

Instruction Manual

LR5011 TEMPERATURE LOGGER



HIOKI E.E. CORPORATION

July 2013 Revised edition 2 LR5011B980-02 13-07H



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Introduction

Thank you for purchasing the HIOKI "Model LR5011 Temperature Logger." To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

Registered Trade Marks

Windows is a registered trademark of Microsoft Corporation in the United States and/ or other countries.

Notation

\bigcirc	Indicates a prohibited action.
(p.)	Indicates the location of reference information.
@ >	Indicates quick references for operation and remedies for troubleshooting.
*	Indicates that descriptive information is provided below.
[]	Menus, commands, dialogs, buttons in a dialog, and other names on the screen and the keys are indicated in brack- ets.
SET (Bold charac- ters)	Bold characters within the text indicate operating button labels.
Windows	Unless otherwise specified, "Windows" represents Windows XP, Windows Vista, or Windows 7.
Dialog	Dialog box represents a Windows dialog box.

The screen of this instrument displays characters in the following manner.

A	В	С	D	Е	F	G	Н	Ι	J	К	L	М	Ν	0	Ρ	Q	R	S	т	U	٧	W	Х	Υ	Ζ
R	Ь	С	ď	Е	F	۵	Н	,	J	Ľ	L	ñ	п	o	Ρ	9	r	5	F	U	U	Ľ	11	У	Ξ
1	2	3	4	5	6	7	8	9	0	7															
1	2	З	Ч	5	6	7	8	9	0	?															

Mouse Operation

Click	Press and quickly release the left button of the mouse.
Right-click	Press and quickly release the right button of the mouse.
Double click	Quickly click the left button of the mouse twice.
Drag	While holding down the left button of the mouse, move the mouse and then release the left button to deposit the chosen item in the desired position.
Activate	Click on a window on the screen to activate that window.

Verifying Package Contents

When you receive the instrument, inspect it carefully to ensure that no damage occurred during shipping. In particular, check the accessories, panel switches, and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

Quantities in parentheses ().



Options

The following logger options are available separately. Even if purchased previously, you may want to confirm that you have them at hand.



Transporting Precautions

Use the original packing materials when transporting the instrument, if possible. Pack the instrument so that it will not sustain damage during shipping, and include a description of existing damage. We do not take any responsibility for damage incurred during shipping.

Safety Information

This manual contains information and warnings essential for safe operation of the instrument and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

CANGER This instrument is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result i n injury or death, as well a s damage to the instrument. However, using the instrument in a way not described in this manual may negate the provided safety features.

Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from instrument defects.

Safety Symbols

Markings on the logger have the following meanings.



In the manual, the \triangle symbol indicates particularly important information that the user should read before using the instrument.



The \triangle symbol printed on the instrument indicates that the user should refer to a corresponding topic in the manual (marked with the \boxed{M} symbol) before using the relevant function.

Indicates DC (Direct Current).

Symbols for Various Standards

Markings on the logger have the following meanings.



 This symbol indicates that the electrical and electronic appliance is
 put on the EU market after August 13, 2005, and producers of the Member States are required to display it on the appliance under Article 11.2 of Directive 2002/96/EC (WEEE).

This symbol indicates that the product conforms to safety regulations set out by the EC Directive.

Danger Levels

The following symbols in this manual indicate the relative importance of cautions and warnings.

DANGER	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
<u>AWARNING</u>	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
ACAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the instrument.
NOTE	Indicates advisory items related to performance or correct operation of the instrument.

Operating Precautions

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

Installation Precautions

Operating temperature and humidity:

Logger: -20 to70°C (-4.0 to 158.0°F), 80%RH or less (non-condensating), Temperature Sensor: As specified for each sensor **Storage temperature and humidity:** Logger: -20 to70°C (-4.0 to 158.0°F), 80%RH or less (non-condensating)

Temperature Sensor: As specified for each sensor



• The protection rating for the enclosure of this device (based on EN60529) is *IP54.

- Although this instrument is designed to resist the ingress of dust and water, it is not entirely water- or dust-proof, so to avoid shock or damage, do not use it in a wet or dusty environment.
- If used outside the specified environmental ranges for operation (or storage), the operation of the unit cannot be guaranteed.
- Temperature sensors other than Models LR9601 to LR9604 are not designed with ingress prevention against water and dust. Do not use it in an especially dusty environment, nor where it might be splashed with liquid. This may cause damage.
- This temperature sensor is not drip-proof. Water droplets on the grip or connector may result in malfunctions.
- *IP54 :This indicates the degree of protection provided by the enclosure of the device against use in hazardous locations, entry of solid foreign objects, and the ingress of water.
 - 5 : Protected against access to hazardous parts with wire measuring 1.0 mm in diameter. Dust-proof type (The penetration of dust cannot be prevented completely, but quantities of dust that may hinder the stated operation of equipment or safety cannot penetrate the enclosure.)
 - 4 : The equipment inside the enclosure is protected against the harmful effects of spraying water.

Avoiding Logger Damage

<u> ACAUTION</u>

To avoid damage to the instrument, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.

CD Handling

- Always hold the disc by the edges, so as not to make fingerprints on the disc or scratch the printing. Never touch the recorded side of the disc. Do not place the disc directly on anything hard.
- Do not wet the disc with volatile alcohol or water, as there is a possibility of the label printing disappearing.
- To write on the disc label surface, use a spirit-based felt pen. Do not use a ball-point pen or hard-tipped pen, because there is a danger of scratching the surface and corrupting the data. Do not use adhesive labels.
- Do not expose the disc directly to the sun's rays, or keep it in conditions of high temperature or humidity, as there is a danger of warping, with consequent loss of data.
- To remove dirt, dust, or fingerprints from the disc, wipe with a dry cloth, or use a CD cleaner. Always wipe from the inside to the outside. and do no wipe with circular movements. Never use abrasives or solvent cleaners.
- Hioki shall not be held liable for any problems with a computer system that arises from the use of this CD, or for any problem related to the purchase of a Hioki product.

Preliminary Checks

Before using the instrument the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.



WARNING Before using the instrument, make sure that the insulation on the sensor cables is undamaged and that no bare conductors are improperly exposed. Using the instrument in such conditions could cause an electric shock, so contact your dealer or Hioki representative for replacements.

Measurement Preparation to Data Analysis

The steps from measurement preparation to data analysis are illustrated with a typical measurement example.

Example Case: Record warehouse temperature at 10-minute intervals for one month, and store the data on a computer.

Required Items:

Quantities in parentheses ().



Procedure:



9 *Measurement Preparation to Data Analysis*

3	3 Install the LR5000 Utility Program on the computer. See: "2.3" (p.21)
	Select the recording interval for the logger
4	(in this case, 10 minutes).
	See: "Recording Interval Setting" (p.28)
	(The setting can be made also from the LR5000 Utility Program.) (p.35)
	5 Set the logger to the correct date and time
5	(in this case, 15 May 2010, 13:00). See: "Real-Time Clock Setting" (p.29)
- 15	(With the LR5000 Utility Program, the log- ger can be set to the computer time.) (p.38)
1	
ТІМЕ	
	• Set the stop method to [OFF]
	(This setting provides one-time measurement:
	recording stops when memory becomes full.) See: "Stop Method Setting (for when
	memory becomes full)" (p.30)
	(The setting can be made also from the LR5000 Utility Program.) (p.35)
oFF	



Overview

Chapter 1

1.1 Product Overview and Features

This instrument is a compact portable data logger for measuring, displaying, and recording temperature.



1.2 Part Names/Functions and Display Indicators

Front

LCD(p.13)

The display blanks after 30 seconds of operator inactivity (auto power save). The display reappears by pressing a button.

When the display is visible, it refreshes about once per second.

IR Port (p.44)

Communicates with the LR5091 Communication Adapter or LR5092-20 Data Collector.



Back

Stand/Strap Attachment Hole (p.40)

Attach the logger to a wall or other surface by hanging it on a screw. (Supported screw head dimensions: up to approx. 6.8 mm in diameter and approx. 2.5 mm in thickness)



Operating Buttons

SET button

Displays settings.

REC/STOP button

Hold for two seconds to start/stop recording. From a setting display, switches to measurement display.



(-) button, (+) button

Changes Measurement display contents. Changes setting values on the Settings display.

LR5091 Communication Adapter



IR Port (p.44)

Communicates with the logger.

USB Port (p.32)

Connect a USB cable here to communicate with a computer. (Mini-B receptacle)

Display Indicators

The display indicators provide the following information.

REC Indicator

Indicates recording in progress. (Blinks when waiting to record.)

ΜΔΧ

TIMEINT

DATA

AL indicator

When the alarm* function is enabled, this indicates when a measured value is outside of the specified (upper/lower value*) range.

ENDLESS indicator

ENDLESS STAT FILT

STAT indicator

Indicates the Stop Method Setting display. Also appears on the Measurement display to indicate endless recording (p.30) is enabled.

Indicates the battery charge status. (p.18)

Not used by the logger.

Indicates the Recording Mode Setting display.

Also appears on the Measurement display to indicate statistic recording (p.31) is enabled.

Units

Indicates the unit of

measurement on

each channel.

Battery Status Indicator

MAX indicator

Indicates that the value displayed at the right is the maximum.

Measurement Channel –

MIN indicator

Indicates that the value displayed at the right is the minimum.

DATA indicator

Indicates that the value displayed at the right is the data count.

TIME indicator

Indicates the Date-Time Setting display.

INTVL indicator

Indicates the Recording Interval Setting display.

 * Setting is available from the LR5000 Utility Program or via the LR5092-20 Data Collector.
 See: "3.3 Making Settings from the LR5000 Utility Program" (p.32), LR5092-20 Data Collector Instruction Manual

1.3 Display Organization

The logger has two general display types: Measurement and Settings.

Measuring display

The (+) and (-) buttons switch the display type.



NOTE

- For instantaneous recording, the maximum and minimum values are obtained from all the data measured at each recording interval.
- For statistical recording, the maximum and minimum values are obtained from all the data measured every second.
- The maximum and minimum values are not displayed when the recorded data count is 0.

1

Setting Display

Select the display with the **SET** button. Press (+) and (-) to change a setting. Press the **REC/STOP** button to switch to the Measurement display from any other.



NOTE

- When no operation occurs for 30 seconds with the Settings display, automatically switches to Measurement display.
- When the **I** battery indicator appears, settings cannot be changed (although they can still be displayed).
- Settings cannot be changed while recording. However, settings can still be displayed by pressing the **SET** button from the Measurement display.

Measurement Preparations

Chapter 2

2.1 Installing (or Replacing) the Battery

MARNING • After replacing the battery, replace the cover before using the logger.

- Be sure to insert them with the correct polarity. Otherwise, poor performance or damage from battery leakage could result. Replace batteries only with the specified type.
- Battery may explode if mistreated. Do not short-circuit, recharge, disassemble or dispose of in fire.
- Handle and dispose of batteries in accordance with local regulations.

NOTE

- Data and settings stored in the logger are retained even when the battery is depleted, and during battery replacement.
 - Once the **I** battery indicator appears, operation can still continue for about 30 seconds when the battery is removed during recording.
 - Testing monitor batteries installed in the unit may possibly be weak. Replace batteries before extended measurement usage.
 - Use only LR03 Alkaline batteries. Using manganese batteries may not result in accurate measurements or proper communication with the LR5091 Communication Adapter and LR5092-20 Data Collector.
 - After installing the batteries, the following displays appear, and the date and time need to be set. (p.29)



• When the **I** battery indicator appears, settings cannot be changed (although they can still be displayed).



· When battery voltage is too low to operate the logger, the following appears. Replace the battery to restore normal operation.



Battery Status Indicator

This indicator is displayed at the top right corner.

100	Battery charge remains. Fewer blocks within the indicator signify weaker battery charge.
ſ	Replace the discharged battery as soon as possible.(Even when the battery is removed during recording, operation can continue for about 30 seconds.)
•	In this state, recording and communication with the LR5091 Communication Adapterr and LR5092-20 Data Collector are not possible.

Using a NiMH Battery

The battery status indicator does not accurately show the remaining battery capacity when using a NiMH battery. Moreover, the battery life will vary greatly with the capacity, charging conditions and repeated uses. Please take note of these points when using it.

The device's battery status display and battery life are based on the usage of a brandnew alkaline battery.

When the logger will not be used for long time

CAUTION To avoid corrosion and damage to this instrument from battery leakage, remove the batteries from the instrument if it is to be stored for a long time (1 week).

Battery Replacement

Required Items: LR6 alkaline battery (1)



2.2 Connecting a Temperature Sensor

Connect a temperature sensor to the logger's sensor jacks.

• A temperature sensor is precision machined. Applying an excessively high voltage pulse or static electricity may damage the sensor.

- Avoid subjecting the temperature probe tip to physical shock, and avoid sharp bends in the leads. These may damage the probe or break a wire.
- Take care that the temperature sensor does not exceed the specified temperature range.
- To avoid breaking the sensor, do not bend or pull it.
- Avoid stepping on or pinching cables, which could damage the cable insulation.
- To avoid damage to the logger, do not apply voltage to sensor jacks.

Connection Method

Required Items: Hioki LR9601 to LR9631 Temperature Sensor



Align the triangle on the plug with the one in front of the sensor jacks, and insert the plug securely.

Values are not displayed correctly if the sensor plug is inserted incorrectly or not inserted far enough.

If values are not displayed correctly even when the plug is inserted properly, the logger or sensor may be damaged. Repair may be necessary. See: "Requesting repairs" (p.91)

Compatible Sensors

LR9601 to LR9604 Temperature Sensor (molded resin type)	Approx. length 1 m/5 m/10 m/45 mm
LR9611 to LR9613 Temperature Sensor (plug terminal type)	Approx. length 1 m/5 m/10 m
LR9621 Temperature Sensor (sheath type)	Approx. length 1 m
LR9631 Temperature Sensor (needle type)	Approx. length 1 m

2.3 Installing the PC Application Program

To save, browse, or print data, or to make logger settings from a computer, first install the "LR5000 Utility Program".

LR5000 Utility Program Operating Requirements

CPU	1 GHz or faster processor clock
RAM	At least 512 MB
OS	Windows XP SP2 or later Windows Vista SP1 or later Windows 7
Library	.NET Framework 2.0/3.5
Interface	USB
Monitor Resolution	1024×768 or higher
Hard Disk	At least 30 MB free space (Additional space is required for storing recorded data. Another 500 MB may be required if .NET Framework 2.0 or 3.5 is not yet installed.)

Installation Procedure

Log in with an Administrator account.

Before installing, close any applications running on the computer.

Required Items: Supplied CD (for Windows XP) LR5091 Communication Adapter, USB cable



2.3 Installing the PC Application Program



How to start the program?

The program starts automatically from the next Windows logon. (The icon appears in the task tray (notification area) (p.32).) Click the icon and click [Show Main Screen].

If the installation screen does not appear?

- Execute X:\English\Setup.exe, where X is the CD-ROM drive letter. After starting setup.exe, follow the on-screen instructions to complete installation. (If .NET FrameWork 2.0 or 3.5 is not already installed, it is installed first.)
- You may be prompted to reboot during installation. If installation does not resume after rebooting, execute setup.exe again.



For setting and importing recorded data from loggers other than the LR5000 series, use the Communication Utility program supplied with the model 3911 or 3912 Communication Base. You can browse the recorded data by using LR5000 Utility Program also.



Settings and recorded data are not deleted when uninstalling or upgrading the program.

Uninstall Procedure

Follow this procedure to uninstall the LR5000 Utility Program.

(The [Program	ns and Features]. ns and Features] screen ap	pears.)	
 Select the [L Change] butto (The [File Delo Click [Yes]. (The program i 	. R5000 Utility Program] , on. ete Confirmation] dialog bo is uninstalled.)	and click the x appears.)	[Uninst
Control Barriel	Desarsone Desarsone and East-ives	Au Control Descenter and Con	
Control Panel	 Programs Programs and Features Uninstall or change a program To uninstall a program, select it from the list and th 	 ✓ Search Programs and Fea en click Uninstall, Change, or Rep 	tures p
Control Panel Home Control Panel Home View installed updates 9 Turn Windows features on or off	Programs Programs and Features Uninstall or change à program To uninstall a program, select it from the list and th Organize Uninstall Change Repair	€y Search Programs and Fea	air.
Control Panel Home Control Panel Home View installed updates Turn Windows features on or off	Programs Programs and Features Uninstall or change à program To uninstall a program, select it from the list and th Organize Uninstall Change Repair	Search Programs and Fea	air.
Control Panel Home Control Panel Home View installed updates Turn Windows features on or off	Programs Programs and Features Uninstall or change a program To uninstall a program, select it from the list and th Organize Uninstall Change Repair LRS000 Utility Program	Search Programs and Fea en click Uninstall, Change, or Rep Publisher HIOKI E.E. CORPORATION	air.
Control Panel Home Control Panel Home View installed updates Turn Windows features on or off	Programs Programs and Features Uninstall or change a program To uninstall a program, select it from the list and th Organize Uninstall Change Repair LRS000 Utility Program E.E. CORPORATION	Search Programs and Fea en click Uninstall, Change, or Rep Publisher HIOKI E.E. CORPORATION HIOKI E.E. CORPORATION	
Control Panel Home Control Panel Home View installed updates Turn Windows features on or off	Programs Programs and Features Uninstall or change a program To uninstall a program, select it from the list and th Organize Uninstall Change Repair E.E. CORPORATION ELE CORPORATION	Search Programs and Fea en click Uninstall, Change, or Rep Publisher HIOXIEE. CORPORATION HIOXIEE. CORPORATION	

Version Upgrading

Download the latest version of the LR5000 Utility Program from our website

Follow the procedure on the download page to install the latest version. (The old version is uninstalled automatically.)

2.3 Installing the PC Application Program

LR5000 Utility Program Screens



Data Import Screens (p.54)

Import data from the logger with these screens.

Example: Logger import screen



Data Viewing Screens (p.57)

View imported data on these screens. Select a file to view, as a graph or table.

Example: Screens for viewing the latest data



2

26 2.3 Installing the PC Application Program

Data Sorting Screens (p.71)

Sort imported data on these screens. You can copy, delete, move, combine, and extract data.

Example: Data Copy screen



Option Screens (p.77)

Make advanced settings on these screens. You can specify the data importing method.

Example: Import Method Setting screen

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April Marcia Campania	
The result and a factor of the second secon	 ✓ Standard the or start of large k
The sector descent part of the sector descent	
	Country Count

Settings

Chapter 3

Configure measurement settings before starting to record. Logger settings can also be made from a PC running the LR5000 Utility Program. (p.32)

3.1 Settings List

Following is a list of all settings.

Although all settings are available from the LR5000 Utility Program, some settings are limited when made from the logger.

Setting Item	Setting Options	Logger	Refer To	LR5000 Utility Program	Refer To
Recording Interval	Sets the recording interval.	Yes	(p.28)	Yes	(p.35)
Current Date and Time	Set the current year, month, day, hour, and minute. (The LR5000 Utility Program can set the logger's clock to match the computer's.)	Yes	(p.29)	Yes	(p.29)
Stop Method	Select the processing method when memory becomes full.	Yes	(p.30)	Yes	Included in the record- ing stop method
Recording Mode	Selects instantaneous or sta- tistical value recording (mea- surements are taken once per second, and instantaneous, maximum, minimum, and average values are saved at each recording interval).	Yes	(p.31)	Yes	(p.35)
Power Save	Battery life is extended when on (enabled).	Yes	(p.31)	Yes	(p.34)
Model Comment	Enter a comment for the specified logger.	No	-	Yes	(p.34)
Channel Comment	Enter a comment for the spec- ified measurement channel.	No	-	Yes	(p.34)
Recording Start Method	Select the recording start method. (The start time can be specified.)	No	-	Yes	(p.35)
Recording Stop Method	Select the recording stop method. (The stop time can be specified.)	No	-	Yes	(p.35)
Scaling	Use to scale measured values to display as adjusted values.	No	-	Yes	(p.36)
Alarm Thresholds	Set upper and lower threshold values to display the alarm indicator [AL] on the logger.	No	-	Yes	(p.37)

3.2 Making Settings on the Logger

To return to the Measurement display from any Settings display, press the REC/ STOP button.



- When the **I** battery indicator appears, settings cannot be changed (although they can still be displayed).
- When no operation occurs for 30 seconds with Settings displayed, automatically switches to Measurement display.
- Settings cannot be changed while recording. However, settings can still be displayed by pressing the **SET** button from the Measurement display.

Recording Interval Setting



Recording Interval 1(Default)/2/5/10/15/20/30 sec., 1/2 /5/10/15/20/30/60 min

Real-Time Clock Setting Press the **SET** button to display the time settings. ([TIME] is displayed, and the year setting blinks.) <u>_</u> Press the (+) and (-) buttons to change the year. TIME Press the SET button to accept the year setting. (The month setting starts blinking.) Year Setting display Repeat this procedure to set the month, Δ day, hour, and minute. Press the SET button to accept the set-5 ting. (The stop method setting is displayed.)

Setting Range 01/01/2010, 00:00 to 12/31/2039, 23:59

Note: Seconds are not settable. However, seconds are set to zero at the instant the display is switched away from the minute setting.



After the battery has been removed for a long time, or if the clock is incorrect, reset it.

Stop Method Setting (for when memory becomes full)



Setting Options	Descriptions
OFF	Recording stops when memory becomes full (One-Time Recording).
ON(Default)	The oldest data is overwritten when memory is full (Endless Recording).



When memory becomes full during one-time recording, the recorded data count appears as follows.



(the Measurement display shows channel measurement value and recorded data count)

When memory becomes full during endless recording, the recorded data count (equal to the memory capacity) remains constant.



(instantaneous value recording display)



(statistical value recording display)
Recording Mode Setting

STAT 4	Press the SET button to display the recording mode setting. (The [STAT] indicator appears, and the setting blinks.)
	2 Press the (+) and (-) buttons to select [ON] or [OFF].
	Press the SET button to accept the setting.(The power save setting is displayed.)

Setting Options	Descriptions
OFF (Default)	The instantaneous value is recorded at each recording interval (instantaneous recording).
ON	When on, measurements are taken once per second, and instantaneous, maxi- mum, minimum, and average values are recorded at each recording interval. (sta- tistical recording). (Up to 15,000 data values can be recorded.)

NOTE

Statistical recording cannot be selected when the recording interval is set to one second.

Power Save Setting

The power save function turns off the display 30 seconds after the last button is pressed. The display reappears upon the next button press.

nnr ^{@@}	Press the SET button to display the power save setting ([APS] appears, and the setting blinks).
สุรร	2 Press the (+) and (-) buttons to select [ON] or [OFF].
	3 Press the SET button to accept the set- ting. (The measurement display appears.)
Setting Options Descriptions	

Setting Options	Descriptions
ON (Default)	Power save is enabled.
OFF	Power save is disabled (the display remains visible).
NOTE	The Auto Power Save feature consumes a small amount of current

See: "Appendix 3 Battery Life Approximation" (p.A2)

3.3 Making Settings from the LR5000 Utility Program

Logger settings can be made with the LR5000 Utility Program supplied with the LR5091 Communication Adapter and the LR5092-20 Data Collector. Install the Utility Program on the computer before connecting. (p.21)

Connecting the Logger, LR5091, and Computer

Connect to the computer using the supplied USB cable.

Required Items: Logger, LR5091 Communication Adapter, USB cable, Computer



Logger Settings



2	2 For the [Setting], click the [Logger] button.
Setting Logger	The Logger Settings screen appears. (If the logger is not connected, you are prompted to connect it. Connect the logger.)
	3 Select the logger from the device list*, and edit the settings. (p.34)
	4 Click the [Send Settings] button.
Setting Options Note: The displayed se from the LR5000 Utili ent from the current Model comment (Sensi no) (Sensi no) (Se	ttings are those previously made ty Program, which may be differ- settings within the logger itself.
Set by model Set by model Set by model comment Dense decommented toggers Settings from other loggers be applied. (p.34)	Send PC Clock Time Returns to the Main screen.
 * About the Device List • Up to ten loggers can be displayed • When [Show disconnected logger tings previously saved appear in the • The list can be sorted in ascending 	when connected to the computer. rs] is selected, disconnected loggers that had set- list. order ([Sort List]).
 How can current settings to 1. Click the [Import Setting (A dialog appears.) Click the [Import Setting are now reflected in the set of the	be imported from the connected logger? ings] button at the upper right of screen. tings to Computer] button. (The logger's settings e program.)

How can the settings from one logger be copied to another?

- 1. From the device list, select a logger with settings to be copied, and click the [Copy Settings] button.
- 2. From the device list, select a logger as the destination for the settings, and click the [Paste Settings] button. (A dialog appears.)
- 3. Click the [Paste] button in the dialog box. (The settings are copied.)

LRS000 Utility	(Setting]-{Logger}					
Setting		Data Im	pot		10	
Lopper	Collector	SD Card	Logger Data	SD Card	Data Organize Data	Option 🕜 Help
Please select the	logger from the device	LR5011 sample 1(S	estal no 105011031) settling			Import Settings
Model	-	Basic Strings				
(Senal no)	Model comment	Model comment	sample 1		Power save setting Enabled	*
LR5001 (100500001)	sample2	CH1 comment	Roor 5	Click a ta		
LR5011 (105011031)	sample 1	Measurement Meth	ed Recording Method			
185041	No.	Rec interval	2sec 💌	-	Valid setting time range	
(100618271)	LR5041	Start method	Button Operation	-	1day Shour 20min Osr	
			2000- 1- 1 00.00	0+1		
		Soo method	Button Onerston Enders)	-	Enders Recorder: The o	and data in
					overwritten when memory Recording Recording sto	as full v'usOne-Time as when memory
		_	2000 1- 100.00	10.41	becomes full	
		Decenter	The second se	-		
		Mec mode	Instantaneous	<u>.</u>		
Sort List	and al	00	00			
Sort by m	todel comment	Delete Data	Send PC Clock Ti	me		*1% Serie Settings
J Show disconn	nected loggers	Copy Settings	Bharboo	Save Settings	Open Settings	Home
		(Les and)		1-		1-
						2011-01-25 07 12:07

Model comment	Enter a comment to describe the logger as needed.
Power save setting	Enable or disable the power save setting (p.31). See: "Appendix 3 Battery Life Approximation" (p.A2)
CH1 comment	Enter a comment to describe the measurement channel as needed.
Nata Osmana anta ma	in a second state of the second s

Note: Comments may consist of up to 20 characters. The following characters are not allowed: \, /, :, *, ?, ", <, >, and |.

2 Settings on the [Recording Method] tab

NOTE

The Auto Power Save feature consumes a small amount of current

Rec Interval

Sets the recording interval.

1/2/5/10/15/20/30 sec., 1/2 /5/10/15/20/30/60 min

Start Method

Select the recording start method.

When [Scheduled Time] is selected, specify the start date and time.

Setting Options	Descriptions
Button Operation	Starts recording by pressing the button on the logger.
Start After Sent	Starts recording by pressing the [Send Settings] button.
Scheduled Time	Starts recording at the scheduled time after pressing the [Send Settings] button.

Valid setting time	01/01/2010 00:00 to	12/31/2030 23.50
range	0 1/0 1/20 10, 00:00 10	12/01/2000, 20.00

NOTE

When the [Scheduled Time] start method is enabled, the [REC] indicator on the logger display blinks until the specified start time.

Stop Method

Select the recording stop method.

When [Scheduled Time (Endless)] or [Scheduled Time (One-Time)] is selected, the date and time need to be set.

Setting Options	Descriptions
Button Operation	Stops recording by pressing the button on the logger.
(endless)	The oldest data is overwritten when memory is full.
Button Operation	Stops recording by pressing the button on the logger.
(one-time)	Recording also stops when memory becomes full.
Scheduled Time	Stops recording at the scheduled time.
(Endless)	The oldest data is overwritten when memory is full.
Scheduled Time	Stops recording at the scheduled time.
(One-Time)	Recording also stops when memory becomes full.
Hold Data at	Specify when setting [Scheduled Time (Endless)].
Scheduled Time	Select this check box to record the data at the scheduled time and stop recording.

Rec Mode

Select the recording mode.

Setting Options	Descriptions
Instantaneous	The instantaneous value is recorded at each recording interval.
Statistical	Measurements are taken once per second, and instantaneous, maximum, minimum, and average values are recorded at each recording interval. (Up to 15,000 data values can be recorded.)

Statistical recording results in shorter battery life.

See: "Appendix 3 Battery Life Approximation" (p.A2)



Statistical recording cannot be selected when the recording interval is set to one second.

36 *3.3 Making Settings from the LR5000 Utility Program*

Measuremen	t Method PC Click a ta	ab.	
CH1 Scaling	Disabled	Edit	
Alarm	Disabled	Edit	
	Data	ck Time	Send Settings

Scaling (set as needed) See: "What is Scaling?" (p.38)

The following scaling calculation is applied to measured values. Scaled Result = Raw data (measured value)× A + B× SI prefix (multiplier) The scaled result is displayed on the logger.

C Scaling	22		
The following scaling calculation is applied to measure Scaled Result - Raw data (measured value)× A	nable scaling	g : box to enable scaling.	
A/B (slope/offset) values Scaled	unts		
Specify by example Specify by A/B SI Pref Raw data Scaled result Image: Control of the second result Image: Control of the second result	x Char. String		
0.2 °C 3 0 Deplay 50.4 50.00 C V Page	digts d decimal point	Specify by example	e, or Specify by A
Example selecting 0 displays values in the form 0000, and selecting 3 displays values in the form 0.000. When (Fixed decimal point) is not selected post values are displayed for display were automat	oning, to decimal.	Clicking this tab changes the setting options. Make set- tings on either tab.	A/B (slope/offset) values Specify by example Specify by A/B A 1
Setting confirmation Raw data	icaled result	(The settings are applied to the other tab.)	8 -0.2 C

Setting Options	Descriptions
Specify by example	Enter two known conversion points (up to ten digits each).
Specify by A/B	Enter the scaling coefficients (A and B, up to ten digits each).
Scaled units	 Select the [SI Prefix]. ([p]=1E-12, [n]=1E-9, [μ]=1E-6, [m]=1E-3, blank =1E0, [k]=1E3, [M]=1E6, [G]=1E9, [T]=1E12) Enter the [Char. String] to identify the scaled units. (Up to five characters, except /, :, *, ?, ", <, >, and .)
Display digits	 Select [Fixed decimal point] and specify the [Decimal digits] to be displayed to the right of the decimal point. Valid settings are 0 to 3. (Examples: selecting 0 displays values in the form 0000, and selecting 3 displays values in the form 0.000) When [Fixed decimal point] is not selected, values are displayed as four digits (0.000 to ±9999) with automatic decimal positioning.

1. Set the following options.

2. Confirm settings.

Setting	Confirm that scaling is performed properly. Enter any numerical value as raw
confirmation	data, and click the [Calc] button to display the scaled result.

3. Click the [Save] button.

(Scaling settings are saved, and the display returns to the Logger Settings screen.) Note: If you click the [Cancel] button without saving the settings, the display still returns to the Logger Settings screen.

Alarm Thresholds (set as needed)

Set the upper and lower alarm threshold values.When a measurement is outside of the specified area, the [AL] (alarm) indicator is displayed on the logger.



Click the [Save] button to save your settings.

(The display returns to the Logger Settings screen.)

- Note: If you click the [Cancel] button without saving the settings, the display still returns to the Logger Settings screen.
- Note: Alarm judgment is performed at every recording interval during instantaneous recording, and once per second during statistical recording.
- Note: Alarm judgment is performed using measurement values with a larger number of digits than the values (4 digits) indicated in the LR5011 display.
- Note: The **[AL]** indicator appears when the measured value is out of range (OF/UF displayed), and when a sensor anomaly occurs (- - displayed).



What is Scaling?

Scaling converts actual measurement values to their corresponding values in arbitrarily determined units for display. It is useful for reconciling the difference between values measured with the logger and those of a reference device.

For example, when two points of correspondence are known between values measured with the logger and those of the reference device, select [Specify by example]. (1) When the logger measures 0.2° C the reference device measures 0.0° C, and (2) when the logger measures 50.4° C the reference device measures 50.0° C



Alternatively, when one point of correspondence is known between the logger and reference device, select [Specify by A/B].

(1) The logger measures 0.2°C and the reference device measures 0.0°C.

Since only one point is known, set the slope to "1" and enter the offset only.

[°C]	A/B (slope/offset) values	Scaled units
1 Slope (coefficient A)	Specify by example Specify by A/B	SI Prefix Char. String
[°C] -0.2 Offset (coefficient B)	B -0.2 C	Display digits ✓ Fixed decimal point Decimal digits 1 ▼

Measurement and Analysis Chapter 4

4.1 Pre-Measurement Inspection

Inspect the following items before starting measurement.



4.2 Installing the Logger

After inspection, install the logger at the measurement site. Be sure to read the""Installation Precautions" (p.5) before installing. Install the logger as necessary according to the following procedure.

MARNING Persons wearing electronic medical devices such as a pacemaker should not use the Z5004 strap with magnet. Such persons should avoid even proximity to the Z5004, as it may be dangerous. Medical device operation could be compromised, presenting a hazard to human life.

<u>CAUTION</u> Do not apply heavy downward pressure with the stand extended. The stand could be damaged.

- Avoid shocking the Z5004, such as by dropping. Shock can cause it to be chipped or cracked.
 - Do not use the Z5004 where it may be subject to rain, dust, or condensation. Use in such conditions may cause corrosion or deterioration of the magnet.
 - If the Z5004 is brought near a magnetic memory device such as a floppy disk, credit/debit card, or pre-paid card or ticket, the device may become unusable due to data corruption. It can also cause damage if brought near a precision electronic device such as a computer, TV, or electronic wristwatch.

Using the Stand

NOTE

Required Items: Stand (Accessory)



Wall Mounting with the LR9901 Wall-Mounted Holder

Required Items: LR9901 (Option), 2 screws (supplied with the LR9901) screwdriver, etc. (as needed)



Wall Mounting with the Z5004 Magnetic Strap

Required Items: Z5004 (Option)



4.3 Starting and Stopping Recording

Start recording after installing the logger.





Recording cannot start when the battery is depleted. When the battery becomes exhausted during recording, recording stops. See: "2.1 Installing (or Replacing) the Battery" (p.17)

Automatic Recording Start at Convenient Times

Depending on the selected recording interval, recording start is automatically delayed until the next convenient clock time.

Recording Interval	Recording Start Time
1 sec.	00 to 59 s (1-second interval)
2 sec.	00 to 58 s (2-seconds interval)
5 sec.	00 to 55 s (5-seconds interval)
10 sec.	00 to 50 s (10-seconds interval)
15 sec.	00 to 45 s (15-seconds interval)
20 sec.	00 to 40 s (20-seconds interval)
30 sec.	00 to 30 s (30-seconds interval)
1 min	00 min, 00 s to 59 min, 00 s (1-minute interval)
2 min	00 min, 00 s to 58 min, 00 s (2-minutes interval)
5 min	00 min, 00 s to 55 min, 00 s (5-minutes interval)
10 min	00 min, 00 s to 50 min, 00 s (10-minutes interval)
15 min	00 min, 00 s to 45 min, 00 s (15-minutes interval)
20 min	00 min, 00 s to 40 min, 00 s (20-minutes interval)
30 min	00 min, 00 s to 30 min, 00 s (30-minutes interval)
60 min	00 h, 00 min, 00 s to 23 h, 00 min, 00 s (1-hour interval)

Example: When the button is pushed to start recording at 12:01:00, and the recording interval is 10 minutes



4.4 Confirming Currently Measured Values and Data Recording

Confirm data recording on the Measurement display (p.14).

You can browse current measurement values (instantaneous), the count of recorded data items, and maximum and minimum values.

The (+) and (-) buttons select the type of value displayed.

How to switch from a Setting display to Measurement display? To switch to the Measurement display from any other display, press REC/STOP.

NOTE

ΔΔ

- When power saving (p.31) is enabled, the display blanks after no operation occurs for 30 seconds. To browse measurement values (instantaneous) and verify each recorded data value, press any button to turn on the Measurement display.
 - The currently displayed instantaneous measurement value is refreshed about once per second, regardless of the recording interval setting.

4.5 Automatically Importing (Saving) Recorded Data to a Computer, and Graph Display

Data recorded in the logger can be imported to the computer. Install the LR5000 Utility Program on the computer beforehand. (p.21)

Required Items: Logger, LR5091 Communication Adapter (or LR5092-20 Data Collector), USB cable, Computer



4.5 Automatically Importing (Saving) Recorded Data to a Computer, and Graph Display



4

4.5 Automatically Importing (Saving) Recorded Data to a Computer, and Graph Display

Viewer Screen

The viewer screen appears as follows.



Menu	Item	Contents
	Open	Opens a file containing recorded data.
	Recently opened recording files	Opens recently used files.
- 11-	Save recording file as	Currently displayed recording data is saved as a new file.
File	Print graph	Prints data in graphic format. (p.59)
	Paste to Microsoft Excel	Pastes displayed data into Microsoft Excel.
	Export CSV file	Exports displayed data as a CSV file.
	Exit	Closes the program.
	Scaling	Applies scaling to data on one channel. (p.63)
Process Data	Power Calculation	Performs approximate electric power calculation. (p.64)
	Energy Cost	Performs approximate energy cost calculation. (p.65)
	Operating Rate	Performs approximate operating rate calculation. (p.66)
	Integration	Performs data integration. (p.67)
	Dew Point	Performs dew-point temperature calculation. (p.68)
	Two-Data-Item Arithmetic	Performs approximate two-data-item arithmetic cal- culation. (p.69)
	OVER Data Revision	Converts data outside of the upper and lower thresh- old settings to specified values, and saves as new data. (p.70)
	Help	Displays the help file.
Help	Version	Displays LR5000 Utility Program version informa- tion.

Menu Bar Items

4.5 Automatically Importing (Saving) Recorded Data to a Computer, and Graph Display

Main Graph Features

The main graph features are shown below.

[Graph Settings] dialog box

Graph details can be set as follows. Click each tab to access various settings.

[Common] tab	1	Automatically sets the time axis and Y-
Graph Settings	2	Select to display the grid.
1 Automatic setting	3	Changes the graph background color.
Image: Copy graph to clipboard	4	Copies the graph to the clipboard. The graph can then be pasted into Microsoft Word etc.

- 1 Automatically sets the time axis to the optimum scale.
- 2 Zooms the display to show only the time span between A/B cursors.
- **3** Changes the time base scale.
- 4 Specifies the displayed time span on the time axis. Click [Execute] to apply the settings.
- 5 Specifies cursor positions. Click [Execute] to apply the settings.
- 6 Specifies the graph start position (time). Click [Execute] to apply the settings.

4

[Y axis] tab

Graph Settings
Common Time axis Yaxis
1 Automatic setting for all Y axis
Number of axis 2 Jordisplays
Axis comment Temperature
5 Display item 7 1 2 3 4 5 6 7 8 9 10 11 12 12 15
6 Yaxis scale
Automatic setting for Y axis
- Execute
Yaxis grid Fine Rough Standard
10 🗆 Display integrated graph
Display upper and lower limits Display boundary lines of limits
Maximum Execute
 Shade to display area outside scope Draw lines to indicate limits

- **1** Automatically sets all Y-axes to the optimum scale.
- 2 When the Y-axis is different for each item, set the number of axes to a value other than one. The axes can be set to the number of displayed items (up to 16).
- 3 Displays all axes.
- **4** A comment can be entered for each axis.
- 5 Select the item assigned to each axis.
- 6 Sets the Y-axis scale for each axis.
- 7 Automatically sets the currently selected Y-axis to the optimum scale.
- 8 Specifies the display span on the Y-axis. Click [Execute] to apply the settings.
- **9** Sets the Y-axis grid spacing.
- 10 Display the items selected in [Display item] on an integrated graph.
- **11** Upper and lower thresholds can be displayed as solid lines on the graph, or outof-range areas can be filled with a solid color.

[Statistical Information and Item Settings] dialog box

The following items appear on the [Statistical information] tab.

- Item no.
- Serial no.
- Channel no.
- · Channel comments
- Property (Type of measurement value)
- · Measured values at A/B cursors
- · Statistical data
- Units

Statistical Information and Item	ayed only for integrable items.						
Cursor A 01/07/2011 07:44:12 Cursor B 01/07/2011 09:55:18	Statistical calculation between A-B cursors						
Item Serial no CH CH comment Property Cursor A Cursor B	Maximum Minimum						
1 100618237 1 Temperature Instant value 19.3 22.9 01/0)7/11 10:30:36 23.7 01/07/11 06:49:18 19.2						
2 100618237 2 Humidity Instant value 31.8 45.2 01/0	J7/11 14:58:58 56.1 01/07/11 08:06:04 29.2						

The following items appear on the [Item settings] tab.

- · Display on/off
- · Graph line colors and thickness
- Bar graph display on/off

[Item settings] tab

Statistical Information and Item Settings						
Display On/Off	Color	Thickn	ess	ltem	Measurement item	Bar graph
V		1	-	1	Temperature	
✓ 1 ✓ 2 Humidity						
Statistical information tem settings						

4

4.5 Automatically Importing (Saving) Recorded Data to a Computer, and Graph Display

Main Table Features

The main table features are shown below.

Shows the itt ment, proper minimum, an Open Displ Ker W Graph	em no., seria ty , measur d integration hay Print Table	al no., mod ement units n values of	lel comment, channel com- s, and average, maximum, all data.
tem no	1	2	▲
Serial no	100618237	100618237	
Model comment	LR5001	LR5001	
Property	I emperature	Humidity	
Unit	instant value	%	
Average	21.9	41.2	
Maximum	23.7	56.1	Double click a maximum or minimum numeri-
Minimum	19.2	29.2	cal value to jump to the relevant cell (or to the
Integration	327973.2	617488.4	first if there are multiple relevant cells).
01/07/11 06:40:44	19.3	32.9	
01/07/11 06:40:46	19.3	32.9	
01/07/11 06:40:48	19.3	32.9	
01/07/11 06:40:50	19.3	32.9	
01/07/11 06:40:52	19.3	32.9	
01/07/11 06:40:56	19.3	32.9	
01/07/11 06:40:58	19.3	32.9	
01/07/11 06:41:00	19.3	32.9	
01/07/11 06:41:02	19.3	32.9	
01/07/11 06:41:04	19.3	32.9	
01/07/11 06:41:06	19.3	32.9	
01/07/11 06:41:08	19.3	32.9	
101/07/11 06:41:01	192	32.9	
Time of Recording	Recorde Blue indi	d Values cates minir	num values, and red indicates maximum values.

Convenient Table Functions

Use the following operations to scroll the table and copy data to the clipboard.

Item	Contents
Press Ctrl and Home keys simulta- neously	Moves to the upper left corner of the table.
Press Ctrl and End keys simulta- neously	Moves to the lower right corner of the table.
Home key	Scrolls to display the left edge of the table.
End key	Scrolls to the right edge of the table.
Press Ctrl and C keys simultaneously	Copies the value of the currently selected cell to the clipboard.

Selecting Items for Display

Click the [Display Item] button in the viewer to display the [Select Items for Display] screen.

	Display Item	Print		2	Clie	ck the	[OK] button.
ect items for Displ	ay and a second		_			_	
ielect measurement	t items for table/gr	aph display and d	isplay	range			
tem Model	Serial no	Model comment	CH	CH comment	Unit	Property	Searching down conditions for items on display
1 LR5011	105001030	LR5011	1	Temperature	10	Average v	Search down by model name
Lineas.	105001030	LR5011	1	Temperature	°C	Maximum	Display Al
LASUIT			-				
LHSUIT	105001030	LR5011	1	Temperature	31	Mnim.m v	
Check	105001030 105001030	LR5011 LR5011	1	Temperature Temperature	37 37	Minimum v Instant val	Search down by serial no
Check	105001030 105001030	LR5011 LR5011	1	Temperature Temperature	с 2	Minimum v Instant val	Search down by serial no Deplay All
Check	105001030 105001030	LR5011 LR5011	1	Temperature Temperature	7 0	Minimum v Instant val	Search down by serial no Deplay All
Check	105001030	LR5011 LR5011	1	Temperature Temperature	3	Minimum v Instant val	Search down by serial no Daplay Al
Check	105001030	LR5011 LR5011	1	Temperature Temperature	3	Minimum v Instant val	Search down by serial no Display Al Search down by model comment Display celly dem with the following labels
Check	105001030	LR5011 LR5011	1	Temperature Temperature	0 2	Mnimum v	Search down by serial no Daplay Al Search down by model comment Display cetry dem with the following labels
Check	105001030 105001030	LR5011 LR5011	1	Temperature Temperature	2	Mnimum v Instant va	Search down by serial no Deplay Al Search down by model comment Display cely deen with the following tables Search down by CH comment Display, cely deen with the following tables
Check	105001030	LR5011 LR5011	3	Temperature Temperature	3	Minimum v	Scarch down by serial no Daylay Al Search down by model comment Daylay, cody dem with the following labels Search down by CH comment Display, only item with the following labels
Check	105001030 105001030	LR5011 LR5011	1	Temperature	3	Minimum v	Search down by secial no Daplay Al Search down by model comment Display cetry dem with the following labels Search down by CR comment Display cetry item with the following labels
Check	105001030 105001030	LR5011 LR5011	3	Temperature Temperature	9 0	Minimum v	Search down by serial no Daplay Al

Menu Bar Items

Menu	Items	Contents
	Check selection range	Add and clear selection of multiple items (display in blue) selected with the mouse.
	Select all selections	When there are 600 item in the above list, click to select or clear all items.
Select Items	Select all instant values Select all maximum values Select all minimum values Select all average values	Select all items (up to 600) of the same property.
Sort Itoma	Sort by model name Sort by serial no Sort by model comment	Sort by model name, serial no., or model comment.
Son nems	Move selected item up Alt+Up Move selected item down Alt+Down	Move blue mouse-selected items up or down.
	Restore original order	Restore original order.

4.6 Manually Importing (Saving) Recorded Data to a Computer, and Graph Display

You can manually import (save) recorded data to a computer, and display it in a graph.

Import recorded d Please connect a and click the [Star Model (Setal no)	lata from the logger. logger, select the logg it importing] button Model commert	er in the list of devices.				
Please connect a and click the [Star Model (Setal no)	logger, select the logg et importing] button Model comment	er in the list of devices.				
and dick the (Star Model (Setal no)	et Importing] button Model comment	lefonation of later				
Model (Setal no)	Model comment	Information of Isram				
(Setal no)	Model commerts	TIGHISLAN OF NEEDE	recorded data.			
			OH1		OH2	
		Comment	CHI)	CH2	
(0050007)		Unit	T	100	8	
		Length	2011-01-13 17.04	1-00-2011-01-17 170	1:08	
		Count		5757		
		Information of last re	corded data			Import Data Selection
		Connect	CHI	1	CH2	Ge latest data only
		Unit	C		×	🗇 last data only
		Rec interval		2sec.		C Both
		Length	2011-01-11 5:22	10~2011-01-13 17.0	245	
		Count		15000		
Suttlat						
If the r	orevious	data has no	ot been impo	rted, info	rma-	Cart benuter
tion is	displaye	d along wit	th the latest	data		(a)
After	making	he limpert	Dote Select	aata.	the	
After I	making t	ne limport	Data Select	ion], ciici	k the	2011-01-2
Start	importing	g] or [Next]	button.			
					Sav	ve Method Sc
LRS000 Utility [Data Import)-(Logge	aj			Sav	ve Method So
LR5000 Utility (etting	Data Import]-{Logge	n) Data Inpi	X		Sav	ve Method So
LR5000 Utility (etting	Data Import)-[Logge	er) Data Impe SD Carel		thod 1	Sav	ve Method So
			Me Mod. Fd	thod 1	Sav e destina	ve Method So
LR5000 Unlinty (Logger 4 S		socae Dealer	w Re Me	thod 1 it the sav	Sav e destina	ve Method Sc
LR5000 Utility [Logger Logger Logger T	Data Importi-fLogge Codes Gelect the hree metho	so care availa	w Re Me Iod. able. Not	thod 1 it the sav e: The Opt	Sav e destina	ve Method Sc ation (basic set en settings (p.78)
LR5000 Utility (etting Logger Logger S S S S S S S S S S S S S S S S S S S	Data Import - Logge Data Collector Gelect the hree metho ettinga) on the Option a	el socari save meth ods are availa	iod. able.	thod 1 it the sav e: The Opt refreshe	Sav e destina ions scree	ve Method So ation (basic set en settings (p.78)
LR5000 Ubility (eting Logger Logger Logger Logger Logger Logger Logger Logger	Data Import-fLogge Data Collect Collect the hree metho etrog on the Option a	so care availa	iod. able.	thod 1 it the sav e: The Opt refreshe	Sav e destina ions scree d.	ve Method Sc ation (basic sei en settings (p.78)
LR5000 Utility (eting Logger Logger S Use (Basic Se Setings Save Deatin	Data Import)-(Logge Data Collect Collect the hree metho etrog) on the Option a ado C'Misen Vicki Do	et Deta ingo societ Quita ingo save methods are availa cover.	mod. able.	ethod 1 it the sav e: The Opt refreshe	Sav e destina ions scree	ve Method So ation (basic set en settings (p.78)
LR5000 Utility (eting Logor Logor Logor Til S Use (Basic Se Setings Save Destin	Data Importi-Luogo Data Select the hree metho Heres Week Voc	Deta Hype SoCores Deta Hype Save meth codes are availat cover: cover: cover: cover: cover: cover:	able.	thod 1 it the sav e: The Opt refreshe	Sav e destina ions scree	ve Method Sc ation (basic set en settings (p.78)
Lagger La	Data Importi-Loogo Data Delect the hree metho setogal on the Option a seto C Waen's hole 'De- ien al sech logger for	Both Report Son Cores Son Cores	Me Me Me Ed Not Saf moored date	thod 1 it the sav e: The Opt refreshe	Sav e destina ions scree	ve Method So ation (basic set en settings (p.78)
LRS000 Ubliefy (etting Looper 4 S Setting Save Dettin (Deables) Save Dettin (Deables)	Data Importi-fuogo Data Select the hree metho etago on the Option a anto C Malers from the data function for anto C Malers from the formation	vi Defa ingo SD.Corel Defa ingo SSD.Corel Defa	Marine Me add. able. - Sat mooting date	ethod 1 it the sav refreshe V	Sav e destina ions scree d. Metho	ve Method Sc ation (basic sei en settings (p.78)
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4.6 Manually Importing (Saving) Recorded Data to a Computer, and Graph Display

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please click a [Cha	nge Settings] button						Settings	
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4.7 Displaying a Graph of Saved Recording Data

Use the LR5000 Utility Program to display saved recording data as a graph.

Show all data

Filter by model
 Filter by Serial no

Filter displayed data

 \bigcirc

B Filter by Model Comment sample2

Other Data Viewing Screen Functions

sample2

2011-01-25

Deplay Table

Home.

N Display Graph

Display Table

You can filter which loggers appear in the list. Specify the desired filtering criteria, and click the [Refresh List] button. Note: You can enter up to 20 characters for [Filter by Model Comment].

How can past data be viewed?

LR5001 Humidly Lagger

100500001

On the [Search Folders] tab, select the folder and file name to display.

List

Select the logger from the list, and click [D Select a file , show information of recorded Recently folder [C:\Users\hick\Doc C:0	nctary Graph	Rie information Folder C:\Users\hioki\Do Rie name	ocumenta/LR5000		
2 Select the drive	/e ⁰¹¹⁰¹¹⁷	20110125			
- Contacts	//10125	information of recorded	data 1	2	
Desktop		Model	LR5011	LR5001	
DataMini		Name	Temperature Logger	Humidity Logger	
- Downi sda	A Select the file	Senai no	105011031	100500001	
Linka	<u></u>	Model comment	sample 1	sample2	
Pictur Save smès		Rec start date	2011-01-25	2011-01-25	
Select the folder					_
			Display Graph	Display Table	-

4.8 Printing Recorded Data

Saved recording data can be printed as a graph. Graphs displayed in the LR5000 Utility Program can be printed on A3, A4, or B4-size paper. With the desired graph displayed, click the [Print] button.

See:Graph Display Methods:"4.5" (p.44), "4.6" (p.54), and"4.7" (p.57)

Processing Recorded Data

Chapter 5

Recorded data saved on the computer can be processed by scaling, electric power calculation, energy cost calculation, operating rate calculation, integration, dewpoint temperature calculation, two-item arithmetic calculation, and out-of-range data revision. The LR5000 Utility Program performs the calculations.

View Data	I f the LR5000 Utility Program is not runing on the computer, click the icon in task tray (notification area), and cl [View Data].
Click Exit	The Data View screen appears. The [View latest data] tab shows a list of t loggers with data saved on the computer.
▲ 🔜 🔯 📮 🅪 1/23/2011	2 Select the logger from the list.
	Information about the latest data appears.
Note: If the LR5000 Utility Program is running, click [View Data] on the	3 Click the [Display Graph] button.
main screen.	The viewer opens to display the graph
	(If there are 16 or more items to display
View Data	display item selection screen appears. Sel the data items for processing.) (p.53).
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[Process Data] Items

Items	Contents	See
Scaling	Performs scaling on the data of one channel.	(p.63)
Power Calculation	Performs approximate electric power calculation.	(p.64)
Energy Cost	Performs approximate energy cost calculation.	(p.65)
Operating Rate	Performs approximate operating rate calculation.	(p.66)
Integration	Integrates displayed data.	(p.67)
Dew Point	Performs dew-point temperature calculation.	(p.68)
Two-Data-Item Arithmetic	Performs approximate two-data-item arithmetic calculation.	(p.69)
OVER Data Revision	Converts data outside of the upper and lower threshold set- tings to specified values, and saves as new data items.	(p.70)

5.1 Scaling

The following scaling calculation is applied to measured values.

Scaled Result = Raw data (measured value) \times A + B \times SI prefix (multiplier) Scaled results are saved as a new item in the recording file.

🖵 Scaling	
The following society conclusion as applied to measured values. Societal Read-Read and the improved value of a 1 = 5 grants multiplies) Societal results are send as a new item in the recording file. New lact results are send as a new item in the recording file. New lact results are send as a new item in the recording file.	Item and range settings Select the item to be scaled, and the time span.
Calculation 2011-01-07 Calculation 2011-01-0	
All (close/third) values Societ or third Societ or third Societ or third Pare data Societ or third 2 Setting continuation Societ or third Pare data 0.2 % 2 Setting continuation Societ or third Pare data 0.2 % 3 Exercise Fronts	A/B (slope/offset) values Clicking this tab changes the setting options. Make set- tings on either tab. (The settings are ap- plied to the other tab.)

1. Select the items, time span, and the following options.

Setting Options	Descriptions
Specify by example *	Enter two known conversion points (up to ten digits each).
Specify by A/B *	Enter the scaling coefficients (A and B, up to ten digits each).
Scaled units	 Select the [SI Prefix]. ([p]=1E-12, [n]=1E-9, [μ]=1E-6, [m]=1E-3, blank =1E0, [k]=1E3, [M]=1E6, [G]=1E9, [T]=1E12) Enter a character string to identify the scaled units. (Up to five characters, except /, :, *, ?, ", <, >, and .)

* Set either one.

2. Confirm settings.

Setting	Confirm that scaling is performed properly. Enter any numerical value as raw
confirmation	data, and click the [Calculate] button to display the scaled result.

 Click the [Execute] button. (The scaled results are saved.) Note: Click the [Finish] button to close the [Scaling] dialog box.

5.2 Calculating Electric Power

Approximate electric power is calculated using current measurement data from a clamp logger.

Calculation results are saved as a new item in the recording file.

- NOTE
- Electric power calculations are only approximate, so results do not always equal the true electric power value. Use a wattmeter if accurate power measurements are required.
- There is no way to confirm that a specified data item is really a current value. Calculation occurs regardless of data type.

- Power Calculation		a the		
Approximate electric p Calculation results are	over is calculated using current measurement data, saved as a new item in the recording file.			
item and range settin	ça		Item and range settings	
Current1	Test machine - Current 1	3 🧹	Specify two measured current values	
Geven0	Test mething: Gumm#1	-	and the time span for calculation.	
Time open for calculation Te	2011/01/07 • ~ 2011/01/07 •	Select all span		
Calculation formula Electric Power Turne	182W		Calculation formula	
	Current1 * Voltage1 * PowerFactor		[Electric Power Type]	
2 Settings of voltage p Voltage1' Vol [100 [10]	wer fector, and unit Registered settings Setting 1		Choose [1P2W], [1P3W] or [3P3W] to such the appropriate calculation formula.	elect
Power factor Uni	Register	Delete		
	3 Execute	Finish		

- 1. Select the items, time span, and calculation formula to be used.
- 2. Specify the voltage, power factor, and units.
 - •To save the settings, click the [Register] button.
 - To apply a registered setting, double click it ("Setting1" in the above screenshot).
 To delete a setting, click it then click the [Delete] button.
- 3. Click the [Execute] button.
 - (Calculation results are saved.)

Note: Click the [Finish] button to close the [Power Calculation] dialog box.

5.3 Calculating Energy Cost

Approximate energy cost is calculated using current measurement data from a clamp logger.

- Energy cost calculations are only approximate, so results do not always equal the true energy cost.
- There is no way to confirm that a specified data item is really an electric power value. Calculation occurs regardless of data type.

Energy Cost	
Approximate energy cost is calculated using current measurement data.	
Rem and range settings	Item and range settings
Inter for calculation The machine - Current Image: Constant Image: Constant <t< td=""><td>Specify the measured current value and the time span for calculation. The time span can also be specified by setting the A/B cursors (p.48) on a graph and selecting [Calculate between A/B cursors]</td></t<>	Specify the measured current value and the time span for calculation. The time span can also be specified by setting the A/B cursors (p.48) on a graph and selecting [Calculate between A/B cursors]
Calculator neutron Betric Betric Betric Reagy Kith Energycost Cos3 Calculate	
	Friah

- 1. Select the item and time span.
- 2. Specify the cost per kWh, voltage, and power factor.
- 3. Click the [Calculate] button.

(Electric power consumption and energy cost values are calculated and displayed.) Note: Click the [Finish] button to close the [Energy Cost] dialog box.

5.4 Calculating Operating Rate

The approximate operating rate of the measured value is calculated.

The total amount of time during which data exceeds the **[Upper threshold]** is considered operating time, and the operating rate is calculated as the ratio of the operating time to the total calculation time span.

Example: The time during which a device consumes 20 A or more is considered the operating time.

The sum of the times depicted by is the operating time. (In the above diagram, operating time is 1.5 hours.)

Operating time (1.5 h) ÷ calculation time span (2.5 h) × 100 = 60% operating rate

- 1. Select the item and time span.
- 2. Set the upper threshold.
- 3. Click the [Calculate] button.

(Operating hours and operating rate values are calculated and displayed.) Note: Click the [Finish] button to close the [Operating Rate] dialog box.
5.5 Integration

Measurement data can be integrated over a specified time span. Integration results are saved as a new item in the recording file.

Messuement data can be integrated over a specified time span. Integration results are saved as a new item in the recording file.	
The start and range settings The matrix and the Count The start of the recording tile The star	
2 Execute Fursh	

- 1. Select the item and time span.
- Click the [Execute] button. (Integration results are saved.) Note: Click the [Finish] button to close the [Integration] dialog box.

5

5.6 Calculating Dew-Point Temperature

Dew-point temperature is calculated from the temperature and humidity measurement data from the logger.

Calculation results are saved as a new item in the recording file.



- There is no way to confirm that a specified data item is really a temperature or humidity value. Dew-point calculation occurs regardless of data type.
- Only the specified temperature and humidity data measured during the specified recording time span is applied to calculations and saved.
- The valid range for calculation input measurement data is -100 to 100 degrees, and 0 to 100% humidity. Values outside of these ranges are replaced with the maximum or minimum value within the valid range.

Dew-point lemperature Colculation results are	is calculated from the temperature and humidity measurement saved as a new item in the recording file.		
bert and range setting	p		Item and range settings
Temperature	LR5001 - Temperature		
Humidity	LR5001 - Humidity	-	Specify the temperature and humidity values,
Time span for calculation	2011-01-07 • ~ 2011-01-07 •	Select all span	and the time span for calculation.
De	ne span of the recording file 2011-01-07 - 2011-01-07		

- 1. Select the items and time span.
- 2. Click the [Execute] button.

(Calculation results are saved.) Note: Click the [Finish] button to close the [Dew Point] dialog box.

5.7 Two-Data-Item Arithmetic Calculations

Simple arithmetic operations (+, -, *, and /) can be applied to two data items. Calculation results are saved as a new item in the recording file.



Only the values of data items measured during the specified recording time span are applied to calculations and saved.

Inter-Date acm Antomatic Simple andmetic operations (*, *, * and /) can be applied to two data items. Occulator results are saved as a new tem in the recording ble	
	Item and range settings
Atm and registerings Import 1 Import 1<	Select the items for calculation, and the time span.
bent (ben2 3 _ Erecte Frish	

- 1. Select the items and time span.
- 2. Select the calculation operator.
- Click the [Execute] button. (Calculation results are saved.) Note: Click the [Finish] button to close the [Two-Data-Item Arithmetic] dialog box.

5

5.8 Converting Over-Threshold Data Values

Data values larger than the upper threshold and smaller than the lower threshold can be converted to specified values.

Converted results are saved as new data items in the recording file.

- OFER Data Revision		
Over-threshold data values can be converted to specified values. Converted results are saved as new data items in the recording file.		
item and range settings	-	Item and range settings
Nem for calculation [LR5001 - Humidity	•	Select the items for conversion, and the time
Time span for 2011-01-07 • 2011-01-07 •] Select all span	span.
Time span of the recording file 2011-01-07 - 2011-01-07		
Settings		
Lower threahold 10 % S Conversion 0 %		
3 Execute	Finish	

- 1. Select the items and time span.
- 2. Set the upper and lower threshold values, and their corresponding conversion values.
- 3. Click the [Execute] button. (Conversion results are saved.)

Note: Click the [Finish] button to close the [OVER Data Revision] dialog box.

Organizing Data

Chapter 6

The LR5000 Utility Program can reorganize (copy, delete, move, combine, and extract) imported data.



6.1 Copying and Moving Data

The selected logger recording files can be copied or moved to any folder.

Example: Copy a file from the folder C:\Users\hioki\Documents\LR5000 to C:\Users\hioki\Desktop.

Pere relet or the Prestor Tree	ve.	Copying Data	Execut
File to copy recently opened folder		Destination folder recently opened folder	Select the drive.
C.\Users\hicki\Documents\LF_000	*	C:\Users Vicki\Documents\LR	54
C:0 • Hie list		C:0	File lat
Select the folder.	4. Select the file. (Up to 100 car be selected.)	Depitago Carristiz 6 Sele Lirks Maric 1	ect the folder.

6.2 Deleting Data

Select and delete logger recording files as follows.

Example: Delete a file from the folder C:\Users\hioki\Documents\LR5000.

File to delete Recently opend folder	_		
C:\Users\hoki\Documents\LR5000	*		
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6.3 **Combining Data** Separate logger recording files can be combined into one set of recording data. Example: Combine file 20110117 with other files in C:\Users\hioki\Documents/LR5000, and save the combined data file in C:\Users\hioki/ Desktop. LR5000 Utility (Organize Data) Select [Combining Data Import 1 6 Click Logger Data SD Card Logge Data]. B Help Operation Type Ple 2 Select the drive. Combining Data En Plas File to combining Destination folder Recently opend folder Save Destination File Ref C:\Users\hicki\Documents\LR5000 ٠ 0 C/Users/hick/Desktop/RecData1.htp2 C:0 • Fie list 5 Click to specify the desti-PerfLogs Program Files . 20110113 nation and file name for Users 20110125 the combined data file. Contacts Desktop Select the file. Documents LR5000 (Up to 10 can be Downlads Favo selected.) Links Musi 3 Select the folder. selected file count: 1 Clear all selections Home Home

6.4 Extracting Data

Data in a logger recording file can be extracted to a specified time span and saved with a different file name.

		Click to specify the destination and file name for the extracted data file.
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Options Settings (LR5000 Utility Program) Chapter 7

These settings determine the saving method for imported logger data, device connection monitoring, and logger setting display functions.



Chapter 7 Options Settings (LR5000 Utility Program)

7.1 Changing the Saving Method for Imported Data

The saving method for imported logger data can be changed as follows.

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7.2 Changing the Connection Monitoring Method, and Logger Settings Displays

Change the device connection monitoring settings and the functions on the logger settings displays as follows.



Chapter 7 Options Settings (LR5000 Utility Program)

Specifications

Chapter 8

8.1 Measurement Specifications

Sensor	External temperature sensor 1channel (Thermistor)
Measurement ranges	 Temperature: -40.0°C to 180.0°C (-40.0°F to 356.0°F) Note 1: Measurement range is limited according to sensor type. Note 2: "UF" or "OF" indicates out-of-range measurement.
Measurement accuracy (logger + sensor)	• Temperature: between -40.0°C (-40.0°F) and 0.0°C (32.0°F) : $\pm 1.0°C (\pm 1.8°F)$ between 0.0°C (32.0°F) and 35.0°C (95.0°F) : $\pm 0.5°C (\pm 0.9°F)$ between 35.0°C (95.0°F) and 70.0°C (158.0°F) : $\pm 1.0°C (\pm 1.8°F)$ between 70.0°C (158.0°F) and 120.0°C (248.0°F) : $\pm 2.0°C (\pm 3.6°F)$ 120.0 to 180.0°C (248.0 to 356.0°F) : $\pm 5.0°C (\pm 9.0°F)$ ± 4 ± 3 ± 4 ± 4
Accuracy guarantee for temperature and humidity	 Temperature: -20.0°C to 70.0°C (-4.0°F to 158.0°F) (logger) Humidity: 80%RH or less (logger) non-condensating
Guaranteed accuracy period	1 year

8.2 Functional Specifications

Display type	LCD
Display contents	Measured value, units (°C), recording (REC), endless recording (END- LESS), statistical recording (STAT), recording interval (INTVL), date and time (TIME), alarm (AL), battery status, recorded data count (DATA), maximum value (MAX), minimum value (MIN), auto power saving (APS)
Operation key	Four ("SET", "REC/STOP", "+", "-")
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording modes	 Instantaneous recording: The instantaneous value is recorded at each recording interval Statistical recording: Measurements are taken once per second, and instantaneous, maximum, minimum, and average values are saved at each recording interval (cannot be selected when the recording interval is set to one second).
Recording capacity	 Instantaneous recording: 60,000 values Statistical recording: 15,000 instantaneous, maximum, minimum, and average values
Recording start method	 Logger button operation Instant or scheduled time (set by computer/Data Collector)
Recording stop method	 Logger button operation (endless recording) Logger button operation (one-time recording) Scheduled time (endless recording) Scheduled time (one-time recording) Scheduled time is set by computer/Data Collector
Retained recording sessions	Two sessions (each from recording start to stop)
Alarm	Indicates when measured values are outside of the range defined by upper and lower thresholds set from a computer or the Data Collector
Scaling	Scales and displays measured values according to settings made from a computer or the Data Collector
Power save setting	The measurement data display turns off about 30 seconds after the last button operation (cancel power save for continuous display)
Real-time clock	Provided

8.3 Miscellaneous

Clock accuracy	±50ppm (@25°C (77°F)) ±4.32 s/day
Backup	Recorded data and settings (independent of battery)
Interface	Half-duplex start/stop synchronous infrared serial communication between the logger and Communication Adapter or Data Collector
Power supply	 Rated supply voltage: 1.5 VDC One LR6 alkaline battery Recording and clock operation, and maximum and minimum values are retained for about 30 seconds during battery replacement
Maximum rated power	0.1 VA
Battery life	 Approx. 2 year (instantaneous recording, with 1-minute recording interval and auto power saving, @20°C (68°F)) Approx. 2 month (with 1-second recording interval, @20°C (68°F))
Dimensions	Approx. 79W×57H×28D mm (3.11"W×2.24"H×1.10"D)
Mass	Approx. 105 g (3.7 oz.) (w/battery)
Dust and water protection rating	IP54 (EN60529) (with sensor connected, but not including sensor tip)
Accessories	LR6 alkaline battery
Options	 LR5091 Communication Adapter LR5092-20 Data Collector LR9601 Temperature Sensor LR9602 Temperature Sensor LR9603 Temperature Sensor LR9604 Temperature Sensor LR9611 Temperature Sensor LR9612 Temperature Sensor LR9613 Temperature Sensor LR9621 Temperature Sensor LR9631 Temperature Sensor LR9631 Temperature Sensor LR9631 Temperature Sensor Sensor LR9631 Temperature Sensor Sensor Sensor Sensor Sensor LR9631 Temperature Sensor Sensor /ul>
Environmental conditions	 Operating environment: indoors, pollution degree 2, up to 2000 m ASL Operating temperature and humidity: -20°C to 70°C (-4.0°F to 158.0°F), 80%RH or less (non-condensating) Storage temperature and humidity: -20°C to 70°C (-4.0°F to 158.0°F), 80%RH or less (non-condensating)
Applicable Standards	Safety: EN61010 EMC : EN61326

8.4 LR5091 Communication Adapter Specifications

Main Unit General Specifications

Functions	Converts between the logger's infrared signals and USB signals to support communications between the logger and a computer (USB port).
Compatible loggers	LR5001 Humidity Logger, LR5011 Temperature Logger, LR5031 Instru- mentation Logger, LR5041 Voltage Logger (50 mV), LR5042 Voltage Logger (5 V), LR5043 Voltage Logger (50 V), LR5051 Clamp Logger Note: Communication with models LR5031 is supported by PC Utility version 1.05 and later. LR5051 is supported by PC Utility version 1.01 and later.
Operating temperature and humidity	Temperature: 0°C to 40°C (32.0°F to 104.0°F), Humidity: 80%RH or less (non-condensating)
Storage temperature and humidity	Temperature: -10°C to 50°C (14.0°F to 122.0°F), Humidity: 80%RH or less (non-condensating)
Operating environment	Indoors, pollution degree 2, up to 2000 m ASL
Power supply	5 VDC (USB bus-powered)
Maximum rated power	0.5 VA
Dimensions	Approx. 83W×61H×19D mm (3.27"W×2.40"H×0.75"D) (without projections)
Mass	Approx. 43 g (1.5 oz.) (without USB cable)
Applicable Standards	• Safety: EN61010 • EMC :EN61326
USB standard	USB 2.0 compliant, Full Speed support
Connector	Mini B series receptacle
Connectable device	Computer
Communication speed	115,200bps

Communication method	Half-duplex start/stop synchronous infrared serial communication
Communication speed	115,200bps

Accessories

USB cable (1 m)1	
LR5000 Utility Program (CD)1	

Supplied LR5000 Utility Program Specifications

Supplied medium	CD1
Operating environment	 Personal computer meeting the following specifications CPU: 1 GHz or faster processor clock RAM: at least 512 MB Operating system: Windows XP SP2 or later, Vista SP1 or later, or Windows 7 Runtime library: .NET Framework 2.0/3.5 Interface: USB (or COM port for models 3910, 3911, or 9612) Monitor resolution: 1024 x 768 or higher Hard disk: At least 30 MB free space (Another 500 MB may be required if .NET Framework 2.0 or 3.5 is not yet installed. Additional space is required for storing recorded data.)
Model communication support	 All LR5000-series loggers Note1: Communication with models LR5031 is supported by PC Utility version 1.05 and later. LR5051 is supported by PC Utility version 1.01 and later. Note2: The COMMUNICATION UTILITY program supports the following models' settings and data import functions. A computer COM port and 9612 RS-232C cable are required when using the model 3910 or 3911 Communication Base. All "Data Logger" models 363x to 364x Communication Base models 3910, 3911, and 3912
Communication connections	 Communication with LR5000-series loggers: Computer, USB cable, LR5091 Communication Adapter, and LR5000-series logger Computer, USB cable, LR5092-20 Data Collector, and LR5000-series logger Communication with the LR5092-20 Data Collector: Computer, USB cable, and LR5092-20 Data Collector
Setting functions	 Export/import settings by communication with the LR5000 series Settings exported from each LR5000 are stored on the computer (the following functions are supported by the supplied PC Utility version 2.00, or later) Export/import settings by communication using the LR5092-20 Data Collector Import and save logger settings using the LR5092-20 Data Collector via communication or SD memory card Settings exported to the LR5092-20 Data Collector are stored on the computer
Auto-start function	A small resident program (icon in the task tray/notification area) detects when a logger or the Data Collector is connected to the computer, and automatically starts the LR5000 Utility Program.

8.4 LR5091 Communication Adapter Specifications

Data import functions	 Communicates with the LR5000-series loggers, and imports recorded data Combines recorded data Incorporates new data when an LR5000-series logger holds data not previously imported (the following functions are supported by the supplied PC Utility version 2.00, or later) Communicates with the LR5092-20 Data Collector, and imports recorded data saved in the Data Collector Imports data saved to an SD memory card in the LR5092-20 Data Collector tor
Graph display functions	 Displays up to 16 channels in a graph Displays up to 16 Y-axes Displays one time base axis Set line colors for each channel, and display/hide lines and bar graphs for each channel Auto setting of time base and vertical axis Display/hide Y-axis grid lines, and set grid display density Select display background color Copy graph images to the clipboard A/B cursor functions Displays statistical data (maximum, minimum, and average)
Data list display functions	 Browse recorded data in tabular format Displays up to 600 channels Displays statistical data (maximum, minimum, and average)
Export functions	 Export all recorded data displayed in a table in CSV format Paste to Excel all recorded data displayed in a data table Export all recorded data between A/B cursors in CSV format Paste to Excel all recorded data between A/B cursors
Import functions	Import text files from the 3169 Clamp-On Power HiTester Note: Only electric energy data recorded at one-second or longer inter-
	val can be imported
Printing functions	 Prints graphs and statistical data Supports A3, A4, and B4 paper sizes
Printing functions Data processing functions	 Prints graphs and statistical data Supports A3, A4, and B4 paper sizes Scaling (y=a×x+b), electric power calculation, energy cost calculation, operating rate calculation, integration, dew-point temperature calculation, arithmetic calculations, out-of-range data revision
Printing functions Data processing functions File management functions	 Prints graphs and statistical data Supports A3, A4, and B4 paper sizes Scaling (y=a×x+b), electric power calculation, energy cost calculation, operating rate calculation, integration, dew-point temperature calculation, arithmetic calculations, out-of-range data revision Copy and delete data saved on the computer (the following functions are supported by the supplied PC Utility version 2.00, or later) Delete data saved to an SD memory card in the LR5092-20 Data Collector

8.5 Temperature Sensors Specifications

General Specifications

LR9601, LR9602, LR9603, LR9604 (molded resin type)

Sensor type	Thermistor
Operating temperature	-40°C to 180°C (-40.0°F to 356.0°F) (with no condensation on connectors) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Storage temperature	-40°C to 180°C (-40.0°F to 356.0°F) (with no condensation on connectors) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Response time	Approx. 100 sec. Note: 90% response time for temperature (reference value)
Dust and water protection rating	Water ingress protection (JIS C 0920) When connected to LR5011 Temperature Logger
Operating environment	Indoors
Materials	Cable: Silicone Sensor: Silicone
Dimensions	 Cable length (including sensor): Approx. 1000 mm (39.37") (LR9601), Approx. 5000 mm (196.85") (LR9602), Approx. 10000 mm (393.70") (LR9603), Approx. 45 mm (1.77") (LR9604) Sensor element: Approx. 6 mm (0.24") diameter, and 28 mm (1.10") long
Mass	Approx. 16 g (0.6 oz.) (LR9601), Approx. 60 g (2.1 oz.) (LR9602), Approx. 115 g (4.1 oz.) (LR9603), Approx. 6 g (0.2 oz.) (LR9604)

LR9611, LR9612, LR9613 (lug terminal type)

Sensor type	Thermistor
Operating temperature and humidity	-30°C to 180°C (-22.0°F to 356.0°F), 80%RH or less (non-condensating) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Storage temperature and humidity	-30°C to 180°C (-22.0°F to 356.0°F), 80%RH or less (non-condensating) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Response time	Approx. 45 sec. Note: 90% response time for temperature (reference value)
Dust and water protection rating	No
Operating environment	Indoors
Dimensions	 Cable length (including metal tip): Approx. 1000 mm (39.37") (LR9611), Approx. 5000 mm (196.85") (LR9612), Approx. 10000 mm (393.70") (LR9613) Metal tip: Outside diameter Approx. 7 mm (0.28"), Inside diameter Approx. 3.2 mm (0.13"), Thickness Approx. 0.5 mm (0.02")
Mass	Approx. 17 g (0.6 oz.) (LR9611), Approx. 61 g (2.2 oz.) (LR9612), Approx. 116 g (4.1 oz.) (LR9613)

8.5 Temperature Sensors Specifications

LR9621 (sheath type)

Sensor type	Thermistor
Operating temperature and humidity	-40°C to 120°C (-40.0°F to 248.0°F), 80%RH or less (non-condensating) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Storage temperature and humidity	-40°C to 120°C (-40.0°F to 248.0°F), 80%RH or less (non-condensating) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Response time	Approx. 90 sec. Note: 90% response time for temperature (reference value)
Dust and water protection rating	No
Operating environment	Indoors
Materials	Cable: Silicone Metal tip: SUS304
Dimensions	 Cable length (including metal tip): Approx. 1000 mm (39.37") Metal tip: Outside diameter Approx. 4 mm, Length Approx. 180 mm
Mass	Approx. 23 g (0.8 oz.)

LR9631 (needle type)

Sensor type	Thermistor
Operating temperature and humidity	-40°C to 120°C (-40.0°F to 248.0°F), 80%RH or less (non-condensating) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Storage temperature and humidity	-40°C to 120°C (-40.0°F to 248.0°F), 80%RH or less (non-condensating) Note: -20°C to 70°C (-4.0°F to 158.0°F) at connectors
Response time	Approx. 20 sec. Note: 90% response time for temperature (reference value)
Dust and water protection rating	No
Operating environment	Indoors
Materials	Cable: Silicone Metal tip: SUS304
Dimensions	 Cable length (including metal tip): Approx. 1000 mm (39.37") Metal tip: Diameter Approx. 1.3 mm (0.05"), Length Approx. 25 mm (0.98")
Mass	Approx. 17 g (0.6 oz.)

Appearance molded resin type

LR9601 Temperature Sensor (Approx. length 1 m)



LR9602 Temperature Sensor (Approx. length 5 m)



LR9603 Temperature Sensor (Approx. length 10 m)



LR9604 Temperature Sensor (Approx. length 45 mm)



lug terminal type

LR9611 Temperature Sensor (Approx. length 1 m)



LR9612 Temperature Sensor (Approx. length 5 m)



LR9613 Temperature Sensor (Approx. length 10 m)



sheath type

LR9621 Temperature Sensor (Approx. length 1 m)



needle type

LR9631 Temperature Sensor (Approx. length 1 m)



Maintenance and Service

Chapter 9

Requesting repairs

- · Use the original packing materials when transporting the instrument, if possible.
- Pack the instrument so that it will not sustain damage during shipping, and include a description of existing damage. We do not take any responsibility for damage incurred during shipping.
- Please contact your dealer or Hioki representative for information on where to submit products for repair.

When the logger will not be used for long time

CAUTION To avoid corrosion and damage to this instrument from battery leakage, remove the batteries from the instrument if it is to be stored for a long time (1 week).

9.1 Cleaning

To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.

NOTE

Wipe the LCD gently with a soft, dry cloth.

9.2 Disposing of the Logger

Obey local regulations for disposal of electronic equipment.

9.3 Troubleshooting

If damage is suspected, check the "Before requesting repairs" section before contacting your dealer or Hioki representative.

Before requesting repairs

Problem Symptom	Probable Causes	Remedies and References
The Utility Program cannot be installed. No measured value is dis- played.	 The computer operating environment may be incompatible. The installation procedure may be incorrect. The sensor plug is inserted incorrectly. The sensor plug is not inserted all the way in page 100 million. 	 Check the operating environment requirements, and try installing in (another) compatible computer. See: "LR5000 Utility Program Operating Requirements" (p.21) Refer to the installation procedure, and try again. Pay particular attention to the following: Be sure to log in with an Administrator account. Before installing, be sure to close any applications running on the computer. If the installation Procedure" (p.21) Verify the correct plug orientation, and insert it as far as possible. If the values are not displayed despite these measures, the sensor and log-
	NOTE The maximum and minimum val- ues are not displayed when the recorded data count is 0.	ger need to be inspected and re- paired. Please contact your dealer or Hioki representative. See: "Requesting repairs" (p.91) [ERROR] is displayed when this (faulty) data is imported by the Utility Program.
The display is blank.	Power save is enabled.	Press any button or send a communi- cation signal to turn on the display. See: "Part Names/Functions and Display Indicators" (p.12)
The battery is depleted too quickly.	 The battery supplied with the logger is still being used. A zinc-manganese battery is being used. 	Install a new AA-size (LR6) alkaline battery. See: "2.1 Installing (or Replacing) the Battery" (p.17)

Before requesting repairs

Problem Symptom	Probable Causes	Remedies and References
Logger settings cannot be changed.	Dead battery.	When the I battery indicator appears, settings cannot be changed (but only displayed). Replace the battery.
		See: "2.1 Installing (or Replacing) the Battery" (p.17)
How can the logger's mem- ory be erased?		Logger memory can be erased using the LR5000 Utility Program.
		See: "Other Settings on the Logger Settings Screen" (p.38)
	_	Note that data recorded prior to the last recording is automatically erased whenever recording starts. (The logger retains the data from both current and most recent prior record- ing operation.)
		See: "4.3 Starting and Stopping Recording" (p.42)
How can recorded values		Enable scaling.
be reorganized?		See: "5.1 Scaling" (p.63)
	_	Scaling settings can be made before recording.
		See: "Scaling (set as needed)" (p.36)
Recorded data has disap- peared.	Recording was restarted after stopping.	Note that if recording is accidentally restarted after stopping, data record- ed prior to the last recording is auto- matically erased. (The logger retains the data from both current and most recent prior recording operations.)

9.3 Troubleshooting

Before requesting repairs

Problem Symptom	Probable Causes	Remedies and References
The [REC] indicator disappears even though recording has not been stopped.	The one-time recording stop method is selected.	With one-time recording, recording stops automatically when memory becomes full. Change the stop meth- od to endless recording.
230 [®] FULL		 See: Making Settings on the Log- ger:"Stop Method Setting (for when memory becomes full)" (p.30) See: Making Settings from the LR5000 Utility Program:"Stop Method" (p.35)
		(With endless recording, the oldest data is overwritten when memory is full, so be sure to save data to a com- puter periodically during long-term re- cording. Data can be saved to a computer without stopping recording.)
		See: "4.5 Automatically Importing (Saving) Recorded Data to a Computer, and Graph Display" (p.44)
The logger cannot commu- nicate with the new LR5091 (LR5092).	The installation of the device driver to the LR5091 (LR5092 failed.	For Window XP, the driver may be re- quired to be installed to each LR5091 (LR5092). Open Windows Device Manager and re-install the driver.

9.4 Error Displays

The display appears as follows when an error occurs on the logger.

Logger Error Displays

Error Displays	Meaning	Remedies and References
Err, I	Calibration data error: A fault occurred with the internal calibration data.	Inspection and repair is required. Please contact your dealer or Hioki representative.
Err2	Microcomputer error: A fault occurred in microcomputer ROM/RAM.	See: "Requesting repairs" (p.91)
Err,3	Data recording error: A fault occurred in recording data or accessing settings.	
682E	Battery voltage is too low for nor- mal logger operation.	Replace the battery. See: "2.1 Installing (or Replacing) the Battery" (p.17)
oF or UF	A measured value is out of range.	Out-of-range values cannot be dis- played. [OF] or [UF] is displayed when this data is imported by the Utility Pro- gram.
DATA	 The sensor plug is inserted incorrectly. The sensor plug is not inserted all the way in. The sensor is damaged. The logger is damaged. 	Verify the correct plug orientation, and insert it as far as possible. If the values are not displayed despite these measures, the sensor and log- ger need to be inspected and re- paired. Please contact your dealer or Hioki representative.
		[ERROR] is displayed when this (faulty) data is imported by the Utility Program.

LR5000 Utility Program Error Displays

Error Displays	Meaning	Remedies and References
OF	A measured value is out of range.	Out-of-range values cannot be displayed.
UF		



Appendix 1 About Recording Modes

The recording method depends on the selected recording mode. The recording modes are as follows.

Instantaneous Recording

Measurements are recorded in internal memory at each recording interval.



Statistical Recording

Measurements are taken once per second, and instantaneous, maximum, minimum, and average values are saved to internal memory at each recording interval. Data at the recording start time is not recorded (in the following case, data at 10:00:00 is not recorded).



Statistical recording cannot be selected when the recording interval is set to one second.

Appendix 2 Recording Intervals and Maximum Recording Times

The recording time is calculated according to the recording capacity.



The maximum recording time is limited by the remaining battery capacity.

Instantaneous Recording

Up to 60,000 values can be recorded.

Recording Interval	Recording Time	Recording Interval	Recording Time
1 sec	16 h, 40 min	1 min	41 d, 16 h
2 sec	1 d, 9 h, 20 min	2 min	83 d, 8 h
5 sec	3 d, 11 h, 20 min	5 min	208 d, 8 h
10 sec	6 d, 22 h, 40 min	10 min	416 d, 16 h
15 sec	10 d, 10 h	15 min	625 d
20 sec	13 d, 21 h, 20 min	20 min	833 d, 8 h
30 sec	20 d, 20 h	30 min	1250 d
		60 min	2500 d

Statistical Recording

Up to 15,000 values can be recorded.

Recording Interval	Recording Time	Recording Interval	Recording Time
1 sec (Cannot be set)	-	1 min	10 d, 10 h
2 sec	8 h, 20 min	2 min	20 d, 20 h
5 sec	20 h, 50 min	5 min	52 d, 2 h
10 sec	1 d, 17 h, 40 min	10 min	104 d, 4 h
15 sec	2 d, 14 h, 30 min	15 min	156 d, 6 h
20 sec	3 d, 11 h, 20 min	20 min	208 d, 8 h
30 sec	5 d, 5 h	30 min	312 d, 12 h
		60 min	625 d

Appendix 3 Battery Life Approximation

Battery life depends on the recording interval.

The following table shows battery life when power saving (p.31) is enabled. Battery life is approximately two months when power saving is disabled or when the statistical recording mode is enabled.

Recording Interval	Battery Life	Recording Interval	Battery Life
1 sec	Approx. 60 days	30 sec	Approx. 1.5 year
10 sec	Approx. 1 year	1 min or more	Approx. 2 year

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