ADVANTEST

ADVANTEST CORPORATION

Wireless Data Logger
WM1000 Series
User's Guide

MANUAL NUMBER 8703485-02

Applicable Systems

WM1000
WM1010

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Revision History

Rev.	Date	Remarks
01	January 9, 2015	
02	October 31, 2015	

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Preface

For effective use of this manual, this chapter describes the configuration of this manual and the notational rules.

Relevant Product of This Manual

This manual is for the following product.

- WM1000
- WM1010

How This Manual Is Organized

Each chapter of this manual contains the following information.

Chapter 1 Product Summary	This chapter describes a summary of this product.
Chapter 2 Precautions	This chapter describes notes on using this product. Read this chapter carefully before using this product.
Chapter 3 Setting up the Equipment	This chapter describes how to set up this product when delivered to the user.
Chapter 4 Basic Operation	This chapter describes the basic operations of this product, focusing on how to measure temperatures, which is the main function of this equipment.
Chapter 5 Other Operations	This chapter describes other functions of this equipment.
Chapter 6 Specifications	This chapter describes the specifications of this equipment.
Chapter 7 Maintenance	This chapter describes the daily maintenance (including cleaning, calibration, and storage) of this equipment for maintaining its performance and functions. This chapter also describes actions to take for troubleshooting.

Notational Rules of This Manual

Notations for GUI operation

The name of an item to be operated on a GUI (Graphical User Interface) screen is described by putting it in brackets ([ ]). An arrow (→) is used to describe the operation of selecting a command in a menu.

Typographical style or symbol	Description	Example
[ ]	Represents the name of an item to be operated on a GUI screen.	[File] menu [OK] button
[ ] → [ ]	Represents a command in a menu.	[File] → [Exit]

Notations for key operations

Keyboard keys are described in brackets ([ ]). A plus sign (+) is used to describe the operation of pressing multiple keys simultaneously. Commas (,) are used to describe the operation of pressing multiple keys in sequence.

Typographical style or symbol	Description	Example
[ ]	Represents a key on the keyboard.	[Return] key
[ ] + [ ]	When a plus sign is present between two keys, it means that the operator is to press the two keys simultaneously.	[Ctrl] + [c]

Chapter 1. Product Summary

The Wireless Data Logger WM1000 Series uses multiple sensor units to measure temperatures and then it sends the measured data to a PC through wireless communication to display and save the data on the PC.

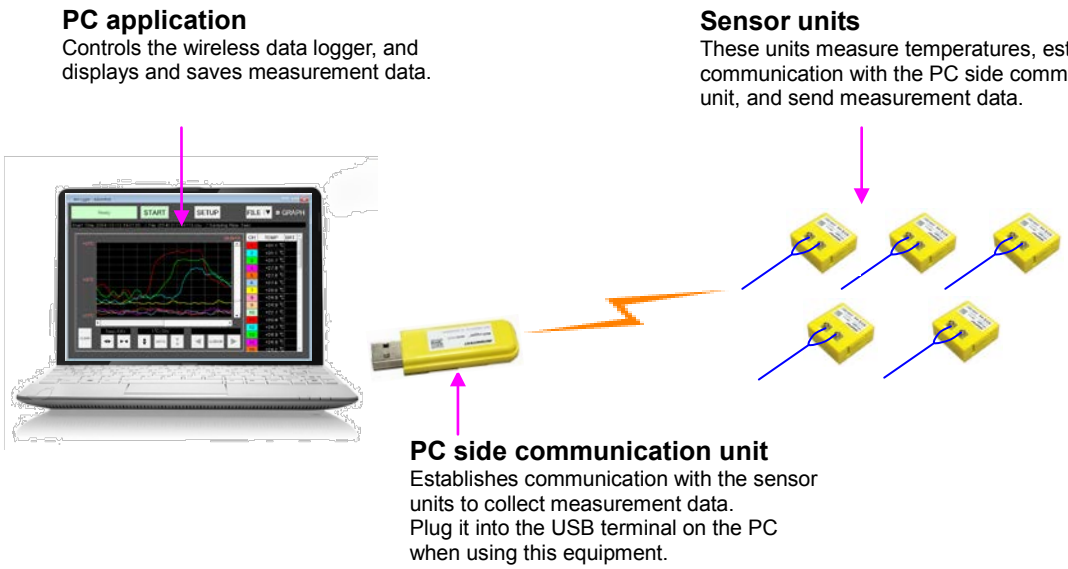
The main features of this equipment are as follows.

- The wireless system saves users the trouble of having to wire the system, eliminating wiring mistakes.
- The wireless system provides easy temperature measurement in enclosed spaces or of moving or rotating objects, whose temperature would otherwise be difficult to measure.

1.1 Part Names

This section describes the names of the parts of this equipment.

- System configuration

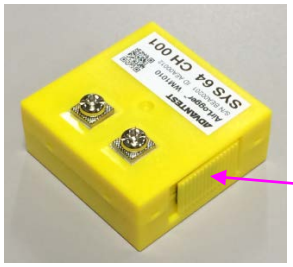


- Sensor unit

Thermocouple connecting terminal blocks

System No.

Channel No.



Power supply switch

- PC side communication unit

Chapter 2. Precautions

This chapter describes precautions for use of this equipment. Read this chapter carefully before using this equipment.

2.1 In the Event of a System Failure

If smoke comes from this equipment or if abnormal odor or noise is detected, turn off the power supply switch of the sensor unit and unplug the PC side communication unit from the USB terminal on the PC to disconnect this equipment and the PC. Then contact Advantest or an Advantest agent immediately.

2.2 Operating Precautions

When using this equipment, pay careful attention to the following points.

- **When the PC application is terminated, turn off the power supply switch of each sensor unit promptly. If the power of a sensor unit is on when the PC application is not running, the power consumption of the sensor unit will increase.**
- Do not heat a sensor unit beyond the heat resistant temperature range or put it in a fire.
- When measuring a high temperature, be careful not to let the heat reach the sensor unit(s).
- Do not insert the battery of a sensor unit with reverse polarity.
- Only use the specified type of battery for the sensor units.
- Do not overtighten the screws for the lids of the battery case and thermocouples. Tightening these screws too much may damage the case of the sensor unit.
- The batteries that come with this product are for checking the operation. Their service life is not guaranteed as new batteries.
- Do not let water get in this product.
- Do not take apart, repair, or modify this product by yourself.
- This equipment can cause malfunction of medical equipment such as pacemakers. Do not use this equipment near such equipment.
- Do not use this equipment in an environment with an intense electric or magnetic field.
- When measuring the temperature of a moving object, securely attach sensor units to the object.
- Do not give a strong shock to any unit of this equipment.
- Note that the communication may become unstable or the communication distance may become shorter depending on the radio wave environment and obstacles during use.
- WM1010 is designed to be used in Japan only.
- Use of this equipment in any manner that is not specified in this manual may impair the protection function of this equipment.

- When using a laptop(portable personal computer), it must have been evaluated as a Limited Power Source As defined in IEC,EN,UL, and CSA 60950-1.

2.3 Certification Mark on This Equipment

This equipment has a wireless module that has been certified as wireless equipment that enables advanced low-power data communication based on the Radio Act. Accordingly, a radio station license is not required for using this equipment. However, the user may be punished by law if any of the following acts are committed.

- Taking apart or modifying this equipment
- Erasing the certification mark or certification number printed on the components in this equipment

FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user’ s authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate(SAR).

This device complies with part 15 of the FCC Rules. Operation is subject to the following two

conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Chapter 3. Setting up the Equipment

This chapter describes the procedure for setting up this equipment from delivery to the user to the completion of the setup.

3.1 Checking the Delivered Product

When the product arrives, follow the steps below to check its appearance and accessories.

1. Check for visible signs of damage to the product.

WARNING	If any damage to the sensor units, PC side communication unit, or installation CD is found, do not use the product.

2. Check the quantity of the standard accessories against the list of standard accessories shown below. Also check each accessory for damage.

In any of the following cases, contact Advantest or an Advantest agent.

- The box in which the product was packed or the cushioning is damaged, or there is evidence that a large force was applied to the cushioning.
- There is external damage to the product.
- One or more of the standard accessories are missing or damaged.
- A problem is found when checking the operation of the product as described in the subsequent sections. If a problem is found during the operation check, refer to "7.6 Troubleshooting" to check if the problem is a failure of the system or not.

Standard Accessories

Name	Quantity
Sensor unit	10 or 1
Button battery (for checking the operation)	One for each sensor unit
PC side communication unit	1
PC software installation CD	1
User's guide (this manual)	1

3.2 Selecting an Installation Environment

Install this equipment in an environment that satisfies the following conditions.

- Ambient temperature
  - Sensor units: −15°C to +70°C (operating temperature range)
    −20°C to +75°C (storage temperature range)
  - PC side communication unit: +5°C to +45°C (operating temperature range)
    −20°C to +75°C (storage temperature range)
- Relative humidity
  - Sensor units: 85% or less (no condensation)
  - PC side communication unit: 85% or less (no condensation)
- Place where corrosive gas will not be generated
- Place that has little dust
- Place where there is not much vibration

3.3 Power Supply Conditions

Each sensor unit of this equipment uses a button battery as its power source. The specifications of this button battery are as follows.

Battery specifications

CR2032

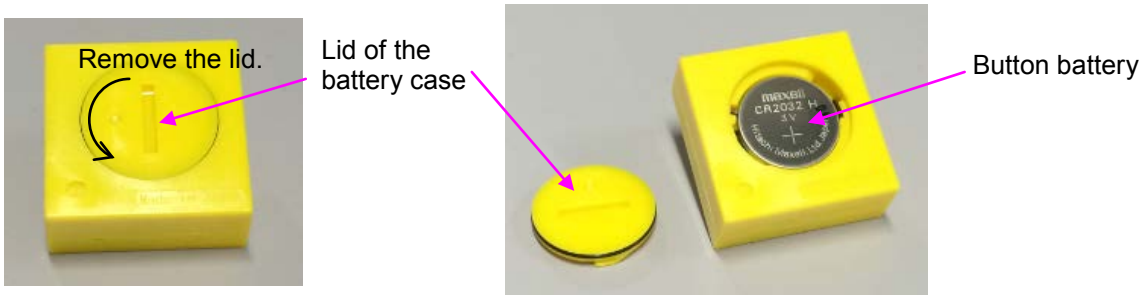
* Use a battery that can handle the operating temperature.

* Recommended battery: CR2032 of Hitachi Maxell, Ltd.

3.3.1 Replacing the Battery

If the battery of a sensor unit runs out, measurement can no longer be performed. Replace the battery.

Replace the battery as shown below.



(1) Use a coin or a similar item to turn the lid to remove it and then remove the button battery.

(2) Set a new button battery with the positive electrode facing up and then close the lid.

3.4 Installing the PC Application

This section describes how to install the PC application that controls this equipment.

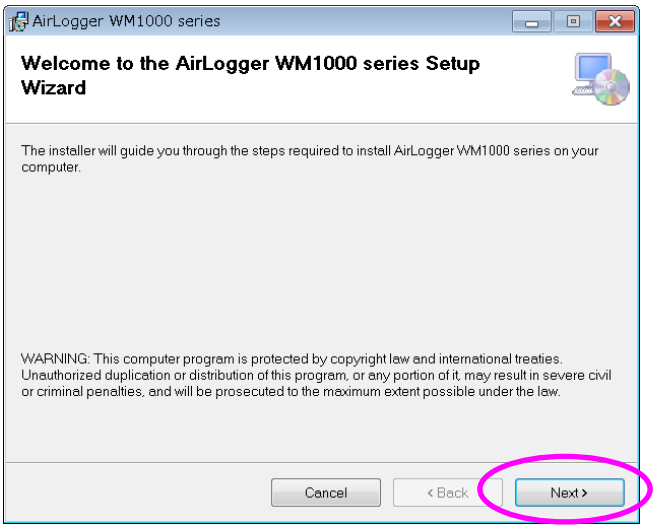
(1) Checking the environment of the PC on which to install the application

Confirm that the PC on which the PC application is to be installed satisfies the following conditions.

Item	Condition
OS	Windows 7 32-bit or 64-bit Windows 8 32-bit or 64-bit Windows 8.1 32-bit or 64-bit
Disk free space	10 MB or more
Memory capacity	2 GB or more

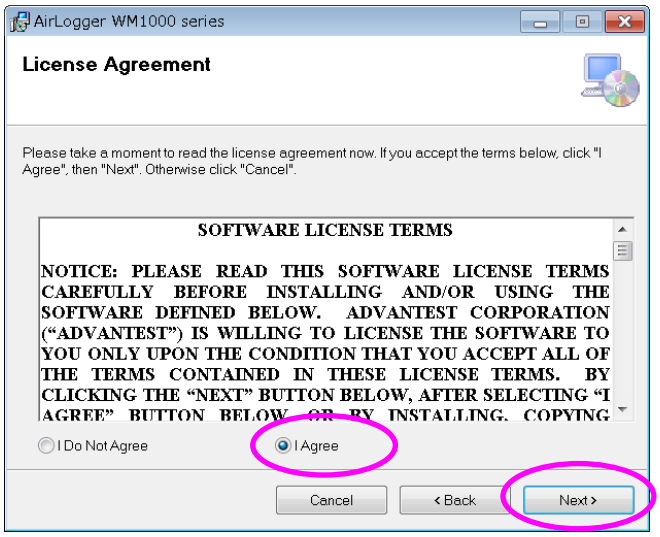
(2) Insert the accompanying CD-ROM into the drive and then double-click SetupAirLogger.msi on the CD-ROM.

The following window is displayed and installation starts.



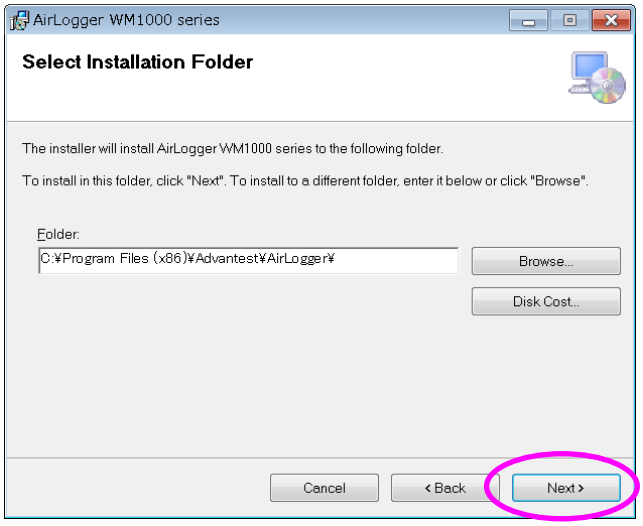
(3) Click [Next].

The license terms are displayed. Be sure to read them.



(4) If you agree with the terms of the license, click [Accept], and then click [Next].

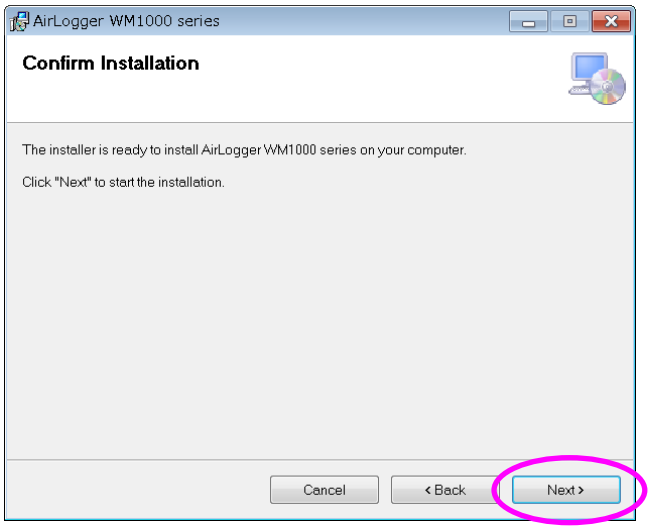
The installation folder is displayed.



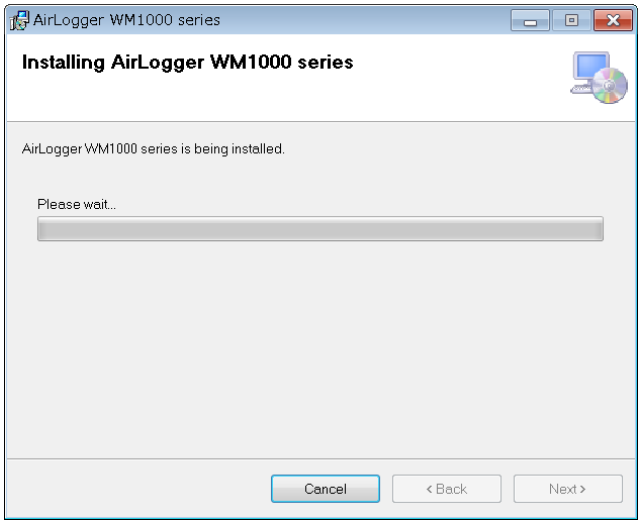
(5) To install the application in the displayed folder, click [Next].

To install the application in another folder, enter the address directly or click the [Browse] button to select the folder.

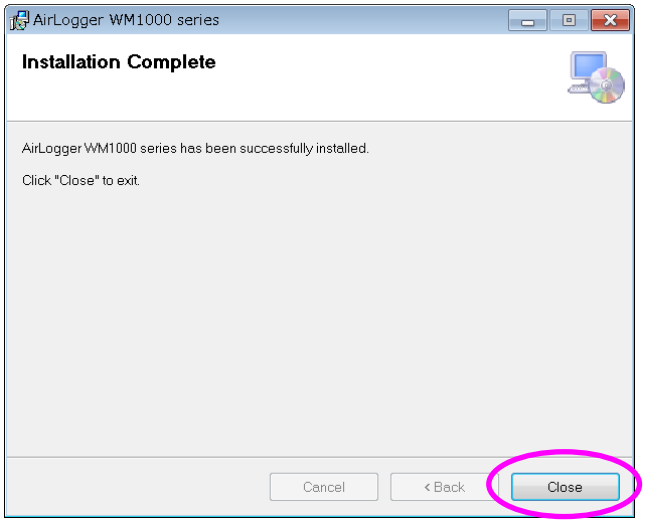
This completes the preparations for installation of the PC application.



(6) Click [Next] to start the installation.



When installation is complete, the following window is displayed.



(7) Click [Close] to terminate the installation.

When the installation is complete, the following shortcut icon is created on the desktop of the PC.

3.5 Uninstalling the PC Application

To uninstall the PC application, follow the steps below.

1. Open Control Panel of the Windows OS.
2. Click [Programs and Features].
3. Right-click the line containing [AirLogger] in the list of programs.
4. Click [Uninstall] in the pop-up menu to execute the uninstallation.

3.6 Updating the PC Application

To update the PC application, uninstall the old version of the PC application first, and then install the new version.

3.7 Setting up the Hardware

This section describes how to set up the hardware for practical use of this equipment.

(1) Connect the thermocouple to the thermocouple connecting terminal block of the sensor unit.

(2) Plug the PC side communication unit into a USB terminal on the PC.

(3) Turn on the power supply switch of the sensor unit and then attach the tip of the thermocouple to the measurement target.

Chapter 4. Basic Operation

This chapter describes the basic operations of the PC application for conducting a temperature measurement using this equipment.

4.1 Outline of the PC Application

The PC application is software used to control the wireless data logger and display/save the collected temperature data.

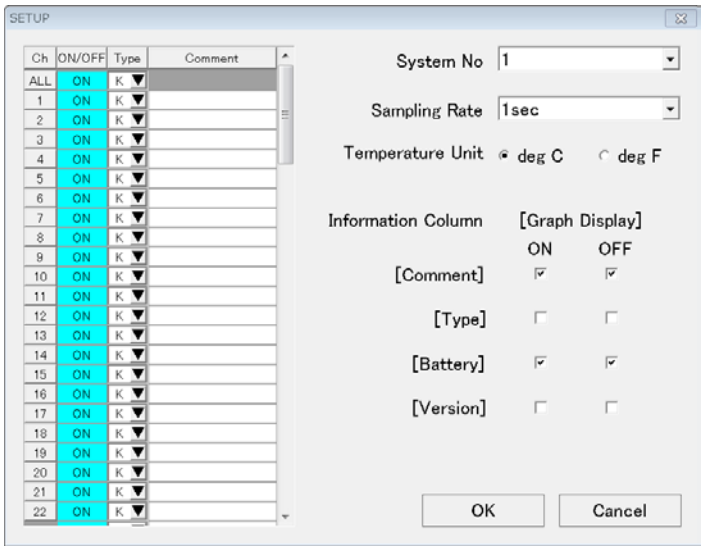
The PC application consists of two windows.

(1) Main window

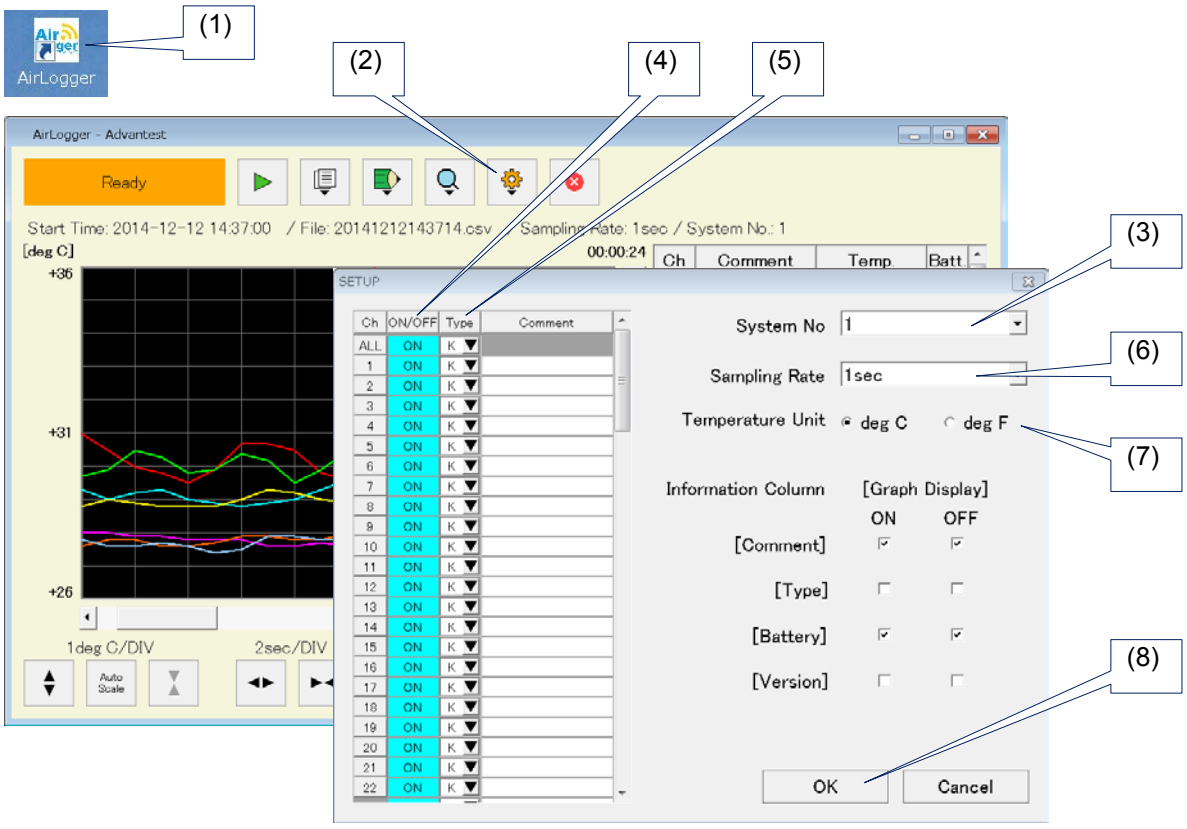
Displays and saves temperature data.

(2) Setup window

Used to set up the sensor unit(s).



4.2 Setting up the PC Application



(1) Double-click the shortcut icon of AirLogger on the desktop of the PC to start the PC application.

(2) Click  → [Setup] in the main window to display the setup window.

Note that when the PC application is started for the first time after installation, the setup window is displayed automatically.

(3) Enter the System No. of the sensor unit to be used.

(4) Set the channel number of the sensor unit to be used to ON.

To switch ON/OFF of all channels at once, use the [ON/OFF] setting of the channel labeled [ALL].

(5) Specify the thermocouple type of the sensor unit to be used.

To switch the thermocouple type of all channels at once, use the [Type] setting of the channel labeled [ALL].

(6) Specify the sampling rate.

When using 20 or more sensor units, the sampling rate cannot be set to shorter than one second.

(7) Select a unit of temperature data.

Select [deg C] for Celsius and [deg F] for Fahrenheit.

(8) Click the [OK] button to determine the settings.

4.2.1 Saving/Restoring Setup Information

To save the setup information, follow the steps below.

(1) Click  → [Export Setup] in the main window.

(2) In the file selection dialog box, specify a folder in which to save the setup information and a file name.

(3) Click the [Save] button to save the setup information.

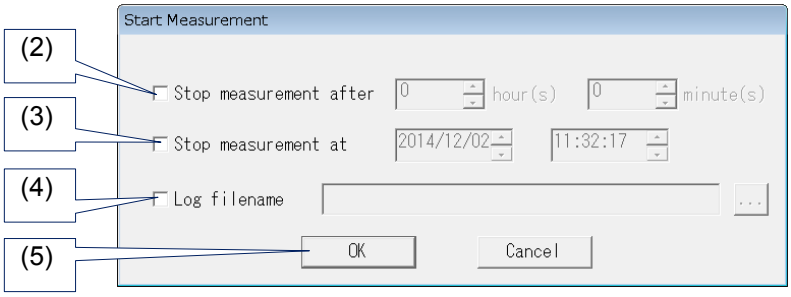
To restore the saved setup information, follow the steps below.

(1) Click  → [Import Setup] in the main window.

(2) In the file selection dialog box, select the file containing the saved setup information.

(3) Click the [Open] button to restore the setup information.

4.3 Starting a Temperature Measurement



(1) Click the  button in the main window.

The above dialog box is displayed.

(2) To stop the measurement after a specified amount of time has elapsed, select the [Stop measurement after] checkbox, and then enter the desired hours and minutes.

(3) To stop the measurement at a specific time on a specific day, select the [Stop measurement at] checkbox, and then enter the desired date and time.

If both the [Stop measurement after] checkbox and [Stop measurement at] checkbox are checked, the condition that comes first is used.

(4) To automatically save the measured temperature data to file, check the [Log Filename] checkbox, and then enter a file name.

(5) Click the [OK] button to start the measurement.
Measurement data is sequentially saved in the work data file during measurement.
The work data file is created in the following folder:

C:\Users\"Name of the user who has logged in"\Documents \Advantest\AirLogger\Log

The PC is prevented from entering sleep mode during measurement, regardless of the PC settings.
When the measurement is complete, the PC settings are enabled.

4.4 Status Display

The following statuses are displayed in accordance with the operating status of this equipment.

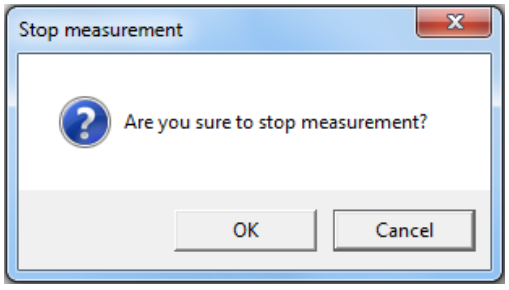
Status	Description
Not Ready	The PC side communication unit cannot be detected for some reason, such as the PC side communication unit not being plugged in to the USB

	terminal. It is possible to display saved temperature data and configure the SETUP settings in this state.
Ready	Measurement can be performed.
Measuring	A temperature measurement is in process.

4.5 Stopping a Temperature Measurement

(1) To stop a temperature measurement, click the  button in the main window.

(2) The following confirmation dialog box appears. Click [OK] to stop the measurement.



4.6 Zooming In and Out of the Graph Display Area

By operating the buttons located at the bottom of the graph display area, the graph display area can be zoomed in or zoomed out.

- Changing the display range of the time axis (X axis)

  Click the  (zoom in) button or the  (zoom out) button.

- Changing the display range of the temperature axis (Y axis)

  Click the  (zoom in) button or the  (zoom out) button.

- Automatically setting the display range of the temperature axis (Y axis)

  Click the  button.

4.7 Checking Temperature Data Using the Cursor

Use the cursor to see the measured values at an arbitrarily chosen timing.

(1) Click the button located at the bottom of the graph display area to switch the cursor between display and hide.

(2) When the cursor is displayed, the measured values at the point where the cursor is displayed are displayed in the [Temp] column in the sensor unit information area.

(3) Click the button or button located at the bottom of the graph display area to move the cursor to the point where you wish to read the measured values. Press and hold the mouse button to move the cursor continuously.

(4) The cursor can also be moved by clicking the mouse button at the point in the graph display area where you wish to read the measured values.

4.8 Displaying/Hiding the Graph of Each Sensor Unit

To only display the graph of a specific sensor unit in the graph display area, click the corresponding [Ch] column in the sensor unit information area.

4.9 Saving/Viewing Temperature Data

To save temperature data, follow the steps below.

(1) Click  → [Save Data] in the main window.

(2) In the file selection dialog box, specify a folder in which to save the data and a file name.

(3) Click the [Save] button to save the temperature data in CSV format.

To load and view saved temperature data, follow the steps below.

(1) Click  → [Load Data] in the main window.

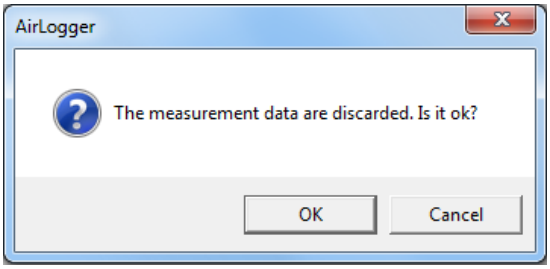
(2) In the file selection dialog box, select the file containing the saved temperature data.

(3) Click the [Open] button to load the temperature data.

4.10 Notes on System Operations after Measurement Is Complete

If any of the following operations is attempted without saving the temperature data after a measurement is complete, a confirmation dialog box is displayed.

- Clicking  to start another measurement
- Clicking  → [Setup] to display the setup window
- Clicking  → [Load Data] to load a temperature data file.
- Clicking  → [Import Setup] to restore setup information



Clicking the [OK] button of the confirmation dialog box will discard the temperature data.

To keep the temperature data, follow the steps below.

(1) Click [Cancel] of the confirmation dialog box to close the dialog box.

(2) Click  → [Save Data] to save the temperature data to a file.

(3) Then execute the operation you were going to perform.

Chapter 5. Other Operations

This chapter describes operations other than those for the basic usage of the PC application described in the previous chapter.

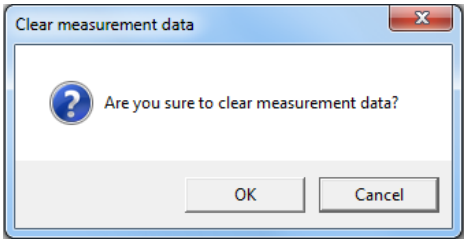
5.1 Deleting All or Part of the Temperature Data

To delete all or part of the temperature data, follow the steps below.

- Deleting all of the temperature data

(1) Click  → [Clear All Data].

(2) The following dialog box is displayed. Click [OK].



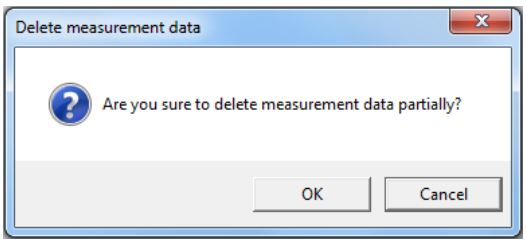
- Deleting the temperature data up to a specified time from measurement start

(1) Click the  button located at the bottom of the graph display area to display the cursor.

(2) Move the cursor to the desired end point of the part to be deleted.

(3) Click  → [Delete Data Before Cursor].

(4) The following dialog box is displayed. Click [OK].



- Deleting the temperature data from a specified time to the end of the measurement

(1) Click the  button located at the bottom of the graph display area to display the cursor.

(2) Move the cursor to the desired starting point of the part to be deleted.

(3) Click → [Delete Data After Cursor].

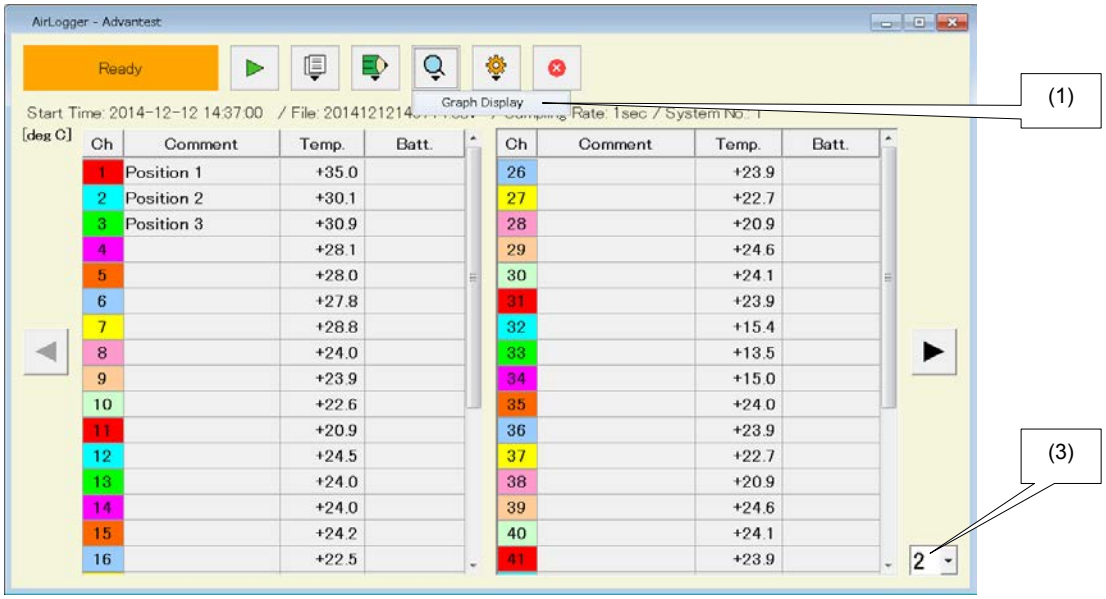
(4) The previously shown dialog box is displayed. Click [OK].

5.2 Displaying/Hiding the Graph Display Area

(1) By clicking → [Graph Display] in the main window, the graph display area can be displayed or hidden.

(2) When the graph display area is hidden, the sensor unit information area is displayed using the entire main window.

(3) In this case, the number of rows for displaying sensor units can be specified in the main window. The number of rows can be selected from 1, 2, and 4.



5.3 Displaying Information on Sensor Units

The following pieces of information can be displayed in the sensor unit information area.

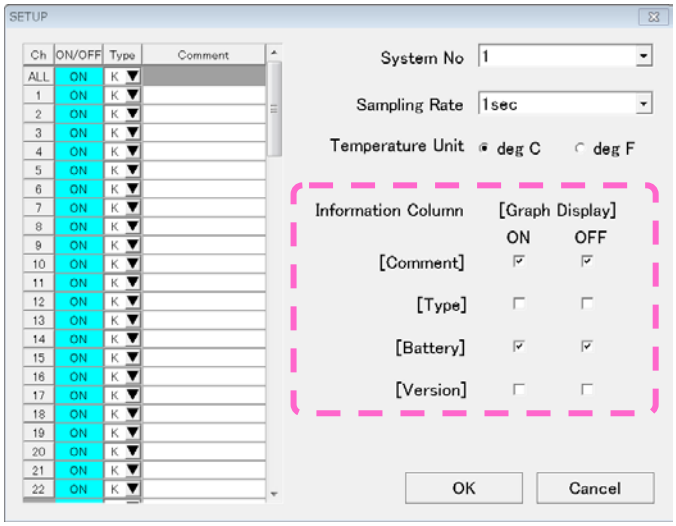
Column name	Description
Ch.	Displays channel numbers of the sensor units. The background color of each channel number shows the color of the corresponding waveform data in the graph display area.

	Click this column to display or hide the waveform data.
Temp.	Displays the current measured values during measurement. If temperature data cannot be collected for some reason such as poor communication, "Lost" is displayed in red in the relevant cell. If temperature data is outside of the measurable range, "Out of Range" is displayed in the relevant cell. When the cursor is displayed, the measured values at the cursor position are displayed.
Comment *1	Displays the comment set to each channel.
Batt. *1	Displays the remaining battery level of each channel. The reference values of the remaining battery level are as follows. Battery mark in yellow: The battery will run out in about one day (when the sampling rate is one second). Battery mark in red: The battery will run out in about three hours (when the sampling rate is one second).
Ver. *1	Displays the firmware version number of each channel.
Type *1	Displays the thermocouple type set to each channel.

*1: These columns can be switched between display and hide. Switching is performed in the setup window.

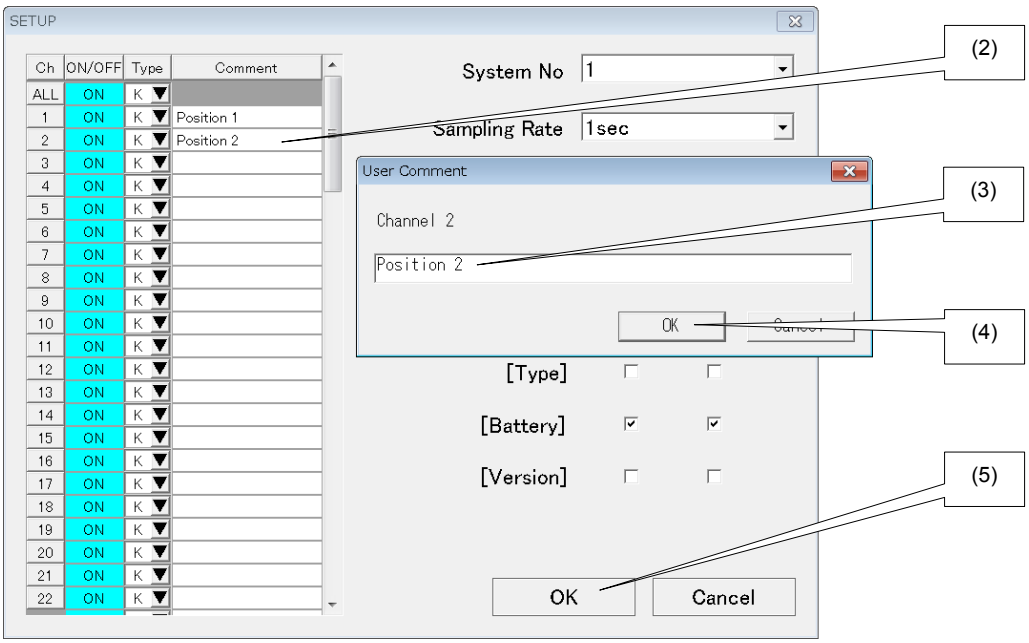
To display or hide each of these columns, select or deselect each checkbox of [Comment], [Type], [Battery], and [Version] in the setup window.

This setting for displaying or hiding each of these columns can be made separately for when the [Graph Display] menu in the main window is ON and OFF.



5.4 Entering a Comment for a Sensor Unit

In the setup window, a comment can be entered for each sensor unit.



(1) Click  → [Setup] in the main window to display the setup window.

(2) In the displayed list of sensor units, click the comment column of the channel number for which a comment is to be entered.

(3) A dialog box for entering a comment appears. Enter a comment.

(4) Click [OK] to close the dialog box.

(5) Repeat the above steps to enter a comment for each channel number as needed.

(6) When finished entering comments, click [OK] in the setup window.

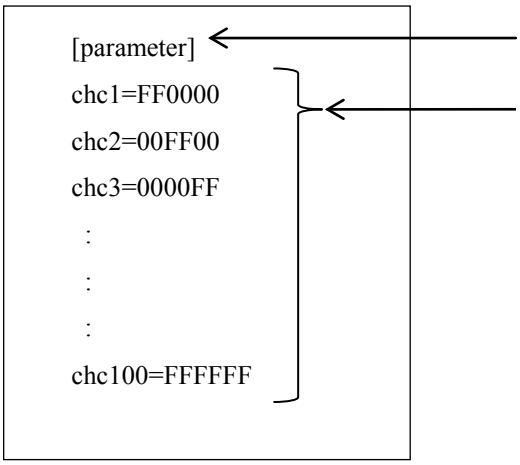
(7) The entered comments are displayed in the comment column in the sensor unit information area in the main window.

5.5 Specifying Colors in the Graph Display Area

To specify colors for the sensor units displayed in the graph, follow the steps below.

(1) Use a text editor (e.g., Notepad) to create a text file named "define.ini" that contains the following information.

define.ini



Write this keyword on the first line of the file.

Starting from the second line, enter a value for the color of each channel of the sensor units you wish to change. Only enter values for the channel numbers you wish to change.
Syntax:
chc"channel number"="color setting"
To set a color, set eight bits at a time in hexadecimal notation in the order of RGB (red, green, and blue).
Example:

chc1=FF0000 ← Channel 1 is set to red.

chc2=00FF00 ← Channel 2 is set to green.

chc3=0000FF ← Channel 3 is set to blue.

chc4=FFFFFF ← Channel 4 is set to white.

(2) Place the created "define.ini" file in the following folder:

C:\Users\username\Documents\Advantest\AirLogger\Setup

("username" represents the name of the user who has logged in.)

This folder is automatically created when the PC application is used even once.

(3) Restart the PC application.

The descriptions in the "define.ini" file will not be reflected in the PC application unless the PC application is restarted.

5.6 Correcting Temperature Error

If the resistance of the thermocouple is too large such as when the thermocouple connected to a sensor unit is relatively long (several meters or longer), the error in measured temperature value will be significant. (Refer to Section 5.6.1, "How Temperature Errors Occur.")

Recommended resistance value: 10 Ω or less

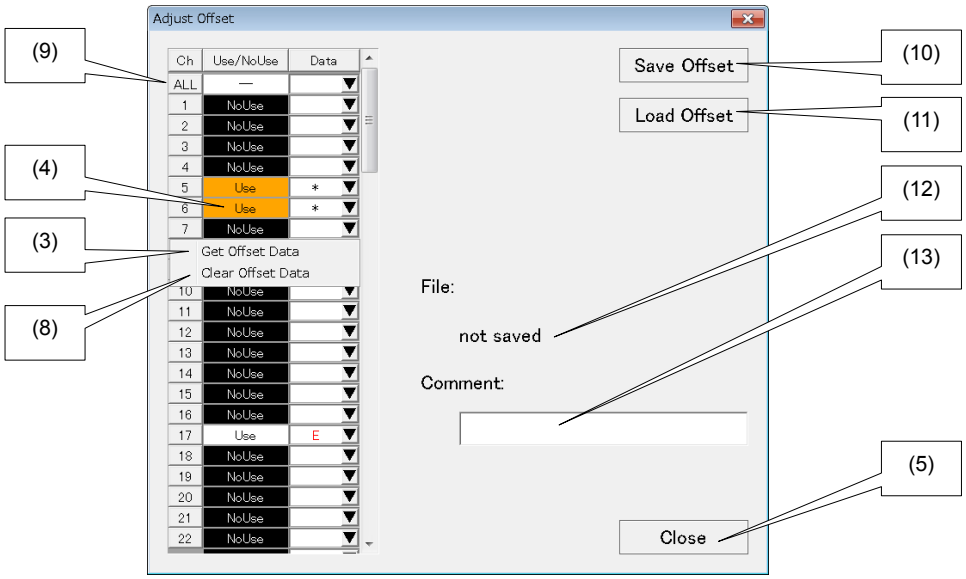
Reference: Length of a thermocouple whose resistance value is 10 Ω

Wire diameter	K type	T type	J type
0.2 mm	Approx. 30 cm	Approx. 60 cm	Approx. 50 cm
0.32 mm	Approx. 80 cm	Approx. 160 cm	Approx. 130 cm
0.65 mm	Approx. 330 cm	Approx. 660 cm	Approx. 550 cm

To correct these errors, follow the steps below.

(1) Turn on the power of the sensor unit that is to be corrected, and set the temperature of both the unit body and the tip of the thermocouple to be the same at room temperature.

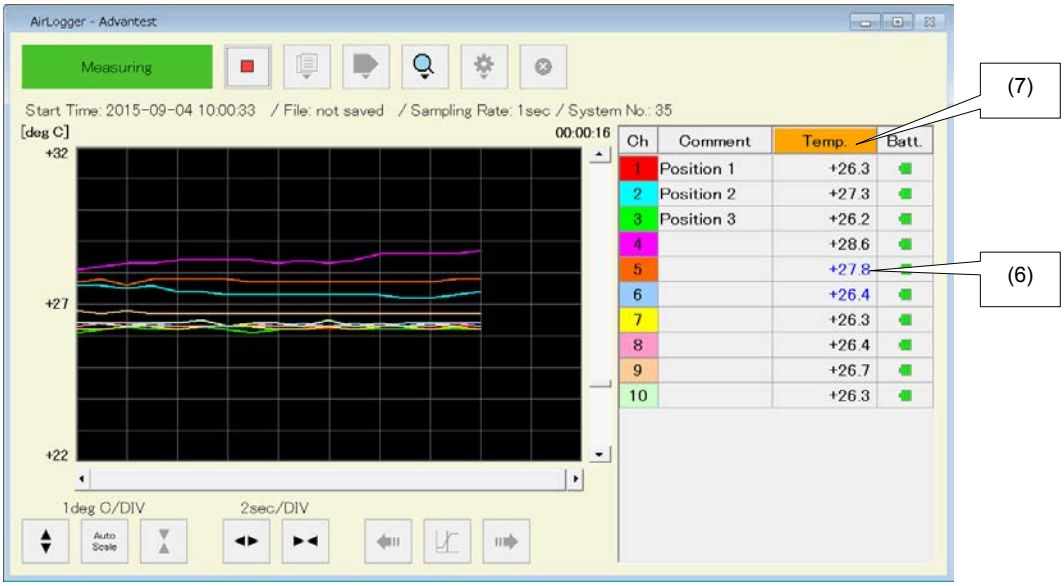
(2) Click  → [Adjust Offset] in the main window to display the Adjust Offset dialog box.



(3) Click ▼→ [Get Offset Data] in the Data column of the number of the channel whose data is to be corrected to obtain the offset value to correct the temperature.
When the offset value has been obtained successfully, "*" is displayed in the Data column.
When the offset value was not obtained successfully because of faulty communication or some other reason, a dialog box saying "Failed to get offset data" is displayed and "E" is displayed in red in the Data column.

(4) Click the Use/No Use column of the number of the channel whose data is to be corrected to select whether to make the correction by using the offset value or without using the offset value in measurement. To make a correction using the offset value, select [Use].

(5) If there are multiple channels whose data is to be corrected, repeat steps (3) and (4), and click [Close] when finished.



(6) When the measurement starts, the corrected temperature values are displayed in blue.

(7) If there is even one channel for which the temperature value has been corrected, the background color of the [Temp.] label turns orange.

In the Adjust Offset dialog box, you can also carry out the following operations, in addition to the above operations.

(8) To discard the offset value, click ▼→ [Clear Offset Data] in the Data column of the target channel number.

(9) By using [Use/No Use] and [Data] of [ALL], you can carry out an operation at once for all channels.

(10) To save the information in the Adjust Offset dialog box to a file, click [Save Offset].

(11) To load the information of the Adjust Offset dialog box saved to a file, click [Load Offset].

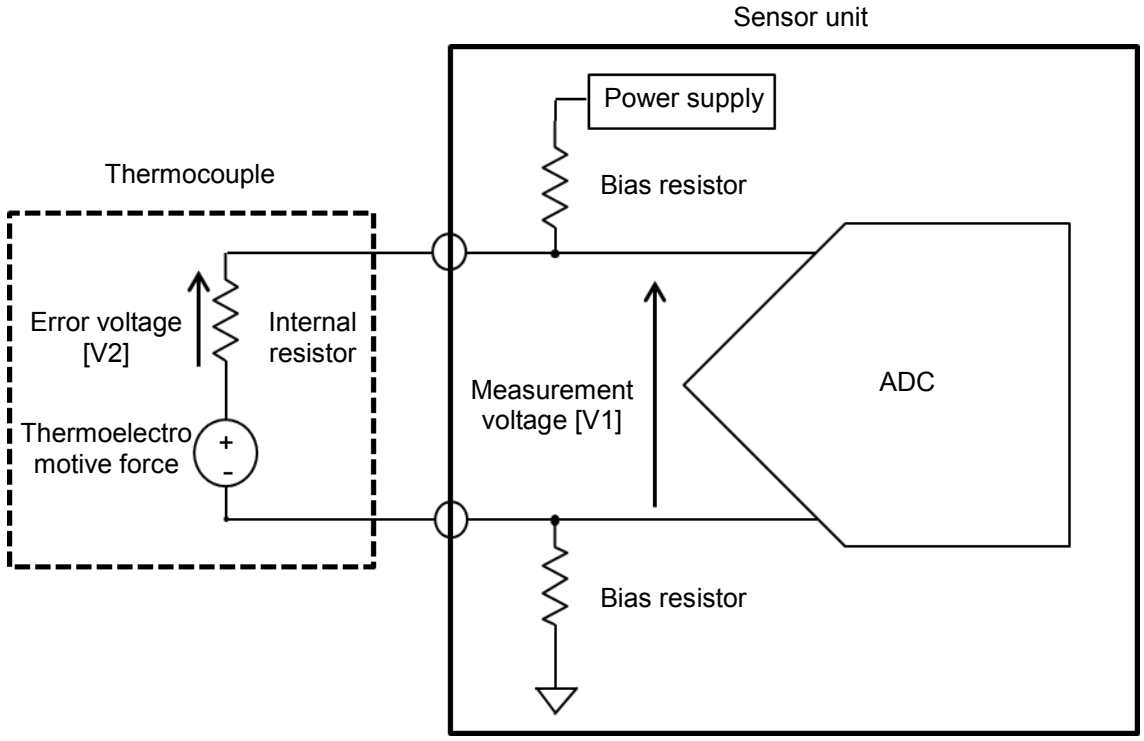
(12) The name of the file that has been saved or loaded is displayed under the [File] label.
If the information in the dialog box is changed after the information has been saved or loaded, "*" is displayed after the file name.
If the information in the dialog box has not been saved to a file, "not saved" is displayed.

(13) You can enter comments in the Comment field before saving the information to a file.

5.6.1. How Temperature Errors Occur

This section describes how a temperature error occurs.

The equivalent circuit for temperature measurement is as follows.



A sensor unit configures a circuit with bias resistors and a power supply through a thermocouple.

In temperature measurement, the voltage difference between both ends of the thermocouple are measured (measurement voltage [V1]). At this time, because the current flowing to the bias resistors flows to the thermocouple, a voltage difference is generated by the internal resistor in the thermocouple (error voltage [V2]). Therefore, the measurement voltage [V1] is calculated as a sum of the thermoelectromotive force and the error voltage [V2] that is generated by the internal resistor.

When the thermocouple is short, the internal resistance is small, and thus the error voltage [V2] will be negligibly small. However, if the thermocouple is several meters long or longer, the internal resistance will be large, and accordingly, the error voltage [V2] will no longer be negligibly small.

The function that subtracts the error voltage [V2] from the measurement voltage [V1] in calculation is Adjust Offset.

Chapter 6. Specifications

This chapter describes the specifications of this equipment. Unless otherwise stated, the performance of this equipment can be guaranteed under the following conditions.

- Calibration is performed on schedule.

Reference data is provided solely for facilitating effective use of the product. It is not a guarantee of performance. These pieces of data are indicated using the notation shown below.

Specification (spec.):	Indicates guaranteed product performance. Specifications take into account variations between individual products, measurement uncertainty at time of calibration, and environment-induced changes in performance.
Typical value (typ.):	Indicates average product performance. It does not take into account variations between individual products, measurement uncertainty, or environment-induced changes in performance.
Nominal value (nom.):	Indicates general product data and does not indicate the performance level of the product.

6.1 Performance Data

Item	Specification (WM1000, WM1010)
Maximum number of connected sensor units	100/system
Communication distance	Line-of-sight communication: Up to 10 m (nom.)
Measurement function	Thermocouple temperature measurement
Supported thermocouples	K, T, J
Temperature measurement range	K: –200°C to +1300°C T: –200°C to +400°C J: –200°C to +1000°C
Temperature measurement resolution	0.1°C
Temperature measurement accuracy Ambient temperature of sensor units 25±5°C * Accuracy of thermocouple not included	K: −100 to +1300°C ±(0.2%+1.3°C) –200 to –100°C ±(0.2%+1.7°C) T: −100 to +400°C ±(0.2%+1.3°C) –200 to −100°C ±(0.2%+1.7°C) J: −100 to +1000°C ±(0.2%+1.2°C) –200 to –100°C ±(0.2%+1.4°C)
Temperature sampling rate	With 20 or less sensor units 100 msec, 200 msec, 500 msec, 1 sec, 2 sec, 5 sec, 10 sec, 1 min, 5 min, 10 min With 21 to 100 sensor units 1 sec, 2 sec, 5 sec, 10 sec, 1 min, 5 min, 10 min
Measurement timing error (between sensor units)	±5 ms
PC I/F	USB 2.0 (PC side communication unit)
Data file (measurement data)	Saving/loading function (file format: CSV) Maximum number of points recorded (per channel): 10,000,000 points
Resistance against vibration	Equivalent to JIS_D1601_Type 1_Type C
Dustproof/waterproof performance	Equivalent to IP54

6.2 General Specifications

Item	Specification (WM1000, WM1010)
Operating environment range	Sensor units: –15 to 70°C, 5 to 85%RH (When CR2032 of Hitachi Maxell, Ltd. is used) PC side communication unit: 5 to 45°C, 5 to 85%RH No condensation Indoor use, pollution Degree: 2, at an altitude of up to 5000 meters
Storage environment range	Sensor units: –20 to 75°C, 5 to 85%RH PC side communication unit: –20 to 75°C, 5 to 85%RH No condensation
Power supply for sensor unit	Button battery: CR2032 (Hitachi Maxell, Ltd. brand is recommended) Battery service life: 15 days maximum when continuously used with a sampling rate of one second Includes remaining battery level display. Rated voltage: 3.3 V
Power supply for PC side communication unit	-
Outer dimensions	Sensor units: 35 mm × 35 mm × 14.5 mm PC side communication unit: 62 mm × 21 mm × 10 mm
Weight	Sensor units: 20 g (including battery) PC side communication unit: 10 g
certification of wireless	JAPAN: technical standards conformity USA: FCC compliance

Chapter 7. Maintenance

This chapter describes information on maintenance for maintaining the performance of this product.

7.1 Cleaning

This section describes how to clean the mechanical unit of this product as well as notes on cleaning.

WARNING Never open the plastic cases of the units to clean the inside of them.

- Cleaning the plastic case

  To clean the plastic cases of this equipment, be careful about the following points.

  Wipe the plastic case with a soft, dry cloth.

  If the dirt does not come off, wipe it with a damp cloth with a diluted solution of neutral detergent.

  Then wipe it with a soft, dry cloth.

Note Do not let water get inside the plastic case. Do not use organic solvents such as benzene, toluene, xylene, and acetone, or cleanser to clean the plastic cases. Doing so may deform and/or deteriorate the plastic case.

7.2 Calibration

Calibration should be performed periodically in order to prevent performance degradation of the equipment (or to adjust for changes over time). We recommend performing calibration once a year.

Send the equipment back to Advantest for calibration. For details, contact Advantest or an Advantest agent.

7.3 How to Store This Equipment

Store this equipment in the following environment.

- Place where there is not much vibration
- Place where there is little dust
- Place where the equipment will not be exposed to direct sunlight
- Temperature range: –20°C to +75°C
- Humidity range: 5% to 85%

Remove the battery from each unit before storing this equipment.

When not using this equipment for a long period of time (more than 90 days), store it with a desiccant in a moisture-proof bag.

7.4 Requesting Periodic Calibration or Other Action for This Equipment

To request that Advantest perform calibration or some other task on this equipment, send an email including the following information to the email address shown below.

- Company name and address
- Name of the contact
- Product ID (found on the sticker attached to this equipment)
- Details of the request

Send the email to: support_wm@advantest.com

ADVANTEST CORPORATION

New Concept Product Initiative

1-5, Shin-tone, Kazo-shi, Saitama 349-1158, Japan

7.5 List of Error Messages

This section describes error messages displayed due to functional restrictions or errors in the operation of this equipment.

Message displayed	Description
Set the system number correctly.	This message is displayed when [OK] is clicked without setting a System No. in the setup window. Set the System No. correctly.
Stopped measurement because DEVICE ERROR occurred.	This message is displayed when the connection to the PC side communication unit is severed during measurement. One possible cause is that the PC side communication unit has been pulled out of the USB terminal. Measurement stops when this error message is displayed.
Stopped measurement because the number of measurement data exceeded the maximum value (0xFFFFFFFF).	This message is displayed when the number of measured data items has exceeded 0xFFFFFFFF during measurement, which is the maximum number of data items that can be stored. Measurement stops when this error message is displayed.
There is no data to save.	This message is displayed when temperature data to be saved to file does not exist.
Failed to save data to the file.	This message is displayed when temperature data or setup information was not successfully saved to file. The following cause is possible. • The user does not have write access for the destination folder.
Failed to read data from the file.	This message is displayed when temperature data or setup information was not loaded successfully from a file. The following cause is possible. • The specified file does not exist. • The specified file was of the wrong format. • The user does not have read access to the specified folder or file.
Set time to stop measurement correctly.	This message is displayed when the [Stop measurement after] checkbox in the [Start Measurement] dialog box is selected and [OK] is clicked with hour(s) and minute(s) set to 0 at the start of measurement. Set the measurement stop time correctly.

Set the data file name.	This message is displayed when the [Log filename] checkbox in the [Start Measurement] dialog box is selected and [OK] is clicked without setting the file name at the start of measurement. Set a data file name.

7.6 Troubleshooting

If a problem occurs with this equipment, check this section first before judging that the problem is a malfunction.

No.	Problem	Item to check/Action to take
1	Temperature data is not displayed even after measurement has started.	1. Is the System No. setting in the setup window correct? Check the System No. printed on the sticker attached to each sensor unit, and then set the correct system numbers in the setup window. 2. Is the power supply switch of each sensor unit set to OFF? Turn on the power supply switch of each sensor unit, and then start measurement. 3. Has the battery of the sensor unit run out? Check the display of the remaining battery level in the main window for each sensor unit, and if the battery has run out, replace the button battery with a new one. 4. Is the contact between the button battery and the sensor unit good? If the remaining battery level in the main window still shows empty even after a new battery is inserted, take the battery out of the case, and then put it in the case again.
2	Correct temperatures are not displayed.	1. Is the thermocouple type set correctly in the setup window? Check the thermocouple type used, and if it is incorrect, set the correct type in the setup window. 2. Did you connect the thermocouple electrodes with reverse polarity? Check the positive and negative marks shown on the sensor unit, and then connect the thermocouple correctly.

		3. Is the thermocouple connected securely? Confirm that both ends of the thermocouple are secured with screws.
3	The temperature display shows [Out Of Range].	1. Is the thermocouple disconnected or damaged? Replace it with a working thermocouple.
4	Temperature data is not displayed continuously.	1. There is a possibility that reception is poor. To check whether it is a failure of the equipment or poor reception, place the sensor unit close to the PC, and then check to see if the equipment works correctly.
5	The status of the PC application does not show [Ready] even after the PC side communication unit has been plugged into the USB terminal.	1. There are cases where USB devices are not recognized for some reason. Restart Windows, and then check to see if the equipment works correctly.

If you still have trouble, email us at support_wm@advantest.com.

7.7 Product Disposal and Recycling

When disposing of the product, follow the applicable waste-disposal laws and regulations that are established by the municipality and country. Before disposing of the product, separate and collect the parts listed below to prevent any substances that may harm the global environment, humans, and ecosystem from being spread.

Name of part or material	Used or not used	Unit	Parts and materials
Capacitor containing polychlorinated biphenyl (PCB)	Not used		
Parts containing mercury	Not used		
Battery	Used	Sensor unit	Coin-type lithium battery
Printed circuit board	Used	Sensor unit PC side communication unit	Printed board
Toner cartridge	Not used		
Plastic containing brominated flame retardants	Used	Sensor unit PC side communication unit	Diodes and transistors ICs and other packages
Asbestos and parts containing asbestos	Not used		

Cathode-ray tube	Not used		
Chlorofluorocarbon, hydrochlorofluorocarbon, hydrofluorocarbon, or hydrocarbon	Not used		
Discharge lamp	Not used		
Liquid crystal display of 100 cm^2 or larger	Not used		
External electric cables	Not used		
Parts containing refractory ceramic fiber	Not used		
Parts containing radioactive materials	Not used		
Electrolytic capacitor containing hazardous substances (Height > 25 mm, diameter > 25 mm, or equivalent volume)	Not used		
Cadmium and cadmium compounds	Not used		
Lead and lead compounds	Used	Sensor unit PC side communication unit	Resistors and packages such as ICs
Rust-preventive agent	Not used		
Coolant	Not used		

Battery :

Perchlorate Material – special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchlorate.

TERMS AND CONDITIONS OF SALE

These Terms and Conditions ("Terms") together with, exhibits and/or the other terms indicated on the Advantest quotation and sales order acknowledgement shall govern the sale of Product(s) and the license of Software by Advantest Corporation ("Advantest").

1. DEFINITIONS

a. "Applicable Trade Term" means the term as defined in the then current version of the Incoterms, agreed by the parties, and documented in the quotation.

b. "Consumable(s)" means a spare part whose life expectancy and mode of failure is known or predictable during the normal operation of the Product.

c. “Custom Product(s)” means those Products that Advantest manufactures, develops or customizes in accordance with customer provided specifications and requirements.

d. "Delivery Date" means the date when Advantest places the Product(s) at customer’s or customer’s representative’s disposal at the address agreed to by Advantest in accordance with the Applicable Trade Term.

e. "Part(s)" means any hardware accessories, parts, sub-assembly, complete assembly, instrument of any Product and peripherals which are installed in, used with Products. Parts do not include Consumables.

f. "Product(s)" means Wireless Battery Chargings and its Consumables, Parts, and Third Party Products sold and/or Software licensed under these Terms that are available for purchase upon Advantest’s receipt of customer’s order.

g. "Software" means one or more computer programs or firmware in object code format, whether stand-alone or bundled with other Products, and related documentation provided to customer under these Terms.

h. "Specifications" mean specific technical information about Products, which is published by Advantest and in effect on the date Advantest ships customer's order.

i. “Third Party Products” mean non-Advantest branded products purchased from a third party and sold by Advantest to customers under the brand name of the third party.

2. PRICES

a. Prices shall be quoted in accordance with the Applicable Trade Term. Prices are valid for the period indicated on the quotation. Notwithstanding the foregoing, Advantest reserves the right to adjust its prices and fees at any time without prior notice, provided, however, that orders accepted by Advantest prior to the effective date of such adjustments shall not be subject thereto.

b. Prices exclude any sales, value added, use, withholding or other similar tax and charges and/or any import duties or other assessments imposed by any government or taxing authority (collectively, "sales related taxes and assessments"), all of which shall be payable by customer in addition to the purchase price if applicable. If exemption from taxes is claimed, customer shall provide a certificate of exemption. Unless otherwise stated in Advantest’s invoice, customer agrees to pay any and all such sales related taxes and assessments in connection with these Terms or any order. As may be required by such government or taxing authority, Advantest is entitled to adjust or gross up the invoice price in order to recover such sales related taxes and assessments.

3. ORDERS, CANCELLATIONS AND RETURNS

a. All orders are subject to acceptance by Advantest. Product orders shall specify a Delivery Date within three (3) months from order date.

b. Product returns shall be subject to Advantest's approval and return/refurbishment charges.

c. Product orders require manufacture of customer-specific configurations. Any changes to Delivery Dates or configurations after the initial order date may require a revised quotation and/or price change.

d. Unless otherwise stated herein, customer may cancel any order for Products upon written notice to Advantest. Cancellation charges shall apply to such Products (but excluding Consumables and Parts) as follows: twenty percent (20%) of the net Product price if cancelled no later than fifteen (15) days prior to the scheduled Delivery Date; forty percent (40%) of the net Product price if cancelled between eight (8) and fourteen (14) days prior to scheduled Delivery Date; and sixty percent (60%) of the net Product price if cancelled eight (8) days or less prior to the scheduled Delivery Date. Notwithstanding the foregoing, cancellation of Third Party Products and Custom Products (excluding probe cards) is subject to a cancellation charge of up to one hundred percent (100%) of the net price.

e. Product orders where the Delivery Date is rescheduled and subsequently cancelled by customer is subject to cancellation charges as set forth in Section 3.d. above. The date customer initially reschedules the Delivery Date shall be used to determine the cancellation charge. Customer rescheduled Delivery Dates that result in orders that are not delivered within one (1) month of the original Delivery Date date are deemed to be cancelled and are subject to cancellation charges as set forth in Section 3.d. above.

f. If customer requires Advantest to use any specific ERP or similar business management software application or tool in connection with customer's purchase of any Advantest Products that is chargeable to Advantest, customer shall bear all costs for Advantest's use of such software application or tool including, without limitation, the cost of any annual or recurring subscription or licensing fees. Advantest reserves the right to either include such charges on any invoice for Products provided in connection with these Terms or separately invoice such charges to customer.

4. SHIPMENT AND RISK OF LOSS

a. Advantest shall make commercially reasonable efforts to meet the Delivery Date and shipment requirements. Any Delivery Date quoted or otherwise given is only an estimate. If Advantest is unable to meet the Delivery Date and shipment requirements, alternative arrangements may be agreed. In the absence of such agreement, customer's sole remedy is to cancel the order.

b. Risk of loss and damage shall pass to customer at the address agreed to by Advantest in accordance with the Applicable Trade Term.

5. ACCEPTANCE

a. Customer's acceptance shall occur upon the delivery according to the Applicable Trade Term.

b. Any special acceptance procedures shall be agreed to by Advantest's authorized representative in writing prior to receipt of customer's order.

6. PAYMENT

a. Payment terms are subject to Advantest credit approval. All payments due hereunder shall be made within thirty (30) days from Advantest's invoice date. Advantest may change credit or payment terms at any time should customer's financial condition or previous payment record so warrant.

b. Advantest, at its sole option, may assess a fee for any late payments at a rate of one and one half percent (1.5%) per month, or the maximum permitted by law, if less.

c. Advantest may suspend or discontinue performance if customer fails to pay any sum due, or fails to perform under these Terms if, after five (5) days written notice, the failure has not been cured.

d. Notwithstanding anything to the contrary in these Terms and to the extent permissible by law, as collateral security for the payment of the purchase price of Products, customer hereby grants Advantest a security interest (mortgage by transfer) in each of the Product(s) sold or to be sold under these Terms and in the proceeds thereof prior to customer paying Advantest the purchase price for such Product(s), in the amount of such Product(s) purchase price. The security interests in such Product(s) shall be satisfied by payment in full of such Product(s) purchase price. Customer hereby appoints Advantest as its attorney-in-fact to execute and file with any appropriate government agency or appropriate authority

any financing statement(s) and other similar instruments to perfect its security interest in the Products sold and in the proceeds thereof. Customer shall execute and deliver such further documents and do such other acts and things as Advantest may reasonably request in order to effect fully the purposes of these Terms.

7. WARRANTY

a. Unless otherwise specifically agreed by customer and Advantest in writing, Advantest warrants that Products (other than Consumables and Third Party Products) shall be free from defects in material and workmanship and shall conform to its Specifications during the Warranty Period.

The Warranty Period is :

b. (i) twelve (12) months from the Delivery Date for Products.Advantest warrants that Software will not fail to execute its programming instructions due to defects in materials and workmanship when properly installed and used on the hardware designated by Advantest and will substantially conform to its Specifications and documentation as they exist on the Delivery Date for a period of twelve (12) months following its Delivery Date. In addition to any other warranty limitations in these Terms, Advantest does not warrant that Software will operate in hardware and software combinations selected by customer, or meet requirements specified by customer.

c. This warranty (and all of Advantest's obligations with respect thereto) terminates and is void in the event that, without Advantest's prior written consent, (i) the Product is moved from its original delivered country or (ii) the Product is sold by the customer to a third party.

d. The warranty provided herein is extended solely to customer and not to any third party.

e. This warranty does not apply to defects or damages to the Product or any parts or components thereof resulting from any of the following:

(i) any improper or inadequate maintenance, any improper or inadequate site preapration, handling, unauthorized modification, carriage or storage of the Product by the customer or any third party (other than Advantest or its agents);

(ii) use of the Product not in conformance with or under operating conditions or environments different than those specified in the Specifications or the operation manual or recommended in writing by Advantest, including, without limitation, (1) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (2) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;

(iii) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended in writing by Advantest;

(iv) incorporation in the Product of any parts or components (1) provided by customer or (2) provided by a third party at the request or direction of customer or due to specifications or designs supplied by customer (including, without limitation, any degradation in performance of such parts or components);

(v) Advantest’s incorporation or use of any specifications or designs supplied by customer;

(vi) the occurrence of an event of force majeure as referenced in Section 12.a; or

(vii) any negligent act or omission of the customer or any third party other than Advantest.

f. If Advantest receives notice of defects or non-conformance as defined in Section 7.a during the Warranty Period for Products other than Software, customer's exclusive remedy under this warranty shall be replacement of the affected Products. If Advantest determines that it is unable, within a reasonable time, to replace the affected Products, Advantest will grant a refund of the purchase price less a reasonable depreciation, upon prompt return of the Products to Advantest. Advantest's sole obligation under this warranty with respect to Software shall be limited to using commercially reasonable efforts to correct material defects and supply customer with a corrected version of such Software as soon as practicable after customer has notified Advantest of such material defects.

g. Except as otherwise specifically agreed by Advantest and customer in writing, Advantest warrants Consumables purchased by customer shall be free from defects in materials and workmanship upon receipt. Customer's exclusive remedy under this warranty is limited to replacement of the defective Consumable(s).

h. Advantest does not warrant that the operation of Products shall be uninterrupted or error free.

i. To the extent legally permitted, Advantest does not warrant or support any Third Party Products even if included with other Advantest branded Products. Advantest provides all such Third Party Products AS-IS. However, the original manufacturers or suppliers may provide their own warranties as specified in the documentation accompanying such Third Party Products.

j. Customer is responsible for removing any items not eligible for warranty service. Failure to remove such items may result in additional charges to customer computed at Advantest's then current standard service rates.

k. Customer is responsible for maintaining a procedure external to the Products to reconstruct lost or altered customer files, data or programs. Customer shall have a representative present when Advantest provides warranty services at customer's site. Customer shall notify Advantest if Products are being used in an environment, which poses a potential health hazard to Advantest employees or subcontractors. Advantest may refuse to provide warranty services in such environment or require customer to maintain such Products under Advantest supervision.

l. EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND CUSTOMER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (1) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, COURSE OF DEALING OR USAGE OF TRADE AND (2) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION. THE REMEDIES SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF CUSTOMER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT(S).

m. Products are not fault-tolerant and are not designed or intended for any use requiring fail-safe performance in which the failure of a Product could lead to death, serious personal injury, or severe physical and environmental damages (collectively, "High Risk Activities"), such as the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, weapons systems and/or direct life-support machines. ADVANTEST EXPRESSLY DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR HIGH RISK ACTIVITIES.

8. LICENSES

a. Subject to any additional Advantest license terms that may apply, Advantest grants customer a non-exclusive license (without the right to sublicense) to use the Software on a Advantest Product for

customer's internal purposes in accordance with the documentation provided with the Software. Such documentation, together with Advantest's quotation or sales order acknowledgement, may include additional license terms and restrictions that apply to the specific software being provided by Advantest and/or Advantest 's third party suppliers, which shall take precedence over these general software license terms. By installing, copying, or otherwise using the Software, customer acknowledges that customer has read such additional license terms, understands them and agrees to be bound by their applicable requirements and restrictions. In the absence of documentation specifying the applicable license, customer is granted the right to use multiple copies of the Software on one Product, or as otherwise indicated on the quotation.

b. Any Software that is licensed by Advantest to customer on a perpetual basis is transferable upon Advantest's receipt of the name, address and location of the transferee on the form to be provided by Advantest and payment of any applicable fees to the extent permissible under local laws. The transferee shall agree to Advantest's Software license terms prior to the transfer of the Software. In addition, customer's license terms will be binding on involuntary transferees, notice of which is hereby given.

c. Notwithstanding anything to the contrary in this Agreement, any Software licensed by Advantest on a non-perpetual basis (e.g., fixed term and/or subscription based licenses) is non-transferable and non-assignable.

d. The Software is owned and copyrighted by Advantest or its third party suppliers. Advantest and its third party suppliers retain all right, title and interest in the Software. Third party suppliers may protect their rights in the Software in the event of any violation of these license terms. Customer shall reproduce and apply any copyright or other proprietary notices included on or in the Software to any copies thereof, in whole or in part, in any form.

e. Customer will not disassemble or otherwise modify or create derivative works based upon the Software without written authorization from Advantest, except as permitted by law. Customer may not copy, upload to or distribute the Software onto any public or distributed network.

f. Advantest may terminate customer's license upon notice for breach of these license terms. Customer shall destroy all copies of the Software immediately upon notice of termination and so certify to Advantest in writing.

g. The Software is "commercial computer software." Software and technical data rights granted to the federal government include only those rights customarily provided to end user customers. Use, duplication, or disclosure by the United States government is subject to restrictions set forth in this Agreement and as provided in FAR 12.211 (Technical Data) and 12.212 (Computer Software), FAR 27.405(b)(2), FAR 52.227-19, or FAR 52.227-14(ALT III) and DFARS 252.227-7015 (Technical Data Commercial Items) and DFARS 227.7201 through 227.7202-4, or successor provisions, as applicable.

9. INTELLECTUAL PROPERTY CLAIMS

a. Advantest shall defend or settle any claim against customer for IP Losses provided that customer promptly notifies Advantest in writing, and cooperates with and provides full control of the defense or settlement to Advantest, to the extent legally permissible. For purposes of these Terms, "IP Losses" means defense costs, settlement amounts and court-awarded damages arising from any claim against customer that Products (excluding Custom Products) delivered under these Terms infringe an intellectual property right in the country where the Products are used or sold to customer under these Terms (an "IP Claim").

b. If an IP Claim is asserted or appears likely, Advantest may, at its option, modify the allegedly infringing Product, procure any necessary license, or replace the Product with a non-infringing substitute or, if Advantest determines that none of these alternatives is reasonably available, repurchase the Product at customer's purchase price less depreciation (based on a five-year straight-line depreciation).

c. Advantest has no obligation to indemnify customer against IP Losses arising from:

(1) Advantest's compliance with, or use of, customer's designs, specifications, instructions or technical information;

(2) Product modifications by customer or a third party;

(3) Product use prohibited by Specifications; or

(4) Use of the Product with products not supplied by Advantest.

d. These Terms state Advantest's entire liability for claims of intellectual property infringement.

10. LIMITATION OF LIABILITY AND REMEDIES

a. ADVANTEST, ITS AFFILIATES, SUBCONTRACTORS AND SUPPLIERS SHALL NOT HAVE ANY LIABILITY TO CUSTOMER OR ANY THIRD PARTY FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, DOWNTIME COSTS, LOSS OF DATA, COSTS OF PROCUREMENT OF SUBSTITUTE PRODUCTS BY CUSTOMER, RESTORATION COST, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE AND EVEN IF ANY OF THE LIMITED REMEDIES IN THESE TERMS FAIL OF THEIR ESSENTIAL PURPOSE.

b. TO THE EXTENT THAT LIMITATION OF LIABILITY IS PERMITTED BY LAW, ADVANTEST'S CUMULATIVE LIABILITY UNDER THESE TERMS FOR ALL CAUSES OF ACTION, WHETHER ASSERTED AS A TORT CLAIM OR CONTRACT CLAIM, SHALL NOT EXCEED THE AMOUNT PAID BY CUSTOMER FOR THE PRODUCT(S) GIVING RISE TO THE LIABILITY, EXCEPT THAT ADVANTEST'S OBLIGATION TO MAKE WARRANTY REFUNDS UNDER SECTION 7 IS LIMITED TO THE PRODUCT PURCHASE PRICE. THE LIMITATIONS SET FORTH IN THIS SECTION 10 SHALL NOT APPLY TO DAMAGES FOR BODILY INJURY OR DEATH.

c. THE REMEDIES IN THESE TERMS ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES.

11. TERMINATION

Unless prohibited by applicable bankruptcy law, should either party (i) become insolvent; (ii) have any proceedings instituted by or against it in bankruptcy, under insolvency laws (including without limitation being subject to a voluntary or involuntary bankruptcy petition), or for the party's reorganization, receivership, dissolution or liquidation; (iii) make an assignment for the benefit of creditors or any general arrangement with creditors; (iv) discontinue business or adopt a resolution calling for the same; (v) become unable to pay or generally fail to pay its debts as they become due; or (vi) have a receiver/trustee appointed for such party's assets, the other party may elect to cancel any unfilled obligations hereunder.

12. GENERAL

a. Advantest is not responsible for any delay or failure to perform any of its obligation under these Terms arising from or related to any cause beyond its reasonable control including, without limitation, labor dispute, acts of nature, delays of suppliers or subcontractors or carriers, curtailment of or failure to obtain sufficient electrical or other energy, act of terrorism, governmental action, fire, explosion, geological change, storm, flood, earthquake, tidal wave, explosion, epidemic, radioactive contamination, lightning or act of war, or any acts or omissions of customer, including but not limited to, non-payment or failure to execute an acceptance certificate or financing documents.

b. If, prior to or during the course of the performance of these Terms, the terms and conditions contained in these Terms shall cease to be fair or become inequitable due to factors beyond the control of the parties hereto, including but not limited to, substantial changes in economic circumstances, then the parties hereto shall discuss how far such situation can be taken into account and shall further review any or all provisions of these Terms as may be necessary.

c. Customer may not assign or transfer these Terms, without prior written consent of Advantest. Any attempt to do so shall be null and void.

d. Customer who exports, re-exports, transfers or imports Products, technology or technical data purchased hereunder, assumes responsibility for complying with applicable U.S. and other laws and regulations, and for obtaining required export and import authorizations. Customer shall comply with U.S. and other laws and regulations prohibiting transfers, exports and re-exports to certain end-users and destinations or for certain end-uses, unless written authorization is obtained from the appropriate government. Advantest may suspend performance if Advantest believes that customer is in violation or threatened violation of applicable laws or regulations. As part of Advantest's export compliance program, customer may be required to provide end use, end user statements as well as trade compliance statements and export policy statements regarding the Products purchased by or licensed to customer.

e. Disputes arising in connection with these Terms shall be governed by the laws of Japan and the parties agree to submit any claim or action arising from or relating to these Terms to the exclusive jurisdiction of the Tokyo District Court.

f. Provisions herein which by their nature extend beyond the termination of any sale of Products shall remain in effect until fulfilled.

g. Neither party's failure to exercise any of its rights under these Terms shall be deemed a waiver or forfeiture of those rights.

h. Customer shall keep confidential and not disclose to any third party the terms of these Terms, any license agreement, and any other non-public information disclosed to customer by Advantest, including without limitation technical data and/or documentation regarding the Products or pricing information, and/or terms contained in or attached to Advantest's quotation, sales order acknowledgement and invoice. As between Advantest and customer, Advantest retains all intellectual property rights to and ownership interest in any Advantest confidential information disclosed or provided to customer arising from or related to these Terms, including, without limitation, all rights in and to any design data or manufacturing data. Any disclosure without Advantest's prior written consent could cause irreparable harm and significant injury that monetary damages may be inadequate to remedy and may entitle Advantest to injunction relief or equitable relief in addition to monetary damages. No rights in any confidential or proprietary information of Advantest shall be transferred to customer by virtue of its purchase of any Product from Advantest.

i. To the extent that any provision of these Terms is determined to be illegal or unenforceable, the remainder of these Terms shall remain in full force and effect.

j. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to these Terms.

k. These Terms constitute the entire agreement between Advantest and customer, and supersede any previous communications, representations or agreements between the parties, whether oral or written, regarding transactions hereunder. These Terms take precedence over any of customer's additional or different terms and conditions, including without limitation, those contained in any purchase order, to which notice of objection is hereby given by Advantest. Customer's purchase or license of Products shall constitute customer's acceptance of these Terms. In case of a conflict between these Terms and any customer purchase order or other document provided by customer, these Terms shall prevail. No change or modification of any of these Terms will be valid or binding on either party unless in writing and signed by the party against whom enforcement is sought.

l. Customer shall not directly or indirectly reverse engineer, disassemble or decompile any technology, software, prototype, or other tangible objects which are provided pursuant to these Terms.

m. Any required notices shall be given in writing at the address of the receiving party either by registered or certified mail, postage prepaid, return receipt requested, or courier with proof of delivery.