MEMORY HiLOGGER Model 8423 is a data acquisition system capable of measuring and recording multiple channels at high speed. Acquired data can be easily analyzed on a personal computer. This model is ideal for acquiring data for evaluation and testing at development sites. If your evaluation needs require faster data sampling than was available with former HIOKI MEMORY HiLOGGERs, or if you just need more measurement channels, this model has the capabilities you want.
Who needs 10 ms high-speed sampling?

- Answer -

To acquire data when converting automobile electronics for electric or hybrid vehicles

- Fastest measurement interval (sampling interval) is 10 ms
- Acquires up to 600 channels of data with 10 ms sampling interval
- Insulation withstand voltage between the measurement channels in each module is 200 V (Model 8948)

In the development of electric and hybrid automobiles, the need to capture sudden swings in various loads requires a measurement instrument with multi-channel high-speed sampling capability. For this purpose, HIOKI has developed a very economical logger that can measure with 10-ms sampling interval on all channels. Also included is a dual-sampling function that can measure at two different sampling rates simultaneously. This new model can follow waveforms that former 100-ms-sampling instruments could not.

Sudden-load-change testing of a fuel cell employs dual sampling to measure with 10-ms (upper trace) and 100-ms sampling (lower trace). (Timebase: 50 ms/div).

A 5 Hz pulse waveform is measured using dual sampling: 10-ms (upper trace) and 100-ms sampling (lower trace). (Timebase: 50 ms/div).
Who needs 120 or 600 channels?

- Answer -

To acquire multi-point temperature distribution data
To measure the voltage of each cell in a stack

- Expandable up to 120 channels with a single instrument
- Up to five instruments can be connected for measuring up to 600 channels
- Isolated to sustain up to 600 V between modules and earth

Temperature distribution is measured to evaluate air conditioning systems during development. A system to acquire data on up to 600 channels can be constructed with merely a LAN or USB connection, providing highly detailed temperature distribution measurements.

With all channels isolated and a 600V AC/DC maximum rated voltage to earth, even when the common mode voltage increases as is common with layered batteries, the voltage of each individual battery cell can be safely measured.

To evaluate heat radiation characteristics and copy machine operation, temperatures at many points inside the chassis and analog voltages from the control board are simultaneously measured.
“Simplicity” as a Design Concept

Installation

Because the terminal blocks are designed to be removable, thermocouples can be connected to the terminal block in hand before connecting the block to a HiLOGGER input module, with just one touch.

Easily add input modules: just align and mate the connectors on the left side of the instrument assembly, and turn the metal clasp. For added strength, attach the supplied mounting bracket on the rear, or attach a standard DIN rail to the rear for tray or rack mounting.

Measurement configuration settings

Logger configuration settings are made from a computer running the supplied application program. Settings can be easily made using familiar PC operations. To keep the process simple, the user is guided sequentially through the setting items.
Data is recorded on the computer in real time using the supplied Logger Utility PC application program. View a trend graph in a window and scroll back to view earlier waveform data, even while recording.

**Post-measurement analysis (New Double-Thumb function*)**

The newly developed Double-Thumb function simplifies analysis. Two windows are displayed side by side, each with a scroll bar at the bottom containing a thumb (scroll box) that corresponds to the length and position of that window's displayed segment within the overall waveform. The thumbs in the scroll bars of the waveform display windows show you the position of the segments at a glance, greatly simplifying scrolling operations.

* Patent pending
More Functional Details

**Universal isolated inputs for temperature, voltage and pulsess**

With the modular input design, you can select the input modules appropriate for your measurement application. Select from voltage and temperature (thermocouple or Pt input) and humidity.*1 *2 Also, Digital Pulse Module 8996 provides 15 input channels for totalization/rotation counts and Hi/Lo logic measurements. In addition to interchannel input isolation, the PC connection interface is completely isolated from the measurement terminals, minimizing shock hazards and interference even when measuring thermocouple and voltage inputs at the same time.

**Real-time saving to CF Card**

Each measurement can be saved to a CF Card in real time. Continuous long-term recording can be performed with high capacity CF Cards up to 1 GB. Data can be viewed on a PC using the supplied Logger Utility program.

**Enhanced data protection from power failures**

This exclusive technology has been developed to preserve data as reliably as possible in the event of a power failure, by incorporating memory card technology with the know-how built into the MEMORY HILOGGER 8420-50, 8421-50 and 8422-50 series. The 8423 emphasizes the existing HILOGGER functions and maintains internal supply voltage with a large internal capacitor until all data has been saved to the card, resulting in greater reliability when acquiring large amounts of data.

A CF Card slot is included as a standard feature, supporting HIOKI CF Cards up to 1 GB (operation with non-HIOKI-brand cards is not guaranteed). Using a CF Card, instrument settings can be easily copied from one 8423 to another.

**Recording Times with a 128 MB Card**

**Voltage, Temperature and Humidity Measurements, but no Pulse Channels**

<table>
<thead>
<tr>
<th>Recording intervals</th>
<th>128MB (using 1 channel)</th>
<th>128MB (using 15 channels)</th>
<th>128MB (using 30 channels)</th>
<th>128MB (using 60 channels)</th>
<th>128MB (using 120 channels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10ms</td>
<td>7.14 h 24 min</td>
<td>6.12 h 24 min</td>
<td>5.10 h 24 min</td>
<td>4.08 h 24 min</td>
<td>3.06 h 24 min</td>
</tr>
<tr>
<td>20ms</td>
<td>14.28 h 48 min</td>
<td>12.24 h 48 min</td>
<td>11.20 h 48 min</td>
<td>10.16 h 48 min</td>
<td>9.12 h 48 min</td>
</tr>
<tr>
<td>50ms</td>
<td>35.70 h 120 min</td>
<td>30.56 h 120 min</td>
<td>25.42 h 120 min</td>
<td>20.38 h 120 min</td>
<td>15.34 h 120 min</td>
</tr>
<tr>
<td>100ms</td>
<td>71.40 h 240 min</td>
<td>60.28 h 240 min</td>
<td>50.06 h 240 min</td>
<td>40.94 h 240 min</td>
<td>30.82 h 240 min</td>
</tr>
<tr>
<td>200ms</td>
<td>142.80 h 480 min</td>
<td>120.56 h 480 min</td>
<td>100.12 h 480 min</td>
<td>80.90 h 480 min</td>
<td>60.68 h 480 min</td>
</tr>
<tr>
<td>500ms</td>
<td>357.00 h 1200 min</td>
<td>305.60 h 1200 min</td>
<td>254.20 h 1200 min</td>
<td>203.80 h 1200 min</td>
<td>153.40 h 1200 min</td>
</tr>
<tr>
<td>1s</td>
<td>1.07 h 246 min</td>
<td>0.93 h 246 min</td>
<td>0.79 h 246 min</td>
<td>0.65 h 246 min</td>
<td>0.51 h 246 min</td>
</tr>
<tr>
<td>10s</td>
<td>10.70 h 2460 min</td>
<td>9.30 h 2460 min</td>
<td>7.90 h 2460 min</td>
<td>6.50 h 2460 min</td>
<td>5.10 h 2460 min</td>
</tr>
<tr>
<td>10min</td>
<td>107.00 h 24600 min</td>
<td>93.00 h 24600 min</td>
<td>79.00 h 24600 min</td>
<td>65.00 h 24600 min</td>
<td>51.00 h 24600 min</td>
</tr>
<tr>
<td>1hour</td>
<td>1070.00 h 246000 min</td>
<td>930.00 h 246000 min</td>
<td>790.00 h 246000 min</td>
<td>650.00 h 246000 min</td>
<td>510.00 h 246000 min</td>
</tr>
</tbody>
</table>

**Voltage**

- 100 mV f.s.
- 1 V f.s.
- 10 V f.s.
- 20 V f.s.
- 100 V f.s.

**Thermocouples**

- 100 °C f.s.
- 500 °C f.s.
- 2000 °C f.s.

**Humidity**

- 5% to 95% rh

**Pulse**

- 1-5 V f.s.
- 20 V f.s.
- 10 V f.s.
- 1 V f.s.
- 100 mV f.s.

**Trigger function**

Level, Window and Logic trigger functions are provided. You can have one criterion start recording and another stop recording.

Note: Actual CF data capacity is less than total CF storage capacity, and waveform file headers are not included in these calculated values, so we recommend using 90% of these values for estimation purposes.

Note: Periods longer than 365 days are abbreviated.
**Dual Sampling**

Two different measurement intervals can be specified at the same time (one interval setting per input module). Using dual sampling, the appropriate measurement interval can be set for each type of object to be measured, optimizing use of internal memory and CF Card capacity.

**USB Port Included**

A USB 2.0 (mini-B connector) port is included as standard. The 8423 instrument and a PC can be connected by a USB cable (A to mini-B) for transferring 8423 operating settings and data.

**LAN Terminal Included**

A 100Base-TX LAN terminal is included as standard. The 8423 instrument and a PC can be connected by a LAN cable for transferring 8423 operating settings and data.

**External Control Inputs Included**

Input terminals are provided for external triggering, external start and stop and external sampling. External signals can be applied as a trigger source and to start and stop measurements, so data can be acquired by controlled sampling timing.

*Note: External triggering and external sampling share a common terminal, so only one of these control input types can be used at a time.*
More Functional Details

All-Channel Synchronous Measurement Capability

When measuring up to 120 channels on combined modules, all input channels are sampled synchronously. When multiple 8423s are connected via LAN or USB for measuring up to 600 channels, the sampling of each instrument in the system can be synchronized using optional Connection Cable Model 9683. As well as PC-based data collection, measurement start and stop can be controlled by the [START/MARK] and [STOP] keys on a master 8423.

Note: Any 8423 may be designated as the master. Only the initial acquisition criteria setting needs to be performed on a PC via USB or LAN.

Enhanced Noise Immunity

A delta-sigma type A/D converter has been incorporated in the measurement circuitry. The effects of previously problematic inverter switching noise and 50/60 Hz hum noise have been greatly reduced by the digital filtering function using the oversampling principle inherent in this type of device.

Note: Optimum noise suppression is obtained with recording intervals of two seconds or longer.
PC control
Data acquisition and measurement criteria settings are controlled by the PC data acquisition program; data acquired to internal memory and CF Cards is
Interface
Start backup
Alarm Module
signal
Trigger type
Event mark input : Press [Start / Stop] key at measurement
Function : Connect via the connection cable model 9683 for synchronous sampling
Clock
Auto calendar, leap year auto distinguish, Precision : ±0.2s/ day at power ON, ±3s/ day at power OFF (at 23˚C / 73˚F)
Accuracy of timebase
0.02s/ day on measurement (at 23˚C / 73˚F)
Recording intervals
10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s, 20s, 30s, 1min, 2min, 5min, 10min, 20min, 30min, 1hr (5s to 1hr when combined with humidity measurement)
Recording length
Set to arbitrary length or continuous; Data storage : last 16-mega datas in internal memory (for one channel recording. For n channels, 16 M-datas / n data)
Recording mode
Continue, Repeat, Timer measurement
Number of data
For analog "n" channels, ( 16-mega datas / n ) datas
Durability of battery
Backup battery for clock and setting conditions: battery life of at least 10 years, For measurement data: none (at 23˚C / 73˚F)
No. of connectable units
Maximum 8 units (total 120 channels)
Environmental conditions
Operating temperature and humidity : 0 to 40˚C (4˚F to 104˚F), 30 to 80% rh, Storage temperature and humidity : -10 (14˚F) to 50˚C (122˚F), 80% rh or less, non-condensating
Conforming standards
Safety : EN61010, EMC : EN61326, EN61000-3-2, EN61000-3-3, Protections : Over 10 ms at "L", Over 5 ms at "H", or terminal open
Voltage limits : ± 30 V DC, ± 45 V AC, ± 50 V AC, ± 50 V AC
AC power consumption
10 VA (when connected with 8 units)
Dimensions & Mass
Approx. 67 mm (2.64 in) W × 133 mm (5.24 in) H × 125 mm (4.92 in) D, 600 g (21.2 oz)
Accessories
Operating Manual x1, Quick Start Manual x1, AC ADAPTER 9418-15 x1, USB cable x1, Connection Plate x1, CD-R (data collection software 'Logger Utility') x1, Connector cover x1, Ferrite clamp x1
PC Interface
Data storage media
CF card slot
Data storage media
CF card slot
Data storage media
CF card slot
Data storage media
CF card slot
Function Specifications
Major Functions
Control the input units, or output units, Communication to the PC, Data storage to the CF card
Measurement parameters
Depending on the connected measurement unit: Temperature (thermocouple, Pt), voltage, humidity (used optional sensor), totalized pulses (addition, substraction), rotation count, digital signal
Real time save
Measurement data are saved as binary data to the CF Card in real time, and can be saved to separate files at preset times, selectable as full files or an endless loop with automatic deletion of oldest data.
Dual sampling
Two (high-speed and low-speed) recording intervals can be specified for every input module from the following: 10, 20, 50, 100, 200 and 500 ms; 1, 2, 5, 10, 20 and 30 s; 1, 2, 5, 10, 20 and 30 min; and 1 hr (the low-speed setting divided by the high-speed setting must be an integer less than 1,000)
Marking
Event mark input : Press [Start / Stop] key at measurement
Trigger function
Mode : Single / Repeat, Timing : Start / Stop / Start & Stop, Pre-Trigger : records period before trigger, can be set for real-time saving
Trigger source
Analog input : Maximum 120 channels, depend on number of the input unit.
Pulse totalizer inputs : Maximum 120 channels, depend on number of the input unit.
Logic inputs : Maximum 120 channels, depend on number of the input unit.
External trigger : Rise up or fall down of the external input signal (selectable)
Logical AND or OR for each trigger source, Trigger condition settable for each channels
Trigger type
Level: Triggers when rising or falling through preset level
Window: Triggers when entering or exiting range defined by preset upper and lower limit values
Trigger level resolution : 0.1 % f.s. Logic : ± 1, 0, × Pattern trigger
External trigger signal
Rise up : Low level (0 to 1.0 V) to High level (2.5 V to 5.0 V)
Fall down : High level (2.5 V to 5.0 V) to Low level (0 to 1.0 V), or terminal short
Input voltage range : ± 5 to 10 V DC, Filter ON/OFF possible
Pulse width response : more than 1 ms (High period), more than 2 μs (Low period) at filter OFF, more than 2.5 ms (High period), more than 4 ms (Low period) at filter ON
Alarm output
Alarm Module 8997 can be connected along with various measurement modules (although it cannot be connected alone)
Alarm type
Level: Triggers when rising or falling through preset level
Window: Triggers when entering or exiting range defined by preset upper and lower limit values
Logic pattern : agreement (or disagreement) in the specified pattern
Output latch settings : latch / no latch
Start backup
Possible

8423 Hardware Specifications
(accuracy is specified @23˚C / 73˚F, 30 to 80 % rh, from 30 minutes after power on, accuracy guaranteed for one year, product guaranteed for one year)

<table>
<thead>
<tr>
<th>Display</th>
<th>LCD, 16 characters × 2 lines, 5 × 8 dots / characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory capacity</td>
<td>Total 16 M-word (about 16.77 million data points: 32 mega-bytes)</td>
</tr>
<tr>
<td>External control connectors</td>
<td></td>
</tr>
<tr>
<td>Push-button type terminal block</td>
<td>External trigger / External sampling input (exclusive OR), External start input, External stop input</td>
</tr>
<tr>
<td>External sampling</td>
<td>rise-up, or fall-down (selectable)</td>
</tr>
<tr>
<td>Rise-up</td>
<td>Low (0 to 1.0 V) to High (2.5 to 5.0 V)</td>
</tr>
<tr>
<td>Fall-down</td>
<td>High (2.5 to 5.0 V) to Low (0 to 1.0 V), or terminal short</td>
</tr>
<tr>
<td>Input voltage range</td>
<td>± 5 to 10 V DC, Filter ON/OFF possible</td>
</tr>
<tr>
<td>Pulse width response</td>
<td>Over 1 ms at &quot;H&quot;, over 2 μs at &quot;L&quot; (at filter OFF), Over 2.5 ms at &quot;H&quot;, over 4 ms at &quot;L&quot; (at filter ON)</td>
</tr>
<tr>
<td>Maximum external sampling period</td>
<td>10 ms (at digital filter OFF), 20 ms (at digital filter ON, and combined with humidity measurement), 5 s (at digital filter ON, and combined with humidity measurement)</td>
</tr>
<tr>
<td>Synchronous sampling</td>
<td>Five-units maximum for synchronous connection, Function : Connect via the connection cable model 9683 for synchronous sampling</td>
</tr>
<tr>
<td>Clock</td>
<td>Auto calendar, leap year auto distinguish, Precision : ±0.2s/ day at power ON, ±3s/ day at power OFF (at 23˚C / 73˚F)</td>
</tr>
<tr>
<td>Accuracy of timebase</td>
<td>0.02s/ day on measurement (at 23˚C / 73˚F)</td>
</tr>
<tr>
<td>Recording intervals</td>
<td>10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s, 20s, 30s, 1min, 2min, 5min, 10min, 20min, 30min, 1hr (5s to 1hr when combined with humidity measurement)</td>
</tr>
<tr>
<td>Recording length</td>
<td>Set to arbitrary length or continuous; Data storage : last 16-mega datas in internal memory (for one channel recording. For n channels, 16 M-datas / n data)</td>
</tr>
<tr>
<td>Recording mode</td>
<td>Continue, Repeat, Timer measurement</td>
</tr>
<tr>
<td>Number of data</td>
<td>For analog &quot;n&quot; channels, ( 16-mega datas / n ) datas</td>
</tr>
<tr>
<td>Durability of battery</td>
<td>Backup battery for clock and setting conditions: battery life of at least 10 years, For measurement data: none (at 23˚C / 73˚F)</td>
</tr>
<tr>
<td>No. of connectable units</td>
<td>Maximum 8 units (total 120 channels)</td>
</tr>
<tr>
<td>Environmental conditions</td>
<td>Operating temperature and humidity : 0 to 40˚C (4˚F to 104˚F), 30 to 80% rh, Storage temperature and humidity : -10 (14˚F) to 50˚C (122˚F), 80% rh or less, non-condensating</td>
</tr>
<tr>
<td>Conforming standards</td>
<td>Safety : EN61010, EMC : EN61326, EN61000-3-2, EN61000-3-3, Protections : Over 10 ms at &quot;L&quot;, Over 5 ms at &quot;H&quot;, or terminal open</td>
</tr>
<tr>
<td>Power supply</td>
<td>(1) Using the AC ADAPTER 9418-15, 100 to 240 VAC, 50/60 Hz (2) 12 V Battery (voltage may range from .20% to ±30%, Please contact HIOKI for connection cord)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>20 VA (when connected with 8 units)</td>
</tr>
<tr>
<td>Dimensions &amp; Mass</td>
<td>Approx. 67 mm (2.64 in) W × 133 mm (5.24 in) H × 125 mm (4.92 in) D, 600 g (21.2 oz)</td>
</tr>
<tr>
<td>Accessories</td>
<td>Operating Manual x1, Quick Start Manual x1, AC ADAPTER 9418-15 x1, USB cable x1, Connection Plate x1, CD-R (data collection software 'Logger Utility') x1, Connector cover x1, Ferrite clamp x1</td>
</tr>
<tr>
<td>PC Interface</td>
<td>Data card slot x 1, HIOKI 9726 (128MB), 9727 (256MB), 9728 (512MB), 9729 (1GB), MS-DOS format</td>
</tr>
<tr>
<td>Interface</td>
<td>LAN : supports 100Base-TX, DHCP, DNS USB : Ver 2.0, mini-B receptacle</td>
</tr>
<tr>
<td>PC control</td>
<td>Data acquisition and measurement criteria settings are controlled by the PC data acquisition program; data acquired to internal memory and CF Cards is downloaded via FTP server function; simple operations (measurement start/stop and data acquisition to internal memory) are available via HTTP server function</td>
</tr>
</tbody>
</table>

9
**Specification**

**Logger Utility (bundled application software)**

- **Media/Oparing environment**
  - One CD-R, CPU: Pentium 3 (500 MHz or more), at least 512 MB of memory, Ethernet, or USB terminal
  - OS: Windows 2000 (SP4 or later), Windows XP (SP2 or later), Vista (32-bit only) (This software is compatible only to the MEMORY HiLOGGER 8423, 8430-20/-21)
- **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)
  - Maximum number of controllable instruments: 5
  - Data acquisition systems: 1 (acquisition from multiple systems is possible by running multiple instances of the application program)
  - Display: Waveforms (multiple time axes can be displayed); Numerical values (logging) and alarm status can be displayed at the same time; Numerical value monitoring is possible in a separate window; measuring while waveform scrolling is possible
  - Data saving destination: Real-time data acquisition file (LUW format)
  - Event marks: can be applied while recording

**Data acquisition settings**

- Settings: Data acquisition settings for the HiLOGGER
- Saving: The setting for multiple HiLOGGERS can be saved together in one file (LUS format); Instrument configuration settings can be sent and received

**Waveform display**

- **Processed data file**: Real-time data acquisition file (LUW format), Measurement data file (MEM format), Waveform processing data
- **Others**: Waveform display on sheet for each channel, scroll, record event mark, cursor, hard copy, numeric display value

**Data conversion**

- **Target data**: Real-time data acquisition file (LUW format), Measurement data file (MEM format), Waveform processing data, Converted sections: All data, designation section
- **Format**: CSV format (separate by comma, space, tab), transfer to EXCEL sheet, arbitrary data thinning

**Parameter calculations**

- **Target data**: Real-time data acquisition file (LUW format), Measurement data file (MEM format), Waveform processing data
- **Calculation items**: average, peak, maximum and minimum values, timing of maximum and minimum values, ON time, OFF time, count the number of ON time and OFF time, standard deviation, integration, area values

**Search function**

- **Target data**: Real-time data acquisition file (LUW format), Measurement data file (MEM format), Waveform processing data
- **Search mode**: event mark, time and date, maximum position, minimum position, maximum pole, minimum pole, alarm position, level, window, the amount of change

**Print function**

- **Supported printer**: printer compatible with the OS
- **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

**Waveform processing**

- **Processing items**: Four arithmetic operations, Number of processing channels: 60 channels (Software Version 1.20 or later)

**VOLTAGE/TEMP UNIT 8948**

- **Input**
  - Terminal: M3 (metric) screw terminals (2 terminals/each), terminal block removable, supplied terminal block cover
  - Number of channels: 15 channels isolated from each other and chassis, (voltage or thermocouple selectable for each channels)
  - Input impedance: 1MΩ (850Ω when open-circuit polling is enabled)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Setting Range</th>
<th>Measurement Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>10mV f.s.</td>
<td>150mV to ±150mV</td>
<td>±5μV</td>
<td>±0.1% f.s.</td>
<td>±1μV</td>
</tr>
<tr>
<td>1V f.s.</td>
<td>±1.5V to ±1.5V</td>
<td>±10μV</td>
<td>±1% f.s.</td>
<td>±1μV</td>
</tr>
<tr>
<td>10V f.s.</td>
<td>±15V to ±15V</td>
<td>±100μV</td>
<td>±1% f.s.</td>
<td>±1μV</td>
</tr>
<tr>
<td>20V f.s.</td>
<td>±30V to ±30V</td>
<td>±1mV</td>
<td>±0.1% f.s.</td>
<td>±0.1μV</td>
</tr>
<tr>
<td>500V f.s.</td>
<td>±100V to ±100V</td>
<td>±5mV</td>
<td>±1% f.s.</td>
<td>±1μV</td>
</tr>
<tr>
<td>1V f.s.</td>
<td>±1V to ±1V</td>
<td>±5μV</td>
<td>±1% f.s.</td>
<td>±1μV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermocouples</th>
<th>Setting Range</th>
<th>Measurement Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>K 100˚C f.s.</td>
<td>±100˚C to ±100˚C</td>
<td>±1˚C</td>
<td>±0.1% f.s.</td>
<td>±0.1˚C</td>
</tr>
<tr>
<td>K 500˚C f.s.</td>
<td>±500˚C to ±500˚C</td>
<td>±5˚C</td>
<td>±0.1% f.s.</td>
<td>±0.5˚C</td>
</tr>
<tr>
<td>K 1000˚C f.s.</td>
<td>±1000˚C to ±1000˚C</td>
<td>±10˚C</td>
<td>±0.1% f.s.</td>
<td>±1˚C</td>
</tr>
<tr>
<td>K 2000˚C f.s.</td>
<td>±2000˚C to ±2000˚C</td>
<td>±20˚C</td>
<td>±0.1% f.s.</td>
<td>±2˚C</td>
</tr>
<tr>
<td>E 100˚C f.s.</td>
<td>±100˚C to ±100˚C</td>
<td>±1˚C</td>
<td>±0.1% f.s.</td>
<td>±0.1˚C</td>
</tr>
<tr>
<td>E 500˚C f.s.</td>
<td>±500˚C to ±500˚C</td>
<td>±5˚C</td>
<td>±0.1% f.s.</td>
<td>±0.5˚C</td>
</tr>
<tr>
<td>E 1000˚C f.s.</td>
<td>±1000˚C to ±1000˚C</td>
<td>±10˚C</td>
<td>±0.1% f.s.</td>
<td>±1˚C</td>
</tr>
<tr>
<td>E 2000˚C f.s.</td>
<td>±2000˚C to ±2000˚C</td>
<td>±20˚C</td>
<td>±0.1% f.s.</td>
<td>±2˚C</td>
</tr>
</tbody>
</table>

- **A/D conversion**
  - Resolution: 16 bit
  - Maximum sampling speed: 10 ms
- **Filter function**
  - Digital filter: OFF, 50 Hz, 60 Hz (With 50 and 60 Hz settings, the digital filter is automatically set according to recording interval)
- **Max. allowable input**
  - Max. allowable input: 100 V DC (maximum voltage between input terminals that does not cause damage), Max. rated voltage between channels: 200 V DC
  - Max. rated voltage to earth: 600 V DC, AC (Upper limit voltage that does not cause damage when applied between input channel and chassis, and between each input channels)
- **Conforming standards**
  - Safety: EN601010, EMC: EN61326
- **Dimensions & Mass**
  - Approx. 38.5 mm (1.52 in) W × 133 mm (5.24 in) H × 141.2 mm (5.56 in) D mm, 550 g (19.4 oz)
- **Accessories**
  - Connection Plate x1, Operating Manual x1
### Specification

#### UNIVERSAL UNIT 8949

**Measurement parameters:** Voltage, Thermocouples (K, E, J, T, N), R, S, B, W.

**Terminal:** Screw-type terminals (4 terminals/each), terminal block removable, supplied terminal block cover

**Number of channels:** 15 channels (input type selectable for each channel), isolated from each other and chassis (at voltage or thermocouples), Not isolated from each other and common GND (at resistance temperature sensor or humidity)

**Input impedance:** 1MΩ (50mA when open-circuit polling is enabled at thermocouples), 2MΩ (when resistance temperature sensor)

### Digital/Pulse Input

**Input signal condition:** No-voltage a contact (normally open contact), open collector or voltage input, Digital / Pulse input selectable for each channels

**Measurement parameters:** Voltage, Totalized pulses (integrated or instantaneous), Rotation count, ON/OFF digital signal

**Number of channels:** 15 channels (digital / pulse selectable for each channels) (common ground for CH-1 to CH-5, common ground for CH-6 to CH-10, common ground for CH-11 to CH-15)

**Input impedance:** 1.1MΩ

### Pulse Input

**Digital input**

**Logic detection level**

- **HIGH** = at least 1.0 V
- **LOW** = 0 to 0.5 V
- **LOW** = at least 4.0 V

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

**Max. rated voltage to earth:** 600 V DC, AC (Upper limit input voltage that does not cause damage when applied between CH-1 to CH-5 each channel and chassis, CH-6 to CH-10 each channel and chassis, CH-11 to CH-15 each channel, CH-1 to CH-5 each channel and CH-11 to CH-15 each channel)

**Conforming standards**

- Safety: EN61010, IEC : EN61326
- Dimensions & Mass: Approx. 38.5 mm (1.52 in) W × 133 mm (5.24 in) H × 141.2 mm (5.56 in) D mm, 530 g (18.7 oz)
- Accessories: Flat-blade Screwdriver x1 (for terminal block), Connection Plate x1, Operating Manual x1

### ALARM UNIT 8997

#### Output

**Output type:** open collector (active low)

**Alarm parameters:** Use up to 15 channels in response to analog input, pulse input, rotation count, or ON/OFF digital signal

**Terminal:** M3 (mm) screw terminals (2 terminals/each)

**Number of channels:** 15 channels isolated from each other and chassis

**Output sink current**

- Maximum switching capability: 5 to 60 V DC @10 mA (open collector drive)

**Output refresh**

- Output latch settings: Latch / No latch at every recording interval

**Max. rated voltage to earth:** 600 V DC, AC (Upper limit input voltage that does not cause damage when applied between each output channel and chassis, and between units)

**Conforming standards**

- Safety: EN61010, IEC : EN61326
- Dimensions & Mass: Approx. 38.5 mm (1.52 in) W × 133 mm (5.24 in) H × 141.2 mm (5.56 in) D mm, 500 g (17.6 oz)
- Accessories: Connection Plate x1, Operating Manual x1