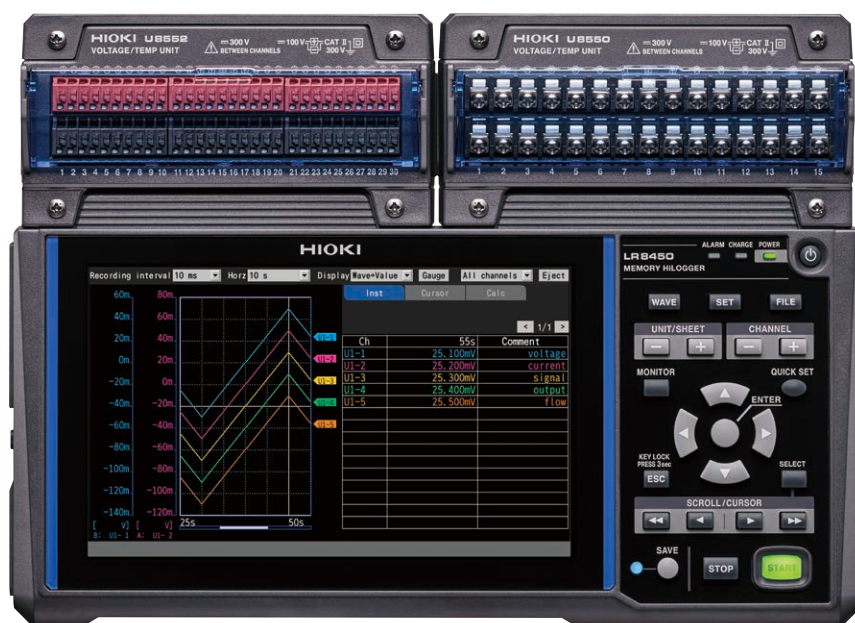


LR8450

LR8450-01

Datasheet



Basic Specifications

LR8450/LR8450-01 Memory HiLogger

1. General specifications

-1. Basic specifications

Product warranty duration	3 years
Accuracy guarantee duration	1 year
Maximum number of connectable modules	4 plug-in modules + 7 wireless modules* *: LR8450-01 only Up to a total of four U8555/LR8535 modules can be connected.
Connectable modules (Plug-in modules)	U8550 Voltage/Temp Unit U8551 Universal Unit U8552 Voltage/Temp Unit U8553 High Speed Voltage Unit U8554 Strain Unit U8555 CAN Unit U8556 Current Module U8557 Thermistor Module
Connectable modules (Wireless modules) (LR8450-01 only)	LR8530 Wireless Voltage/Temp Unit LR8531 Wireless Universal Unit LR8532 Wireless Voltage/Temp Unit LR8533 Wireless High Speed Voltage Unit LR8534 Wireless Strain Unit LR8535 Wireless CAN Unit LR8536 Wireless Current Module LR8537 Wireless Thermistor Module
Internal buffer memory	Volatile memory, 256 Mwords
Clock functionality	Auto-calendar, automatic leap year recognition, 24-hour clock
Clock precision (Precision of clock displayed by instrument as well as start/stop times)	±1.0 s/day (at 23°C) Time can be synchronized with an NTP server to which instrument is connected.
Time axis accuracy	±0.2 s/day (at 23°C) Connecting to an NTP server can automatically correct sampling interval deviations.
Backup battery service life	At least 10 years for clock (reference value at 23°C)
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)

Dimensions	Without any modules:	272W × 145H × 43D mm (10.72"W × 5.71"H × 1.69"D) (excluding protrusions)
	With 2 modules:	272W × 198H × 63D mm (10.71"W × 7.8"H × 2.78"D) (excluding protrusions)
	With 4 modules:	272W × 252H × 63D mm (10.71"W × 9.92"H × 2.48"D) (excluding protruding parts)
Weight	Approx. 1.1 kg (38.8 oz.)	
Standards	Safety	EN 61010
	EMC	EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])	

-2. Display

Display	7-inch TFT color LCD (WVGA 800 × 480 dots)	
Display resolution (with waveform display selected)	Max. 20 divisions (horizontal axis) × 10 divisions (vertical axis) (1 division = 36 dots [horizontal axis] × 36 dots [vertical axis])	
Display language	Japanese/English/Simplified Chinese/Traditional Chinese/Korean (user-selectable)	
Backlight service life	Approx. 100,000 h (reference value at 23°C)	
Backlight saver	Turns off backlight when no key is operated for a set amount of time. (Choose from Off, 30 s, 1 min., 2 min., 5 min., 10 min.)	
Backlight brightness	5 levels (user-selectable)	
Waveform background color	Dark/light (user-selectable)	

-3. Power supply

Power supply	AC adapter	Z1014 AC Adapter (12 V DC ±10%) AC Adapter rated supply voltage 100 V to 240 V AC (assuming voltage fluctuation of ±10%) AC Adapter Rated power-supply frequency 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V
	Battery	The instrument accommodates two batteries. Z1007 Battery Pack (When used with AC Adapter, AC Adapter has priority.)
	External power supply	10 V to 30 V DC
Power consumption	Normal power consumption	Using Z1014 AC Adapter or 12 V DC external power supply, without Battery Pack With LCD at maximum brightness: 8.5 VA (instrument only) With LCD backlight off: 7 VA (instrument only)
	Maximum rated power	When using the Z1014 AC Adapter 95 VA (including AC Adapter) When using a 30 V DC external power supply 28 VA (while charging battery with LCD at maximum brightness) When using the Z1007 Battery Pack 20 VA (with LCD at maximum brightness)

Continuous operating time	Battery	With one Z1007 Battery Pack:	Approx. 2 h (reference value at 23°C)
		With two Z1007 Battery Packs:	Approx. 4 h (reference value at 23°C)
		Conditions: With one U8551 Universal Unit connected, backlight on, voltage output off, and Z4006 connected	
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and the AC Adapter is connected.		
	Charging time: Approx. 7 h (reference value at 23°C)		

-4. Interface specifications

The LAN interface and USB interface (function) cannot be used at the same time.

LAN interface	LAN	IEEE 802.3 Ethernet, automatic 100Base-TX/1000Base-T detection Auto MDI-X, DHCP, DNS support
	Connector	RJ-45
	LAN functionality	Acquiring data and setting recording conditions with the Logger Utility
		Configuring settings and controlling recording using communications commands
		Manually acquiring data using the FTP server Acquiring files from a connected SD Memory Card or USB Drive Supported protocol: FTP
		Automatically sending data via FTP (FTP client) Transferring files saved on a connected SD Memory Card or USB Drive While measurement is in progress: Waveform files (binary, text, MDF) After measurement has finished: Waveform files (binary, text, MDF), numerical calculation result files Supported protocol: FTP, FTPS
		HTTP server function Control mode (one instrument) Displaying screen and remotely controlling instrument and modules, displaying current measured values, starting/stopping measurement, acquiring data via FTP, configuring comment, updating instrument and modules Browsing mode (up to four instruments) Displaying screen, current measured values, measurement status, and comments
		Email transmission The instrument will send emails at a regular interval and at the following events: start trigger, stop trigger, alarm, power outage recovery, internal buffer memory full, media full, wireless unit communications interruption, and battery low. Attachment of instantaneous value data can be enabled or disabled. Emails can be sent regularly at the following intervals: 30 min., 1 h, 12 h, 1 day. Authentication protocol SMTP authentication (LOGIN, PLAIN, CRAM-MD5), POP authentication, no authentication Encryption SSL/TLS, STARTTLS, no encryption
		XCP on Ethernet Support limited to measurement mode for ECU measurement and calibration software ASAM e.V. MCD-1 XCP v 1.5.0 compliant
		NTP client function Time synchronization with an NTP server Regular synchronization intervals: 1 h, 1 day Pre-measurement synchronization function

GENNECT Cloud collaboration function**Real-time monitor**

Measured values can be uploaded onto the cloud server every minute.

Remote control

The screen of the instrument can be displayed and the instrument can be remotely operated via the cloud server.

File transfer

Waveform data saved in real time can be uploaded onto the cloud server.

Target file: waveform file (binary, text, MDF)

Wireless LAN interface (LR8450-01 only)	Wireless LAN	IEEE 802.11b/g/n Communications range: 30 m, line of sight Encryption function: WPA-PSK/WPA2-PSK, TKIP/AES Available channels: between 1 and 11 Auto-connect function Wireless LAN function can be toggled on and off.
	Supporting mode	Access point, station, wireless module connection
	Connectable devices	Wireless modules and computer / tablet computer Wireless modules and computer / tablet computer are mutually exclusive.
	Wireless LAN functionality	Configuring settings and controlling recording using communications commands
		Manually acquiring data using the FTP server Acquiring files from a connected SD Memory Card or USB Drive Supported protocol: FTP
		Automatically sending data via FTP (FTP client) Transferring files saved on a connected SD Memory Card or USB Drive While measurement is in progress: Waveform files (binary, text, MDF) After measurement has finished: Waveform files (binary, text, MDF), numerical calculation result files Supported protocol: FTP, FTPS
		HTTP server function Control mode (one instrument) Displaying screen and remotely controlling instrument and modules, displaying current measured values, starting/stopping measurement, acquiring data via FTP, configuring comment, updating instrument and modules Browsing mode (up to four instruments) Displaying screen, current measured values, measurement status, and comments
		Email transmission The instrument will send emails at a regular interval and at the following events: start trigger, stop trigger, alarm, power outage recovery, internal buffer memory full, media full, wireless unit communications interruption, and battery low. Attachment of instantaneous value data can be enabled or disabled. Emails can be sent regularly at the following intervals: 30 min., 1 h, 12 h, 1 day. Authentication protocol SMTP authentication (LOGIN, PLAIN, CRAM-MD5), POP authentication, no authentication Encryption SSL/TLS, STARTTLS, no encryption
		XCP on Ethernet Support limited to measurement mode for ECU measurement and calibration software ASAM e.V. MCD-1 XCP v 1.5.0 compliant
		NTP client function Time synchronization with an NTP server Regular synchronization intervals: 1 h, 1 day Pre-measurement synchronization function

	GENNECT Cloud collaboration function	
	Real-time monitor Measured values can be uploaded onto the cloud server every minute.	
	Remote control The screen of the instrument can be displayed and the instrument can be remotely operated via the cloud server.	
	File transfer Waveform data saved in real time can be uploaded onto the cloud server. Target file: waveform file (binary, text, MDF)	
USB interface (host)	Standard compliance	USB 2.0 compliant
	Connectors	Series A receptacle ×2
	Guaranteed-operation options	Z4006 USB Drive (16 GB) File system: FAT16, FAT32
	Connectable devices	Keyboard, mouse, hub (1 layer), USB Drive (1 port only)
USB interface (function)	USB standard	USB 2.0 compliant
	Connector	Series mini-B receptacle
	USB functionality	Acquiring data and setting recording conditions with the Logger Utility
		Configuring settings and controlling recording using communications commands
SD card slot	Standard compliance	SD standard-compliant slot × 1 (with SD Memory Card/SDHC Memory Card support)
	Guaranteed-operation options	Z4001 (2 GB), Z4003 (8 GB) File system: FAT16, FAT32

-5. External control terminals

Terminal block	Push-button type terminal block	
Synchronization input	Input voltage	0 V to 10 V DC High level: 2.0 V to 10 V; low level: 0 V to 0.8 V
	Response pulse width	High period: 100 μs or greater; low period: 100 μs or greater
	Number of terminals	1 Non-isolated (common GND with instrument)
	Functionality	Synchronization control (SYNC.IN)
Synchronization output	Output format	CMOS output
	Output voltage	High level: 2.3 V to 3.6 V; low level: 0 V to 0.5 V
	Output pulse width	High period: 100 μs or greater; low period: 100 μs or greater
	Number of terminals	1 Non-isolated (common GND with instrument)
	Functionality	Synchronization control (SYNC.OUT)

External I/O

	Number of terminals	4 Non-isolated (common GND with instrument)
	Input	Input voltage 0 V to 10 V DC High level: 2.5 V to 10 V; low level: 0 V to 0.8 V
		Slope Rising/falling (user-selectable)
		Response pulse width High period: 2.5 ms or greater; low period: 2.5 ms or greater
		Functionality Choose from off, start, stop, start/stop, trigger input, event input.
	Output	Output format Open-drain output (with 5 V voltage output)
		Output voltage High level: 4.0 V to 5.0 V; low level: 0 V to 0.5 V
		Maximum switching capacity 5 V to 10 V DC, 200 mA
		Output pulse width (Trigger output) 10 ms or greater
		Functionality Trigger output
Alarm output	Output format	Open-drain output (with 5 V voltage output)
	Output voltage	High level: 4.0 V to 5.0 V; low level: 0 V to 0.5 V Triggered by alarm High output/low output (user-selectable)
	Maximum switching capacity	5 V to 30 V DC, 200 mA
	Output pulse width	10 ms or greater
	Number of terminals	8 Non-isolated (common GND with instrument)
Voltage output	Output voltage	Off, 5 V $\pm 10\%$, 12 V $\pm 10\%$, 24 V* $\pm 10\%$ (user-selectable) Supply current: Max. 100 mA each *: 24 V output can be selected for the VOUTPUT1 terminal only.
	Number of terminals	2 Non-isolated (common GND with instrument)
GND terminal	Number of terminals	10 (common GND)

2. Recording

Recording mode	Normal
Recording intervals	1 ms*, 2 ms*, 5 ms*, 10 ms, 20 ms, 50 ms, 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 *: Setting available only when using a module with data refresh intervals including 1 ms.
Data refresh interval	Automatically- or user-selected value per module Automatically-selected value: The optimal data refresh interval is automatically selected based on the recording interval setting. User-selected value: Available settings depend on module specifications.
Repeat recording	Off/On (user-selectable) On: Recording resumes after recording stops (due to stop trigger conditions or the completion of measurement for the set recording time). Recording repeats until the STOP key is pressed. Off: Recording is performed once until it stops.

Specified time/ continuous	Specified time	The recording time is set in days, hours, minutes, and seconds. The time can be set up to the maximum capacity of the internal buffer memory (total of 256 M).
	Continuous	Recording is performed once until it is stopped. If the maximum capacity of the internal buffer memory is exceeded, the memory will be overwritten.
Waveform recording	The last 256 M data points (when recording 1 analog channel; if recording n channels, 256 M/n data points) are saved in the internal buffer memory. The user can scroll through and view data stored in the internal buffer memory. Alarm source data recording can be toggled on and off.*¹ The numerical expression of the number of channels (n) $n = (\text{Number of analog channels}) + (\text{number of pulse channels}) \times 2$ $+ (\text{number of logic channels}) \times 1$ $+ (\text{number of waveform calculation channels}) \times 4$ $+ (\text{number of CAN channels}^{*2}) + 26^{*3}$ *1: CAN channel alarm source data cannot be recorded. *2: Calculated as 2 channels when using 32 bits or 4 channels when using 64 bits. *3: Added when the alarm source setting is enabled.	
Backup of recorded data	None	

3. Display

Sheet function	Can switch among display sheets for all channels and individual units (for CAN Units, up to 4 sub sheets with 125 channels each). Maximum number of measurement channels on all-channel display sheet : 120 Analog/CAN channels, 30 waveform calculation channels, 8 pulse/logic channels, 8 alarm channels	
Waveform display screen	Time-axis waveform display	Simultaneous display of gages and settings (channel representative settings and display settings)
	Simultaneous display of time-axis waveforms and values	Instantaneous values, cursor values, or numerical calculation values (user-switchable)
	Numerical display	Simultaneous display of instantaneous values and statistical values
	Alarm display	Display of alarm status and alarm history
Display format	Time-axis waveform display: 1 screen X-Y waveform display: 1 screen	
X-Y composite	Composite up to 8 waveforms.	
Numerical display format	SI units, decimal, or exponent (user-selectable) When decimal is selected, the number of decimal places to display can be set (values will then be rounded to the set number of places).	
Waveform colors	24 colors	
Zooming in and out on the waveform display	Horizontal axis	2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 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, 2 h, 5 h, 10 h, 12 h, 1 day/division
	Vertical axis	Number of divisions per screen: 10 Setting method Select position or upper and lower limits for each channel. (Waveform calculation channels: upper and lower limits only) • When setting by position: Set zoom factor and zero position. Zoom factor: 1/2×, 1×, 2×, 5×, 10×, 20×, 50×, 100× Zero position: -50% to 150% (with a zoom factor of 1×) • When setting by upper/lower limit: Set the upper and lower limit.
Waveform scrolling	The display can be scrolled left and right both during recording and while recording is stopped (during waveform rendering only).	
Monitor display	The user can check instantaneous values and waveforms without recording data to memory (the monitor of the trigger standby state is available).	
Wireless module status indication (LR8450-01 only)	Indicates the battery remaining and the radio-wave strength, in the four levels, of the wirelessly connected modules.	

4. Files

-1. Saving

Save destinations	SD Memory Card/USB Drive (user-selectable)
Filenames	Up to 8 single-byte characters Automatic numbering, adding date and/or title comment (user-selectable)
Auto saving	Waveform data (real-time saving) Off, binary format, text format, or MDF format (user-selectable) Numerical calculation results (saved after recording) Off or text format (user-selectable) When text format is selected, the user can choose whether to save all calculations in one file or to save each calculation in its own file.
Priority save destination	SD Memory Card/USB Drive (user-selectable) The user can choose whether to give priority to the SD Memory Card or the USB Drive for saving data when both are inserted.
Delete and save	On/Off (user-selectable) Off: The system will stop saving data when the SD Memory Card or USB Drive starts to run out of available space. On: When the SD Memory Card or USB Drive starts to run out of available space, the system will delete the oldest waveform file (binary, text, or MDF) and then continue saving data. When both an SD Memory Card and a USB Drive are inserted, the system will perform delete and save on the media that has been set as the priority save destination only.
Folder splitting	Disabled, 1 day, 1 week, or 1 month (user-selectable)
File splitting	Disabled, enabled, or timed (user-selectable) Disabled: Data for each recording session is saved in its own file. Enabled: Data for each set period of time is saved in its own file, starting with the start of measurement. Split time: Day, hour, or minute (user-selectable) Timed: Data will be segmented at intervals of the segment time based on the previously set reference time and saved in separate files. Reference time: Set in hours and minutes. Split time: 1 min, 2 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 h, 2 h, 3 h, 4 h, 6 h, 8 h, 12 h, 1 d
External media eject (SD Memory Card/USB Drive)	External media can be ejected during real-time saving by activating a button on the screen and confirming a message. • When both an SD Memory Card and a USB Drive are inserted and the media set as the priority save destination is ejected, the system will continue to save data on the other media. • When either an SD Memory Card or a USB Drive is inserted and the media set as the priority save destination is ejected, the system will stop saving data. If external media is reinserted under these conditions, the system will continue saving data remaining in the internal buffer memory to a different file.
Data protection	Yes (valid only when the Z1007 Battery Pack is installed) If the remaining battery life declines during real-time saving, the system will close the file and stop saving data (although measurement operation will continue).

Manual saving		Data is saved when the SAVE key is pressed. The user can choose either selective save or immediate save as the operation to perform when the SAVE key is pressed.
	Selective save	The user will be prompted to choose what to save: settings, waveform data (binary format), waveform data (text format), waveform data (MDF format), A2L file, numerical calculation results (all calculations in one file or each calculation in its own file), display image (PNG format).
	Immediate save	Data will be saved immediately when the SAVE key is pressed. The type of data to save is set in advance along with the format and range. Filenames can be entered when saving data.
Decimation (text format only)	Decimate and save	Off or a value from 1/2 to 1/100,000 (user-selectable)
	Saved data	Select from instantaneous values and statistical values. When statistical values are selected: Instantaneous values, maximum values, minimum values, and average values will be saved for the thinning interval.

-2. Loading data

Loading saved data	The user can specify a position and then load up to 256 M data points of previously saved text-format data (when recording 1 analog channel; if recording n channels, 256 M/ n data points).
Setting conditions	Setting conditions files saved with the instrument can be loaded.* Loadable items: Measurement setting, communication setting, system setting, wireless module configuration *: Available only when the module configuration is the same as those at the time when the setting condition was saved.

5. Calculations

Numerical calculations	Number of calculations	Up to 10 calculations simultaneously
	Calculation content	Average value, peak-to-peak value, maximum value, maximum value time, minimum value, minimum value time, integral* ¹ , integration* ¹ , moving average* ² , on time* ² , off time* ² , on count* ² , off count* ² *1: Total, positive, negative, or absolute value (user-selectable) *2: Threshold values can be set for individual channels.
	Calculation range	During recording: Calculations performed for all data during recording After recording has stopped: Calculations performed for all data in the internal buffer memory, or for data in a calculation range specified by the A/B cursors (on the vertical axis)
	Time split calculation	Disabled, enabled, or timed (user-selectable) Disabled: Calculations performed for all data during recording Enabled: Data for each segment of time, starting with the start of measurement Split time: Set DD HH:MM format Timed: Calculations will be made at intervals of the segment time based on the previously set reference time. Reference time: Set in hours and minutes. Split time: 1 min, 2 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 h, 2 h, 3 h, 4 h, 6 h, 8 h, 12 h, 1 d

Waveform calculations	Calculation content	The following calculations can be set: • Four arithmetic operations* among channels • Moving average, simple average, integral, and integration of any channel Calculated values are recorded as data for the calculation channels (W1 through W30). (Calculations are performed at the same time as measurement. Values cannot be recalculated after measurement.) *: Calculation expression $(A \times CHa \square B \times CHb \square C \times CHc \square D \times CHd) \blacksquare E$ where A, B, C, D, E: User-specified constants CHa, CHb, CHc, CHd: User-specified measurement channels $\square$: Plus (+), minus (-), multiplication (*), or division(/) (one operation) $\blacksquare$: Plus (+), minus (-), multiplication (*), division(/), or exponentiation (^) (one operation)
------------------------------	---------------------	---

6. Triggers

Trigger method	Digital comparison method	
Trigger timing	Start, stop, or start & stop	
Trigger conditions	AND/OR operation performed on trigger source, interval trigger, or external trigger When triggers are disabled, free run	
Trigger sources	Analog, pulse, logic, waveform calculations, CAN (up to 100)	
Trigger types	Analog, pulse, waveform calculations, CAN	Level triggers Trigger activated by rising or falling edge at set level Window triggers Set by trigger level upper limit and lower limit Trigger activated when value leaves area or when value enters area
	Logic, CAN	Trigger activated when patterns of 1/0/X match (where "X" indicates either)
Interval triggers	Trigger activated for set recording interval after setting days/hours/minutes/seconds	
External triggers	Trigger activated by rising or falling edge at set level in external input signal Rising/falling (user-selectable)	
Trigger response time	With plug-in module(s): $(\text{Recording interval or data refresh interval, whichever is longer}) \times 2 + 1 \text{ ms} + (\text{analog response time})^{*1}$ When using the wireless modules (LR8450-01 only): $(\text{Recording interval or data refresh interval, whichever is longer}) \times 2 + (\text{wireless response time})^{*2} + (\text{analog response time})^{*1}$ *1: Depending on filter settings (U8554 with a data refresh interval of 5 ms and low-pass filter of 120 Hz). *2: When the radio-wave state is in good condition, 1s.	
Trigger level resolution	Analog	0.1% f.s. (f.s. = 10 divisions) The trigger level can be set in units of the measurement resolution for the U8556 Current Module and the LR8536 Wireless Current Module. When performing temperature conversion with the U8557 or LR8537 Thermistor Module, the resolution is 0.2°C.
	Pulse	Integration 1c, rotational speed 1/n (where n = pulse count per rotation setting)
Pre-triggers	Set day/hours/minutes/seconds. Can be set during real-time saving.	

7. Alarms

Alarm conditions	Set separately for ALM1 to ALM8 The system will output an alarm when any of the following conditions are satisfied: • AND/OR operation performed on alarm sources • Low battery • Thermocouple wire break • Disruption of communications with wireless modules (LR8450-01 only)	
Alarm sources	Analog, pulse, logic, waveform calculations, CAN (up to 100)	
Disruption of communications with wireless modules (LR8450-01 only)	If communicates with a wireless module are disrupted Off/Now/3 min. (user-selectable) Now: Outputs an alarm upon a communications disruption 3 min.: Outputs an alarm if a communication disruption continues for 3 minutes.	
Low remaining battery life	The system will output an alarm when the remaining battery life of the instruments or a wireless module decline.	
Thermocouple wire break	The system will output an alarm when a thermocouple wire break occurs (when the thermocouple wire break detection setting is enabled).	
Types of alarms	Analog, pulse, waveform calculations, CAN	Level The system will output an alarm following a rising or falling edge at set level.
		Window Set upper limit and lower limit. The system will output an alarm when value exits area or when value enters area.
		Slope Set a level and a time interval The system will output an alarm when the rate of change (level per unit time) continues to exceed the specified change rate during the set time interval.
		Slope 2p (Amount in change) Set a level, a time interval, and a slope. The system will output an alarm when the amount of change in the set time interval is greater than or less than the set level value.
		Logic The system will output an alarm when patterns of 1, 0, and X match (where "X" indicates either).
Alarm filter	Apply a filter to the results of AND/OR operations performed on alarm sources. Set based on sample count (Off, 2 to 1000). The system will output an alarm if the alarm state continues for the set number of samples.	
Alarm setting resolution	Analog	0.1% f.s. (f.s. = 10 divisions)
	Pulse	Integration 1c, rotational speed 1/n (where n = pulse count per rotation setting)
Alarm retention	On/Off (user-selectable) Clear alarms: When alarm retention is On, alarms will be cleared without stopping recording.	
Alarm tone	On/Off (user-selectable)	
Alarm output response time	When using the plug-in modules (Recording interval or data refresh interval, whichever is longer) × 2 + 1 ms + (analog response time)* ¹ When using the wireless modules (LR8450-01 only) (Recording interval or data refresh interval, whichever is longer) × 2 + (wireless response time)* ² + (analog response time)* ¹ *1: Depending on filter settings (U8554 with a data refresh interval of 5 ms and low-pass filter of 120 Hz). *2: When the radio-wave state is in good condition, 1s.	

8. Synchronous operation

Instrument synchronization	Start/stop, triggers, and sampling are synchronized among multiple instruments (using the SYNC.OUT and SYNC.IN terminals). • Trigger synchronization time: Within (recording interval × 2) samples • Can not be used with wireless modules
Number of instruments that can be synchronized	5 (Up to four secondary instruments can operate in synchronization with one primary instrument.)
Configurable recording interval	No limitations (can be set from 1 ms)

9. Other functionality

Even mark function	Even mark entry method	Assigns event marks when one of the following events occurs. (1) Pressing the START key (2) With [Mark] chosen on the screen, pressing the ENTER key. (3) Inputting a signal to an external input terminal (4) If an alarm is outputted (can be toggled between on and off).
	Number of inputs	Up to 1000 inputs per measurement
Waveform search function	Search waveforms and display target location in the center of the waveform screen.	
	Search conditions	Search by choosing level, window, maximum value, minimum value, local maximum value, or local minimum value.
	Search range	All data in the internal buffer memory or data between the A/B cursors (on the vertical axis)
	Search targets	Analog, pulse, logic, waveform calculations
Jump function	Specify the event mark, A/B cursor position, trigger point, or waveform display position to display in the center of the waveform screen.	
Cursor measurement function	Cursor display	All channels or specified channels (user-selectable)
	Cursor movement	A, B, or simultaneous (user-selectable)
	Types of cursors	Vertical or horizontal (user-selectable)
		Vertical Display of the following values: • Times at the A and B cursors • Measured values at the A and B cursors • Time lag between the A and B cursors • Reciprocals of the time lags (frequencies) between any two points selected from among the trigger point, A cursor, and B cursor • Differences in measured values between the A and B cursors Horizontal Display of the following values acquired across the selected channels: • Values at the A and B cursor • Difference between values at the A and B cursors

Scaling function	Scaling settings can be configured separately for each channel.	
	Analog	Set by conversion rate, by 2 points, by strain gage rating (Strain Unit only), or by sensitivity (user-selectable)
	Pulse (integration)	Set by physical value per pulse or number of pulses per physical value (user-selectable)
	Pulse (rotational speed)	Set by conversion rate or by 2 points (user-selectable)
	Temperature display in degrees Fahrenheit	When display language is set to English, Fahrenheit temperature scaling is available.
Comment entry function	Enter titles and channel-specific comments (values, alphabetical characters, and symbols).	
Start state retention function	On/Off (user-selectable) When enabled, the system will enter the re-start state and automatically start recording if the power is turned off during recording and then turned back on (or the trigger standby state if using a trigger).	
Startup auto-measurement function	On/off (user-selectable) When the function is enabled, the instrument will automatically start measurement on startup (get into the trigger standby state when the trigger setting is enabled)	
Functionality for saving setting conditions	Up to five groups of setting conditions can be saved in the instrument's internal backup memory.	
Auto-setup function	Setting conditions saved in the instrument's memory or on an SD Memory Card or a USB Drive can be automatically loaded when the instrument is powered on. If there are setting conditions stored in the instrument's memory as well as on an SD Memory Card and a USB Drive, setting conditions have the following precedence: instrument memory, SD Memory Card, and USB Drive.	
Prevention of inadvertent START/STOP key operation	When the START or STOP key is pressed, the system will display a message asking whether the user wishes to start or stop measurement. Confirmation message: Enable/disable (user-selectable)	
Key lock function	Disables operation keys (enabled/disabled by pressing and holding the ESC key for 3 s or more).	
Beep tone	On/Off (user-selectable)	
Self-check function	Can check keys, LCD, ROM/RAM, LAN, media, and modules.	
Display of horizontal axis (time values)	Horizontal axis (time value) display can be set to time, date, or data point count. Setting is applied when text data is saved.	
Measurement start/stop time specification function	Measurement start and stop conditions can be set. Specified date •Start and stop times (year, month, day, hour, and minute) can be set.	
Configuration navigation (Quick Set) function	Wireless module registration guide (LR8450-01 only), countermeasures against wireless communication failure (LR8450-01 only), connection diagram display (strain gage, external terminals), loading setting conditions	
Power supply frequency filter function	50 Hz/60 Hz selection	

10. Input

Pulse/logic input	Number of channels	8 channels (common GND, non-isolated) Exclusive setting for pulse/logic input for individual channels			
	Terminal block	Push-button type terminal block			
	Adaptive input format	Non-voltage contact, open collector (PNP open collector requires external resistor), or voltage input			
	Maximum input voltage	0 V to 42 V DC			
	Input resistance	1.1 MΩ ±5%			
	Detection level	2 levels (user-selectable) High: 1.0 V or greater; low: 0 to 0.5 V High: 4.0 V or greater; low: 0 to 1.5 V			
	Pulse input	Measurement range, maximum resolution, measurable range, measurement accuracy			
	</				

11. Accessories and options

Accessories	See "Accessories" in the Quick Start Manual.
Options	See "Options (sold separately)" in the Quick Start Manual.

Plug-in Module Specifications

U8550 Voltage/Temp Unit

1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety: EN 61010 EMC: EN 61326, Class A
Standard compliance	Thermocouples: JIS C1602:2015, IEC 60584-1:2013
Vibration resistance	JIS D 1601:1995:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 63D mm (5.28"W × 2.76"H × 2.48"D) (including cover)
Weight	Approx. 345 g (12.2 oz.)
Product warranty duration	3 years
Accessories	Instruction Manual Installation screws × 2
Options	Z2000 Humidity Sensor

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	15 (Set voltage, thermocouple, or humidity for each channel.)
Input terminals	M3 screw-type terminal block (2 terminals per channel), outfitted with terminal block cover
Measurement target	Voltage Thermocouples (K, J, E, T, N, R, S, B, C) Humidity (using the Z2000 Humidity Sensor)
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated
A/D resolution	16 bits
Maximum input voltage	±100 V DC
Maximum channel-to-channel voltage	300 V DC
Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (+, –) and the instrument (LR8450/LR8450-01) or between any two modules Anticipated transient overvoltage: 2500 V

Input resistance	10 MΩ or greater (10 mV f.s. to 2 V f.s. voltage ranges, all thermocouple ranges) 1 MΩ ±5% (10 V f.s. to 100 V f.s. voltage ranges, 1-5 V f.s. voltage range, humidity range)
Allowable signal source resistance	1 kΩ or less
Reference junction compensation	Internal/external (user-selectable) (during thermocouple measurement)
Thermocouple wire break detection	The system will check for wire breaks at the data refresh intervals during thermocouple measurement. On/Off (user-selectable) (set for entire module) Detection current: 5 μA ±20% No current flows while acquiring measurement data. (Setting not available when the data refresh interval is set to 10 ms.)
Data refresh interval	10 ms*, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s *: Setting available when thermocouple wire break detection is disabled.
Digital filters	The digital filter notch frequency is automatically set as described in the following table according to the data refresh interval, Wire break detection setting, and power supply frequency filter setting: —: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60	60
	On	—	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
50 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50	50
	On	—	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50

Unit: Hz

Zero-adjustment	Cancels the offset of the product's internal measurement circuitry.
------------------------	---

-2. Accuracy specifications

Accuracy guarantee conditions	Accuracy guarantee duration	1 year
	Accuracy guarantee temperature and humidity range	23°C ±5°C (73°F ±9°F), 80% RH or less
	Warm-up time	At least 30 minutes after connecting to the LR8450/LR8450-01 Memory HiLogger and turning on the instrument
	The conditions have been specified with after zero-adjustment finished and the notch frequency set to 50 Hz/60 Hz (see notch frequency table in "Digital filters").	

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	—	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	±50 µV
		200 mV f.s.	10 µV	–200 mV to 200 mV	±100 µV
		1 V f.s.	50 µV	–1 V to 1 V	±500 µV
		2 V f.s.	100 µV	–2 V to 2 V	±1 mV
		10 V f.s.	500 µV	–10 V to 10 V	±5 mV
		20 V f.s.	1 mV	–20 V to 20 V	±10 mV
		100 V f.s.	5 mV	–100 V to 100 V	±50 mV
		1-5 V f.s.	500 µV	1 V to 5 V	±5 mV
Thermocouple (Not including accuracy of reference junction compensation)	K	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than 500°C	±0.5°C
				Greater than or equal to 500°C and less than or equal to 1350°C	±0.7°C
	J	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1200°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	E	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1000°C	±0.5°C
	T	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
	N	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.9°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.9°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 1300°C	±0.9°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	R	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
	S	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
	B	2000°C f.s.	0.1°C	Greater than or equal to 400°C and less than 600°C	±5.4°C
				Greater than or equal to 600°C and less than 1000°C	±3.7°C
				Greater than or equal to 1000°C and less than or equal to 1800°C	±2.4°C
	C	100°C f.s.	0.01°C	0°C to 100°C	±1.7°C
		500°C f.s.	0.05°C	0°C to 500°C	±1.7°C
		2000°C f.s.	0.1°C	0°C to 2000°C	±1.7°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Humidity	—	100% RH f.s.	0.1% RH	5.0% RH to 95.0% RH	As per measurement accuracy of the Z2000 Humidity Sensor
Humidity accuracy table Relative humidity (% RH) Temperature (°C) ■ : Out of accuracy guarantee range Each boundary line is included in the better measurement accuracy area.					

Accuracy of reference junction compensation	±0.5°C (with input terminal temperature balancing) Reference junction compensation: Add thermocouple measurement accuracy when set to <i>internal</i> .
Temperature characteristics	Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure (for humidity, see humidity accuracy table).
Normal-mode rejection ratio	50 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s) (With thermocouple wire break detection disabled)
Common-mode rejection ratio	Signal source resistance of 100 Ω or less 100 dB or greater (With 50 Hz/60 Hz input and a data refresh interval of 10 ms) 140 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 10 mV f.s. range) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 10 mV f.s. range) (With thermocouple wire break detection disabled)
Effect of radiated radio-frequency electromagnetic field	±5% f.s. (80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m) (in the 10 V f.s. voltage range)
Effect of conducted radio-frequency electromagnetic field	±5% f.s. at 10 V (in the 10 V f.s. voltage range)

U8551 Universal Unit

1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety: EN 61010 EMC: EN 61326, Class A
Standard compliance	Thermocouples: JIS C1602:2015, IEC 60584-1:2013 Resistance temperature detector (Pt100, Pt1000): JIS C1604:2013, IEC 60751:2008 Resistance temperature detector (JPt100): JIS C1604:1989
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 63D mm (5.28"W × 2.76"H × 2.48"D) (including cover)
Weight	Approx. 318 g (11.2 oz.)
Product warranty duration	3 years
Accessories	Instruction Manual Installation screws × 2
Options	Z2000 Humidity Sensor

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	15 (Set voltage, thermocouple, humidity, resistance temperature detector, or resistor for each channel.)
Input terminals	Push-button type terminal block (4 terminals per channel), outfitted with terminal block cover
Measurement target	Voltage Thermocouples (K, J, E, T, N, R, S, B, C) Humidity (using the Z2000 Humidity Sensor) Resistance temperature detector (Pt100, Jpt100, Pt1000) (Connection: 3-wire/4-wire) (Measurement current: 1 mA ±5% [Pt100 and Jpt100 measurement]; 0.1 mA ±5% [Pt1000 measurement]) (During Pt1000 measurement, setting available when the data refresh interval is greater than 100 ms.) Resistor (connection: 4-wire; measurement current: 1 mA ±5%)
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated (The SoL terminals used to connect resistance temperature detectors and resistors are not isolated as they are shorted for all channels internally.)
A/D resolution	16 bits
Maximum input voltage	±100 V DC
Maximum channel-to-channel voltage	300 V DC (The SoL terminals used to connect resistance temperature detectors and resistors are not isolated as they are shorted for all channels internally.)

Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (SoH, SoL, +, -) and the instrument (LR8450/LR8450-01) or between any two modules Anticipated transient overvoltage: 2500 V
Input resistance	10 MΩ or greater (10 mV f.s. to 2 V f.s. voltage ranges, all thermocouple ranges, all resistance temperature detector and resistor ranges) 1 MΩ ±5% (10 V f.s. to 100 V f.s. voltage ranges, 1-5 V f.s. voltage range, humidity range)
Allowable signal source resistance	1 kΩ or less
Reference junction compensation	Internal/external (user-selectable) (during thermocouple measurement)
Thermocouple wire break detection	The system will check for wire breaks at the data refresh intervals during thermocouple measurement. On/Off (user-selectable) (set for entire module) Detection current: 5 μA ±20% (No current flows while acquiring measurement data.) (Setting not available when the data refresh interval is set to 10 ms.)
Data refresh interval	10 ms ^{*1} , 20 ms ^{*2} , 50 ms ^{*2} , 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s *1: Setting available when thermocouple wire break detection is disabled and not set for Pt1000 measurement. *2: Setting available when not set for Pt1000 measurement.
Digital filters	The digital filter notch frequency is automatically set as described in the following table according to the data refresh interval, Wire break detection setting, and power supply frequency filter setting:

–: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms ^{*3}	20 ms ^{*3}	50 ms ^{*3}	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60	60
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
50 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50	50
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50

Unit: Hz

*3: Setting not available when mixed with Pt1000 measurement.

Zero-adjustment	Cancels the offset of the product's internal measurement circuitry.
------------------------	---

-2. Accuracy specifications

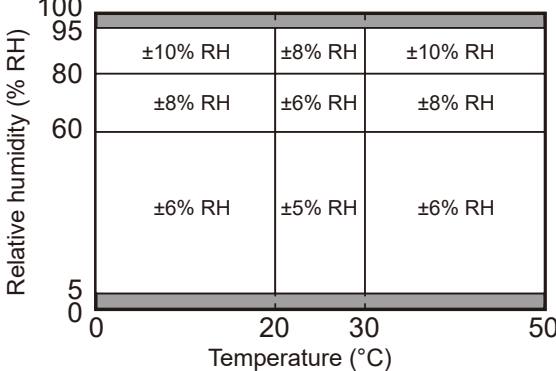
Accuracy guarantee conditions	Accuracy guarantee duration	1 year
	Accuracy guarantee temperature and humidity range	23°C ±5°C (73°F ±9°F), 80% RH or less
	Warm-up time	At least 30 minutes after connecting to the LR8450/LR8450-01 Memory HiLogger and turning on the instrument
	The conditions have been specified with zero-adjustment finished and the notch frequency set to 50 Hz/60 Hz (see notch frequency table in "Digital filters").	

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	—	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	±50 µV
		200 mV f.s.	10 µV	–200 mV to 200 mV	±100 µV
		1 V f.s.	50 µV	–1 V to 1 V	±500 µV
		2 V f.s.	100 µV	–2 V to 2 V	±1 mV
		10 V f.s.	500 µV	–10 V to 10 V	±5 mV
		20 V f.s.	1 mV	–20 V to 20 V	±10 mV
		100 V f.s.	5 mV	–100 V to 100 V	±50 mV
		1-5 V f.s.	500 µV	1 V to 5 V	±5 mV
Thermocouple (Not including accuracy of reference junction compensation)	K	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than 500°C	±0.5°C
				Greater than or equal to 500°C and less than or equal to 1350°C	±0.7°C
	J	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1200°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	E	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1000°C	±0.5°C
	T	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
	N	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.9°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.9°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 1300°C	±0.9°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	R	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
				Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
		500°C f.s.	0.05°C	Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
				Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
		2000°C f.s.	0.1°C	Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
				Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
	S	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
				Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
		500°C f.s.	0.05°C	Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
				Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
		2000°C f.s.	0.1°C	Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
				Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
	B	2000°C f.s.	0.1°C	Greater than or equal to 400°C and less than 600°C	±5.4°C
				Greater than or equal to 600°C and less than 1000°C	±3.7°C
				Greater than or equal to 1000°C and less than or equal to 1800°C	±2.4°C
	C	100°C f.s.	0.01°C	0°C to 100°C	±1.7°C
		500°C f.s.	0.05°C	0°C to 500°C	±1.7°C
		2000°C f.s.	0.1°C	0°C to 2000°C	±1.7°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Humidity	—	100% RH f.s.	0.1% RH	5.0% RH to 95.0% RH	As per measurement accuracy of the Z2000 Humidity Sensor
		Humidity accuracy table  ■ : Out of accuracy guarantee range Each boundary line is included in the better measurement accuracy area.			
Resistance temperature detector	Pt100	100°C f.s.	0.01°C	−100°C to 100°C	±0.5°C
		500°C f.s.	0.05°C	−200°C to 500°C	±0.7°C
		2000°C f.s.	0.1°C	−200°C to 800°C	±0.9°C
	JPt100	100°C f.s.	0.01°C	−100°C to 100°C	±0.5°C
		500°C f.s.	0.05°C	−200°C to 500°C	±0.7°C
		2000°C f.s.	0.1°C	−200°C to 500°C	±0.9°C
	Pt1000	100°C f.s.	0.01°C	−100°C to 100°C	±0.5°C
		500°C f.s.	0.05°C	−200°C to 500°C	±0.7°C
		2000°C f.s.	0.1°C	−200°C to 800°C	±0.9°C
Resistance	—	10 Ω f.s.	0.5 mΩ	0 Ω to 10 Ω	±10 mΩ
		20 Ω f.s.	1 mΩ	0 Ω to 20 Ω	±20 mΩ
		100 Ω f.s.	5 mΩ	0 Ω to 100 Ω	±100 mΩ
		200 Ω f.s.	10 mΩ	0 Ω to 200 Ω	±200 mΩ

Accuracy of reference junction compensation

±0.5°C (with input terminal temperature balancing)
Reference junction compensation: Add thermocouple measurement accuracy when set to *internal*.

Temperature characteristics

Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure (for humidity, see humidity accuracy table).

Normal-mode rejection ratio

50 dB or greater
(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s)
(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s)
(With thermocouple wire break detection disabled)

Common-mode rejection ratio

Signal source resistance of 100 Ω or less
100 dB or greater
(With 50 Hz/60 Hz input and a data refresh interval of 10 ms)
140 dB or greater
(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 10 mV f.s. range)
(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 10 mV f.s. range)
(With thermocouple wire break detection disabled)

Effect of radiated radio-frequency electromagnetic field	±5% f.s. (80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m) (Pt100 resistance temperature detector, 100°C f.s. range, 4-wire connection)
Effect of conducted radio-frequency electromagnetic field	±5% f.s. at 10 V (Pt100 resistance temperature detector, 100°C f.s. range, 4-wire setup)

U8552 Voltage/Temp Unit

1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety: EN 61010 EMC: EN 61326, Class A
Standard compliance	Thermocouples: JIS C1602:2015, IEC 60584-1:2013
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 63D mm (5.28"W × 2.76"H × 2.48"D) (including cover)
Weight	Approx. 319 g (11.3 oz.)
Product warranty duration	3 years
Accessories	Instruction Manual Installation screws × 2
Options	Z2000 Humidity Sensor

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	30 (Set voltage, thermocouple, or humidity for each channel.)
Input terminals	Push-button type terminal block (2 terminals per channel), outfitted with terminal block cover
Measurement target	Voltage Thermocouples (K, J, E, T, N, R, S, B, C) Humidity (using the Z2000 Humidity Sensor)
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated
A/D resolution	16 bits
Maximum input voltage	±100 V DC
Maximum channel-to-channel voltage	300 V DC
Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (+, –) and the instrument (LR8450/LR8450-01) or between any two modules Anticipated transient overvoltage: 2500 V
Input resistance	10 MΩ or greater (10 mV f.s. to 2 V f.s. voltage ranges, all thermocouple ranges) 1 MΩ ±5% (10 V f.s. to 100 V f.s. voltage ranges, 1–5 V f.s. voltage range, humidity range)
Allowable signal source resistance	1 kΩ or less

Reference junction compensation	Internal/external (user-selectable) (during thermocouple measurement)
Thermocouple wire break detection	The system will check for wire breaks at the data refresh intervals during thermocouple measurement. On/Off (user-selectable) (set for entire module) Detection current: 5 μA $\pm$20% (No current flows while acquiring measurement data.) Setting not available when the data refresh interval is set to 10 ms. Setting not available when the data refresh interval is set to 20 ms and 16 or more channels are being used.
Data refresh interval	10 ms^{*1}, 20 ms^{*2}, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s ^{*1}: Setting available when thermocouple wire break detection is disabled and the number of channels in use ranges from 1 to 15. ^{*2}: Setting available when thermocouple wire break detection is disabled and the number of channels in use ranges from 16 to 30. Alternatively, setting available when thermocouple wire break detection is enabled and the number of channels in use ranges from 1 to 15.
Digital filters	The digital filter notch frequency is automatically set as described in the following table according to the number of channels in use, data refresh interval, Wire break detection setting, and power supply frequency filter setting: (1) When the number of channels in use is 15 or less –: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60	60
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
50 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50	50
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50

Unit: Hz

(2) When the number of channels in use is 16 to 30

–: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
	On	–	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60
50 Hz	Off	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50
	On	–	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50

Unit: Hz

Zero-adjustment	Cancels the offset of the product's internal measurement circuitry.
------------------------	---

-2. Accuracy specifications

Accuracy guarantee conditions	Accuracy guarantee duration	1 year
	Accuracy guarantee temperature and humidity range	23°C $\pm$ 5°C (73°F $\pm$ 9°F), 80% RH or less
	Warm-up time	At least 30 minutes after connecting to the LR8450/LR8450-01 Memory HiLogger and turning on the instrument
	The conditions have been specified with zero-adjustment finished and notch frequency set to 50 Hz/60 Hz (see notch frequency table in "Digital filters").	

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	–	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	±50 µV
		200 mV f.s.	10 µV	–200 mV to 200 mV	±100 µV
		1 V f.s.	50 µV	–1 V to 1 V	±500 µV
		2 V f.s.	100 µV	–2 V to 2 V	±1 mV
		10 V f.s.	500 µV	–10 V to 10 V	±5 mV
		20 V f.s.	1 mV	–20 V to 20 V	±10 mV
		100 V f.s.	5 mV	–100 V to 100 V	±50 mV
		1-5 V f.s.	500 µV	1 V to 5 V	±5 mV
Thermocouple (Not including accuracy of reference junction compensation)	K	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than 500°C	±0.5°C
				Greater than or equal to 500°C and less than or equal to 1350°C	±0.7°C
	J	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1200°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	E	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±0.9°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1000°C	±0.5°C
	T	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±1.4°C
				Greater than or equal to –100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
	N	100°C f.s.	0.01°C	Greater than or equal to –100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.9°C
		500°C f.s.	0.05°C	Greater than or equal to –200°C and less than –100°C	±2.1°C
				Greater than or equal to –100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.9°C
		2000°C f.s.	0.1°C	Greater than or equal to –200°C and less than –100°C	±2.1°C
				Greater than or equal to –100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 1300°C	±0.9°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	R	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
	S	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
	B	2000°C f.s.	0.1°C	Greater than or equal to 400°C and less than 600°C	±5.4°C
				Greater than or equal to 600°C and less than 1000°C	±3.7°C
				Greater than or equal to 1000°C and less than or equal to 1800°C	±2.4°C
	C	100°C f.s.	0.01°C	0°C to 100°C	±1.7°C
		500°C f.s.	0.05°C	0°C to 500°C	±1.7°C
		2000°C f.s.	0.1°C	0°C to 2000°C	±1.7°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Humidity	—	100% RH f.s.	0.1% RH	5.0% RH to 95.0% RH	As per measurement accuracy of the Z2000 Humidity Sensor
Humidity accuracy table Relative humidity (% RH) Temperature (°C) ■ : Out of accuracy guarantee range Each boundary line is included in the better measurement accuracy area.					

Accuracy of reference junction compensation	±0.5°C (with input terminal temperature balancing) Reference junction compensation: Add thermocouple measurement accuracy when set to <i>internal</i> .
Temperature characteristics	Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure (for humidity, see humidity accuracy table).
Normal-mode rejection ratio	50 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s) (With thermocouple wire break detection disabled and 15 or fewer channels in use)
Common-mode rejection ratio	Signal source resistance of 100 Ω or less 100 dB or greater (With 50 Hz/60 Hz input and a data refresh interval of 10 ms) 140 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 10 mV f.s. range) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 10 mV f.s. range) (With thermocouple wire break detection disabled and 15 or fewer channels in use)
Effect of radiated radio-frequency electromagnetic field	±5% f.s. (80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m) (in the 10 V f.s. voltage range)
Effect of conducted radio-frequency electromagnetic field	±5% f.s. at 10 V (in the 10 V f.s. voltage range)

U8553 High Speed Voltage Unit

1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety: EN 61010 EMC: EN 61326, Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 63D mm (5.28"W × 2.76"H × 2.48"D) (including cover)
Weight	Approx. 237 g (8.4 oz.)
Product warranty duration	3 years
Accessories	Instruction Manual Installation screws × 2

2. Input and measurement specifications

-1. Basic specifications

Number of input channels	5 (voltage only)
Input terminals	M3 screw-type terminal block (2 terminals per channel), outfitted with terminal block cover
Measurement target	Voltage
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated
A/D resolution	16 bits
Maximum input voltage	±100 V DC
Maximum channel-to-channel voltage	300 V DC
Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (+, –) and the instrument (LR8450/LR8450-01) or between any two modules Anticipated transient overvoltage: 2500 V
Input resistance	1 MΩ ±5%
Allowable signal source resistance	100 Ω or less
Data refresh interval	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s

Digital filters

The digital filter notch frequency is automatically set as described in the following table according to the data refresh interval and power supply frequency filter setting:

Power supply frequency filter setting	Data refresh interval												
	1 ms	2 ms	5 ms	10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	50 k	5.4 k	2.6 k	1.0 k	400	200	100	60	60	10	5	5	5
50 Hz	50 k	5.4 k	2.6 k	1.0 k	400	200	100	50	50	10	5	5	5

Unit: Hz

Zero-adjustment

Cancels the offset of the product's internal measurement circuitry.

-2. Accuracy specifications

Accuracy guarantee conditions

Accuracy guarantee duration

1 year

Accuracy guarantee temperature and humidity range

23°C ±5°C (73°F ±9°F), 80% RH or less

Warm-up time

At least 30 minutes after connecting to the LR8450/LR8450-01 Memory HiLogger and turning on the instrument

The conditions have been specified with zero-adjustment finished and notch frequency set to 5 Hz, 10 Hz, 50 Hz, or 60 Hz (see notch frequency table in "Digital filters").

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	—	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 characteristics

Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure.

Normal-mode rejection ratio

50 dB or greater

(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s)

(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s)

Common-mode rejection ratio

Signal source resistance of 100 Ω or less

100 dB or greater

(With 50 Hz/60 Hz input and a data refresh interval of 1 ms)

140 dB or greater

(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 100 mV f.s. range)

(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 100 mV f.s. range)

Effect of radiated radio-frequency electromagnetic field

±5% f.s. (80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m) (in the 10 V f.s. voltage range)

Effect of conducted radio-frequency electromagnetic field

±5% f.s. at 10 V (in the 10 V f.s. voltage range)

U8554 Strain Unit

1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety: EN 61010 EMC: EN 61326, Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 63D mm (5.28"W × 2.76"H × 2.48"D) (including cover)
Weight	Approx. 236 g (8.3 oz.)
Product warranty duration	3 years
Accessories	Instruction Manual Installation screws × 2 Connection confirmation label

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	5 (Set voltage or strain for each channel.)	
Input terminals	Push-button type terminal block (5 terminals per channel), outfitted with terminal block cover Set DIP switches according to measurement target.	
Measurement target	Voltage	
	Strain	Strain gage-type converter Strain gage 1-gage method (2-wire setup), 1-gage method (3-wire setup), 2-gage method (adjacent sides), 4-gage method
Adaptive gage resistance	1-gage method, 2-gage method: 120 Ω (external bridge box required for 350 Ω) 4-gage method: 120 Ω to 1 kΩ	
Gage factor	Fixed to 2.0	
Bridge voltage	2 V ±0.05 V DC	
Balance adjustment	Method	Electronic auto-balancing
	Range	Voltage: ±20 mV or less (1 mV f.s. to 20 mV f.s. ranges), ±200 mV or less (50 mV f.s. to 200 mV f.s. ranges) Strain: ±20,000 με or less (1000 με f.s. to 20,000 με f.s. ranges), ±200,000 με or less (50,000 με f.s. to 200,000 με f.s. ranges)
Input type	Balanced differential input, non-isolated channels, simultaneous sampling of all channels	
A/D resolution	16 bits	
Maximum input voltage	±0.5 V DC	

Maximum channel-to-channel voltage	Non-isolated (all channels share common GND)											
Maximum rated line-to-ground voltage	30 V rms AC or 60 V DC (between analog input channels and the instrument [LR8450/LR8450-01]) Anticipated transient overvoltage: 330 V											
Input resistance	2 MΩ ±5%											
Data refresh interval	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s											
Low-pass filter	Cutoff frequency −3 dB ±30% Auto, 120, 60, 30, 15, 8, 4 (Hz) Auto: The low-pass filter's cutoff frequency is automatically set as described in the following table based on the set data refresh interval:											
Data refresh interval												
1 ms	2 ms	5 ms	10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
120 Hz	60 Hz	30 Hz	15 Hz	8 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz
Attenuation characteristics				5th-order Butterworth filter, −30 dB/oct								

-2. Accuracy specifications

Accuracy guarantee conditions	Accuracy guarantee duration	1 year
	Accuracy guarantee temperature and humidity range	23°C ±5°C (73°F ±9°F), 80% RH or less
	Warm-up time	At least 30 minutes after connecting to the LR8450/LR8450-01 Memory HiLogger and turning on the instrument
	The conditions have been specified with auto-balance finished and the low-pass filter set to 4 kHz.	

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Range	Maximum resolution	Measurable range	Measurement accuracy*
Voltage	1 mV f.s.	50 nV	-1 mV to 1 mV	±9 µV
	2 mV f.s.	100 nV	-2 mV to 2 mV	±10 µV
	5 mV f.s.	250 nV	-5 mV to 5 mV	±25 µV
	10 mV f.s.	500 nV	-10 mV to 10 mV	±50 µV
	20 mV f.s.	1 µV	-20 mV to 20 mV	±100 µV
	50 mV f.s.	2.5 µV	-50 mV to 50 mV	±250 µV
	100 mV f.s.	5 µV	-100 mV to 100 mV	±500 µV
	200 mV f.s.	10 µV	-200 mV to 200 mV	±1 mV
Strain	1,000 µε f.s.	0.05 µε	-1,000 µε to 1,000 µε	±9 µε
	2,000 µε f.s.	0.1 µε	-2,000 µε to 2,000 µε	±10 µε
	5,000 µε f.s.	0.25 µε	-5,000 µε to 5,000 µε	±25 µε
	10,000 µε f.s.	0.5 µε	-10,000 µε to 10,000 µε	±50 µε
	20,000 µε f.s.	1 µε	-20,000 µε to 20,000 µε	±100 µε
	50,000 µε f.s.	2.5 µε	-50,000 µε to 50,000 µε	±250 µε
	100,000 µε f.s.	5 µε	-100,000 µε to 100,000 µε	±500 µε
	200,000 µε f.s.	10 µε	-200,000 µε to 200,000 µε	±1000 µε

Temperature characteristics*

Gain ±0.05% f.s. per °C
 Zero position
 Voltage: ±1.5 µV per °C
 Strain: ±1.5 µε per °C

Built-in bridge resistance precision

Tolerance: ±0.01%
 Temperature characteristics: ±2 ppm per °C

Common-mode rejection ratio

100 dB or greater with a signal source resistance of 300 Ω or less (for 50 Hz/60 Hz input)

Effect of radiated radio-frequency electromagnetic field

±50% f.s.
 (80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m)
 (in the 5000 µε f.s. strain range with low-pass filter enabled at 4 Hz)

Effect of conducted radio-frequency electromagnetic field

±5% f.s. at 10 V
 (in the 5000 µε f.s. strain range with low-pass filter enabled at 4 Hz)

*: Does not include built-in bridge resistance tolerance and temperature characteristics.

U8555 CAN Unit

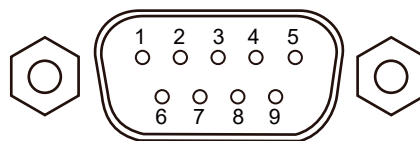
1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	−10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	−20°C to 60°C (−4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety: EN 61010 EMC: EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 54D mm (5.28"W × 2.76"H × 2.13"D) (not including protruding parts)
Weight	Approx. 235 g (8.3 oz.)
Product warranty duration	3 years
Accessories	Instruction Manual Installation screws ×2
Options	9713-01 CAN Cable SP7001-95 Non-Contact CAN Sensor

2. Input, output, and measurement specifications

-1. Basic specifications

Number of CAN ports	2 ports
Input terminals	D-sub 9-pin male ×2



Pin	Assignment	Functionality
1	N.C.	Unused
2	CAN_L	CAN_L communications line
3	GND	Ground
4	N.C.	Unused
5	N.C.	Unused
6	N.C.	Unused
7	CAN_H	CAN_H communications line
8	N.C.	Unused
9	N.C.	Unused

Interface	Supported protocols	CAN (ISO 11898-1:2015 compliant) CAN FD (ISO 11898-1:2015 compliant) CAN FD (non-ISO)
	Physical layer	ISO 11898 (High Speed)
Terminator	Can be enabled/disabled for each port. Resistance value: 120 Ω $\pm$ 10 Ω	
ACT LED	Displays the CAN bus operating status.	
TERM LED	Illuminates when the terminator is enabled.	
Data refresh interval	10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s	
Baud rate	CAN, CAN FD (arbitration) : 50k, 62.5k, 83.3k, 100k, 125k, 250k, 500k, 800k, 1000k [Baud] CAN FD (data): 0.5M, 1M, 2M, 2.5M, 4M, 5M [Baud]	
Sampling point	CAN, CAN FD (arbitration): 50.0% to 95.0% CAN FD (data): 50.0% to 95.0%	
ACK	The ACK response when receiving CAN data can be enabled/disabled.	
Operating mode	Can switch between receive mode and measured value output mode for each unit. The two ports on the unit must always be set to the same operating mode.	

-2. Receive mode specifications

Number of channels	Data refresh interval 10 ms: Up to 50 channels (up to 50 signals) Data refresh interval 20 ms: Up to 100 channels (up to 100 signals) Data refresh interval 50 ms: Up to 250 channels (up to 250 signals) Data refresh interval 100 ms or longer: Up to 500 channels (up to 500 signals)	
Receive ID count	Function for recording the number of times a target ID is received during a data refresh interval	
User frame transmission	Overview	Sends user CAN frames while operating in receive mode.
	Number of sets of conditions that can be set	8 conditions per unit

-3. Measured value output mode specifications

Overview	Converts LR8450 measured values into CAN frames and outputs them.	
Output target	Measurement data from plug-in modules (other than CAN Units) Measurement time	
Output data refresh period	Varies with the data refresh interval for the units whose data is being output (as short as 1 ms).	
Response	(Data refresh interval) $\times$ 2 + 1 ms + (analog response time*) *: Varies with filter settings (U8554: 5 ms, with 120 Hz low-pass filter).	

U8556 Current Module

1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoors, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 63D mm (5.28"W × 2.76"H × 2.48"D) (excluding protrusion)
Weight	Approx. 256 g (9.0 oz.)
Product warranty period	3 years
Accessories	Instruction Manual Installation screws ×2 Caps ×5
Options	L0220-01 Extension Cable (2 m) L0220-02 Extension Cable (5 m) L0220-03 Extension Cable (10 m)

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	5 channels
Measurement target	Current (using optional current sensors)
Input type	Isolated input by current sensor, simultaneous sampling of all channels
Input terminals	Dedicated connector (Hioki PL14)
Applicable current sensors	CT7812 AC/DC Current Sensor (rated current: 2 A) CT7822 AC/DC Current Sensor (rated current: 20 A) CT7126 AC Current Sensor (rated current: 60 A) CT7131 AC Current Sensor (rated current: 100 A) CT7136 AC Current Sensor (rated current: 600 A) CT7044 AC Flexible Current Sensor (rated current: 6000 A, diameter: 100 mm) CT7045 AC Flexible Current Sensor (rated current: 6000 A, diameter: 180 mm) CT7046 AC Flexible Current Sensor (rated current: 6000 A, diameter: 254 mm) CT7731 AC/DC Auto-Zero Current Sensor (rated current: 100 A) CT7736 AC/DC Auto-Zero Current Sensor (rated current: 600 A) CT7742 AC/DC Auto-Zero Current Sensor (rated current: 2000 A) CT7116 AC Leakage Current Sensor (rated current: 6 A)

Measurement range	200 mA, 2 A (CT7812) 500 mA, 5 A (CT7116) 2 A, 20 A (CT7822) 5 A, 50 A (CT7126) 100 A (CT7131, CT7731) 50 A, 500 A (CT7136, CT7736) 200 A, 2000 A (CT7742) 50 A, 500 A, 5000 A (CT7044, CT7045, CT7046)
Response time for instantaneous values	150 μ s (step input, 90% of final value, design value)
Frequency characteristics for RMS values	DC to 5 kHz (–3 dB)
Response time for RMS values	0.8 s (step input, time required for a measured value to fall within the accuracy specification range, design value)
A/D resolution	16 bits
Input resistance	1 M Ω $\pm$ 10%
Power for current sensors	+5 V $\pm$ 0.25 V, –5 V $\pm$ 0.25 V
Maximum measurable current	130% of each range or the maximum measurable current of a current sensor to be connected, whichever is less
Maximum rated line-to-ground voltage	Not isolated
Data refresh interval	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s
Measurement item	Instantaneous value, RMS value (switchable)
RMS value measuring method	The RMS-value IC calculates real RMS values according to measured AC+DC values.
Low-pass filter	OFF, 220 Hz (–3 dB) Available for measurement of instantaneous values and RMS values
Zero-adjustment	Cancels the offset including the connected current sensor. Note that the demagnetization functionality provided by the CT7812 and CT7822 is not used.

-2. Accuracy specifications

Accuracy guarantee conditions	Product warranty period	1 years
	Accuracy guarantee temperature and humidity range	23°C $\pm$ 5°C (73°F $\pm$ 9°F), 80% RH or less
	Warm-up time	At least 30 minutes
	After zero adjustment DC input for instantaneous values, sine wave input for RMS values	
	Extendable length	Up to 10 m
Accuracy guarantee range	Instantaneous values $\pm$ 120% of each range or the upper limit of the accuracy guarantee range of a current sensor to be connected, whichever is narrower RMS values 5% to 100% of each range	

Combinational accuracy with CT7812 AC/DC Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
2.0000 A	0.0002 A	$\pm 0.38\%$ rdg ± 0.0037 A
200.0 mA	0.1 mA	$\pm 0.38\%$ rdg ± 2.4 mA

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		$45 \text{ Hz} \leq f \leq 66 \text{ Hz}$	$66 \text{ Hz} < f \leq 500 \text{ Hz}$	$500 \text{ Hz} < f \leq 1 \text{ kHz}$
2.0000 A	0.0002 A	$\pm 1.1\%$ rdg ± 0.0125 A	$\pm 1.3\%$ rdg ± 0.0125 A	$\pm 2.1\%$ rdg ± 0.0125 A
200.0 mA	0.1 mA	$\pm 1.1\%$ rdg ± 11.4 mA	$\pm 1.3\%$ rdg ± 11.4 mA	$\pm 2.1\%$ rdg ± 11.4 mA

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7822 AC/DC Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
20.000 A	0.002 A	$\pm 0.38\%$ rdg ± 0.037 A
2.000 A	0.001 A	$\pm 0.38\%$ rdg ± 0.024 A

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		$45 \text{ Hz} \leq f \leq 66 \text{ Hz}$	$66 \text{ Hz} < f \leq 500 \text{ Hz}$	$500 \text{ Hz} < f \leq 1 \text{ kHz}$
20.000 A	0.002 A	$\pm 1.1\%$ rdg ± 0.046 A	$\pm 1.3\%$ rdg ± 0.04 A	$\pm 2.1\%$ rdg ± 0.046 A
2.000 A	0.001 A	$\pm 1.1\%$ rdg ± 0.035 A	$\pm 1.3\%$ rdg ± 0.029 A	$\pm 2.1\%$ rdg ± 0.035 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7731 AC/DC Auto-Zero Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
100.00 A	0.01 A	$\pm 1.08\%$ rdg ± 0.58 A

RMS value

Range	Resolution	Combinational accuracy for RMS values	
		$45 \text{ Hz} \leq f \leq 66 \text{ Hz}$	$66 \text{ Hz} < f \leq 500 \text{ Hz}$
100.00 A	0.01 A	$\pm 1.8\%$ rdg ± 2.16 A	$\pm 3\%$ rdg ± 2.16 A ($I \leq 80$ A) $\pm 3.5\%$ rdg ± 2.16 A ($80 \text{ A} < I \leq 100$ A)

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7736 AC/DC Auto-Zero Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
500.0 A	0.1 A	±2.08% rdg ±3.6 A
50.00 A	0.01 A	±2.08% rdg ±3.06 A

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
500.0 A	0.1 A	±2.8% rdg ±4.8 A	±4% rdg ±4.8 A	±4.6% rdg ±4.8 A
50.00 A	0.01 A	±2.8% rdg ±4.16 A	±4% rdg ±4.16 A	±4.6% rdg ±4.16 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7742 AC/DC Auto-Zero Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
2000.0 A	0.2 A	±1.58% rdg ±11.7 A
200.0 A	0.1 A	±1.58% rdg ±10.4 A

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
2000.0 A	0.2 A	±2.8% rdg ±18.7 A	±3.5% rdg ±28.7 A (I ≤ 1800 A) ±4.0% rdg ±28.7 A (1800 A < I ≤ 2000 A)	±4.1% rdg ±28.7 A
200.0 A	0.1 A	±2.3% rdg ±17.6 A	±3.5% rdg ±27.6 A	±4.1% rdg ±27.6 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7126 AC Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
50.00 A	0.01 A	±1.1% rdg ±0.09 A	±2% rdg ±0.09 A	±2.6% rdg ±0.09 A
5.000 A	0.001 A	±1.1% rdg ±0.022 A	±2% rdg ±0.022 A	±2.6% rdg ±0.022 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7131 AC Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
100.00 A	0.01 A	±1.1% rdg ±0.18 A	±1.8% rdg ±0.18 A	±2.4% rdg ±0.18 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7136 AC Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
500.0 A	0.1 A	±1.1% rdg ±0.9 A	±1.8% rdg ±1 A	±2.4% rdg ±1 A
50.00 A	0.01 A	±1.1% rdg ±0.22 A	±1.8% rdg ±0.28 A	±2.4% rdg ±0.28 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7044/CT7045/CT7046 AC Flexible Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values
		45 Hz ≤ f ≤ 66 Hz
5000 A	1 A	±2.3% rdg ±33 A
500.0 A	0.1 A	±2.3% rdg ±3.3 A
50.00 A	0.01 A	±2.3% rdg ±2.66 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7116 AC Leakage Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
5.000 A	0.001 A	±1.8% rdg ±0.011 A	±4% rdg ±0.014 A	±4.6% rdg ±0.014 A
500.0 mA	0.1 mA	±1.8% rdg ±4.6 mA	±4% rdg ±7.6 mA	±4.6% rdg ±7.6 mA

The symbol f in the above table denotes the measurement signal frequency.

Accuracy of the module only

Range	Measurement accuracy for instantaneous values
1	±0.08% of reading ±8 dgt
2-L (×5)	±0.08% of reading ±17 dgt
2-H (×10)	±0.08% of reading ±4 dgt
5-L (×1)	±0.08% of reading ±6 dgt
5-H (×10)	±0.08% of reading ±6 dgt

Range	Accuracy guarantee temperature and humidity range		
	45 Hz ≤ f ≤ 100 Hz	100 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
	Measurement accuracy for RMS values		
1	±0.8% of reading ±16 dgt	±1.0% of reading ±16 dgt	±1.6% of reading ±16 dgt
2-L (×5)	±0.8% of reading ±27 dgt	±1.0% of reading ±27 dgt	±1.6% of reading ±27 dgt
2-H (×10)	±0.8% of reading ±16 dgt	±1.0% of reading ±16 dgt	±1.6% of reading ±16 dgt
5-L (×1)	±0.8% of reading ±8 dgt	±1.0% of reading ±8 dgt	±1.6% of reading ±8 dgt
5-H (×10)	±0.8% of reading ±16 dgt	±1.0% of reading ±16 dgt	±1.6% of reading ±16 dgt

- Accuracy is not guaranteed for a measurement signal frequency of 1 kHz or more.
- The symbol f in the above table denotes the measurement signal frequency.

Temperature characteristics	When the instrument is used at temperatures outside the accuracy guarantee temperature range, add the following value to the measurement accuracy. Measurement accuracy for instantaneous values: $\Delta T \times 0.1 \times (\text{measurement accuracy of each range})$ Measurement accuracy for RMS values: $\Delta T \times 0.1 \times (\text{measurement accuracy of each range, depending on the frequency})$ ΔT: Temperature difference between the operating temperature and the upper or lower limit of the accuracy guarantee temperature range (°C)
Effect of radiated radio-frequency electromagnetic field	$\pm 25\%$ f.s. (Test level: 10 V/m for a frequency range of 80 MHz to 1 GHz, 3 V/m for a frequency range of 1 GHz to 6 GHz) Add the influence value of the sensor if the specification of the sensor lists it.
Effect of conducted radio-frequency electromagnetic field	$\pm 5\%$ f.s. (Test level: 10 V) Add the influence value of the sensor if the specification of the sensor lists it.

3. Interface specifications

Connector	Dedicated interface (Hioki PL14)
------------------	----------------------------------

U8557 Thermistor Module

1. General specifications

Compatible logger	LR8450/LR8450-01 Memory HiLogger
Operating environment	Indoors, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	−10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	−20°C to 60°C (−4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Dimensions	Approx. 134W × 70H × 63D mm (5.28"W × 2.76"H × 2.48"D) (including cover)
Weight	Approx. 243 g (8.6 oz.)
Product warranty period	3 years
Accessories	Instruction Manual Installation screws ×2

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	15								
Input terminals	Push-button type terminal block (2 terminals per channel), outfitted with terminal block cover								
Measurement target	Thermistor, resistance* *: In both cases, the instrument can record measured values as resistance values or temperature-converted values.								
Measurement method	Measurement signal: Constant current (pulse excitation) Measurement method: DC 2-wire method Measurement current: As shown below <table border="1"> <thead> <tr> <th>Measurement range</th><th>Measurement current</th></tr> </thead> <tbody> <tr> <td>2000 Ω f.s. range</td><td>100 μA ±5%</td></tr> <tr> <td>20 kΩ f.s. range</td><td>100 μA ±5%</td></tr> <tr> <td>200 kΩ f.s. range</td><td>10 μA ±5%</td></tr> </tbody> </table>	Measurement range	Measurement current	2000 Ω f.s. range	100 μA ±5%	20 kΩ f.s. range	100 μA ±5%	200 kΩ f.s. range	10 μA ±5%
Measurement range	Measurement current								
2000 Ω f.s. range	100 μA ±5%								
20 kΩ f.s. range	100 μA ±5%								
200 kΩ f.s. range	10 μA ±5%								
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated								
A/D resolution	16 bits								
Maximum rated line-to-ground voltage	300 V AC, DC								
Data refresh interval	50 ms*, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s *: Selectable only when the auto range function is off								

Digital filters

The digital filter notch frequency is automatically set as described in the following table according to the data refresh interval and power supply frequency filter setting:

–: Setting not available

Power supply frequency filter	Auto range	Data refresh interval							
		50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	No	2.98 k	2.42 k	739	60	60	60	60	60
	Yes	–	2.98 k	2.42 k	739	60	60	60	60
50 Hz	No	2.98 k	2.42 k	739	50	50	50	50	50
	Yes	–	2.98 k	2.42 k	739	50	50	50	50

Unit: Hz

Resistance-temperature conversion

Method	Steinhart-Hart equation, B constant
Resolution	0.01°C
Temperature range	–100°C to 300°C (–148°F to 572°F)
Temperature measurement accuracy (reference value)	±0.2°C Reference values under the following conditions Thermistor: OMEGA Model Number 44006 Measurement temperature range: 10°C to 50°C (50°F to 122°F) Data update interval: 500 ms Conversion method: Steinhart-Hart equation (A: 0.001032, B: 0.0002387, C: 0.000000158) Thermistor accuracy must be added separately.

Auto range

off/on (selectable for each channel)
Available when temperature conversion is enabled and the data update interval is 100 ms or longer.

Zero-adjustment

Cancels the offset of the product's internal measurement circuitry.

Wire resistance cancellation

Subtracts the set wire resistance value.
Setting range: 0.0 Ω to 100.0 Ω

-2. Accuracy specifications**Accuracy guarantee conditions**

Accuracy guarantee duration	1 year
Accuracy guarantee temperature and humidity range	23°C ±5°C (73°F ±9°F), 80% RH or less
Specified under the following conditions: Notch frequency set to 50 Hz/60 Hz (see the table under "Digital filters"), zero-adjustment performed, using an AWG26 cable with a wiring length of 6 m or less.	

Measurement range, measurement resolution, measurable range, measurement accuracy figures, and Maximum open voltage

Measurement range	Measurement resolution	Measurable range	Measurement accuracy	Maximum open voltage
2000 Ω f.s.	0.1 Ω	0 Ω to 2000 Ω	±2 Ω	+4.0 V
20 kΩ f.s.	1 Ω	0 Ω to 20 kΩ	±20 Ω	
200 kΩ f.s.	10 Ω	0 Ω to 200 kΩ	±200 Ω	

Temperature characteristics Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure.

Normal-mode rejection ratio

50 dB or greater
(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s)
(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s)

Common-mode rejection ratio	100 dB or greater (With 50 Hz/60 Hz input, with a signal source resistance of 100 Ω or less and a data update interval of 50 ms).
Effect of radiated radio-frequency electromagnetic field	$\pm 5\%$ f.s. (80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m, with the 2000 Ω f.s. resistance range)
Effect of conducted radio-frequency electromagnetic field	$\pm 5\%$ f.s. (When measuring 2000 Ω with the 2000 Ω f.s. resistance range.)

Wireless Module Specifications

LR8530 Wireless Voltage/Temp Unit

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, wirelessly communicate to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Standard compliance	Thermocouples: JIS C1602:2015, IEC 60584-1:2013
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming ±10% voltage fluctuation of the rated supply voltage) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 25 VA (including AC Adapter) Normal power consumption: 2.5 VA (instrument only, with the battery removed) • Z1007 Battery Pack (When used with the AC Adapter, the AC Adapter has priority.) Maximum rated power: 1.5 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (external power supply 30 V DC, while charging battery) Normal power consumption: 2.5 VA (external power supply 12 V DC, with the battery removed)
Continuous operating time	When using the Z1007 Battery Pack Approx. 9 h (all data refresh intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154W × 106H × 57D mm (6.06"W × 4.17"H × 2.24"D) (including cover)
Weight	Approx. 423 g (14.9 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty duration	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for the mounting plate)

Options	Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case
----------------	--

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	15 channels (Set voltage or thermocouple for each channel.)
Input terminals	M3 screw-type terminal block (2 terminals per channel), outfitted with terminal block cover
Measurement target	Voltage Thermocouples (K, J, E, T, N, R, S, B, C)
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated
A/D resolution	16 bits
Maximum input voltage	±100 V DC
Maximum channel-to-channel voltage	300 V DC
Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (+, -) and the enclosure Anticipated transient overvoltage: 2500 V
Input resistance	10 MΩ or greater (10 mV f.s. to 2 V f.s. voltage ranges, all thermocouple ranges) 1 MΩ ±5% (10 V f.s. to 100 V f.s. voltage ranges, 1-5 V f.s. voltage range)
Allowable signal source resistance	1 kΩ or less
Reference junction compensation	Internal/external (user-selectable) (during thermocouple measurement)
Thermocouple wire break detection	The system will check for wire breaks at the data refresh intervals during thermocouple measurement. On/Off (user-selectable) (set for entire module) Detection current: 5 μA ±20% No current flows while acquiring measurement data. (Setting not available when the data refresh interval is set to 10 ms.)
Data refresh interval	10 ms*, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s *: Setting available when thermocouple wire break detection is disabled.

Digital filters

The digital filter notch frequency is automatically set as described in the following table according to the data refresh interval, wire break detection setting, and power supply frequency filter setting:

–: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60	60
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
50 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50	50
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50

Unit: Hz

Zero-adjustment

Cancels the offset of the product's internal measurement circuitry.

-2. Accuracy specifications**Accuracy guarantee conditions**

Product warranty duration 1 year

Accuracy guarantee temperature and humidity range 23°C ±5°C (73°F ±9°F), 80% RH or less

Warm-up time At least 30 minutes after turning on the module

The conditions have been specified with after zero-adjustment finished and the notch frequency set to 50 Hz/60 Hz (see notch frequency table in "Digital filters").

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	–	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	±50 µV
		200 mV f.s.	10 µV	–200 mV to 200 mV	±100 µV
		1 V f.s.	50 µV	–1 V to 1 V	±500 µV
		2 V f.s.	100 µV	–2 V to 2 V	±1 mV
		10 V f.s.	500 µV	–10 V to 10 V	±5 mV
		20 V f.s.	1 mV	–20 V to 20 V	±10 mV
		100 V f.s.	5 mV	–100 V to 100 V	±50 mV
		1-5 V f.s.	500 µV	1 V to 5 V	±5 mV

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	K	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than 500°C	±0.5°C
				Greater than or equal to 500°C and less than or equal to 1350°C	±0.7°C
	J	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1200°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	E	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1000°C	±0.5°C
	T	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	N	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.9°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.9°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 1300°C	±0.9°C
	R	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
	S	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	B	2000°C f.s.	0.1°C	Greater than or equal to 400°C and less than 600°C	±5.4°C
				Greater than or equal to 600°C and less than 1000°C	±3.7°C
				Greater than or equal to 1000°C and less than or equal to 1800°C	±2.4°C
	C	100°C f.s.	0.01°C	0°C to 100°C	±1.7°C
		500°C f.s.	0.05°C	0°C to 500°C	±1.7°C
		2000°C f.s.	0.1°C	0°C to 2000°C	±1.7°C

Reference junction compensation ±0.5°C (with input terminal temperature balancing)
Reference junction compensation: Add thermocouple measurement accuracy when set to *internal*.

Temperature characteristics Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure.

Normal-mode rejection ratio 50 dB or greater
(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s)
(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s)
(With thermocouple wire break detection disabled)

Common-mode rejection ratio Signal source resistance of 100 Ω or less
100 dB or greater
(With 50 Hz/60 Hz input and a data refresh interval of 10 ms)
140 dB or greater
(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 10 mV f.s.)
(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 10 mV f.s.)
(With thermocouple wire break detection disabled)

Effect of radiated radio-frequency electromagnetic field ±5% f.s. (80 MHz to 1 GHz: 10 V/m, 1 GHz to 6 GHz: 3 V/m) (in the 10 V f.s. voltage range)

Effect of conducted radio-frequency electromagnetic field ±5% f.s. at 10 V (in the 10 V f.s. voltage range)

3. Functionality specifications

LED indication Wireless connection, measurement status, error status, AC Adapter- / external power supply-powered operation, battery-powered operation, battery-charging status

Operation keys Auto, reset

Auto-connect function Yes

LR8531 Wireless Universal Unit

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, wirelessly communicate to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	-20°C to 55°C (-4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	-20°C to 60°C (-4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Standard compliance	Thermocouples: JIS C1602:2015, IEC 60584-1:2013
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming ±10% voltage fluctuation of the rated supply voltage) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 25 VA (including AC Adapter) Normal power consumption: 3 VA (instrument only, with the battery removed) • Z1007 Battery Pack (When used with the AC Adapter, the AC Adapter has priority.) Maximum rated power: 2 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (external power supply 30 V DC, while charging battery) Normal power consumption: 3 VA (external power supply 12 V DC, with the battery removed)
Continuous operating time	When using the Z1007 Battery Pack Approx. 7 h (all data refresh intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154W × 106H × 57D mm (6.06"W × 4.17"H × 2.24"D) (including cover)
Weight	Approx. 386 g (13.6 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty duration	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for the mounting plate)

Options	Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case Z2000 Humidity Sensor
----------------	---

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	15 channels (Set voltage, thermocouple, humidity, resistance temperature detector, and resistor for each channel.)
Input terminals	Push-button type terminal block (4 terminals per channel), outfitted with terminal block cover
Output terminals	M3 screw-type terminal block (1 output, 2 terminals per channel, power supply dedicated to Z2000 Humidity Sensor, 15 pieces of Z2000 Humidity Sensor can be powered at the same time)
Measurement target	Voltage Thermocouples (K, J, E, T, N, R, S, B, C) Humidity (with Z2000 Humidity Sensor) Resistance temperature detectors (Pt100, JPt100, Pt1000) (Connection: 3-wire setup/4-wire setup) (Measurement current: 1 mA $\pm$ 5% [Pt100 and Jpt100 measurement] 0.1 mA $\pm$ 5% [Pt1000 measurement]) (During Pt1000 measurement, setting available when the data refresh interval is set to 100 ms or longer) Resistance (connection: 4-wire; measurement current: 1 mA $\pm$ 5%)
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated (The SoL terminals used to connect resistance temperature detectors and resistors are not isolated as they are shorted for all channels internally.)
A/D resolution	16 bits
Maximum input voltage	$\pm$ 100 V DC
Maximum channel-to-channel voltage	300 V DC (The SoL terminals used to connect resistance temperature detectors and resistors are not isolated as they are shorted for all channels internally.)
Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (SoH, SoL, +, -) and the enclosure Anticipated transient overvoltage: 2500 V
Input resistance	10 M Ω or greater (10 mV f.s. to 2 V f.s. voltage ranges, all thermocouple ranges, all resistance temperature detector ranges, and all resistor ranges) 1 M Ω $\pm$ 5% (10 V f.s. to 100 V f.s. voltage ranges, 1-5 V f.s. voltage range, humidity range)
Allowable signal source resistance	1 k Ω or less
Reference junction compensation	Internal/external (user-selectable) (during thermocouple measurement)
Thermocouple wire break detection	The system will check for wire breaks at the data refresh intervals during thermocouple measurement. On/Off (user-selectable) (set for entire module) Detection current: 5 μ A $\pm$ 20% No current flows while acquiring measurement data. (Setting not available when the data refresh interval is set to 10 ms.)
Data refresh interval	10 ms ^{*1} , 20 ms ^{*2} , 50 ms ^{*2} , 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s ^{*1} : Setting available when thermocouple wire break detection is disabled and no Pt1000 measurement setting is involved. ^{*2} : Setting available when no Pt1000 measurement setting is involved.

Digital filters

The digital filter notch frequency is automatically set as described in the following table according to the data refresh interval, wire break detection setting, and power supply frequency filter setting:

–: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms ^{*3}	20 ms ^{*3}	50 ms ^{*3}	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60	60
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
50 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50	50
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50

Unit: Hz

*3: Not available when measurement with Pt1000 is involved.

Zero-adjustment

Cancels the offset of the product's internal measurement circuitry.

-2. Accuracy specifications**Accuracy guarantee conditions**

Product warranty duration 1 year

Accuracy guarantee temperature and humidity range 23°C ±5°C (73°F ±9°F), 80% RH or less

Warm-up time At least 30 minutes after turning on the module

The conditions have been specified with after zero-adjustment finished and the notch frequency set to 50 Hz/60 Hz (see notch frequency table in "Digital filters").

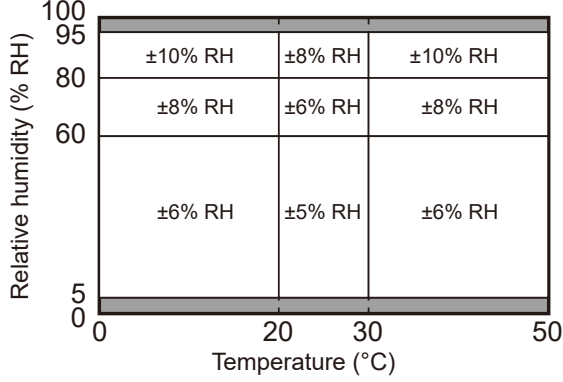
Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	–	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	±50 µV
		200 mV f.s.	10 µV	–200 mV to 200 mV	±100 µV
		1 V f.s.	50 µV	–1 V to 1 V	±500 µV
		2 V f.s.	100 µV	–2 V to 2 V	±1 mV
		10 V f.s.	500 µV	–10 V to 10 V	±5 mV
		20 V f.s.	1 mV	–20 V to 20 V	±10 mV
		100 V f.s.	5 mV	–100 V to 100 V	±50 mV
		1-5 V f.s.	500 nV	1 V to 5 V	±5 mV

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	K	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than 500°C	±0.5°C
				Greater than or equal to 500°C and less than or equal to 1350°C	±0.7°C
	J	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1200°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	E	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1000°C	±0.5°C
	T	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	N	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.9°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.9°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 1300°C	±0.9°C
	R	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
	S	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	B	2000°C f.s.	0.1°C	Greater than or equal to 400°C and less than 600°C	±5.4°C
				Greater than or equal to 600°C and less than 1000°C	±3.7°C
				Greater than or equal to 1000°C and less than or equal to 1800°C	±2.4°C
	C	100°C f.s.	0.01°C	0°C to 100°C	±1.7°C
		500°C f.s.	0.05°C	0°C to 500°C	±1.7°C
		2000°C f.s.	0.1°C	0°C to 2000°C	±1.7°C
Humidity	—	100% RH f.s.	0.1% RH	5.0% RH to 95.0% RH	As per measurement accuracy of the Z2000 Humidity Sensor
		Humidity accuracy table  Relative humidity (% RH) Temperature (°C) ■ : Out of accuracy guarantee range Each boundary line is included in the better measurement accuracy area.			
Resistance temperature detector	Pt100	100°C f.s.	0.01°C	−100°C to 100°C	±0.5°C
		500°C f.s.	0.05°C	−200°C to 500°C	±0.7°C
		2000°C f.s.	0.1°C	−200°C to 800°C	±0.9°C
	JPt100	100°C f.s.	0.01°C	−100°C to 100°C	±0.5°C
		500°C f.s.	0.05°C	−200°C to 500°C	±0.7°C
		2000°C f.s.	0.1°C	−200°C to 500°C	±0.9°C
	Pt1000	100°C f.s.	0.01°C	−100°C to 100°C	±0.5°C
		500°C f.s.	0.05°C	−200°C to 500°C	±0.7°C
		2000°C f.s.	0.1°C	−200°C to 800°C	±0.9°C
Resistance	—	10 Ω f.s.	0.5 mΩ	0 Ω to 10 Ω	±10 mΩ
		20 Ω f.s.	1 mΩ	0 Ω to 20 Ω	±20 mΩ
		100 Ω f.s.	5 mΩ	0 Ω to 100 Ω	±100 mΩ
		200 Ω f.s.	10 mΩ	0 Ω to 200 Ω	±200 mΩ

Reference junction compensation

±0.5°C (with input terminal temperature balancing)
 Reference junction compensation: Add thermocouple measurement accuracy when set to *internal*.

Temperature characteristics

Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure (for information about the humidity accuracy, see the humidity accuracy table).

Normal-mode rejection ratio	50 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s) (With thermocouple wire break detection disabled)
Common-mode rejection ratio	Signal source resistance of 100 Ω or less 100 dB or greater (With 50 Hz/60 Hz input and a data refresh interval of 10 ms) 140 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 10 mV f.s.) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 10 mV f.s.) (With thermocouple wire break detection disabled)
Effect of radiated radio-frequency electromagnetic field	$\pm 5\%$ f.s. (80 MHz to 1 GHz: 10 V/m, 1 GHz to 6 GHz: 3 V/m) (Pt100 resistance temperature detector, 100°C f.s. range, 4-wire connection)
Effect of conducted radio-frequency electromagnetic field	5% f.s. At 10 V (Pt100 resistance temperature detector, 100°C f.s. range, 4-wire connection)

3. Functionality specifications

LED indication	Wireless connection, measurement status, error status, AC Adapter- / external power supply-powered operation, battery-powered operation, battery-charging status
Operation keys	Auto, reset
Auto-connect function	Yes

LR8532 Wireless Voltage/Temp Unit

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, wirelessly communicate to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Standard compliance	Thermocouples: JIS C1602:2015, IEC 60584-1:2013
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming ±10% voltage fluctuation of the rated supply voltage) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 25 VA (including AC Adapter) Normal power consumption: 2.5 VA (instrument only, with the battery removed) • Z1007 Battery Pack (When used with AC Adapter, AC Adapter has priority.) Maximum rated power: 1.5 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (external power supply 30 V DC, while charging battery) Normal power consumption: 2.5 VA (external power supply 12 V DC, with the battery removed)
Continuous operating time	When using the Z1007 Battery Pack Approx. 9 h (all data refresh intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154W × 106H × 57D mm (6.06"W × 4.17"H × 2.24"D) (including cover)
Weight	Approx. 388 g (13.7 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty duration	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for the mounting plate)

Options	Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case
----------------	--

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	30 channels (Set voltage or thermocouple for each channel.)
Input terminals	Push-button type terminal block (2 terminals per channel), outfitted with terminal block cover
Measurement target	Voltage Thermocouples (K, J, E, T, N, R, S, B, C)
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated
A/D resolution	16 bits
Maximum input voltage	±100 V DC
Maximum channel-to-channel voltage	300 V DC
Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (+, -) and the enclosure Anticipated transient overvoltage: 2500 V
Input resistance	10 MΩ or greater (10 mV f.s. to 2 V f.s. voltage ranges, all thermocouple ranges) 1 MΩ ±5% (10 V f.s. to 100 V f.s. voltage ranges, 1-5 V f.s. voltage range)
Allowable signal source resistance	1 kΩ or less
Reference junction compensation	Internal/external (user-selectable) (during thermocouple measurement)
Thermocouple wire break detection	The system will check for wire breaks at the data refresh intervals during thermocouple measurement. On/Off (user-selectable) (set for entire module) Detection current: 5 μA ±20% No current flows while acquiring measurement data. (When the data refresh interval is set to 10 ms, the setting is not available. When the data refresh interval is set to 20 ms and 16 channels or more are used, the setting is not available.)
Data refresh interval	10 ms ^{*1} , 20 ms ^{*2} , 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s ^{*1} : Setting available when thermocouple wire break detection is disabled and between 1 and 15 channels are used. ^{*2} : Setting available when thermocouple wire break detection is disabled and between 16 and 30 channels are used. Alternatively, setting available when thermocouple wire break detection is enabled and between 1 and 15 channels are used.

Digital filters

The digital filter notch frequency is automatically set as described in the following table according to the number of channels used, the data refresh interval, wire break detection setting, and power supply frequency filter setting:

(1) When 15 or fewer channels are used

–: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60	60
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
50 Hz	Off	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50	50
	On	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50

Unit: Hz

(2) When between 16 and 30 channels are used

–: Setting not available

Power supply frequency filter setting	Wire break detection setting	Data refresh interval									
		10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	Off	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60	60
	On	–	–	20.8 k	6.94 k	2.98 k	2.37 k	739	60	60	60
50 Hz	Off	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50	50
	On	–	–	20.8 k	6.94 k	2.98 k	2.37 k	739	50	50	50

Unit: Hz

Zero-adjustment

Cancels the offset of the product's internal measurement circuitry.

-2. Accuracy specifications**Accuracy guarantee conditions**

Product warranty duration 1 year

Accuracy guarantee temperature and humidity range 23°C ±5°C (73°F ±9°F), 80% RH or less

Warm-up time At least 30 minutes after turning on the module

The conditions have been specified with after zero-adjustment finished and the notch frequency set to 50 Hz/60 Hz (see notch frequency table in "Digital filters").

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	–	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	±50 µV
		200 mV f.s.	10 µV	–200 mV to 200 mV	±100 µV
		1 V f.s.	50 µV	–1 V to 1 V	±500 µV
		2 V f.s.	100 µV	–2 V to 2 V	±1 mV
		10 V f.s.	500 µV	–10 V to 10 V	±5 mV
		20 V f.s.	1 mV	–20 V to 20 V	±10 mV
		100 V f.s.	5 mV	–100 V to 100 V	±50 mV
		1-5 V f.s.	500 µV	1 V to 5 V	±5 mV

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	K	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than 500°C	±0.5°C
				Greater than or equal to 500°C and less than or equal to 1350°C	±0.7°C
	J	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1200°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	E	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±0.9°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 1000°C	±0.5°C
	T	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.5°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±1.4°C
				Greater than or equal to -100°C and less than 0°C	±0.7°C
				Greater than or equal to 0°C and less than or equal to 400°C	±0.5°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	N	100°C f.s.	0.01°C	Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 100°C	±0.9°C
		500°C f.s.	0.05°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 500°C	±0.9°C
		2000°C f.s.	0.1°C	Greater than or equal to -200°C and less than -100°C	±2.1°C
				Greater than or equal to -100°C and less than 0°C	±1.1°C
				Greater than or equal to 0°C and less than or equal to 1300°C	±0.9°C
	R	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C
	S	100°C f.s.	0.01°C	0°C to 100°C	±4.4°C
		500°C f.s.	0.05°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 500°C	±2.2°C
		2000°C f.s.	0.1°C	Greater than or equal to 0°C and less than 100°C	±4.4°C
				Greater than or equal to 100°C and less than 300°C	±2.9°C
				Greater than or equal to 300°C and less than or equal to 1700°C	±2.2°C

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Thermocouple (Not including accuracy of reference junction compensation)	B	2000°C f.s.	0.1°C	Greater than or equal to 400°C and less than 600°C	±5.4°C
				Greater than or equal to 600°C and less than 1000°C	±3.7°C
				Greater than or equal to 1000°C and less than or equal to 1800°C	±2.4°C
	C	100°C f.s.	0.01°C	0°C to 100°C	±1.7°C
		500°C f.s.	0.05°C	0°C to 500°C	±1.7°C
		2000°C f.s.	0.1°C	0°C to 2000°C	±1.7°C

Reference junction compensation	±0.5°C (with input terminal temperature balancing) Reference junction compensation: Add thermocouple measurement accuracy when set to <i>internal</i> .
Temperature characteristics	Add (measurement accuracy × 0.1) per degree to the measurement accuracy figure.
Normal-mode rejection ratio	50 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s) (when thermocouple wire break detection is disabled and 15 or fewer channels are used)
Common-mode rejection ratio	Signal source resistance of 100 Ω or less 100 dB or greater (With 50 Hz/60 Hz input and a data refresh interval of 10 ms) 140 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 10 mV f.s.) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 10 mV f.s.) (when thermocouple wire break detection is disabled and 15 or fewer channels are used)
Effect of radiated radio-frequency electromagnetic field	±5% f.s. (80 MHz to 1 GHz: 10 V/m, 1 GHz to 6 GHz: 3 V/m) (in the 10 V f.s. voltage range)
Effect of conducted radio-frequency electromagnetic field	±5% f.s. at 10 V (in the 10 V f.s. voltage range)

3. Functionality specifications

LED indication	Wireless connection, measurement status, error status, AC Adapter- / external power supply-powered operation, battery-powered operation, battery-charging status
Operation keys	Auto, reset
Auto-connect function	Yes

LR8533 Wireless High Speed Voltage Unit

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, wirelessly communicate to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming ±10% voltage fluctuation of the rated supply voltage) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 25 VA (including AC Adapter) Normal power consumption: 2.5 VA (instrument only, with the battery removed) • Z1007 Battery Pack (When used with AC Adapter, AC Adapter has priority.) Maximum rated power: 2 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (external power supply 30 V DC, while charging battery) Normal power consumption: 2.5 VA (external power supply 12 V DC, with the battery removed)
Continuous operating time	When using the Z1007 Battery Pack Approx. 9 h (all data refresh intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154W × 106H × 57D mm (6.06"W × 4.17"H × 2.24"D) (including cover)
Weight	Approx. 370 g (13.1 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty duration	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for the mounting plate)
Options	Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case

2. Input and measurement specifications

-1. Basic specifications

Number of input channels	5 channels (voltage only)
Input terminals	M3 screw-type terminal block (2 terminals per channel), outfitted with terminal block cover
Measurement target	Voltage
Input type	Scanning by semiconductor relays, floating unbalanced input All channels isolated
A/D resolution	16 bits
Maximum input voltage	±100 V DC
Maximum channel-to-channel voltage	300 V DC
Maximum rated line-to-ground voltage	300 V AC, DC (Measurement Category II) Between any input channel (+, -) and the enclosure Anticipated transient overvoltage: 2500 V
Input resistance	1 MΩ ±5%
Allowable signal source resistance	100 Ω or less
Data refresh interval	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s
Digital filters	The digital filter notch frequency is automatically set as described in the following table according to the data refresh interval, and power supply frequency filter setting:

Power supply frequency filter setting	Data refresh interval												
	1 ms	2 ms	5 ms	10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s
60 Hz	50 k	5.4 k	2.6 k	1.0 k	400	200	100	60	60	10	5	5	5
50 Hz	50 k	5.4 k	2.6 k	1.0 k	400	200	100	50	50	10	5	5	5

Unit: Hz

Zero-adjustment	Cancels the offset of the product's internal measurement circuitry.
------------------------	---

-2. Accuracy specifications

Accuracy guarantee conditions	Product warranty duration	1 year
	Accuracy guarantee temperature and humidity range	23°C ±5°C (73°F ±9°F), 80% RH or less
	Warm-up time	At least 30 minutes after turning on the module
	The conditions have been specified with after zero-adjustment finished and the notch frequency set to 5 Hz/10 Hz/50 Hz/60 Hz (see notch frequency table in "Digital filters").	

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Type	Range	Maximum resolution	Measurable range	Measurement accuracy
Voltage	—	100 mV f.s.	5 μ V	–100 mV to 100 mV	$\pm 100 \mu$ V
		200 mV f.s.	10 μ V	–200 mV to 200 mV	$\pm 200 \mu$ V
		1 V f.s.	50 μ V	–1 V to 1 V	± 1 mV
		2 V f.s.	100 μ V	–2 V to 2 V	± 2 mV
		10 V f.s.	500 μ V	–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 μ V	1 V to 5 V	± 10 mV

Temperature characteristics Add (measurement accuracy $\times 0.1$) per degree to the measurement accuracy figure.

Normal-mode rejection ratio 50 dB or greater
(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s)
(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s)

Common-mode rejection ratio Signal source resistance of 100 Ω or less
100 dB or greater
(With 50 Hz/60 Hz input and a data refresh interval of 1 ms)
140 dB or greater
(With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s in the 100 mV f.s.)
(With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s in the 100 mV f.s.)

Effect of radiated radio-frequency electromagnetic field $\pm 5\%$ f.s. (80 MHz to 1 GHz: 10 V/m, 1 GHz to 6 GHz: 3 V/m) (in the 10 V f.s. voltage range)

Effect of conducted radio-frequency electromagnetic field $\pm 5\%$ f.s. at 10 V (in the 10 V f.s. voltage range)

3. Functionality specifications

LED indication Wireless connection, measurement status, error status, AC Adapter- / external power supply-powered operation, battery-powered operation, battery-charging status

Operation keys Auto, reset

Auto-connect function Yes

LR8534 Wireless Strain Unit

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, wirelessly communicate to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming ±10% voltage fluctuation of the rated supply voltage) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 25 VA (including AC Adapter) Normal power consumption: 4.0 VA (instrument only, with the battery removed) • Z1007 Battery Pack (When used with AC Adapter, AC Adapter has priority.) Maximum rated power: 3.5 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (external power supply 30 V DC, while charging battery) Normal power consumption: 4.0 VA (external power supply 12 V DC, with the battery removed)
Continuous operating time	When using the Z1007 Battery Pack Approx. 5 h (all data refresh intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154 W × 106H × 57D mm (6.06"W × 4.17"H × 2.24"D) (including cover)
Weight	Approx. 372 g (13.1 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty duration	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for mounting plate) Connection confirmation label
Options	Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	5 channels (Set voltage or strain for each channel.)																																																
Input terminals	M3 screw-type terminal block (5 terminals per channel), outfitted with terminal block cover Set DIP switches according to the measurement target.																																																
Measurement target	Voltage																																																
	Strain	Strain gage-type converter Strain gage 1-gage method (2-wire setup), 1-gage method (3-wire setup), 2-gage method (adjacent sides), 4-gage method																																															
Adaptive gage resistance	1-gage method, 2-gage method: 120 Ω (external bridge box required for 350 Ω) 4-gage method: 120 Ω to 1 kΩ																																																
Gage factor	Fixed to 2.0																																																
Bridge voltage	2 V DC ±0.05 V																																																
Balance adjustment	Input type	Method																																															
	Range	Voltage: ±20 mV or less (1 mV f.s. to 20 mV f.s. ranges), ±200 mV or less (50 mV f.s. to 200 mV f.s. ranges) Strain: ±20,000 με or less (1000 με f.s. to 20,000 με f.s. ranges), ±200,000 με or less (50,000 με f.s. to 200,000 με f.s. ranges)																																															
Input type	Balanced differential input, non-isolated channels, simultaneous sampling of all channels																																																
A/D resolution	16 bits																																																
Maximum input voltage	±0.5 V DC																																																
Maximum channel-to-channel voltage	Non-isolated (all channels share common GND)																																																
Maximum rated line-to-ground voltage	30 V rms AC or 60 V DC (between each analog input channel and the enclosure) Anticipated transient overvoltage: 330 V																																																
Input resistance	2 MΩ ±5%																																																
Data refresh interval	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s																																																
Low-pass filter	Cutoff frequency −3 dB ±30% Auto, 120, 60, 30, 15, 8, 4 (Hz) Auto: The low-pass filter's cutoff frequency is automatically set as described in the following table based on the set data refresh interval:																																																
	<table><tr><th colspan="12">Data refresh interval</th></tr><tr><th>1 ms</th><th>2 ms</th><th>5 ms</th><th>10 ms</th><th>20 ms</th><th>50 ms</th><th>100 ms</th><th>200 ms</th><th>500 ms</th><th>1 s</th><th>2 s</th><th>5 s</th><th>10 s</th></tr><tr><td>120 Hz</td><td>60 Hz</td><td>30 Hz</td><td>15 Hz</td><td>8 Hz</td><td>4 Hz</td><td>4 Hz</td><td>4 Hz</td><td>4 Hz</td><td>4 Hz</td><td>4 Hz</td><td>4 Hz</td><td>4 Hz</td></tr></table>												Data refresh interval												1 ms	2 ms	5 ms	10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s	120 Hz	60 Hz	30 Hz	15 Hz	8 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz
Data refresh interval																																																	
1 ms	2 ms	5 ms	10 ms	20 ms	50 ms	100 ms	200 ms	500 ms	1 s	2 s	5 s	10 s																																					
120 Hz	60 Hz	30 Hz	15 Hz	8 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz	4 Hz																																					
Attenuation characteristics		5th-order Butterworth filter, −30 dB/oct																																															

-2. Accuracy specifications

Accuracy guarantee conditions	Product warranty duration	1 year
	Accuracy guarantee temperature and humidity range	23°C $\pm 5^\circ\text{C}$ (73°F $\pm 9^\circ\text{F}$), 80% RH or less
	Warm-up time	At least 30 minutes after turning on the module
	The conditions have been specified with auto-balance finished and the low-pass filter set to 4 kHz.	

Measurement range, maximum resolution, measurable range, and measurement accuracy figures

Measurement target	Range	Maximum resolution	Measurable range	Measurement accuracy*
Voltage	1 mV f.s.	50 nV	-1 mV to 1 mV	±9 µV
	2 mV f.s.	100 nV	-2 mV to 2 mV	±10 µV
	5 mV f.s.	250 nV	-5 mV to 5 mV	±25 µV
	10 mV f.s.	500 nV	-10 mV to 10 mV	±50 µV
	20 mV f.s.	1 µV	-20 mV to 20 mV	±100 µV
	50 mV f.s.	2.5 µV	-50 mV to 50 mV	±250 µV
	100 mV f.s.	5 µV	-100 mV to 100 mV	±500 µV
	200 mV f.s.	10 µV	-200 mV to 200 mV	±1 mV
Strain	1,000 µε f.s.	0.05 µε	-1,000 µε to 1,000 µε	±9 µε
	2,000 µε f.s.	0.1 µε	-2,000 µε to 2,000 µε	±10 µε
	5,000 µε f.s.	0.25 µε	-5,000 µε to 5,000 µε	±25 µε
	10,000 µε f.s.	0.5 µε	-10,000 µε to 10,000 µε	±50 µε
	20,000 µε f.s.	1 µε	-20,000 µε to 20,000 µε	±100 µε
	50,000 µε f.s.	2.5 µε	-50,000 µε to 50,000 µε	±250 µε
	100,000 µε f.s.	5 µε	-100,000 µε to 100,000 µε	±500 µε
	200,000 µε f.s.	10 µε	-200,000 µε to 200,000 µε	±1000 µε

Temperature characteristics*

Gain ±0.05% f.s./°C
Zero position
Voltage: ±1.5 µV/°C
Strain: ±1.5 µε/°C

Built-in bridge resistance accuracy

Tolerance: ±0.01%
Temperature characteristics: ±2 ppm/°C

Common-mode rejection ratio

100 dB or greater with a signal source resistance of 300 Ω or less (for 50 Hz/60 Hz input)

Effect of radiated radio-frequency electromagnetic field

±50% f.s.
(80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m, in the 5000 µε f.s. strain range with the low-pass filter enabled at 4 Hz)

Effect of conducted radio-frequency electromagnetic field

±5% f.s. at 10 V
(in the 5000 µε f.s. strain range with the low-pass filter enabled at 4 Hz)

*: Does not include built-in bridge resistance tolerance and temperature characteristics.

3. Functionality specifications

LED indication	Wireless connection, measurement status, error status, AC Adapter- / external power supply-powered operation, battery-powered operation, battery-charging status
Operation keys	Auto, reset
Auto-connect function	Yes

LR8535 Wireless CAN Unit

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, wirelessly communicate to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming ±10% voltage fluctuation of the rated supply voltage) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 28 VA (including AC Adapter) Normal power consumption: 4.0 VA (instrument only, with the battery removed) • Z1007 Battery Pack (When used with AC Adapter, AC Adapter has priority.) Maximum rated power: 3.5 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (external power supply 30 V DC, while charging battery) Normal power consumption: 4.0 VA (external power supply 12 V DC, with the battery removed)
Continuous operating time	When using the Z1007 Battery Pack Approx. 10 h (when not using any Non-Contact CAN Sensors, all data refresh intervals, communications in good condition, reference value at 23°C) Approx. 5 h (when using two Non-Contact CAN Sensors, all data refresh intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154W × 106H × 48D mm (6.06"W × 4.17"H × 1.89"D) (not including protruding parts)
Weight	Approx. 355 g (12.5 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty duration	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for mounting plate)

Other Options

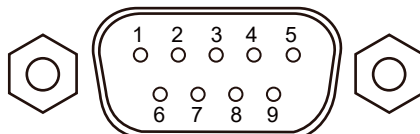
Options	9713-01 CAN Cable Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case SP7001-95 Non-Contact CAN Sensor
----------------	---

2. Input, output, and measurement specifications

-1. Basic specifications

Number of CAN ports	2 ports
----------------------------	---------

Input terminal	D-sub 9-pin male ×2
-----------------------	---------------------



Pin	Assignment	Functionality
1	N.C.	Unused
2	CAN_L	CAN_L communications line
3	GND	Ground
4	N.C.	Unused
5	N.C.	Unused
6	N.C.	Unused
7	CAN_H	CAN_H communications line
8	N.C.	Unused
9	N.C.	Unused

Power supply receptacle	USB port (Series A receptacle) ×2 For exclusively supplying power to Hioki Non-Contact CAN Sensor
--------------------------------	--

Interface	Supported protocols CAN (ISO 11898-1:2015 compliant) CAN FD (ISO 11898-1:2015 compliant) CAN FD (non-ISO) Physical layer ISO 11898 (High Speed)
------------------	--

Terminator	Can be enabled/disabled for each port. Resistance value: 120 Ω ±10 Ω
-------------------	---

ACT LED	Displays the CAN bus operating status.
----------------	--

TERM LED	Illuminates when the terminator is enabled.
-----------------	---

Data refresh interval	10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s
------------------------------	--

Baud rate	CAN, CAN FD (arbitration) : 50k, 62.5k, 83.3k, 100k, 125k, 250k, 500k, 800k, 1000k [Baud] CAN FD (data): 0.5M, 1M, 2M, 2.5M, 4M, 5M [Baud]
------------------	--

Sampling point	CAN, CAN FD (arbitration): 50.0% to 95.0% CAN FD (data): 50.0% to 95.0%
-----------------------	--

ACK	The ACK response when receiving CAN data can be enabled/disabled.
------------	---

Operating mode	Only receive mode is supported.
-----------------------	---------------------------------

-2. Receive mode specifications

Number of channels	Data refresh interval 10 ms: Up to 50 channels (up to 50 signals) Data refresh interval 20 ms: Up to 100 channels (up to 100 signals) Data refresh interval 50 ms: Up to 250 channels (up to 250 signals) Data refresh interval 100 ms or longer: Up to 500 channels (up to 500 signals)
Receive ID count	Function for recording the number of times a target ID is received during a data refresh interval

3. Functionality specifications

Wireless status LED indicators	Wireless connection, measurement status, error status, AC Adapter- / external power supply-powered operation, battery-powered operation, battery-charging status
Operation keys	Auto, reset
Auto-connect function	Yes

LR8536 Wireless Current Module

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, while wirelessly communicating to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming voltage fluctuation of ±10%) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 25 VA (including AC Adapter) Normal power consumption: 2.9 W (with the CT7822 connected to all channels, measuring a current of 10 A rms, with no battery inserted) • Z1007 Battery Pack (When used with the AC Adapter, the AC Adapter has priority.) Maximum rated power: 3.5 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (a voltage of 30 V DC supplied externally, while charging battery) Normal power consumption: 2.4 VA (with the CT7822 connected to all channels, measuring a current of 10 A rms, with no battery inserted)
Continuous operating time	When Z1007 Battery Pack is used Approx. 5 h (when refreshing all data at the regular intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is inserted and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154W × 115H × 48D mm (6.06"W × 4.53"H × 1.89"D) (excluding protrusion)
Weight	Approx. 377 g (13.3 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty period	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for mounting plate) Caps ×5

Other Options

Options	Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case L0220-01 Extension Cable (2 m) L0220-02 Extension Cable (5 m) L0220-03 Extension Cable (10 m)
----------------	---

2. Input, output, and measurement specifications

-1. Basic specifications

Number of input channels	5 channels
Measurement target	Current (using optional current sensors)
Input type	Isolated input by current sensor, simultaneous sampling of all channels
Input terminals	Dedicated connector (Hioki PL14)
Applicable current sensors	CT7812 AC/DC Current Sensor (rated current: 2 A) CT7822 AC/DC Current Sensor (rated current: 20 A) CT7126 AC Current Sensor (rated current: 60 A) CT7131 AC Current Sensor (rated current: 100 A) CT7136 AC Current Sensor (rated current: 600 A) CT7044 AC Flexible Current Sensor (rated current: 6000 A, diameter: 100 mm) CT7045 AC Flexible Current Sensor (rated current: 6000 A, diameter: 180 mm) CT7046 AC Flexible Current Sensor (rated current: 6000 A, diameter: 254 mm) CT7731 AC/DC Auto-Zero Current Sensor (rated current: 100 A) CT7736 AC/DC Auto-Zero Current Sensor (rated current: 600 A) CT7742 AC/DC Auto-Zero Current Sensor (rated current: 2000 A) CT7116 AC Leakage Current Sensor (rated current: 6 A)
Measurement range	200 mA, 2 A (CT7812) 500 mA, 5 A (CT7116) 2 A, 20 A (CT7822) 5 A, 50 A (CT7126) 100 A (CT7131, CT7731) 50 A, 500 A (CT7136, CT7736) 200 A, 2000 A (CT7742) 50 A, 500 A, 5000 A (CT7044, CT7045, CT7046)
Response time for instantaneous values	150 μ s (step input, 90% of final value, design value)
Frequency characteristics for RMS values	DC to 5 kHz (-3 dB)
Response time for RMS values	0.8 s (step input, time required for a measured value to fall within the accuracy specification range, design value)
A/D resolution	16 bits
Input resistance	1 M Ω $\pm$ 10%
Power for current sensors	+5 V $\pm$ 0.25 V, -5 V $\pm$ 0.25 V
Maximum measurable current	130% of each range or the maximum measurable current of a current sensor to be connected, whichever is less
Maximum rated line-to-ground voltage	Not isolated
Data refresh interval	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s
Measurement items	Instantaneous value, RMS value (switchable)
RMS value measuring method	The RMS-value IC calculates real RMS values according to measured AC+DC values.

Other Options

Low-pass filter	OFF, 220 Hz (−3 dB) Available for measurement of instantaneous values and RMS values
Zero-adjustment	Cancels the offset including the connected current sensor. Note that the demagnetization functionality provided by the CT7812 and CT7822 is not used.

-2. Accuracy specifications

Accuracy guarantee conditions	Product warranty period	1 years
	Accuracy guarantee temperature and humidity range	23°C ±5°C (73°F ±9°F), 80% RH or less
	Warm-up time	At least 30 minutes
	After zero adjustment DC input for instantaneous values, sine wave input for RMS values	
	Extendable length	Up to 10 m
Accuracy guarantee range	Instantaneous values ±120% of each range or the upper limit of the accuracy guarantee range of a current sensor to be connected, whichever is narrower RMS value 5% to 100% of each range	

Combinational accuracy with CT7812 AC/DC Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
2.0000 A	0.0002 A	±0.38% rdg ±0.0037 A
200.0 mA	0.1 mA	±0.38% rdg ±2.4 mA

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
2.0000 A	0.0002 A	±1.1% rdg ±0.0125 A	±1.3% rdg ±0.0125 A	±2.1% rdg ±0.0125 A
200.0 mA	0.1 mA	±1.1% rdg ±11.4 mA	±1.3% rdg ±11.4 mA	±2.1% rdg ±11.4 mA

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7822 AC/DC Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
20.000 A	0.002 A	±0.38% rdg ±0.037 A
2.000 A	0.001 A	±0.38% rdg ±0.024 A

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
20.000 A	0.002 A	±1.1% rdg ±0.046 A	±1.3% rdg ±0.04 A	±2.1% rdg ±0.046 A
2.000 A	0.001 A	±1.1% rdg ±0.035 A	±1.3% rdg ±0.029 A	±2.1% rdg ±0.035 A

The symbol f in the above table denotes the measurement signal frequency.

Other Options

Combinational accuracy with CT7731 AC/DC Auto-Zero Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
100.00 A	0.01 A	±1.08% rdg ±0.58 A

RMS value

Range	Resolution	Combinational accuracy for RMS values	
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz
100.00 A	0.01 A	±1.8% rdg ±2.16 A	±3% rdg ±2.16 A (I ≤ 80 A) ±3.5% rdg ±2.16 A (80 A < I ≤ 100 A)

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7736 AC/DC Auto-Zero Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
500.0 A	0.1 A	±2.08% rdg ±3.6 A
50.00 A	0.01 A	±2.08% rdg ±3.06 A

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
500.0 A	0.1 A	±2.8% rdg ±4.8 A	±4% rdg ±4.8 A	±4.6% rdg ±4.8 A
50.00 A	0.01 A	±2.8% rdg ±4.16 A	±4% rdg ±4.16 A	±4.6% rdg ±4.16 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7742 AC/DC Auto-Zero Current Sensor

Instantaneous values

Range	Resolution	Combinational accuracy for instantaneous values
2000.0 A	0.2 A	±1.58% rdg ±11.7 A
200.0 A	0.1 A	±1.58% rdg ±10.4 A

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
2000.0 A	0.2 A	±2.8% rdg ±18.7 A	±3.5% rdg ±28.7 A (I ≤ 1800 A) ±4.0% rdg ±28.7 A (1800 A < I ≤ 2000 A)	±4.1% rdg ±28.7 A
200.0 A	0.1 A	±2.3% rdg ±17.6 A	±3.5% rdg ±27.6 A	±4.1% rdg ±27.6 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7126 AC Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
50.00 A	0.01 A	±1.1% rdg ±0.09 A	±2% rdg ±0.09 A	±2.6% rdg ±0.09 A
5.000 A	0.001 A	±1.1% rdg ±0.022 A	±2% rdg ±0.022 A	±2.6% rdg ±0.022 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7131 AC Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
100.00 A	0.01 A	±1.1% rdg ±0.18 A	±1.8% rdg ±0.18 A	±2.4% rdg ±0.18 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7136 AC Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
500.0 A	0.1 A	±1.1% rdg ±0.9 A	±1.8% rdg ±1 A	±2.4% rdg ±1 A
50.00 A	0.01 A	±1.1% rdg ±0.22 A	±1.8% rdg ±0.28 A	±2.4% rdg ±0.28 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7044/CT7045/CT7046 AC Flexible Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values
		45 Hz ≤ f ≤ 66 Hz
5000 A	1 A	±2.3% rdg ±33 A
500.0 A	0.1 A	±2.3% rdg ±3.3 A
50.00 A	0.01 A	±2.3% rdg ±2.66 A

The symbol f in the above table denotes the measurement signal frequency.

Combinational accuracy with CT7116 AC Leakage Current Sensor

RMS value

Range	Resolution	Combinational accuracy for RMS values		
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	500 Hz < f ≤ 1 kHz
5.000 A	0.001 A	±1.8% rdg ±0.011 A	±4% rdg ±0.014 A	±4.6% rdg ±0.014 A
500.0 mA	0.1 mA	±1.8% rdg ±4.6 mA	±4% rdg ±7.6 mA	±4.6% rdg ±7.6 mA

The symbol f in the above table denotes the measurement signal frequency.

Accuracy of the module only

Range	Measurement accuracy for instantaneous values
1	$\pm 0.08\%$ of reading ± 8 dgt
2-L ($\times 5$)	$\pm 0.08\%$ of reading ± 17 dgt
2-H ($\times 10$)	$\pm 0.08\%$ of reading ± 4 dgt
5-L ($\times 1$)	$\pm 0.08\%$ of reading ± 6 dgt
5-H ($\times 10$)	$\pm 0.08\%$ of reading ± 6 dgt

Range	Accuracy guarantee frequency range		
	45 Hz $\leq f \leq$ 100 Hz	100 Hz $< f \leq$ 500 Hz	500 Hz $< f \leq$ 1 kHz
	Measurement accuracy for RMS values		
1	$\pm 0.8\%$ of reading ± 16 dgt	$\pm 1.0\%$ of reading ± 16 dgt	$\pm 1.6\%$ of reading ± 16 dgt
2-L ($\times 5$)	$\pm 0.8\%$ of reading ± 27 dgt	$\pm 1.0\%$ of reading ± 27 dgt	$\pm 1.6\%$ of reading ± 27 dgt
2-H ($\times 10$)	$\pm 0.8\%$ of reading ± 16 dgt	$\pm 1.0\%$ of reading ± 16 dgt	$\pm 1.6\%$ of reading ± 16 dgt
5-L ($\times 1$)	$\pm 0.8\%$ of reading ± 8 dgt	$\pm 1.0\%$ of reading ± 8 dgt	$\pm 1.6\%$ of reading ± 8 dgt
5-H ($\times 10$)	$\pm 0.8\%$ of reading ± 16 dgt	$\pm 1.0\%$ of reading ± 16 dgt	$\pm 1.6\%$ of reading ± 16 dgt

- Accuracy is not guaranteed for a measurement signal frequency of 1 kHz or more.
- The symbol f in the above table denotes the measurement signal frequency.

Temperature characteristics	When the instrument is used at temperatures outside the accuracy guarantee temperature range, add the following value to the measurement accuracy. Measurement accuracy for instantaneous values: $\Delta T \times 0.1 \times (\text{measurement accuracy of each range})$ Measurement accuracy for RMS values: $\Delta T \times 0.1 \times (\text{measurement accuracy of each range, depending on the frequency})$ ΔT: Temperature difference between the operating temperature and the upper or lower limit of the accuracy guarantee temperature range ($^{\circ}\text{C}$)
Effect of radiated radio-frequency electromagnetic field	$\pm 25\%$ f.s. (Test level: 10 V/m for a frequency range of 80 MHz to 1 GHz, 3 V/m for a frequency range of 1 GHz to 6 GHz) Add the influence value of the sensor if the specification of the sensor lists it.
Effect of conducted radio-frequency electromagnetic field	$\pm 5\%$ f.s. (Test level: 10 V) Add the influence value of the sensor if the specification of the sensor lists it.

3. Functionality specifications

LED indicators	Wireless connection, measurement status, error status, AC Adapter-/external power supply-powered operation, battery-powered operation, battery-charging status
Operation keys	AUTO, RESET
Auto-connect function	Yes

4. Interface specifications

Connector	Dedicated interface (Hioki PL14)
------------------	----------------------------------

LR8537 Wireless Thermistor Module

1. General specifications

Compatible logger	LR8450-01 Memory HiLogger
Communication means for control	With the Z3230/Z3231 Wireless LAN Adapter (accessory) attached, wirelessly communicate to the LR8450-01.
Communication buffer memory	4 Mwords (volatile memory) If a communication error occurs, data can be retained. The retained data will be resent after the communications recover.
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing) (Charging temperature range: 5°C to 35°C)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Standards	Safety EN 61010 EMC EN 61326 Class A
Vibration resistance	JIS D 1601:1995 5.3 (1) Class 1: Passenger vehicles; conditions: Class A equivalent (4 h along X-axis and 2 h along Y- and Z-axes at a vibration acceleration of 45 m/s ² [4.6 G])
Power supply	• Z1008 AC Adapter (12 V DC) Rated supply voltage: 100 V to 240 V AC (assuming ±10% voltage fluctuation of the rated supply voltage) Rated power-supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 25 VA (including AC Adapter) Normal power consumption: 3 VA (instrument only, with the battery removed) • Z1007 Battery Pack (When used with AC Adapter, AC Adapter has priority.) Maximum rated power: 2 VA • External power supply Rated supply voltage: 10 V to 30 V DC Maximum rated power: 8 VA (external power supply 30 V DC, while charging battery) Normal power consumption: 3 VA (external power supply 12 V DC, with the battery removed)
Continuous operating time	When using the Z1007 Battery Pack Approx. 9 h (all data refresh intervals, communications in good condition, reference value at 23°C)
Charging functionality	Charging is available when the Z1007 Battery Pack is attached and either the AC Adapter or an external power supply (10 V to 30 V DC) is connected. Charging time: Approx. 7 h (reference value at 23°C)
Dimensions	Approx. 154W × 106H × 57D mm (6.06"W × 4.17"H × 2.24"D) (including cover)
Weight	Approx. 384 g (13.5 oz., including Z3230/Z3231 Wireless LAN Adapter)
Product warranty duration	3 years
Accessories	Z3231 Wireless LAN Adapter Instruction Manual Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Mounting plate M3×4 screws ×2 (for the mounting plate) Mounting screws ×2
Options	Z3231 Wireless LAN Adapter Z1008 AC Adapter (3-prong grounded-type [2-pole] power cord) Z1007 Battery Pack (Li-ion) C1012 Carrying Case

Other Options

Wire resistance cancellation	Subtracts the set wire resistance value. Setting range: 0.0 Ω to 100.0 Ω
-------------------------------------	---

-2. Accuracy specifications

Accuracy guarantee conditions	Accuracy guarantee duration	1 year
	Accuracy guarantee temperature and humidity range	23°C $\pm$ 5°C (73°F $\pm$ 9°F), 80% RH or less
	Specified under the following conditions: Notch frequency set to 50 Hz/60 Hz (see the table under "Digital filters"), zero-adjustment performed, using an AWG26 cable with a wiring length of 6 m or less.	

Measurement range, measurement resolution, measurable range, measurement accuracy figures, and Maximum open voltage

Measurement range	Measurement resolution	Measurable range	Measurement accuracy	Maximum open voltage
2000 Ω f.s.	0.1 Ω	0 Ω to 2000 Ω	$\pm$ 2 Ω	+4.0 V
20 k Ω f.s.	1 Ω	0 Ω to 20 k Ω	$\pm$ 20 Ω	
200 k Ω f.s.	10 Ω	0 Ω to 200 k Ω	$\pm$ 200 Ω	

Temperature characteristics	Add (measurement accuracy $\times$ 0.1) per degree to the measurement accuracy figure.
------------------------------------	--

Normal-mode rejection ratio	50 dB or greater (With 50 Hz input, power supply frequency filter of 50 Hz, and a data refresh interval of 5 s) (With 60 Hz input, power supply frequency filter of 60 Hz, and a data refresh interval of 5 s)
------------------------------------	--

Common-mode rejection ratio	100 dB or greater (With 50 Hz/60 Hz input, with a signal source resistance of 100 Ω or less and a data update interval of 50 ms).
------------------------------------	---

Effect of radiated radio-frequency electromagnetic field	$\pm$ 5% f.s. (80 MHz to 1 GHz: 10 V/m; 1 GHz to 6 GHz: 3 V/m, with the 2000 Ω f.s. resistance range)
---	---

Effect of conducted radio-frequency electromagnetic field	$\pm$ 10% f.s. (When measuring 2000 Ω with the 2000 Ω f.s. resistance range.)
--	--

3. Functionality specifications

LED indication	Wireless connection, measurement status, error status, AC Adapter- / external power supply-powered operation, battery-powered operation, battery-charging status
Operation keys	Auto, reset
Auto-connect function	Yes

Specifications of Other Options

Z3230 Wireless LAN Adapter, Z3231 Wireless LAN Adapter

Product warranty duration	3 years
Applicable modules	LR8530 Wireless Voltage/Temp Unit LR8531 Wireless Universal Unit LR8532 Wireless Voltage/Temp Unit LR8533 Wireless High Speed Voltage Unit LR8534 Wireless Strain Unit LR8535 Wireless CAN Unit LR8536 Wireless Current Module LR8537 Wireless Thermistor Module
Wireless specifications	Wireless LAN (IEEE802.11b/g/n) Communication distance: 30 m (line-of-sight) Encryption functionality: WPA-PSK/WPA2-PSK, TKIP/AES Available channels: between 1 and 11
Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	–20°C to 55°C (–4°F to 131°F), 80% RH or less (non-condensing)
Storage temperature and humidity range	–20°C to 60°C (–4°F to 140°F), 80% RH or less (non-condensing)
Dimensions	Approx. 34W × 38H × 15D mm (1.34"W × 1.5"H × 0.59"D) (including connector)
Weight	Approx. 13 g (0.5 oz.)
Standards	Safety EN 61010 EMC EN 61326 Class A
Accessories	Instruction Manual

Z5040 Fixed Stand

Product warranty duration	3 years
Applicable logger	LR8450/LR8450-01 Memory HiLogger
Dimensions	Approx. 312W × 145H × 45D mm (12.28"W × 5.71"H × 1.77"D)
Weight	Approx. 560 g (19.8 oz.)
Accessories	Instruction Manual Binding head screws (M3×5) ×2

Z2000 Humidity Sensor

Product warranty duration	1 year
Accuracy guarantee duration	1 year
Accuracy guarantee range	5.0% RH to 95.0% RH
Measurement accuracy	As per the following humidity accuracy table. (Including the measurement accuracy of applicable models)

Relative humidity (% RH)

Temperature (°C)

Legend: : Out of accuracy guarantee range
Each boundary line is included in the better measurement accuracy area.

Operating temperature and humidity range	0°C to 50°C (32°F to 122°F), 100% RH or less (non-condensing)
Storage temperature and humidity range	-20°C to 70°C (-4°F to 158°F), 90% RH or less (non-condensing)
Cord	Approx. 3 m
Dimensions	Approx. 44.0W × 19.5H × 10.1D mm (1.73"W × 0.77"H × 0.40"D) (including connector)
Weight	Approx. 55.0 g (1.9 oz, including 3 m-long cord)