Up to 105 channels*

*When used with LR8510 or LR8511 measurement units.

Wireless Data Collection

Featuring Bluetooth® wireless technology, faster wiring of multichannel input, and easy distributed setup.
Easy expansion with an extensive selection of measurement units and loggers

Data is sent wirelessly to the wireless logging station from measurement units and wireless loggers.

Wireless loggers

<table>
<thead>
<tr>
<th>Name</th>
<th>Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless Pulse Logger</td>
<td>LR8512</td>
</tr>
<tr>
<td>Wireless Clamp Logger</td>
<td>LR8513</td>
</tr>
<tr>
<td>Wireless Humidity Logger</td>
<td>LR8514</td>
</tr>
<tr>
<td>Wireless Voltage/Temp Logger</td>
<td>LR8515</td>
</tr>
</tbody>
</table>
Measurement units

<table>
<thead>
<tr>
<th>No. of input channels</th>
<th>LR8510</th>
<th>LR8511</th>
<th>LR8512</th>
<th>LR8513</th>
<th>LR8514</th>
<th>LR8515</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Temperature</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Humidity</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Resistance</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Pulse</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Current</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

Communication range: **30 m, line of sight**

Number of units: **Up to 7**

(including mixture of measurement units and wireless loggers)

Measurement units and wireless loggers

**LR8510/LR8511**

- **Voltage**
  - Fully isolated input channels
  - Maximum rated voltage to earth: 300 VAC, DC
  - Maximum inter-channel voltage: 300 VDC

**LR8551/LR8511**

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

**LR8511**

- **Pt100/ JPt100**
  - -100 to 800 °C
  - 3-wired/ 4-wired, 1mA testing current

**LR8511**

- **Resistance**
  - 0 to 200 Ω
  - Measurement ranges: 10/20/100/200Ω

**LR8511**

- **Humidity**
  - 5.0 to 95.0 %rh
  - Requires Humidity Sensor Z2000 (option).

**LR8512**

- **Flow rate-No. of revolutions**
  - Non-voltage "a" contact
  - Open collector, or voltage input (0 to 50V)

**LR8513**

- **Current using sensors**
  - AC and DC load current and AC leak current
  - Measurement range varies with clamp type (see option page).

**LR8514**

- **Temperature, humidity**
  - Dedicated temperature and humidity sensor (optional)
  - Z2000 (50 mm long, including sensor)
  - Z2011 (cable length: 1.5 m)

**LR8515**

- **Voltage**
  - 0 to 50V
  - Measurement range: 50m/500m/5/50V

**LR8515**

- **Thermocouple**
  - K, T
  - Requires thermocouple
Wireless data transmission for superior ease of use

1. Making the wiring process faster while minimizing costs

**Have you dealt with problems like these?**
Recording a large number of channels means you’ll have to deal with a mess of wires. In addition to increasing the cost of connection cables and thermocouples, long wires make setup more time-consuming.

**Resolved with wireless data transmission**
The lack of wiring around the instrument makes for a clean installation. Minimal wiring means lower costs and faster setup.

Long wires are used to connect the instrument to the measurement locations.

Data is sent wirelessly from measurement units to the LR8410.

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

**Have you dealt with problems like these?**
Running a large number of thermocouples from a logger to the ceiling or crawl space would mean a wiring nightmare. Data can’t be viewed during measurement, and data download is virtually impossible. Logging for extended periods requires extra power, something traditional loggers can’t support.

**Resolved with wireless data transmission**
There’s no need to connect measurement units to the Wireless Logging Station LR8410 with long wires. Instead, you can install the logging module in an attic or crawl space and check data from the LR8410’s screen while measurement is ongoing.

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

Roof and crawl space installations are possible. Measurement units can operate on batteries in locations where power is not available. LR8510/LR8511: Battery pack LR8512 to LR8515: LR6 alkaline batteries.

Monitoring the temperature near wall-mounted air-conditioners, in high places such as roof spaces, or in crawl spaces...
3. Make measurements of interior conditions from the outside, with the door closed.

**Have you dealt with problems like these?**

We can't close the windows or doors due to all the wires. As a result, there's a gap in the gasket, and the vehicle cannot be sealed.

**Resolved with wireless data transmission**

Wires do not protrude outside the vehicle, allowing the windows and doors to be closed so that the vehicle can be tested under airtight conditions.

4. Synchronize measurement data

**Have you dealt with problems like these?**

Installing individual loggers on test equipment means each set of measured data is on its own time line, making it hard to compare the data with respect to a single time axis. Conventional data loggers are sometimes too bulky and difficult to fit into test equipment.

**Resolved with wireless data transmission**

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.

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**Easy wireless setup**

The LR8410 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.**
- **You can verify if the communications state between the LR8410 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.**

**3. Make measurements of interior conditions from the outside, with the door closed.**

**Have you dealt with problems like these?**

We can’t close the windows or doors due to all the wires. As a result, there’s a gap in the gasket, and the vehicle cannot be sealed.

**Resolved with wireless data transmission**

Wires do not protrude outside the vehicle, allowing the windows and doors to be closed so that the vehicle can be tested under airtight conditions.

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**Resolved with wireless data transmission**

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.
Applications in diverse fields

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

**AC adapter, battery, or DC power supply**

Measurement units or wireless loggers can operate on a rechargeable battery pack or alkaline batteries, respectively, close to the measurement target, enabling their use even in locations where AC power is not available.

### Continuous operating time (LR6 Alkaline battery)

<table>
<thead>
<tr>
<th>Recording intervals</th>
<th>LR8512</th>
<th>LR8513</th>
<th>LR8514</th>
<th>LR8515</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 sec *1</td>
<td>Approx. 5 day</td>
<td>Approx. 5 day</td>
<td>Approx. 5 day</td>
<td>Approx. 2 day</td>
</tr>
<tr>
<td>1 sec</td>
<td>Approx. 7 days</td>
<td>Approx. 7 days</td>
<td>Approx. 7 days</td>
<td>Approx. 4 days</td>
</tr>
<tr>
<td>1 min</td>
<td>Approx. 10 days</td>
<td>Approx. 10 days</td>
<td>Approx. 10 days</td>
<td>Approx. 10 days</td>
</tr>
</tbody>
</table>

*1 LR8513, LR8514: 0.5 sec

### Continuous operating time (BATTERY PACK Z1007)

<table>
<thead>
<tr>
<th>Recording intervals</th>
<th>LR8510/LR8511</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ms</td>
<td>Approx. 24 hours</td>
</tr>
<tr>
<td>1 min</td>
<td>Approx. 120 hours</td>
</tr>
</tbody>
</table>

*Use of the AC adapter is recommended when recording data over an extended period of time. (The Wireless Logging Station LR8410 operates using an AC adapter.)*

Ensure peace of mind even in the event of a power outage or signal disruption.

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

### If the power goes out during measurement

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 the measurement unit or wireless logger 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.) The device will automatically switch power supplies if you install a battery pack (LR8510/LR8511) or LR6 alkaline batteries (LR8512 to LR8515) while using an AC adapter.

**If communication is temporarily interrupted**

Measurement units and wireless loggers have an operating temperature range of -20°C to 60°C.

Measurement units and wireless loggers can be used with confidence and peace of mind in hot environments such as the interior of a car during the summer as well as in cold-weather testing in the subzero temperatures of winter.

Ensuring a safe measuring environment by closing doors

Distribution panels and control panels can be measured and data recorded safely by placing a measurement unit inside the enclosure, closing the door, and placing the LR8410 outside the enclosure.

Measurements unit: Inside the distribution panel

LR8410: Outside the distribution panel

*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.
Remote control from a computer via the HTTP/FTP server function

Download and automatically send data files and control instrument operation remotely without the need to install special application software on the computer.

- **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 communication error occurs, when 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.

LAN network

Data collection software
*"Logger Utility"
( Accessories)

SD Memory Card (2GB) Z4001 ( Accessories)
WIRELESS LOGGING STATION LR8410
(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

General specifications

Control devices
LR8510, LR8511, LR8512, LR8513, LR8514, LR8515

No. of control devices
Max. 7 units (up to 105 channels when used with the LR8510 or LR8511)

Control and communications devices
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 (SRAM)

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 settings (@23°C, 73.4°F)

Operating temp. & humidity
-10 to 95% (14 to 122°F), 10 to 80% RH or less (non-condensing)

Storage temp. & humidity
-20 to 60°C (+4 °F to 140 °F), 50% RH or less (non-condensing)

Applicable standards
Safety: EN61010
EMC: EN61326 classa, EN61000-3-2, EN61000-3-3
Wireless certification:
Japan (type) Incorporates a wireless module that has been certified as compliant with applicable technical standards
US(FCC) : Part 15.247 (Contains FCC ID: QWQ0011A)
Canada(CIC) : RSS-210 (Contains CIC ID: 5123A-BGTWT11A)
EU : EN 300 328, EN 301 480-1, EN 301 480-17

Vibration endurance
JIS D 60195-5.3(C); Category 1: Vehicle; Condition: Category A equiv.

External control terminal
External trigger input, trigger output, four channel output terminals, ground

Dimensions and Mass
250mm (9.96)W x 125mm (4.92)H x 36mm (1.42)D, 700 g (24.7oz.) (excluding Battery Pack)

Communication functions
IEEE802.3 Ethernet 100BASE-TX DHCP, DNS
Data acquisition and measurement criteria setting with the Logger Utility
Setting and measurement by communications commands
Manual file transfer by FTP server
(From the instrument memory or removable storage)
Auto sending files by FTP client
Remote control by HTTP server
E-mailing

LAN Interface
USB2.0 compatible High Speed, Series-min B receptacle
Data acquisition, condition settings used with the Logger Utility software (supplied as standard)
Configure the unit and measure using communications commands
Transfer data from the SD memory card to a PC via USB drive mode (data transfer not possible from USB memory stick)

USB Interface

Display section
5.7 inch TFT color liquid crystal display (640 x 480 pixel), horizontal 16 division, vertical 10 division, selectable between English and Japanese displays, back light savior available
LCD Brightness
Selectable from 100, 30, 40, or 25 %

Power supplies
AC adapter
Using the LC Adapter Z800 (supplied as standard, 100 to 240 VAC, 50/60 Hz), Power consumption: 8 W (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 (@23°C, 1 LCD brightness 25 %)
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 (Please connect your Hioki distributor for connection cord)
(At the time when battery is charged, and w/LCD max. brightness)

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
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)
[Level trigger] Triggers when rising or falling through preset threshold level (With [Window] Triggers when entering or exiting range defined by preset upper and lower limit values)
[Pattern trigger] Applies the trigger when a pattern defined in terms of 1, 0, +, and - values is matched

Trigger output
Open-drain output, Trigger output terminal: Push-button type terminal block
Voltage output, active, low level, output value: ±100 mA
Response time:
Recording interval × 3 sec. or less (with 1 measurement unit, good communications)
Recording interval × 5 sec. or less (with 7 measurement units, good communications)

Alarm output
Open drain output (with 7 pull-up, active low), output response time:
Recording interval + 3 sec. or less (with 1 measurement unit, good communications)
Recording interval + 5 sec. or less (with 7 measurement units, good communications)

Output sink current
200 mA at 5 V to 30 VDC

Measurement settings

Recording intervals (sampling period)
*1: 100 ms, *2: 200 ms, 500 ms, 1 s, 2 s, 3 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)
All input channels are scanned at high speed during every recording interval
* Setting not available when the thermocouple burnout detection setting is on.

Recording length (time span)
Enable continuous recording (records until the Stop key is pressed), or continuous recording OFF (enable a specified time span)

Repeat measurement recording
When On, measurement repeats at the set recording interval

Display

Time axis
200 ms to 1/day divisions

Voltage axis
Select by position (magnification can be x100 to x12, 0 Position)
Set between (±150) or (±500) or (± upper/lower limits)

Waveshape
Time-axis scaling is available by left-right arrow keys while measuring and when measurement stops (wavedrawing display period)

Jump function
Selects the displayed span of the waveform.

Monitor function
Confirm instantaneous values and waveforms without recording data.

Memory saving
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

Select a SD memory card or USB memory (use only SD memory cards sold by Hioki, with 7 measurement units, good communications)

Storage operation
Auto: Save waveform data or time divided calculation results in real time
Manual: Push the save key (operation select: item choose / directly save)
Possible: Waveforms are saved approximately every one minute as binary or text data to the SD memory card or the USB memory if sampling rate is slower than 1 minute, waveforms are saved at each interval
To the PC: Waveforms are saved to the HDD in the PC via LAN or USB software or the Logger Utility Software
Data can be saved in real time to the SD memory card or USB memory at the same time

Real-time saving
Simple divide: Save waveform data at pre-set times into separate files from the time measurement starts.
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

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
Average value, peak value, maximum value, time to maximum value, minimum value, time to minimum value

Waveform calculations
During measurement or after stopping: Applies calculations to all data in internal buffer memory, or to the time-span specified by A/B cursors.
Interval calculation: Calculate values at pre-determined 1 sec to 1 day intervals and display the latest value
Possible: After measuring the last calculated value is automatically saved to the SD memory card or USB memory as a text file
Timed save: Saves calculated data at pre-determined 1 s or 1 day intervals as text data to the SD memory card or USB memory in real time.
(Calculation: sum, difference, product, quotient, square root of a channel value, maximum value difference, cursor measured value)
Displayed in real-time with the real-time waveform display software, indicates changes 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 entry number entered and display the waveforms appearing before and after event
Number of events: Maximum 1000 per measurement

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 the full scale of the unit

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, beep sound, quick setting, quick setup function
### Basic specifications

<table>
<thead>
<tr>
<th>No. of input channels</th>
<th>15 channels (select voltage or thermocouple for each channel) (Pt100/JPt100, resistance, and humidity are also selectable for each channel with the model LR8511)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input terminals</td>
<td>[LR8510] M3 screw type terminal block (2 terminals per channel) [LR8511] Push-button terminals (4 terminals per channel)</td>
</tr>
<tr>
<td>Supported device</td>
<td>Wireless Logging Station LR8410-20</td>
</tr>
<tr>
<td>Control and</td>
<td></td>
</tr>
<tr>
<td>communications</td>
<td>Bluetooth® 2.1+EDR (Communications range: 30 m, line of sight, security: SSP)</td>
</tr>
<tr>
<td>Backup memory</td>
<td>When recording n channels, (65,536/n) data points Data is maintained in the event of a communications error and present when communications are restored.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td></td>
</tr>
<tr>
<td>and humidity</td>
<td>Temperature: -20°C to 40°C (to 140°F)</td>
</tr>
<tr>
<td></td>
<td>Humidity: 20°C to 40°C (to 40°F) 80%RH or less (noncondensing) 40°C to 45°C (140 to 113°F) 60%RH or less (noncondensing) 45°C to 50°C (113 to 122°F) 50%RH or less (noncondensing) 50°C to 60°C (122 to 140°F) 30%RH or less (noncondensing)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Temperature: 50°C to 60°C (122 to 140°F) 30%RH or less (noncondensing) 45°C to 50°C (113 to 122°F) 50%RH or less (noncondensing) 50°C to 60°C (122 to 140°F) 30%RH or less (noncondensing)</td>
</tr>
<tr>
<td>and humidity</td>
<td></td>
</tr>
<tr>
<td>Input resistance</td>
<td>1 MΩ±5% (voltage and thermocouple measurement) 2 MΩ±5% (RTD and resistance measurement)</td>
</tr>
<tr>
<td>Maximum input voltage</td>
<td>±100 VDC</td>
</tr>
<tr>
<td>Maximum inter-channel</td>
<td></td>
</tr>
<tr>
<td>voltage</td>
<td>300 VDC (Channels are not isolated during resistance, humidity measurement.)</td>
</tr>
<tr>
<td>Maximum rated voltage</td>
<td>300 VAC, DC</td>
</tr>
<tr>
<td>to earth</td>
<td></td>
</tr>
<tr>
<td>Digital filter</td>
<td>Select OFF: 51Hz ±5 Hz (in order to remove harmonic components, during analog input the cut-off frequency is automatically set according to the sampling rate)</td>
</tr>
<tr>
<td>Safety:</td>
<td>EN61010</td>
</tr>
<tr>
<td>EMC:</td>
<td>EN61326 Class A, EN61000-3-2, EN61000-3-3</td>
</tr>
<tr>
<td>Applicable standards</td>
<td>Wireless certification Japan (type 1: Incorporates a wireless module that has been certified certification as compliant with applicable technical standards. US(FCC): Part 15.247 (Contains FCC ID: QQWWT11IA) Canada (IC): RSS-210 (Contains IC: 5123A-BGTWT11IA) EU: EN 303 328 EN 304 891 EN 304 187</td>
</tr>
<tr>
<td>Vibration endurance</td>
<td>JIS D 601953.5.3 (Category 1: Vehicle, Condition: Category A equivalent)</td>
</tr>
<tr>
<td>Dimensions and mass</td>
<td>Approx.150×90×150×56mm (5.91×3.54×2.2”) (Réductions, [LR8510] approx. 340 g (12 oz.) [LR8511] approx. 320 g (11.3 oz.))</td>
</tr>
<tr>
<td>Accessories</td>
<td>Instruction Manuals 1, AC Adapter Z1008 x 1, Bracket × 1</td>
</tr>
<tr>
<td>Power source</td>
<td>AC Adapter Z1008 (bundled accessory, 12 VDC) 100 to 240 VAC, 50/60 Hz Typical power consumption: 1.0 VA (unit only)</td>
</tr>
<tr>
<td>Battery</td>
<td>Battery Pack Z1007 (1.8-69.7 V 2.710 mAh) (Option, the AC Adapter has priority when connected)</td>
</tr>
<tr>
<td>Voltage</td>
<td>Continuous operating time: Approx. 24 hours (with a recording interval of 1 min., @23°C, 73°F)</td>
</tr>
<tr>
<td>External power</td>
<td>Approx. 7 hours (when battery is charged)</td>
</tr>
</tbody>
</table>

### LR8511 Input specifications

#### Temperature

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Max. Resolution</th>
<th>Measurable Range</th>
<th>Measurement Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>-100 to 100°C</td>
<td>±0.6°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>-200 to 500°C</td>
<td>±0.8°C</td>
<td></td>
</tr>
<tr>
<td>1000°C f.s.</td>
<td>0.1°C</td>
<td>-1000 to 1000°C</td>
<td>±1.0°C</td>
<td></td>
</tr>
<tr>
<td>JPt100</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>-100 to 100°C</td>
<td>±0.6°C</td>
</tr>
<tr>
<td>50°C f.s.</td>
<td>0.05°C</td>
<td>-100 to 0°C or less</td>
<td>±0.8°C</td>
<td></td>
</tr>
<tr>
<td>0°C f.s.</td>
<td>0.1°C</td>
<td>0 to 100°C</td>
<td>±1.0°C</td>
<td></td>
</tr>
</tbody>
</table>

#### Humidity

<table>
<thead>
<tr>
<th>Range</th>
<th>Max. Resolution</th>
<th>Measurable Range</th>
<th>Measurement Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%r.h.</td>
<td>0.1%r.h.</td>
<td>0 to 95.0%r.h.</td>
<td>(See Humidity Accuracy Table)</td>
</tr>
</tbody>
</table>

### Analog input section

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Range</th>
<th>Max. Resolution</th>
<th>Measurable Range</th>
<th>Measurement Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mV f.s.</td>
<td>±10 μV</td>
<td>-10 mV to 10 mV</td>
<td>±10 μV</td>
<td></td>
</tr>
<tr>
<td>20 mV f.s.</td>
<td>1 μV</td>
<td>-20 mV to 20 mV</td>
<td>±20 μV</td>
<td></td>
</tr>
<tr>
<td>100 mV f.s.</td>
<td>5 μV</td>
<td>-100 mV to 100 mV</td>
<td>±100 μV</td>
<td></td>
</tr>
<tr>
<td>200 mV f.s.</td>
<td>10 μV</td>
<td>-200 mV to 200 mV</td>
<td>±200 μV</td>
<td></td>
</tr>
<tr>
<td>1 V f.s.</td>
<td>50 μV</td>
<td>-1 V to 1 V</td>
<td>±1 mV</td>
<td></td>
</tr>
<tr>
<td>2 V f.s.</td>
<td>100 μV</td>
<td>-2 V to 2 V</td>
<td>±2 mV</td>
<td></td>
</tr>
<tr>
<td>10 V f.s.</td>
<td>500 μV</td>
<td>-10 V to 10 V</td>
<td>±10 mV</td>
<td></td>
</tr>
<tr>
<td>20 V f.s.</td>
<td>1 mV</td>
<td>-20 V to 20 V</td>
<td>±20 mV</td>
<td></td>
</tr>
<tr>
<td>100 V f.s.</td>
<td>5 mV</td>
<td>-100 V to 100 V</td>
<td>±100 mV</td>
<td></td>
</tr>
<tr>
<td>1 ~ 5 V f.s.</td>
<td>50 μV</td>
<td>1 V to 5 V</td>
<td>±10 mV</td>
<td></td>
</tr>
</tbody>
</table>

### Temperature(Thermocouples)

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Max. Resolution</th>
<th>Measurable Range</th>
<th>Measurement Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>-100 to 0°C or less</td>
<td>±0.8°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>-200 to -100°C or less</td>
<td>±1.5°C</td>
<td></td>
</tr>
<tr>
<td>2000°C f.s.</td>
<td>0.1°C</td>
<td>-1000 to 1500°C</td>
<td>±0.8°C</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>-100 to 0°C or less</td>
<td>±0.6°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>-200 to -100°C or less</td>
<td>±1.0°C</td>
<td></td>
</tr>
<tr>
<td>2000°C f.s.</td>
<td>0.1°C</td>
<td>-1000 to 0°C or less</td>
<td>±0.6°C</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>-100 to 0°C or less</td>
<td>±0.6°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>-200 to -100°C or less</td>
<td>±1.0°C</td>
<td></td>
</tr>
<tr>
<td>2000°C f.s.</td>
<td>0.1°C</td>
<td>-1000 to 0°C or less</td>
<td>±0.6°C</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>-100 to 0°C or less</td>
<td>±0.2°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>-200 to -100°C or less</td>
<td>±2.2°C</td>
<td></td>
</tr>
<tr>
<td>2000°C f.s.</td>
<td>0.1°C</td>
<td>-1000 to 0°C or less</td>
<td>±2.2°C</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>0 to 100°C</td>
<td>±0.6°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>100 to 300°C or less</td>
<td>±4.5°C</td>
<td></td>
</tr>
<tr>
<td>2000°C f.s.</td>
<td>0.1°C</td>
<td>300 to 1700°C</td>
<td>±4.5°C</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>0 to 100°C</td>
<td>±0.6°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>100 to 300°C or less</td>
<td>±4.5°C</td>
<td></td>
</tr>
<tr>
<td>2000°C f.s.</td>
<td>0.1°C</td>
<td>300 to 1700°C</td>
<td>±4.5°C</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>100°C f.s.</td>
<td>0.01°C</td>
<td>0 to 100°C</td>
<td>±0.6°C</td>
</tr>
<tr>
<td>500°C f.s.</td>
<td>0.05°C</td>
<td>100 to 300°C or less</td>
<td>±4.5°C</td>
<td></td>
</tr>
<tr>
<td>2000°C f.s.</td>
<td>0.1°C</td>
<td>300 to 1700°C</td>
<td>±4.5°C</td>
<td></td>
</tr>
</tbody>
</table>

### 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.)
### Wireless Loggers LR8512, LR8513, LR8514, LR8515

**Shared specifications**
- **Control and communications**: Bluetooth® 2.1+EDR (Communications range: 30 m, line of sight, security: SSP)
- **Internal memory**: Nonvolatile memory (Flash memory)
- **Storage capacity**: 500,000 data items for each channel
- **Standard compliance**: Same as Wireless Logging Station LR8410

**Functions**
- Alarm, Scaling, Recording operation function
- Erroneous operation prevention, Comment recording function, Basic recording function, Authentication function, Free Run (excluding LR8512)

**Vibration endurance**: IEC 68-2-6, Category 1, Vibration, Condition Category A

**Operating temperature and humidity**
- Temperature: -20 to 60 °C (-4 to 140 °F)
- Humidity: 80% rh or less (non-condensing)

**Power supplies**
- AC Adapter Z2003 (sold as a separate option), 100 to 240 VAC 50/60 Hz

**Accessories**
- Power supplies: AC Adapter Z2003 (sold as a separate option), 100 to 240 VAC 50/60 Hz
- CD-R (Instruction Manual, Logger Utility) × 1, Measurement Guide ×1, Caution for Using Radio Waves × 1, AA alkaline batteries × 2, 5 to 13.5 VDC external power source

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### Wireless Pulse Logger LR8512

**Basic specifications** (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
- **No. of input channels**: 2 channels (common GND)
- **Input terminals**: M3 screw type terminal block (2 terminals per channel)
- **Logic (Record type)**: Logic (Records an 1/0 for each recording interval)

**Measurement ranges (Resolution)**
- Voltage: 50 mV/500 mV/5 V/50 V
- Temperature: 5 mV/50 mV/500 mV/5 V
- Relative humidity: 1 mV/5 mV/10 mV/50 mV

**Supported input format**
- Non-voltage “a” contact (always-open contact point), open collector, or voltage input (DC 0 V to 50 V)

**Recording intervals**
- 0.1 to 30 sec, 1 to 60 min, 16 selections

**Recording modes**
- Instantaneous value

**Dimensions**
- 85W×61H×31D mm (3.35W×2.40H×1.22D in)

**Mass**
- 130 g (Not including the battery)

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### Wireless Clamp Logger LR8513

**Basic specifications** (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
- **No. of input channels**: 2 channels (common GND)
- **Measurement items**
  - AC load current, DC load current
  - AC leak current (using current sensor)
  - Non-voltage “a” contact (always-open contact point), open collector, or voltage input (DC 0 V to 50 V)

**Effective value calculation**
- Software calculates the true RMS value

**Measurement ranges**
- AC: 500.0 mA to 2000 A
  - Voltage: 50 mV/500 mV/5 V/50 V
  - Thermocouples: 1000 °C

**Supported input format**
- Non-voltage “a” contact (always-open contact point), open collector, or voltage input (DC 0 V to 50 V)

**Recording intervals**
- 0.1 to 30 sec, 1 to 60 min, 14 selections

**Recording modes**
- Instantaneous value

**Dimensions**
- 85W×75H×38D mm (3.35W×2.95H×1.50D in)

**Mass**
- 95 g (Not including the battery)

---

### Wireless Temperature/Environmental Logger LR8514

**Basic specifications**
- **No. of input channels**: 2 ch
- **Measurement items**
  - Temperature
  - Humidity

**Temperature measurement accuracy**
- ±0.5°C (10 °C to 60 °C), using Z2010/Z2011
- ±1% rh (20 °C to 30 °C, 20% to 90% rh)

**Humidity measurement accuracy**
- ±3% rh (20 °C to 30 °C, 20% to 90% rh)
  - If outside above range, see Figure 1
  - Hysteresis: ±1% rh ( Added to the humidity measurement accuracy)

**Recording intervals**
- 0.5 to 30 sec, 1 to 60 min, 14 selections

**Recording modes**
- Instantaneous value

**Dimensions**
- 85W×61H×31D mm (3.35W×2.40H×1.22D in)

**Mass**
- 95 g (Not including the battery)

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### Wireless Humidity Logger LR8514

**Basic specifications**
- **No. of input channels**: 2 ch for humidity (2 sensors can be attached)

**Temperature**
- 100 °C f.s.
- 0.1 °C
- -40 °C to 80 °C

**Humidity**
- 100% rh f.s.
- 0.1 %rh
- 0 to 100 %rh

**Temperature measurement accuracy**
- ±1 %rh
- ±5% rh
- ±8% rh
- ±12% rh

**Humidity measurement accuracy**
- ±5% rh
- ±4% rh
- ±6% rh
- ±6% rh

**Humidity measurement accuracy (fig. 1)**
- The accuracy of values indicated by the * mark is not guaranteed (reference values)

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### Wireless Voltage/Temp Logger LR8515

**Basic specifications** (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)
- **No. of input channels**: 2 ch (isolated; select voltage of thermocouple for each channel)
  - Voltage: 50 mV/500 mV/5 V/50 V
  - Thermocouples: 1000 °C

**Input terminals**
- M3 screw type terminal block (2 terminals per channel)

**Measurement ranges**
- Voltage: 50 mV/500 mV/5 V/50 V
  - Thermocouples: 1000 °C

**Maximum input voltage**
- DC±50 V

**Max. inter-channel voltage**
- DC 60 V

**Recording intervals**
- 0.1 to 30 sec, 1 to 60 min, 16 selections

**Recording modes**
- Instantaneous value

**Dimensions**
- 85W×75H×38D mm (3.35W×2.95H×1.50D in)

**Mass**
- 126 g (Not including the battery)

---

### Wireless Temperature/Environmental Logger LR8515

**Basic specifications**
- **No. of input channels**: 2 ch
- **Measurement items**
  - Temperature
  - Humidity

**Temperature measurement accuracy**
- ±0.5°C (10 °C to 60 °C), using Z2010/Z2011
- ±1% rh (20 °C to 30 °C, 20% to 90% rh)

**Humidity measurement accuracy**
- ±3% rh (20 °C to 30 °C, 20% to 90% rh)
  - If outside above range, see Figure 1
  - Hysteresis: ±1% rh ( Added to the humidity measurement accuracy)

**Recording intervals**
- 0.5 to 30 sec, 1 to 60 min, 14 selections

**Recording modes**
- Instantaneous value

**Dimensions**
- 85W×61H×31D mm (3.35W×2.40H×1.22D in)

**Mass**
- 95 g (Not including the battery)
Supported units
Model 8423, 8430, LR8431, LR8432, LR8400, LR8401, LR8402, and LR8409

Operating environment
Windows 10/8/7 (32bit/64bit), Vista (32bit/64bit), XP SP2 or later (32bit)

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)

Number of controllable instruments up to 5 units
(This software is compatible only with the LR8400, LR8400 series, LR8431, 8423, and 8430)

Display: Waveforms (time-axis divided display possible), numerical values (logging), and alarm status can be displayed at the same time
Numerical value display: Can be monitored in a separate window
Scroll: Waveform scroll while measuring

Data saving destination: Real-time data transfer to Excel, or Real-time data acquisition file (LUW format)
Event marks: Can be set while measuring

Data acquisition settings
Data acquisition settings for the logger or logging station
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)
Display format: Simultaneously display waveform and numerical value, (time-axis divided display possible)
Maximum number of channels: 675 channels (measurement data) + 60 channels (waveform processing data)
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)
Converted sections: All data, designation section
Format: CSV format (separate by comma, space, tab), transfer to Excel, spreadsheet, arbitrary data thinning

Waveform processing
Processing items: Four arithmetic operations
Number of processing channels: 60 channels

Parameter calculations
Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format)
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)
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
Target data: Real-time data acquisition file (LUW format), record to internal memory data (MEM format)
Print format: Waveform image, report format, list print (channel settings, event, cursor value)
Print area: The entire area, area between cursors A and B
Print preview: Supported

Model : WIRELESS LOGGING STATION LR8410
Model No. (Order Code) (Note)
LR8410-20 (English model, main unit only)

Accessories: Instruction manual +1, Measurement guide +1, SD Memory Card (2GB) Z4001 +1, CD-R (data collection software "Logger Utility") +1, USB cable +1, AC Adapter Z1008 +1

Measurement units

Model : WIRELESS VOLTAGE/TEMP UNIT LR8510
Model No. (Order Code) (Note)
LR8510 (For the LR84010)
LR8511 (For the LR8410)

Model : WIRELESS CLAMP LOGGER LR8513
Model No. (Order Code) (Note)
LR8513 (2 ch)
For AC/DC load current, AC leak current measurement, sensor is sold separately

Model : WIRELESS HUMIDITY LOGGER LR8514
Model No. (Order Code) (Note)
LR8514 (2 ch)
2 ch Temperature/ 2 ch Humidity measurement, sensor is sold separately

Model : WIRELESS PULSE LOGGER LR8512
Model No. (Order Code) (Note)
LR8512 (2 ch)
For pulse count, rotation, 1/0 signal measurement, L1010 cable bundled

Model : WIRELESS VOLTAGE/TEMP LOGGER LR8515
Model No. (Order Code) (Note)
LR8515 (2 ch)
Voltage / Thermocouple (K, T) measurement, sensor is sold separately

Model : WIRELESS FUNGAL LOGGER LR8520
Model No. (Order Code) (Note)
LR8520 (2 ch)
Record fungal index, growth prediction, alarm 1 channel, temperature measurement, humidity sensor is sold separately

An optional AC adapter for the LR8510 to LR8520 is available for separate purchase.

Electronic loggers

Collect data on your tablet!
Use your tablet, smart phone*, or PC via Bluetooth® to collect data from Wireless Mini Loggers. (*Android™ only)
Transfer data even during recording, or check data and fluctuating waveforms on the spot.
Options for the Wireless Logging Station LR8410

Options for the LR8510/ LR8511

Shared options for the LR8510/ LR8511

Options for the LR8511

Options for the LR8512/ LR8520

Options for the LR8514/ LR8520

Options for the LR8515

Current Sensor Options for the LR8513

Use of the Wireless Logging Station

The LR8510/ LR8511 measurement units, the LR8512/ LR8513/ LR8514/ LR8515/ LR8520 wireless loggers, and the LR8410 Wireless Logging Station use the 2.4 GHz band. No radio station license is required in order to use these products, 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/Temperature Meter and the 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.

Do not use in proximity to pacemakers or other medical devices.

Do not use with systems required to exhibit a high level of safety or reliability.

Options for the LR8512 to LR8520

Shared Options for the LR8512 to LR8520

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