HIOKI

WIRELESS LOGGING STATION
LR8410

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.

Voltage | Thermocouple | Pt100/JPt100 | Resistance | Temperature Humidity | Current | Pulse

Guarantee

Please see www.hioki.com for list of supported regions.

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

WIRELESS PULSE LOGGER
LR8512

WIRELESS CLAMP LOGGER
LR8513

WIRELESS HUMIDITY LOGGER
LR8514

WIRELESS VOLTAGE/TEMP LOGGER
LR8515

Measurement units

WIRELESS VOLTAGE/TEMP UNIT LR8510

WIRELESS UNIVERSAL UNIT LR8511

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	LR8512	LR8513	LR8514	LR8515
No. of input channels		15	15	2	2	2	2
Input type	Voltage	✔	✔				✔
	Temperature	✔	✔			✔	✔
	Humidity		✔			✔	
	Resistance		✔				
	Pulse			✔			
	Current				✔		

LR8510/LR8511

Voltage

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

LR8510/LR8511

Thermocouple

K, J, E, T, N, R, S, B, W
Measurement range varies with thermocouple type (see specifications page).

LR8511

Pt100/ JPt100

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

Pulse

Flow rate·No. of revolutions

LR8513

Current using sensors

AC and DC load current and

LR8514

Temperature, humidity

Dedicated temperature and

LR8515

Voltage

0 to 50V

LR8515

Thermocouple

K, T

Wireless data transmission for superior ease of use

The communications range between the LR8410 and measurement units/wireless loggers is 30 m (line of sight). The communications range may be reduced if there are obstructions (such as walls or metallic shielding) between the devices.

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.

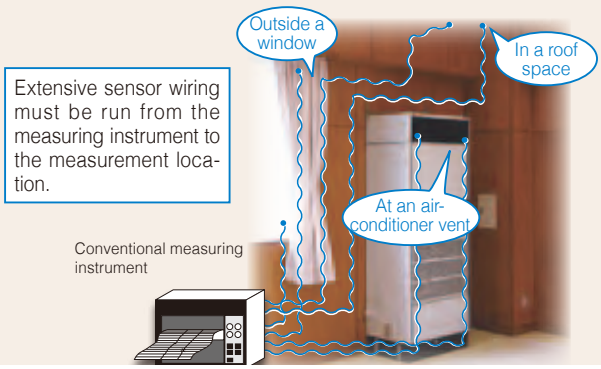
2. Make measurements where it would not be practical to wire equipment directly.

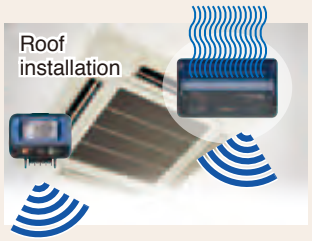
Have you dealt with problems like these?

Running a large number of thermocouples from a logger to the ceiling or crawlspace 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.

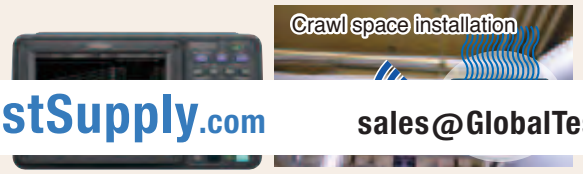
Resolved with wireless data transmission

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.





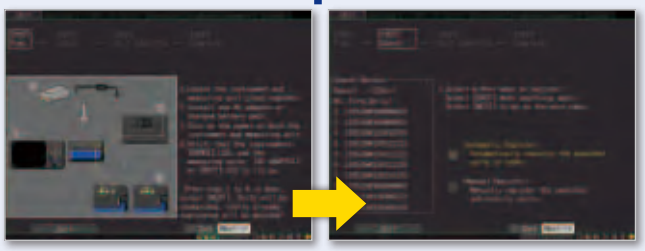
Measurement units can operate on batteries in locations where power is not available.
LR8510/LR8511: Battery pack
LR8512 to LR8515: LR6 alkaline batteries



in high places such as roof spaces, or in crawl spaces

Easy wireless setup

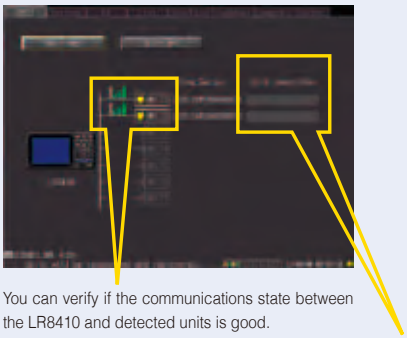
The LR8410 features Hioki's Quick Set function. Since measurement units can be registered simply by following the Unit Registration Guide, even first-time users can start measurement right away. It's also easy to configure settings when adding measurement units later.



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

Logging modules within wireless range are automatically detected.

If no logging modules have been registered, the Quick Set screen is displayed when the LR8410 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 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.

Conventional wiring

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

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.

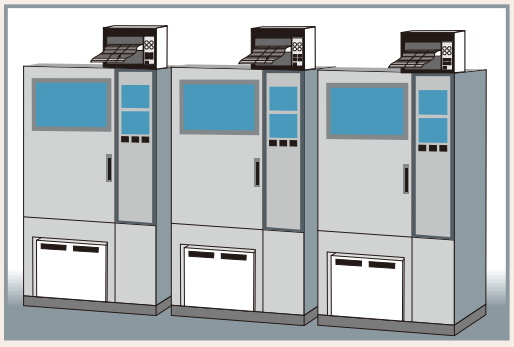
LR8410

Data is sent wirelessly from measurement units and wireless loggers to the LR8410.

4. Synchronize measurement data

Have you dealt with problems like these?

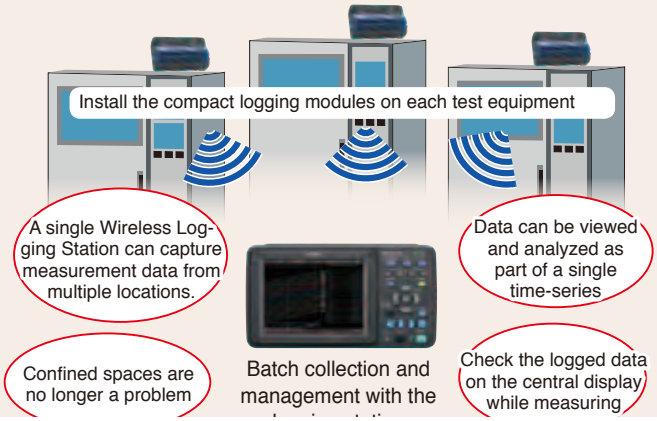
Installing individual loggers on test equipment means each set of measured data is on its on time line, making it hard to compare the data with respect to a single time axis.
Conventional data loggers are sometimes too bulky and difficult to fit into test equipment.



Traditionally, data loggers are installed on each device

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)

Recording intervals	LR8512	LR8513	LR8514	LR8515
0.1 sec *1	Approx. 5 day	Approx. 5 day	Approx. 5 day	Approx. 2 day
1 sec	Approx. 7 days	Approx. 7 days	Approx. 7 days	Approx. 4 days
1 min	Approx. 10 days	Approx. 10 days	Approx. 10 days	Approx. 10 days

*1 LR8513, LR8514: 0.5 sec

Continuous operating time (BATTERY PACK Z1007)

Recording intervals	LR8510/LR8511
100 ms	Approx. 24 hours
1 min	Approx. 120 hours

*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.)

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.

*The temperature range for recharging the Z1007 Battery Pack is 5°C to 35°C.
For the operating temperature of the battery pack, batteries or current sensors, please refer to the specifications of each respective device.

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.

Measurement unit:
Inside the distribution panel

LR8410:
Outside the distribution panel

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

Data is protected by a battery and backup function!

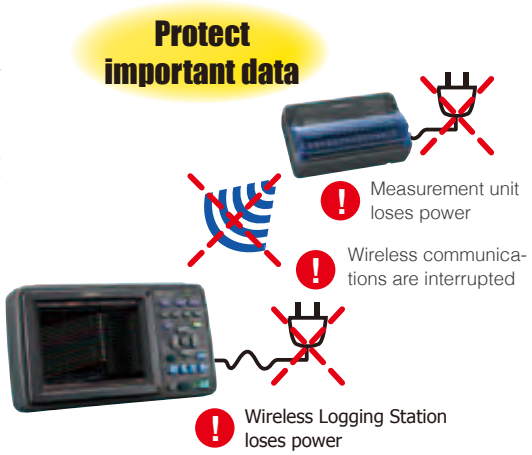
If the power goes out during measurement

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 built-in buffer memory so that measurement data can be saved if communication is temporarily disrupted. This data is resent once communication is restored, allowing the measurement data to be stored 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 communication outage of up to about 72 minutes. Additionally, alarms can be output and emails sent to notify the operator in the event that communication is interrupted or the logging module's remaining battery life is low.

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

LAN network

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 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.*

Data collection software
"Logger Utility"
(Accessories)

SD Memory Card (2GB)
Z4001(Accessories)

Recording data in real time on a computer
Data collection software "Logger Utility"

By connecting a computer to the LR8410 using the instrument's USB or LAN interface, you can observe data in real time as it is recorded and scroll backwards through past waveform data.

Recording data in real time on an SD memory card

Waveform data collected wirelessly from measurement units and wireless loggers is recorded by the LR8410 on an SD memory card or USB flash drive at an interval of about 1 minute. (If the recording interval is longer than 1 minute, data is saved at the recording interval.)

Replace storage media during real-time recording

Storage media can be switched without stopping measurement. When the new media is inserted, any data remaining in the instrument's internal buffer memory is saved as a separate file.

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.

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 Internal memory(16 MB)	7h 46m	15h 32m	1d 14h 50m	3d 5h 40m	6d 11h 20m	16d 4h 21m	32d 8h 43m
SD Memory Card Z4001(2 GB)	41d 10h 12m	82d 20h 24m	207d 3h 1m	"★"	"★"	"★"	"★"

**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.*

WIRELESS LOGGING STATION LR8410 (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

General specifications

Controllable devices	LR8510, LR8511, LR8512, LR8513, LR8514, LR8515
No. of controllable devices	Max. 7 units (up to 105 channels when used with the LR8510 or LR8511)
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 EMC: EN61326 classA, EN61000-3-2, EN61000-3-3 Wireless certification: Japan (type certification) :Incorporates a wireless module that has been certified as compliant with applicable technical standards. US(FCC) : Part 15.247 (Contains FCC ID: QOQWT11IA) Canada(IC) : RSS-210 (Contains IC: 5123A-BGTWT11IA) EU : EN 300 328, EN 301 489-1, 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, SD Memory Card (2GB) Z4001 × 1, CD-R (data collection software "Logger Utility") ×1, USB cable ×1, AC Adapter Z1008 × 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 •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
USB Interface	USB2.0 compliant High Speed, Series-mini B receptacle • Data acquisition, condition settings used with the Logger Utility software (supplied as standard) • Configure the unit and measure using communication commands • 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 %) 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 contact your HIOKI distributor for connection cord) 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). [Level trigger] Triggers when rising or falling through preset level [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 (Setting only available when using logic measuremeent with the LR8512)
Interval trigger	Set year, month, date, hour, minute and second (triggers when specified measurement interval is passed)
	Open-drain output, Trigger output terminal: Push-button type terminal block (5 V voltage output, active low, pulse width: at least 100 ms) Output response time: (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). 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 (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, *2100 ms, *2200 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) *All input channels are scanned at high speed during every recording interval* *1 Setting not available when the thermocouple burnout detection setting is on. *2 The data update rate of the LR8513 and LR8514 is 500ms.
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. 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 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 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 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. 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 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. 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 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 Number of events: Maximum 1000 per measurement
A-B cursor	Measurement: Time difference between A/B cursors, measured value difference, cursor measured value, time 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 and a comment for each channel

WIRELESS VOLTAGE/TEMP UNIT LR8510 / WIRELESS UNIVERSAL UNIT LR8511

Basic specifications

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) [LR8511] Push-button terminals (4 terminals per channel)
Measurement objects	[LR8510] Voltage/ Thermocouple [LR8511] Voltage/ Thermocouple/ RTDs/ Resistance/ Humidity
Supported device	Wireless Logging Station LR8410-20
Control and communications	Bluetooth® 2.1+EDR (Communications range: 30 m, line of sight, security: SSP)
Backup memory	When recording n channels: (65,536/n) data points 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) Humidity: -20°C to 40°C (-4 to 140°F) 80%RH or less (noncondensating) 40°C to 45°C (140 to 113°F) 60%RH or less (noncondensating) 45°C to 50°C (113 to 122°F) 50%RH or less (noncondensating) 50°C to 60°C (122 to 140°F) 30%RH or less (noncondensating) (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) Humidity: -20°C to 40°C (-4 to 140°F) 80%RH or less (noncondensating) 40°C to 45°C (140 to 113°F) 60%RH or less (noncondensating) 45°C to 50°C (113 to 122°F) 50%RH or less (noncondensating) 50°C to 60°C (122 to 140°F) 30%RH or less (noncondensating)
Input resistance	1 MΩ±5% (voltage and thermocouple measurement) 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 Japan (type certification) : Incorporates a wireless module that has been certified as compliant with applicable technical standards. US(FCC) : Part 15.247 (Contains FCC ID: QOQWT11IA) Canada(IC) : RSS-210 (Contains IC: 5123A-BGTWT11IA) EU : EN 300 328 EN 301 489-1 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) 100 to 240 VAC, 50/60 Hz Typical power consumption: 1.0 VA (unit only)
Battery	Battery Pack Z1007 (Li-ion 7.2V 2170 mAh) (Option, the AC Adapter has priority when connected) Continuous operating time: Approx. 24 hours (with a recording interval of 100 ms, @23°C, 73.4°F) Approx. 120 hours (with a recording interval of 1 min., @23°C, 73.4°F) Charging time: Approx. 7 hours (@23°C, 73.4°F) 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 Maximum rated power: 7 VA (when battery is charged)

LR8511 input specifications

Temperature

Resistance Temperature Detector (RTD): Pt 100/JPt 100; connection: 3-wire/4-wire; measurement current: 1 mA
Ratings: JIS C1604-1997 and IEC 751 (Pt 100), JIS C1604-1989 (JPt 100)

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

Connection: 4-wire; measurement 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

100 %rh f.s.	0.1 %rh	5.0 to 95.0 %rh	(See Humidity Accuracy Table)

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

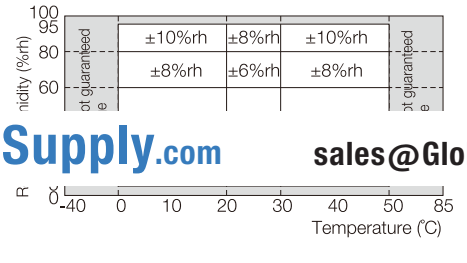
Range	Max. Resolution	Measurable Range	Measurement Accuracy
10 mV f.s.	500 nV	-10 mV to 10 mV	±10 µV
20 mV f.s.	1 µV	-20 mV to 20 mV	±20 µV
100 mV f.s.	5 µV	-100 mV to 100 mV	±100 µV
200 mV f.s.	10 µV	-200 mV to 200 mV	±200 µV
1 V f.s.	50 µV	-1 V to 1 V	±1 mV
2 V f.s.	100 µV	-2 V to 2 V	±2 mV
10 V f.s.	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)

Type	Range	Max. Resolution	Measurable Range	Measurement Accuracy
K	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±1.5 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 1350 °C	±1.5 °C ±0.8 °C
J	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±1.0 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 1200 °C	±1.0 °C ±0.8 °C ±0.6 °C
E	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±1.0 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 1000 °C	±1.0 °C ±0.8 °C ±0.6 °C
T	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±0.8 °C ±0.6 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 400 °C	±1.5 °C ±0.8 °C ±0.6 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 400 °C	±1.5 °C ±0.8 °C ±0.6 °C
N	100 °C f.s.	0.01 °C	-100 to 0 °C or less 0 to 100 °C	±1.2 °C ±1.0 °C
	500 °C f.s.	0.05 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 500 °C	±2.2 °C ±1.2 °C ±1.0 °C
	2000 °C f.s.	0.1 °C	-200 to -100 °C or less -100 to 0 °C or less 0 to 1300 °C	±2.2 °C ±1.2 °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	100 to 300 °C or less 300 to 500 °C 300 to 1700 °C	±4.5 °C ±3.0 °C ±2.2 °C
	2000 °C f.s.	0.1 °C	0 to 100 °C or less 100 to 300 °C or less 300 to 1700 °C	±4.5 °C ±3.0 °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 100 to 300 °C or less 300 to 500 °C	±4.5 °C ±3.0 °C ±2.2 °C
	2000 °C f.s.	0.1 °C	0 to 100 °C or less 100 to 300 °C or less 300 to 1700 °C	±4.5 °C ±3.0 °C ±2.2 °C
B	2000 °C f.s.	0.1 °C	400 to 600 °C or less 600 to 1000 °C or less 1000 to 1800 °C	±5.5 °C ±3.8 °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

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.)

■ Humidity Sensor Z2000 accuracy



■ Option

HUMIDITY SENSOR Z2000

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 hold function, Erroneous operation prevention, Comment recording function, Energy saving function, Authentication function, Free Run (excluding LR8512)
Vibration endurance	JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv.
Operating temperature and humidity	Temperature: -20 to 60 °C (-4 to 140 °F), Humidity: 80% rh or less (non-condensing) (Depends on battery and current sensor specifications when they are in use)
Power supplies	AC Adapter Z2003 (sold as a separate option), LR6 alkaline batteries × 2, 5 to 13.5 VDC external power source
Accessories	CD-R (Instruction Manual, Logger Utility) × 1, Measurement Guide ×1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) ×2 Note: Only included with the LR8512: Connection Cable L1010 × 2

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)
Measurement modes	Integrating (cumulative/Instant), Revolution, Logic (Records an 1/0 for each recording interval)
Measurement ranges (Resolution)	Totalization: 1000M pulse f.s. (1 pulse) No. of revolutions: 5000/n[r/s]f.s. (1/n[r/s]) *n is the number of pulses, 1 to 1000, per revolution.
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	95 g (Not including the battery)

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)
Effective value calculation	Software calculates the true RMS value
Measurement ranges	AC500.0 mA to 2000 A (By current sensor) DC10.00 A to 2000 A (By current sensor) *Current and leak current that occur intermittently cannot be measured.
Measurement accuracy	±0.5% rdg.±5 dgt. (DC, AC 50/60 Hz) *Add the sensor's accuracy when the current sensor is connected (Page 12)
Recording intervals	0.5 to 30 sec, 1 to 60 min, 14 selections
Recording modes	Instantaneous value, average value, Maximum value recording
Dimensions	85W×75H×38D mm (3.35W×2.95H×1.50D in)
Mass	130 g (Not including the battery)

Sensor used	Range	Max. Resolution	Measurable Range
9675	500.0 mA	0.1 mA	AC 1.0 mA to 500.0 mA
	5.000 A	0.001 A	AC 0.010 A to 5.000 A
9657-10	500.0 mA	0.1 mA	AC 1.0 mA to 500.0 mA
	5.000 A	0.001 A	AC 0.010 A to 5.000 A
9695-02	5.000 A	0.001 A	AC 0.010 A to 5.000 A
	50.00 A	0.01 A	AC 0.10 A to 50.00 A
CT6500	50.00 A	0.01 A	AC 0.10 A to 50.00 A
	500.0 A	0.1 A	AC 1.0 A to 500.0 A
9669	1000 A	1A	AC 10 A to 1000 A
CT7631/ CT7731	10.00 A	0.01 A	AC 0.10 A to 10.00 A DC± (0.10 A to 10.00 A)
	100.0 A	0.1 A	AC 1.0 A to 100.0 A DC± (1.0 A to 100.0 A)
CT7636/ CT7736	20.00 A	0.01 A	AC 0.10 A to 20.00 A DC± (0.10 A to 20.00 A)
	200.0 A	0.1 A	AC 1.0 A to 200.0 A DC± (1.0 A to 200.0 A)
CT7642/ CT7742	200.0 A	0.1 A	AC 1.0 A to 200.0 A DC± (1.0 A to 200.0 A)
	2000 A	1 A	AC 10 A to 2000 A DC± (10 A to 2000 A)
CT9667-01/-02/-03	500.0 A	0.1 A	AC 1.0 A to 500.0 A
	5000 A	1 A	AC 10 A to 5000 A

WIRELESS HUMIDITY LOGGER LR8514

Basic specifications

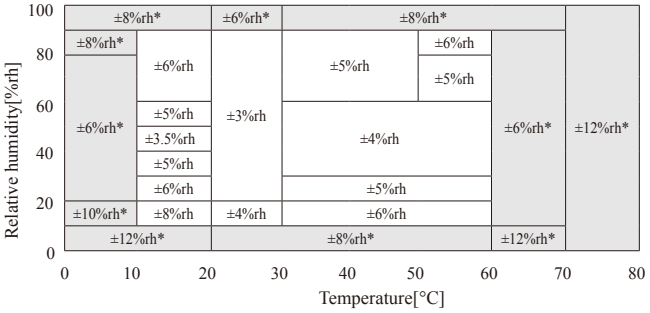
*Only the temperature and humidity sensors affect the measurement accuracy and are subject to calibration. The LR8514 logger does not require calibration.

No. of input channels	2 ch for temperature + 2 ch for humidity (2 sensors can be attached)
Measurement items	Temperature, humidity
Temperature measurement accuracy	±0.5°C (10°C to 60°C), using Z2010/Z2011 If outside above temperature range: Add 0.015°C/°C (-40°C to 10°C) or 0.02°C/°C (60°C to 80°C)
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)

Measurement objects	Range	Max. Resolution	Measurable Range
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

■ **Humidity measurement accuracy** (fig. 1)

The accuracy of values indicated by the * mark is not guaranteed (reference values).



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)
Measurement items	Voltage/Thermocouple (K, T)
Input terminals	M3 screw type terminal block (2 terminals per channel)
Measurement ranges	Voltage: 50 mV/500 mV/5 V/50 V Thermocouple: 1000˚C (1832˚F)
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)

Measurement objects	Type	Range	Max. Resolution	Measurable Range	Measurement Accuracy
Voltage		50 mV f.s.	0.01 mV	-50 mV to 50 mV	±0.05 mV
		500 mV f.s.	0.1 mV	-500 mV to 500 mV	±0.5 mV
		5 V f.s.	1 mV	-5 V to 5 V	±5 mV
		50 V f.s.	10 mV	-50 V to 50 V	±50 mV
Thermocouples	K	1000 °C f.s.	0.1 °C	-200 °C to -100 °C	±1.5 °C
				-100 °C to 999.9 °C	±0.8 °C
	T	1000 °C f.s.	0.1 °C	-200 °C to -100 °C	±1.5 °C
				-100 °C to 0 °C	±0.8 °C
				0 °C to 400 °C	±0.6 °C

Reference contact compensation: Switchable between internal and external
Reference contact compensation accuracy: ±0.5°C (When using internal compensation, add to thermocouple measurement accuracy.)
Temperature characteristics: Add (measurement accuracy × 0.1)/°C to measurement accuracy.

Logger Utility specifications

Bundled application software(CD-R)

Supported units	Model 8423, 8430, LR8431, LR8432, LR8400, LR8401, LR8402, and LR8410
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 LR8410, 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 channerls (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 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 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

LR8410-20 Main unit

LR8510
(Sold separately)

Card bundled

LAN

USB2.0

CE

3 year Guarantee

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 cannot be performed using the LR8410 alone. Measurement requires an LR8510/LR8511 measurement unit or an LR8512 or other wireless logger series. (One LR8410 can control from one to seven units [different models can be mixed].)

Measurement units

Model : WIRELESS VOLTAGE/TEMP UNIT LR8510

Model No. (Order Code)	(Note)
LR8510	(For the LR8410)

Model LR8510/ LR8511/ LR8410 Shared bundled accessory: AC ADAPTER Z1008

Model : WIRELESS UNIVERSAL UNIT LR8511

Model No. (Order Code)	(Note)
LR8511	(For the LR8410)

An optional AC adapter for the LR8512 to LR8520 is available for separate purchase.

Wireless loggers

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 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 VOLTAGE/TEMP LOGGER LR8515

Model No. (Order Code) (Note)

Model : WIRELESS FUNGAL LOGGER LR8520

Model No. (Order Code) (Note)

Collect data on your tablet !

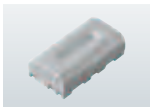
Use your tablet*, smart-phone*, or PC via Bluetooth® to col-

Options for the Wireless Logging Station LR8410

Bundled Accessory

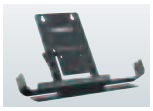
AC ADAPTER Z1008
100 to 240V AC

SD MEMORY CARD 2GB Z4001
For storing measurement data

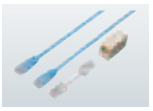


BATTERY PACK Z1007
Li-ion, Charges while installed, 7.2V/2170mAh

CARRYING CASE C1007
Holds one LR8410 and four measurement units



FIXED STAND Z1009
For wall hanging and slanted bench mounting



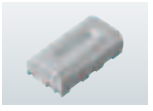
LAN CABLE 9642
Straight Ethernet cable, supplied with straight to cross conversion adapter, 5 m (16.41 ft) length

Shared options for the LR8510/ LR8511

Bundled Accessory

*AC adapter is bundled with the LR8510/8511

AC ADAPTER Z1008
100 to 240V AC



BATTERY PACK Z1007
Li-ion, Charges while installed, 7.2V/2170mAh

Thermocouple
For reference only. Please purchase locally.

Options for the LR8511

HUMIDITY SENSOR Z2000
3 m (9.84 ft) length

Shared options for the LR8512/ LR8520

Bundled Accessory

*L1010 is bundled with the LR8512/8520

CONNECTION CABLE L1010
1.5 m (4.92 ft) length

Shared options for the LR8514/ LR8520

HUMIDITY SENSOR Z2010
50 mm (1.97 in) length

HUMIDITY SENSOR Z2011
1.5 m (4.92 ft) cord length

Options for the LR8515

Thermocouple
For reference only. Please purchase locally.

Current Sensor Options for the LR8513

* Maximum measurable current when used with the LR8513

CLAMP ON SENSOR CT6500
500 A AC, φ46 mm (1.81 in)

CLAMP ON SENSOR 9669
1000 A AC, φ55 mm (2.17 in)

CLAMP ON LEAK SENSOR 9657-10
* 5 A AC, φ40 mm (1.57 in)

CLAMP ON LEAK SENSOR 9675
* 5 A AC, φ30 mm (1.18 in)

AC FLEXIBLE CURRENT SENSOR CT9667-01/-02/-03
φ100/ 180/ 254 mm (3.94/ 7.09/ 10.00 in)

CLAMP ON SENSOR 9695-02
50 A AC, φ15 mm (0.59 in), Not CE marked

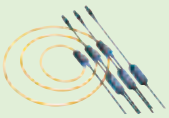
CONNECTION CABLE 9219
The 9219 is required to connect the 9695-02

Make measurements over extended periods of time without the need to perform zero-adjustment, even in locations with temperature variations.

AC/DC AUTO-ZERO CURRENT SENSOR
CT7731
100 A AC/DC, φ33 mm (1.30 in)
CT7736
* 200 A AC/DC, φ33 mm (1.30 in)
CT7742
2000 A AC/DC, φ55 mm (2.17 in)

Even in locations without temperature variations.

AC/DC CURRENT SENSOR
CT7631
100 A AC/DC, φ33 mm (1.30 in)
CT7636
* 200 A AC/DC, φ33 mm (1.30 in)
CT7642
2000 A AC/DC, φ55 mm (2.17 in)



AC FLEXIBLE CURRENT SENSOR
CT7044
* 5000 A AC, φ100 mm (3.94 in)
CT7045
* 5000 A AC, φ180 mm (7.09 in)
CT7046
* 5000 A AC, φ254 mm (10.00 in)

OUTPUT CORD L9095
Connect to BNC terminal, 1.5 m (4.92 ft) length, for the CM7290 or other

DISPLAY UNIT CM7290
For the CT7000 series

Caution: The CT7000 series Current Sensor cannot be connected directly to the Wireless Clamp Logger LR8513. The Display Unit CM7290 and Output Cord L9095 is required to connect those sensors to the LR8513.

Shared Options for the LR8512 to LR8520

AC ADAPTER Z2003
100 V to 240 VAC

MAGNETIC STRAP Z5004

Strong Magnetic force type

MAGNETIC STRAP Z5020

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/ 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.
- Although communications with the LR8510/ LR8511 measurement units, the LR8512/ LR8513/ LR8514/ LR8515/ LR8520 wireless loggers, and the LR8410 Wireless Logging Station are encrypted using SSP, the confidentiality of information sent and received in this manner is not guaranteed. Hioki is not liable for any damage sustained due to the interception of measured values sent using wireless communications.
- The LR8510/ LR8511 measurement units, the LR8512/ LR8513/ LR8514/ LR8515/ LR8520 wireless loggers, and the LR8410 Wireless Logging Station 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.

HIOKI
HIOKI E.E. CORPORATION