HIOKI

New

# WIRELESS LOGGING STATION LR8410-20

Data Loggers


Wireless data link

No-fuss Wiring

Easy data capture

QUICK SET function

Quick configuration

## Logging Multi-point Data Has Never Been So Easy

***Introducing* HIOKI*'s new, multi-channel wireless logger with Bluetooth® technology!***

**HIOKI**'s new Wireless Logging Station LR8410-20 captures data from remotely installed logging modules wirelessly. Two types of logging modules provide measurement and recording capabilities for **voltage**, **temperature**, **resistance**, and **humidity** data. Each station can control up to seven logging modules (for a total of **105 channels**), and data is logged using a high-speed sampling process that scans **all channels every 100 ms**. Wireless technology makes it possible to log over 100 channels of data in applications where it would be difficult to use a conventional logger, such as high locations where wiring would be difficult or inside secured control panels. Since the logging modules can be placed right next to the system to be measured, long wires and connection complexities are minimized. The new LR8410-20 dramatically expands the potential of the multi-channel logger.

CE

ISO 9001 JMI-0216

ISO14001 JQA-E-90091

INTERNET HIOKI Website

www.hioki.com

HIOKI company overview, new products, environmental considerations and other information are available on our website.

Countries and regions where wireless operation is currently supported:
Japan, U.S.A., Canada, EU, Norway, Switzerland, Turkey, Singapore (labeled products only)

# Wireless data transmission !

Wire-free data capture

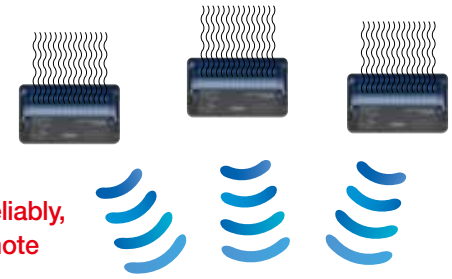
100 ms sampling of all channels

## HIOKI's new *Bluetooth*®-enabled wireless logger !

Since input units can be placed close to measurement targets,

**wire lengths are reduced and wiring complexity is eliminated.**

Data is sent wirelessly from the logging modules to the Wireless Logging Station over line-of-sight distances of up to 30 meters, facilitating measurement at locations from which it would be difficult to route wires.



Gather data reliably, even from remote locations.

Advantages of a wireless network of small, individual logging modules

**Add units easily.**

Up to 105 ch on 7 units

A single Wireless Logging Station can control up to seven logging modules, allowing you to collect 105 channels of data at a sampling speed of 100 ms. Simply add more logging modules to the implementation when necessary.

## Two Measurement Units

An optional measurement unit is required to perform measurement, and two types, shown below, are available. Both offer 15 channels of input in a single unit and send measured data to the LR8410-20 wirelessly. Units feature three-way power so that they can use an AC Adapter (included), Battery Pack (optional), or DC power supply.

### WIRELESS VOLTAGE/TEMP UNIT LR8510 (2 terminals M-3 mm screw type)

Voltage, Thermocouple

### WIRELESS UNIVERSAL UNIT LR8511 (4 terminals push-button type)

Voltage, Thermocouple, Pt100/JPt100, Resistance, Humidity

**Voltage**

**Fully isolated input channels**

Maximum rated voltage to earth: 300 VAC, DC
Max. inter-channel voltage: 300 VDC

**Thermocouple**

**K, J, E, T, N, R, S, B, W**

Measurement range varies with thermocouple type (see specifications page).

**Pt100/ JPt100**

**Pt100 :-100 to 800°C**
**JPt100 :-100 to 500°C**

3-wired/ 4-wired, testing current 1 mA

**Resistance**

**0 to 200 Ω**

Measurement ranges: 10/20/100/200Ω

**Humidity**

**5.0 to 95.0 %rh**

Requires Humidity Sensor Z2000 (option).

Poor display visibility

Messy connections

Tricky wiring

# Eliminate the problems of using multi-channel loggers

Long wires, complicated wiring, crowded spaces all make traditional multi-channel logging a chore. Wireless data capture lets you log data from multiple locations efficiently and conveniently.

Issue

**Before** ► **After**

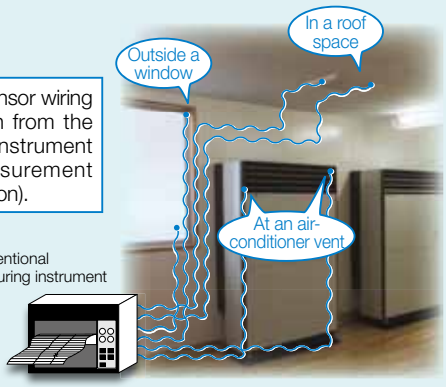
Advantage

**Problems with conventional loggers** — **Solved by the Wireless Logging Station**

## Make measurements where it would not be practical to wire equipment directly.

Monitoring the temperature near wall-mounted air-conditioners, in high places such as roof spaces, or in crawlspaces

Extensive sensor wiring must be run from the measuring instrument to the measurement target (location).




**Issue 1** Running a large number of thermocouples from a logger to the ceiling or crawlspace would mean a wiring nightmare.

**Issue 2** Data can't be viewed during measurement, and data download is virtually impossible.

**Issue 3** Logging for extended periods requires extra power, something traditional loggers can't support.


Measurement units can operate on battery power where no power supply is available! (Battery pack: Option)

Battery life of logging modules:
100ms recording interval: Approx. 24 hours
1 minute recording interval: Approx. 120 hours

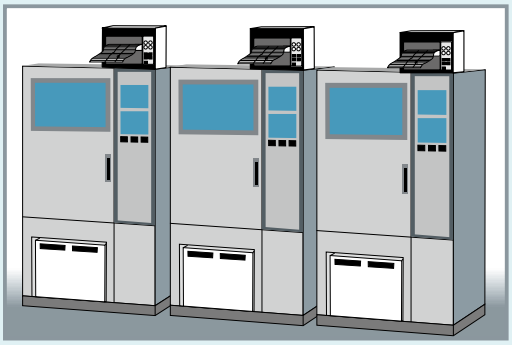
Range: 30m, line-of-sight


**Solution** There's no need to connect measurement units to the Wireless Logging Station LR8410-20 with long wires. Instead, you can install the logging module in an attic or crawlspace and check data from the LR8410-20's screen while measurement is ongoing.

The wireless data link between the station and logging module operates over a line-of-sight distance of up to 30 meters. (The presence of obstructions may shorten this range.)

## Synchronize measurement data

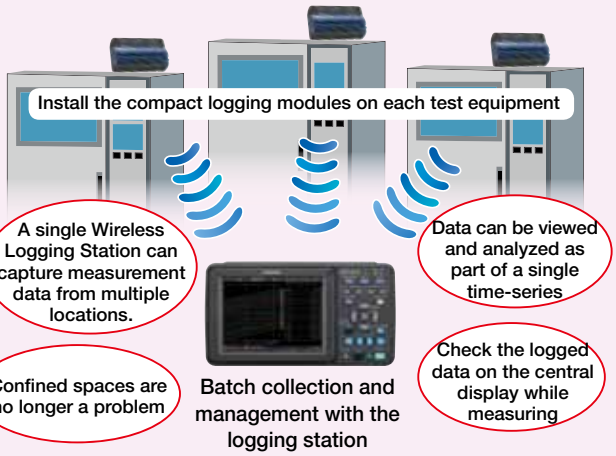
View test data from multiple points for a synchronized comparison



Traditionally, data loggers are installed on each device

**Issue 1** Installing individual loggers on test equipment means each set of measured data is on its on time line, making it hard to compare the data with respect to a single time axis.

**Issue 2** Conventional data loggers are sometimes too bulky and difficult to fit into test equipment.




**Solution** You can observe measurement results from multiple pieces of experimental equipment as part of the same time series.

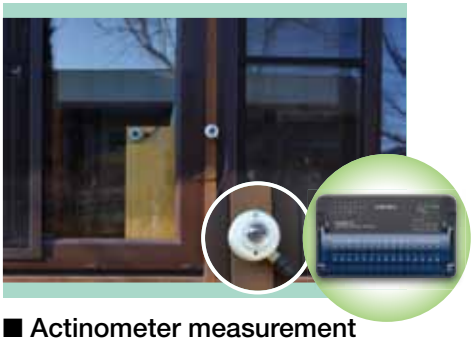
Logging modules are small enough to fit almost anywhere.

# Example Applications

Measurement/photography with the cooperation of : Kaneko Kensetsu Corporation

## Evaluating the performance of an environmentally friendly home

"We wanted to measure numerous remote locations simultaneously with a single measuring instrument."
Wireless data collection is useful in this type of measurement application.
Wireless collection means no messy wiring and the ability to manage all measurement data at once, even when measuring multiple remote locations.



### ■ Actinometer measurement

The sensor is positioned near or outside a window to measure solar insolation.

### ■ Heat flow meter measurement

A thermocouple sensor or heat flow meter sensor is positioned on a window, wall, floor, or other surface in the home to measure the wall surface temperature and heat volume (heat flow).
Insulation performance can be evaluated and heat input and output managed based on the manner in which heat is transferred. Logging modules are used to measure output from sensors in the home's various rooms, and all the data is collected by the LR8410-20.

### ■ Temperature measurement

The temperature environment in individual rooms is studied using a temperature sensor and black-bulb thermometer that have been suspended from the ceiling at the same height. The temperature sensor measures the air temperature in the space, while the black-bulb thermometer measures heat radiated by objects in the room.

**Key Point**

To use a conventional measuring instrument, you would need to string long wire runs between sensors in the measurement locations and the measuring instrument. Use of a large number of channels tends to create problems involving messy, disorganized wiring.

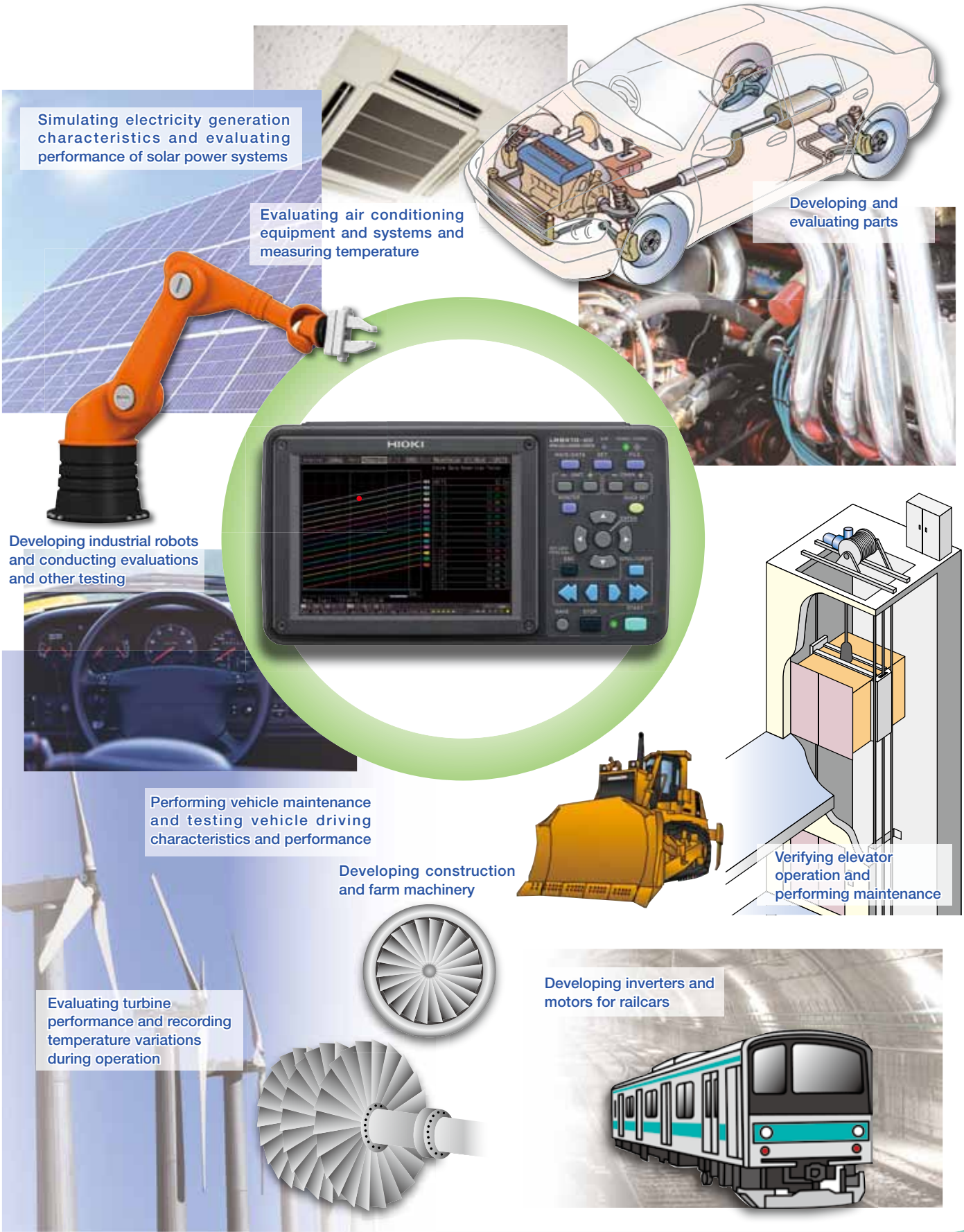
Since wiring is minimized…
Input wiring length and complexity are minimized !

Since data is sent wirelessly between logging modules and the Wireless Logging Station, there is no need to string long wire runs, and even a large number of channels can be measured with a clean, organized setup. Since logging modules can be placed near measurement targets, wiring can be minimized.

(Artist's conception of home exterior)

# Applications in a Variety of Fields

Loggers that collect data wirelessly have applications in a variety of fields. They provide a flexible solution for measuring data in locations where a conventional logger would be difficult to use--for example, in high locations or with moving target objects. They are also useful in recording mixed data from numerous channels.



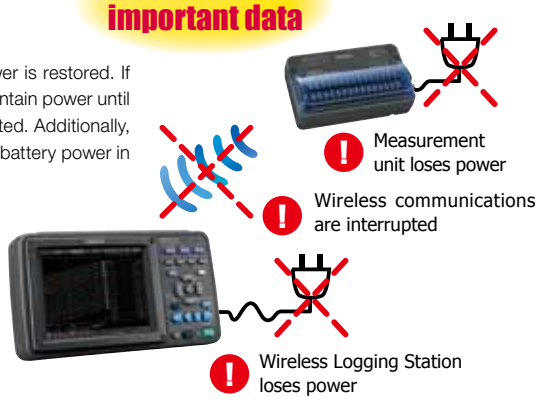
Key Point 1

"What if the power goes out during measurement?
What if wireless communications are interrupted?"

## Data is protected by a battery and backup function!

### If the power goes out during measurement

**Protect important data**




#### ■ If the Wireless Logging Station loses power

If the start backup setting is enabled, the instrument will resume measurement automatically when power is restored. If data is saved in real time to the SD memory card, the instrument's built-in high-capacity capacitor will maintain power until all data has been downloaded, making it extremely unlikely that data will be lost or the file system corrupted. Additionally, if a battery is installed while operating with the AC adapter, the logging station will automatically switch to battery power in the event of an outage.

#### ■ If a logging module loses power

When power is restored, measurement will pick up where it left off. (Data for the outage period is assumed to have been lost.) If a battery is installed while operating with the AC adapter, the module will automatically switch to battery power in the event of an outage.

### If communications are temporarily interrupted

Logging modules have internal buffer memory, which is used to store measurement data while communications are interrupted. This data is resent once communications are restored, allowing the measurement data to be restored in the Wireless Logging Station. For example, if 15 channels of data are measured at a recording interval of 1 second, data integrity can be preserved throughout a communications outage of up to about 72 minutes. Additionally, alarms can be output and emails sent to notify the operator in the event that communications are interrupted or the logging module's remaining battery life is low.

**Number of data points that can be stored in the internal memory: When recording n channels, (65,536/n) data points*
**Data collected using the logger utility is not restored during measurement. Load restored data that has been saved to an SD memory card or other media with the instrument.*

Key Point 2

"I'm using this system for the first time. Is it difficult to configure the wireless settings?"

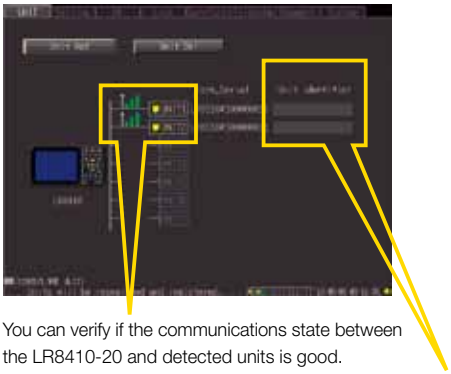
## HIOKI's Quick Set function makes configuration a breeze!

The LR8410-20 features Hioki's Quick Set function. Since measurement units can be registered simply by following the Unit Registration Guide, even first-time users can start measurement right away. It's also easy to configure settings when adding measurement units later.

QUICK SET easy setup screen
(shown when the Wireless Logging Station is turned on)

Logging modules within wireless range are automatically detected.

If no logging modules have been registered, the Quick Set screen is displayed when the LR8410-20 is turned on, and the instrument automatically detects any logging modules that are within communications range. Detected units are assigned to No. 1 through No. 7, and the registration process is completed. If one or more units have already been registered, the Wireless Logging Station automatically initiates a connection with the registered modules.



You can verify if the communications state between the LR8410-20 and detected units is good.

You can also assign a name to each unit for ID purposes. This feature helps you recognize where units are located when registering multiple units.

Key Point 3

"There's no power available where I need to make measurements. Is that OK?"

## Introducing three-way power, including extended measurement on battery power!

#### ■ Three-way power (AC adapter, battery, or DC power supply)

Both the Wireless Logging Station and logging modules feature three-way power, allowing them to operate using an AC adapter, battery, or 10 to 28 V DC external power supply. This capability enables users to choose the power supply that best suits each measurement application. Both the Wireless Logging Station and all measurement units include an AC adapter. Additionally, both the AC adapter and battery can be used with the Wireless Logging Station and all logging modules.

**Logging module battery operating time**

**With a recording interval of 100 ms: Approx. 24 hours**
**With a recording interval of 1 min: Approx. 120 hours**

Since logging modules can operate for an extended period of time on battery power, there's no need to worry about the module's power supply as long as you position the Wireless Logging Station in a location where power is available.

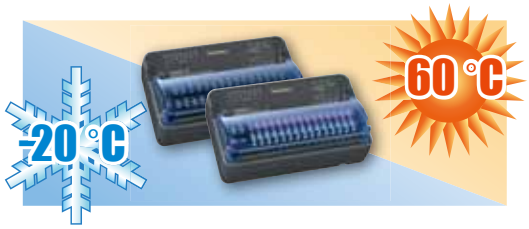
Key Point 4

Broad operating temperature range

## Measure in even high-temperature environments (up to 60°C)

### ■ Logging module operating environment temperature range of -20°C to 60°C

The operating temperature range for the Wireless Voltage/ Temp Unit and Wireless Universal Unit is -20°C to 60°C. (The temperature range within which the battery can be charged is 5°C to 35°C.) This broad range allows you to make measurements in hot environments--for example, inside a vehicle during the summer--with confidence and peace of mind.




Key Point 5

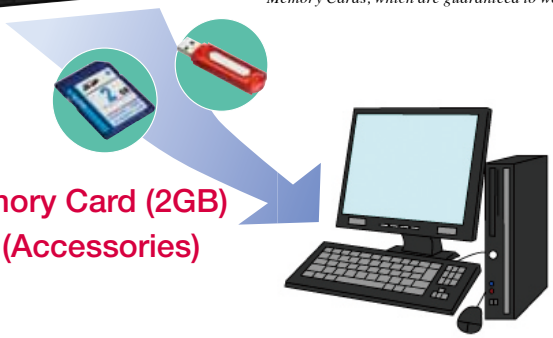
Wireless data gathering

## Save data in real-time to the included SD Memory Card

### ■ The Wireless Logging Station comes standard with a reliable, genuine Hioki SD Memory Card (2 GB)! It also supports easy-to-use USB memory sticks.

Waveform data captured wirelessly from logging modules is saved by the LR8410-20 on its SD memory card or USB memory stick approximately once every minute. (When the recording interval is longer than 1 minute, data is saved once each recording interval.)

*Note: Although USB memory devices enable real-time saving of data, for more reliable data protection we recommend use of Hioki SD Memory Cards, which are guaranteed to work with the instrument, for real-time saving of data.*



SD Memory Card (2GB)
Z4001 (Accessories)

### ■ Replace storage media during real-time recording

During real-time saving of data, the media can be changed without stopping measurement. When new media is inserted, saving of the data remaining in the instrument's internal buffer memory resumes with a new file.

### ■ Data can be saved on media and sent to a computer at the same time.

Data can be saved on the instrument's storage media in real time and at the same time sent to a computer (using the Logger Utility, a PC application included with the LR8410-20.)

### ■ Maximum recording time

Recording 2 units (30 analog) (no alarm output or waveform processing)

| Recording intervals | 100 ms | 200 ms | 500 ms | 1 s | 2 s | 5 s | 10 s |
|---|---|---|---|---|---|---|---|
| LR8410-20 Internal memory(16 MB) | 7h46m | 15h32m | 1d14h50m | 3d5h40m | 6d11h20m | 16d4h21m | 32d8h43m |
| SD Memory Card Z4001(2 GB) | 41d10h12m | 82d20h24m | 207d3h1m | "★" | "★" | "★" | "★" |

**Use only Hioki SD Memory Cards that are guaranteed to operate with the Wireless Logging Station for continuous long-term recording.*
**Maximum recording time is inversely proportional to number of recording channels.*
**Because the header portion of waveform files is not included in capacity calculations, expect actual maximum times to be about 90% of those in the table.*
**"★" exceeds 1 year.*

# Other Convenient Functions

### ■ Basic arithmetic operations using data from different channels

The Wireless Logging Station can perform basic arithmetic operations (addition, subtraction, multiplication, and division) using data from different channels. These calculations can be performed in real time and their results displayed as a graph. Calculation results can be displayed for 30 channels of data, and basic arithmetic operations can also be performed on calculation results.

### ■ Trigger functions

Measurement can be started and stopped based on input signals' rising and falling edges. Additionally, signals from external sources can be used as triggers. Data can also be measured prior to trigger activation based on a specified time (this capability is known as the pre-trigger function).

### ■ Scaling functions

Input values can be converted from voltage into current and other physical properties describing the measurement target and displayed. Converted values can be displayed using either decimal or scientific notation.

### ■ Numerical value calculations functions

The instrument can perform six types of calculations (maximum value, minimum value, average value, peak-to-peak value, time to maximum value, and time to minimum value), and up to six can be calculated at the same time. Automatic (real-time) and manual (post-measurement) calculations are supported, and you can specify the calculation range when performing calculations after measurement.

### ■ Event marking (Search functions)

During measurement, you can set event markers where desired (up to 1,000 markers) using either the keys on the instrument or an external signal. You can also set event markers when alarms occur, and you can search for event markers later.

### ■ Reservation functions

You can start and stop measurement on a regular basis by specifying dates and days of the week.

Key Point
PC Measurement

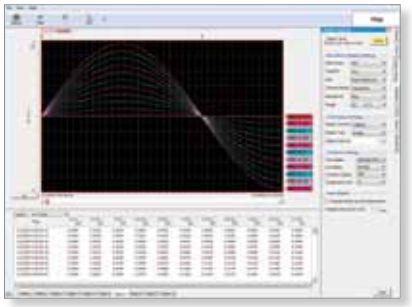
Data collection software (Bundled accessory)

# Logger Utility

- The supplied Logger Utility software enables processing of measurement data on a PC
- View past data during recording
- Output PC data to a printer

## Control measurements from a PC screen

Connect the PC to the Wireless Logging Station using USB or via LAN. Use the supplied Logger Utility software to record data on a PC in real-time. Scroll backwards through the displayed trend graph window to view past waveforms even while recording.

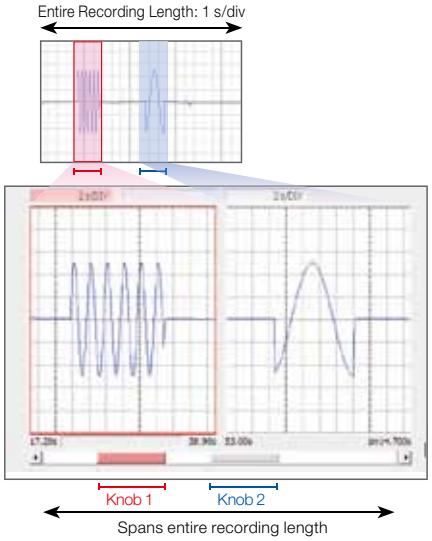


## Up to five Hioki data loggers can be connected to one PC

The Logger Utility can connect to and control up to five devices, including not only the Wireless Logging Station LR8410-20, but also conventional Hioki Memory HiLogger models (LR8400-20 series, LR8431-20, 8423, and 8430-20) from a single computer. This capability allows you to mix wireless loggers and conventional wired loggers.

## Patented "dual-knob function"

You can use the scrollbar to confirm the position of the waveform portion displayed on the screen within the whole recorded waveform.
The ability to change the time axis shown on individual windows provides a convenient way to analyze data collected over an extended period of time.
*Analysis using the dual-knob function is a patented Hioki technology.




## Data acquisition via FTP

Download data files from the instrument's internal buffer memory, SD memory card, and USB memory stick to a computer.
*Note: Waveform data cannot be downloaded from internal memory while measuring.*

## Data transfer via FTP

Data files stored on the Wireless Logging Station's SD memory card or USB memory stick are automatically sent to an FTP server regularly while measurement is in progress or after measurement is complete.

## Get notifications via E-mail

The Wireless Logging Station can send an e-mail message to a network-connected computer or mobile phone when a communications error occurs, when the any of the device's remaining battery life runs low, when the media or the internal memory is full, when a stop trigger occurs, and when an alarm occurs. E-mail messages can also be sent on a regular basis.

## Remote control through HTTP server function

Using a Web browser, you can monitor screens and operate the instrument remotely, including to configure settings and download data. You can also perform configuration and measurement tasks using communications commands.
*Note: Waveform data cannot be downloaded from internal memory while measuring.*

# WIRELESS LOGGING STATION LR8410-20

(Product and accuracy guaranteed for one year)

## General specifications

| | |
|---|---|
| Controllable devices | **Wireless Voltage/Temp Unit LR8510**<br>**Wireless Universal Unit LR8511** |
| No. of controllable devices | Max. 7 units (105 ch) |
| Control and communications (Between instrument and units) | Bluetooth® 2.1 + EDR (between Wireless Logging Station and logging modules); communication range: 30 m (line of sight), SSP security |
| Internal buffer memory | 8 MWords volatile RAM (SDRAM) |
| Clock functions | Auto calendar, clock accuracy: ±3 s/day (@23°C, 73.4°F) |
| Timebase accuracy | ±0.2 s/day while measuring (@23°C, 73.4°F) |
| Backup battery life | At least five years for clock and settings (@23°C, 73.4°F) |
| Operating temp. & humidity | -10 to 50°C (14 to 122°F), 30 to 80%RH or less (non-condensating) |
| Storage temp. & humidity | -20 to 60°C (-4 to 140°F), 80% RH or less (noncondensating) |
| Applicable standards | Safety: EN61010<br>EMC: EN61326 classA, EN61000-3-2, EN61000-3-3<br>Wireless certification:<br>Japan (type certification) :Incorporates a wireless module that has been certified as compliant with applicable technical standards.<br>US(FCC) : Part 15.247 (Contains FCC ID: QOQWT11IA)<br>Canada(IC) : RSS-210 (Contains IC: 5123A-BGTWT11IA)<br>EU : EN 300 328<br>EN 301 489-1<br>EN 301 489-17 |
| Vibration endurance | JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv. |
| External control terminal | External trigger input, trigger output, four alarm channel outputs, ground |
| Dimensions and mass | 230mm (9.06in)W × 125mm (4.92in)H × 36mm (1.42in)D, 700 g (24.7oz.) (excluding Battery Pack) |
| Accessories | Instruction manual ×1, Measurement guide ×1, AC Adapter Z1008 × 1, USB cable ×1, CD-R (data collection software "Logger Utility") ×1, SD Memory Card (2GB) Z4001 × 1 |

## Data storage media

| | |
|---|---|
| SD memory card | SD standard-compliant × 1, Hioki Z4001 (2 GB), Data format: FAT16, FAT32 |
| USB memory | Series A receptacle |

## Communication functions

| | |
|---|---|
| LAN Interface | IEEE802.3 Ethernet 100BASE-TX DHCP, DNS<br>•Data acquisition and measurement criteria setting with the Logger Utility<br>•Setting and measurement by communications commands<br>•Manual file transfer by FTP server (from the instrument memory or removable storage).<br>•Auto sending files by FTP client<br>•Remote control by HTTP server<br>•E-Mailing |
| USB Interface | USB2.0 compliant High Speed, Series-mini B receptacle<br>• Data acquisition, condition settings used with the Logger Utility software (supplied as standard)<br>• Configure the unit and measure using communication commands<br>• Transfer data from the SD memory card to a PC via USB drive mode (data transfer not possible from USB memory sticks) |

## Display section

| | |
|---|---|
| Display | 5.7 inch TFT color liquid crystal display (640 × 480 pixel), horizontal 16 division, vertical 10 division, selectable between English and Japanese displays, back light saver available |
| LCD Brightness | Selectable from 100, 70, 40, or 25 % |

## Power supplies

| | |
|---|---|
| AC adapter | Using the AC Adapter Z1008 (supplied as standard, 100 to 240 VAC, 50/60 Hz), Power consumption: 8 VA (with battery pack removed and maximum brightness) |
| Battery | Using the Battery Pack Z1007 (Li-ion 7.2V 2170mAh) (optional accessory, AC adapter has priority when used in combination with battery pack), continuous operation time: 3 hours (at 23 °C, LCD brightness 25 %)<br>Fast recharging time: 7 hours (the AC Adapter or a 10 to 28 V DC external power supply can be connected while the Battery Pack Z1007 is installed.) |
| External power | 10 to 28 VDC<br>15 VA (when battery is charged, and w/LCD max. blightness) |

## Trigger functions

| | |
|---|---|
| Trigger mode, timing | Modes : Single / Repeat, Timing : Start / Stop / Start & Stop, Logical sum (OR) and product (AND) of each trigger source, selectable for each channel |
| Analog signal source | Up to 105 channels, depending on how many Wireless Voltage/ Temp Units LR8510 and Wireless Universal Units LR8511 are connected (U1-1 to U7-15).<br>[Level trigger] Triggers when rising or falling through preset level<br>[Window] Triggers when entering or exiting range defined by preset upper and lower limit values |
| Interval trigger | Set year, month, date, hour, minute and second (triggers when specified measurement interval is passed) |
| Trigger output | Open-drain output,<br>Trigger output terminal: Push-button type terminal block<br>(5 V voltage output, active low, pulse width: at least 100 ms)<br>Output response time:<br>Recording interval + 3 sec. or less<br>(with 1 measurement unit, good communications)<br>Recording interval + 5 sec. or less<br>(with 7 measurement units, good communications) |

## Alarm output

| | |
|---|---|
| Number of channels | 4 channels, non-isolated (common ground with chassis) |
| Alarm source | Analog input: Up to 105 channels, depending on how many Wireless Voltage/ Temp Units LR8510 and Wireless Universal Units LR8511 are connected (U1-1 to U7-15).<br>When thermocouple burn-out detection is enabled, when the Wireless Voltage/ Temp Unit LR8510 or Wireless Universal Unit LR8511 battery is low, or when a communications error occurs |
| Alarm type | Level, window, output latch/ no latch, cancel alarm while measuring |
| Alarm sound | Buzzer, ON/OFF possible |
| Alarm output | Open drain output (with 5 V pull-up, active low), output response time: Recording interval + 3 sec. or less<br>(with 1 measurement unit, good communications)<br>Recording interval + 5 sec. or less<br>(with 7 measurement units, good communications) |
| Output sink current | 200 mA at 5 V to 30 VDC |

## Measurement settings

| | |
|---|---|
| Recording intervals (sampling period) | 100 ms*, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, 1 h (16 selections)<br>*All input channels are scanned at high speed during every recording interval*<br>*Setting not available when the thermocouple burnout detection setting is on. |
| Recording length (time span) | Enable continuous recording ON (records until the Stop key is pressed), or continuous recording OFF (enable a specified time span) |
| Repeat measurement recording | Set Off or On.<br>When On, measurement repeats at the set recording interval. |

## Display

| | |
|---|---|
| Time axis | 200 ms to 1day/divisions |
| Voltage axis | Select by position (magnification can be×100 to ×1/2, 0 Position : Set between -50 to 150%) or upper/ lower limits |
| Waveform scrolling | Time-axis scrolling is available by left/right arrow keys while measuring and when measurement stops (waveform drawing period). |
| Jump function | Selects the displayed span of the waveform. |
| Monitor function | Confirm instantaneous values and waveforms without recording data. |
| Unit battery life remaining display | Displays the remaining battery life for wirelessly connected units as 1 of 3 levels. |
| Signal strength display | Displays the signal strength for wirelessly connected units as 1 of 3 levels. |

## Data saving

| | |
|---|---|
| Save destination | Select a SD memory card or USB memory (use only SD memory cards sold by Hioki). |
| Storage operation | Auto: Save waveform data or time divided calculation results in real time<br>Manual: Push the save key (operation select: item choose/ directly save) |
| Real-time saving | Possible: Waveforms are saved approximately every one minute as binary or CSV data to the SD memory card or the USB memory (if sampling rate is slower than 1 minute, waveforms are saved at each interval)<br>To the PC: Waveforms are saved to the HDD in the PC via LAN or USB communication when used with the Logger Utility Software. Data can be saved in real time to the SD memory card or USB memory at the same time. |
| Split save | Simple divide: Save waveform data at pre-set times into separate files from the time measurement starts.<br>On schedule: Designate a reference time within 24 hours and save data into separate files at every set time interval starting from the reference time. |
| Overwriting save | Endless loop saving: New file overwrites the oldest file when the SD memory card or USB memory capacity runs short |
| Remove external media | Storage media may be removed during real-time save after message confirmation. Upon inserting the storage media again, data saved in internal memory during that time will be saved as a separate file in the media. |
| Data protection | If a power outage occurs or the battery runs out during real-time saving, power is cut off after the file is closed (protection becomes possible approximately 10 min. or more after the instrument is turned on). |
| Save types | Setting condition, waveform data (binary or text style), calculation of numerical value, screen data (compressed BMP), reservation settings |
| Reloading data | Stored binary data can be recalled by the logging station in 8 MB quantities |

## Calculation functions

| | |
|---|---|
| Numerical value calculations | Six calculations are available at the same time<br>Average value, peak value, maximum value, time to maximum value, minimum value, time to minimum value |
| Data range of calculation | During measurement or after stopping: Applies calculations to all data in internal buffer memory, or to the time-span specified by A/B cursors.<br>Interval calculation: Calculate values at pre-determined 1 sec to 1 day intervals and display the latest value |
| Calculation value save | Possible: After measuring the last calculated value is automatically saved to the SD memory card or USB memory as a text file<br>Timed save: Save calculated data at pre-determined 1 sec to 1 day intervals as text data to the SD memory card or USB memory in real time. |
| Waveform calculations | Calculate sum, difference, product, and quotient between channels, with calculated results displayed as channels W1 to W30 (valid only while measuring, saved in real time with a channel's waveform data.). |

## Other functions

| | |
|---|---|
| Event marking | Search: Move to the event number entered and display the waveforms appearing before and after event<br>Number of events: Maximum 1000 per measurement |
| A-B cursor | Measurement: Time difference between A/B cursors, measured value difference, cursor measured value, time<br>Types: Select trace, vertical, or horizontal |
| Scaling | Convert and display the measurement value of each channel as a scaled value |
| Rate adjustment function | Scaling can be set for a channel so that its value is the same as that for UNIT1-CH1 |
| Comment entry | Enter a title or a comment for each channel |
| Others | Start backup, save 5 types setting conditions into main unit, auto set up, start/stop key lock, key-lock, beep sound, schedule, Quick Set function |

# ■ WIRELESS VOLTAGE/TEMP UNIT LR8510 / WIRELESS UNIVERSAL UNIT LR8511

## Analog input section (@ 23±5°C /73±9°F, 80% RH or less, Defined after zero-adjustment has been performed. The 50/60 Hz cut-off setting is selected)

## Voltage
Measurement unit: LR8510 / LR8511

| Range | Max. Resolution | Measurable Range | Measurement Accuracy |
|---|---|---|---|
| 10 mV f.s. | 500 nV | -10 mV to 10 mV | ±10 µV |
| 20 mV f.s. | 1 µV | -20 mV to 20 mV | ±20 µV |
| 100 mV f.s. | 5 µV | -100 mV to 100 mV | ±100 µV |
| 200 mV f.s. | 10 µV | -200 mV to 200 mV | ±200 µV |
| 1 V f.s. | 50 µV | -1 V to 1 V | ±1 mV |

| Range | Max. Resolution | Measurable Range | Measurement Accuracy |
|---|---|---|---|
| 2 V f.s. | 100 µV | -2 V to 2 V | ±2 mV |
| 10 V f.s. | 500 µV | -10 V to 10 V | ±10 mV |
| 20 V f.s. | 1 mV | -20 V to 20 V | ±20 mV |
| 100 V f.s. | 5 mV | -100 V to 100 V | ±100 mV |
| 1 – 5 V f.s. | 500 µV | 1 V to 5 V | ±10 mV |

## Temperature (Thermocouples)
Measurement unit: LR8510 / LR8511

*(Compliance standard) K, J, E, T, N, R, S, B : JIS C1602-1995, IEC 584, W : ASTME-988-96, Not including RJC accuracy*

| Type | Range | Max. Resolution | Measurable Range | Measurement Accuracy |
|---|---|---|---|---|
| K | 100 °C f.s. | 0.01 °C | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 100 °C | ±0.6 °C |
| | 500 °C f.s. | 0.05 °C | -200 to -100 °C or less | ±1.5 °C |
| | | | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 500 °C | ±0.6 °C |
| | 2000 °C f.s. | 0.1 °C | -200 to -100 °C or less | ±1.5 °C |
| | | | -100 to 1350 °C | ±0.8 °C |
| J | 100 °C f.s. | 0.01 °C | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 100 °C | ±0.6 °C |
| | 500 °C f.s. | 0.05 °C | -200 to -100 °C or less | ±1.0 °C |
| | | | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 500 °C | ±0.6 °C |
| | 2000 °C f.s. | 0.1 °C | -200 to -100 °C or less | ±1.0 °C |
| | | | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 1200 °C | ±0.6 °C |
| E | 100 °C f.s. | 0.01 °C | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 100 °C | ±0.6 °C |
| | 500 °C f.s. | 0.05 °C | -200 to -100 °C or less | ±1.0 °C |
| | | | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 500 °C | ±0.6 °C |
| | 2000 °C f.s. | 0.1 °C | -200 to -100 °C or less | ±1.0 °C |
| | | | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 1000 °C | ±0.6 °C |
| T | 100 °C f.s. | 0.01 °C | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 100 °C | ±0.6 °C |
| | 500 °C f.s. | 0.05 °C | -200 to -100 °C or less | ±1.5 °C |
| | | | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 400 °C | ±0.6 °C |
| | 2000 °C f.s. | 0.1 °C | -200 to -100 °C or less | ±1.5 °C |
| | | | -100 to 0 °C or less | ±0.8 °C |
| | | | 0 to 400 °C | ±0.6 °C |

| Type | Range | Max. Resolution | Measurable Range | Measurement Accuracy |
|---|---|---|---|---|
| N | 100 °C f.s. | 0.01 °C | -100 to 0 °C or less | ±1.2 °C |
| | | | 0 to 100 °C | ±1.0 °C |
| | 500 °C f.s. | 0.05 °C | -200 to -100 °C or less | ±2.2 °C |
| | | | -100 to 0 °C or less | ±1.2 °C |
| | | | 0 to 500 °C | ±1.0 °C |
| | 2000 °C f.s. | 0.1 °C | -200 to -100 °C or less | ±2.2 °C |
| | | | -100 to 0 °C or less | ±1.2 °C |
| | | | 0 to 1300 °C | ±1.0 °C |
| R | 100 °C f.s. | 0.01 °C | 0 to 100 °C | ±4.5 °C |
| | 500 °C f.s. | 0.05 °C | 0 to 100 °C or less | ±4.5 °C |
| | | | 100 to 300 °C or less | ±3.0 °C |
| | | | 300 to 500 °C | ±2.2 °C |
| | 2000 °C f.s. | 0.1 °C | 0 to 100 °C or less | ±4.5 °C |
| | | | 100 to 300 °C or less | ±3.0 °C |
| | | | 300 to 1700 °C | ±2.2 °C |
| S | 100 °C f.s. | 0.01 °C | 0 to 100 °C | ±4.5 °C |
| | 500 °C f.s. | 0.05 °C | 0 to 100 °C or less | ±4.5 °C |
| | | | 100 to 300 °C or less | ±3.0 °C |
| | | | 300 to 500 °C | ±2.2 °C |
| | 2000 °C f.s. | 0.1 °C | 0 to 100 °C or less | ±4.5 °C |
| | | | 100 to 300 °C or less | ±3.0 °C |
| | | | 300 to 1700 °C | ±2.2 °C |
| B | 2000 °C f.s. | 0.1 °C | 400 to 600 °C or less | ±5.5 °C |
| | | | 600 to 1000 °C or less | ±3.8 °C |
| | | | 1000 to 1800 °C | ±2.5 °C |
| W | 100 °C f.s. | 0.01 °C | 0 to 100 °C | ±1.8 °C |
| | 500 °C f.s. | 0.05 °C | 0 to 500 °C | ±1.8 °C |
| | 2000 °C f.s. | 0.1 °C | 0 to 2000 °C | ±1.8 °C |

**Other specifications about thermocouple measurement**

| | |
|---|---|
| Reference junction compensation | Internal/ External, at INT RJC, total accuracy = add ± 0.5 °C |
| Thermocouple burn-out detection | Enable/disable thermocouple burn-out detection at each recording interval.(The burnout detection setting cannot be used with a recording interval of 100 ms.) |

## Temperature (Pt 100, JPt 100 sensor)
Measurement unit: LR8511

*Pt100/JPt100, 3-wired/ 4-wired, testing current 1 mA*
*(Compliance standard) Pt 100 : JIS C1604-1997, IEC 751, JPt 100 : JIS C1604-1989*

| Type | Range | Max. Resolution | Measurable Range | Measurement Accuracy |
|---|---|---|---|---|
| Pt 100 | 100 °C f.s. | 0.01 °C | -100 to 100 °C | ±0.6 °C |
| | 500 °C f.s. | 0.05 °C | -200 to 500 °C | ±0.8 °C |
| | 2000 °C f.s. | 0.1 °C | -200 to 800 °C | ±1.0 °C |
| JPt 100 | 100 °C f.s. | 0.01 °C | -100 to 100 °C | ±0.6 °C |
| | 500 °C f.s. | 0.05 °C | -200 to 500 °C | ±0.8 °C |
| | 2000 °C f.s. | 0.1 °C | -200 to 500 °C | ±1.0 °C |

## Resistance
Measurement unit: LR8511

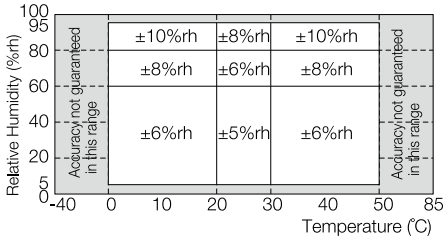
*4-wired, testing current 1 mA*

| Range | Max. Resolution | Measurable Range | Measurement Accuracy |
|---|---|---|---|
| 10 Ω f.s. | 0.5 mΩ | 0 to 10 Ω | ±10 mΩ |
| 20 Ω f.s. | 1 mΩ | 0 to 20 Ω | ±20 mΩ |
| 100 Ω f.s. | 5 mΩ | 0 to 100 Ω | ±100 mΩ |
| 200 Ω f.s. | 10 mΩ | 0 to 200 Ω | ±200 mΩ |

## Humidity (when using Z2000)
Measurement unit: LR8511

| Range | Max. Resolution | Measurable Range | Measurement Accuracy |
|---|---|---|---|
| 100 %rh f.s. | 0.1 %rh | 5.0 to 95.0 %rh | (See Humidity Accuracy Table) |

■ Humidity Sensor Z2000 accuracy




■ Option

HUMIDITY SENSOR
Z2000

# ■ WIRELESS VOLTAGE/TEMP UNIT LR8510 / WIRELESS UNIVERSAL UNIT LR8511

## Basic specifications

(Product and accuracy guaranteed for one year)

| | |
|---|---|
| No. of input channels | 15 channels (select voltage or thermocouple for each channel) (Pt100/JPt100, resistance, and humidity are also selectable for each channel with the model **LR8511**) |
| Input terminals | [**LR8510**] M3 screw type terminal block (2 terminals per channel)<br>[**LR8511**] Push-button terminals (4 terminals per channel) |
| Measurement objects | [**LR8510**] Voltage/ Thermocouple<br>[**LR8511**] Voltage/ Thermocouple/ RTDs/ Resistance/ Humidity |
| Supported device | Wireless Logging Station LR8410-20 |
| Control and communications | Bluetooth 2.1+EDR<br>(Communications range: 30 m, line of sight, security: SSP) |
| Backup memory | When recording n channels: (65,536/n) data points<br>Data is maintained in the event of a communications error and resent when communications are restored. |
| Operating temperature and humidity | Temperature: -20°C to 60°C (-4 to 140°F)<br>Humidity: -20°C to 40°C (-4 to 140°F) 80%RH or less (noncondensating)<br>40°C to 45°C (140 to 113°F) 60%RH or less (noncondensating)<br>45°C to 50°C (113 to 122°F) 50%RH or less (noncondensating)<br>50°C to 60°C (122 to 140°F) 30%RH or less (noncondensating)<br>(temperature variation range is 5 to 35°C (41 to 95°F)) |
| Storage temperature and humidity | Temperature: -20°C to 60°C (-4 to 140°F)<br>Humidity: -20°C to 40°C (-4 to 140°F) 80%RH or less (noncondensating)<br>40°C to 45°C (140 to 113°F) 60%RH or less (noncondensating)<br>45°C to 50°C (113 to 122°F) 50%RH or less (noncondensating)<br>50°C to 60°C (122 to 140°F) 30%RH or less (noncondensating) |
| Input resistance | 1 MΩ±5% (voltage and thermocouple measurement)<br>2 MΩ±5% (RTD and resistance measurement) |
| Maximum input voltage | ±100 VDC |
| Max. inter-channel voltage | 300 VDC (Channels are not isolated during resistance bulb, resistance, or humidity measurement.) |
| Maximum rated voltage to earth | 300 VAC, DC |
| Digital filter | Select OFF/ 50 Hz/ 60 Hz (In order to remove harmonic components, during analog input the cut-off frequency is automatically set according to the sampling rate) |
| Applicable standards | Safety: EN61010 |
| | EMC: EN61326 Class A, EN61000-3-2, EN61000-3-3 |
| | Wireless certification<br>Japan (type certification) : Incorporates a wireless module that has been certified as compliant with applicable technical standards.<br>US(FCC) : Part 15.247 (Contains FCC ID: QOQWT11IA)<br>Canada(IC) : RSS-210 (Contains IC: 5123A-BGTWT11IA)<br>EU : EN 300 328<br>EN 301 489-1<br>EN 301 489-17 |

| | |
|---|---|
| Vibration endurance | JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv. |
| Dimensions and mass | Approx.150W×90H×56D mm (5.91"W × 3.54"H × 2.2"D) (including cover), [**LR8510**] approx. 340 g (12.0 oz.), [**LR8511**] approx. 320 g (11.3 oz.) |
| Accessories | Instruction Manual× 1, AC Adapter Z1008 × 1, Bracket × 1 |

### Power source

| | |
|---|---|
| AC adapter | AC Adapter Z1008 (bundled accessory, 12 VDC)<br>100 to 240 VAC, 50/60 Hz<br>Typical power consumption: 1.0 VA (unit only) |
| Battery | Battery Pack Z1007 (Li-ion 7.2V 2170 mAh)<br>(Option, the AC Adapter has priority when connected)<br>Continuous operating time:<br>Approx. 24 hours (with a recording interval of 100 ms, @23°C, 73.4°F)<br>Approx. 120 hours (with a recording interval of 1 min., @23°C, 73.4°F)<br>Charging time: Approx. 7 hours (@23°C, 73.4°F)<br>The AC adapter or a 10 to 28 V DC external power supply can be connected while the Battery Pack Z1007 is installed. |
| External power | 10 to 28 VDC<br>Maximum rated power: 7 VA (when battery is charged) |

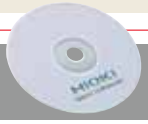
### Use of the Wireless Logging Station

**The Wireless Voltage/ Temp Unit, Wireless Universal Unit, and Wireless Logging Station use the 2.4 GHz frequency band. No radio station license is required in order to use the product, but the following precautions should be observed:**

- Do not use with systems required to exhibit a high level of safety or reliability.
- Do not use in proximity to pacemakers or other medical devices.
- The communications range between the Wireless Voltage/ Temp Unit, Wireless Universal Unit, and Wireless Logging Station is 30 meters (line-of-sight distance). The presence of obstructions (such as walls or metal shielding) may compromise the reliability of communications or shorten the communications range.
- When used in proximity to other devices that use the same frequency band, for example wireless networking devices, transmission and reception of data may become unreliable, and product operation may be affected by the other devices.
- Communications between the Wireless Voltage/ Temp Unit, Wireless Universal Unit, and Wireless Logging Station are encrypted using SSP, but the confidentiality of information is not guaranteed. Hioki is not liable for the leakage or other unauthorized disclosure of measured values that have been transmitted wirelessly.
- The Wireless Voltage/ Temp Unit, Wireless Universal Unit, and Wireless Logging Station can only be used in Japan, the U.S., Canada, and the EU. These products emit radio waves. Use of radio waves is subject to licensing requirements in certain countries. Use in countries or regions other than those listed above may constitute a violation of law, exposing the operator to legal penalties.

## Logger Utility specifications

bundled application software(CD-R)



| | |
|---|---|
| Operating environment | CPU: Pentium 3 (500 MHz or more), at least 1 GB of memory<br>Interface: Ethernet or USB<br>OS: Windows 8/ 7/ Vista/ XP (SP2 or later)<br>(This software is compatible only to the Wireless Logging Station **LR8410-20,** Memory HiLogger **LR8400-20series, LR8431-20, 8423, and 8430-20**) |
| Real-time data acquisition | Measurements on multiple loggers connected by LAN or USB can be controlled to sequentially acquire, display and save waveform data (for recording up to 10 million samples)<br>Number of controllable instruments: up to 5 units<br>(This software is compatible only with the **LR8410-20, LR8400-20series, LR8431-20, 8423, and 8430-20**)<br>Display: Waveforms (time-axis divided display possible), numerical values (logging), and alarm status can be displayed at the same time<br>Numerical value display: Can be monitored in a separate window<br>Scroll: Waveform scroll while measuring<br>Data saving destination: Real-time data acquisition file (LUW format)<br>Event marks: Can be set while measuring |
| Data acquisition settings | Data acquisition settings for the logger or logging station<br>Saving: The setting for multiple loggers or logging stations can be saved together in one file (LUS format); Instrument configuration settings can be sent and received |
| Waveform display | Processed data file: Real-time data acquisition file (LUW format), Record to internal memory data (MEM format)<br>Display format: Simultaneously display waveform and numerical value, (time-axis divided display possible)<br>Maximum number of channels: 675 channerls (measurement data) + 60 channels (waveform processing data)<br>Others: Display each channel's waveform on 10 sheets, scroll, record event mark, cursor, screen hard copy, numerical value display |

| | |
|---|---|
| Data conversion | Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format)<br>Converted sections: All data, designation section<br>Format: CSV format (separate by comma, space, tab), transfer to EXCEL spreadsheet, arbitrary data thinning |
| Waveform processing | Processing items: Four arithmetic operations<br>Number of processing channels: 60 channerls |
| Parameter calculations | Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format), data acquired in real time, waveform processing data<br>Calculation items: Average, peak, maximum values, time to maximum values, minimum values, time to minimum values, ON time, OFF time, count the number of ON time and OFF time, standard deviation, integration, area values, totalization |
| Search functions | Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format)<br>Search mode: Event mark, time and date, maximum position, minimum position, maximum pole, minimum pole, alarm position, level, window, amount of change |
| Print functions | Supported printer: Printer compatible with the OS<br>Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format)<br>Print format: Waveform image, report format, list print (channel settings, event, cursor value)<br>Print area: The entire area, area between cursors A and B<br>Print preview: Supported |

## ■ WIRELESS LOGGING STATION Series (Accessories and options)

# WIRELESS LOGGING STATION LR8410-20

Wirelessly gathers data from measurement units for display, calculation, and saving.

*The LR8410-20 alone is not capable of making measurements. One or more LR8510 or LR8511 measurement units are required in order to enable measurement. (One LR8410-20 can control from one to seven LR8510 and LR8511 units, which can be mixed.)*

## LR8410-20 Accessories

**AC ADAPTER Z1008**

100 to 240V AC, 50/60Hz

**SD MEMORY CARD 2GB Z4001**

2GB

## LR8410-20 Options

**BATTERY PACK Z1007**

Li-ion, 7.2V/2170mAh

**CARRYING CASE C1007**

Holds one LR8410-20 and four measurement units.

**FIXED STAND Z1009**

For wall hanging and slanted bench mounting

**LAN CABLE 9642**

Straight Ethernet cable, supplied with straight to cross conversion adapter, 5 m (16.41 ft) length

## WIRELESS VOLTAGE/ TEMP UNIT LR8510

2 terminals M-3 mm screw type, 15 ch
Voltage, Temperature with thermocouple

## WIRELESS UNIVERSAL UNIT LR8511

4 terminals push-button type, 15 channels
Voltage, Temperature with thermocouple, Platinum Resistance temperature sensor, Humidity, or Resistance measurement

## LR8510, LR8511
### Shared accessories

**AC ADAPTER Z1008**

100 to 240V AC, 50/60Hz

## LR8510, LR8511
### Shared options

**BATTERY PACK Z1007**

Li-ion, 7.2V/2170mAh

## LR8511
### LR8511-only option

**HUMIDITY SENSOR Z2000**

3 m (9.84 ft) length

## ■ Related products: Introducing the MEMORY HiLOGGER Series

**MEMORY HiLOGGER LR8400-20**

30 isolated analog input channels
Can be expanded to a maximum of 60 channels.
With built-in Wireless Voltage/Temp Unit LR8510×2

**MEMORY HiLOGGER LR8401-20**

30 isolated analog input channels
Can be expanded to a maximum of 60 channels.
With built-in Wireless Universal Unit LR8511×2

**MEMORY HiLOGGER LR8402-20**

30 isolated analog input channels
Can be expanded to a maximum of 60 channels.
With built-in LR8510×1, LR8511×1

**MEMORY HiLOGGER LR8431-20**

10 isolated analog input channels
Compact and lightweight model with USB memory stick support

**MEMORY HiLOGGER 8423**

From 15 to 120 channels of isolated analog input
Can be upgraded to a maximum of 600 channels.
Designed for PC measurement.



HIOKI
HIOKI E. E. CORPORATION

**HEADQUARTERS:**
81 Koizumi, Ueda, Nagano, 386-1192, Japan
TEL +81-268-28-0562 FAX +81-268-28-0568
http://www.hioki.com / E-mail: os-com@hioki.co.jp

**HIOKI USA CORPORATION:**
TEL +1-609-409-9109 FAX +1-609-409-9108
http://www.hiokiusa.com / E-mail: hioki@hiokiusa.com

**HIOKI (Shanghai) SALES & TRADING CO., LTD.:**
TEL +86-21-63910090 FAX +86-21-63910360
http://www.hioki.cn / E-mail: info@hioki.com.cn

**HIOKI INDIA PRIVATE LIMITED:**
TEL +91-124-6590210 FAX +91-124-6460113
E-mail: hioki@hioki.in

**HIOKI SINGAPORE PTE. LTD.:**
TEL +65-6634-7677 FAX +65-6634-7477
E-mail: info@hioki.com.sg

**HIOKI KOREA CO., LTD.:**
TEL +82-42-936-1281 FAX +82-42-936-1284
E-mail: info-kr@hioki.co.jp

DISTRIBUTED BY

All information correct as of June. 18, 2013. All specifications are subject to change without notice.
LR8410E1-36M Printed in Japan