MEMORY HiLOGGER
LR8400-20, LR8401-20, LR8402-20

Portable Data Logger with 30 Standard Channels
Expandible to 60 Channels

Only the size of an A4 sheet of paper, the HIOKI LR8400-20 Series is the realization of our goal to build a logger that provides the existing functionality of a multi-channel data logger in a portable format. The new model comes with 30 channel capability as standard, to which another 30 channels can be added. All input channels for measuring temperature (with thermocouples), or voltage are isolated for safety, culminating in a powerful multi-measurement system that also offers pulse and logic inputs. Long-term logging is coupled with the capability to protect data against unexpected power outages and other problems for stable recordings over an entire year (see note).

Note: Continuous recordings lasting longer than 1 year are also possible.
In fuel cell, electric automobile and other development

- Environmental measurements to prevent global warming
- Development of fuel cell materials, energy field
- Development of automobiles, testing of automobile parts
- Maintenance and inspection of equipment
- Monitoring plants
- Testing of electrical products
- Impedance testing of electronic parts

**Multi-channel measurements**

In the development of fuel cells, multiple power-generating cells are connected to form a stack. Independent measurements of each cell require multi-channel measurements of DC voltage, DC current, temperature and other parameters. The LR8400-20 Series comes with 30 channels as standard, which can be expanded to 60 channels.

**High withstand voltage**

The HiLOGGER measures not only fuel cells, but also batteries for UPS (uninterruptible power supplies) devices used in buildings as well as batteries consisting of cells and packaging connected in stacks that require multi-point measurements. In such measurements, high voltage for the whole stack is applied between channel-to-channel and channel-to-ground. Only a measuring instrument with isolated inputs and high-capacity withstand voltage characteristics can endure this.

Note: Isolation between channels is possible through the use of semi-conductor relays. Voltage exceeding the product specifications, such as that originating from lightning surges or other sources, should never be applied between each channel; otherwise the relays will short and the recorder will be damaged.

**High-speed sampling**

In the development of automobiles such as electric vehicles (EV) and plug-in hybrid vehicles (PHV) that use motors for propulsion, abrupt changes in load need to be measured. This makes the multi-channel, high-speed 10 ms sampling capability of the LR8400-20 Series an indispensable feature.
**Measure and record:**
- Temperature & humidity
- A variety of transducer outputs (DC voltage)
- Resistance values

**Also comes with high withstand voltage; isolated inputs required when measuring and recording battery cell voltages**

### Voltage measurement (DC only)
- 30 input channels
  
  Note: The LR84040-20, LR8401-20 and LR8401-20 models differ in the combination of input functions and terminals.

- All input channels are isolated
  
  Note: Maximum rated voltage above ground between the HILOGGER and analog inputs is 300 V AC/DC.

### Temperature & humidity measurement
- Temperature measurements of thermocouples on 30 channels
- M3 screw terminal inputs enable secure connection of even thin thermocouples
- Special sensor permits humidity measurements on 30 channels (optional Z2000)

Note: The sensor power supply is the M3 mm dia. screw terminal block on the left side.

Note: Both universal input terminals and M3 mm dia. input terminals enable humidity measurements.

### Temperature & resistance measurement
- Universal inputs support temperature measurements using Platinum resistance temperature sensor (Pt100/ JPt100), or resistance measurements (four wires)
  
  Note: These cannot be measured using the M3 screw input terminals.

Note: Supports resistance recording to enable assessment of changes in resistance in the device under test. 4-terminal method, measurement resolution 0.5 mΩ, testing current 1 mA.

### Pulse totalization measurement
- 8 channel inputs (pulse and digital input selectable for each channel)
- For measuring energy consumption and cumulative flow
  
  Note: The input signal shares common ground with the HILOGGER

### Pulse rotations measurement
- 8 channel inputs (pulse and digital input selectable for each channel)
- For measuring rotational irregularities of motors and drills
  
  Note: The input signal shares common ground with the HILOGGER

### Logical 1-0 measurement
- 8 channel inputs (digital and pulse input selectable for each channel)
- 1 or 0 is recorded for each recording interval
  
  Note: The input signal shares common ground with the HILOGGER

### Highlights
- **Multi-measurements**
  
  - Temperature & resistance measurement
    
    - Universal inputs support temperature measurements using Platinum resistance temperature sensor (Pt100/ JPt100), or resistance measurements (four wires)
    
    Note: These cannot be measured using the M3 screw input terminals.
    
    Note: Supports resistance recording to enable assessment of changes in resistance in the device under test. 4-terminal method, measurement resolution 0.5 mΩ, testing current 1 mA.

- **A compact A4 size enhances mobility**
  
  A compact A4 size footprint makes it ideal for use in virtually any environment.

- **Helps also in collecting automotive data**
  
  Ideal for testing and collecting data on the vibration characteristics of automotive parts.
Accurately capture any phenomena you want to measure

- **10 ms high-speed sampling**
  
  The development of hybrid and electric automobiles requires instruments that can measure abrupt load changes. Channels 1 to 15 provide 10-ms sampling and channels 16 to 30 provide 20-ms sampling. This channels allow you to track waveforms not possible with earlier models.

  Note: Measurements on channels 31 to 60 provide 50-ms sampling.

- **Enhanced noise suppression**
  
  A digital oversampling filter function reduces inverter switching noise and 50/60 Hz hum noise, a concern in earlier models, during recording.

  Note: The noise reduction effect improves with longer recording intervals (i.e., at slower sampling speeds).

- **5.7 inch TFT LCD display is easy to view even at an angle**
  
  The LCD has a wider visual angle and is larger (5.7 inches, 640 × 480 dots) than the STN LCD in our previous model (8420-51s) to facilitate observation of waveforms on multiple channels.

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Without electric noise reduction, you will obtain a waveform like the one above in temperature measurements of an electromagnetic cooker.

A digital filter in the HILOGGER eliminates high-frequency noise to enable accurate temperature waveforms.
Compatible with USB memory devices
For even greater convenience, the HiLOGGER now provides support for USB memory devices. Measurements can now immediately be written to a USB memory device in real-time. USB memory devices are also a handy means to transfer data to a PC.

Note: Although USB memory devices enable real-time saving of data, for more reliable data protection we recommend use of HIOKI CF cards, which are guaranteed to work with the instrument, for real-time saving of data.

Saving data to CompactFlash (CF) card
Use only HIOKI CF cards, which are manufactured to strict industrial standards, for long-term storage of important data.

Note: Operation of non-HIOKI CF cards is not guaranteed

Recording Capacity

<table>
<thead>
<tr>
<th>Recording intervals</th>
<th>Recording of 15 analog channels only (no pulse measurement, alarm output or waveform processing data)</th>
<th>Recording of 30 analog channels only (no pulse measurement, alarm output or waveform processing data)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internal memory (16 MB)</td>
<td>Internal memory (16 MB)</td>
</tr>
<tr>
<td>10 ms *</td>
<td>Model 9728 (512 MB)</td>
<td>Model 9729 (1 GB)</td>
</tr>
<tr>
<td></td>
<td>1h 33m</td>
<td>2d 06h 42m</td>
</tr>
<tr>
<td>* For 15 or fewer analog channels</td>
<td>4d 03h 25m</td>
<td>8d 06h 50m</td>
</tr>
<tr>
<td>20 ms *</td>
<td>5h 33m</td>
<td>2d 06h 42m</td>
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<tr>
<td></td>
<td>Model 9728 (512 MB)</td>
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<tr>
<td></td>
<td>1h 33m</td>
<td>2d 06h 42m</td>
</tr>
<tr>
<td></td>
<td>1d 13h 24m</td>
<td>10d 08h 33m</td>
</tr>
<tr>
<td>50 ms</td>
<td>7h 46m</td>
<td>10d 17h 06m</td>
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<td>Model 9728 (512 MB)</td>
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<tr>
<td></td>
<td>1h 33m</td>
<td>2d 06h 42m</td>
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<tr>
<td></td>
<td>1d 13h 24m</td>
<td>10d 17h 06m</td>
</tr>
<tr>
<td>200 ms</td>
<td>15h 12m</td>
<td>4h 08h 33m</td>
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<td></td>
<td>1h 33m</td>
<td>2d 06h 42m</td>
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<td></td>
<td>1d 13h 24m</td>
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<tr>
<td>500 ms</td>
<td>31h 50m</td>
<td>8h 08h 33m</td>
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<tr>
<td></td>
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<td>2d 06h 42m</td>
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<td></td>
<td>1d 13h 24m</td>
<td>10d 17h 06m</td>
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<tr>
<td>1s</td>
<td>3d 05h 40m</td>
<td>20d 03h 01m</td>
</tr>
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<td>Model 9728 (512 MB)</td>
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<td>1h 33m</td>
<td>2d 06h 42m</td>
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<tr>
<td></td>
<td>1d 13h 24m</td>
<td>10d 17h 06m</td>
</tr>
<tr>
<td>2s</td>
<td>6d 11h 20m</td>
<td>4d 06h 03m</td>
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<tr>
<td>5s</td>
<td>16d 04h 21m</td>
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<td>2d 06h 42m</td>
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<td>10s</td>
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<td>1h 33m</td>
<td>2d 06h 42m</td>
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<td></td>
<td>1h 33m</td>
<td>2d 06h 42m</td>
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<td></td>
<td>1d 13h 24m</td>
<td>10d 17h 06m</td>
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<td>30s</td>
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<td></td>
<td>1d 13h 24m</td>
<td>10d 17h 06m</td>
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<td>1min</td>
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<td>2min</td>
<td>388d 08h 40m</td>
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<td>1d 13h 24m</td>
<td>10d 17h 06m</td>
</tr>
</tbody>
</table>

* Maximum recording time is inversely proportional to number of recording channels.
* Because the actual capacity of a CF card is less than that indicated, and because the header portion of waveform files is not included in capacity calculations, expect actual maximum times to be about 90% of those in the table.
* * exceeds 1 year.

Cards can be replaced during real-time recording
This function has been provided to enable removal of cards during recording to allow the user to analyze the data recorded so far. This makes it possible to replace USB memory devices and CF cards during real-time recording without having to stop measurements.

Note: During high-speed recording, be sure to insert the new storage media within 2 minutes of removing a card.
Up to two additional 15 channel input units can be added
The need for more measurement channels can be met even after purchasing the instrument. The instrument comes with 30 channels as standard, but another two 15 channel input units can be added to expand the total number of channels to 60.

Note: The units provided with the unit as standard cannot be removed.

Input setting screens with waveform monitoring
The HiLOGGER adopts the setting screens that earned its sister model (8430-20) a reputation for user-friendliness. Range settings, warnings, triggers, waveform processing and other measurement input settings can be taken in at a glance.
**Alarm output**
The HiLOGGER outputs a signal when alarm criteria are satisfied and also sounds a buzzer. Four systems are provided as standard and separate criteria can be set for each input source enabling OR and AND criteria between channels.

*Note: Open-collector output (5 V voltage output and relay drive capacity 5 to 30 V, 200 mA)*

**Trickle charging the internal battery**
An internal battery (optional accessory) is charged when the AC adapter is connected. Since the internal battery will automatically take over in the event of a sudden power outage, it permits uninterruptible operation.

**Protection of files being stored on external storage media**
An internal high-capacity capacitor will provide enough power to store any data at risk on a CF card or USB memory device should a sudden power outage occur during long-term storage. This reduces the risk of data loss and corruption of the file system. Measurements will resume as soon as the power returns.

**Real-time processing functions**
The HiLOGGER comes with [four arithmetic operation] functions for processing between channels. Data processed in real-time can be displayed in graph form. In addition, processing results for 30 channels are stored in internal memory and can be handled as data for independent input channels.

**Records average values every 30 minutes**
The HiLOGGER contains a [time-span processing] function. The instrument will save processing data as text data for a preset time period in real-time.

**Simultaneous recording to storage media and PC**
Measurement data can be simultaneously saved to external storage media and a hard disk on a PC connected to a network to reduce the risk data loss.

**USB and LAN connection for easy setup**
The supplied Logger Utility software allows you to set up the logger from a PC. Setup could not be easier. Just follow the numbered procedures to set up the instrument.

*Note: Data on an inserted CF card can be copied to a PC via USB connection.
Note: The Logger Utility will enable LAN access with software Ver. 1.20 or later.*
Bundled user-friendly software for PC analysis

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

Control of measurements from a PC screen
Connect the PC to the HiLOGGER using USB or via LAN* (see note). Use the supplied Logger Utility software to record data on a PC in real-time. Scroll backwards through the displayed trend graph window to view past waveforms even while recording. Up to five HiLOGGERs can be connected to one PC.

Analyze after measuring
Our new “dual-knob function” greatly simplifies data analysis. Two separate waveform windows are provided, with the displayed waveforms showing different time-axis scales (time bases). This capability substantially simplifies long-term data analysis.

Remote control through HTTP server function*
Without the need to install additional software, you can use an ordinary web browser on your PC to set up the HiLOGGER, acquire data and monitor data on the screen. Note: Waveform data cannot be downloaded from internal memory while measuring.

Data acquisition via FTP*
FTP allows the PC to acquire files stored on HiLOGGER storage devices or measurement data in internal memory. Note: Waveform data cannot be downloaded from internal memory while measuring.

Data transfer via FTP*
Data saved in real-time to storage media can be automatically transferred to an FTP server started from the PC either at regular intervals during measurements or when measurements end.

*Note: LAN communication functions support planned from software Ver. 1.20.

Be informed via E-mail*
Your PC or mobile device is notified of storage media full, internal memory full, stop trigger invoked, alarm occurrence and other events via E-mail.
### General specifications (product and accuracy guaranteed for one year)

**Internal memory:** 16 Mega-bytes (8M data points)

**Internal clock:** Auto calendar, Precision ±3 s/day (at 23 °C/73 °F)

**Accuracy of timebase:** ±0.26 s/day on measurement (at 23 °C/73 °F)

**Backup battery:** For clock and setting conditions: battery life 5 years (at 23 °C/73 °F)

**Operating temp. & humidity:** -30 °C (14°F) to 60 °C (140°F), 80 % rh or less (non-condensing, when charging: 10 °C (50°F) to 40 °C (104°F))

**Storage temp. & humidity:** -20 °C (4 °F) to 70 °C (158 °F), 80 % rh or less (non-condensing)

**Conformance standards:** Safety: EN61010, EN61326, EN61300-2-2, IEC61000-3-3

**Anti-vibration:** JIS D1001: 1995 (5.3) Corresponds to Class 1: a passenger car; class: condition: A

**External control terminal:** Trigger output, trigger output, 4-channel alarm outputs, +12 V/100 mA max, output, GND

**Dimensions & Mass:** Approx. 272 mm (H) x 224 mm (W) x 70 mm (D), 2.0 kg (4.4 lb), 440 mm (17.3 in) x 175 mm (6.9 in) x 43 mm (1.7 in), 1.0 kg (2.2 lb)

**Accessories:** Detailed operating manual +1, Measurement guide +1, AC ADAPTER 9418-15 ×1, USB cable +1, CD-R (data collection software "HiLOGGER") +1

### Data storage media

**CF card:** CF card slot ×1 (Up to 2GB), Data format: FAT, FAT32

**USB memory:** Series A receptacle

### Communication function

**LAN interface (ver. 1.20 or later):** IEEE 802.3 Ethernet 100BASE-TX, DHCP, DNS capable

**USB communication interface:** USB 2.0 high-speed capable, series mini-B receptacle

**Digital input:** Data acquisition, condition settings used with the Logger Utility software (supplied as standard)

**Use the communication command to set and measure**

**Data downloading (via FTP server function used in the CF card or the USB memory)**

**Automatically transmit data via FTP client function**

**Remote control via HTTP server function**

**Send mail function via E-mail system**

**LCD Brightness:** 15 division, vertical 10 division, selectable between English and Japanese

### Power supplies

**AC Power:** Using the AC ADAPTER 9418-15 (supplied as standard, 100 to 240 VAC, 50/60 Hz), Power consumption: 7 VA with battery pack removed and maximum brightness

**DC Power:** Using the VOLT PACK Z1000 (optional accessory, AC adapter has priority when used with combination battery pack)

**Continuous operation time:** 5 hours (at 23 °C, LCD brightness 25 %)

**Fast charging time:** 3 hours (using the AC adapter and main unit to recharge the battery, at 23 °C, reference value)

**External:** 1010 x 28 VDC (Rechargeable voltage 12 to 24 VDC, Please contact your Hioki distributor for connection cord)

**Maximum rated power:** 24 VA at 16 VDC, external power supply, battery charge, LCD brightness 100 %

### Display section

**Display device:** 5.7 inch TFT color liquid crystal display (640 × 480 pixels), horizontal, 15 division, vertical 10 division, selectable between English and Japanese displays, Back light saver available

**Display section:** Selectable from 100, 30, 20, or 15 %

### Trigger functions

**Mode switches:** Simple / Report, Timing / Start / Stop, Start / Stop, Logic sum (OR) and product (AND) of each trigger source, Selectable for each channel

**Analog signal source:** Configure each individual channel for 30 channels or up to 60 channels (depending on number of additional terminal modules installed).

[Level trigger] Triggers when rising or falling through preset level

[Window] Triggers when entering or exiting range defined by preset upper and lower limit values

**Pulse signal source:** 8 channels of pulse totalizer inputs

[Level trigger] Triggers when rising or falling through preset level

[Window] Triggers when entering or exiting range defined by preset upper and lower limit values

**Digital signal source:** 8 channels of digital signal inputs

[Logic pattern trigger] agreement (or disagreement) in the specified 8 channels of digital signal inputs

**Timer trigger:** Set up for year / month / day / hour / minute / second

**Timer trigger output:** Open collector (active low, with 5 V output, at least 10 ms pulse width), M3 mm screw terminal

**Alarm output:** 200 mA at 5 V to 30 VDC

### Measurement Settings

#### Recording Intervals (sampling period)

- 10 ms*1, 20 ms*2, 50 ms*3, 100 ms to 1 h (19 selections)

*Note: All input channels are monitored at high-speed during every recording interval

**Recording time:** 100 ms to 1 day (25 selections)

**Graph time axis:** 100 ms to 1 day (25 selections)

**Repeating recording:** ON/OFF (Enable to repeat after specifying the recorded time span has elapsed)

### Data Saving

**Storage media:** CF card or USB memory (Use only USB Cards sold by Hioki)

**Storage operation:** Auto: Save waveform data or time divided calculation results in real-time

**Manual:** Push the save key (operation select: item choose/ directly save)

**Real-time saving:** Possible: waveform are saved approximately one minute as binary or text data to the CF card or USB memory (of sampling rate is 100 ms, waveform are saved at each interval)

**To the PC:** Waveforms are saved to the HiLOGGER using the PC via LAN or USB communication when used with the Logger Utility Software. Data can be saved in real-time to the CF card or USB memory at the same time.

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

**Delete & save:** Endless loop saving: New file overwrites the oldest file when the CF card or USB memory capacity runs short.

**Interruptions during saving:** Storage media may be removed during real-time save after message confirmation

**Data protect:** Possible: When a power failure occurs during real-time save, the file close sequence is completed before the unit is shut down. When powering with batteries and low battery power is detected, the file close sequence will automatically be executed.

**Saved data types:** Setting condition, waveform data (binary or text style), Calculation of numerical value, Screen data (compressed BMP)

### Calculation function

**Numerical value calculations:** No. 1 to 6, maximum 6 calculations can be conducted simultaneously

**Data range of calculation:** During measurement or after stopping: Store all data as data between A and B cursors into internal memory

**Calculation value save:** Possible: After measuring the last calculated value is automatically saved to the CF card or USB memory as a text file

**Calculation value save:** Time saved: Save calculated data at pre-determined 1 sec to 1 day intervals and display the latest value

**Wavelength calculations:** 4 arithmetic calculations between each channel

**Other functions**

**Event marking:** Search: Move to the event number entered and display the waveforms

**Number of events:** Maximum 100 per measurement

**A-B cursor:** Measurement: time difference between A and B, electric potential, electric potential of A or B and time

**Type:** Trace the data, amplitude axis, time axis

**Scaling:** Convert and display the measurement value of each channel as a scaled value

**Rate adjustment:** Scaling can be set for a channel so that its value is the same as for UNIT1-CH1

**Comment input:** Enter a title or comment for each channel

**alarm output:** A unstable backup, seven types setting conditions into main unit, auto set up, start/stop key lock, key-lock, beep sound

### Pulse, Digital input

**Number of channels:** 1 channels, (digital / pulse selectable for each channel, M3 screw terminal × 6, 2 terminals per channel, not isolated, common ground)

**Input condition:** No-voltage ‘a’ contact (normally open contact), open collector or voltage input, Input resistance: 1.1 MΩ

**Max. allowable input:** 5 V to 50 VDC (maximum voltage between input terminals that does not cause damage)

**Max. rated voltage between channel:** Not isolated (common ground)

**Max. rated voltage to earth:** Not isolated (common ground)

**Detect level:** 2 selectable levels (H over 10 V, L 0.8 ~ 0.15 V), (E over 40 V, L 0.15 ~ 0.8 V)

**Pulse input period:** With filter OFF: 200 μs or more (both H and L periods must be at least 100 μs)

**Pulse input period:** With filter ON: 100 μs or more (both H and L periods must be at least 50 μs)

**Slope:** Rising or falling edge can be set for each channel

**Pulse measurement mode:** Totalized pulses: Integrated (pulse count integration from start), Instantaneous (pulse count value at each sampling, and integrated value is calculated between measurement start and end)

**Rotation count:** Input count pulses during one second

**Filter:** For contact bound resistant (ON/OFF set for each channels)

### Measurement parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Ranges</th>
<th>Finest Resolution</th>
<th>Range of Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse totalization</td>
<td>1,000 M (pulse) x 9</td>
<td>1 (pulse)</td>
<td>0 to 1,000 M (pulse)</td>
</tr>
<tr>
<td>Pulse rotations</td>
<td>1,000 M (rotation) x 1</td>
<td>1 (rotation)</td>
<td>0 to 5,000,000 (rotation)</td>
</tr>
</tbody>
</table>

*Note: The number of output pulses per rotation, 1 to 1,000

**Digital input:** Record logical "1" or "0" at each sampling
### Analog Input Section

<table>
<thead>
<tr>
<th>Voltage Setting Ranges</th>
<th>Resolution</th>
<th>Measurement range</th>
<th>Accuracy</th>
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</thead>
<tbody>
<tr>
<td>10 mV f.s.</td>
<td>500 mV</td>
<td>-10 mV to 10 mV</td>
<td>±100 μV</td>
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<td>-20 mV to 20 mV</td>
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<td>100 mV f.s.</td>
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<td>-100 mV to 100 mV</td>
<td>±100 μV</td>
</tr>
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<td>10 μV</td>
<td>-200 mV to 200 mV</td>
<td>±200 μV</td>
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<td>1 V f.s.</td>
<td>50 μV</td>
<td>-1 V to 1 V</td>
<td>±1 mV</td>
</tr>
<tr>
<td>2 V f.s.</td>
<td>100 μV</td>
<td>-2 V to 2 V</td>
<td>±2 mV</td>
</tr>
<tr>
<td>10 V f.s.</td>
<td>500 μV</td>
<td>-10 V to 10 V</td>
<td>±10 mV</td>
</tr>
<tr>
<td>20 V f.s.</td>
<td>1 mV</td>
<td>-20 V to 20 V</td>
<td>±20 mV</td>
</tr>
<tr>
<td>100 V f.s.</td>
<td>5 mV</td>
<td>-100 V to 100 V</td>
<td>±100 mV</td>
</tr>
<tr>
<td>1 – 5 V f.s.</td>
<td>500 μV</td>
<td>1 V to 3 V</td>
<td>±10 mV</td>
</tr>
</tbody>
</table>

### Thermocouple Temperature (Including standard reference contact accuracy)

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Setting Ranges</th>
<th>Resolution</th>
<th>Measurement range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>100 °C f.s.</td>
<td>0.01 °C</td>
<td>-100 to less than 0 °C</td>
<td>±0.8 °C</td>
</tr>
<tr>
<td></td>
<td>0 to 100 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.8 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 500 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.8 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 1350 °C</td>
<td>0.01 °C</td>
<td>±0.8 °C</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>100 °C f.s.</td>
<td>0.01 °C</td>
<td>-100 to less than 0 °C</td>
<td>±0.6 °C</td>
</tr>
<tr>
<td></td>
<td>0 to 100 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 500 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 1200 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>100 °C f.s.</td>
<td>0.01 °C</td>
<td>-100 to less than 0 °C</td>
<td>±0.6 °C</td>
</tr>
<tr>
<td></td>
<td>0 to 100 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 500 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 1000 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>100 °C f.s.</td>
<td>0.01 °C</td>
<td>-100 to less than 0 °C</td>
<td>±0.6 °C</td>
</tr>
<tr>
<td></td>
<td>0 to 100 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 400 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 400 °C</td>
<td>0.01 °C</td>
<td>±0.6 °C</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>100 °C f.s.</td>
<td>0.01 °C</td>
<td>-100 to less than 0 °C</td>
<td>±1.2 °C</td>
</tr>
<tr>
<td></td>
<td>0 to 100 °C</td>
<td>0.01 °C</td>
<td>±1.2 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±1.2 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 500 °C</td>
<td>0.01 °C</td>
<td>±1.2 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100 to less than 0 °C</td>
<td>0.01 °C</td>
<td>±1.2 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to 1300 °C</td>
<td>0.01 °C</td>
<td>±1.2 °C</td>
<td></td>
</tr>
</tbody>
</table>

### Optional Product Specifications

**VOLTAGE/TEMP UNIT LR8500** (product and accuracy guaranteed for one year)

- **Number of input channels**: 15 channels (input type selectable from voltage, thermocouple, humidity, for each channel), M3 screw terminals (2 terminals per channel)
- **Note**: Isolated between each channel to chassis

**Measurement parameters**

- Voltage: Temperature with thermocouples (K, J, E, T, N, R, S, B, W)
- Note: Isolated between each channel to chassis and from each channel to chassis.
- Humidity: With the sensor Z2000
- Note: Not isolated between channels.

**Input conditions**

- Input resistance: 1 MΩ (at voltage/ thermocouple measurement)
- Max. rating: ±100 V DC (max. voltage between input terminals without damage)

**Max. rated voltage between isolated input channels**

- 300 V AC, DC (max. voltage from terminals to chassis ground)

**Measurement accuracy**

- Refer to MEMORY HILOGGER main unit specifications

**Dimensions & Mass**

- Approx. 128 mm (5.04 in) W × 52.8 mm (2.08 in) H × 64.3 mm (2.54 in) D, 380 g (13.4 oz)

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**UNIVERSAL UNIT LR8501** (product and accuracy guaranteed for one year)

- **Number of input channels**: 15 channels (input type selectable from voltage, thermocouple, Pt 100, JP 100, humidity, resistance, for each channel), Push-button type terminals (4 terminals per channel)
- **Note**: Isolated from each channel to chassis

**Measurement parameters**

- Voltage: Temperature with thermocouples (K, J, E, T, N, R, S, B, W)
- Note: Isolated between each channel to chassis

**Input conditions**

- Input resistance: 1 MΩ (at voltage/ thermocouple measurement, 2 MΩ at platinum resistance temperature sensor, or resistance measurement)
- Max. rating: ±100 V DC (max. voltage between input terminals without damage)

**Max. rated voltage between isolated input channels**

- 300 V DC (max. voltage between input channel terminals)

**Measurement accuracy**

- Refer to MEMORY HILOGGER main unit specifications

**Dimensions & Mass**

- Approx. 128 mm (5.04 in) W × 52.8 mm (2.08 in) H × 64.3 mm (2.54 in) D, 380 g (13.4 oz)
### Model Line-up

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
<th>Model LR8400-20 (with built-in VOLTAGE/TEMP UNIT x 2)</th>
</tr>
</thead>
</table>
| **Analog input** | Built-in 30 channels  
Note: Isolated from each channel to chassis  
[Unit-1, UNIT-2] M3 screw terminals x 30 channels (2 terminals per channel)  
Expansible by adding 30 more channels for a total of 60 input channels  
(optional input unit, Model LR8500 or LR8501, up to 2 units) | Caution: Built-in M3 screw terminal units cannot be removed or replaced |
| **Measurement parameters** | Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W)  
Note: Isolated between channels and from each channel to chassis  
Humidity with the sensor Z2000  
Note: Not isolated between channels nor from each channel to chassis | |
| **Input resistance** | 1 MΩ (in voltage/thermocouple measurement) | |
| **Max. allowable input** | ±100 V DC (max. voltage between input terminals without damage) | |
| **Max. voltage between isolated input channels** | 250 V DC (max. voltage between input terminals) | |
| **Max. voltage from isolated terminals to ground** | 500 V AC, DC (max. voltage from terminals to chassis ground without damage) | |

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
<th>Model LR8401-20 (with built-in UNIVERSAL UNIT x 2)</th>
</tr>
</thead>
</table>
| **Analog input** | Built-in 30 channels  
Note: Isolated from each channel to chassis  
[Unit-1, UNIT-2] Push-button type terminals x 30 channels (4 terminals per channel)  
Expansible by adding 30 more channels for a total of 60 input channels  
(optional input unit, Model LR8500 or LR8501, up to 2 units) | Caution: Built-in push-button terminal unit cannot be removed or replaced |
| **Measurement parameters** | Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W)  
Note: Isolated between channels and from each channel to chassis  
Humidity with the sensor Z2000  
Note: Not isolated between channels nor from each channel to chassis | |
| **Input resistance** | 1 MΩ (in voltage/thermocouple measurement)  
2 MΩ (in resistance temperature sensor, or resistance measurement) | |
| **Max. allowable input** | ±100 V DC (max. voltage between input terminals without damage) | |
| **Max. voltage between isolated input channels** | 300 V DC (max. voltage between input terminals) | |
| **Max. voltage from isolated terminals to ground** | 300 V AC, DC (max. voltage from terminals to chassis ground without damage) | |

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
<th>Model LR8402-20 (with built-in UNIVERSAL UNIT x 1, VOLTAGE/TEMP UNIT x 1)</th>
</tr>
</thead>
</table>
| **Analog input** | Built-in 30 channels  
Note: Isolated from each channel to chassis  
[Unit-1] Push-button type terminals x 15 channels (4 terminals per channel)  
[Unit-2] M3 screw terminals x 15 channels (2 terminals per channel)  
Expansible by adding 30 more channels for a total of 60 input channels  
(optional input unit, Model LR8500 or LR8501, up to 2 units) | Caution: Built-in push-button terminal unit and M3 screw terminal unit cannot be removed or replaced |
| **Measurement parameters** | Voltage, Temperature with thermocouples (K, J, E, T, N, R, S, B, W)  
Note: Isolated between channels and from each channel to chassis  
Humidity with the sensor Z2000  
Note: Not isolated between channels nor from each channel to chassis | |
| **Input resistance** | 1 MΩ (in voltage/thermocouple measurement)  
2 MΩ (in platinum resistance temperature sensor, or resistance measurement) | |
| **Max. allowable input** | ±100 V DC (max. voltage between input terminals without damage) | |
| **Max. voltage between isolated input channels** | 250 V DC at M3 screw terminals, 300 V DC at push-button type terminals (max. voltage between input terminals) | |
| **Max. voltage from isolated terminals to ground** | 300 V AC, DC (max. voltage from terminals to chassis ground without damage) | |

### Bundled software specifications

**Logger Utility** (bundled application software)

- **Operating environment**
  - OS: Windows 8 (32/64 bit), 7 (32/64 bit), Vista, XP (SP2 or later)  
  - This software is compatible only to the Wireless Logging Station LR8410-20, Memory HiLogger LR8400-20series, LR8431-20, 8423, and 8430-20  
- **Real-time data acquisition**
  - Measurements on multiple loggers connected by LAN or USB can be controlled to sequentially acquire, display and save waveform data (for recording up to 10 million samples)  
  - Number of controllable instruments: up to 5 units  
  - This software is compatible only with the LR8410-20, LR8400-20series, LR8431-20, 8423, and 8430-20  
- **Display**
  - Waveforms (time-axis divided display possible), numerical values (logging), and alarm status can be displayed at the same time  
  - Numerical value display: Can be monitored in a separate window  
  - Scroll: Waveform scroll while measuring  
  - Saving destination: Real-time data transfer to Excel, or Real-time data acquisition file (LWU format)  
- **Event marks**
  - Can be set while measuring

- **Data acquisition settings**
  - Data acquisition settings for the logger or logging station  
  - Saving: The setting for multiple loggers or logging stations can be saved together in one file (LUS format); Instrument configuration settings can be sent and received

- **Waveform display**
  - Processed data file: Real-time data acquisition file (LWU format), record to internal memory data (MEM format)  
  - Display format: Simultaneously display waveform and numerical value, (time-axis divided display possible)  
  - Maximum number of channels: 675 channels (measurement data) + 60 channels (waveform processing data)  
  - Others: Display each channel’s waveform on 10 sheets, scroll, record event mark, cursor, screen hard copy, numerical value display

- **Data conversion**
  - Target data: Real-time data acquisition file (LWU format), record to internal memory data (MEM format)  
  - Converted sections: All data, designation section  
  - Format: CSV format (separate by comma, space, tab), transfer to Excel spreadsheet, arbitrary data thinning

- **Wavesform processing**
  - Processing items: Four arithmetic operations  
  - Number of processing channels: 60 channels

- **Parameter calculations**
  - Target data: Real-time data acquisition file (LWU format), record to internal memory data (MEM format)  
  - Calculation items: Average, peak, maximum values, time to maximum values, minimum values, time to minimum values, ON time, OFF time, count the number of ON time and OFF time, standard deviation, integration, area values, totalization

- **Search functions**
  - Target data: Real-time data acquisition file (LWU format), record to internal memory data (MEM format)  
  - Search mode: Event mark, time and date, maximum position, minimum position, maximum pole, minimum pole, alarm position, level, window, amount of change

- **Print functions**
  - Supported printer: Printer compatible with the OS  
  - Target data: Real-time data acquisition file (LWU format), record to internal memory data (MEM format)  
  - Print format: Waveform image, report format, list print (channel settings, event, cursor value)  
  - Print area: The entire area, area between cursors A and B  
  - Print preview: Supported
Main units and Options in Detail

**LR8400-20** (with built-in VOLTAGE/TEMP UNIT × 2)
- Built-in units are equivalent to the VOLTAGE/TEMP UNIT LR8500 (15 ch) × 2
- **Caution:** Built-in units cannot be removed or changed

**LR8401-20** (with built-in UNIVERSAL UNIT × 2)
- Built-in units are equivalent to the UNIVERSAL UNIT LR8501 (15 ch) × 2
- **Caution:** Built-in units cannot be removed or changed

**LR8402-20** (with built-in UNIVERSAL UNIT × 1, VOLTAGE/TEMP UNIT × 1)
- Built-in units are equivalent to the UNIVERSAL UNIT LR8501 (15 ch) × 1, and the VOLTAGE/TEMP UNIT LR8500 (15 ch) × 1
- **Caution:** Built-in units cannot be removed or changed

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**Measurement and Input Options**

- **VOLTAGE/TEMP UNIT LR8500**
  - 15 simultaneous voltage measurements
  - Temperature measurement with a thermocouple
  - Humidity measurement

- **UNIVERSAL UNIT LR8501**
  - 15 simultaneous voltage measurements
  - Temperature measurement with a thermocouple
  - Platinum resistance temperature sensor
  - Humidity or resistance measurement

- **HUMIDITY SENSOR Z2000**
  - Measurement range: 0% to 100%
  - Measuring range: 0°C to 50°C
  - Measuring range: 1% to 99% RH
  - Measuring accuracy: ±2°C or ±5% (RH)
  - Measuring accuracy: ±2°C or ±5% (RH)
  - Measuring accuracy: ±2°C or ±5% (RH)

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**Removable storage (CF card)**

- Supplied with PC Card adapter
  - PC CARD 2G 9630 (2 GB capacity)
  - PC CARD 1G 9729 (1 GB capacity)
  - PC CARD 512M 9728 (512 MB capacity)

**Power Supplies**

- **BATTERY PACK Z1000**
  - Ni-MH battery pack
  - Charges while installed in the HiLOGGER

- **AC ADAPTER 9418-15**
  - 100 to 240 V AC
  - Charges while installed in the HiLOGGER

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**Cases**

- **CARRYING CASE C1000**
  - Includes compartment for options

- **FIXED STAND Z5000**
  - For wall hanging or slanted bench mounting

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**PC Communication**

- **LAN CABLE 9642**
  - Straight Ethernet cable, supplied with straight to cross conversion adapter
  - 5 m (16.4 ft) length

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