



## 8940 F/V UNIT

For use with the 8826, 8835-01, 8841, and 8842 MEMORY HiCORDERs

### Handles tasks ranging from pulse input from rotary equipment to current measurement

#### □ Product outline and features

● In addition to frequency measurement, this single unit handles integration measurement, pulse duty ratio measurement, voltage measurement, and current measurement<sup>1</sup>. <sup>1</sup>When used with a clamp-on sensor. This single unit handles a variety of signal types. A voltage range is also provided, allowing you to see raw voltage waveforms as well as rotation signals.

● Simply insert into the HiCORDER for use  
To use the 8940 F/V unit, simply slot it into the MEMORY HiCORDER, just as you would with one of the existing analog units.

● Rapid 10 $\mu$ s F/V input response  
With frequency measurement, response time should be as short as possible. At frequencies above 300 Hz, the 8940's integration range achieves a rapid response time of 10  $\mu$ s<sup>2</sup> or better.

<sup>2</sup> With pulse duty ratio measurement or at frequencies of 300 Hz or less, response time is 50  $\mu$ s. In either case, the recorder sampling period is added.

● Suitable applications  
Engine or crank rotation  
Wheel and transmission gear rotation  
Vehicle speed encoder output  
Fuel, cooling water flow quantity  
Handle angle  
Dynamo frequency for generators

● Also suitable for current waveform measurement<sup>3</sup>  
The unit is provided with a special purpose terminal that enables use of HIOKI's clamp-on sensors (for wideband measurement). Ordinarily, an external power supply is required to use these clamp-on sensors, but when used with the 8940 F/V, the clamp-on sensor can be connected directly. This makes it easy to measure currents ranging from micro-currents to very large currents.

<sup>3</sup> Current measurement requires the optional 9318 or 9319 Conversion Cable and an appropriate clamp-on sensor.



Photograph shows the 8841 MEMORY HiCORDER



Insert the input unit

#### Convenient Features

- The 8940 F/V UNIT is a frequency and voltage amplifier that plugs directly into a MEMORY HiCORDER, eliminating the inconvenience of wiring that is required when using an external F/V amplifier.
- In order to use the recorder with an external F/V unit, calculation is required to convert frequency and rotation values obtained on the input side, but such calculations are not needed when using the 8940. When the 8940 is used, this conversion is not required. The measured value can be read directly.

#### Main Applications

- Measurement of automotive related rotation signals.
- Current measurement, such as for maintenance of electrical wiring.
- Current measurement for machinery maintenance, such as machine tools and welding equipment.



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The photograph shows the 8841 with the 8936 analog unit attached.



\*The core and shield case are not insulated. To prevent electric accidents, never use on bare conductors.

## ■ Specifications 8940 F/V UNIT



8940 F/V UNIT (Accuracy at 23°C ± 5°C; following 30 min. of warm-up time; accuracy guaranteed for 1 year.)

<b>Input</b>	<p><b>Number of channels:</b> Two The measurement object for each channel can be independently selected. Isolated input/ output and inter-channel isolation.</p> <p><b>Voltage input:</b> BNC terminal (input resistance 1 MΩ, input capacity approx. 60 pF)</p> <p><b>Current clamp-on sensor input:</b> Sensor connector<sup>†1</sup>  <sup>†1</sup> Common GND for the sensor connector and recorder main unit.  <sup>†1</sup> Models that allow unit insertion up to a total of 4 channels: 8835-01, 8841, 8842  <sup>†1</sup> Models that allow unit insertion up to a total of 6 channels: 8826, serial no. 1999-0338386 or later.</p>
<b>Compatible current sensors</b>	9270, 9271, 9272, 9277, 9278, 9279, 3273
<b>Frequency range</b>	<p>0.1 Hz to 10 kHz per division<sup>‡2</sup>, 11 ranges, 10 r/minute to 1 kr/minute per division<sup>‡2</sup> 5 ranges, measurement resolution is 1/160<sup>‡2</sup> of the range.</p> <p><sup>‡2</sup> When attached to recorder where full-scale (f.s.) = 10 divisions 0.05 Hz to 5 kHz per division<sup>‡3</sup>, 11 ranges, 5 r/minute to 500 r/minute per division<sup>‡3</sup> 5 ranges, the measurement resolution is 1/80<sup>‡3</sup> of the range.</p> <p><sup>‡3</sup> When attached to recorder where full-scale (f.s.) = 20 divisions P50 Hz range<sup>‡4</sup> (40 to 60 Hz), P60 Hz range<sup>‡4</sup> (50 to 70 Hz)  <sup>‡4</sup> 9322 DIFFERENTIAL PROBE or 9303 PT is necessary for measuring power-line frequency  <b>Measurement accuracy:</b> ±0.2% f.s. (range where full-scale except 100 kHz), ±0.7% f.s. (range where full-scale corresponds to 100 kHz), ±0.032 Hz (P50 Hz/ P60 Hz range)  <b>Measurement range:</b> DC to 100 kHz</p>
<b>Integration range</b>	<p>10 counts to 1 M counts/division<sup>‡5</sup>, 11 ranges  <sup>‡5</sup> When attached to recorder where full-scale (f.s.) = 10 divisions 5 counts to 500 k counts/division<sup>‡6</sup>, 11 ranges  <sup>‡6</sup> When attached to recorder where full-scale (f.s.) = 20 divisions  <b>Measurement range:</b> DC to 90 kHz</p>
<b>Pulse duty ratio measurement range</b>	<p>100% f.s., 1 range  <b>Measurement accuracy:</b> ±1% f.s. (10 Hz to 100 kHz)  <b>Measurement range:</b> 10 Hz to 100 kHz</p>
<b>Common for frequency, integration, pulse duty ratio</b>	<p><b>Threshold value:</b> -10 to +10 V (changeable in 0.2 V steps)  <b>Response time:</b> 10 μs or less (at 300 Hz frequency and in the integration range)  50 μs or less (at 300 Hz frequency or less and in the pulse duty ratio measurement range)</p>

<b>Voltage range</b>	<p>1 mV to 5 V per division<sup>†7</sup>, 12 ranges  <sup>†7</sup> When attached to recorder where full-scale (f.s.) = 10 divisions  0.5 mV to 2 V per division<sup>†8</sup>, 12 ranges  <sup>†8</sup> When attached to recorder where full-scale (f.s.) = 20 divisions  <b>DC amplitude accuracy:</b> ±0.4% f.s.  <b>Max. input voltage:</b> 30 Vrms or DC 60 V</p>
<b>Current range</b>	<p>10 mA to 10 A per division<sup>†9</sup>, 10 ranges, measurement resolution is 1/160<sup>†9</sup> of the range.  <sup>†9</sup> When attached to recorder where full-scale (f.s.) = 10 divisions, and during use of clamp sensor 9270, 9272 (20 A range), 9277, or 3273.  5 mA to 5 A per division<sup>†10</sup>, 10 ranges, measurement resolution is 1/80<sup>†10</sup> of the range.  <sup>†10</sup> When attached to recorder where full-scale (f.s.) = 20 divisions, and during use of clamp sensor 9270, 9272 (20 A range), 9277, or 3273.  100 mA to 100 A per division<sup>†11</sup>, 10 ranges, measurement resolution is 1/160<sup>†11</sup> of the range.  <sup>†11</sup> When attached to recorder where full-scale (f.s.) = 10 divisions, and during use of clamp sensor 9271, 9272 (200 A range), or 9278.  50 mA to 50 A per division<sup>†12</sup>, 10 ranges, measurement resolution is 1/80<sup>†12</sup> of the range.  <sup>†12</sup> When attached to recorder where full-scale (f.s.) = 20 divisions, and during use of clamp sensors 9271, 9272 (200 A range), or 9278.  200 mA to 200 A per division<sup>†13</sup>, 10 ranges, measurement resolution is 1/128<sup>†13</sup> of the range.  <sup>†13</sup> When attached to recorder where full-scale (f.s.) = 10 divisions, and during use of clamp sensor 9279.  100 mA to 100 A per division<sup>†14</sup>, 10 ranges, measurement resolution is 1/64 or 1/80<sup>†14</sup> of the range.  <sup>†14</sup> When attached to recorder where full-scale (f.s.) = 20 divisions, and during use of clamp sensor 9279.</p>
<b>Common for voltage and current range</b>	<p><b>Frequency characteristics:</b> DC to 400 kHz ±3 dB (during DC supply)  <b>DC amplitude accuracy:</b> ±0.4% f.s.  <b>Zero-position accuracy:</b> ±0.15% f.s.  <sup>†15</sup> Add the accuracy and characteristics of the sensor and probe used for current measurement.</p>
<b>Maximum sampling speed</b>	1 MS/s (simultaneous sampling on two channels)
<b>Other functions</b>	<p><b>Voltage input pull-up:</b> ON (10 kΩ)/OFF  <b>Input connections:</b> DC, GND, AC (voltage, current), DC (others)  <b>Low-pass filter:</b> OFF, 5, 500, 5k, 100 kHz: -3 dB</p>
<b>Maximum grounding voltage</b>	30 Vrms or 60 VDC Voltage applied between input channel and cabinet, and between each channel (BNC terminal)
<b>Dimensions and mass</b>	Approx. 170 × 20 × 148 mm, approx. 300 g
<b>Supplied accessories</b>	None: input cords are optional

## Ordering Information

### 8940 F/V UNIT (2 channels/1 unit)

#### ● Compatible MEMORY HiCORDERs Combined when shipped, or configuration changeable by the user

- 8826 MEMORY HiCORDER (Ver. 2.10 or later can be used, main unit only)  
(Current probes with a serial number of No. 1999-0338386 or later can be used, older types cannot be used.)
- 8835 MEMORY HiCORDER (Main unit only, current probe cannot be used)  
(Standard models later than Ver. 2.10, models installed with 9540 Ver. 5.10 or later.)
- 8835-01 MEMORY HiCORDER (Main unit only)
- 8841 MEMORY HiCORDER (Ver. 2.10 or later, main unit only)

- The 8940 F/V UNIT cannot operate alone. To use the 8940, mount it on a HIOKI MEMORY HiCORDER.
- Measurement input cords are not supplied with the 8940 F/V UNIT. Please order the optional 9198 CONNECTION CORD as required.
- An optional clamp-on sensor and conversion cable are required for current measurement.

- 8842 MEMORY HiCORDER (Ver. 2.10 or later, main unit only)
- 8720 VISUAL HiCORDER (Main unit only)

#### ● Options

- 9198 CONNECTION CORD (low-voltage use, up to 300 V)
- 9217 CONNECTION CORD (insulated BNC - insulated BNC)
- 9303 PT (necessary for measuring power-line frequency)
- 9318 CONVERSION CABLE (to connect 8940 with 9270, 9271, 9272, 9277, 9278, 9279)
- 9319 CONVERSION CABLE (to connect 8940 with 3273)
- 9322 DIFFERENTIAL PROBE (necessary for measuring power-line frequency)
- 9325 POWER CORD (power supply from 8940 sensor connector to 9322)

- 9270 CLAMP ON SENSOR: 20 A, 5 Hz to 50 kHz, 9318 required
- 9271 CLAMP ON SENSOR: 200 A, 5 Hz to 50 kHz, 9318 required
- 9272 CLAMP ON SENSOR: 20/200 A, 5 Hz 10 kHz, 9318 required
- 9277 UNIVERSAL CLAMP ON CT: 20 A, DC to 100 kHz, 9318 required
- 9278 UNIVERSAL CLAMP ON CT: 200 A, DC to 100 kHz, 9318 required
- 9279 UNIVERSAL CLAMP ON CT: 500 A, DC to 20 kHz, 9318 required
- 3273 CLAMP ON PROBE: 15 A, DC to 50 MHz, 9319 required



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