function is input using Paste function..., the function can be input more correctly than it is input from keyboard. And the comment is displayed for necessary argument.

Operation

1. Select a cell in the Function column on the Expanded CH.
2. When Paste function... is selected from Measurement data menu, the dialog box of function list is displayed.
3. Select the function to be set and click the "OK" button.

4-4 Unit



"Measurement data"

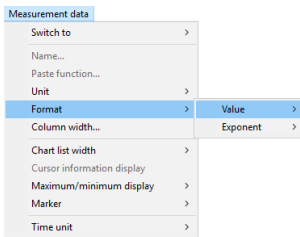
Function Pastes the unit.

Description It is also possible to input the unit from the keyboard.

Operation

1. Select a cell in the Unit column on the Input CH or the Expanded CH.
2. Select the unit from the Unit submenu of the Measurement data menu.

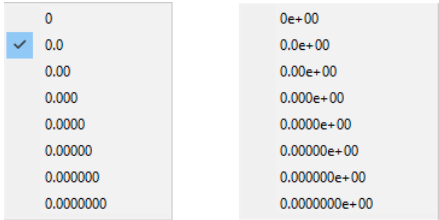
4-5 Format



"Measurement data"

Function Selects display style and digit number of measurement data (numeric value, time).

Screen

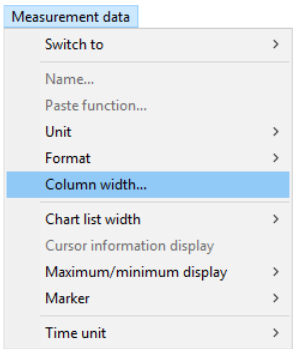


Value Exponent

Description The format has an effect on the numerical display of data but internally keeps the accuracy.
There are the following formats.
0 to 0.0000000 : Value
0e+00 to 0.0000000e+00 : Exponent

- Operation**
1. Select a cell in the **Format** column on the **Input CH** or the **Expanded CH**.
 2. Select the appropriate format from the **Format** submenu of the **Measurement data** menu and select the displayed submenu.

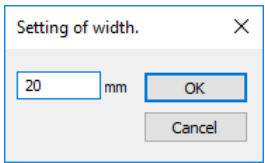
4-6 Column width...



"Measurement data"

Function Sets the width of the column including the selected cell in the unit of mm.

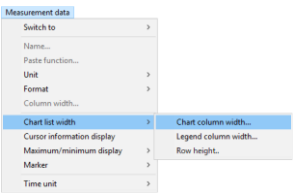
Screen



Description The widths of all the columns displayed on the measurement data file can be set.

- Operation**
1. Select a cell and select the **Column width...** from the **Measurement data** menu. The dialog box for setting is displayed.
 2. After setting, click the "OK" button.

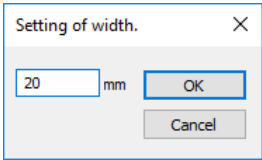
4-7 Chart column width...



"Measurement data"

Function Sets the width of the columns where the chart is displayed on the chart list in the unit of mm.

Screen

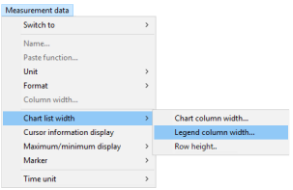


Description On the chart list, columns cannot be selected. Therefore, by executing the Chart column width..., the width of the chart columns is changed.

Operation

1. Select the Chart column width... from the Chart list width sub menu of the Measurement data menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

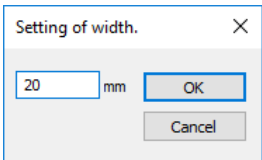
4-8 Legend column width...



"Measurement data"

Function Sets the width of the column where the legends are displayed (at the right end) on the Chart list in the unit of mm.

Screen

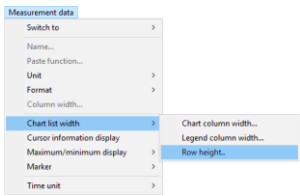


Description On the Chart list, columns cannot be selected. Therefore, by executing the Legend column width..., the width of the legend column is changed.

Operation

1. Select the Legend column width... from the Chart list width sub menu of the Measurement data menu.
2. After setting, click the "OK" button.

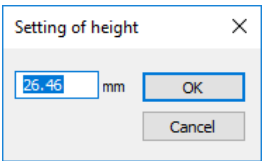
4-9 Row height...



"Measurement data"

Function Sets the height of row in the unit of mm on the chart list.

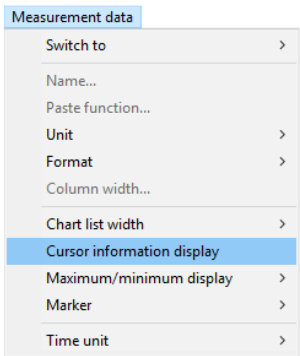
Screen



Description On the Chart list, rows cannot be selected. Therefore, by executing the Row height..., the height of row is changed.

- Operation**
1. Select the Row height... from the Chart list width sub menu of Measurement data menu.
 2. After setting, click the "OK" button.

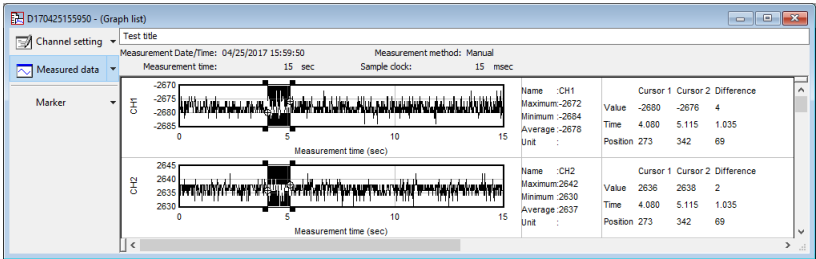
4-10 Cursor information display



"Measurement data"

Overview When the range is selected on the chart list, the ■ marks on the left end of the selected range are cursor 1 while the ■ marks on the right end of the selected range are cursor 2. The elapsed time and the measurement values at those positions are displayed. In addition, values subtracting cursor 1 values from cursor 2 values are also displayed.

Screen

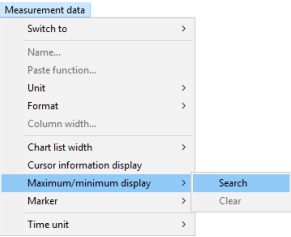


Description The cursor information column is added on the chart list and the data values for the both ends of the selected range are displayed.

The cursor 1 can be moved by ← → keys on the keyboard, and the cursor 2 can be moved by ↑ ↓ keys on the keyboard.

- Operation**
1. Display the Chart list and select the Cursor information display from the Measurement data menu. The cursor information column is added.
 2. Select the range with the mouse or the keys ← → ↑ ↓ on the keyboard to change the value.
 3. To clear the cursor information, select the Cursor information display from the Measurement data menu again.

4-11 Search

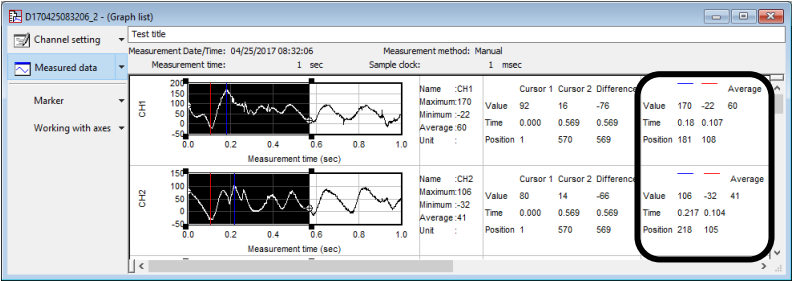


"Measurement data"

Overview

Searches the maximum and minimum values of each channel from the specified data range. And displays those positions and values.
Also displays an average in the specified range in chart list.

Screen



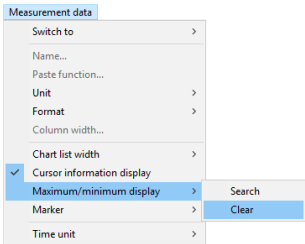
Overview

The Chart list or data list of a measurement data file is used for this search.
In the Chart list, the maximum and minimum values are indicated by blue and red lines, respectively.
The maximum, minimum and mean values within the range are indicated in the fourth column.
In the data list, the maximum and minimum value are indicated by cell color; light blue and light red, respectively.

Operation

1. In the Chart list, set the search range.
If you do not set any search range, all data will be the search range.
In the Data list, select data from the desired channels in the row direction.
The search is performed on the selected rows.
If you select only one row, all data will be the search range.
2. Select Search from the Maximum/minimum display submenu of the Measurement data menu.
3. In the Chart list, the maximum and minimum values are indicated by blue and red lines, respectively.
The third column of the Chart list displays cursor information; the fourth column displays information on the maximum and minimum values and average values.
In the Data list, the maximum and minimum value are indicated by cell color; light blue and light red, respectively.

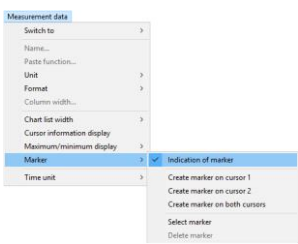
4-12 Clear



"Measurement data"

Overview	Clears the maximum and minimum values displayed by search.
Description	In the Chart list, the red and blue lines disappear and the columns reduced back to two. In the data list, the cell color returns to white.
Operation	1. Select Clear from the Maximum/minimum display submenu of the Measurement data menu.

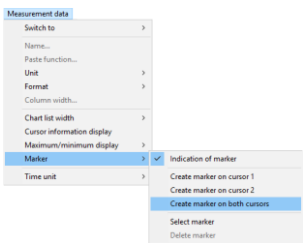
4-13 Indication of marker



"Measurement data"

Overview	Displays or hides the markers on the chart list.
Description	The marker is displayed when Indication of marker is checked. The marker is not displayed when Indication of marker is not checked.
Operation	1. Display the chart list and select the Indication of marker from the Marker submenu of the Measurement data menu

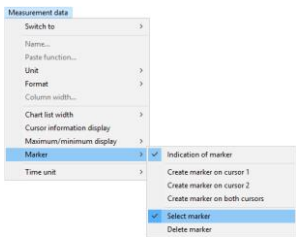
4-14 Create marker on cursor 1, Create marker on cursor 2, Create marker on both cursors



"Measurement data"

Overview	Creates marker on the chart list.
Description	Marker is created at the position of cursor for the range selection on the chart list.
Operation	1. Execute the range selection on the chart list. 2. When creating the marker at cursor 1 on the left side of the range selection, select the Create marker on cursor 1 from the Marker submenu of the Measurement data menu. 3. When creating the marker at cursor 2 on the right side of the range selection, select the Create marker on cursor 2 from the Marker submenu of the Measurement data menu. 4. When creating the markers at cursor 1 and 2 on both sides of the range selection, select the Create marker on both cursors from the Marker submenu of the Measurement data menu.

4-15 Select marker



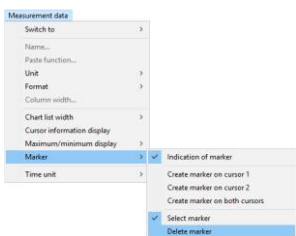
Overview Selects a marker to be deleted.

Description When deleting the unnecessary marker, the marker must be selected individually before the deletion.

Operation

1. Display the chart list and select the **Select marker** from the Marker submenu of the Measurement data menu.
2. Move the mouse cursor onto the chart list and click the marker. While the marker is selected, the cursor turns to \perp .
3. For stopping selecting the marker, select the **Select marker** once more from the menu.

4-16 Delete marker



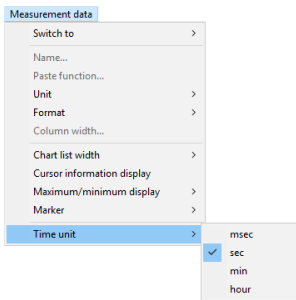
Overview Deletes the marker.

Description The marker selected by "Select marker" is deleted.

Operation

1. Display the chart list and select the **Delete marker** from the Marker submenu of the Measurement data menu.

4-17 Time unit



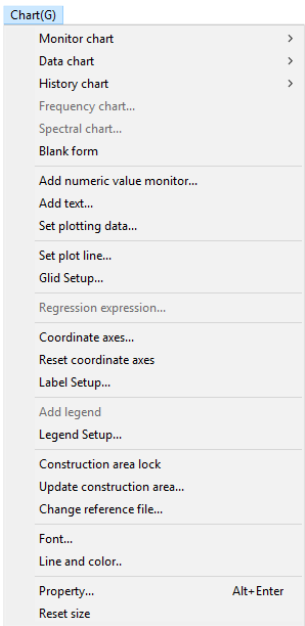
Overview Changes the unit of the elapsed time in the measurement data file and converts the data of time according to the new unit.

Description This is used when the measurement time is reduced after data is deleted.
After the unit of time is changed, the measurement time in the data list and the chart list and the progress chart referring to the measurement data file are displayed in the new unit.

Operation

1. Display the Chart list and select the unit of time from the Time unit submenu of the Measurement data menu.
2. The measurement time in the data list and the chart list and the progress chart referring to the measurement data file are displayed in the new unit.

5 Chart menu

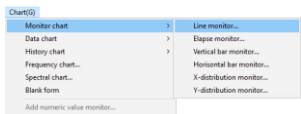


"Chart sheet"

Overview

- Displaying the monitor chart
- Displaying the data chart
- Displaying the frequency chart
- Displaying the history chart
- Displaying the spectral chart
- Adding the value monitor
- Adding the character
- Changing the construction data
- Changing the line type and color of data
- Changing the line type and color of grid
- Changing the chart type, scale and axis font
- Drawing the regression expression
- Fitting the scale to displayed data
- Changing the title and unit of axis label
- Displaying the legend
- Changing the character of legend
- Fixing and releasing the drawing area
- Changing the drawing step and drawing it again
- Changing the referential file
- Changing the character style of the parts on the selected chart
- Adding frame for the parts on the selected chart
- Displaying the setting of the parts on the selected chart
- Resetting the size of the parts on the selected chart

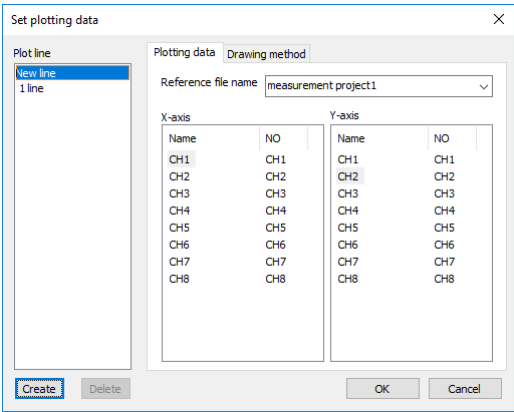
5-1 Line monitor...



"Measurement project"

Function The monitor data are set to the horizontal axis and the vertical axis and a chart is plotted with lines.

Screen



Description A line chart is plotted using lines and symbols during the monitor measurement.

Operation

1. Select the window of measurement project.
2. When Line monitor... is selected from Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of X-axis and Y-axis by Plotting data tab, and create the plot line by "Create" button.
4. Click the "OK" button.

Setting items

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

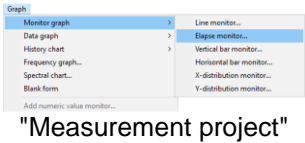
Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list/Y-axis list

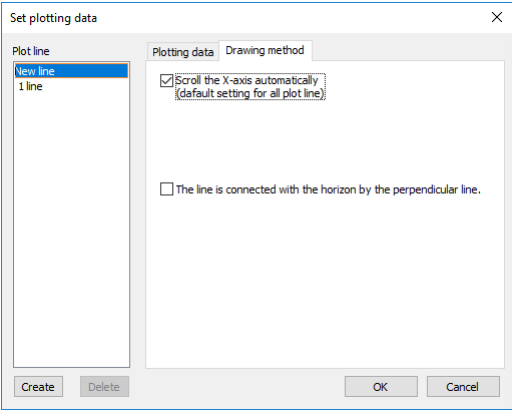
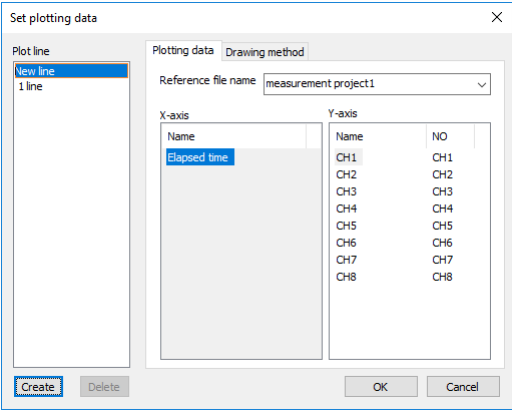
: Select data for plotting.

5-2 Elapse monitor...



Function The elapsed time of the monitor measurement is set to the horizontal axis, the monitor data is set to the vertical axis, and a chart is plotted with a line.

Screen



Description A line chart is plotted using lines and symbols during the monitor measurement.
The method for plotting a chart displaying all data during the monitoring time or the method for plotting a chart with the plotting range of the X-axis (time axis) being fixed and automatically scroll when the plotting range is exceeded can be selected.

Operation

1. Select the window of measurement project.
2. When Elapse monitor... is selected from Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of Y-axis by Plotting data tab, and create the construction line by "Create" button.
4. Select the drawing method by Drawing method tab.
5. Click the "OK" button.

Setting items

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list : Fixed to Elapsed time.

Y-axis list : Select data for plotting.

Drawing method

Scroll the X-axis automatically

: When this is enabled, the construction area of X-axis is fixed and when the construction area is exceeded, X-axis is automatically scrolled, and the latest monitor value is always displayed.

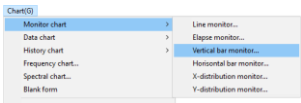
The line is connected with the horizon by the perpendicular line.

: The chart is drawn in step-wise pattern by linking the interval between data by horizontal and vertical lines.



For the plotting range, refer to "Chapter 9: 5-20 Coordinate axis..." (Page 9-100).

5-3 Vertical bar monitor...

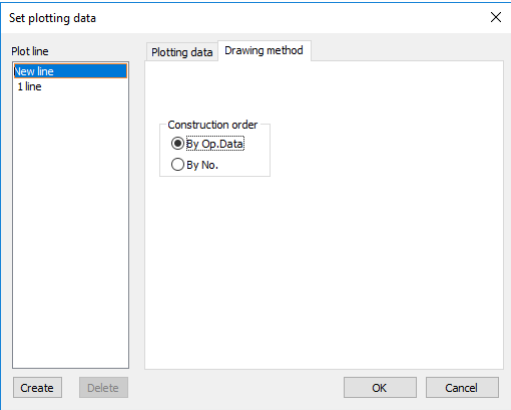
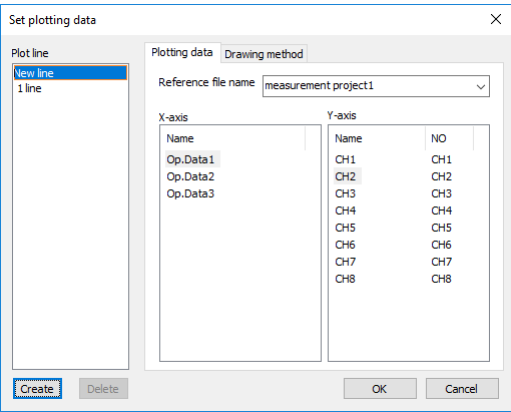


"Measurement project"

Function

Coordinates to the horizontal axis and the monitor data to the vertical axis are set and a distribution map is plotted with bars.

Screen



Description

A distribution map is plotted indicating the monitor data with vertical bars during the monitor measurement.

Operation

1. Select the window of measurement project.
2. When Vertical bar monitor... is selected from Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of X-axis and Y-axis by Plotting data tab.
4. Click the "OK" button.

Setting items

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list : Select Op. Data for plotting.

Y-axis list : Select data for plotting.

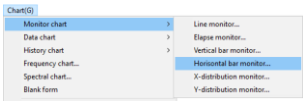
Drawing method

Construction order

By Op.Data : The order of line connection is by Op.Data.

By No. : The order of line connection is by NO of Expanded CH.

5-4 Horizontal bar monitor...

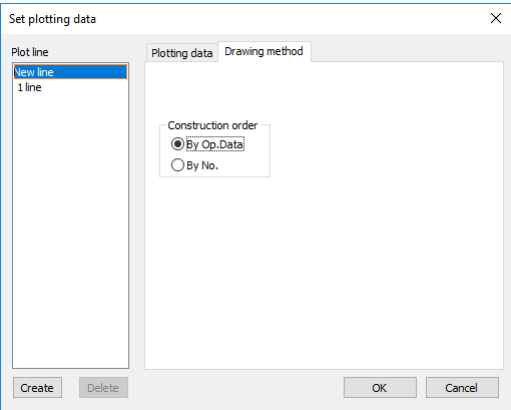
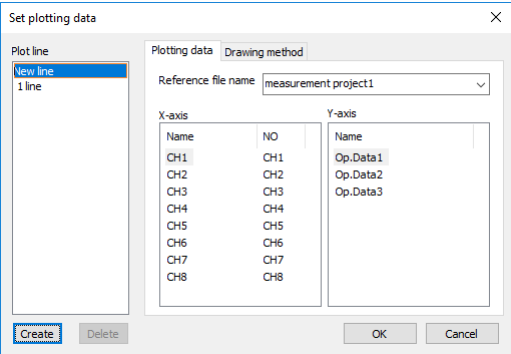


"Measurement project"

Function

Monitor data to the horizontal axis and coordinates to the vertical axis are set and a distribution map is plotted with bars.

Screen



Description

A distribution map is plotted indicating the monitor data with horizontal bars during the monitor measurement.

Operation

1. Select the window of measurement project.
2. When Horizontal bar monitor... is selected from Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of X-axis and Y-axis by Plotting data tab.
4. Click the "OK" button.

Setting items

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list : Select data for plotting.

Y-axis list : Select Op. Data for plotting.

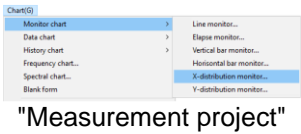
Drawing method

Construction order

By Op.Data : The order of line connection is by Op.Data.

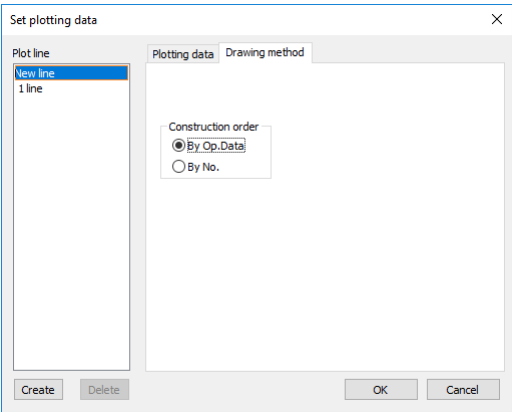
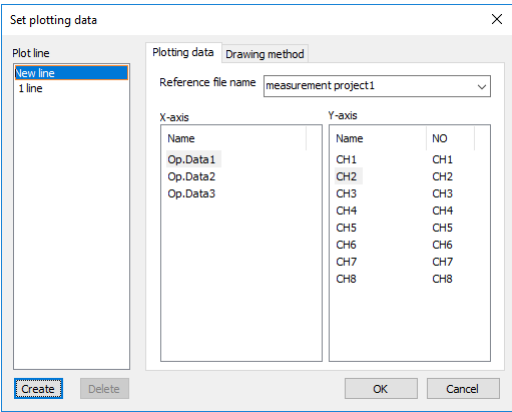
By No. : The order of line connection is by NO of Expanded CH.

5-5 X-distribution monitor...



Function Coordinates to the horizontal axis and the monitor data to the vertical axis are set and a distribution map is plotted with lines.

Screen



Description A distribution map is plotted indicating the monitor data with lines during the monitor measurement.

Operation

1. Select the window of measurement project.
2. When X-distribution monitor... is selected from Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of X-axis and Y-axis by Plotting data tab.
4. Set the Construction order by Drawing method tab, and create the plot line by "Create" button.
5. Click the "OK" button.

Setting items

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list : Select Op. Data for plotting.

Y-axis list : Select data for plotting.

Drawing method

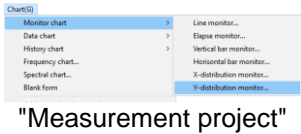
Construction order

By Op.Data : The order of line connection is by Op.Data.

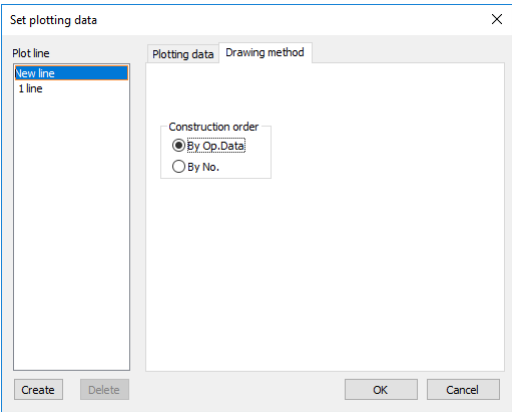
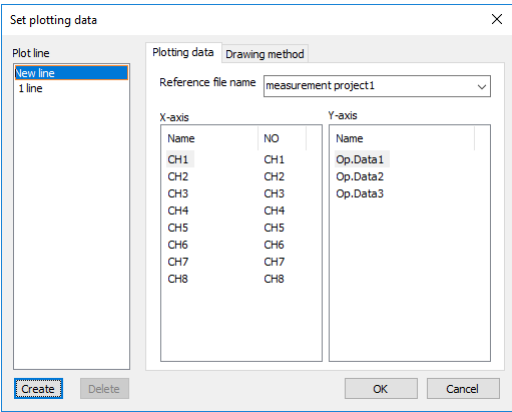
By No. : The order of line connection is by NO of Expanded CH.

5-6 Y-distribution monitor...

Function The monitor data to the horizontal axis and coordinates to the vertical axis are set and a distribution map is plotted with lines.



Screen



Description A distribution map is plotted indicating the monitor data with lines during the monitor measurement.

- Operation
1. Select the window of measurement project.
 2. When Y-distribution monitor... is selected from Chart menu, the dialog box for making a setting is displayed.
 3. Specify the data of X-axis and Y-axis by Plotting data tab.
 4. Set the Construction order by Drawing method tab, and create the plot line by "Create" button.
 5. Click the "OK" button.

Setting items

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple measurement projects are opened, select the measurement project for plotting the chart.

X-axis list : Select data for plotting.

Y-axis list : Select Op. Data for plotting.

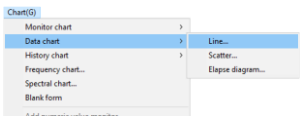
Drawing method

Construction order

By Op.Data : The order of line connection is by Op.Data.

By No. : The order of line connection is by NO of Expanded CH.

5-7 Line...

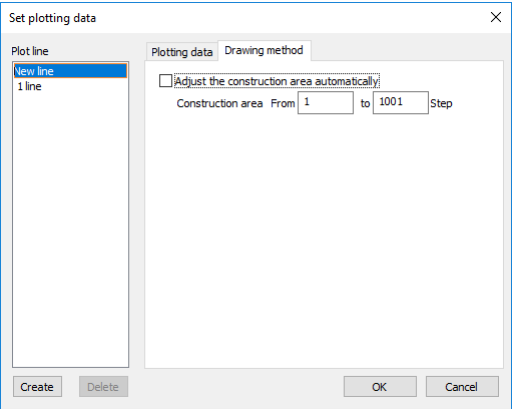
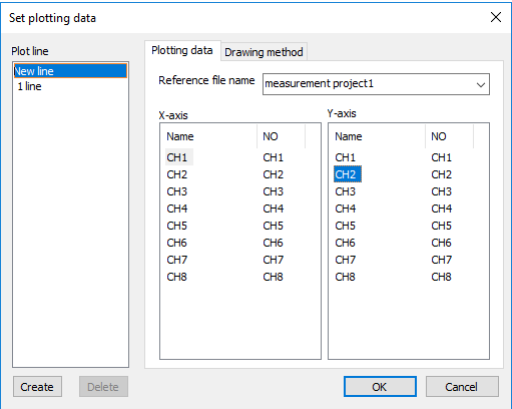


"Measurement project"
"Measurement data"

Function

Sets the measurement data for horizontal axis and vertical axis and draws the figure with lines.

Screen



Description

The measurement data of measurement project or measurement data file is drawn by line chart that uses line and symbol.

Operation

1. Select the window of measurement project or measurement data file.
2. When Line... is selected from Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of X-axis and Y-axis by Plotting data tab.
4. Set the drawing range by Drawing method tab, and create the plot line by "Create" button.
5. Click the "OK" button.

Setting item

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project or the measurement data file for plotting the chart.

X-axis list/Y-axis list

: Select data for plotting.

Drawing method

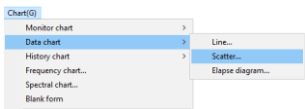
Adjust the construction area automatically

: When this is enabled, all data are plotted. When this is disabled, the range of the data to be plotted should be specified.

Construction area

: Specify the step of data to be drawn.

5-8 Scatter...

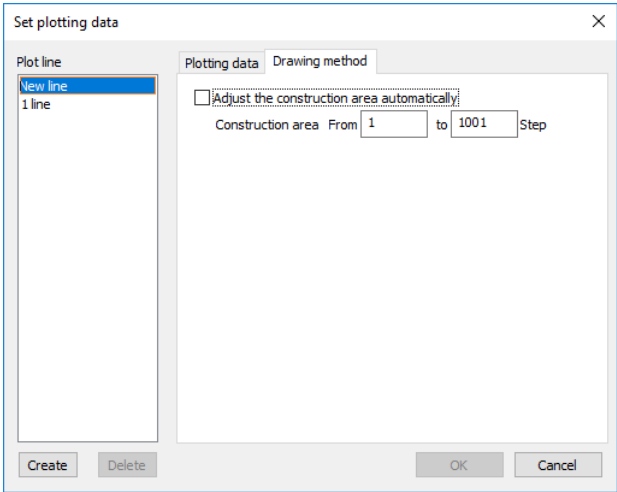
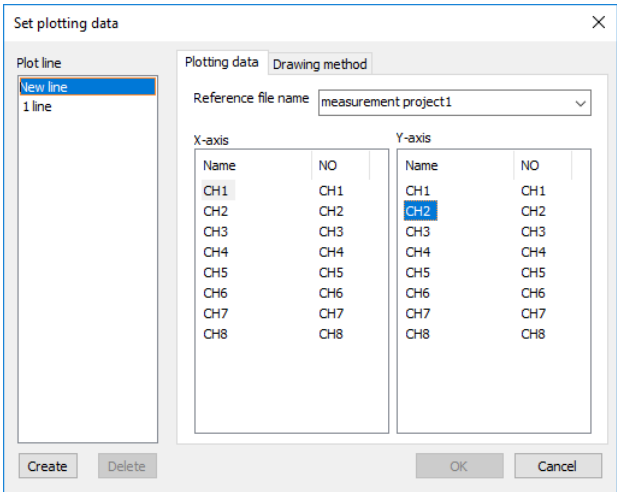


"Measurement project"
"Measurement data"

Function

Sets the measurement data for horizontal axis and vertical axis and draws the figure with dots.

Screen



Description

The measurement data of measurement project or measurement data file is drawn with dots.

Operation

1. Select the window of measurement project or measurement data file.
2. When Scatter... is selected from Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of X-axis and Y-axis by Plotting data tab.
4. Set the drawing range by Drawing method tab, and create the plot line by "Create" button.
5. Click the "OK" button.

Setting items

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project or the measurement data file for plotting the chart.

X-axis list/Y-axis list

: Select data for plotting.

Drawing method

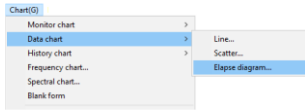
Adjust the construction area automatically

: When this is enabled, all data are plotted. When this is disabled, the range of the data to be plotted should be specified.

Construction area

: Specify the step of data to be drawn.

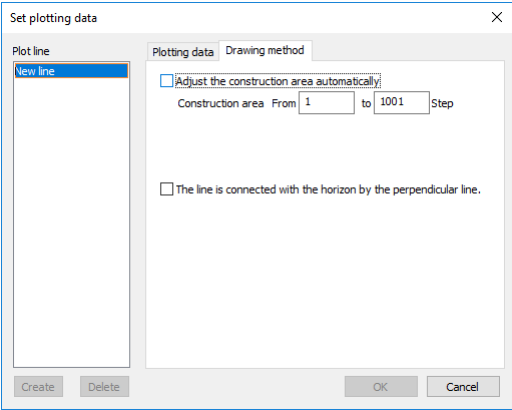
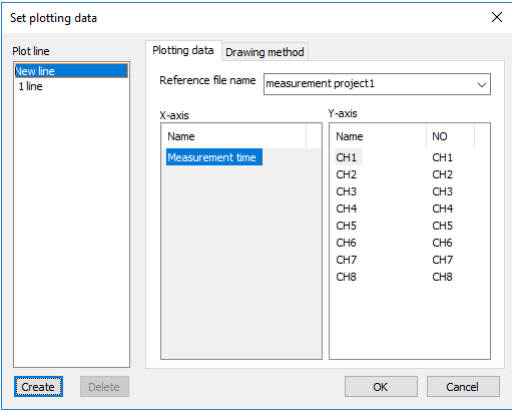
5-9 Elapse diagram...



"Measurement project"
"Measurement data"

Function Sets the measurement time for horizontal axis and the measurement data to vertical axis, and draws the figure with lines.

Screen



Description The measurement data of measurement project or measurement data file is drawn by line chart that uses line and symbol.

- Operation
1. Select the window of measurement project or measurement data file.
 2. When Elapse diagram... is selected from Chart menu, the dialog box for making a setting is displayed.
 3. Specify the data of Y-axis by Plotting data tab.
 4. Set the drawing range by Drawing method tab, and create the plot line by "Create" button.
 5. Click the "OK" button.

Setting item

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project or the measurement data file for plotting the chart.

X-axis list : Fixed to measurement time.

Y-axis list : Select data for plotting.

Drawing method

Adjust the construction area automatically

: When this is enabled, all data are plotted. When this is disabled, the range of the data to be plotted should be specified.

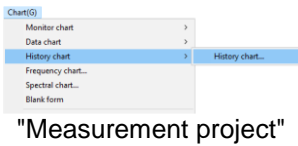
Construction area

: Specify the step of data to be drawn.

The line is connected with the horizon by the perpendicular line.

: The chart is drawn in step-wise pattern by linking the interval between data by horizontal and vertical lines.

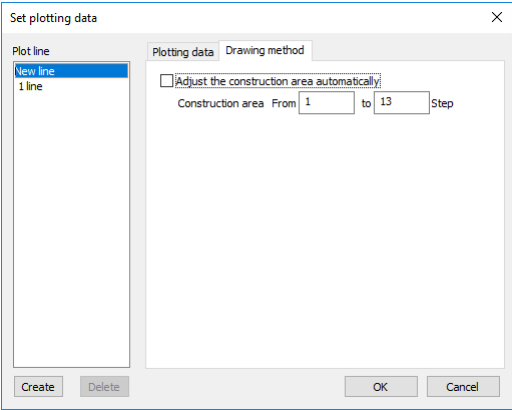
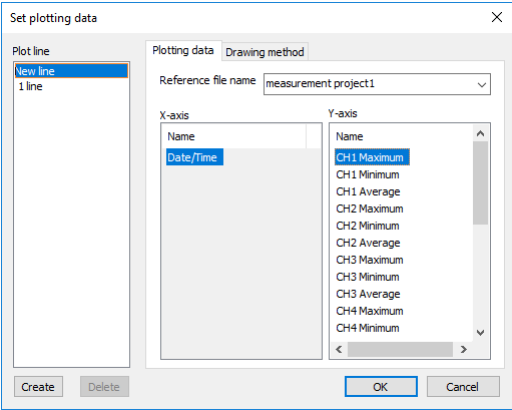
5-10 History chart...



"Measurement project"

Function Sets the measurement date and time for horizontal axis and maximum value, minimum value and average value for vertical axis and draws the figure with line.

Screen



Description The maximum value, minimum value, average value and measurement time from history data of measurement project are drawn by line chart that uses line and symbol.

Operation

1. Select the window of measurement project.
2. When History chart... is selected from the History chart submenu of the Chart menu, the dialog box for making a setting is displayed.
3. Specify the data of Y-axis by Plotting data tab.
4. Set the drawing range by Drawing method tab, and create the plot line by "Create" button.
5. Click the "OK" button.

Setting item

New line : Select this to create a new plot line.

1 line ~ : Select this to change current setting of the existing line.

"Create" button

: A new plot line is added.

"Delete" button

: A selected line is deleted.

Plotting data

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for plotting the chart.

X-axis list : Fixed to Date/Time.

Y-axis list : Select data for plotting.

Drawing method

Adjust the construction area automatically

: When this is enabled, all data are plotted. When this is disabled, the range of the data to be plotted should be specified.

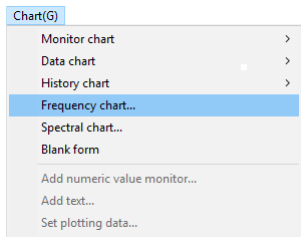
Construction area

: Specify the step of data to be drawn.

5-11 Frequency chart...

Function With the selected frequency data and count, a bar chart is plotted.

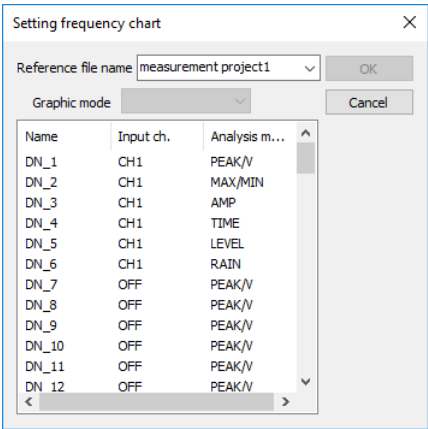
Screen



"Measurement project"
"Measurement data"



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).



Description The frequency data and the monitor during the frequency measurement are displayed.
By starting the frequency measurement while the measurement project is referenced, the monitor is displayed. If the level crossing method (LEVEL) is set for the analysis method, the monitor is not displayed.

Operation

1. Select the window of measurement project or frequency data file.
2. When Frequency chart... is selected from the Chart menu, the dialog box for making a setting is displayed.
3. Specify the frequency data and plotting mode to draw the chart.
4. Click the "OK" button.

Setting items

Reference file name

: Select a file which is referred to.
If the Measurement project is referred to, a monitor chart is plotted during measurement. If the Frequency data file is referred to, a data chart is plotted.
However if you use the level-crossing method as the analysis method, no monitor display is shown.

Graphic mode

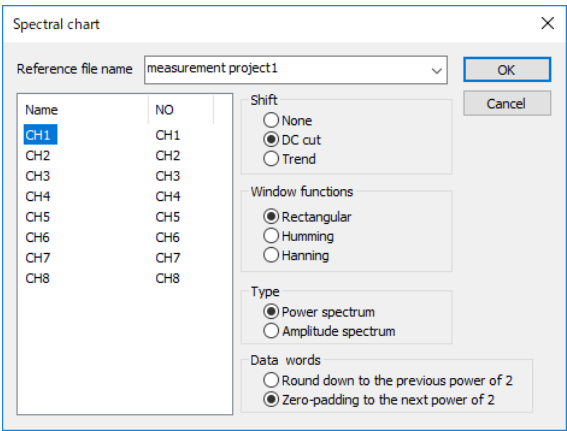
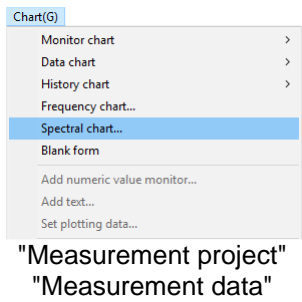
: Select count data to plot a chart for each analysis method. After selecting the frequency data to be drawn from the list, you can select a plotting mode.

List

: Select the frequency data to draw the chart.

5-12 Spectral chart...

Function The chart of power spectrum or amplitude spectrum is drawn.
Screen



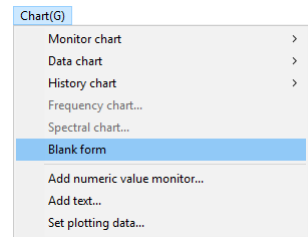
Description Select arbitrary one channel from measurement project or measurement data file and implement FFT analysis and draw the chart of power spectrum or amplitude spectrum.

- Operation
1. Select the window of measurement project or measurement data file.
 2. When Spectral chart... is selected from Chart menu, the dialog box for making a setting is displayed.
 3. Specify the data and select the processing method.
 4. Click the "OK" button.

Setting items

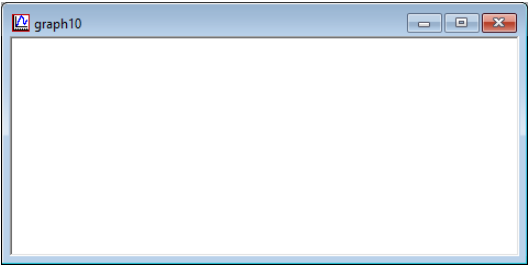
- Reference file name : When multiple measurement projects are opened, select the measurement project or measurement data file for plotting the chart.
- Name list : Select data for plotting.
- Shift
- None : The process of shift is not implemented.
- DC cut : The DC component (direct current component) of measurement data is cut.
- Trend : The trend (least squares method) of measurement data is removed.
- Window functions : Window function is selected from Rectangular, Hamming and Hanning.
- Type : Select one of Power spectrum and Amplitude spectrum.
- Data words : Adjust the number of data to the power of 2.
Round down to the previous power of 2.
Zero-padding to the next power of 2.

5-13 Blank form



Function Numeric monitor, text and picture can be added and arranged freely.

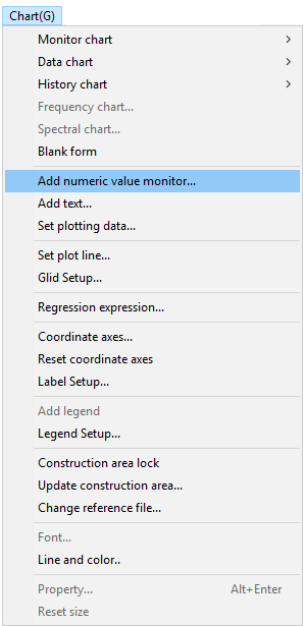
Screen



Operation

1. When Blank form is selected from Chart menu, the blank form is displayed.

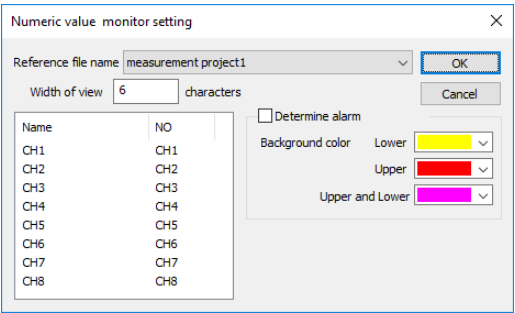
5-14 Add numeric value monitor...



"Chart sheet"

Function Create the numeric monitor.

Screen



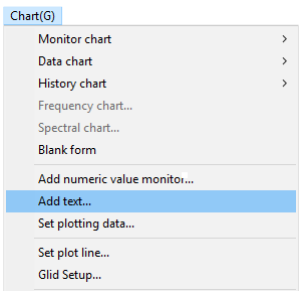
Description The numeric value monitor is the part to display monitor data on chart sheet and blank form. During the monitor measurement, the current value is displayed in real time, and when the condition of alarm value is fulfilled, the color in the frame changes.

Operation

1. Select the chart sheet or blank form.
2. Click where the numeric value monitor is added.
3. When Add numeric value monitor... is selected from Chart menu, the dialog box for making a setting is displayed.
4. After the setting, click the "OK" button.

5-15

Add text...



"Chart sheet"

Setting items

Reference file name

: When multiple Measurement projects are opened, select the Measurement project for creation.

Width of view

: Input the number of characters of the monitor data.

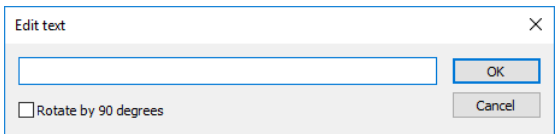
Determine alarm

: When the condition of alarm level that is set by Measurement project is fulfilled, the color of inside of frame changes to the selected background color.

Function

Displays arbitrary character string.

Screen



Description

Arbitrary character string is displayed on chart sheet and blank form, and it can be used as a comment.

Operation

1. Select the chart sheet or blank form.
2. Click where the character string is added.
3. When Add text... is selected from Chart menu, the dialog box for making a setting is displayed.
4. After the setting, click the "OK" button.

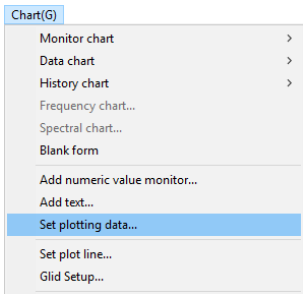
Setting item

Rotate by 90 degree

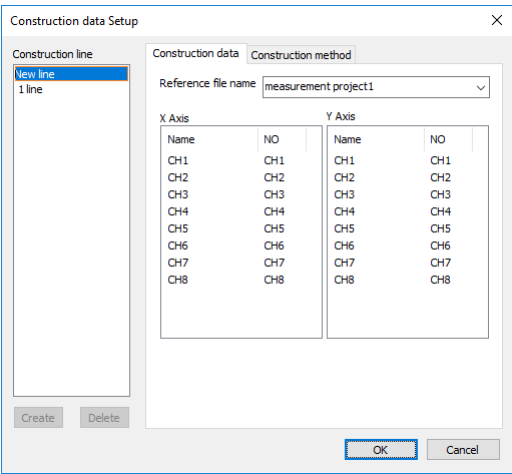
: The character string is rotated by 90 degrees and displayed.

5-16 Construction data Setup...

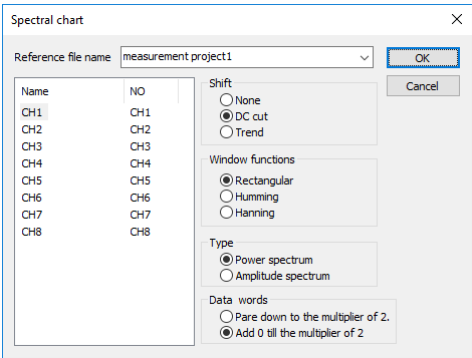
Function Changes the data or step to be drawn.
Screen



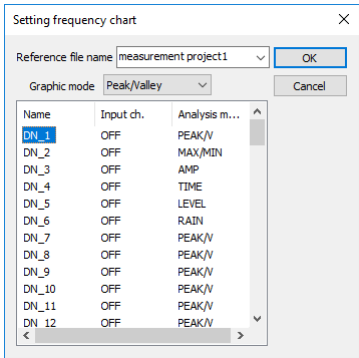
"Chart sheet"



For charts other than spectral and frequency charts



Spectral chart



Frequency chart

Description The data for charting or the plotting method is changed without changing the layout of the Chart sheet.

- Operation
1. Select the Chart sheet.
 2. Select Set plotting data... from the Chart menu. The dialog box for setting is displayed.
 3. After setting, click the "OK" button.

[For charts other than spectral and frequency charts]

Setting items

New line : Select this when new plot line is created.

1 line ~ : Select the existing line to change current setting.

Reference file name

: When multiple measurement projects are opened, the measurement project or measurement data file for plotting is selected.

[In the case of Line monitor, Line chart or Scatter chart]

X-axis list/Y-axis list

: Select data for plotting.

[In the case of Elapse monitor]

X-axis list : Fixed to elapsed time.

Y-axis list : Select data for plotting.

[In the case of Elapse diagram]

X-axis list : Fixed to measurement time.

Y-axis list : Select data for plotting.

[In the case of Vertical bar monitor or X-distribution monitor]

X-axis list : Select Op. Data for plotting.

Y-axis list : Select data for plotting.

[In the case of Horizontal bar monitor or Y-distribution monitor]

X-axis list : Select data for plotting.

Y-axis list : Select Op. Data for plotting.

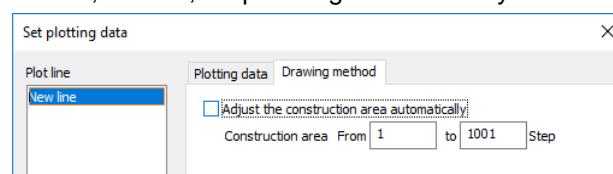
[In the case of History chart]

X-axis list : Fixed to measurement time.

Y-axis list : Select data for plotting.

Click the drawing method tab and set the drawing method.

■ In case of Line, Scatter, Elapse diagram or History



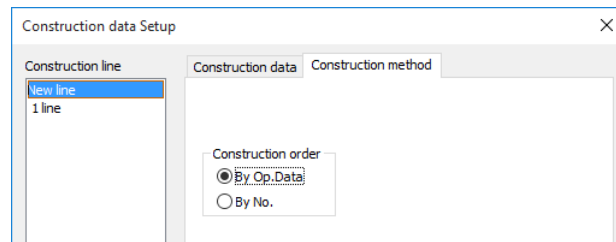
Adjust the construction area automatically

: The drawing range is automatically adjusted. When specifying the drawing range, deselect this.

Construction area

: Specify the step of data to be drawn.

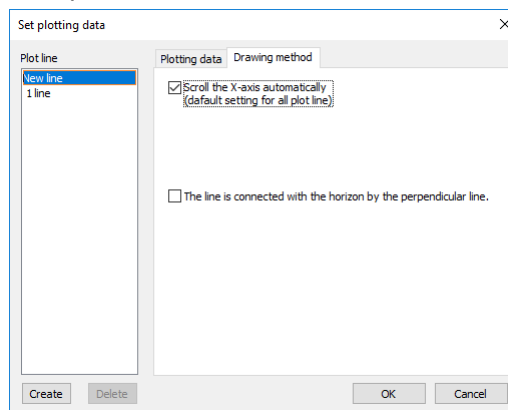
- In the case of Vertical bar monitor, Horizontal bar monitor, X-distribution monitor or Y-distribution monitor



Construction order (By OP.Data/By No.)

: The order of line that connects data is set.

- In the case of Elaplse monitor



Scroll the X-axis automatically

: When this is enabled, the construction area of X-axis is fixed and when the construction area is exceeded, X-axis is automatically scrolled, and the latest monitor value is always displayed.

The line is connected with the horizon by the perpendicular line.

: The chart is drawn in step-wise pattern by linking the interval between data by horizontal and vertical lines.

[Frequency chart]

Setting item

Reference file name

: When multiple measurement projects or frequency data files are opened, select the name of file to draw the chart.

Graphic mode

: Select count data to be drawn for each analysis method.
After selecting the frequency data to be drawn from the list, you can select a plotting mode.

List

: Select the frequency NO to draw the chart.

[Spectral chart]

Setting item

Reference file name

: When multiple measurement projects are opened, select the measurement project or name of measurement data file to be drawn.

Name list : Data to be drawn is selected.

Shift

None : The process of shift is not implemented.

DC cut : The DC component (direct current component) of measurement data is cut.

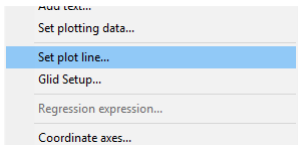
Trend : The trend (least squares method) of measurement data is removed.

Window functions

: Window function is selected from Rectangular, Hamming and Hanning.

Type : Select one of Power spectrum and Amplitude spectrum.

5-17 Construction line Setup...



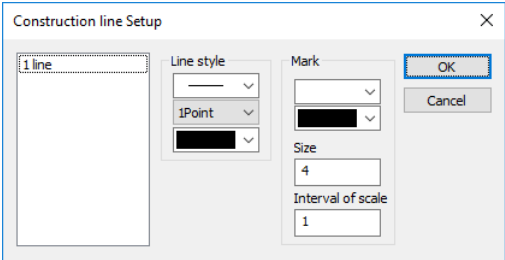
"Measurement project
(Chart list)"
"Measurement data
(Chart list)"
"Chart sheet"



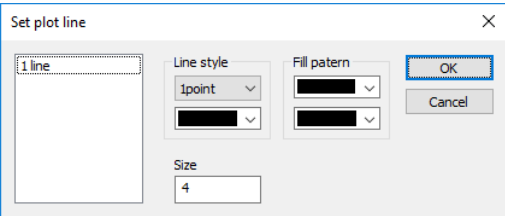
For the automatic scrolling of
the elapse monitor, refer to
"Chapter 6: 1-2 Drawing the
Elapse monitor chart" (Page
6-3).

Function Changes the kinds of lines or colors to be used in charting the data.

Screen



Line monitor, Elapse monitor, Line chart, Elapse diagram,
Scatter chart, History chart, Spectral chart



Vertical bar monitor, Horizontal bar monitor,
X-distribution monitor, Y-distribution monitor

Description After setting, the chart is updated and displayed.

Operation

1. Select the Chart list of chart sheet, measurement project or measurement data file.
2. When Set plot line... is selected from Chart menu, the dialog box for making a setting is displayed.
3. After the setting, click the "OK" button.

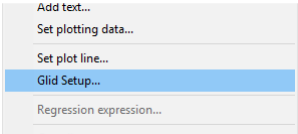
Setting items

- Line : Display the number (1 line, 2 line...) of drawing line to be set.
Select the line to be changed.
- Line style : Specify the type of line.
Specify the thickness of line from none, 1 point, 2 points and 3 points.
Specify the color of line.
- Mark : Specify the type and color of marker that is attached to each point of data. This is not used for bar chart.
- Size : Specify the size of symbol or bar within the range of 2 to 10 (dots from center).
- Interval of scale : The symbol is displayed in the specified step.
- Fill pattern : Specify the painting pattern and color of bar chart.

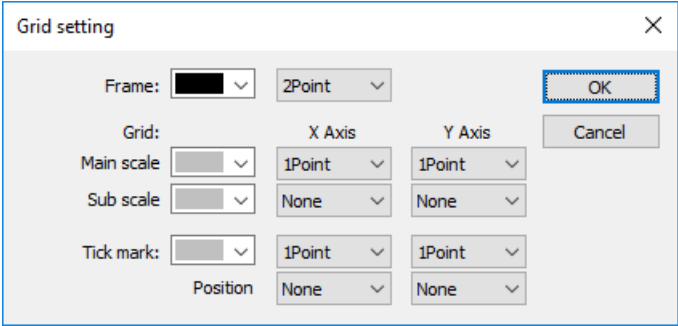
5-18 Grid setting...

Function Changes the kinds and colors of grid.

Screen



"Measurement project
(Chart list)"
"Measurement data
(Chart list)"
"Chart sheet"



Description After setting, the chart is updated and displayed.

Operation

1. Select the Chart sheet, or chart list of Measurement project or Measurement data file.
2. When Grid Setup... is selected from Chart menu, the dialog box for making a setting is displayed.
3. After the setting, click the "OK" button.

Setting items

Frame : Specify the color and thickness of line of frame.

Grid

Main scale : Specify the color and thickness of each main scale of X-axis and Y-axis.

Sub scale : Specify the color and thickness of each supplementary scale of X-axis and Y-axis.

Tick mark

Line : Specify the color and thickness of each scale of X-axis and Y-axis.

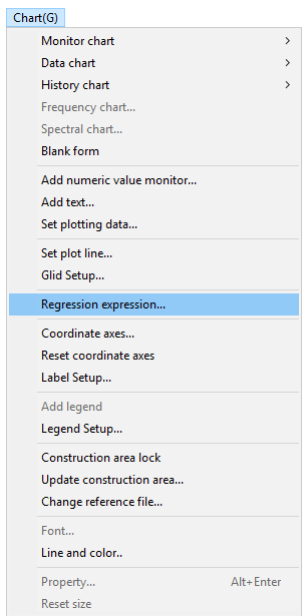
Position : Specify the display position of each scale of X-axis and Y-axis.

The line thickness is selected from None, 1 point, 2 points and 3 points.

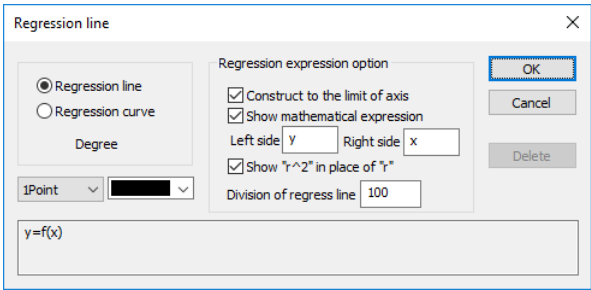
5-19 Regression expression...

Function Draws regression line concerning line chart, scatter chart or elapse diagram.

Screen



"Chart sheet"



Description After setting, the regression line and its mathematical expression is displayed for all data.

Operation

1. Select the Chart sheet.
2. When Regression expression... is selected from Chart menu, the dialog box for making a setting is displayed.
3. After the setting, click the "OK" button.

Setting items

Regression line/Regression curve

: Select regression line or regression curve. For regression curve, set the order of polynomial. Set it within the range of 2 to 9.

Construction to the limit of axis

: The regression line is drawn up to the limit of axis.

Show mathematical expression

: The mathematical expression of regression line is displayed on chart sheet.

Left side/Right side

: Specify the left-hand member and right-hand member of formula.

Show r^2 in place of r

: The linear correlation coefficient r and deviation coefficient r^2 can be switched.

Division of regress line

: Specify the division number within X-axis range where the regression line is drawn.

Regression expression

: The mathematical expression of regression line is displayed.

Point

: Specify the line thickness.
1 point / 2 points / 3 points

Color

: Specify the color of line.

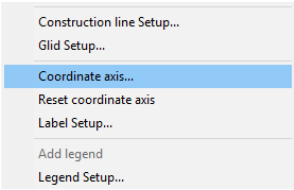
"Delete" button

: The drawn regression line is deleted.



When the number of measurement data is large, it takes time to start the drawing. It is recommended not to implement it during the measurement.

5-20 Coordinate axis...

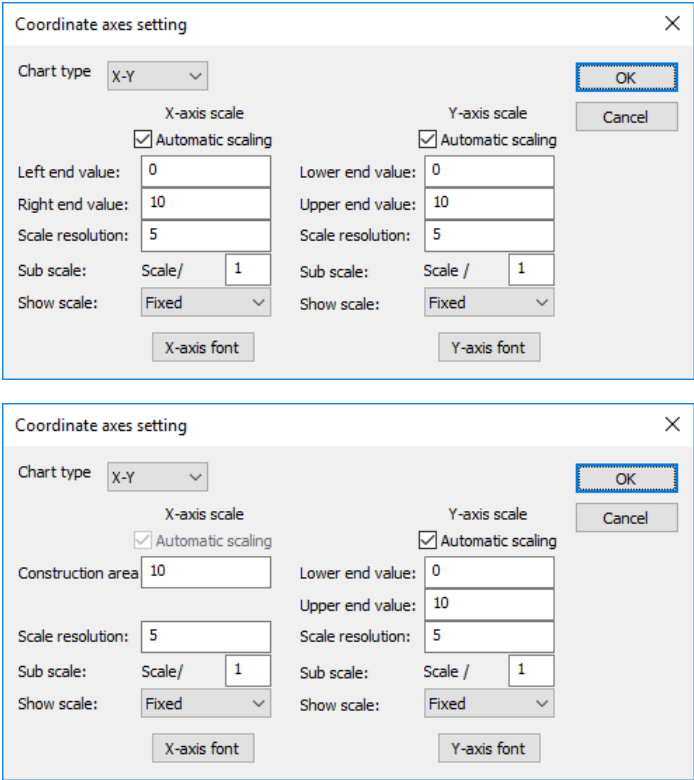


"Measurement project
(Chart list)"
"Measurement data
(Chart list)"
"Chart sheet"

Function	Scales, grid intervals, automatic scaling, chart type and so on are set for the chart.
Description	By checking the Automatic scaling, the scale is automatically renewed when the scale is exceeded.
Operation	<ol style="list-style-type: none">1. Select the chart list of the Chart sheet, the measurement project or the measurement data file.2. Select Coordinate axis... from the Chart menu. The dialog box for setting is displayed.3. After setting, click the "OK" button.

[Line monitor, Elapse monitor, Line chart, Elapse diagram, Scatter chart, Frequency chart, Spectral chart]

Screen



In the case when the automatic scrolling is enabled
on the elapse monitor

Setting items

Chart type

- X-Y : The X-Y correlation chart is plotted.
- Log-Log : The XY chart of double logarithmic scale is plotted. *
- LogX-Y : Semi-logarithmic chart is plotted with logarithmic scale on X-axis. *
- X-LogY : Semi-logarithmic chart is plotted with logarithmic scale on Y-axis.

Automatic scaling

- : If the measured value exceeds the chart scale which is previously set, the chart scale is automatically renewed according to the measured value. *

Left end value/Right end value

- : The scale of X-axis is set when the automatic scaling is not selected. *

Lower end value/Upper end value

- : The scale of Y-axis is set when the automatic scaling is not selected. *

Scale resolution

- : The main scale intervals are set when the automatic scaling is not selected.

- Sub scale : The number of division of the sub-scales is set when the automatic scaling is not selected.
Scale intervals or sub-scale intervals in a logarithmic chart is automatically set.

■ When the automatic scrolling is enabled on the elapse monitor.

- X-Y : The X-Y correlation chart is plotted.
- X-LogY : Semi-logarithmic chart is plotted with logarithmic scale on Y-axis.

Construction area

- : The display range of the X-axis is set. If the elapsed time of monitoring exceeds the display range, the monitor display time is automatically adjusted.

Lower end value/Upper end value

- : The scale of Y-axis is set when the automatic scaling is not selected.

Scale resolution

- : The main scale intervals are set when the automatic scaling is not selected.

- Sub scale : The number of division of the sub-scales is set when the automatic scaling is not selected.
Scale intervals or sub-scale intervals in a logarithmic chart is automatically set.

Show scale

- None : Scales are not displayed.
- Fixed : Scales are displayed in fixed-point arithmetic.
- Float : Scales are displayed in floating-point arithmetic.

"X-axis font" button

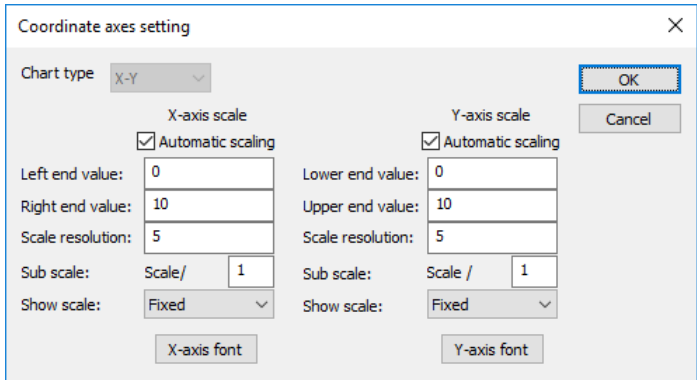
: The font for the X-axis scale is set.

"Y-axis font" button

: The font for the Y-axis scale is set.

[Vertical bar monitor, Horizontal bar monitor, X-distribution monitor, Y-distribution monitor]

Screen



Setting items

Chart type

Distribution chart

: By selecting Op.Data, a vertical bar chart and a distribution map are plotted.

Automatic scaling

: If the measured value exceeds the chart scale which is previously set, the chart scale is automatically renewed according to the measured value.

Left end value/Right end value

: The scale of X-axis is set when the automatic scaling is not selected.

Lower end value/Upper end value

: The scale of Y-axis is set when the automatic scaling is not selected.

Scale resolution

: The main scale intervals are set when the automatic scaling is not selected.

Sub scale : The number of division of the sub-scales is set when the automatic scaling is not selected.

Show scale

None : Scales are not displayed.

Fixed : Scales are displayed in fixed-point arithmetic.

Float : Scales are displayed in floating-point arithmetic.

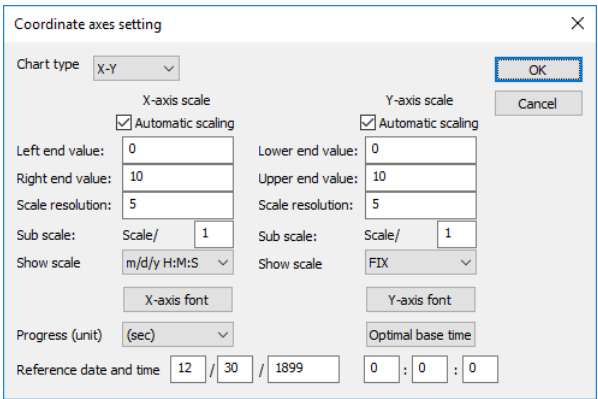
"X-axis font" button

: The font for the X-axis scale is set.

"Y-axis font" button

: The font for the Y-axis scale is set.

[History chart]
Screen



Setting item

Graph type

- X-Y : The X-Y correlation chart is plotted.
- Log-Log : The XY chart of double logarithmic scale is plotted.
- LogX-Y : Semi-logarithmic chart is plotted with logarithmic scale on X-axis.
- X-LogY : Semi-logarithmic chart is plotted with logarithmic scale on Y-axis.

Automatic scaling

: If the measured value exceeds the chart scale which is previously set, the chart scale is automatically renewed according to the measured value.

Left end value/Right end value

: The scale of X-axis is set when the automatic scaling is not selected.

Lower end value/Upper end value

: The scale of Y-axis is set when the automatic scaling is not selected.

Scale resolution

: The main scale intervals are set when the automatic scaling is not selected.

- Sub scale : The number of division of the sub-scales is set when the automatic scaling is not selected.
Scale intervals or sub-scale intervals in a logarithmic chart is automatically set.

Show scale

- None : Scale is not displayed.
- FIX : Displayed by value.
- FLOT : Displayed by index.
- y/m/d H:M:S

: Time year/month/day hour:minute:second

y/m/d : Time year/month/day

H:M:S : Time hour:minute:second

m/d : Time month/day

m/d H : Time month/day hour



H:M : Time hour:minute

m/d/y H:M:S

: Time month/day/year hour:minute:second

m/d/y : Time month/day/year

Progress (unit)

: Select the unit of time scale.
(sec)/(imin)/(hr)/(day)

When setting the progress (unit), select the unit corresponding to the data of lapsed time.

Reference date and time

: Set the time treated as initial time (time 0).

When the process diagram format is drawn before starting the measurement, the referential point is not clear, so the referential time is displayed as "1899/12/30 0:0:0". When the measurement is performed once, the first step is treated as referential time.

"X-axis font" button

: The font of X-axis scale is set.

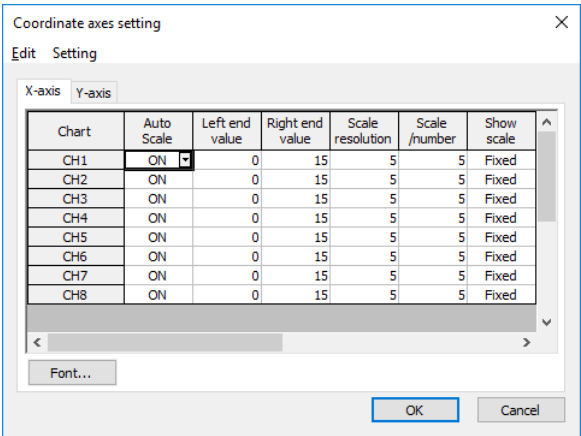
"Y-axis font" button

: The font of Y-axis scale is set.

"Optimal base time" button

: The referential time of X-axis is automatically set and figure is drawn again.

[Chart list]
Screen



Click the X-axis tab to change the coordinate axis of the X-axis and the Y-axis tab to change the coordinate axis of the Y-axis.

Scales and scale intervals can be set by channel.

Setting items

Auto Scale : ON/OFF of automatic scaling is set.

Left end value

: The minimum value of X-axis is set when the automatic scaling is not set.

Right end value

: The maximum value of X-axis is set when the automatic scaling is not set.

Lower end value

: The minimum value of Y-axis is set when the automatic scaling is not set.

Upper end value

: The maximum value of Y-axis is set when the automatic scaling is not set.

Scale resolution

: The main scale intervals are set when the automatic scaling is not selected.

Scale/number

: The number of divisions of the scale is set when the automatic scaling is not selected.

Show scale

None : Scale is not displayed.

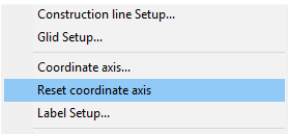
Fixed : Scales are displayed in fixed-point arithmetic.

Float : Scales are displayed in floating-point arithmetic.

"Font..." button

: Specify the font of displayed axis.

5-21 Reset of coordinate axis

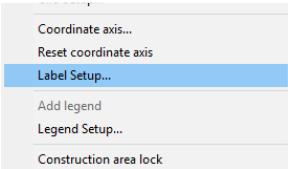


"Chart sheet"

Function Adjusts the coordinate axis to the data being displayed.

Description In the automatic scaling, if the display data exceeds the scale, the scale is renewed. However, if another measurement data is displayed and the data value is smaller than the original scale, the scale is not renewed.
By executing the Reset of coordinate axis, the coordinate axis is renewed to the display data and the chart is re-plotted.

5-22 Label Setup...



"Measurement project (Chart list)"
"Measurement data (Chart list)"
"Chart sheet"

Function Changes the title and unit of the coordinate axis label.

Screen

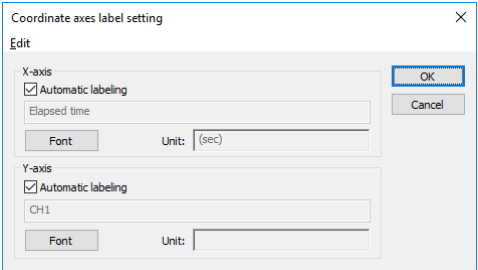


Chart sheet

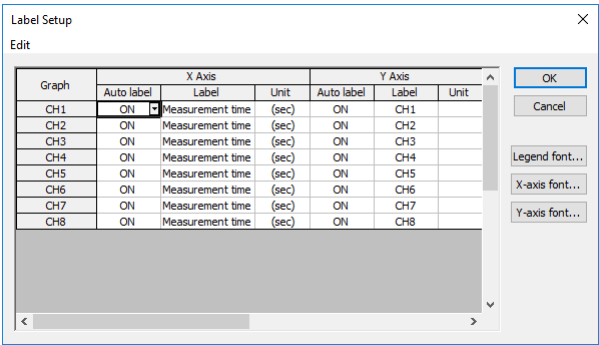


Chart list

Description In the Unit, by right-clicking the mouse, the Superscript/Standard menu is displayed.
On the Chart list, the font of legends can be set.

- Operation**
1. Select the Chart sheet, or the Chart list of measurement project or measurement data file.
 2. Select Label Setup... from the Chart menu. The dialog box for setting is displayed.
 3. After setting, click the "OK" button.

Setting items

X-axis

- Auto label : Set the X-axis label and unit automatically.
- Label : Set the X-axis label.
- Unit : Set the unit of X-axis label.

Y-axis

- Auto label : Set the Y-axis label and unit automatically.
- Label : Set the Y-axis label.
- Unit : Set the unit of Y-axis label.

"X-axis font" button

: Set the font of X-axis label and unit.

"Y-axis font" button

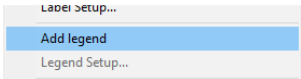
: Set the font of Y-axis label and unit.

For Chart list

"Legend font" button

: Set the font of legend column.

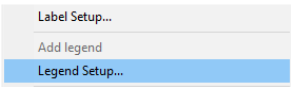
5-23 Add legend



"Chart sheet"

Function	Displays legend on a chart.
Description	This can be selected after the legend is erased from the Chart sheet.

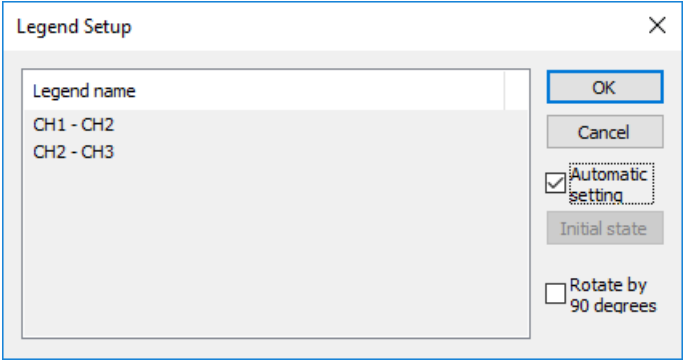
5-24 Legend Setup...



"Chart sheet"

Function Sets the legend names.

Screen



Description Legend names are changed by each plotting line.

Operation

1. Select the Chart sheet.
2. Select **Legend Setup...** from the **Chart** menu. The dialog box for setting is displayed.
3. Click the **Automatic setting** to remove the checkmark.
4. Click the legend name to be changed.
5. Type the legend name.
6. After setting, click the "OK" button.

Setting items

Automatic setting

: Set the legend name from the name of displayed data.

"Initial state" button

: The selected legend name is reset to initial state.

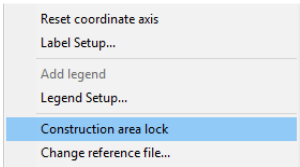
Rotate by 90 degrees

: Whole legend is rotated in 90 degrees counterclockwise and displayed.

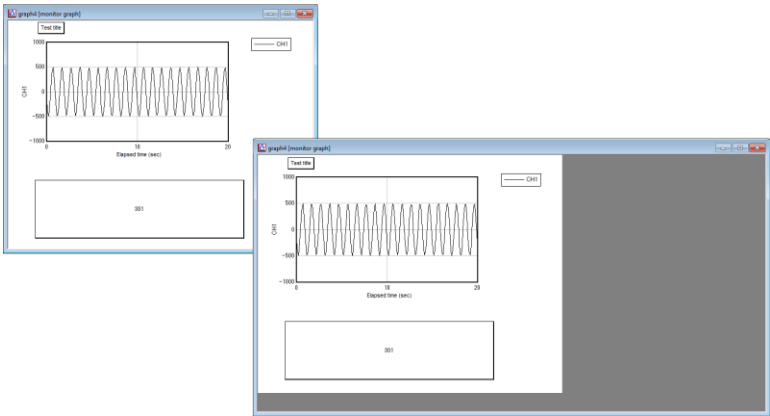
5-25 Construction area lock

Function The window size of the selected Chart sheet is locked for the plotting area.

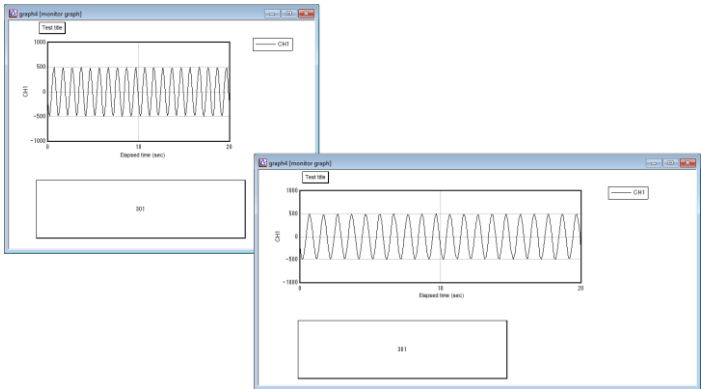
Screen



"Chart sheet"



After locking the plotting area, the chart size is not changed even if the window size is changed.



If the window size is changed without locking the plotting area, the layout of the charts are changed.

Description The size of chart is normally synchronized with the window size. If the window size is changed, the size of the chart is changed. This method is effective when multiple charts are displayed on the whole area of screen in monitor measurement. If the Construction area lock is executed for the print layout, the plotting area is fixed to the window size at the time of execution. Therefore, even if the window size is changed, the positions of parts are not displaced. If the area-locked Chart sheet is selected, the Construction area lock is checkmarked in the menu. By clicking the Construction area lock, the window size is returned to the plotting area size and the chart is displayed in synchronization with the window size.

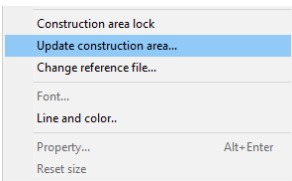


The construction-area-locked Chart sheet is printed in the same size as the window size. If the window size is larger than the paper size, the print size varies according to the settings for the print option.

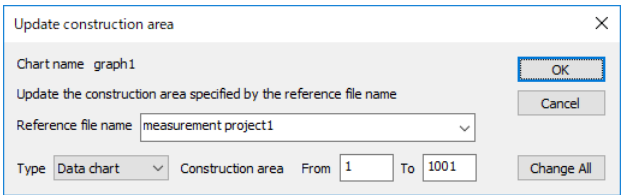
5-26 Update construction area...

Function Re-plots the chart sheet by specifying the construction area.

Screen



"Chart sheet"



Operation

1. Select the chart sheet to be updated.
2. When **Update construction area...** is selected from **Chart** menu, the dialog box for making a setting is displayed.
3. After the setting, click the "OK" button.

Setting item

Reference file name

: 'When multiple data are displayed on selected chart sheet using multiple measurement projects or measurement data files, select measurement project or measurement data file to be updated.

Type

: Select the type from **Data chart** and **History chart**.
The chart of selected type is updated.

Construction area

: Specify the step of data to be updated.

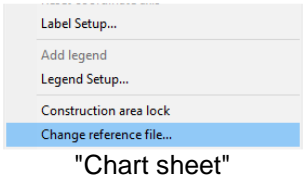
"OK" button

: The data is updated to that of specified construction area for the chart sheet for which chart name is displayed.

"Change All" button

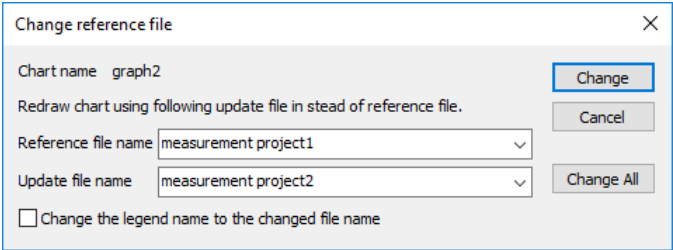
: All chart sheets opened from the referenced file are updated.

5-27 Change reference file...



Function Changes the measurement project or measurement data file which is referred to by the Chart sheet.

Screen



Description This is used when a test is conducted with the same content as that of the previous test. The chart sheet used for the previous test can be used for the next test by changing the reference file.

Operation

1. Select the chart sheet to change the reference file.
2. Open the measurement project or measurement data to be referred to.
3. Select **Change reference file...** from the **Chart** menu. The dialog box for setting is displayed.
4. After setting, click the "Change" button.

Setting items

Reference file name

: If multiple measurement projects or measurement data files are used for the selected chart sheet, select the measurement project or measurement data file to be changed.

Update file name

: Select the file for updated reference file from the opened measurement projects or measurement data files.

Change the legened name to the changed file name

: The legend name is displayed according to the name set in the selected chart sheet.

"Change" button

: The reference file is changed for the chart sheet which is displayed in the Chart name.

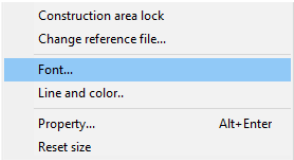
"Change All" button

: The reference file is changed for every opened chart sheet.

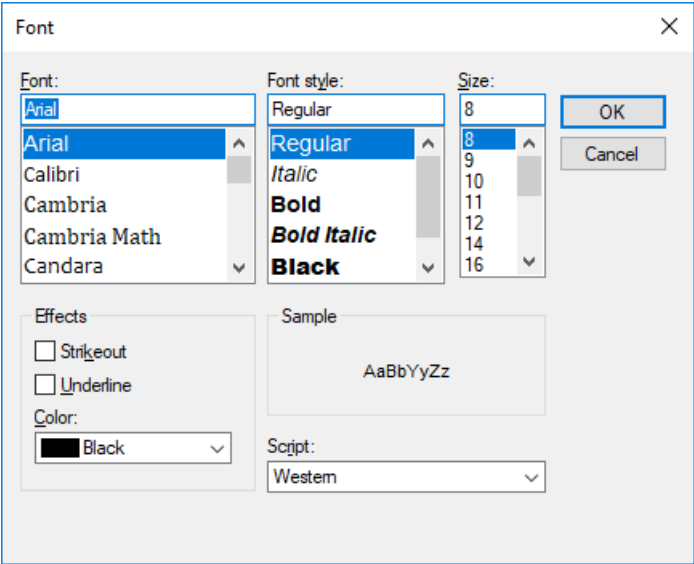
5-28 Font...

Function Sets font, size, style and color to the selected parts such as titles and legends in the Chart sheet.

Screen



"Chart sheet"



Operation

1. Click a part such as title or legend to be selected.
2. Select Font... from the Chart menu. The dialog box for setting is displayed.
3. After setting, click the "OK" button.

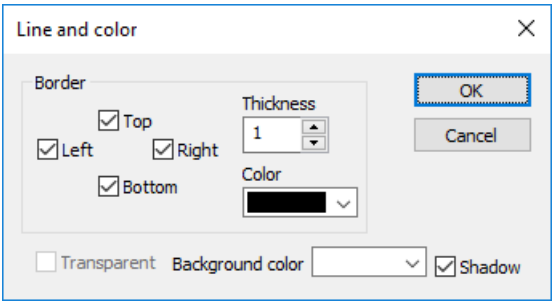
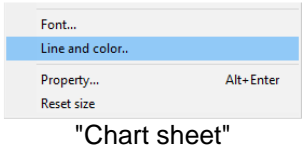
Setting items

- Font : Select the font from the list.
- Font style : Select the style of character from the list.
- Size : Select the size of character from the list.
- Strikeout : A line is drawn at the center in vertical direction of the character string.
- Underline : A line is drawn below the character string.
- Color : Select the color of character.

5-29 Line and color...

Function Sets the frame line of selected parts such as chart, title and legends in the Chart sheet.

Screen



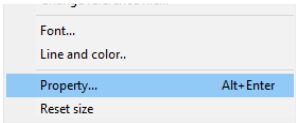
Operation

1. Click a part to be selected with a mouse.
2. Select **Line and color...** from the **Chart** menu. The dialog box for setting is displayed.
3. After setting, click the "OK" button.

Setting items

- Left** : A line is drawn on the left side of the part.
- Right** : A line is drawn on the right side of the part.
- Top** : A line is drawn on the upper side of the part.
- Bottom** : A line is drawn on the lower side of the part.
- Thickness** : Specify the thickness of frame line.
- Color** : Select the color of frame line within the range of 1 to 10.
- Transparent** : The background color is disabled so that you can see the back of the part.
Selectable for chart only.
- Background color** : Specify the color of the inside of the part.
- Shadow** : Shade is added to the frame of the part.

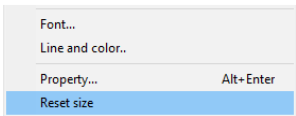
5-30 Property... Alt+Enter



"Chart sheet"

Function	Displays the settings of parts.
Description	The dialog box for changing the setting of the selected part is displayed. The displayed dialog boxes are different in each part. This operation is equivalent to double-clicking the part.
Chart	: The same dialog box as that displayed when the Construction data Setup... is selected is displayed.
Legend	: The same dialog box as that displayed when the Legend Setup... is selected is displayed.
Operation	<ol style="list-style-type: none">1. Click a part to be selected with a mouse.2. Select Property... from the Chart menu. The dialog box for setting is displayed.

5-31 Reset size



"Chart sheet"

Function	Resets the size of chart or parts except legend to the default.
Description	The size of part can be changed by dragging the mark displayed when the part is clicked. By selecting Reset size, the size can be returned to the default.
Operation	<ol style="list-style-type: none">1. Click a part to be selected with a mouse.2. Select Reset size from the Chart menu.

6 Measurement menu

Measurement		
<input checked="" type="checkbox"/>	Show Measurement panel...	F9
	Show Measurement project	
	Balance...	F10
	Calibration output...	
	Monitor setting...	
	Setting recording data...	
	Monitoring	F11
	Peak reset	
	Start measurement	F1
	Auto measurement	>
	Alarm	>
<input checked="" type="checkbox"/>	Automatically save data	
	Automatically deleting memory card data...	
	Reading memory card data...	
	Deleting selection of memory card data...	
	Volume	>
	Upgrading instrument...	

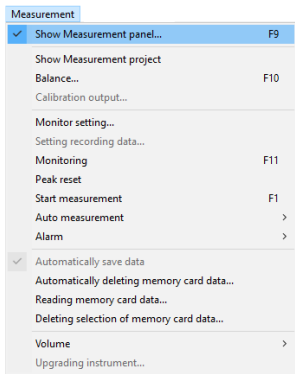
Overview

- Displaying the measurement panel
- Displaying the measurement project
- Balancing
- Controlling the voltage output
- Setting the monitor
- Setting the data recording
- Performing the monitor measurement
- Resetting the peak values of monitor measurement
- Performing the manual measurement
- Performing the data trigger measurement
- Performing the program measurement
- Performing the interval measurement
- Performing the data comparator measurement
- Displaying an alarm
- Setting and controlling the alarm
- Automatically saving the data
- Deleting data from the memory card in the instrument automatically
- Reading data from the memory card in the instrument
- Deleting data from the memory card in the instrument
- Upgrading instrument firmware

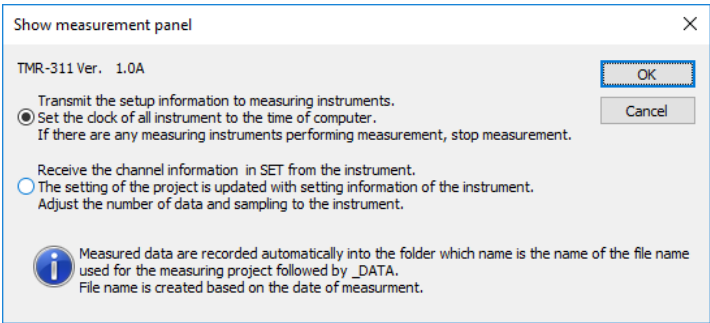
6-1 Show measurement panel...

Function Displays the measurement panel for performing measurement and monitoring data

Screen



"Measurement project"



Description The setting data for the instrument and the measurement project are made in agreement with each other so that the measurement can be conducted.

Operation

1. Select the measurement project to be used in the measurement.
2. Select Show measurement panel... from the Measurement menu. The dialog box for selection is displayed.
3. After selection, click the "OK" button.

Selection items

Transmit the setup information to measuring instruments.

: The setting contents of measurement project are sent to and reflected on the instrument.

Receive the channel information in SET from the instrument.

: The setting contents of the instrument including channel condition and A/D setting are imported to the measurement project.



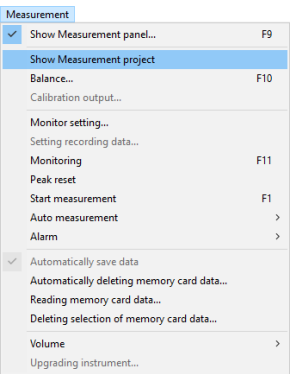
For the display of the measurement panel, refer to "1 How to display the Measurement Panel" in Chapter 5 (Page 5-1).

6-2 Show measurement project

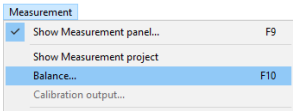
Function Activates the measurement project whose measurement panel is displayed.

Operation

1. Display the measurement panel
2. Select Show Measurement project menu from the Measurement menu, and the corresponding measurement project is activated.

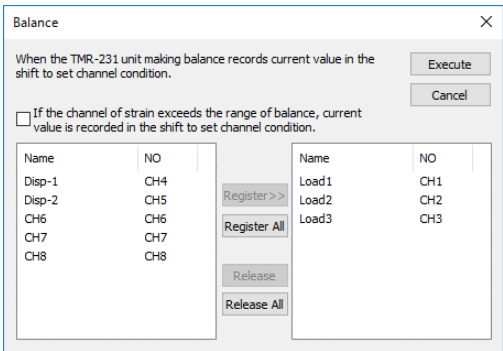


6-3 Balance...



Function Before starting the measurement, zero adjustment of the sensor is executed.

Screen



Description Select the channel to be initialized.
If you execute zero balancing for channels in Voltage/Thermocouple unit (TMR-231), Voltage Input unit (TMR-331) or Thermocouple/Voltage unit (TMR-332), current value is recorded in the Shift cell of each input channel of the referring Measurement project.

Operation

1. Select Balance... from the Measurement menu. The dialog box for setting is displayed.
2. After checking the setting, click the "Execute" button.

Setting items

If the channel of strain exceeds the range of balance, current value is recorded in the shift to set channel condition.

: For the channel of strain that exceeds the balancing range of the instrument, the value does not become 0. When this item is enabled, the current value is recorded in the shift cell of the input CH of the measurement project that is referenced, zero adjustment is performed by calculation.

Left list : List of channels available for balancing is displayed.
The channel set invalid in the CH setting is not indicated.

Right list : List of channels which are to be balanced is displayed.

"Register>>" button

: Channels selected in the left list are registered in the right list.

"Register All" button

: All channels in the left list are registered in the right list.

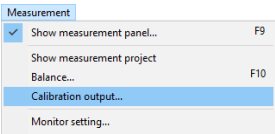
"Release" button

: Channels selected in the right list are deleted from the list.

"Release All" button

: All channels registered in the right list are deleted.

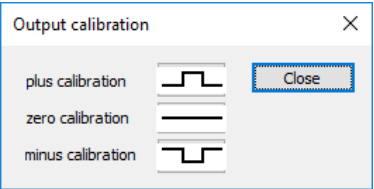
6-4 Calibration output...



For the setting of calibration values, refer to "7-4 How to set the calibration value" in Chapter 4 (Page 4-21).

Function Outputs calibration value from the voltage output terminal of the instrument.

Screen



Description Calibration values set in the Output CH on the measurement project are output from the analog terminal of the instrument.

Operation

1. Select **Calibration output...** from the **Measurement** menu. The dialog box for **Output calibration** is displayed.
2. Click the button to output the calibration value.

Setting items

"plus calibration" button

: The positive calibration is output.

"zero calibration" button

: The 0 mV calibration is output.

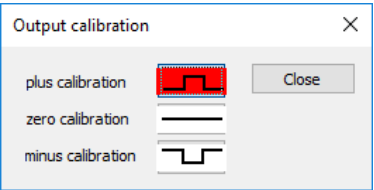
"minus calibration" button

: The negative calibration is output.

"Close" button

: The dialog box of "Output calibration" is closed.

The output button is displayed in red during output.

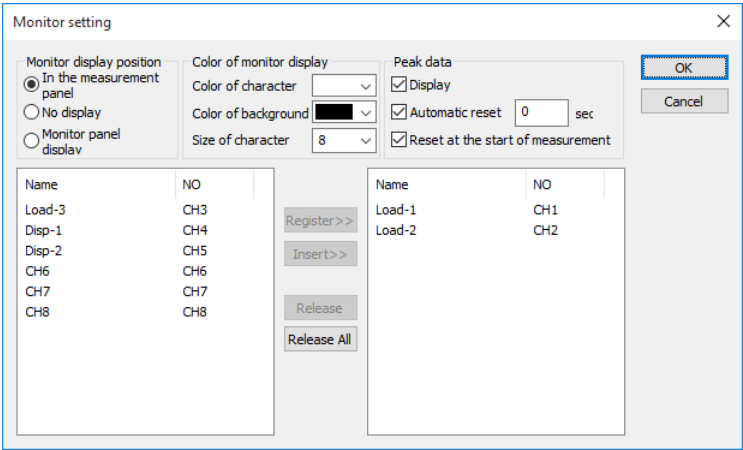
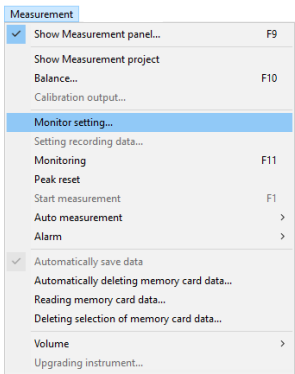


The dialog box cannot be closed while the calibration value is being output. To close the dialog box, click the button displayed in red.

6-5 Monitor setting...

Function Sets the setting of monitor measurement.

Screen



Description The monitor data to be displayed on the measurement panel are selected and the display method is set.

Operation

1. Select Monitor setting... of the Measurement menu or click the "Set monitor" button on the measurement panel. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

Setting items

■ Setting the monitor data of measurement panel

Left list : List of channels available for monitor measurement is displayed.

Right list : List of channels for which monitor measurement is performed is displayed.

"Register>>" button

: Channels selected in the left list are registered in the right list.

"Insert>>" button

: Select where to insert the channel, and insert the channel selected in the left list between the channels registered in the right list.

"Release" button

: Channels selected in the right list are deleted from the list.

"Release All" button

: All channels registered in the right list are deleted.

■ Setting the monitor display position

In the measurement panel

: The monitor value is displayed in the measurement panel.

No display : The monitor value is not displayed. The size of the measurement panel gets smaller.

Monitor panel display

: Monitor values are displayed in a monitor panel other than the measurement panel.

■ Setting the color of monitor display

Color of character

: Specify the color of character of monitor display.

Color of background

: Specify the color of background of monitor display.

Size of character

: Specify the character size when the monitor values are displayed in the monitor panel.

■ Setting the peak data

Display : The maximum and minimum peak data are displayed.

Automatic reset

: The peak data is reset at specified time intervals.

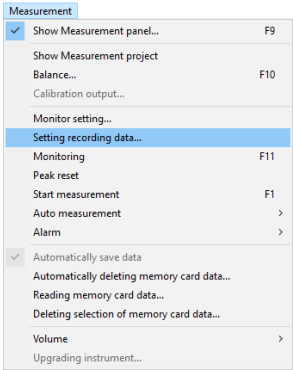
Reset at the start of measurement

: The peak data is reset when the measurement is started.

6-6 Setting recording data...

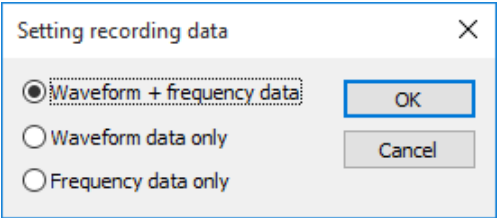


To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).



Function Selects data to be recorded into the memory card during measurement.

Screen



Description The data to be recorded in the memory card during measurement are selected from waveform + frequency data, waveform data and frequency data. Only waveform data can be recorded if there is no Input CH setting for the Frequency NO on the measurement project or if the frequency analysis cannot be conducted due to the restriction of the sample clock.

Operation

- 1. Select **Setting recording data...** from the **Measurement** menu. The dialog box for setting is displayed.
- 2. After setting, click the "OK" button.

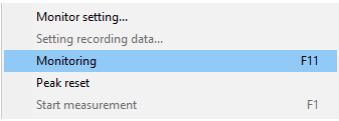
Selection items

Waveform + Frequency data : Waveform and frequency data are concurrently recorded.

Waveform data only : Only waveform data are recorded.

Frequency data only : Only frequency data are recorded.

6-7 Monitoring

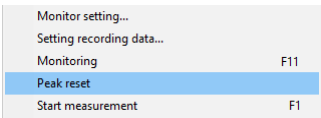


Function Starts monitor measurement.

Operation

1. Select Monitoring in the Measurement menu or click the "Monitor" button on the measurement panel.

6-8 Peak reset

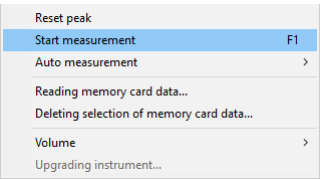


Function Resets the maximum peak and minimum peak of the monitor data with the current values.

Operation

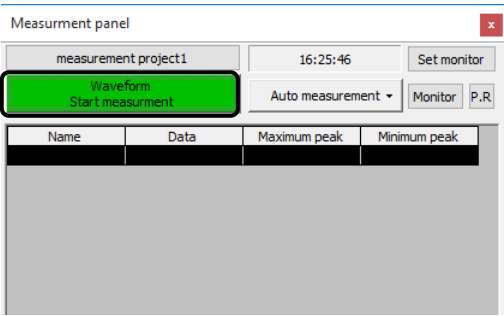
1. Select Peak reset in the Measurement menu or click the "P.R" button on the measurement panel.

6-9 Start measurement F1



Function A single measurement is conducted at any given time and the measurement data is saved.

Screen

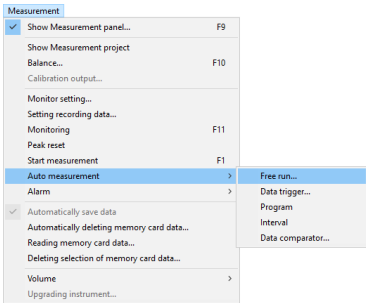


Description A single measurement is conducted at any given time. The "Start measurement" button on the measurement panel is changed to the "Stop measurement" button. By clicking it during measurement, the measurement stops.

Operation

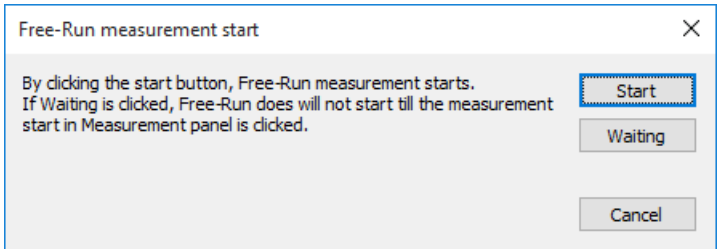
1. Display the measurement panel
2. Select Start measurement in the Measurement menu or click the "Start measurement" button on the measurement panel.

6-10 Free run...



Function The free run measurement function of the instrument is used to conduct the measurement.

Screen



Description Measurement is conducted repeatedly.
Measurement is conducted repeatedly until the "Stop measurement" button is pressed or no space is left in the memory card.
On the high-speed mode, the free run measurement cannot be executed.

Operation

1. Display the measurement panel.
2. Select the **Free run...** from the **Auto measurement** submenu of the **Measurement** menu. The dialog box for selecting the start method is displayed.
3. Click the "Start" button or "Waiting" button.

Setting items



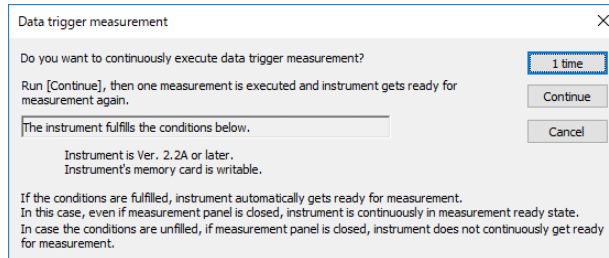
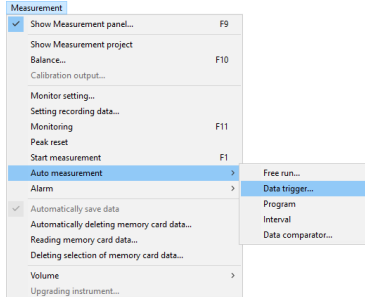
For the free run measurement, refer to "Chapter 5: 7 Free run measurement" (Page 5-10).

By clicking the "Start" button, the free run measurement is started.
By clicking the "Waiting" button, the free run mode is set in the instrument but the measurement doesn't start. Click the "Start measurement" button on the measurement panel to start the measurement.

6-11 Data trigger...

Function The data trigger function of the instrument is used to conduct the measurement.

Screen



Description The instrument judges the input signal according to the trigger level and mode for the channel set in the Data trigger measurement of the measurement project, and the automatic measurement is conducted. The recording method of the data trigger measurement is set before starting the measurement.

Operation

1. Display the measurement panel
2. Select the Data trigger... from the Auto measurement submenu of the Measurement menu. The dialog box for setting is displayed.
3. Click the "1 time" or "Continue" button.

Setting items

By clicking the "Continue" button, another data trigger measurement is executed continuously after the completion of the data trigger measurement.

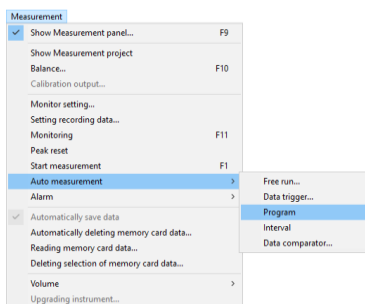
6-12 Program

Function The program measurement function of the instrument is used to conduct the measurement.

Description Automatic measurement is conducted according to the Date/Time of start and the Measurement time in the Program measurement of the measurement project. The recording method of the program measurement is set before starting the measurement.

Operation

1. Display the measurement panel
2. Select the Program from the Auto measurement submenu of the Measurement menu.
3. Program measurement is started.

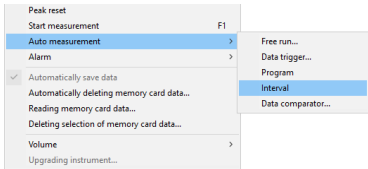


For the program measurement, refer to "Chapter 5: 9 Program measurement" (Page 5-15).

6-13 Interval



For the interval measurement, refer to "Chapter 5: 10 Interval measurement" (Page 5-18).



Function

Starts the interval measurement.

Description

The interval measurement is started according to the setting of interval measurement of measurement project.

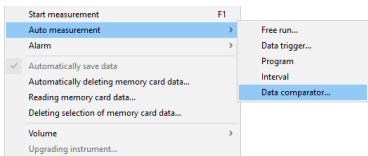
Operation

1. Open the measurement panel.
2. Select Interval from Auto measurement submenu of Measurement menu.

6-14 Data comparator...



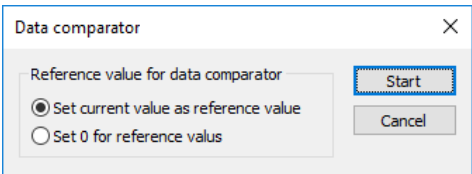
For the data comparator measurement, refer to "Chapter 5: 11 Data comparator measurement" (Page 5-21).



Function

Starts the data comparator measurement.

Screen



Description

The data comparator measurement is started according to the setting of data comparator measurement of measurement project.

Operation

1. Open the measurement panel.
2. When Data comparator... is selected from Auto measurement submenu of Measurement menu, the confirmation dialog box is displayed.
3. After the setting, click the "Start" button.

Setting item

Reference value for data comparator

Set current value as reference value

: The data comparator measurement is performed setting the value of monitor data when "Start" button is clicked as the reference value.

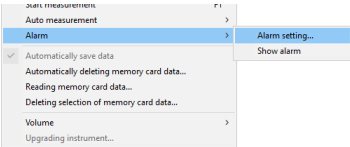
Set 0 for reference value

: The data comparator measurement is performed setting 0 as the reference value.

6-15 Alarm setting...

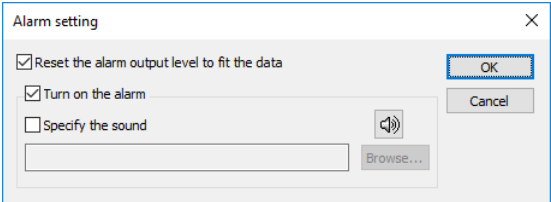


For the alarm function, refer to "Chapter 5: 13 Alarm function" (Page 5-25).



Function Sets the method for resetting the alarm output and the alarm sound that is played when the alarm is generated.

Screen



Description The operation when the alarm is generated is defined using alarm function.

Operation

1. Open the measurement panel.
2. When **Alarm setting...** is selected from **Alarm** submenu of **Measurement** menu, the dialog box for making a setting is displayed.
3. After the setting, click the "OK" button.

Setting item

Reset the alarm output level to fit the data

: After the alarm is generated, when the monitor data becomes the value out of alarm judgment, the alarm is released.
If this is disabled, the alarm is kept displayed until the Release output button on the Alarm panel is pressed.

Turn on the alarm

: It enables to play alarm from computer.



Button : Sound is played by the current setting.

Specify the sound

: The specified sound file is set to the alarm sound.

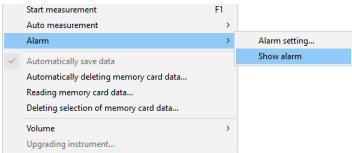
"Browse..." button

: Click this button when selecting the sound file to be used.

6-16 Show alarm

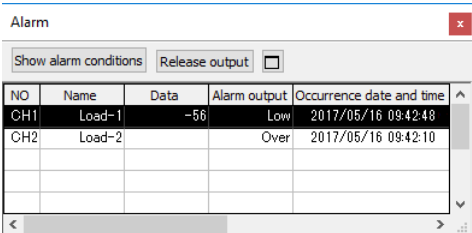


For the alarm function, refer to "Chapter 5: 13 Alarm function" (Page 5-25).



Function Displays the alarm panel.

Screen



Description The data in which an alarm is generated is displayed using alarm function.

Operation

1. Open the measurement panel.
2. When Show alarm is selected from Alarm submenu of Measurement menu, the alarm panel is displayed.

Setting item

"Show alarm conditions" button

: The alarm condition of the Name that is selected with black background is displayed.

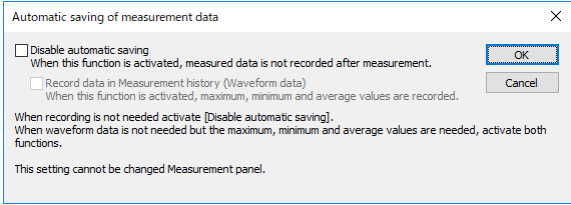
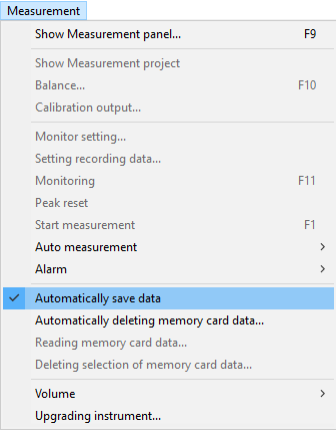
"Release output" button

: All alarm outputs are released.
Even if the alarm outputs are released, an alarm is output again during the monitor measurement if the alarm condition is met.

6-17 Automatically save data...

Function Disables the automatic saving of measurement data.

Screen



Description When it is not necessary to record the measurement data, it is possible to disable the function to save the measurement data automatically.

Operation

1. When Automatically save data... is selected from the Measurement menu, the dialog box for making a setting is displayed.
2. After the setting, click the "OK" button.

Setting item

Disable automatic saving

: If this is enabled (checked), the data are not saved into a computer even though the measurement is performed.

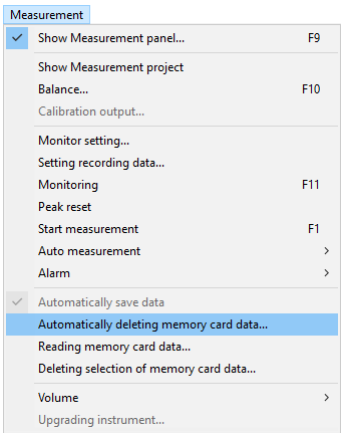
Record data in measurement history (Waveform data)

: When the automatic saving is not implemented, the maximum, minimum and average values are recorded in measurement history.



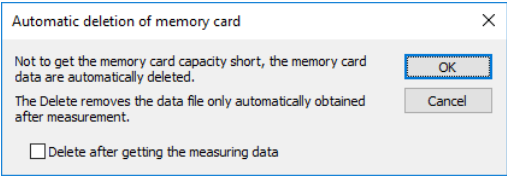
When only "Disable automatic saving" is enabled and "Record data (Wave data) in measurement history" is disabled, data file is not created and no data are recorded in the history even if the measurement is performed. Use this setting only when you check the current phenomenon waveform.

6-18 Automatically deleting memory card data...



Function Deletes the file of the data, which are automatically acquired after the measurement, from the memory card to prevent capacity shortage of the card.

Screen



Description If the remaining capacity of the memory card becomes short during automatic measurement, the measurement cannot be continued.
Using this function, you can conduct measurement beyond the memory card capacity.

- Operation**
1. When Automatically deleting memory card data... is selected from the Measurement menu, the dialog box for making a setting is displayed.
 2. After the setting, click the "OK" button.

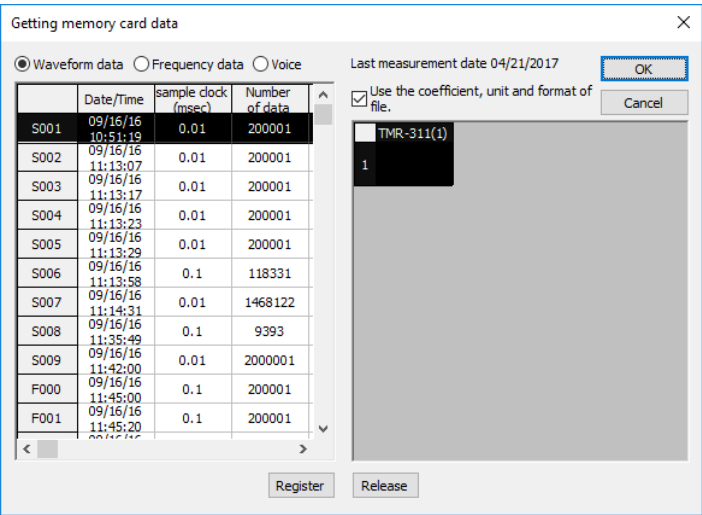
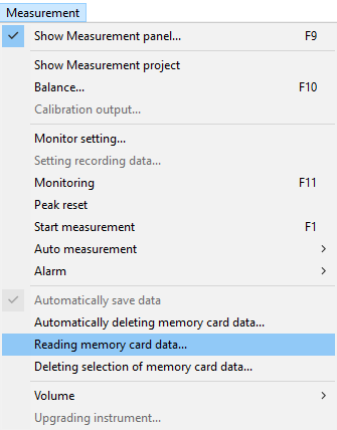
Setting item

Delete after getting the measuring data
: The file of the data which are automatically acquired after the measurement is deleted from the memory card.

6-19 Reading memory card data...

Function The waveform data or the frequency data recorded in the memory card of the instrument are saved to a computer.

Screen



Description The data of off-line measurement recorded in the memory card can be read.
The waveform data and the frequency data can be concurrently read.

- Operation**
1. Display the measurement panel
 2. Select the Reading memory card data... from the Measurement menu. The dialog box is displayed.
 3. After setting, click the "OK" button.

Setting items

Waveform data/Frequency data/Voice

: Select the type of the data file to be displayed.

Use the coefficient, unit, and format of file.

: If you check this box, the settings of coefficient, unit and format included in the specified folder are applied for reading waveform data. If there are no such data, the setting of the Measurement project is used.

Left list : The measurement data which are recorded in the memory card are listed.

Right list : The measurement data to be read are listed.

"Register" button

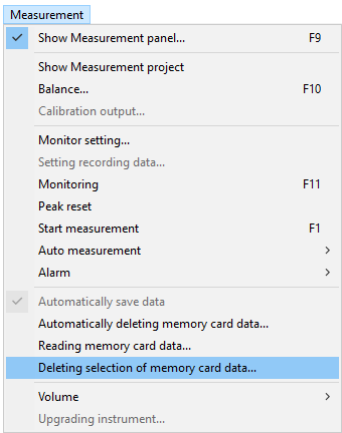
: The measurement data selected in the left list are registered in the right list.

"Release" button

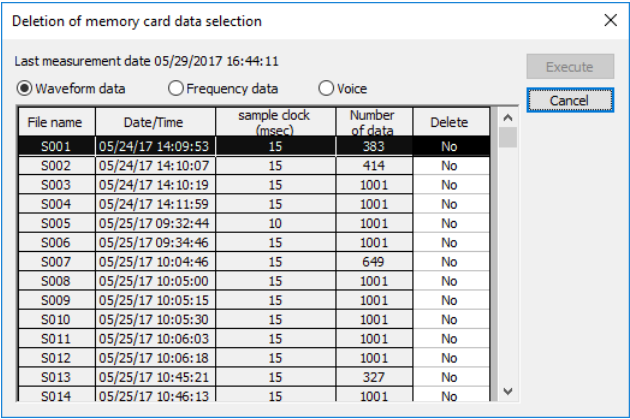
: The measurement data selected in the right list are deleted from the list.

6-20 Deleting selection of memory card data...

Function The selected waveform data or frequency data recorded in the memory card of the instrument can be deleted.



Screen



Description If the free space of the memory card becomes small, the data files can be deleted to increase the free space.

Operation

1. Display the measurement panel.
2. Select the Deleting selection of memory card data... from the Measurement menu. The dialog box is displayed.
3. After setting, click the "Excute" button.

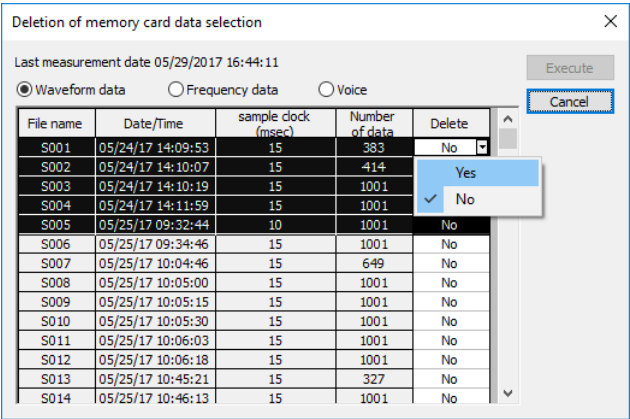
Setting items

Waveform data/Frequency data/Voice

: Select the type of the data file to be displayed.

Delete

: If "Yes" is selected, its file will be deleted.



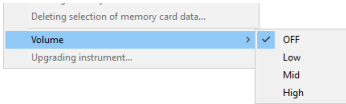
"Execute" button

: Selected file is deleted from the memory card.

6-21 Volume



In case of using the TMR-211, the volume cannot be set.

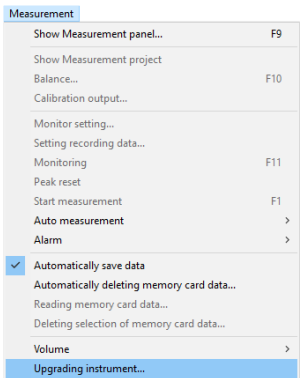


Function	Sets the volume of the instrument.
Description	You can adjust the volume of the instrument while the measurement panel is displayed.
Operation	<ol style="list-style-type: none">1. Display the measurement panel.2. Select volume level from Volume submenu of Measurement menu.
Setting items	
OFF	: Sets the volume level to mute.
Low	: Sets the volume level to low.
Mid	: Sets the volume level to middle.
High	: Sets the volume level to high.

6-22 Upgrading instrument...



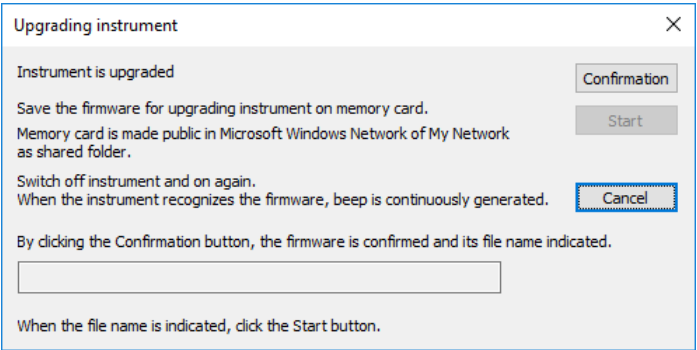
In case of using the TMR-311, the instrument firmware cannot be upgraded by this operation.



"Measurement project"

Function The instrument is upgraded.

Screen

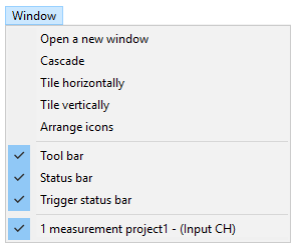


Description Upgrades the instrument firmware by coping a file to memory card.

Operation

1. Copy the firmware for upgrading into the memory card.
2. Insert the memory card in the instrument.
3. Connect to a computer with LAN or USB and turn on the power.
4. Start up the software and execute the interface setting on the Meter setting of the measurement project.
5. Select **Upgrading instrument...** from the **Measurement** menu. The dialog box for upgrading is displayed.
6. Click the "Confirmation" button on the dialog box. The file name of the firmware recorded in the memory card is displayed.
7. After checking the file name, click the "Start" button.
8. When the upgrading is completed normally, the dialog box is displayed. Click the "OK" button.
9. Turn off the power of the instrument, then turn it on again.

7 Window menu



Overview

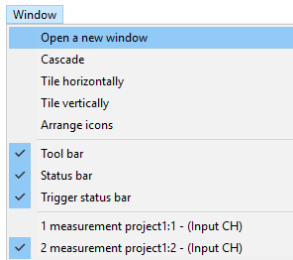
- Displaying single measurement project or measurement data on multiple windows.
- Arranging the windows in cascade
- Arranging the windows horizontally
- Arranging the windows vertically
- Arranging the iconized window
- Display the names of opened measurement project, measurement data and chart sheet.
- Displaying/not displaying the tool bar
- Displaying/not displaying the status bar
- Displaying/not displaying the trigger status bar

7-1 Open a new window

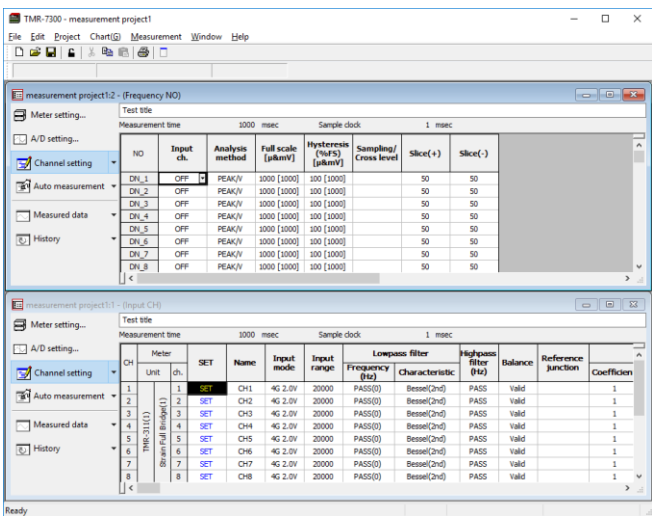
Function

On the new window, the measurement project or the measurement data file is displayed.

Screen



"Measurement project"



Description

One measurement project can be displayed on different windows.

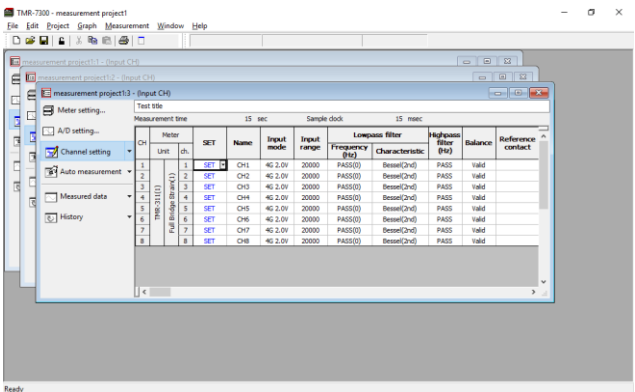
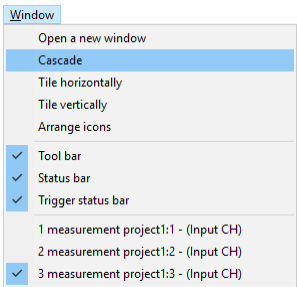
Operation

1. Select the window to be displayed on multiple windows.
2. Select Open a new window from the Window menu.
Another window appears.

7-2 Cascade
Function

When multiple windows for the measurement project, the measurement data file or the Chart sheet are opened, the windows are re-arranged in cascade.

Screen

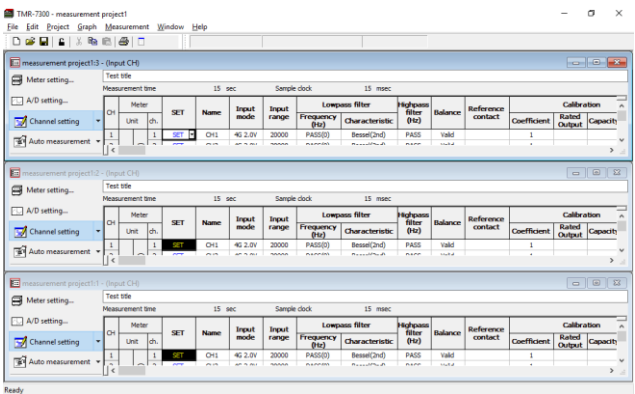
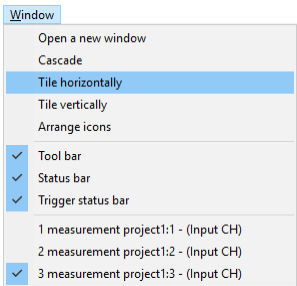


Description All the windows being opened with this software are cascaded. The windows that fall outside the window of the software can be called up.

7-3 Tile horizontally
Function

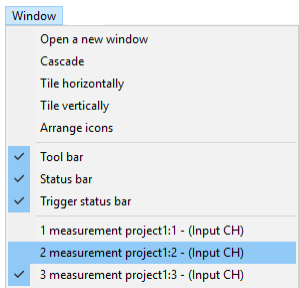
When multiple windows for the measurement project, the measurement data file or the Chart sheet are opened, the windows are re-arranged horizontally.

Screen



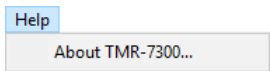
Description All the windows opened with this software are arranged so that each window size is horizontally oriented. The windows that fall outside the window of the software can be called up.

7-6 Selection of windows



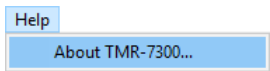
Function	The names of the opened measurement project, the measurement data file or the Chart sheet are listed.
Description	The names of the windows currently selected are checkmarked. By selecting the name, the window can be changed over.

8 Help menu



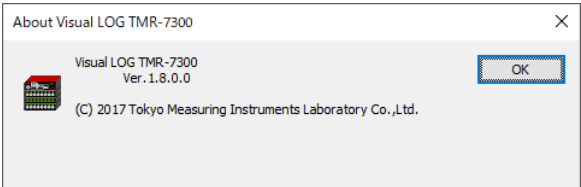
Overview	• The version of this software is displayed.
----------	--

8-1 About TMR-7300...



Function	The version of this software is displayed.
----------	--

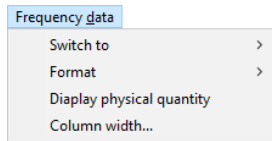
Screen



Operation

1. Select **About TMR-7300...** from the **Help** menu. The dialog box is displayed.
2. After checking, click the "OK" button.

9 Frequency data menu

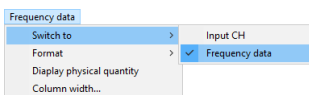
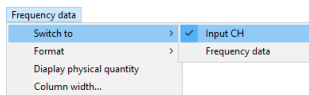


"Frequency data"



To perform the frequency analysis using this software, the instrument shall be equipped with the function of executing the frequency analysis (option).

9-1 Switch to



"Frequency data"

Overview

- Changing over the displays
- Changing the number of displayed digits for the full scale, maximum value, minimum value and physical quantity
- Displaying the physical quantity
- Changing the width of column

Function Changes the display items of the active frequency data file.

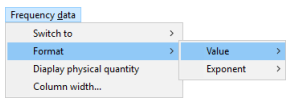
Description

Input CH : The conditions for recording data which were set in the instrument when executing frequency measurement are displayed for each frequency number.
The number of display digits of the full scale, maximum number, minimum number and physical quantity of the frequency data can be changed.

Frequency data

: The setting conditions and the frequency data of each frequency NO when the frequency measurement was conducted are displayed.
The maximum value/minimum value of each frequency data are also displayed.

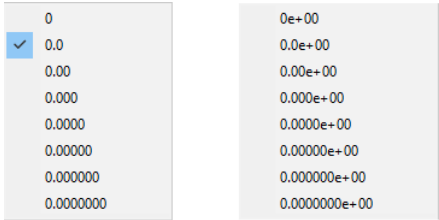
9-2 Format



"Frequency data"

Function Changes the display digit number of the full scale, maximum value, minimum value and physical quantity of the frequency data.

Screen



Value

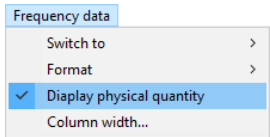
Exponent

Description The format has an effect on the numerical display of data but internally keeps the accuracy.
There are the following formats.
0 to 0.0000000 : Value
0e+00 to 0.0000000e+00 : Exponent

Operation

1. Select a cell in the Format column on the Input CH.
2. Select from the formats displayed in the Format submenu of the Frequency data menu.

9-3 Displaying the physical quantity



"Frequency data"

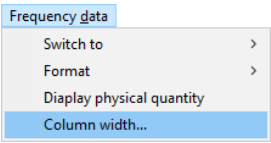
Function Display or non-display the physical quantity in the frequency data.

Description The physical quantity is displayed when Display physical quantity is checked. The physical quantity is not displayed when Display physical quantity is not checked.

Operation

1. Display the Frequency data and select the Display physical quantity from the Measurement data menu

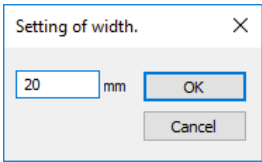
9-4 Column width...



"Frequency data"

Function Sets the width of the column including the selected cell in the unit of mm.

Screen



Description The width of all columns can be set separately for the input channel, setting conditions of the frequency data and the frequency data.

Operation

1. Select a cell and select the **Column width...** from the **Frequency data** menu. The dialog box for setting is displayed.
2. After setting, click the "OK" button.

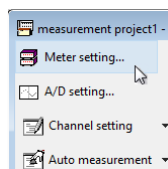
Chapter 10

CAN unit

This chapter describes settings and usage specific to the CAN unit (TMR-351).

1 CAN Unit Selection

Click "Meter setting..." button in the Measurement project.



For details on the setting of instrument, refer to "Chapter 4: 2. Setting of the instrument" (Page 4-2).

Name	IP address	Port number
TMR-311(1)	172.20.44.89	50000

Unit port	Channel	Type	Name
Port 1	1 - 8	TMR-351	CAN unit
Port 2	9 - 16	TMR-351	CAN Add. CH.
Port 3	17 - 24	TMR-351	CAN Add. CH.
Port 4	25 - 32	TMR-351	CAN Add. CH.
Port 5	33 - 40	TMR-321	Strain Full Bridge
Port 6	41 - 48		Not used
Port 7	49 - 56		Not used
Port 8	57 - 64		Not used
Port 9	65 - 72		Not used
Port 10	73 - 80		Not used

Select CAN unit from the Name column of unit port to which CAN unit (TMR-351) is connected and click the "OK" button.

If the later unit port after the CAN unit (TMR-351) is not connected, the virtual unit "CAN Add. CH." is displayed.

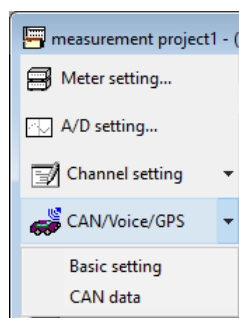
If another unit is connected, it will not be displayed thereafter.

In the virtual unit, CAN receive signals can be additionally assigned to the CH of the virtual unit. (See p10-5 "Setting of virtual units")



Only one CAN unit (TMR-351) can be connected to one control unit;

CAN/Voice/GPS is added to the buttons displayed in the Measurement project.



The setting screen inherent in CAN/Voice/GPS unit is displayed from this "CAN/Voice/GPS" button.

2 Timing of data recording

The CAN unit (TMR-351) records received data or transmits data in the following cycle.

Recording of incoming data

- : It records at the same period as the sampling of the A/D setting.
The fastest clock is 1 ms.

Data Transmission

- : Sets a different cycle than the A/D setting.
Select the transmission cycle from
1/2/5/10/20/50/100/200/500/1000 ms.



Transmission cycle setting, refer to "4-1Displaying the Basic setting screen"(Page 10-3).

3 Data Recording

Received data from the CAN unit (TMR-351) can be saved either by assigning some signals to input channels and saving them in a waveform file or by saving all signals as a CAN file.

Save to waveform file

- : Some signals can be assigned to input channels and saved as waveform files (dat) on the TMR-311's memory card.
However, the signals assigned to the input channels must be less than 2 bytes (16 bits) in data length.

- Save to CAN file** : The data of all messages received during measurement is stored in the internal memory (32Mbyte) of the CAN unit (TMR-351) and saved as a CAN file on the memory card of the TMR-311 at the end of measurement.
Due to the above characteristics, free-run measurement and programmed measurement cannot be selected when the CAN file is set to be saved.



Channel Assignment, refer to "4-1Displaying the Basic setting screen"(Page 10-3).



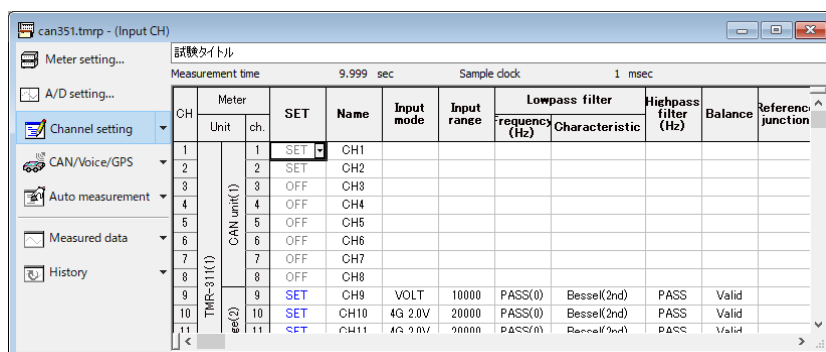
CAN file saving settings, refer to "4-1Displaying the Basic setting screen"(Page 10-3).

4 CAN unit settings



For details on the input CH, refer to "Chapter 4: 6. Input Channels" (Page 4-10).

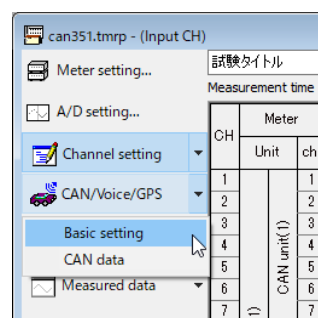
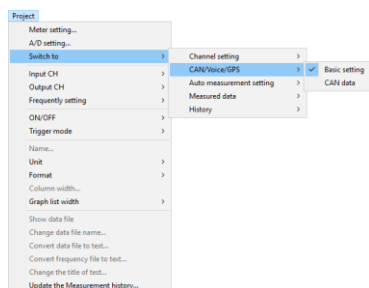
The setting of CAN/Voice/GPS unit is made on the input CH screen and the CAN/Voice/GPS screen.



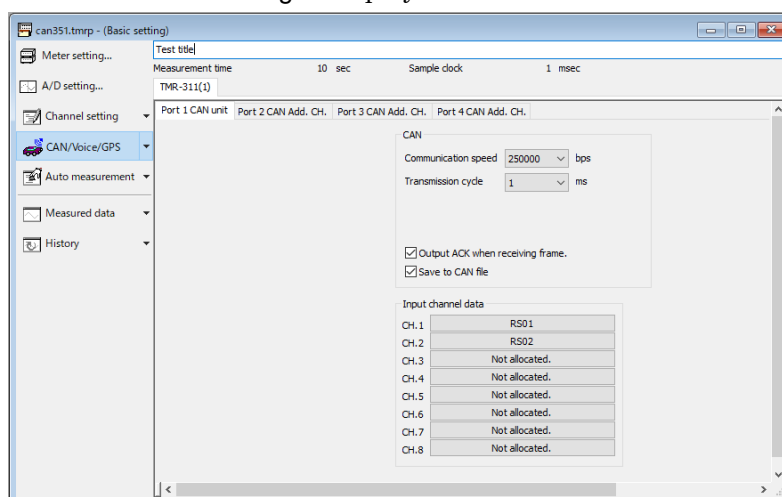
The setting of input CH cannot set items other than Name.

4-1 Displaying the Basic setting screen

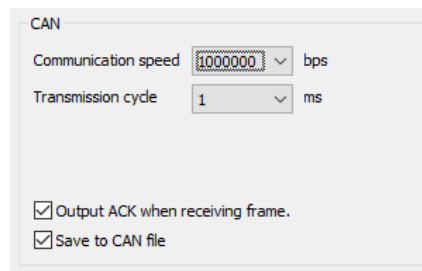
In order to set CAN/Voice/GPS unit, select the Basic setting from the "CAN/Voice/GPS" button menu.



The screen of basic setting is displayed.



● CAN



CAN

Communication speed: 1000000 bps

Transmission cycle: 1 ms

☒ Output ACK when receiving frame.

☒ Save to CAN file

Communication speed

: Sets the baud rate of the communicating device.

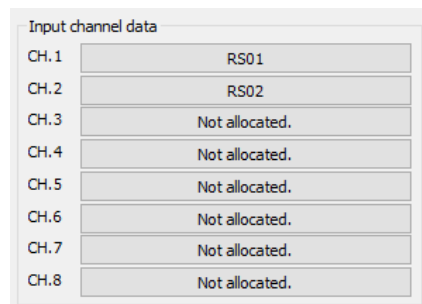
Transmission cycle: Select the cycle for sending messages from 1/2/5/10/20/50/100/200/500/1000 milliseconds.

Output ACK when receiving frame.

: Turns the transmit function ON (Normal mode) when enabled.
Turns off the transmit function when disabled (Listen only).

Save to CAN file : The data of received messages are stored in the internal memory of the CAN unit (TMR-351) during measurement, and CAN files are created in the memory card of the TMR-311 at the end of measurement.

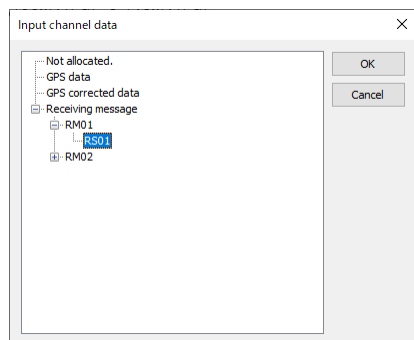
● Input channel data



Input channel data	
CH.1	RS01
CH.2	RS02
CH.3	Not allocated.
CH.4	Not allocated.
CH.5	Not allocated.
CH.6	Not allocated.
CH.7	Not allocated.
CH.8	Not allocated.

Some signals can be assigned to input channels to record to a waveform file (dat) and monitor values.

To assign to an input channel, click the "Not allocated." button and select the target signal from the following screen.



Input channel data

Not allocated.

GPS data

GPS corrected data

Receiving message

RM01

RS01

RM02

OK

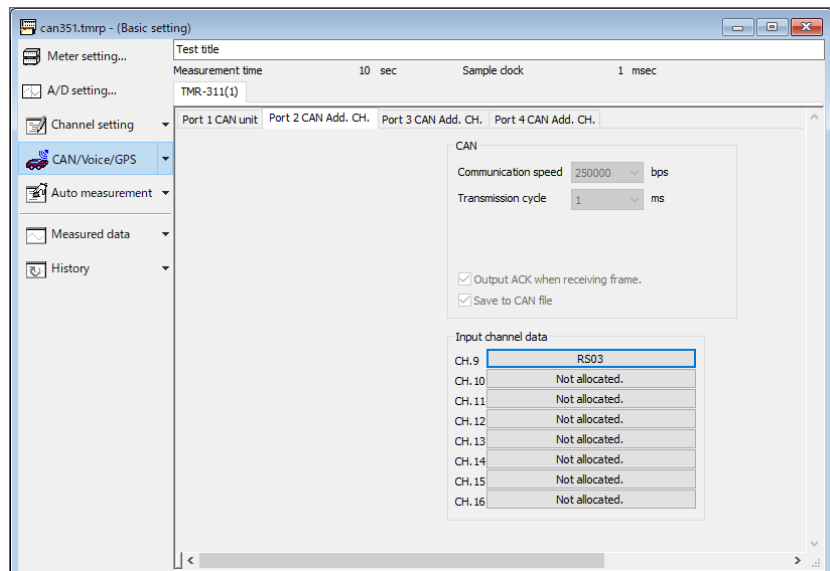
Cancel

Press "OK" to confirm your selection.

● Setting of virtual units

Normally, the number of channels in a measurement unit is the number of channels corresponding to sensor inputs (8 channels), but in the case of CAN, 8 channels may not be sufficient depending on the messages to be received.

Therefore, by enabling channel assignment of incoming signals of CAN units to unused unit, up to 80 CH can be recorded per sampling.

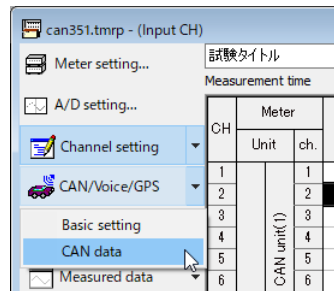
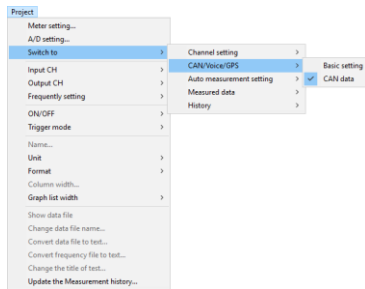


Since the virtual unit is a function that assigns receive signals set by the CAN unit (TMR-351), only "Input channel data" can be set for the virtual unit.

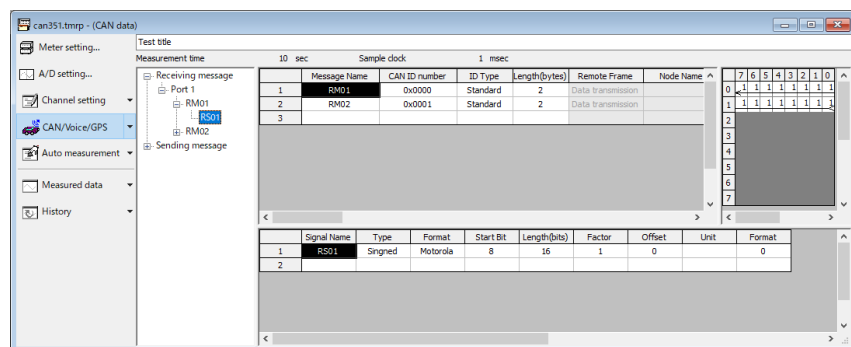
The following section, "Setting of sent/received data" also cannot be set for the virtual unit.

4-2 Setting of sent/received data

To set the data to be received or transmitted by the CAN unit (TMR-351), select CAN data from the "CAN Voice GPS" button.

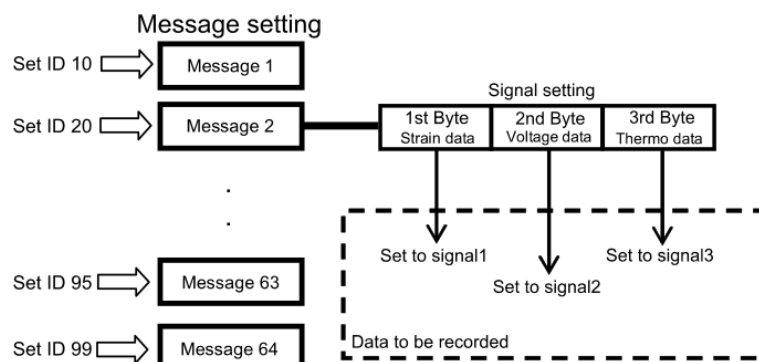


Make a setting of CAN data on the CAN data screen according to the transmission/reception data.



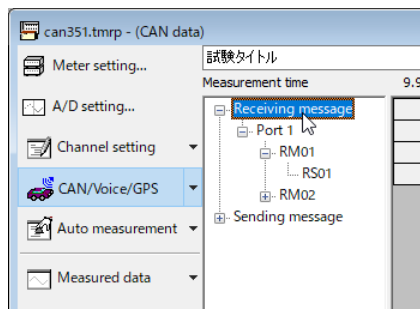
● Message and signal

The CAN unit (TMR-351) uses the concepts "message" and "signal". In CAN, data are discriminated by an identifier called ID. In CAN unit (TMR-351), the setting is made by allocating the ID to 64 messages. An ID that is not set to a message is not recorded. Recording is not performed even if the ID is just set to the message. The preparation for recording is completed when the message and the signal are set. For the signal, more than one data can be input in one ID for CAN. For example, it is like a case that the data of strain, voltage and thermocouple are input in the same ID. However, in this case, you cannot see where the strain data ends. Therefore it is necessary to set where the data (signal) ends. It is the signal setting. The relationship between the message and the signal is shown in the figure below.



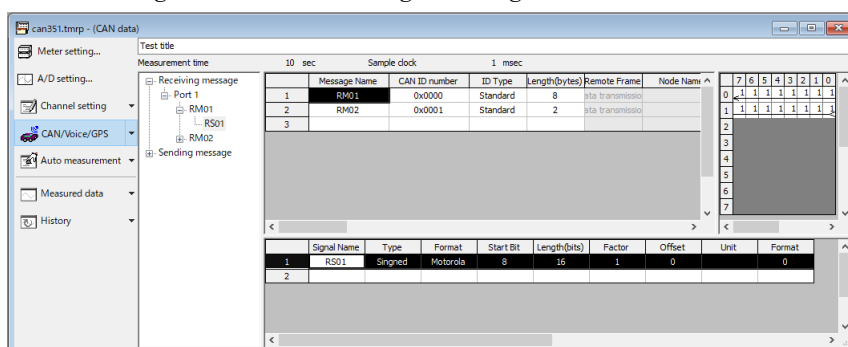
● Setting the CAN reception

Select "Receiving message" on the CAN data screen.



The screen of receiving message is displayed.

Make settings in order of message and signal.



The maximum number of messages that can be received is 64, including outgoing messages.

Message setting

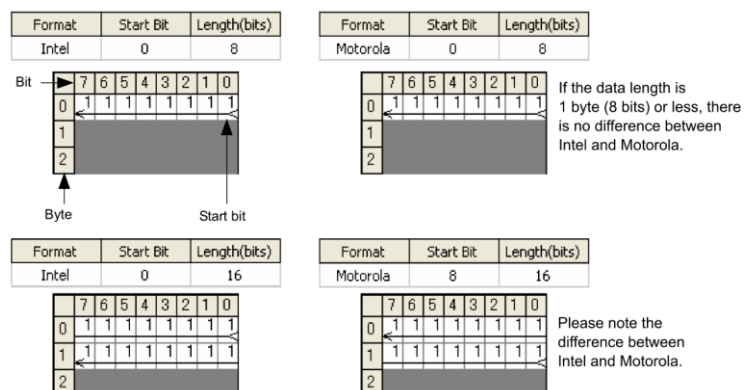
- Message Name** : Input the name of message. Input an arbitrary name which is easy to understand.
- CAN ID number** : Input the ID number in hexadecimal number. The ID number is arbitrarily set by each device (data). Check and input the ID number of output device.
- ID Type** : Select the ID type between standard and extended. The standard and the extended are sometimes represented as 11Bit ID and 29Bit ID or CAN2.0A and CAN2.0B respectively. Check the setting of output device and make a selection.
- Length(bytes)** : Set the data length of ID. 1 byte is 8 bits. Check the specification of output device and make a selection.
- Remote Frame** : It cannot be set.
- Node Name** : It cannot be set.



If the number of bits is 43 or more, the data is rounded to 16 significant digits when converted to physical quantity.

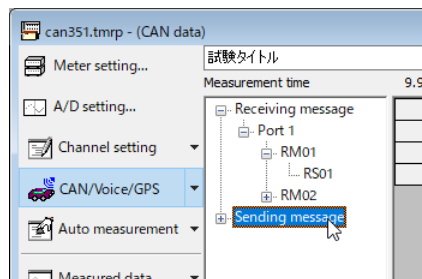
Signal setting

- Signal Name** : This is for inputting the name of the signal. Input an arbitrary name.
- Type** : This is to select between the integer with sign and integer without sign for the data. It is sometimes represented as Signed and Unsigned for with sign and without sign, respectively. Check the specification of the output device and make selection.
- Format** : This is to select between Intel format and Motorola format for the data. This setting shows whether the upper byte of the data is on the beginning of the data or the end of the data. The Intel format and the Motorola format are also represented as little endian and big endian, respectively. Check the specification of the output device and make selection.
- Start Bit** : This is to specify the first bit of the data. The bit array varies between the Intel format and the Motorola format. Refer to the example shown in the figure below.
- Length(bits)** : This is to specify the length of the signal (data) by the number of bits. The length of data varies depending on the device (data). Check the specification of output device and make a selection.
- Factor** : The data are multiplied by this factor (coefficient) and recorded. If you want to record data without change, set 1 to the Factor.
- Offset** : This offset value is added to the data and the sum is recorded. If you want to record data without change, set 0 to the Offset. The CAN data do not become 0 even if balancing is executed. If you want to make the input data to 0, set an appropriate value to the Offset.
- Unit** : Specify the unit for display and recording. You can select the unit from 41 units such as μStrain , m/s^2 and rpm.
- Format** : Select the data display format for display and recording. If the format is set to 0, the digits after the decimal point are not recorded. Make a selection in combination with Factor.



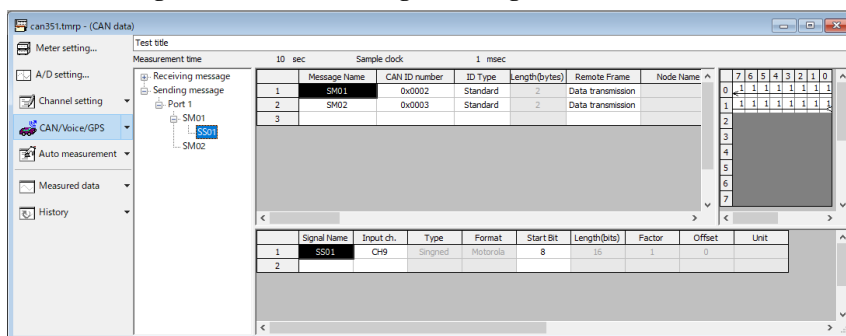
● Setting the CAN transmission

Select "Sending message" on the CAN data screen



The screen of sending message is displayed.

Make settings in order of message and signal.



You can send up to 62 messages.

Up to 4 signals can be set per message.

Message setting

- Message Name** : Input the name of message. Input an arbitrary name which is easy to understand.
- CAN ID number** : Input the ID number in hexadecimal number. The ID number is arbitrarily set by each device (data). Input the ID number by checking that the number is not overlapping with that of other devices.
- ID Type** : Select the ID type between standard and extended. The standard and the extended are sometimes represented as 11Bit ID and 29Bit ID or CAN2.0A and CAN2.0B respectively. Check the specification of the device to be recorded.
- Length(bytes)** : Set the data length of ID. It is fixed to 2 bytes for output.
- Remote frame** : Sets the content and timing of data transmission.
 "Data transmission" sends data at each set transmission cycle.
 "Transmit data on receipt" transmits data when a remote frame is received, regardless of the transmission cycle.
 "Remote frame transmission" sends remote frames instead of data.
- Node Name** : It cannot be set.

Signal setting

Signal Name	: Input the name of signal. Input an arbitrary name which is easy to understand.
Input ch.	: Select the channel to be transmitted from the measurement unit.
Type	: It cannot be set.
Format	: It cannot be set.
Start Bit	: Specifies the first bit of data.
Length(bits)	: It cannot be set.
Factor	: It cannot be set.
Offset	: It cannot be set.
Unit	: It cannot be set.

5 CAN file processing

Received data stored in the internal memory of the CAN unit (TMR-351) is created as a CAN file in the memory card of the TMR-311 at the end of measurement.

If the measurement was taken online with a computer, the CAN file is automatically imported into the computer as well as the waveform file (dat).

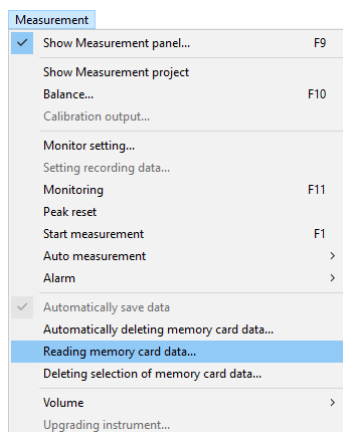
However, if the measurements were taken offline, they must be imported manually.

5-1 Reading memory card data

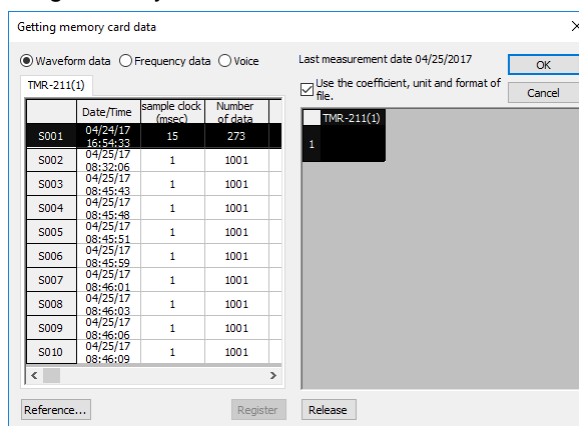
You can save the measurement data stored in the memory card in the instrument to a computer.

■ "Reading memory card data..."

Select "Reading memory card data..." in the Measurement menu



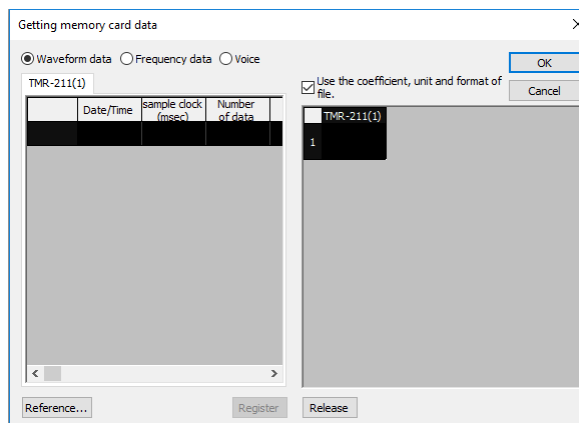
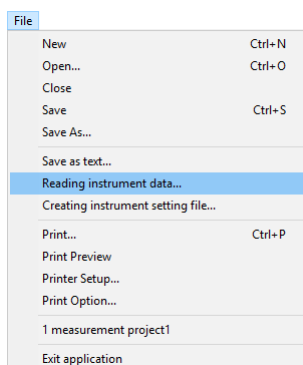
For details, please read "Chapter 5: 16Reading memory card data" (Page 5-30).



The data recorded in the memory card is displayed.

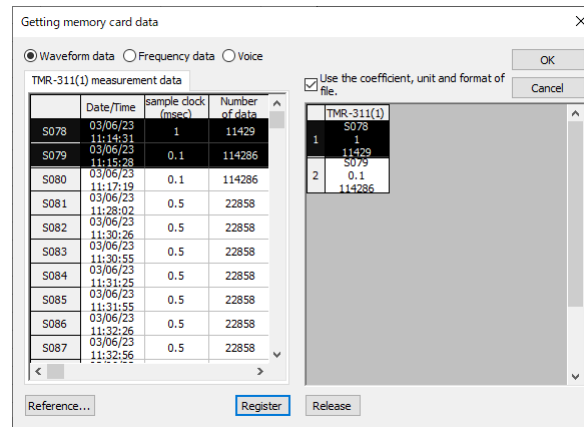
■ "Reading instrument data..."

Insert the memory card in the memory card slot of computer and select "Reading instrument data..." in the File menu.

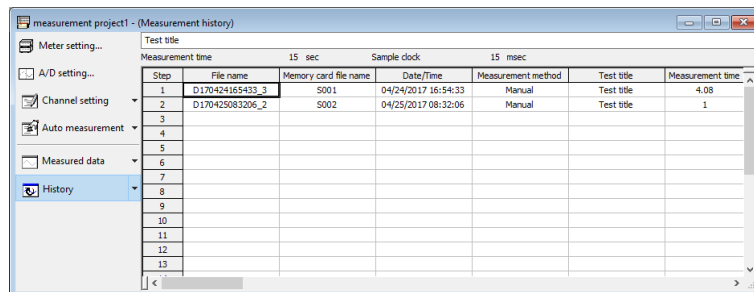


If you click "Reference" button and select the folder in which the data are recorded, the data recorded in that folder are displayed.

CAN data is registered by selecting waveform data.



If you click the "OK" button, the data are read and displayed in the history.

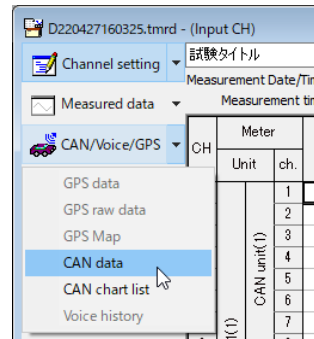


5-2 Display of CAN data



For details on displaying data files, see "Chapter 7, 3-2 Displaying Data Files" (Page7-9).

If a data file is displayed from the history and it contains data from a CAN file, the "CAN Voice GPS" button will appear and CAN data can be selected.



A list of CAN data is displayed.

The screenshot shows a software window titled 'D220427160325.tmr - (CAN data)'. It displays a table of CAN data. The table has columns: 'Name', 'Unit', 'sec', 'RS01', 'sec', and 'RS02'. The data is organized into a summary section and a list of 14 items.

Name	Unit	sec	RS01	sec	RS02
Maximum	9.998	449	9.998	12986	
Minimum	0.000	-455	0.000	12975	
Average		-3		12980	
1	0.000	265	0.000	12978	
2	0.000	268	0.000	12978	
3	0.002	275	0.002	12988	
4	0.002	278	0.002	12981	
5	0.004	283	0.004	12978	
6	0.004	288	0.004	12980	
7	0.006	291	0.006	12980	
8	0.006	296	0.006	12981	
9	0.008	301	0.008	12982	
10	0.008	305	0.008	12981	
11	0.010	308	0.010	12981	
12	0.010	312	0.010	12981	
13	0.012	317	0.012	12977	
14	0.012	319	0.012	12979	

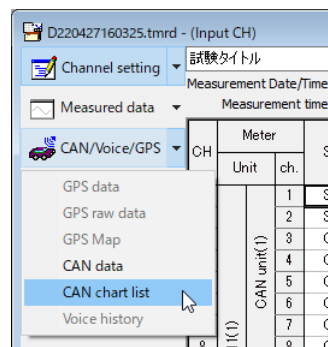
The CAN data displays the value of the received signal and the measured time at which the message was received.



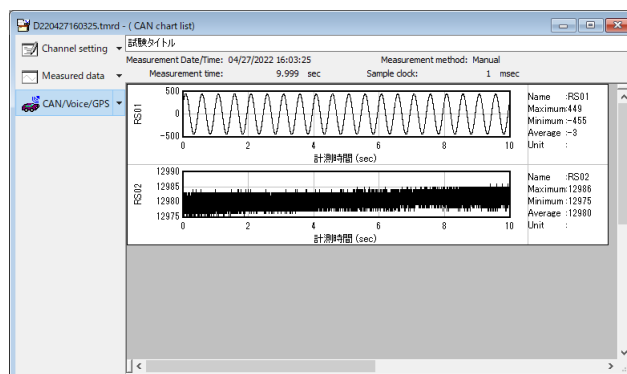
For details on displaying data files, see "Chapter 7, 3-2 Displaying Data Files" (Page7-9).

5-3 Displaying CAN chart list

When a data file is displayed from the history and it contains data from a CAN file, the "CAN Voice GPS" button appears and the CAN chart list can be selected.



A chart list of CAN data is displayed.



The CAN chart list draws the received signals in a transitional graph.

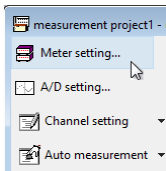
Chapter 11

GPS unit

This chapter describes settings and usage specific to the GPS unit (TMR-354).

1 GPS Unit Selection

Click "Meter setting..." button in the Measurement project.



For details on the setting of instrument, refer to "Chapter 4: 2. Setting of the instrument" (Page 4-2).

Name	IP address	Port number
TMR-311(1)	172.20.44.89	50000

Unit port	Channel	Type	Name
Port 1	1 - 8	TMR-354	GPS unit
Port 2	9 - 16	TMR-354	GPS Add. CH.
Port 3	17 - 24	TMR-354	GPS Add. CH.
Port 4	25 - 32	TMR-354	GPS Add. CH.
Port 5	33 - 40	TMR-321	Strain Full Bridge
Port 6	41 - 48		Not used
Port 7	49 - 56		Not used
Port 8	57 - 64		Not used
Port 9	65 - 72		Not used
Port 10	73 - 80		Not used

Select GPS unit from the Name column of unit port to which GPS unit (TMR-354) is connected and click the "OK" button.

If the unit port behind the GPS unit (TMR-354) is not connected, the virtual unit "GPS Add. CH." is displayed. (Up to 3 units are displayed)

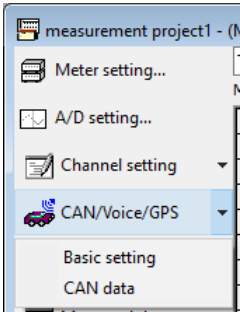
If another unit is connected, it will not be displayed thereafter.

In the virtual unit, GPS reception data can be additionally assigned to the CH of the virtual unit. (See p11-6 "Settings of virtual unit.")



Only one GPS unit (TMR-354) can be connected to one control unit;

CAN/Voice/GPS is added to the buttons displayed in the Measurement project.



The setting screen inherent in CAN/Voice/GPS unit is displayed from this "CAN/Voice/GPS" button.

2 Data Recording

The measurement data of the GPS unit (TMR-354) includes a waveform file that records the reception data assigned to each input channel and a GPS file that records fixed reception parameters.

Waveform file :

By assigning some received data to input channels, the data is saved as a waveform file (dat) on the TMR-311's memory card.

Depending on the receive data assigned to the input channel, the data length is 16 bits and 32 bits, respectively.

The 32-bit data occupies 2 channels.

The data that can be assigned to the input channels are as follows.

Item	Number of occupied CHs	Remarks
Time	2	Cumulative time in 1 ms with reference to 00:00:00.000 0~85,399,999 (00:00:00.000~23:59:59.999)*
Date	2	Date in yymmdd ex) In case 10/1/2022 : 221001
Latitude	2	0.0000001° increments. North is positive.
Longitude	2	0.0000001° increments. East is positive.
Elevation	1	1m increments.
Speed	1	0.1km/h increments.
Distance	2	1m increments.
Direction	1	0.1° increments.
Roll	1	0.1° increments.
Pitch	1	0.1° increments.
Heading	1	0.1° increments.
Acceleration - x	1	0.001m/s ² increments.
Acceleration - y	1	0.001m/s ² increments.
Acceleration - z	1	0.001m/s ² increments.
Angular Rate - x	1	0.01deg/s increments.
Angular Rate - y	1	0.01deg/s increments.
Angular Rate - z	1	0.01deg/s increments.

※ The "Time"(T) is shown as a cumulative time in

1 ms increments relative to midnight (0:00 AM).

To display the time as hours:minutes:seconds, the following calculations must be made, respectively.

Hours:H = T / 3600000

Minutes:M = T / 60000 - 60 × H

Seconds:S = T / 1000 - (3600 × H + 60 × M)

Each value should be calculated as an integer and rounded down to the nearest whole number.

For seconds (S), after the decimal point can be treated as a millisecond.



If extended CH is used for data that occupies two channels, the extended CH data cannot be recorded.

GPS file :

Specific data received during measurement is saved as a GPS file (gps) on the TMR-311's memory card.

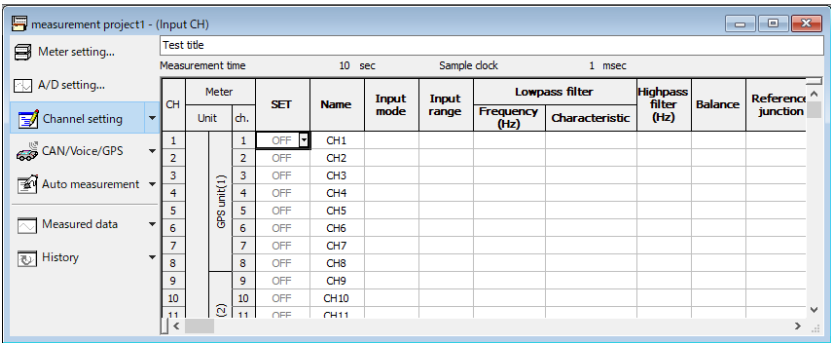
The GPS unit (TMR-354) must be set to "binary" or "binary + CSV" as the recording format.

3 GPS unit settings



For details on the input CH, refer to "Chapter 4: 6. Input Channels" (Page 4-10).

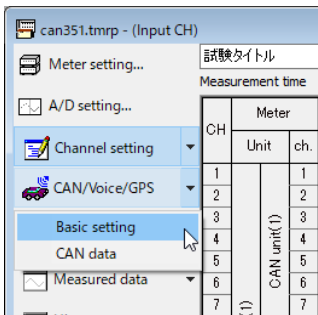
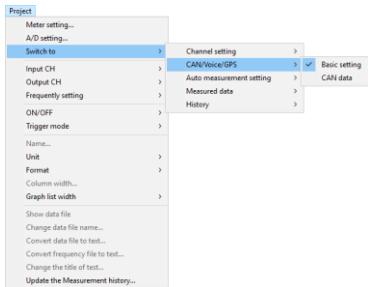
The setting of GPS unit is made on the input CH screen and the CAN/Voice/GPS screen.



The setting of input CH cannot set items other than Name.

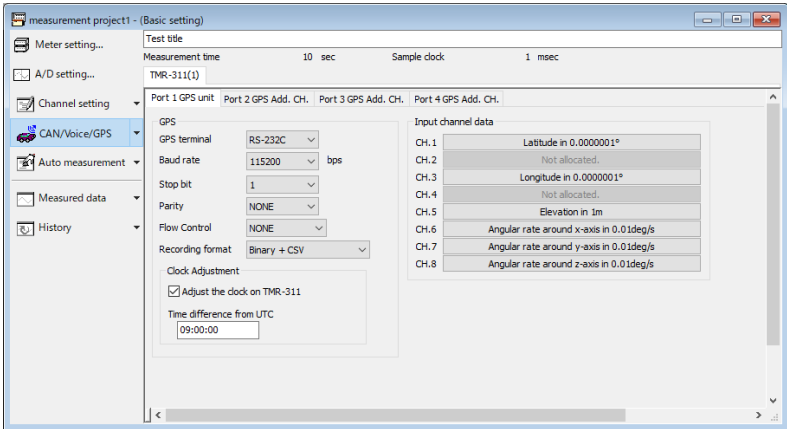
3-1 Displaying the Basic setting screen

In order to set GPS unit, select the Basic setting from the "CAN/Voice/GPS" button menu.



The screen of basic setting is displayed.

After selecting the corresponding Port, please configure the settings.



3-2 GPS data measurement settings

● GPS

The image displays two side-by-side screenshots of the GPS settings interface. Both screenshots show a 'GPS' section with the following fields: 'GPS terminal' (a dropdown menu), 'Baud rate' (a dropdown menu followed by 'bps'), 'Stop bit' (a dropdown menu), 'Parity' (a dropdown menu), 'Flow Control' (a dropdown menu), 'Recording format' (a dropdown menu), and 'Clock Adjustment' (a checkbox followed by a text input field for 'Time difference from UTC').

The left screenshot shows the settings for RS-232C: 'GPS terminal' is set to 'RS-232C', 'Baud rate' is '115200', 'Stop bit' is '1', 'Parity' is 'NONE', 'Flow Control' is 'NONE', 'Recording format' is 'Binary + CSV', and 'Clock Adjustment' is checked with a value of '09:00:00'.

The right screenshot shows the settings for CAN: 'GPS terminal' is set to 'CAN', 'Baud rate' is '250k', 'Stop bit' is '1', 'Parity' is 'NONE', 'Flow Control' is 'NONE', 'Recording format' is 'Binary + CSV', and 'Clock Adjustment' is checked with a value of '09:00:00'.

GPS terminal : Set the terminal that the GPS receiver are connected to from among "RS-232C" and "CAN".

Communication speed

: Select the communication speed with the GPS receiver from the following options.
RS-232C:(4800/9600/19200/38400/57600/115200)
CAN:(100k/125k/250k/500k/800k/1M)

Stop bit : Select stop bit from 1 and 2. (RS-232C)

Parity : Select parity from (NONE/ODD/EVEN).
(RS-232C)

Flow Control : Select Flow Control from (NONE/HARDWARE).
(RS-232C)

Recording format : Select file recording format for TMR-354 from
(No Record/ Binary / Binary + CSV).

Clock Adjustment : This function adjusts the clock of TMR-311 using GPS.
Select whether or not to adjust the clock, and enter the time difference from UTC.
The range of time difference setting is
-12:59:59 to +12:59:59.

● Input channel data

Input channel data	
CH.1	Latitude in 0.0000001°
CH.2	Not allocated.
CH.3	Longitude in 0.0000001°
CH.4	Not allocated.
CH.5	Elevation in 1m
CH.6	Angular rate around x-axis in 0.01deg/s
CH.7	Angular rate around y-axis in 0.01deg/s
CH.8	Angular rate around z-axis in 0.01deg/s

By assigning some GPS data to input channel, it is possible to record the data to a waveform file (dat) and monitor the values.

To assign to an input channel, click the "Not allocated." button and select the target signal from the following screen.

Input channel data

Not allocated.

GPS data

Cumulative time in 1 ms with reference to 00:00:00.000

Date in yymmdd

Latitude in 0.0000001°

Longitude in 0.0000001°

Elevation in 1m

Speed in 0.1km/h

Distance in 1m

Direction in 0.1°

Roll angle in 0.1°

Pitch angle in 0.1°

Heading angle in 0.1°

Acceleration along x-axis in 0.001m/s^2

Acceleration along y-axis in 0.001m/s^2

Acceleration along z-axis in 0.001m/s^2

Angular rate around x-axis in 0.01deg/s

Angular rate around y-axis in 0.01deg/s

Angular rate around z-axis in 0.01deg/s

OK

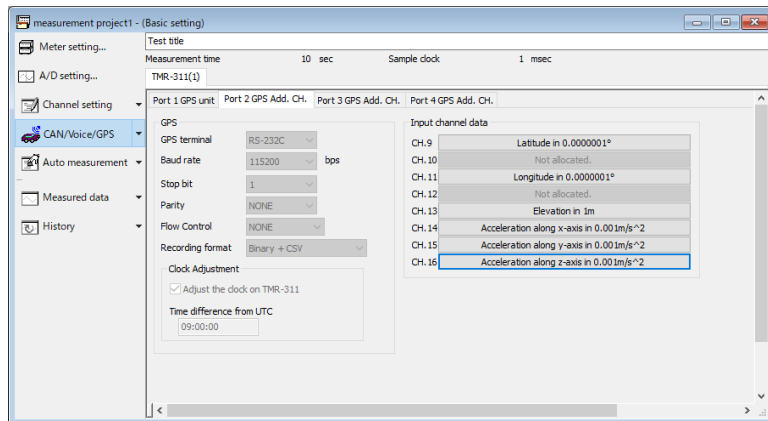
Cancel

Press "OK" to confirm your selection.

- Setting of virtual units

Although a maximum of 8 CHs can be recorded per unit, it is assumed that the GPS unit (TMR-354) can acquire more than 8 CHs of received data, so that one unit will not be sufficient.

Therefore, by enabling channel assignment of the GPS unit's received data to unused unit numbers, all items can be recorded.



Only "Input channel data" can be set for the virtual unit

4 Processing GPS measurement data

If the measurement was taken online with a computer, the GPS file is automatically imported into the computer as well as the waveform file (dat).

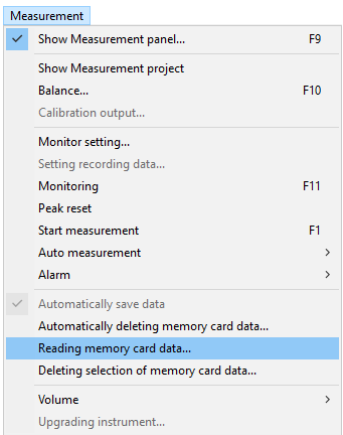
However, if the measurements were taken offline, they must be imported manually.


4-1 Reading memory card data

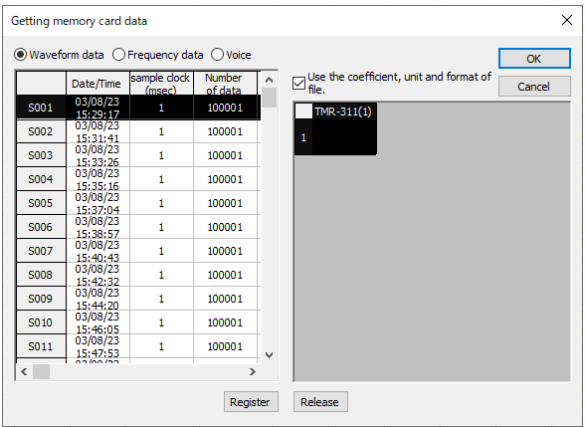
You can save the measurement data stored in the memory card in the instrument to a computer.

■ "Reading memory card data..."

Select "Reading memory card data..." in the Measurement menu



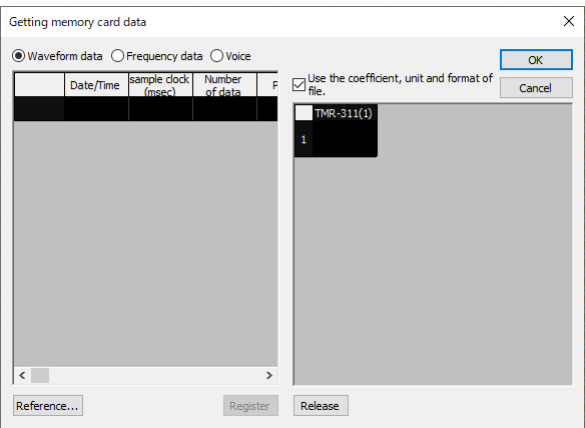
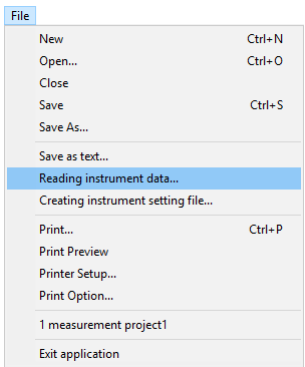
 For details, please read "Chapter 5: 16Reading memory card data" (Page 5-30).



The data recorded in the memory card is displayed.

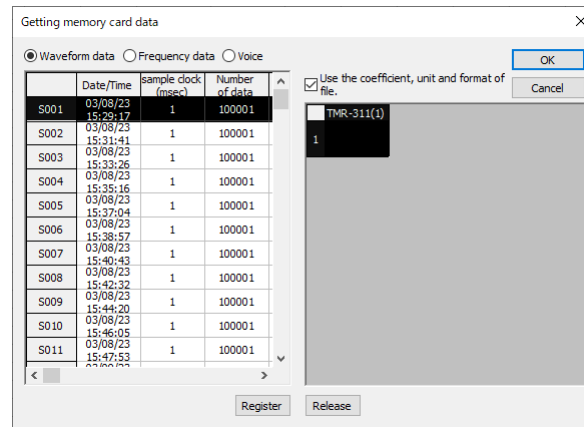
■ "Reading instrument data..."

Insert the memory card in the memory card slot of computer and select "Reading instrument data..." in the File menu.

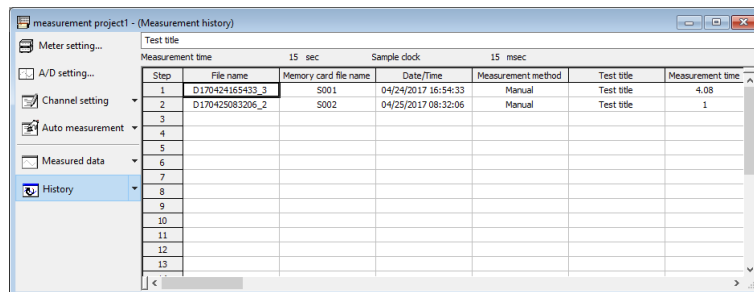


If you click "Reference" button and select the folder in which the data are recorded, the data recorded in that folder are displayed.

GPS data is registered by selecting waveform data.



If you click the "OK" button, the data are read and displayed in the history.



4-2 Display of GPS data



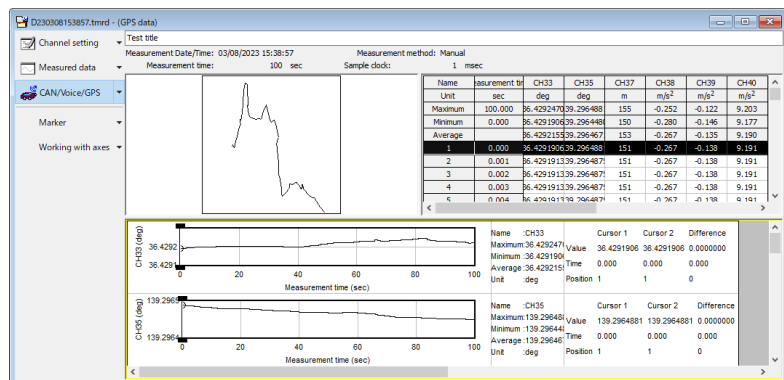
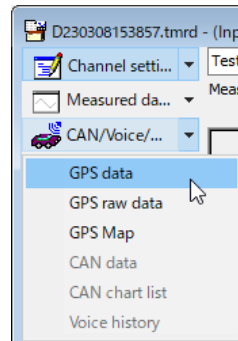
For details on the input CH, refer to "Input channel data" (Page 11-5) in "Chapter 11: 3-2 Setting the GPS data measurement".



On the display of the GPS data, the editing of marker can be done.

For editing marker, refer to "Chapter 7: 7-5 Display and editing of marker" (page 7-28).

If a data file is displayed from the history and it contains data from a GPS data file, the "CAN Voice GPS" button will appear and GPS data can be selected.

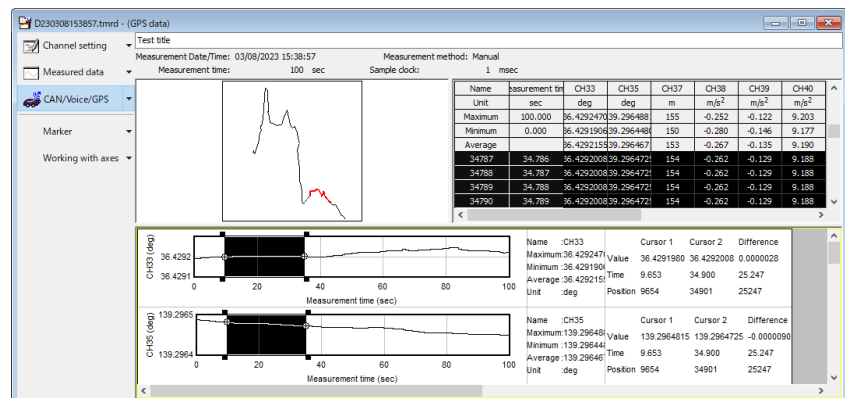


If the GPS data is selected, only the GPS data is displayed.

The display is divided in three parts and the trajectory is drawn in upper left using the data of latitude and longitude. Nothing is displayed if there is no data of latitude and longitude.

In the upper right area and the lower area, the data list and the chart list are displayed, respectively.

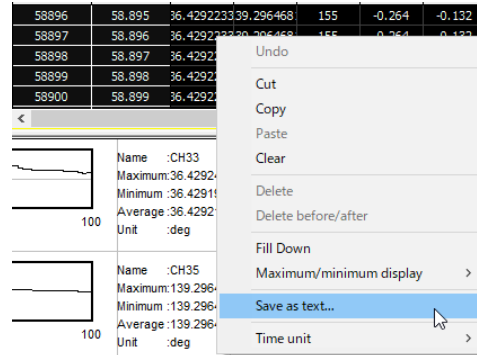
If you drag the chart in the chart list, the selected part is highlighted in each area.



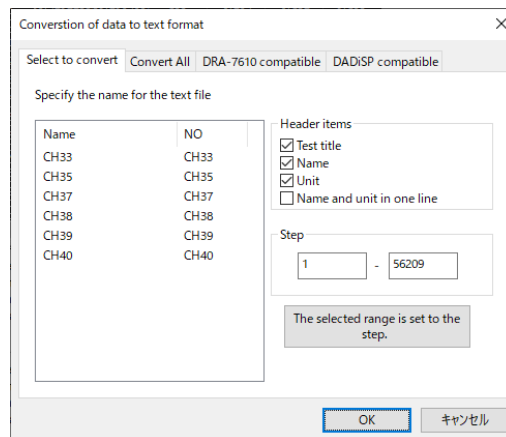
If the latitude and longitude are got with multiple CHs, the trajectory is drawn using the latitude and longitude with the smallest CH number.

■ Saving the selected part as text

In order to save the selected part as text, right-click the chart list or the data list and select **Save as text...** from the displayed menu.



The dialog box for text conversion is displayed.



If you click the "The selected range is set to the step", the step changes to the selected range.

Step

18608 - 56209

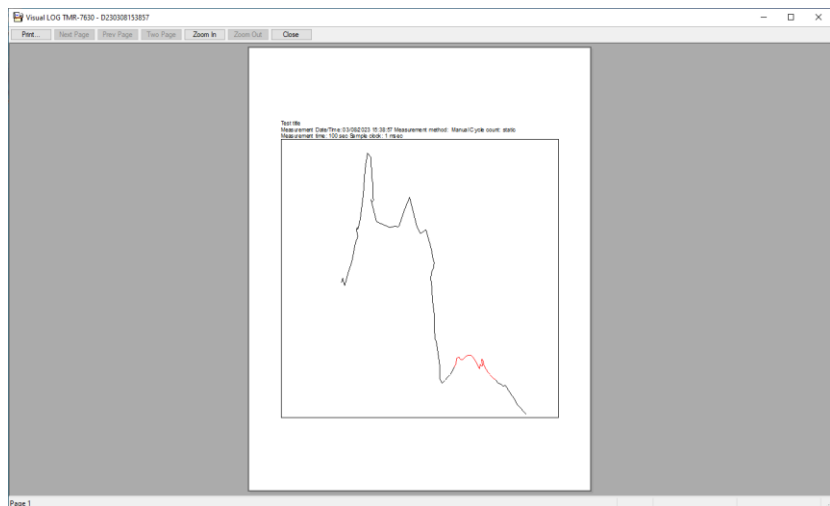
The selected range is set to the step.

If you select the data and click the "OK" button, the selected part is saved as text.

■ Printing the area

If you click each area, a yellow frame is displayed in that area.

If you implement the printing while this frame is displayed, the content displayed in that area is printed.

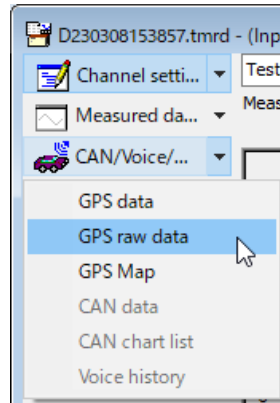


4-3 Displaying the GPS raw data

GPS raw data is data recorded as a GPS file.

The GPS unit (TMR-354) must be set to "binary" or "binary + CSV" as the recording format.

If a GPS file is recorded, the "CAN Voice GPS" button will appear and GPS raw data can be selected.



The list of GPS raw data is displayed.

A screenshot of a software window titled 'D230308153857.tmr - (GPS raw data)'. It displays a table of recorded data. The table has columns for 'gps_lat_abso_deg', 'gps_lon_abso_deg', 'gps_date', 'gps_ele_abso', 'gps_vel', and 'gps_trk'. The data is organized into rows, with the first row being the header and subsequent rows containing numerical values. The table is scrollable, and the first few rows are visible.

	gps_lat_abso_deg	gps_lon_abso_deg	gps_date	gps_ele_abso	gps_vel	gps_trk
1	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
2	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
3	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
4	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
5	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
6	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
7	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
8	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
9	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
10	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
11	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
12	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
13	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
14	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
15	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
16	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
17	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0
18	36.4291913	139.2964875	23/03/08 15:38:57.0	151	0.1	8.0

The following items are displayed in the GPS raw data.

- gps_lat_abso_deg : Latitude, in 0.0000001° increments.
- gps_lon_abso_deg : Longitude, in 0.0000001° increments.
- gps_date : Date and time.
- gps_ele_abso : Elevation, in 1m increments.
- gps_vel : Speed, in 0.1k/h increments.
- gps_trk : Direction, in 0.1° increments.
- gps_roll : Rotation, in 0.1° increments.
- gps_pitch : Pitch, in 0.1° increments.
- gps_heading : Heading, in 0.1° increments.
- gps_acc_x : X-axis acceleration, in 0.001m/s² increments.
- gps_acc_y : Y-axis acceleration, in 0.001m/s² increments.
- gps_acc_z : Z-axis acceleration, in 0.001m/s² increments.
- gps_ang_x : X-axis angular rate, in 0.01deg/s increments.
- gps_ang_y : Y-axis angular rate, in 0.01deg/s increments.
- gps_ang_z : Z-axis angular rate, in 0.01deg/s increments.

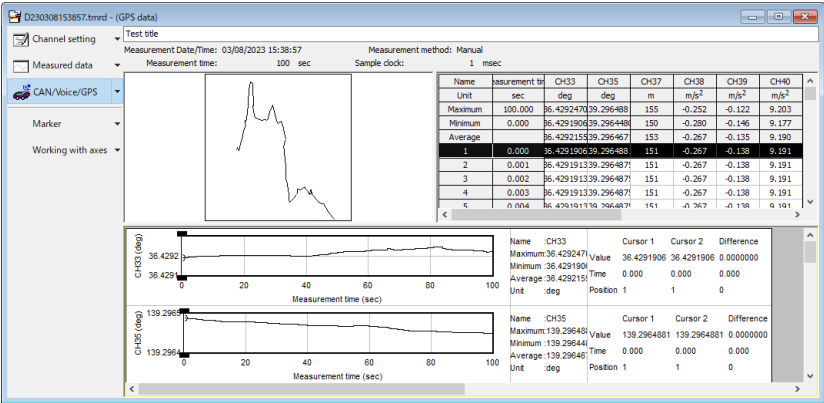
4-4 Display of GPS map

The trajectory can be drawn on the map according to the latitude and longitude recorded with GPS unit.

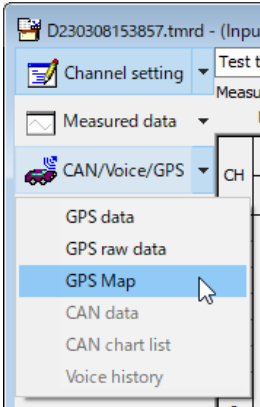


The use of this function needs an environment where the computer is connected to Internet. The maps are drawn using Google Maps API.

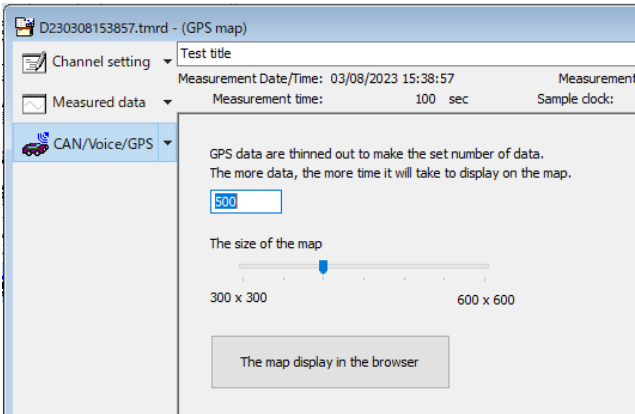
Display the data file of the latitude and longitude.



Select the GPS Map on the "CAN/Voice/GPS" button menu.



Screen for setting the size of the map and the number of trajectory data drawn on the map is displayed.

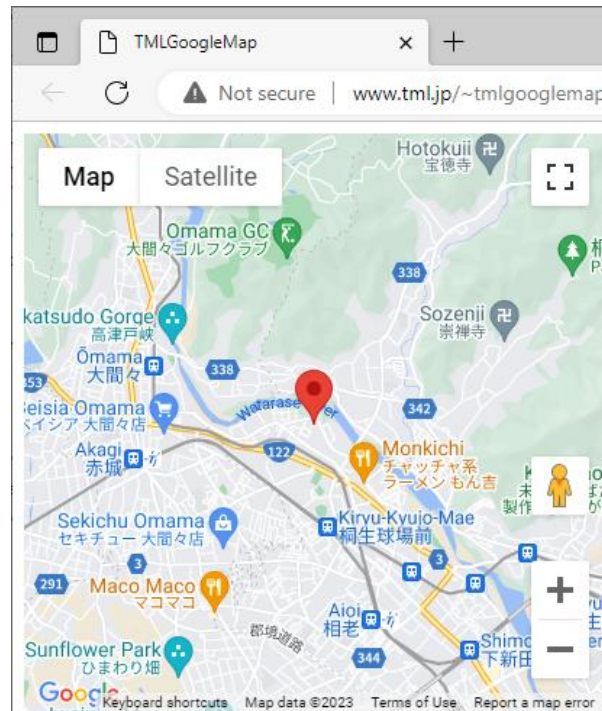


As the number of trajectory data increases, drawing will take much time or may be made incorrectly. Set the number of data between 50 and 5000.

If the number of recorded data is more than the set value, the data are thinned out at even intervals to approximate the set value. In case that the number of data is less, all the data are used.

The size of the map can be changed by shifting the slider.

The browser is launched when you click the button "The map display in the browser", and the trajectory is drawn on the map.



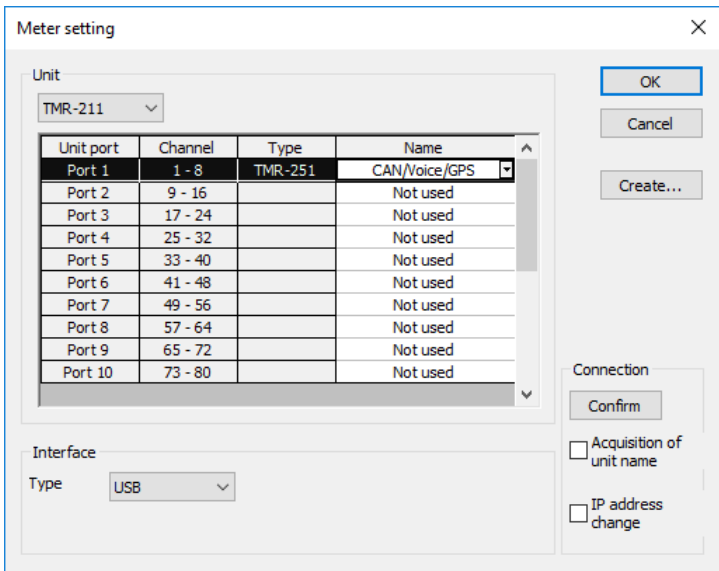
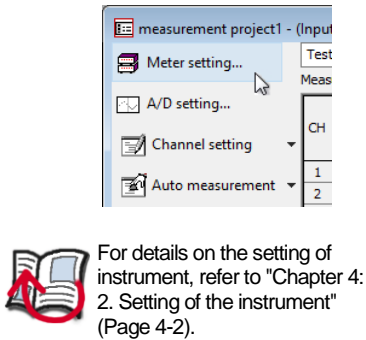
Chapter 12

CAN/Voice/GPS unit

This chapter explains the settings and the usage inherent in the CAN/Voice/GPS unit (TMR-251).

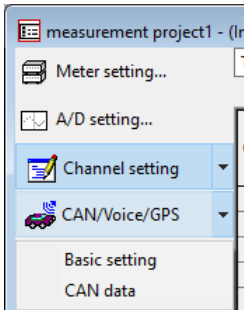
1 Selecting CAN/Voice/GPS unit

Click "Meter setting..." button in the Measurement project.



Select CAN/Voice/GPS from the Name column of unit port to which CAN/Voice/GPS unit (TMR-251) is connected and click the "OK" button.

CAN/Voice/GPS is added to the buttons displayed in the Measurement project.



The setting screen inherent in CAN/Voice/GPS unit is displayed from this "CAN/Voice/GPS" button.

2 Note on the timing for recording the data

With CAN/Voice/GPS unit (TMR-251), the setting of sampling clock is reflected as shown below.

CAN data

As for the data reception, the received data are recorded in the same cycle as the sampling clock. As for the data transmission, data are output as the same cycle as the sampling clock.

For example, if the sampling clock is set to 1ms, the received data are recorded at intervals of 1ms and the data are output at intervals of 1ms. However, if the remote frame is set for the output data, the sampling clock setting for the output is ignored.

GPS data

The data are recorded in the same cycle as sampling clock setting.

Voice data

The sampling clock setting is ignored.

For the sampling clock of CAN/Voice/GPS unit (TMR-251), 1ms is the minimum. The smaller value can be set, however, the interval for updating the data of CAN/Voice/GPS unit (TMR-251) is 1ms.

3 Note on the recording of data

There are two methods for recording the data of CAN/Voice/GPS unit (TMR-251); the method for recording the data in TMR-211 in real time and the method for recording the data in the internal memory of CAN/Voice/GPS unit (TMR-251).

Recording in TMR-211

The selected measurement data from CAN data and GPS data which are received by CAN/Voice/GPS unit (TMR-251) is recorded to memory card in TMR-211. As the data capacity depends on the memory card, the long-duration recording is available. However, the number of data (number of items) that can be recorded at the same time is limited.

Recording in CAN/Voice/GPS unit (TMR-251)

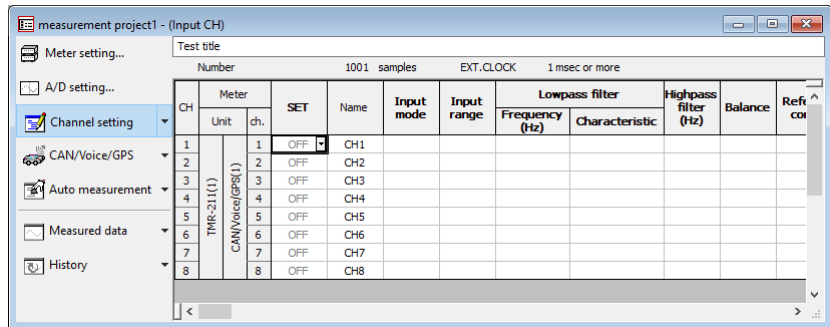
Record the data in the internal memory of CAN/Voice/GPS unit (TMR-251). The data capacity of the internal memory is 6MB and it can be allocated to CAN, Voice and GPS. However, this method is not suitable for high-speed recording of data or long-duration data recording. This internal memory should be used supplementarily.

4 Setting the CAN/Voice/GPS unit



For details on the input CH, refer to "Chapter 4: 6. Input Channels" (Page 4-10).

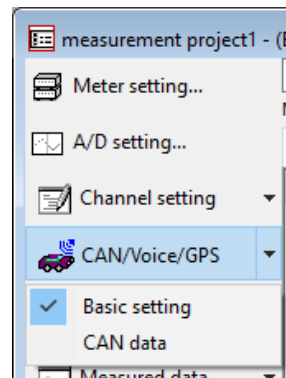
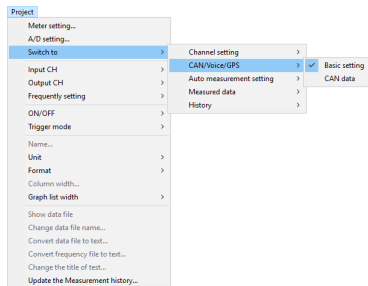
The setting of CAN/Voice/GPS unit is made on the input CH screen and the CAN/Voice/GPS screen.



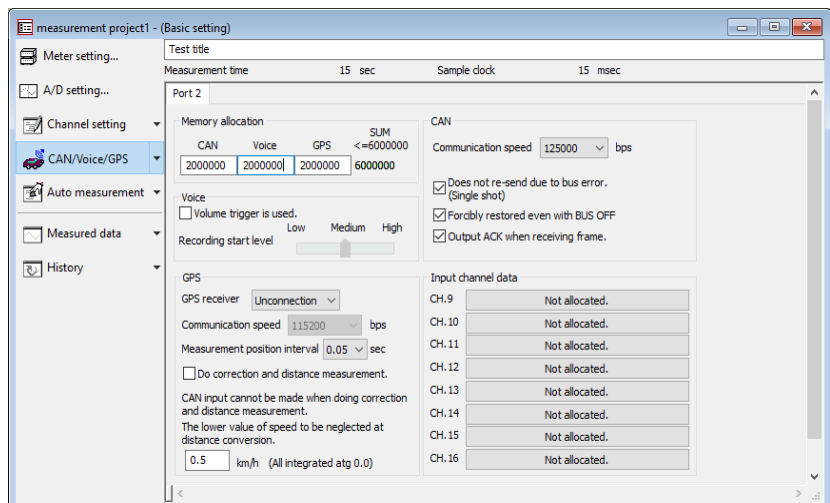
The setting of input CH cannot set items other than Name.

4-1 Displaying the Basic setting screen

In order to set CAN/Voice/GPS unit, select the Basic setting from the "CAN/Voice/GPS" button menu.



The screen of basic setting is displayed.



4-2 Setting the GPS data measurement

These are the items to be set relevant to GPS data in the Basic setting.

- Memory allocation

Memory allocation			
CAN	Voice	GPS	SUM
2000000	2000000	2000000	<=6000000
			6000000

Input the number of memory areas used for the measurement of GPS data. The total memory of CAN, Voice and GPS should be 6,000,000Byte or less. For example, if CAN and Voice are not used, GPS can be set to 6,000,000Byte and others can be set to 0Byte. If the internal memory of CAN/Voice/GPS unit (TMR-251) is not used, set every item to 0Byte. If the internal memory is used, the received data of GPS are recorded in the internal memory when the measurement is started. The interval of recording is set by Measurement position interval.

The data to be recorded in the internal memory are shown below.

Header	Longitude	Latitude	Time	Altitude	Speed	Azimuth
4Byte	4Byte	4Byte	6Byte	2Byte	2Byte	2Byte

If the measurement position interval is set to 1 second, the recording time is as shown below.

GPS memory	Recording time
1000000	1,000,000Byte / 24Byte = 41,666 seconds
2000000	2,000,000Byte / 24Byte = 83,333 seconds
6000000	6,000,000Byte / 24Byte = 250,000 seconds

- GPS

GPS

GPS receiver Unconnection

Communication speed 115200 bps

Measurement position interval 0.05 sec

☐ Do correction and distance measurement.

CAN input cannot be made when doing correction and distance measurement.

The lower value of speed to be neglected at distance conversion.

0.5 km/h (All integrated atg 0.0)

GPS receiver

: Select the receiver used for receiving the GPS data. If GPS is not used, select [Unconnection].

Measurement position interval

: Select the interval for receiving the GPS data. The interval at which the GPS data can be received varies depending on the GPS receiver. The fastest interval of TMR-251-1 and TMR-251-2 is 0.05 second and 0.25 second, respectively. If the positioning interval is made faster, more detailed data can be obtained, however, the total recordable time becomes less.



If the data are recorded in TMR-211, the positioning interval is set to the update interval of GPS data. If the data are recorded in the internal memory of CAN/Voice/GPS unit (TMR-251), it is set to the sample interval of GPS data.

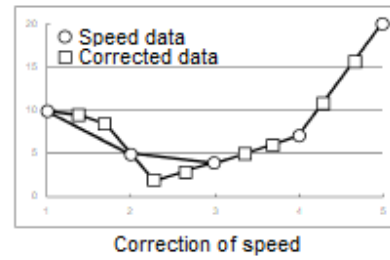
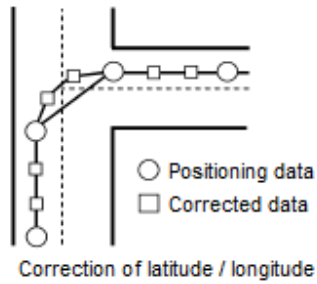
Do correction and distance measurement

: This setting is valid only when the data is recorded in TMR-211. The following operations are made by enabling this function.

1. The latitude and longitude data are supplemented using the internal accelerometer. The data between the positioning intervals is supplemented at 100Hz. With this function, the data on a curve gets closer to the actual smooth driving data.
2. The speed data measured by the GPS receiver is supplemented using the data of internal accelerometer.
3. The travel distance calculated from the corrected speed is output. This data is reset when the balancing is implemented or the measurement is started. The speed equal to or less than the value which is set by "The lower value of speed to be neglected at distance conversion" is neglected.
4. The digital signal input function is mounted on the GPS receiver. This function is mainly used as a marker.



This correction function cannot be used at the same time with the CAN data input.



• Input channel data

Set this item when the data is recorded or monitored by TMR-211 or the voltage output, the alarm or the trigger function is used. If you click the "Not allocated" of the measurement monitor channel for displaying the received data of GPS, the data screen for input CH as shown below is displayed. Select the GPS data to be allocated to the channel, and click the "OK" button.

The number of channels that can use this function is limited to 8 channels collectively. With the GPS data, the number of channels that are allocated to each item varies as shown below.

GPS data		GPS Corrected data	
Data item	Num of CH	Data item	Num of CH
Longitude	2	Corrected longitude	2
Latitude	2	Corrected latitude	2
Elevation	1	Corrected elevation	1
Velocity	1	Corrected velocity	1
Azimuth	1	Distance	2
		Voltage input	1



If extended CH is used for data that occupies two channels, the extended CH data cannot be recorded.

4-3 Setting the CAN data measurement

This is the item to be set related to CAN data in the Basic setting.

- Memory allocation

Memory allocation			
CAN	Voice	GPS	SUM
2000000	2000000	2000000	<=6000000 6000000



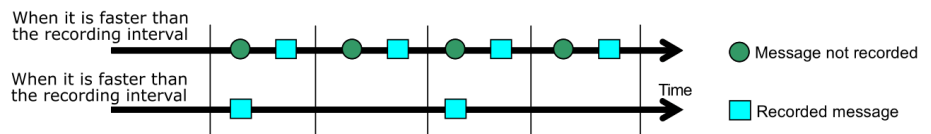
For details on the A/D setting, please read "Chapter 4. 3. A/D setting" (Page 4-6).

Input the number of memory areas used for the measurement of CAN data. The total memory of CAN, Voice and GPS should be 6,000,000Byte or less. For example, if GPS and Voice are not used, CAN can be set to 6,000,000Byte and others can be set to 0Byte. If the internal memory of CAN/Voice/GPS unit (TMR-251) is not used, set every item to 0Byte. If the internal memory is used, the received data of CAN are recorded in the internal memory when the measurement is started. The recording interval is set by "A/D setting".

The data to be recorded in the internal memory are shown below.

Received time	Message number	Number of data	Data
4Byte	1Byte	1Byte	1 to 8 Byte variable

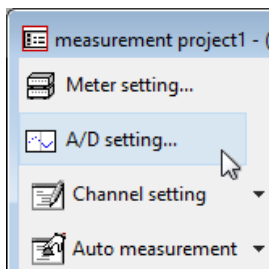
The latest message is recorded in every recording interval.



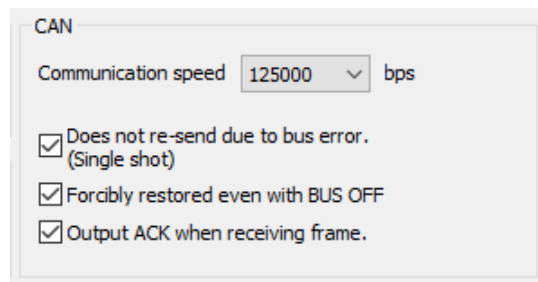
The shortest recording time when the recording interval is 1 second and the data length is 8Byte is shown below.

CAN memory	Recording time
1000000	$1,000,000\text{Byte} / 14\text{Byte} - 1 = 71,427 \text{ seconds}$
2000000	$2,000,000\text{Byte} / 14\text{Byte} - 1 = 142,856 \text{ seconds}$
6000000	$6,000,000\text{Byte} / 14\text{Byte} - 1 = 428,570 \text{ seconds}$

Take note that the data recorded in TMR-211 is the signal and the data recorded in the internal memory of CAN/Voice/GPS unit (TMR-251) is the message.



- CAN

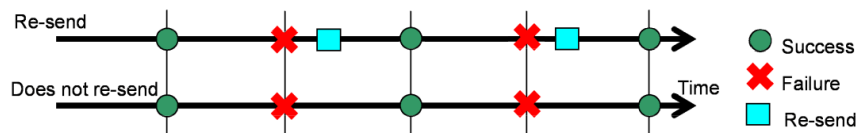


Communication speed

: Set the communication speed according to the used instrument.

Does not re-send due to bus error. (Single shot)

: If the data cannot be sent due to lost arbitration when sending the data from CAN/Voice/GPS unit (TMR-251), the transmission is tried again until the data can be sent. Take note that the timing deviates from the normal transmission timing. If this item is checked (enabled), the retransmission is not implemented. The transmission timing does not deviate, however, the data fails.



Forcibly restored even with BUS OFF

: In CAN, the communication state is monitored to detect an error. If the number of errors exceeds a certain level, the operation mode is shifted. There are three modes; "error active", "error passive" and "bus off". The system is separated from the CAN network in the "bus off" state. This setting decides whether to return to the network promptly or not, after the operation mode is shifted to bus off state. Before making this setting, check the followings.

- Cause of bus off is known
- Release of bus off does not affect the network

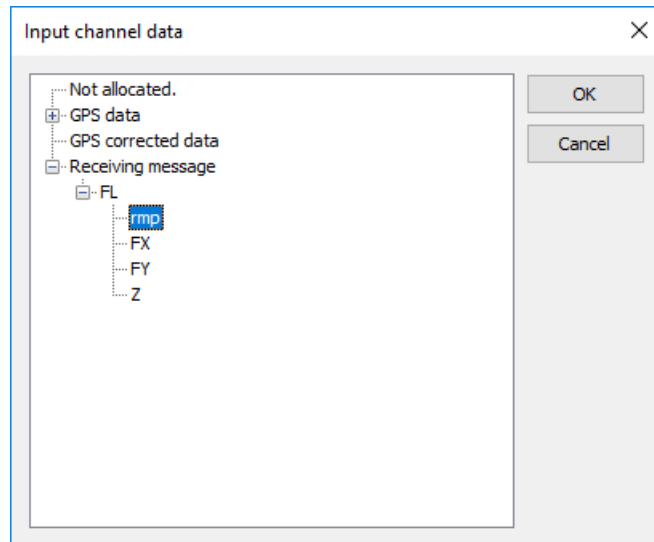
Output ACK when receiving frame.

: The ACK signal is output when a communication is performed properly regardless of the setting (message, ID, signal) of CAN/Voice/GPS unit (TMR-251).

If the ACK signal is not output, the sending side decides that an error occurred. Generally, when the connection is made on one-to-one basis, set this to output ACK. When connecting to an existing network, it is safer not to output ACK because the output may have a serious influence on the network.

- Input channel data

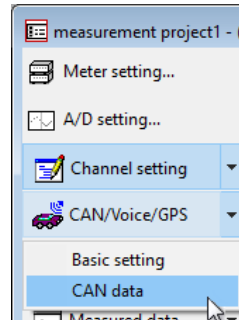
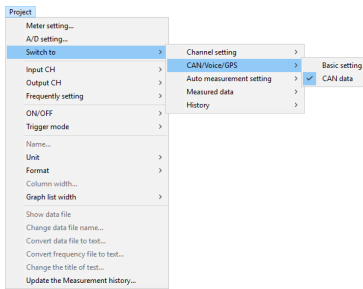
Make a setting when the data is recorded or monitored by TMR-211, or the voltage output, the alarm or the trigger function is used. If you click "Not allocated" button of the measurement monitor channel for displaying the received data of CAN, the data screen for the input CH shown in the figure below is displayed. Select the CAN data to be allocated to the channel and click "OK" button at upper right of screen.



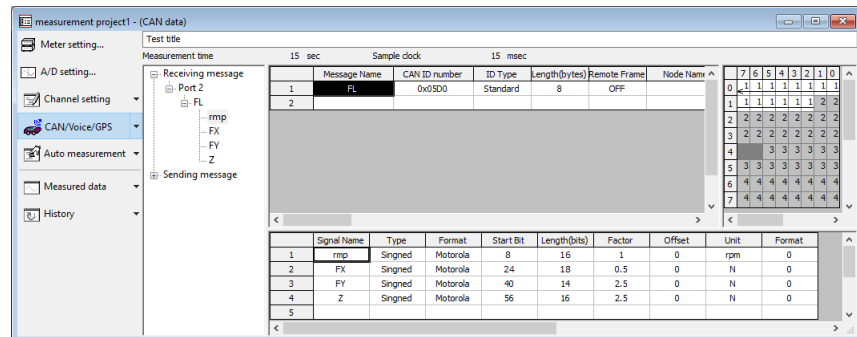
If the check box of "Do correction and distance measurement" in the setting of GPS data measurement is checked, the input of CAN data is disabled.

4-4 Setting the CAN transmission/reception data

In order to set the data to be received or sent by CAN/Voice/GPS unit (TMR-251), select CAN data from the "CAN/Voice/GPS" button menu.

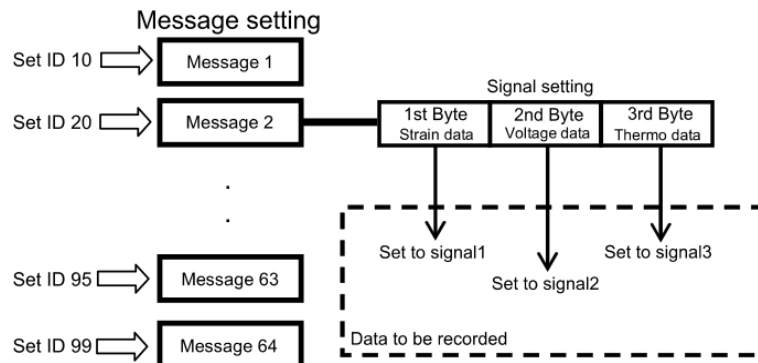


Make a setting of CAN data on the CAN data screen according to the transmission/reception data.



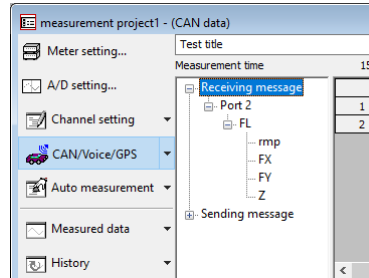
• Message and signal

The CAN/Voice/GPS unit (TMR-251) uses the concepts "message" and "signal". In CAN, data are discriminated by an identifier called ID. In CAN/Voice/GPS unit (TMR-251), the setting is made by allocating the ID to 64 messages. An ID that is not set to a message is not recorded. Recording is not performed even if the ID is just set to the message. The preparation for recording is completed when the message and the signal are set. For the signal, more than one data can be input in one ID for CAN. For example, it is like a case that the data of strain, voltage and thermocouple are input in the same ID. However, in this case, you cannot see where the strain data ends. Therefore it is necessary to set where the data (signal) ends. It is the signal setting. The relationship between the message and the signal is shown in the figure below.



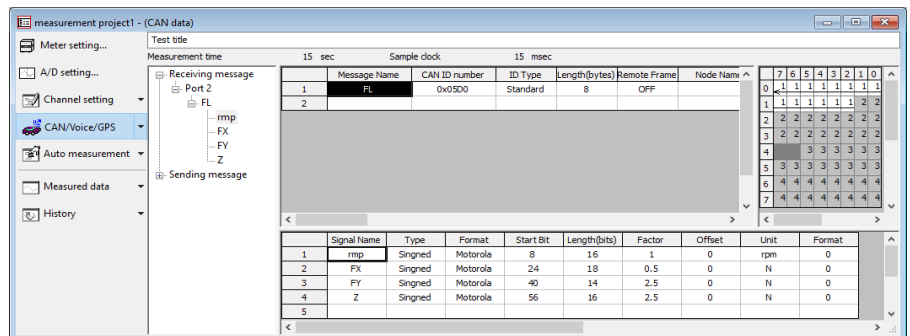
• Setting the CAN reception

Select "Receiving message" on the CAN data screen.



The screen of receiving message is displayed.

Make settings in order of message and signal.



The number of receivable messages is up to 64 messages including the sending message.

Message setting

Message Name

: Input the name of message. Input an arbitrary name which is easy to understand.

CAN ID number

: Input the ID number in hexadecimal number. The ID number is arbitrarily set by each device (data). Check and input the ID number of output device.

ID Type

: Select the ID type between standard and extended. The standard and the extended are sometimes represented as 11Bit ID and 29Bit ID or CAN2.0A and CAN2.0B respectively. Check the setting of output device and make a selection.

Length(bytes)

: Set the data length of ID. 1 byte is 8 bits. Check the specification of output device and make a selection.

Remote Frame

: Set the data reception by the remote frame between ON and OFF. The remote frame means the data output request and in this case, the output of specified ID data to other device from CAN/Voice/GPS unit (TMR-251) is requested. The remote frame is requested from CAN/Voice/GPS unit (TMR-251) in the timing of sample interval.

Node Name : This is the setting for expansion.



If the number of bits is 43 or more, the data is rounded to 16 significant digits when converted to physical quantity.

Signal setting

Signal Name

: This is for inputting the name of the signal. Input an arbitrary name.

Type

: This is to select between the integer with sign and integer without sign for the data. It is sometimes represented as Signed and Unsigned for with sign and without sign, respectively. Check the specification of the output device and make selection.

Format

: This is to select between Intel format and Motorola format for the data. This setting shows whether the upper byte of the data is on the beginning of the data or the end of the data. The Intel format and the Motorola format are also represented as little endian and big endian, respectively. Check the specification of the output device and make selection.

Start Bit

: This is to specify the first bit of the data. The bit array varies between the Intel format and the Motorola format. Refer to the example shown in the figure below.

Length(bits)

: This is to specify the length of the signal (data) by the number of bits. The length of data varies depending on the device (data). Check the specification of output device and make a selection.

Factor

: The data are multiplied by this factor (coefficient) and recorded. If you want to record data without change, set 1 to the Factor.

Offset

: This offset value is added to the data and the sum is recorded. If you want to record data without change, set 0 to the Offset. The CAN data do not become 0 even if balancing is executed. If you want to make the input data to 0, set arbitrary value to the Offset.

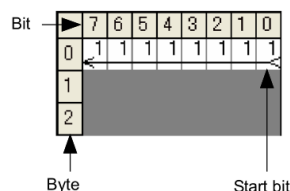
Unit

: Specify the unit for display and recording. You can select the unit from 41 units such as μStrain , m/s^2 and rpm.

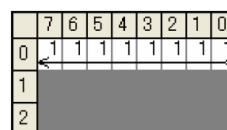
Format

: Select the data display format for display and recording. If the format is set to 0, the digits after the decimal point are not recorded. Make a selection in combination with Factor.

Format	Start Bit	Length(bits)
Intel	0	8

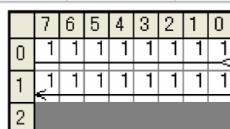


Format	Start Bit	Length(bits)
Motorola	0	8

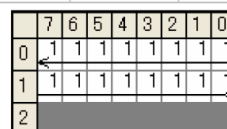


If the data length is 1 byte (8 bits) or less, there is no difference between Intel and Motorola.

Format	Start Bit	Length(bits)
Intel	0	16



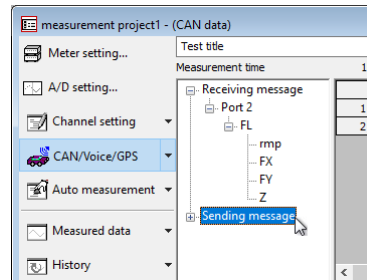
Format	Start Bit	Length(bits)
Motorola	8	16



Please note the difference between Intel and Motorola.

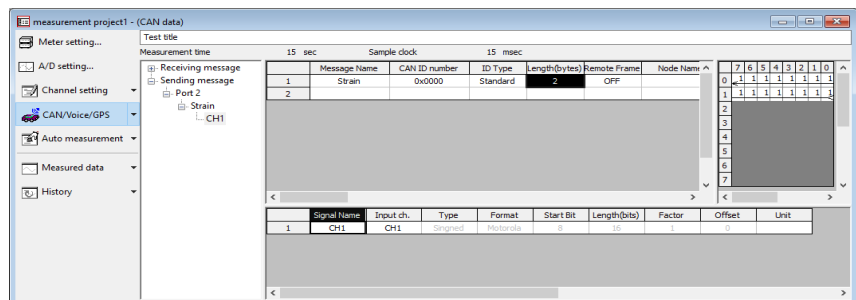
• Setting the CAN transmission

Select "Sending message" on the CAN data screen



The screen of sending message is displayed.

Make settings in order of message and signal.



Up to 8 messages can be sent.

Message setting

Message Name

: Input the name of message. Input an arbitrary name which is easy to understand.

CAN ID number

: Input the ID number in hexadecimal number. The ID number is arbitrarily set by each device (data). Input the ID number by checking that the number is not overlapping with that of other device.

ID Type

: Select the ID type between standard and extended. The standard and the extended are sometimes represented as 11Bit ID and 29Bit ID or CAN2.0A and CAN2.0B respectively. Check the specification of the device to be recorded.

Length(bytes)

: Set the data length of ID. It is fixed to 2 bytes for output.



When the data is sent, it is fixed to 1 message and 1 signal.

Remote Frame

: Set the data by remote frame between ON/OFF. The remote frame means the data output request and in this case, output of specified ID data from other device to CAN/Voice/GPS unit (TMR-251) is requested. In this case, the sampling interval of CAN/Voice/GPS unit (TMR-251) is disabled.

Node Name : This is the setting for expansion.

Signal setting

Signal Name

: Input the name of signal. Input an arbitrary name which is easy to understand.

Input ch. : Select the data to be sent. The measurement unit other than the voltage output unit TMR-241 can be selected.

Type : This is to select between the integer with sign and integer without sign for the data. When sending data, it is fixed to the integer with sign.

Format : This is to select between Intel format and Motorola format for the data. When sending data, it is fixed to Motorola.

Start Bit : This is to specify the first bit of the data. When sending data, it is fixed to 8.

Length(bits) : This is to specify the length of the signal (data) by the number of bits. When sending data, it is fixed to 16.

Factor : The data are multiplied by this factor (coefficient) and output. When sending the data, it is fixed to 1.

Offset : This offset value is added to the data. When sending the data, it is fixed to 0.

Unit : The unit is specified for display and recording. When sending data, no unit is added.

• Notes on CAN transmission data

The CAN/Voice/GPS unit (TMR-251) can send the data of measurement unit to be connected.

For example, the data such as strain, voltage and temperature can be sent.

The data sent to CAN by CAN/Voice/GPS unit (TMR-251) is sent based on the rule shown below.

$$\text{CAN transmission} = \frac{10,000 \times \text{Measured value}}{\text{Range}}$$



However, this rule is not applied to TMR-253 pulse-count.

The formula above shows that "10000" is output to CAN when a value equal to the set range of the measurement unit is input to the unit.

The table below shows some examples of CAN transmission data of each measurement unit.

Measurement Unit	Range	Measured value	CAN transmission data	Measurement Unit	Range	Measured value	CAN transmission data
TMR-221 (TMR-222)	5,000μ	5,000μ	10,000	TMR-253	100kHz	1kHz	100
	5,000μ	1μ	2		10kHz	1kHz	1000
	10,000μ	5,000μ	5,000		1kHz	1kHz	10000
	10,000μ	1	1		Pulse-count*	1	1
	20,000μ	5,000	2,500		Pulse-count*	29,999	29,999
	20,000μ	2	1				
TMR-231	20V	1.000V	500				
	10V	1.000V	1000				
	5V	1.000V	2000				
	1V	1.000V	10000				
	T(400°C)	100.0°C	2500				
	K(1300°C)	100.0°C	769				

F or TMR-253 pulse-count only, the value without change is output.

4-5 Setting the Voice recording

These are the items to be set relevant to Voice data in the Basic setting.

• Memory allocation

CAN	Voice	GPS	SUM
2000000	2000000	2000000	6000000

Input the number of memory areas used for recording the Voice data. The total memory of CAN, Voice and GPS should be 6,000,000Byte or less. For example, if CAN and GPS are not used, Voice can be set to 6,000,000Byte and others can be set to 0Byte. If the internal memory of CAN/Voice/GPS unit (TMR-251) is not used, set every item to 0Byte. The Voice data is recorded in TMR-211 when the measurement is not performed. It is recorded in the internal memory of CAN/Voice/GPS unit (TMR-251) during the measurement. The Voice recording time is fixed to 20 seconds.

The Voice data to be recorded in the internal memory is shown below.

Time data 1	Time data 2	Data
4Byte	4Byte	Approximately 200,000Byte

The number of times available for recording Voice file of 20 seconds in the measurement is calculated as follows.

Voice memory	Number of recording times
1000000	1,000,000Byte / 200,000Byte - 1 = 4 times
2000000	2,000,000Byte / 200,000Byte - 1 = 9 times
6000000	6,000,000Byte / 200,000Byte - 1 = 29 times

• Voice

Volume trigger is used.

: Check the box when you record the Voice.

Recording start level

: Set the sound volume of recording trigger by Voice. Set the trigger level by operating the slide bar. The recording trigger level goes down in order of High, Medium and Low. The Voice trigger is the function for recording the Voice depending on the Voice level.

5 Processing CAN/Voice/GPS measurement data

If the measurement is performed by connecting the computer and TMR-211, the data of CAN and GPS are automatically read after the measurement is terminated and the data file is created.

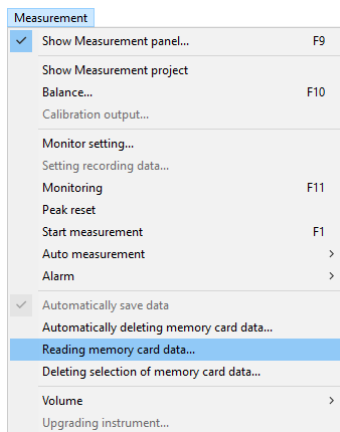
The Voice data is not read automatically, so make a selection from Reading memory card data... or Reading instrument data... to read the data.

5-1 Reading memory card data

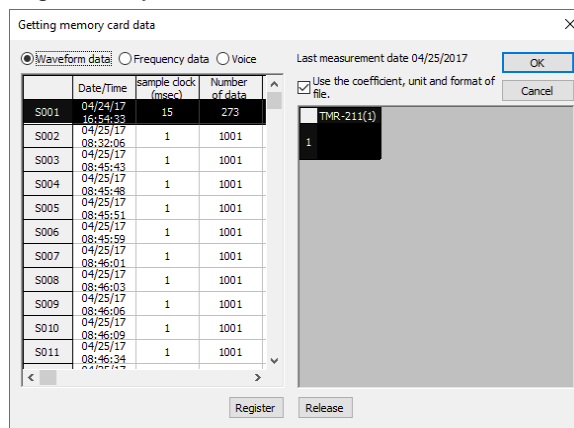
You can save the measurement data stored in the memory card in the instrument to a computer.

■ "Reading memory card data..."

Select "Reading memory card data..." in the Measurement menu



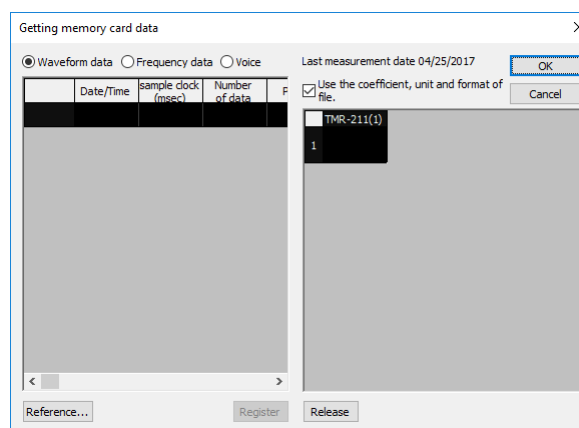
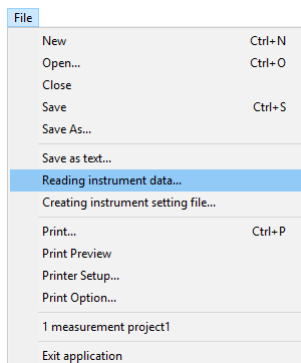
For details, please read "Chapter 5: 16 Reading memory card data" (Page 5-30).



The data recorded in the memory card are displayed.

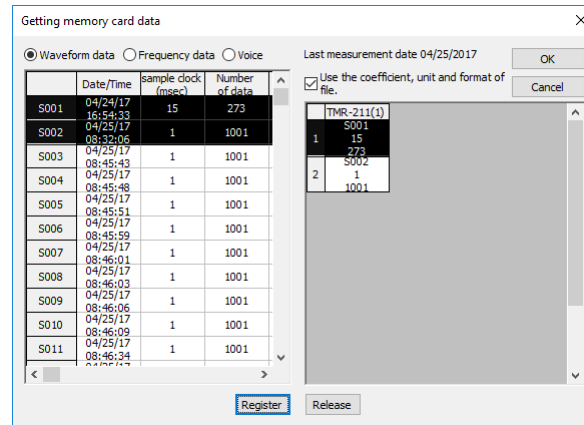
■ "Reading instrument data..."

Insert the memory card in the memory card slot of computer and select "Reading instrument data..." in the File menu.

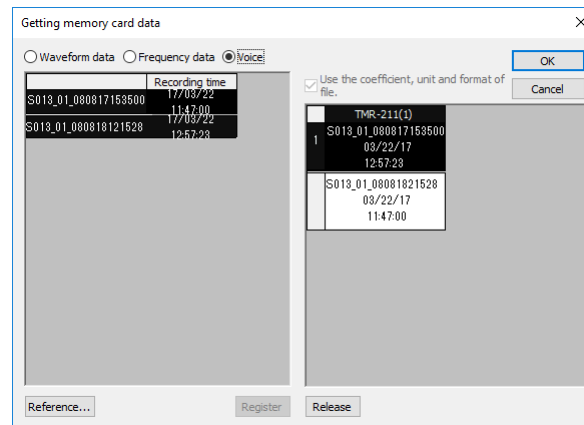


If you click "Reference" button and select the folder in which the data are recorded, the data recorded in that folder are displayed.

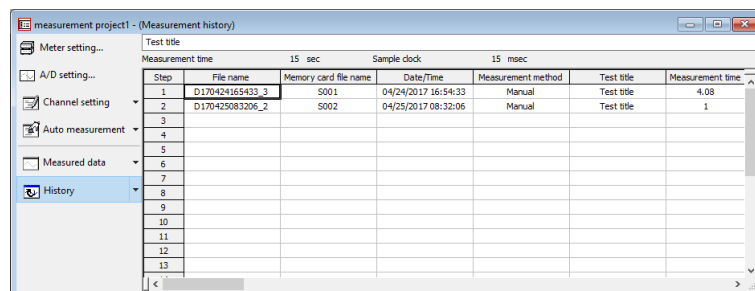
For the data of CAN and GPS, select Waveform data to register.



For the Voice data, click the "Voice" button to display the list of Voice data, and then select and register the Voice data.



If you click the "OK" button, the data are read and displayed in the history.



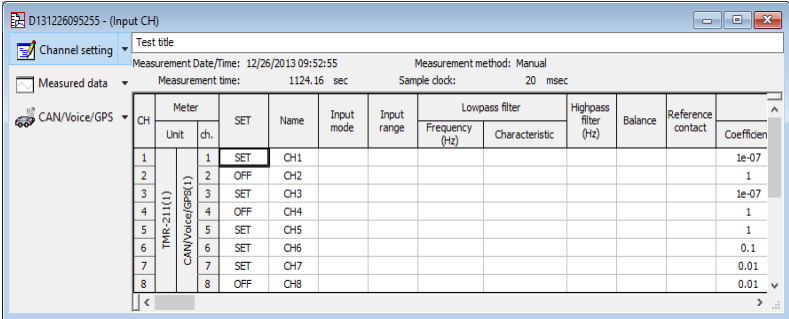
5-2 Displaying the GPS data



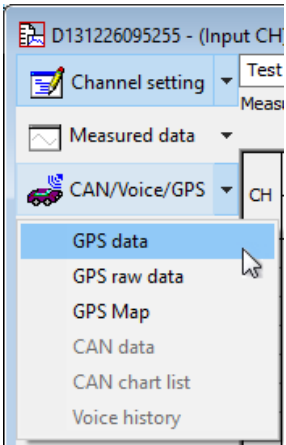
For details on the input CH, refer to "Input channel data" (Page 12-6) in "Chapter 12: 4-2 Setting the GPS data measurement".

The GPS data that has been set as an input channel of TMR-211 is displayed.

In order to display the GPS data, display the Measurement data file.

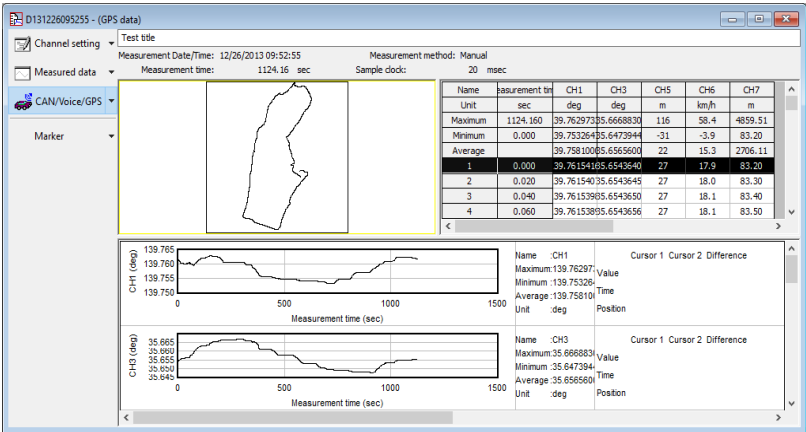


In case of the data for which the GPS data is selected for input CH, "CAN/Voice/GPS" button is displayed to enable the selection of GPS data.



On the display of the GPS data, the editing of marker can be done. For editing marker, refer to "Chapter 7: 7-5 Display and editing of marker" (page 7-28).

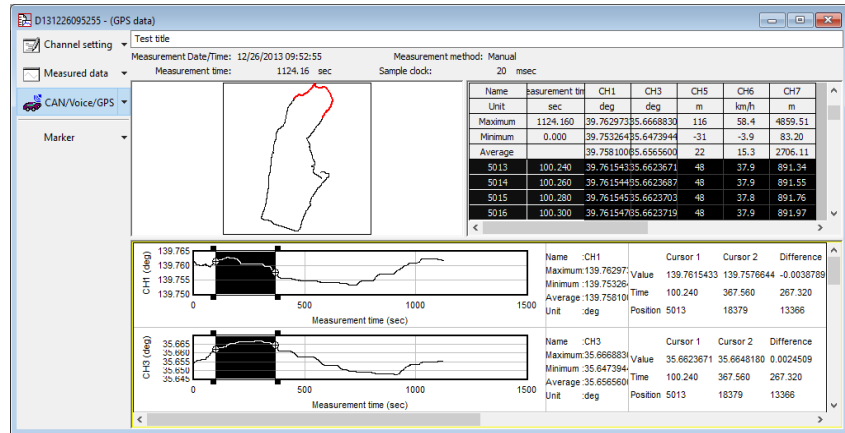
If the GPS data is selected, only the GPS data is displayed.



The display is divided in three parts and the trajectory is drawn in upper left using the data of latitude and longitude. Nothing is displayed if there is no data of latitude and longitude.

In the upper right area and the lower area, the data list and the chart list are displayed, respectively.

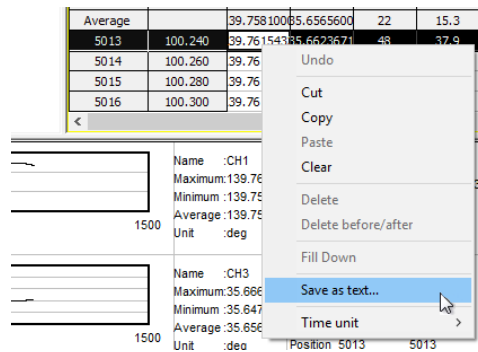
If you drag the chart in the chart list, the selected part is highlighted in each area.



If the latitude and longitude are got with multiple CHs, the trajectory is drawn using the latitude and longitude with the smallest CH number.

■ Saving the selected part as text

In order to save the selected part as text, right-click the chart list or the data list and select **Save as text...** from the displayed menu.



The dialog box for text conversion is displayed.



For details on the text conversion, please read "Chapter 7. 7-11 Save as text" (Page7-36).

If you click the "The selected range is set to the step", the step changes to the selected range.

The screenshot shows a dialog box titled "Step". It contains two input fields: the first contains "18608" and the second contains "56209", separated by a minus sign. Below these fields is a button with the text "The selected range is set to the step." The button is highlighted with a blue border.

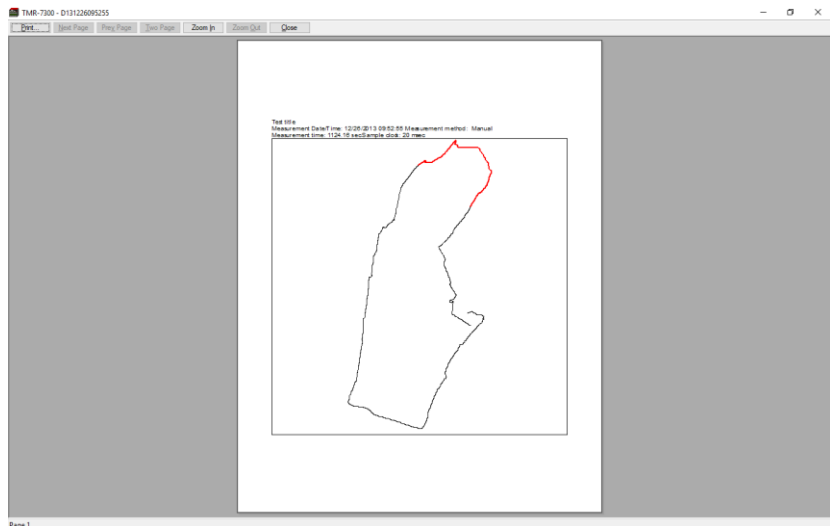
If you select the data and click the "OK" button, the selected part is saved as text.

■ Printing the area

If you click each area, a yellow frame is displayed in that area.

If you implement the printing while this frame is displayed, the content displayed in that area is printed.

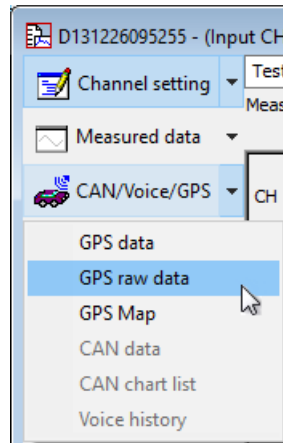
For example, if you click the area where the upper left trajectory is displayed and implement the printing, the trajectory is printed.



5-3 Displaying the GPS raw data

The GPS raw data is the data received by the GPS unit, which is recorded in the internal memory of CAN/Voice/GPS unit (TMR-251). This data is recorded even if it is not set to the input CH in the basic setting.

In case of the data file in which the raw data of GPS is recorded, "CAN/Voice/GPS" button is displayed to enable the selection of GPS raw data.



The list of GPS raw data is displayed.

A screenshot of the software interface showing a table of GPS raw data. The table has columns for 'gps_date', 'Time', 'gps_lon_abso_deg', 'gps_lat_abso_deg', 'gps_ele_abso', 'gps_vel', and 'gps_trk'. The data is organized into rows, with the first row highlighted. The table is part of a window titled 'D131226095255 - (GPS raw data)'.

	gps_date	Time	gps_lon_abso_deg	gps_lat_abso_deg	gps_ele_abso	gps_vel	gps_trk
		sec	deg	deg	m	km/h	deg
1	08/11/26 13:52:56.0	0.130	139.7615028	35.6545033	27	19	304.5
2	08/11/26 13:52:56.1	0.371	139.7614946	35.6545331	27	19	303.0
3	08/11/26 13:52:56.2	0.652	139.7614884	35.6545732	27	20	303.6
4	08/11/26 13:52:56.3	0.873	139.7614774	35.6545945	27	22	304.8
5	08/11/26 13:52:57.0	1.135	139.7614643	35.6546108	27	23	305.7
6	08/11/26 13:52:57.1	1.376	139.7614508	35.6546267	27	23	306.0
7	08/11/26 13:52:57.2	1.637	139.7614347	35.6546362	26	25	305.8
8	08/11/26 13:52:57.3	1.878	139.7614232	35.6546672	26	25	305.8
9	08/11/26 13:52:58.0	2.120	139.7614104	35.6546965	26	26	306.3
10	08/11/26 13:52:58.1	2.381	139.7613972	35.6547252	26	26	306.5
11	08/11/26 13:52:58.2	2.642	139.7613831	35.6547551	26	27	306.6
12	08/11/26 13:52:58.3	2.883	139.7613705	35.6547878	25	28	306.9
13	08/11/26 13:52:59.0	3.145	139.7613566	35.6548192	25	29	307.3
14	08/11/26 13:52:59.1	3.366	139.7613424	35.6548474	25	30	307.5
15	08/11/26 13:52:59.2	3.647	139.7613280	35.6548789	25	30	307.8
16	08/11/26 13:52:59.3	3.888	139.7613123	35.6549071	25	31	308.2
17	08/11/26 13:53:00.0	4.150	139.7612964	35.6549362	25	32	308.3
18	08/11/26 13:53:00.1	4.391	139.7612801	35.6549653	24	32	308.3

In the GPS raw data, following items are displayed.

gps_date : Measurement date and hour

Time : Elapsed time sec

gps_lon_abso_deg
: Longitude, 0.0000001° unit

gps_lat_abso_deg
: Latitude, 0.0000001° unit

gps_ele_abso
: Altitude, 1m unit

gps_vel : Speed, 0.1km/h unit

gps_trk : Clockwise azimuth orientation from north, 0.01° unit

5-4 Display of GPS map

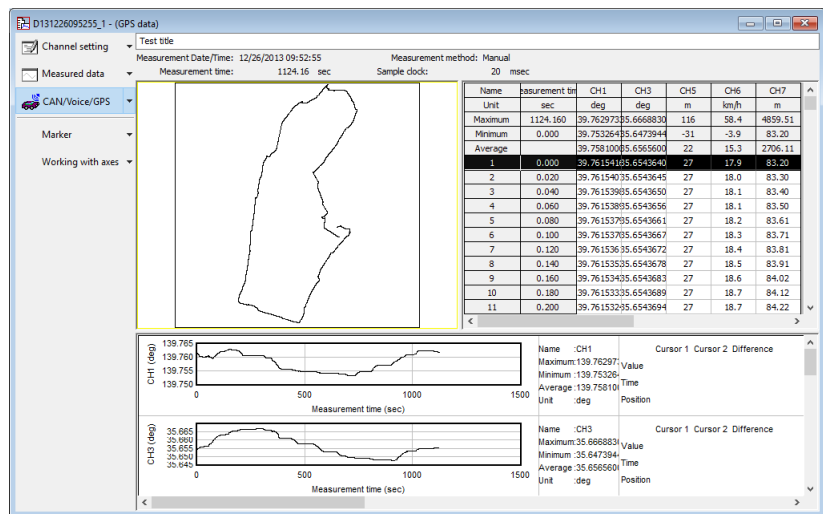
The trajectory can be drawn on the map according to the latitude and longitude recorded with CAN/Voice/GPS unit.



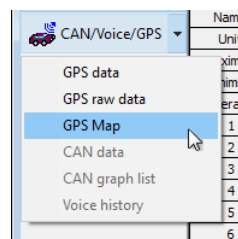
The use of this function needs an environment where the computer is connected to Internet. The maps are drawn using Google Maps API.

For the data of the latitude and longitude, corrected values are used. If corrected values are not available, GPS raw data are used.

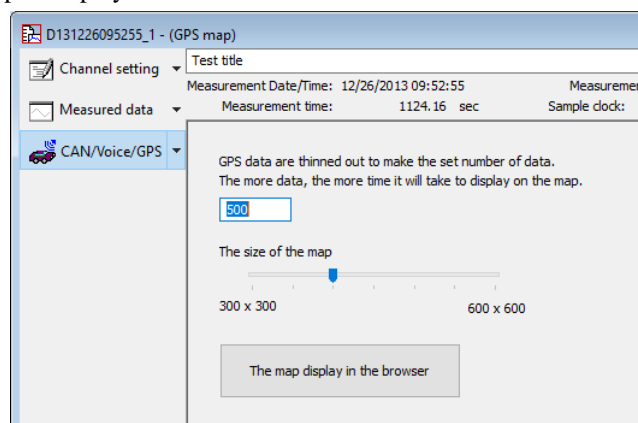
Display the data file of the latitude and longitude.



Select the GPS Map on the "CAN/Voice/GPS" button menu.



Screen for setting the size of the map and the number of trajectory data drawn on the map is displayed.



As the number of trajectory data increases, drawing will take much time or may be made incorrectly. Set the number of data between 50 and 5000.

If the number of recorded data is more than the set value, the data are thinned out at even intervals to approximate the set value. In case that the number of data is less, all the data are used.

The magnification of the map can be changed by shifting the slider.

The browser is launched when you click the button "The map display in the browser", and the trajectory is drawn on the map.



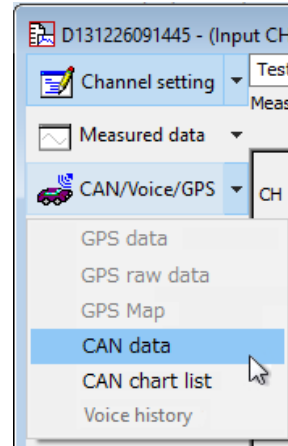
5-5 Displaying the CAN data



For details on the received message, refer to "Setting the CAN reception" (Page 12-10) in "Chapter 12: 4-4 Setting CAN transmission/reception data".

The CAN data is the message that has been defined as a received message by the setting of CAN, which is received by CAN/Voice/GPS unit (TMR-251) and recorded in the internal memory of CAN/Voice/GPS unit (TMR-251).

In case of the data file in which the CAN data is recorded, "CAN/Voice/GPS" button is displayed to enable the selection of CAN data.



The list of CAN data is displayed.

Name	Measurement time	Lump	Measurement time	a	Measurement time	b	Measurement time	c	Measurement time
Unit	sec	uV	sec		sec		sec		sec
Maximum	99.991	720	99.991	0	99.991	0	99.991	0	99.991
Minimum	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Average		360		0		0		0	
1	0.000	123	0.000	0	0.000	0	0.000	0	0.000
2	0.000	119	0.000	0	0.000	0	0.000	0	0.000
3	0.007	114	0.007	0	0.007	0	0.007	0	0.006
4	0.017	109	0.017	0	0.017	0	0.017	0	0.016
5	0.027	105	0.027	0	0.027	0	0.027	0	0.026
6	0.037	101	0.037	0	0.037	0	0.037	0	0.036
7	0.047	96	0.047	0	0.047	0	0.047	0	0.046
8	0.057	92	0.057	0	0.057	0	0.057	0	0.056

For the CAN data, the value of received signal and the measurement time of receiving the message are displayed.

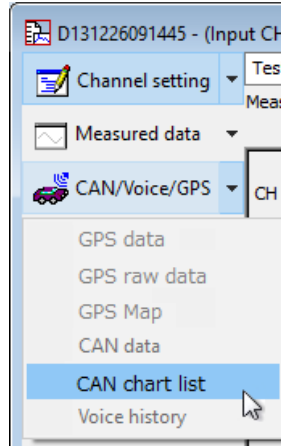
5-6 Displaying the CAN chart list



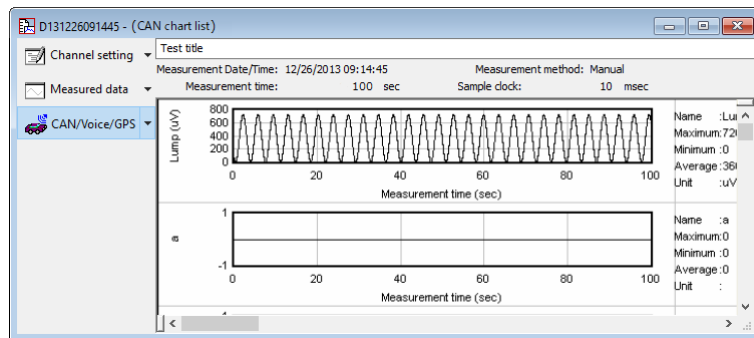
For details on the received message, refer to "Setting the CAN reception" (Page 12-10) in "Chapter 12: 4-4 Setting the CAN transmitted and received data".

The CAN data is the message that has been defined as a received message by the setting of CAN, which is received by CAN/Voice/GPS unit (TMR-251) and recorded in the internal memory of CAN/Voice/GPS unit (TMR-251).

For a data file in which CAN data are recorded, "CAN/Voice/GPS" button is displayed to enable the selection of CAN chart list.



The chart list of CAN data is displayed.



The CAN chart list draws the received signal as an elapse chart.

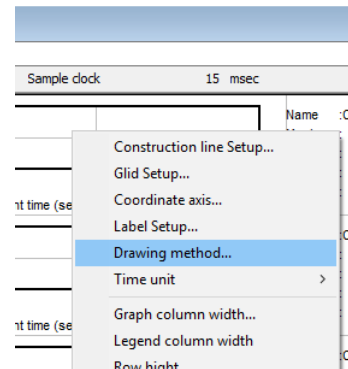
5-7 How to draw the chart

Data are sometimes generated stepwise like a pulse in CAN data or some other data.

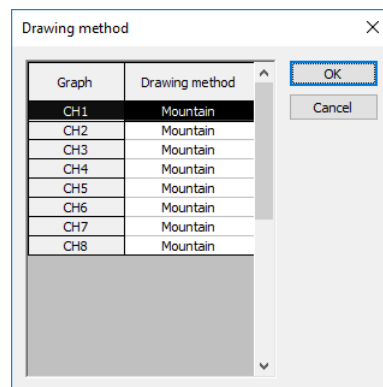
If you draw such data as an elapse chart, data points are connected with diagonal lines and the chart may not be exactly equal to the actual phenomenon.

In such a case, the chart can be drawn by connecting each two adjacent data points with horizontal and vertical lines

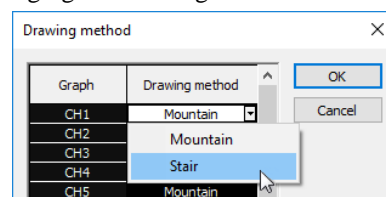
If you right-click the chart list, the menu is displayed.



If you select **Drawing method...**, the dialog box for setting the drawing method is displayed.

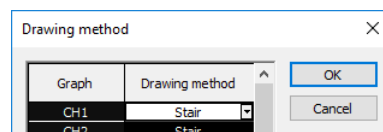


Select the data for changing the drawing method.

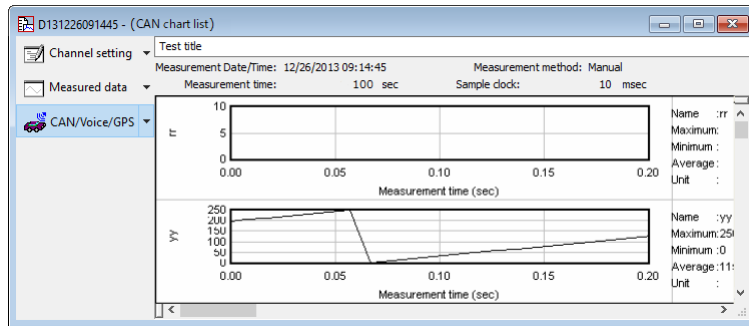


Select **Stair** to connect each two adjacent data points with horizontal and vertical lines.

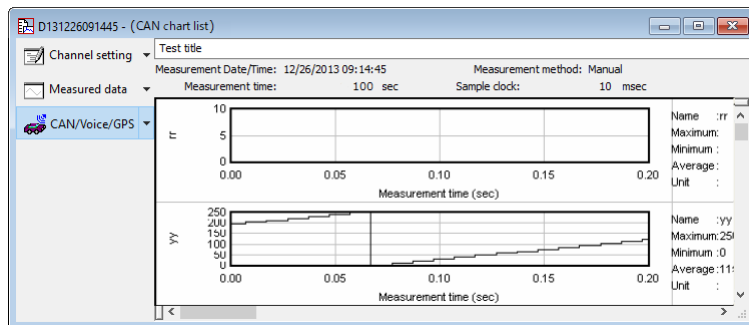
If you select **Mountain**, each two adjacent data points are connected with diagonal line.



If you click the "OK" button, the chart is drawn in the selected method.



Mountain

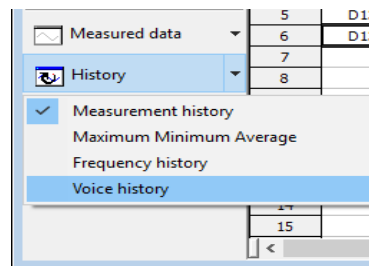


Stair

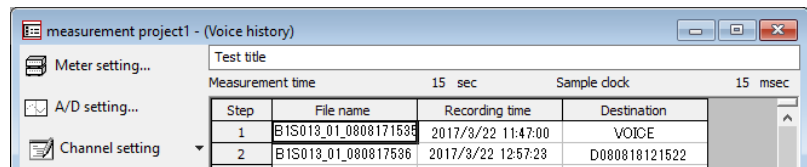
5-8 Playing the Voice data

The voice data is played by Voice history.

Select the Voice history from the "History" button in the measurement project.



The list of recorded Voice files is displayed.



In the Voice history, following items are displayed.

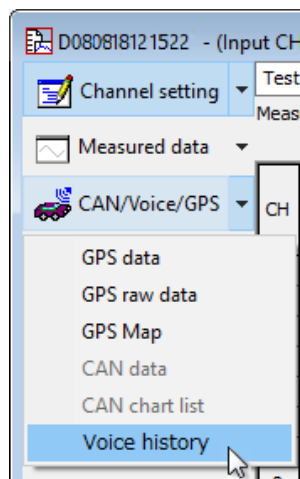
File name : File name of Voice file

Recording time

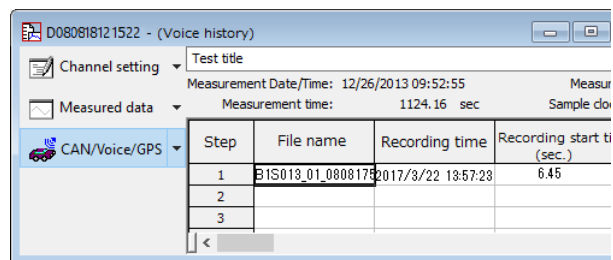
: Date and time when the recording was started

Destination : Name of folder in which the Voice file is saved

The Voice file whose destination is VOICE was recorded while measurement was not performed, and it is saved in the VOICE folder in the DATA folder related to the measurement project. The Voice file whose destination is a data file name was recorded while measuring the data file, and it is saved in the folder in which the data file is saved.




If the Voice history of data files is displayed, the Voice files that were recorded during the measurement are displayed



In the Voice history of data file, the recording start time is displayed.

The recording start time indicates the time when the recording was started, and it is the relative time after the measurement was started.


In order to play the Voice data, click the  button displayed beside the file name.

Measurement time: 1124.16 s		
Step	File name	Recording time
1	B1S013_01_0808171538	2017/3/22 13:00:00

Or right-click the Voice list to display the menu and select Play.

Measurement time 15 sec		Sample clock 15 msec	
Step	File name	Recording time	Destination
1	B1S013_01_0808171538	2017/3/22 13:00:00	VOICE
2			
3			
4			
5			
6			
7			
8			
9			
10			

- Copy
- Play
- Stop
- Change voice file name...
- Update the Measurement history...
- Save as text...

In order to stop the playing of Voice, click the  button again or right-click the Voice list to display the menu and select Stop.

Measurement time 15 sec		Sample clock 15 msec	
Step	File name	Recording time	Destination
1	B1S013_01_0808171538	2017/3/22 13:00:00	VOICE
2			
3			
4			
5			
6			
7			
8			
9			
10			

- Copy
- Play
- Stop
- Change voice file name...
- Update the Measurement history...
- Save as text...

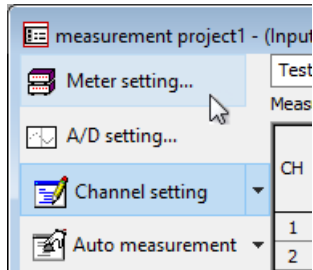
Chapter 13

Digital I/O unit

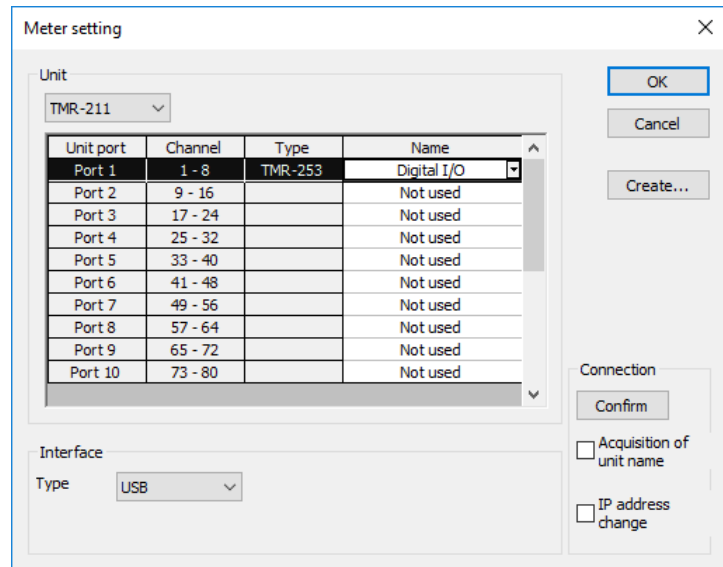
This chapter explains the settings and the usage inherent in the Digital I/O unit (TMR-253/TMR-353).

1 Selecting the Digital I/O unit

Click the "Meter setting..." button in the Measurement project.



For details on the setting of instrument, refer to "Chapter 4: 2. Setting of the instrument" (Page 4-2).



Select Digital I/O from the Name column of unit port to which the Digital I/O unit (TMR-253/TMR-353) is connected and click the "OK" button.

2 Setting the Digital I/O unit

The setting of the Digital I/O unit is made on the input CH screen and the Digital I/O screen.



For details on the input CH, refer to "Chapter 4: 6 Input Channels" (Page 4-10).

CH	Meter	Unit	ch.	SET	Name	Input mode	Input range	Lowpass filter Frequency (Hz)	Characteristic	Highpass filter filter (Hz)	Balance	R
1			1	SET	CH1	FREQ.	5000				Valid	
2			2	SET	CH2	FREQ.	100000				Valid	
3			3	SET	CH3	FREQ.	100000				Valid	
4			4	SET	CH4	FREQ.	100000				Valid	
5			5	SET	CH5	JNT(Unsign)	20000				Valid	
6			6	SET	CH6	JNT(Unsign)	20000				Valid	
7			7	SET	CH7	JNT(Unsign)	20000				Valid	
8			8	SET	CH8	NONE					Valid	

The setting of the input CH has following restrictions.

- Input mode, Input range, Low-pass filter, High-pass filter and Reference junction cannot be set.
- For the 8th channel, Calibration, Unit and Format cannot be set too.

2-1 Displaying the Digital I/O screen

In order to make a detailed setting of the Digital I/O unit, select the Digital I/O from "Channel setting" button menu.

Project	Meter setting...	A/D setting...	Switch to...	Channel setting	Input CH
Input CH	>	CAN/Voice/GPS	>	Output CH	Frequency NO
Output CH	>	Auto measurement setting	>	Expanded CH	Expanded CH
Frequently setting	>	Measured data	>	History	Digital I/O
Paste function...	>		>		
ON/OFF	>		>		
Trigger mode	>		>		
Control	>		>		
Select data...	>		>		
Name...	>		>		
Unit	>		>		
Format	>		>		
Column width...	>		>		
Chart list width	>		>		
Show data file	>		>		
Change data file name...	>		>		
Convert data file to text...	>		>		
Convert frequency file to text...	>		>		
Change the title of test...	>		>		
Update the Measurement history...	>		>		

CH	Meter	Unit	ch.	SET	Name	Input mode
1			1	SET	CH1	FREQ.
2			2	SET	CH2	FREQ.
3			3	SET	CH3	FREQ.
4			4	SET	CH4	FREQ.
5			5	SET	CH5	JNT(Unsign)
6			6	SET	CH6	JNT(Unsign)
7			7	SET	CH7	JNT(Unsign)
8			8	SET	CH8	NONE

The Digital I/O screen is displayed.

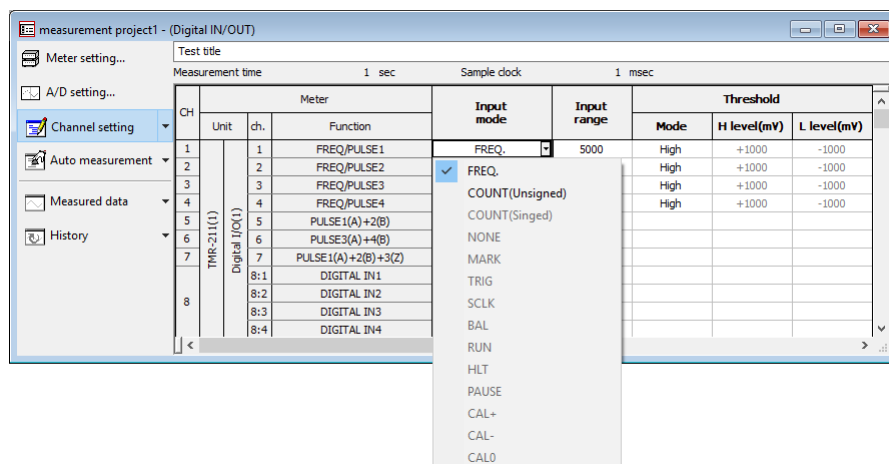
CH	Meter	Unit	ch.	Function	Input mode	Input range	Threshold	Mode	H level(mV)	L level(mV)
1			1	FREQ/PULSE1	FREQ.	5000	High	+1000	-1000	
2			2	FREQ/PULSE2	FREQ.	100000	High	+1000	-1000	
3			3	FREQ/PULSE3	FREQ.	100000	High	+1000	-1000	
4			4	FREQ/PULSE4	FREQ.	100000	High	+1000	-1000	
5			5	PULSE1(A)+2(B)	COUNT(Unsigned)	20000				
6			6	PULSE3(A)+4(B)	COUNT(Unsigned)	20000				
7			7	PULSE1(A)+2(B)+3(Z)	COUNT(Unsigned)	20000				
8:1			8:1	DIGITAL IN1	NONE					
8:2			8:2	DIGITAL IN2	NONE					
8:3			8:3	DIGITAL IN3	NONE					
8:4			8:4	DIGITAL IN4	NONE					

2-2 Input mode

For the input mode of the Digital I/O unit, the settable items vary depending on the channel.



For the details of the input mode, refer to the operation manual of Digital I/O unit (TMR-253/TMR-353).



- 1 to 2 : FREQ/COUNT (Unsigned)/COUNT (32bit)
COUNT (32bit) can only be used with TMR-353, and is set for both channels 1 and 2.
- 3 to 4 : FREQ/COUNT (Unsigned)
- 5 to 6 : COUNT (Unsigned) / COUNT (Signed)
- 7 : Fixed to COUNT (Unsigned)
- 8 : CH8 handles the control signal per bit.
Bit 0 to Bit 3 are assigned to DIGITAL IN1 to DIGITAL IN4 as input bits and the following functions can be set.
NONE/MARK/TRIG/SCLK/BAL/RUN/HLT/PAUSE/
CAL+/CAL-/CAL0
For other than NONE, the same setting cannot be made for more than one DIGITAL IN.

MARK : "1" is recorded in the data of CH8 every time when the marker signal is input.

TRIG : Trigger signal input

SCLK : External sampling input

BAL : Balancing signal input

RUN : Start of measurement

HLT : Stop of measurement

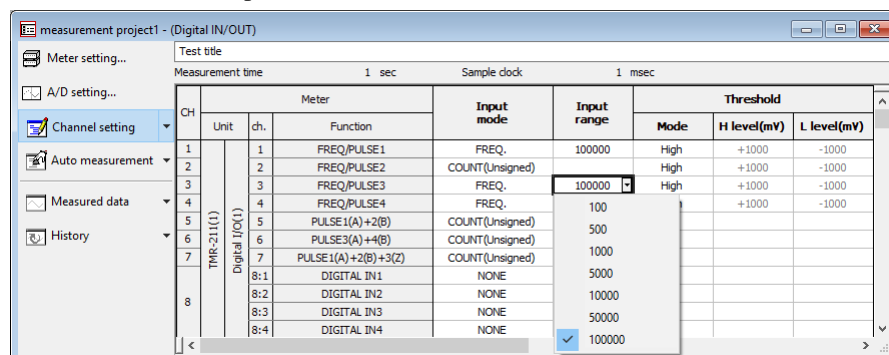
PAUSE : Pause of measurement

CAL+/CAL-/CAL0

: Calibration signal input (Plus/Minus/Zero)

2-3 Input range

For the input range of the Digital I/O unit, the settable items vary depending on the channel and the input mode.



For the details of the input range, refer to the operation manual of Digital I/O unit (TMR-253/TMR-353).

1 to 4 : Setting is not available for COUNT (Unsigned) or COUNT (32bit).

For FREQ, make a selection from 100/500/1000/5000/10000/50000/100000.

5 to 7 : For COUNT (Unsigned), input the value arbitrarily within the range of 2 to 30000.

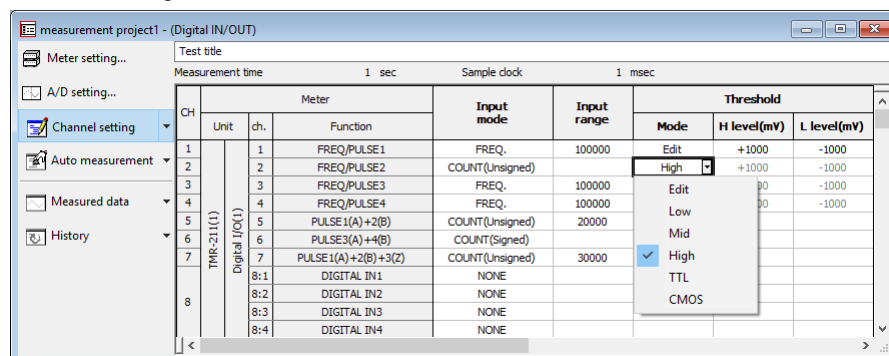
4	FREQ/PULSE4	FREQ.	100000	High
5	PULSE1(A)+2(B)	COUNT (Unsigned)	20000	
6	PULSE3(A)+4(B)	COUNT (Signed)		
7	PULSE1(A)+2(B)+3(Z)	COUNT (Unsigned)	30000	
8:1	DIGITAL IN1	NONE		

Setting is not available for COUNT (Signed).

8 : Setting is not available.

2-4 Threshold value

For the threshold value, set the level for recognizing the signal input to CH1 to CH4 of the Digital I/O unit as waveforms.



The level of threshold value depends on the mode.

Edit : To be input between -10000mV and +10000mV by 100mV step

Low : Fixed to +15mV and -15mV

Mid : Fixed to +100mV and -100mV

High : Fixed to +1000mV and -1000mV

TTL : Fixed to +2000mV and +800mV

CMOS : Fixed to +3500mV and +1500mV

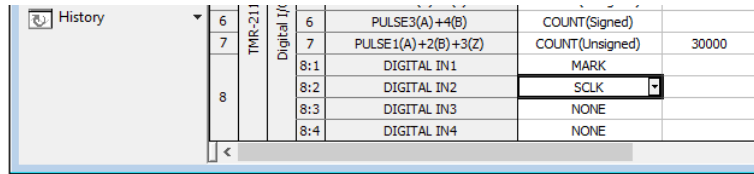


When input mode is set to COUNT (32bit), this setting is ignored because channel 2 is not used as an input.

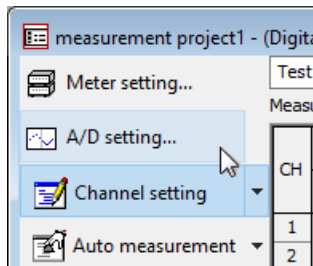
3 External sampling

The external sampling implements the sampling of data by inputting a signal for sampling of data to the Digital I/O unit.

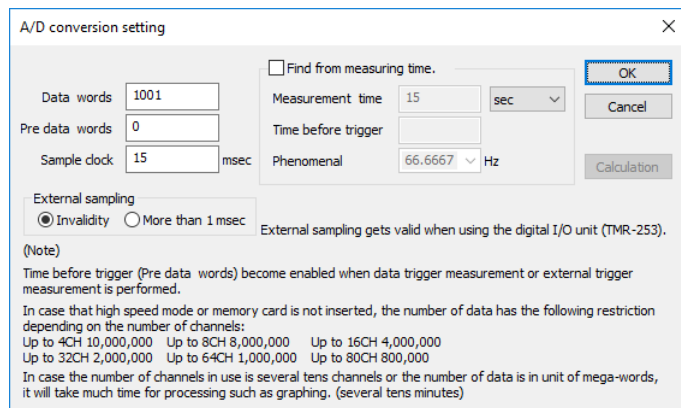
In order to use the external sampling, set **SCLK** to any one of input modes of DIGITAL IN 1 to DIGITAL IN 4 on the Digital I/O screen.



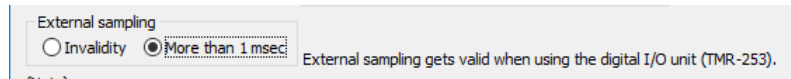
The A/D conversion setting dialog is displayed when A/D setting... in the measurement project is selected.



For details on the A/D setting, refer to "Chapter 4: 3 A/D setting" (Page 4-6).



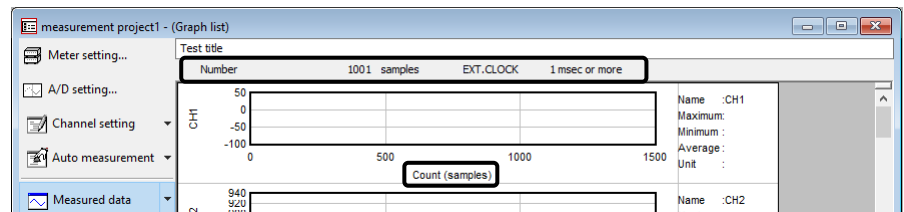
In order to enable the external sampling, click "More than 1 msec".



Setting items

- Invalidity** : The external sampling signal is not used.
 The sampling is implemented by the set Sample clock.
- More than 1 msec**
 : The external sampling signal is used.

The items which were displayed by measurement time are now displayed by count.



4 Cycle trigger measurement

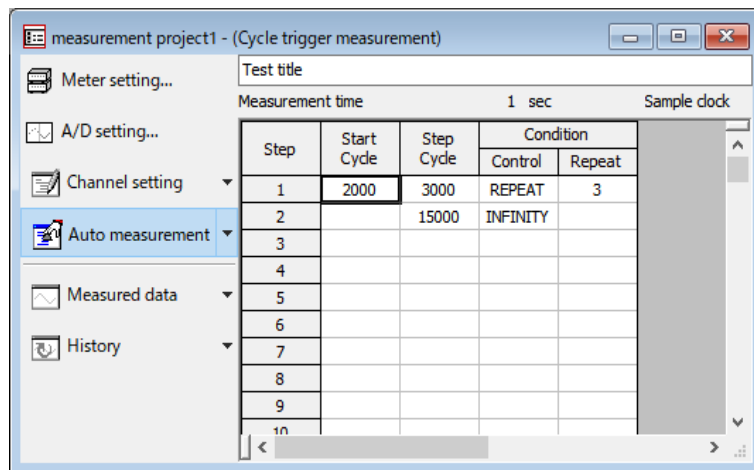


The automatic measurement is performed using the counter value of counter function of measurement system following the start cycle, step cycle and condition.

To use this function, one or more units using the COUNT(32bit) mode are required.

4-1 Setting the cycle trigger measurement

It is set by cycle trigger measurement in automatic measurement setting of measurement project.



Setting item

Start cycle : Input the count value when the measurement is started.

Stop cycle : Input the measurement interval with number of counts.

Condition : The control is selected from INFINITY, REPEAT and GOTO.

INFINITY : The measurement is performed until the measurement is stopped manually.

REPEAT : The measurement is repeated for the number of times that is specified by Repeat.

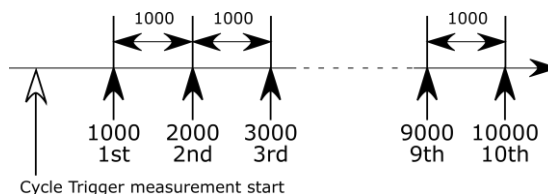
GOTO : It shifts to the step that is specified by Repeat. The Name and Variation are ignored.

4-2 Example of Cycle trigger measurement

■ When the start cycle is set

Step	Start Cycle	Step Cycle	Condition	
			Control	Repeat
1	1000	1000	REPEAT	10
2				
3				

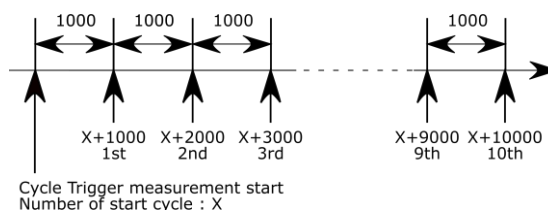
With the setting shown in the figure above, when the count value reaches 1000, the measurement is performed, and then the measurement is performed in 1000 count intervals for 10 times in total, and the cycle trigger measurement is terminated.



■ When the start cycle is omitted

Step	Start Cycle	Step Cycle	Condition	
			Control	Repeat
1		1000	REPEAT	10
2				
3				

With the setting shown in the figure above, the measurement is performed once when the cycle trigger measurement is started, and the measurement is performed in 1000 count intervals for 10 times based on the count value at that time, and the cycle trigger measurement is terminated.



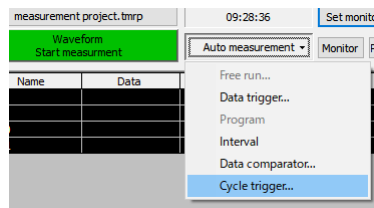
When the count gains speedily, the count may increase after judging the count value till the measurement is actually started, so the count value of measurement result may differ from count value when it is judged.



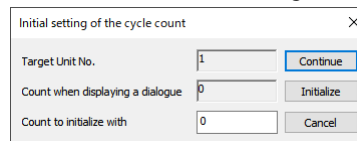
If the actual count value is greater when the judgment of count value is started, the measurement is started immediately

4-3 Start of Cycle trigger measurement

For starting the cycle trigger measurement, click "Cycle trigger..." from button menu of "Auto measurement" of measurement panel or select "Cycle trigger..." from "Auto measurement" sub menu of "Measurement" menu.



The dialog box of cycle count initialization setting is displayed.



Setting item

Count to initialize with

: The initial value of cycle count is set when the cycle trigger measurement is performed after initializing the cycle count value.

Count when displaying dialogue

: The count value when the dialog box of cycle count initialization setting is displayed is displayed.

Count to initialize with

: The initial value of cycle count is set when the cycle trigger measurement is performed after initializing the cycle count value.

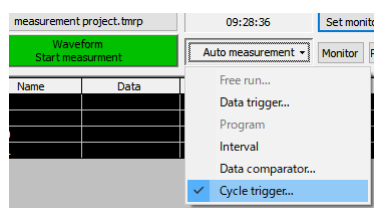
When "Continue" button is clicked, the cycle trigger measurement is started without changing the count value of measurement system. When "Initialize" button is clicked, the cycle trigger measurement is started after initializing the count value of measurement system with the count value that is set by initialization count.



The cycle trigger measurement automatically stops when the count value exceeds 899,999,999.

4-4 Stop of Cycle trigger measurement

To stop the data comparator measurement, click the Cycle trigger... from "Auto measurement" button menu on the Measurement panel.



Refer to "5: 6 Stop of manual measurement" (Page5-9) for stopping the measurement.

5 Processing Cycle trigger measurement data



The data file containing the channel measured as COUNT(32bit) mode records the number of cycles. The number of recorded cycles can be checked at the following.

If there is a channel measured by COUNT(32bit) mode, the number of cycles is recorded even by a measurement method other than cycle trigger measurement.

■ Measurement history

If there is a data file with the number of cycles recorded, or if there is a digital input/output unit (TMR-353) in the meter settings, a column for the number of cycles is displayed.

Step	File name	Memory card file name	Date/Time	Measurement method	Test title	Measurement time	Unit	Number of cycle
1	D200212112842		02/12/2020 11:28:42	Cycle trigger	Test title	1 sec		1000
2	D200212112938		02/12/2020 11:29:38	Cycle trigger	Test title	1 sec		2000
3	D200212113033		02/12/2020 11:30:33	Cycle trigger	Test title	1 sec		3000
4	D200212113129		02/12/2020 11:31:29	Cycle trigger	Test title	1 sec		4000
5	D200212113224		02/12/2020 11:32:24	Cycle trigger	Test title	1 sec		5000
6	D200212113320		02/12/2020 11:33:20	Cycle trigger	Test title	1 sec		6000
7	D200212113416		02/12/2020 11:34:16	Cycle trigger	Test title	1 sec		7000
8	D200212113511		02/12/2020 11:35:11	Cycle trigger	Test title	1 sec		8000

■ Maximum/Minimum/Average

If there is a data file with the number of cycles recorded, or if there is a digital input/output unit (TMR-353) in the meter settings, a column for the number of cycles is displayed.

Step	Date/Time	Number of cycle	Maximum	Minimum	Average	Maximum
1	02/12/2020 11:28:42	1000	4680	8	2375	1018
2	02/12/2020 11:29:38	2000	4686	0	2375	2018
3	02/12/2020 11:30:33	3000	4680	8	2376	3018
4	02/12/2020 11:31:29	4000	4686	0	2375	4018
5	02/12/2020 11:32:24	5000	4680	8	2375	5018
6	02/12/2020 11:33:20	6000	4686	0	2376	6018
7	02/12/2020 11:34:16	7000	4680	6	2374	7018
8	02/12/2020 11:35:11	8000	4686	2	2376	8018

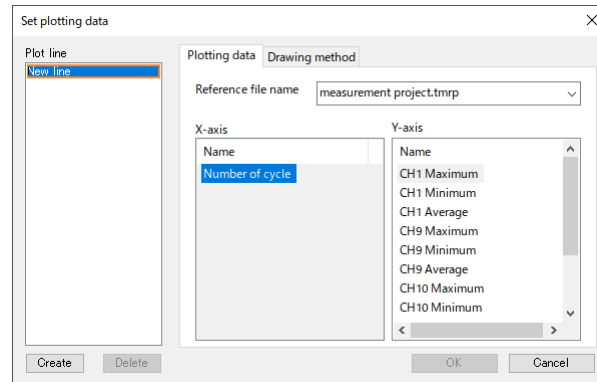
■ Data file opened from measurement history

The number of cycles is displayed next to the measurement method when the data file contains it.

Name	Measurement time	CH1	CH9	CH10	CH16
Unit	sec	4680	1018	0	1

5-1 Drawing the Cycle chart

When "Cycle chart..." is selected from "History chart" sub menu of "Graph" menu with the measurement project selected, the dialog box for setting chart is displayed.



Setting item

Count to initialize with

: The initial value of cycle count is set when the cycle trigger measurement is performed after initializing the cycle count value.

Count when displaying dialogue

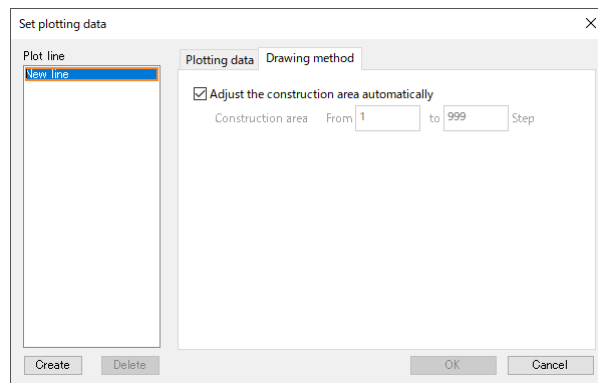
: The count value when the dialog box of cycle count initialization setting is displayed is displayed.

Count to initialize with

: The initial value of cycle count is set when the cycle trigger measurement is performed after initializing the cycle count value.

When new line is selected, multiple lines can be selected for Y-axis list.

Click the construction method to set it.



Drawing method

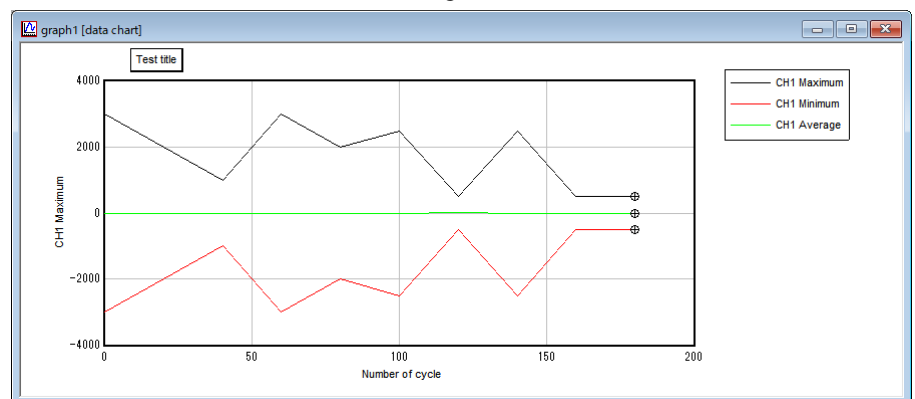
Adjust the construction area automatically

: When this is enabled, all data are plotted. If this is disabled, construction area needs to be specified.

Construction area

: Specify the step of data to be drawn.

When "OK" button is clicked after setting, the data chart is drawn.



Chapter 14

Function

This chapter introduces the function formulas used in this software, and explains the meaning of function and how to use it.

1 Inputting function formula

The method for inputting function formula is the same as inputting a calculation formula of general spreadsheet software. It is also possible to combine the calculation formula and function. The function can be selected using "Paste Function..." menu or directly input.

Either capital letter or small letter is available for the function name.

1-1 Argument

The argument is the data used for the function. The argument used for this software is widely categorized in three types;

To use a value or other function formula

: General function such as SIN and COS

To use data of channel number or data number

: CH function, NO function

To use data number

: CNT32 function, Function such as NAVE and NAADD
whose name starts from "N"

The "data NO" in this chapter is the CH number that is indicated in input CH or the NO number that is indicated in expanded CH.

When the CH number of input CH is used as argument, input the number after "CH". For example, the CH number 20 is input as "CH20".

When the NO number of expanded CH is used as argument, input the number after "NO". For example, the NO number 20 is input as "NO20".

1-2 Description of function

The omission mark ([, ...]) in the formula indicates that an argument of the same type as the preceding argument can be specified repeatedly. For example, the formula of NAVE() function is described as follows. There is no limitation for the number of repetitions provided that the arithmetic formula is within 255 characters.

NAVE (data NO[, data NO, ...])

2 List of function

Each function is classified according to its usage as listed below.

■ Information function

NO(extended CH NO number)

■ Value calculation function

ABS(value or formula)

LN(value or formula)

LOG10(value or formula)

PI()

SQRT(value or formula)

IROUND(value or formula)

SGN(value or formula)

■ Statistics function

NAVE(data NO1[, data NO2, ...])

NMAX(data NO1[, data NO2, ...])

NMIN(data NO1[, data NO2, ...])

NSUM(data NO1[, data NO2, ...])

■ Trigonometric function

ACOS(value or formula)

ASIN(value or formula)

ATAN(value or formula)

COS(value or formula)

NATAN(X coordinate data NO, Y coordinate data NO)

SIN(value or formula)

TAN(value or formula)

■ Measurement information function

CH(CH number of measurement CH)

■ Special calculation function

CNT32(First CH data NO of unit)

NAADD(data NO)

NDEVI(data NO, step number of initial value)

NEMAX(X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus, Poisson's ratio)

NEMIN(X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus, Poisson's ratio)

NEX(X-axis data NO, Y-axis data NO, Young's modulus, Poisson's ratio)

NEY(X-axis data NO, Y-axis data NO, Young's modulus, Poisson's ratio)

NF3DT(temperature data NO, step number of initial value, coefficient of cubic expression a, b, c, d)

NF4DT(temperature data NO, step number of initial value, coefficient of quartic expression a, b, c, d, e)

NFX5(data NO, coefficient of quintic expression a, b, c, d, e, f)

NFADD(data NO)

NFSUB(data NO)

NPDEG(X-axis data NO, Y-axis data NO, Z-axis data NO)

NSMAX(X-axis data NO, Y-axis data NO, Z-axis data NO)

NSMIN(X-axis data NO, Y-axis data NO, Z-axis data NO)

NTEMAX(X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus, Poisson's ratio)

NTSMAX(X-axis data NO, Y-axis data NO, Z-axis data NO)

NTR(data NO, cycle)

3 Function reference

Function (argument(s))

Describes the function.

Example Describes the usage of the function using an example.

Reference Function which is used or related in example is shown.

ABS(value or formula)

This function returns the absolute value. The absolute value is the value itself excluding sign (+, -).

Example The value of data NO1: -135
The result of =ABS(NO(1)) is 135

Reference NO() function

ACOS(value or formula)

This function returns the arccosine of specified value or formula in the range 0 to π radians.

Example The result of =ACOS(-0.5) is 2.09 ($2\pi/3$ radian)
The result of =ACOS(-0.5)*180/PI() is 120(degree)

Reference NO() function, PI() function

ASIN(value or formula)

This function returns the arcsine of specified value or formula in the range $-\pi/2$ to $\pi/2$ radians.

Example The result of =ASIN(-0.5) is -0.52 ($-\pi/6$ radian)
The result of =ASIN(-0.5)*180/PI() is -30 (degree)

Reference NO() function, PI() function

ATAN(value or formula)

This function returns the arctangent of specified value or formula in the range $-\pi/2$ to $\pi/2$ radians.

Example The result of =ATAN(1) is 0.79 ($\pi/4$ radian)
The result of =ATAN(1)*180/PI() is 45 (degree)

Reference NO() function, PI() function

CH(CH number)

This function returns the measured value of specified CH number.
The same CH number can be used for other arithmetic expression.

Example The value of CH1: -646
 The result of =CH(1)*0.5 is -323

Reference NO() function

CNT32 (First CH data NO of unit)

This function returns the converted count value from data measured in the COUNT(32bit) mode.

For the argument, specify the data NO of the first channel of the unit that uses in the COUNT(32bit) mode.

$$\text{CNT32(Data NO)} = \text{Data1} + (\text{Data2} \times 30000)$$

Data1 : Data of CH given by argument

Data2 : Data of the next CH given by the argument

Example The value of CH1 : 1500
 The value of CH2 : 12
 The result of =CNT32(CH1) is 361500



An error will occur if anything other than the first CH of the unit is specified.



An error does not occur even if data NO is set for an input mode other than COUNT(32bit), and the calculation result is returned according to the above formula.



When calculating the count using the CNT32 function, do not set a coefficient or offset for the input CH.



If the same calculation is performed on the expanded channel without using the CNT32 function, the correct value will not be gotten.

COS(value or formula "radian")

This function returns the cosine of "radian" which is specified by value or formula.

Example The result of =COS(1.047) is 0.5
 The result of =COS(60*PI()/180) is 0.5

Reference ACOS() function, PI() function

IROUND(value or formula)

This function returns the value rounded off for specified value or formula.

Example The result of =IROUND(1.3) is 1
 The result of =IROUND(2.6) is 3

Application When the tens place of data NO1 is rounded off and the
 value of data NO1 is 1053;
 The result of =IROUND(NO(1)/100)*100 is 1100

Reference NO() function

LN(value or formula)

This function returns the natural logarithm of value that is given as argument.

When the value is 0 or less, the result is not returned.

Example The result of =LN(86) is 4.45

Reference LOG10() function

LOG10(value or formula)

This function returns the common logarithm (logarithm with base 10) of value.

When the value is 0 or less, the result is not returned.

Example The result of =LOG10(86) is 1.93

Reference LN() function

NAADD(data NO)

This function returns the summation of data NO that is given as argument.

If the argument contains error, blank cell or disconnection data, the value is not returned.

Example The values of data NO1 are 0, 10, 20, 30, 40, 50 in order
 The result of =NAADD(NO1) are 0, 10, 30, 60, 100, 150
 in order

NATAN(X coordinate data NO, Y coordinate data NO)

This function returns the arctangent of X-Y coordinate that is expressed by specified X coordinate and Y coordinate.

Example The value of data NO1 (X coordinate): 0
 The value of data NO2 (Y coordinate): 1
 The result of =NATAN(NO1,NO2)*180/PI() is 90 (degree)

Reference PI() function

NAVE(data NO1 [, data NO2, ...])

This function returns the average value of data NO that is given as argument.

If the argument contains error, blank cell or disconnection data, the value is not returned.

Example The values of data NO1 to data NO4:
 -135,-125,-153,-127
 The result of =NAVE(NO1, NO2, NO3, NO4) is -135

Reference NSUM() function

NDEVI(data NO, step number of initial value)

This function returns the variation from initial value with the data NO, that is given as argument.

When the actual number of measurements does not reach the number of measurements of initial value, the value is not returned.

For argument, input data NO and step number of initial value in order.

Example The reference data NO: NO1
 Step number of initial value: 1
 Initial value: 30
 Data at measurement: 100
 The result of =NDEVI(NO1,1) is 70

NEMAX(X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus, Poisson's ratio)

This function returns the maximum principal stress of rectangular rosette gauge.

For argument, input X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus and Poisson's ratio in order.

Example Young's modulus=205,900 (MPa)
Poisson's ratio=0.3
The value of data NO1 (X-axis): -561
The value of data NO2 (Y-axis): 1561
The value of data NO3 (Z-axis): -801
The result of =NEMAX(NO1, NO2, NO3, 205900, 0.3) is 413.0 (MPa)

Reference NEMIN() function, NSMAX() function, NSMIN() function, NPDEG() function

NEMIN(X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus, Poisson's ratio)

This function returns the minimum principal stress of rectangular rosette gauge.

For argument, input X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus and Poisson's ratio in order.

Example Young's modulus = 205,900 (MPa)
Poisson's ratio = 0.3
The value of data NO1 (X-axis): -561
The value of data NO2 (Y-axis): 1561
The value of data NO3 (Z-axis): -801
The result of =NEMIN(NO1, NO2, NO3, 205900, 0.3) is -118.8 (MPa)

Reference NEMAX() function, NSMAX() function, NSMIN() function, NPDEG() function

NEX(X-axis data NO, Y-axis data NO, Young's modulus, Poisson's ratio)

This function returns the X-axis principal stress of 2-axis gauge.

For argument, input X-axis data NO, Y-axis data NO, Young's modulus and Poisson's ratio in order.

Example Young's modulus = 205,900 (MPa)
 Poisson's ratio = 0.3
 The value of data NO1 (X-axis): -561
 The value of data NO2 (Y-axis): 1561
 The result of =NEX(NO1, NO2, 205900, 0.3) is -21.0 (MPa)

Reference NEY() function, NEMAX() function, NEMIN() function, NPDEG() function

NEY(X-axis data NO, Y-axis data NO, Young's modulus, Poisson's ratio)

This function returns the Y-axis principal stress of 2-axis gauge.

For argument, input X-axis data NO, Y-axis data NO, Young's modulus and Poisson's ratio in order.

Example Young's modulus = 205,900 (MPa)
 Poisson's ratio = 0.3
 The value of data NO1 (X-axis): -561
 The value of data NO2 (Y-axis): 1561
 The result of =NEY(NO1, NO2, 205900, 0.3) is 315.1 (MPa)

Reference NEX() function, NEMAX() function, NEMIN() function, NPDEG() function

NF3DT(temperature data NO, step number of initial value, coefficient of cubic expression a, b, c, d)

This function returns the zero shift (by cubic expression).

When the actual number of measurements does not reach the step number of initial value, the value is not returned.

For argument, input temperature data NO, step number of initial value, and coefficient of cubic expression a, b, c, d in order.

Example Temperature data NO: data NO1
 Step number of initial value: 1
 Initial temperature: 20
 Temperature at measurement: 28
 Coefficient of cubic expression a: -1.27×10^{-4}
 Coefficient of cubic expression b: 0.0226
 Coefficient of cubic expression c: 0.97
 Coefficient of cubic expression d: -30
 The result of
 =NF3DT(NO1, 1, -1.27e-4, 0.0226, 0.97, -30) is 15

NF4DT(temperature data NO, step number of initial value, coefficient of quartic expression a, b, c, d, e)

This function returns the zero shift (by quartic expression).

When the actual number of measurements does not reach the step number of initial value, the value is not returned.

For argument, input temperature data NO, step number of initial value, and coefficient of quartic expression a, b, c, d, e in order.

Example Temperature data NO: data NO1
Step number of initial value: 1
Initial temperature: 20
Temperature at measurement: 28
Coefficient of quartic expression a: -1.95×10^{-6}
Coefficient of quartic expression b: 5.96×10^{-5}
Coefficient of quartic expression c: 0.0202
Coefficient of quartic expression d: 1.02
Coefficient of quartic expression e: -31
The result of
=NF4DT(NO1, 1, -1.95e-6, 5.96e-5, 0.0202, 1.02, -31)
is 16

NFX5(data NO, coefficient of quintic expression a, b, c, d, e, f)

This function returns the result of quintic expression of data No given as argument.

Example The value of data NO1: 28
Coefficient of quintic expression a: 1.6×10^{-11}
Coefficient of quintic expression b: -3.1×10^{-8}
Coefficient of quintic expression c: 2.1×10^{-5}
Coefficient of quintic expression d: -5.6×10^{-3}
Coefficient of quintic expression e: 1.2
Coefficient of quintic expression f: 1.4
The result of
=NFX5(NO1, 1.6e-11, -3.1e-8, 2.1e-5, -5.6e-3, 1.2, 1.4)
is 31

NFADD(data NO)

This function returns the sum with previous data for the data NO that is given as argument.

If the argument contains error, blank cell or disconnection data, the value is not returned.

Example The previous value of data NO1: 10
The value of data NO1: 20
The result of =NFADD(NO1) is 30

Reference NFSUB() function

NFSUB(data NO)

This function returns the difference from previous data for the data NO that is given as argument.

If the argument contains error, blank cell or disconnection data, the value is not returned.

Example The previous value of data NO1: 100
 The value of data NO1: 90
 The result of =NFSUB(NO1) is -10

Reference NFADD() function

NMAX(data NO1 [, data NO2, ...])

This function returns the maximum value in the data NO that is given as argument.

If the argument contains error, blank cell or disconnection data, the data of that argument is not the target of comparison.

Example The values of data NO1 to data NO4:
 135, 125, 153, 127
 The result of =NMAX(NO1, NO2, NO3, NO4) is 153

Reference NMIN() function

NMIN(data NO1 [, data NO2, ...])

This function returns the minimum value in the data NO that is given as argument.

If the argument contains error, blank cell or disconnection data, the data of that argument is not the target of comparison.

Example The values of data NO1 to data NO4:
 135, 125, 153, 127
 The result of =NMIN(NO1, NO2, NO3, NO4) is 125

Reference NMAX() function

NO(data number)

This function returns the calculated value of specified data number. This is used when implementing calculation between data.

Example =NO(1)+NO(2)
 =ABS(NO(1))

Reference CH() function

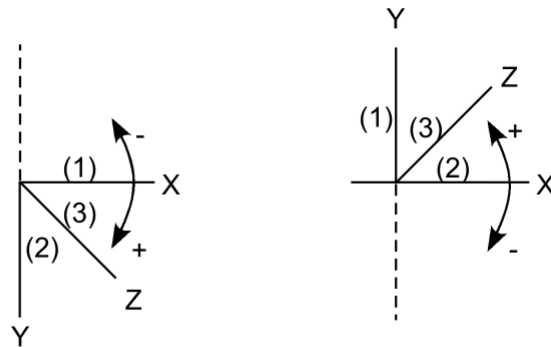
NPDEG(X-axis data NO, Y-axis data NO, Z-axis data NO)

This function returns the maximum principal strain direction of rectangular rosette gauge.

For argument, input X-axis data NO, Y-axis data NO and Z-axis data NO in order.

The relationship between principal strain direction and direction of gauge axis is shown below.

The calculated value is displayed between the first quadrant and the fourth quadrant.



(Direction from X to Y is +) (Direction from X to Y is +)

The number in brackets shown in the figure indicates the gauge axis number.

Example

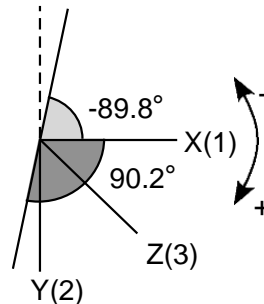
When the calculated value exceeds 90 degrees,

The value of data NO1 (X-axis): 1.7

The value of data NO2 (Y-axis): 3.412

The value of data NO3 (Z-axis): 2.55

The result of =NPDEG(NO1, NO2, NO3) is -89.8 (degree)



Reference

NEMAX() function, NEMIN() function, NSMAX() function, NSMIN() function

NSMAX(X-axis data NO, Y-axis data NO, Z-axis data NO)

This function returns the maximum principal strain of rectangular rosette gauge.

For argument, input X-axis data NO, Y-axis data NO and Z-axis data NO in order.

Example The value of data NO1 (X-axis): -561
 The value of data NO2 (Y-axis): 1561
 The value of data NO3 (Z-axis): -801
 The result of =NSMAX(NO1, NO2, NO3) is 2179 (x 10^{-6} strain)

Reference NSMIN() function, NEMAX() function, NEMIN() function, NPDEG() function

NSMIN(X-axis data NO, Y-axis data NO, Z-axis data NO)

This function returns the minimum principal strain of rectangular rosette gauge.

For argument, input X-axis data NO, Y-axis data NO and Z-axis data NO in order.

Example The value of data NO1 (X-axis): -561
 The value of data NO2 (Y-axis): 1561
 The value of data NO3 (Z-axis): -801
 The result of =NSMIN(NO1, NO2, NO3) is -1179 (x 10^{-6} strain)

Reference NSMAX() function, NEMAX() function, NEMIN() function, NPDEG() function

NSUM(data NO1 [, data NO2, ...])

This function returns the sum of data NO that is given as argument.

If the argument contains error, blank cell or disconnection data, the value is not returned.

Example The values of data NO1 to data NO4:
 -135, -125, -153, -127
 The result of =NSUM(NO1, NO2, NO3, NO4) is -540

Reference NAVE() function

NTEMAX(X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus, Poisson's ratio)

This function returns the maximum shearing stress of rectangular rosette gauge.

For argument, input X-axis data NO, Y-axis data NO, Z-axis data NO, Young's modulus and Poisson's ratio in order.

Example Young's modulus = 205,900 (MPa)
Poisson's ratio = 0.3
The value of data NO1 (X-axis): -561
The value of data NO2 (Y-axis): 1561
The value of data NO3 (Z-axis): -801
The result of =NTEMAX(NO1, NO2, NO3, 205900, 0.3) is 265.9 (MPa)

Reference NTSMAX() function

NTR(data NO, cycle)

This function returns the difference between the value of data number and a multiple of cycle value (if the value of data number is negative, sum of the value of data number and a multiple of cycle value). The returned value V is $0 \leq V < \text{Cycle}$.

For argument, input data NO and cycle in order.

Example The value of data NO1: 480
Cycle: 360
The result of =NTR(NO1, 360) is 120

NTSMAX(X-axis data NO, Y-axis data NO, Z-axis data NO)

This function returns the maximum shearing strain of rectangular rosette gauge.

For argument, input X-axis data NO, Y-axis data NO and Z-axis data NO in order.

Example The value of data NO1 (X-axis): -561
The value of data NO2 (Y-axis): 1561
The value of data NO3 (Z-axis): -801
The result of =NTSMAX(NO1, NO2, NO3) is 3358 ($\times 10^{-6}$ strain)

Reference NTEMAX() function

PI()

This function returns the circle ratio (π).

Though the PI() function does not take argument, be sure to attach the parentheses ().

Example The result of SIN(PI()/2) is 1

SGN(value or formula)

This function returns the signum for specified value or formula.

The signum is $\text{SGN}(0)=0$, $\text{SGN}(x)=x/|x|$.

Example The result of `=SGN(0)` is 0
 The result of `=SGN(-30)` is -1

SIN(value or formula "radian")

This function returns the sine of "radian" which is specified by value or formula.

Example The result of `=SIN(PI()/2)` is 1
 The result of `=SIN(30*PI()/180)` is 0.5

Reference `ASIN()` function, `PI()` function

SQRT(value or formula)

This function returns the square root of the value that is given as argument.

When the value is negative, the value is not returned.

Example The result of `=SQRT(16)` is 4

TAN(value or formula "radian")

This function returns the tangent of "radian" which is specified by value or formula.

Example The result of `=TAN(45*PI()/180)` is 1

Reference `ATAN()` function, `NO()` function

Dynamic Measurement Software **TMR-7300**

12th edition, July 2025

Edited and issued by: Tokyo Measuring Instruments Laboratory Co., Ltd.

URL <http://www.tml.jp/e>

© 2017 Tokyo Measuring Instruments Laboratory Co., Ltd.