

RECORDER

HIOKI

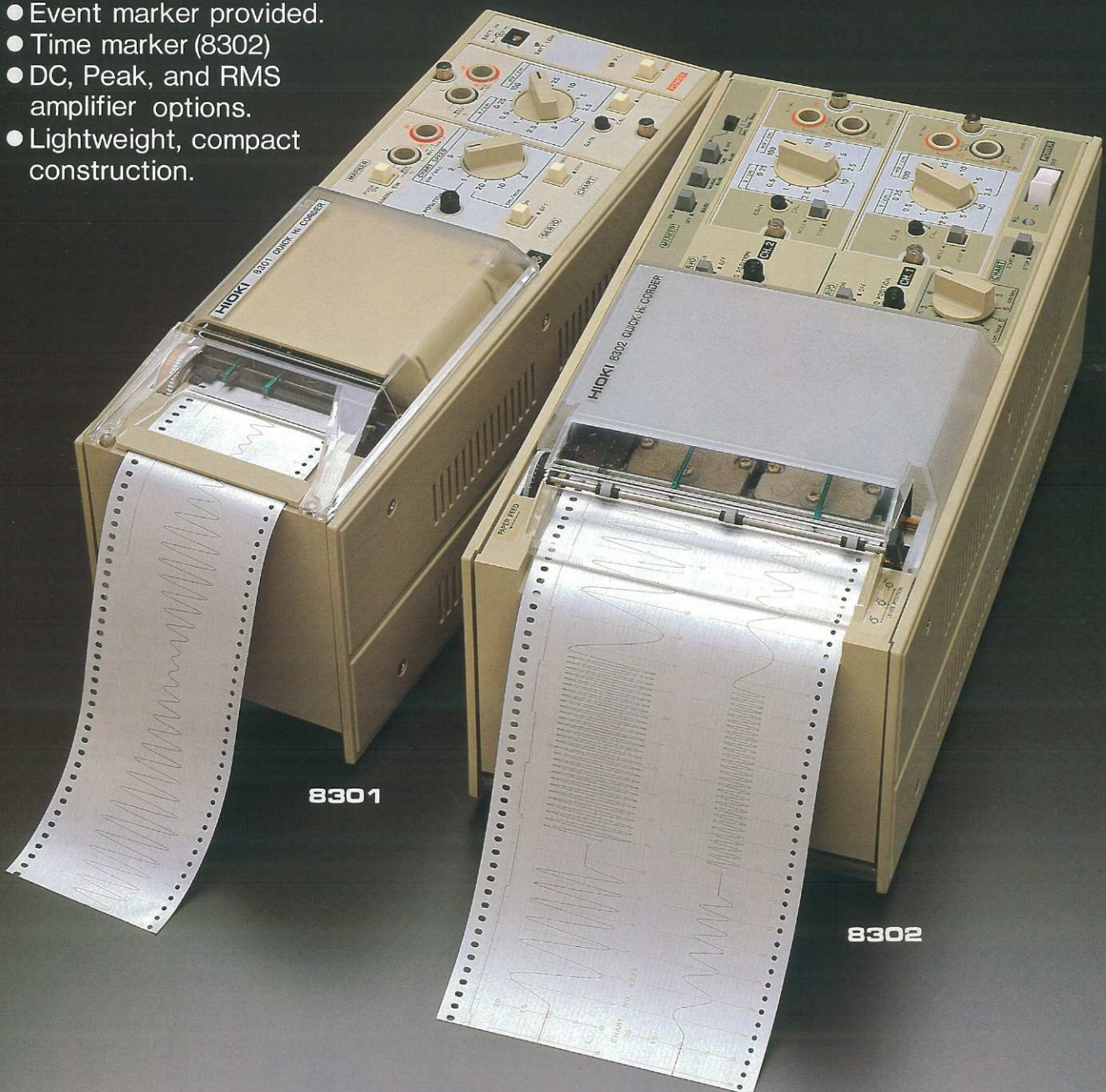
QUICK HI CORDER

8 3 0 1

8 3 0 2

Pen Oscillographs To Increase Your Measurement Analysis Capability

- 8301: Single-channel recorder
- 8302: 2-channel recorder
- Event marker provided.
- Time marker (8302)
- DC, Peak, and RMS amplifier options.
- Lightweight, compact construction.



8301

8302

Versatile functions, easy operations.

Quick Hi Corder

The Quick Hi Corder series consists of the single-channel 8301, and the 2-channel 8302. Three models are available, depending on whether your needs are for DC, peak, or RMS

measurements. Using a discharge-recording stylus, the recorder requires no ink, and records a uniformly darkened line at high speeds. Suited for a wide range of

maintenance and inspection procedures, the highly portable construction of the recorder gives you a versatile instrument that you can use practically anywhere.

8301 operates off AC or DC power source 8302 off AC source.

Two power source models are available with the 8301: one for use with regular AC line voltage, and the other for battery operation. The 8302 is designed to operate off of AC line voltage.

The DC power source is provided by the 9108 battery (optional). Approximately two hours of recording time (signal frequency, approx. 3Hz) is available with battery operation. However, using the battery in combination with the 9109 AC adapter (optional) provides continuous recording capability of signals of less than 10Hz. High frequency signals (e.g., 50Hz) require that the 9108/9109 be used combined. Continuous recording times are given in Table 1. AC power source models are available between AC 100V and AC 240V, and the desired model should be specified at order.

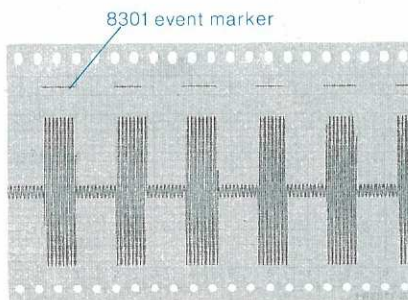
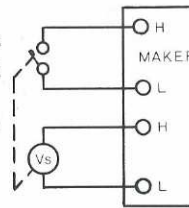


Wide range of chart feed speeds

With 8301, five different models provide a 6-step set of different chart speeds ranging from 5 cm/s to 1 cm/h. Chart speeds on the 8302 cover a wide range (5 cm/s to 6 cm/h) in 12 steps.

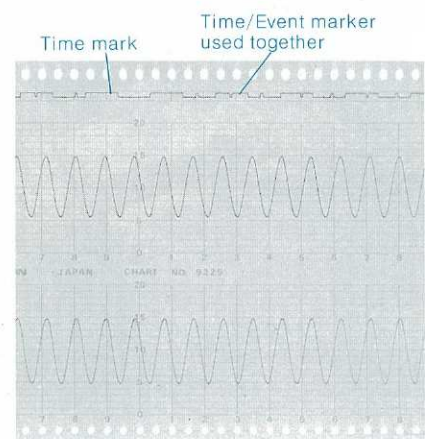
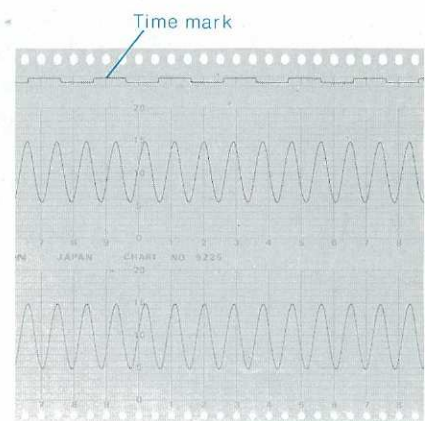
Event marker

The marker can be actuated by mechanical contacts (switch, relay, etc.) coupled to signal source operation, or a digital signal can be used to measure the timing relationship of the recorded signal. Consequently, signal changes relative to switch opening or closure, or alarm reports relative to signal events can easily be monitored on the chart. Timing measurement tasks that require two-channel conventional recorders can now be done with just one recorder, thanks to the addition of the event marker function.



Time marker

In addition to the event marker, 8302 also has a time marker. This marker can be set to make a tick at 1 second, 1 minute or 1 hour intervals, making time-related measurement recordings easier. The time marker and event marker can be used together.



Continuous recording times (Table 1)

Recording time is reduced as input signal amplitude and speed increases.

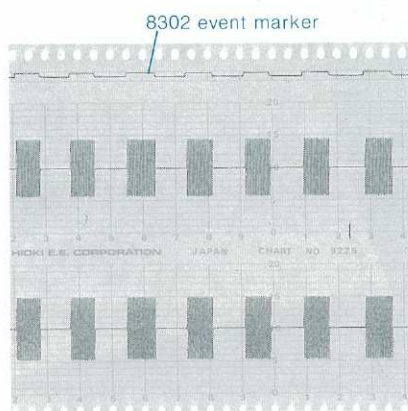
	Balanced*1	Unbalanced*2
Battery only	Approx. 2 hours	Approx. 17 min.

*1 Input signal of a few Hz.
*2 50Hz-20mm p-p signal, pen continuously moving.

Discharge recording method

Recording density remains uniform for all stylus speeds, making it easy to check measurement results. Also, the recording chart is manufactured to be resistant against atmospheric conditions and chemical vapors, plus it stores well.

- Event marker control: External control (TTL neg. logic or switch), or manually-controlled switch.



Remote-control functions, signal output capability for operational versatility

The chart can be started and stopped, and chart feed controlled through an external clock connected to the remote-control terminal.

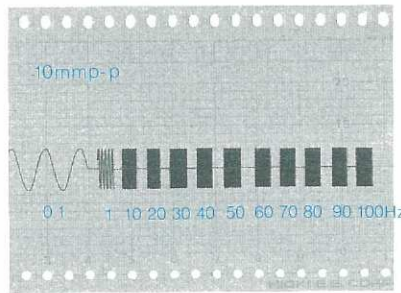
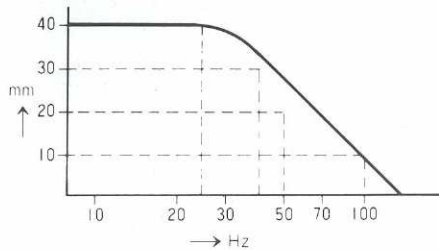
The recorder can be easily synchronized with the signal source. Output terminals also produce the chart START and STOP signal, in addition to the chart feed clock and marker signals for synchronous operation of multiple recorders. Use of the marker function in a multiple recorder setup makes it easy to analyze signals occurring over the same time-base.

Special amplifiers adapt recorder to numerous measurement applications.

DC Mod

The DC amplifier option features the functions required for general applications, and is particularly useful for maintenance and inspection procedures on production lines.

Covers signal frequencies up to 100Hz. Extremely good pen response (100Hz, 10mm p-p) makes it possible to collect accurate field data.



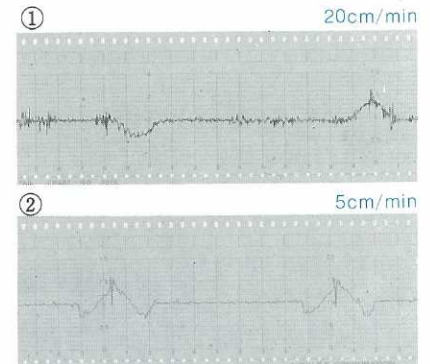
Convenient portability.

Weight of the 8301 is less than five kilograms, including the battery, carrying case, and recorder (battery-operated model).

Application examples.

● Vibration and acceleration measurements.

The example in ① shows acceleration data in the vertical direction for an elevator. Example ② is a recording of acceleration data at punch operation for a metal press.



Peak Mod

Constructed using a broad-band amplifier, full-wave rectifier, and peak-value detector, this amplifier option responds to wave peak values.

Wide-range frequency response. Frequency response covers the frequency band between DC and 10MHz (-3dB), making the recorder ideal for measurement of peak values of high-speed signals, and for use as a voltmeter.



Peak-value detector.

The peak-value detector has an optimum time-constant for capturing transient phenomena, and recorder response for a 500ns single-shot pulse is within -25%.

RMS Mod

The RMS amplifier option uses the high-speed characteristics of its converting circuits to measure and record the root-mean-square value of signals. This model is ideal for use in monitoring power supply voltage, measuring current, etc.

True root-mean-square recording. Internal circuits make the required calculations to measure and record the true root-mean-square value (including the DC component) of the signal. Rectifier outputs, and waveforms containing distortion are thus quantified accurately.

High-speed response.

Converter response speed for rise-time of a sine wave input is better than 100ms (0~90%). Rapid transients occurring over five (approx) cycles are measured with high accuracy, and frequency response covers the range between DC and 20kHz.

This function is useful in measuring the time point, approximate amplitude, and the number of transients occurring in a signal.

Full-wave rectifier.

Both positive and negative input signals are converted to DC values for recording. Vibrations, resonance points, etc. are recorded as peak values regardless of their direction.

Expanding signal input range.

Use of the 9119 (50:1) probe expands measurement range to 5 V/cm~250V/cm (kV f.s.).

Includes DC amp function.

Amplifier response can be switched between DC and PEAK. (DC amp same as DC amplifier option above.)

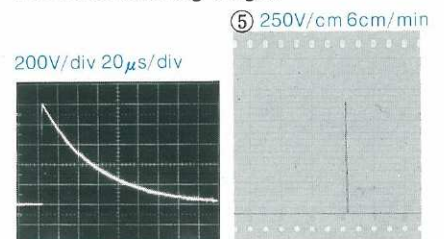
Application examples.

● Surge voltage measurements.

Example ⑤ is a recording made using a lightning surge tester. Recorder is set to $1 \times 40\mu\text{s}$, and a 1kV surge is applied

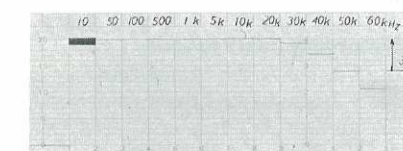
directly through the 50:1 probe. The oscilloscope waveform is taken from the output of a calibrator.

Similarly, measurements can be made of AC line switching surges.

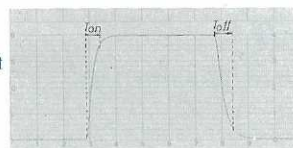


● Vibration measurements.

Example ⑥ illustrates a constant 3G vibration applied to an object, with frequency varied between 20 and 50Hz. Acceleration and resonance of the test object is then measured for recording. The envelope recording in example ⑦ is made using a zero reference point, and marks the larger of the negative or



Response to step input



Offset function provided.

Modes can be switched between RMS and $\pm 50\%$ RMS, making it easy to measure signals near or exceeding full-scale range setting.

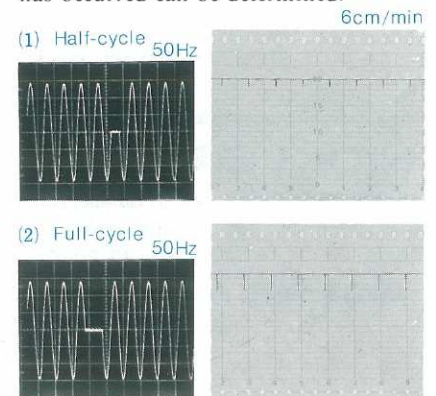
High input resistance, wide measurement range.

Input resistance is $2M\Omega$ (fixed), and measurement range is from 50 mV/cm to 150 V/cm (600 V/f.s.).

Application examples.

● Measuring momentary power failures.

The measurement and recording of momentary power failures is affected by trailing-edge response characteristics, and thus appears on the chart depending on duration of the power failure. However, the fact that a momentary power failure has occurred can be determined.

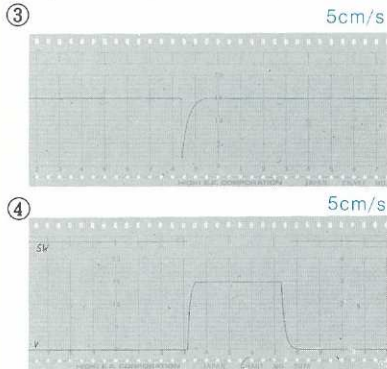


Two basic recorder models.....

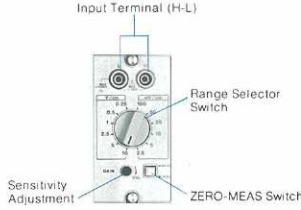
Single-channel, 2-channel.

● Current and voltage measurements.

Example ③ is a measurement taken from a series-regulator type constant-voltage power supply, and shows regulation characteristics when a CR load is quick-connected to the supply. Example ④ shows voltage rise characteristics for the same CR load connection when the AC power switch is turned ON.



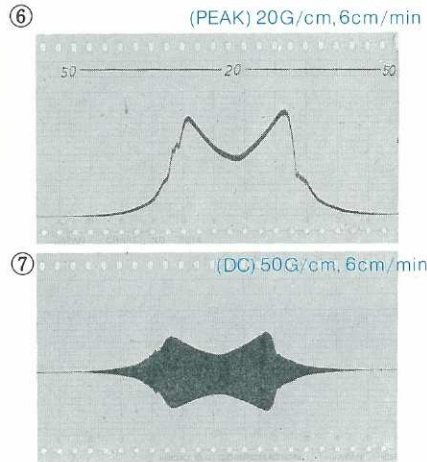
■ DC Amp 8301-0(8926) (8926-01)



Amp Specifications

Measurement range	DC 2.5-5-10-25-50-100mV/cm 0.25-0.5-1-2.5-5-10V/cm
Sensitivity adjustment	100~50% of full-scale value.
Accuracy	DC: $\pm 2.5\%$ f.s. AC: 50Hz, up to 20mm p-p, $\pm 2.5\%$ f.s.; 100Hz, up to 10mm p-p, $\pm 2.5\%$ f.s.
Input resistance, Input type	1M Ω (fixed) Floating, with guard-shield (guard-shield connected internally.)
Maximum allowable input	AC 100V for 1 min.
Max. allowable common-mode input	DC 1000V, or AC 1000V peak
CMRR	Greater than -100dB (50/60 Hz)
Accessories	Input cable (9116), 2 ea.

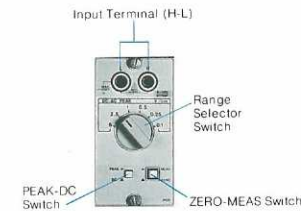
positive peak-value. This type of recording makes it easy to measure maximum acceleration, vibrations, and resonance points.



DC Amp Function

The recorder can also be switched between "DC" and "PEAK", allowing the recorder to handle signals of DC~50Hz, with no new setup required for recording high frequency peak-value signals.

■ PEAK Amp 8301-1(8925) (8925-01)

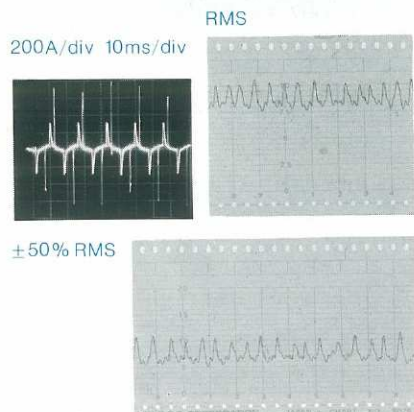


Amp Specifications

Measurement range	DC or PEAK 0.1-0.25-0.5-1-2.5-5V/cm, or 50-times these values when using the 50:1 probe.
Accuracy	DC range DC: $\pm 2.5\%$ f.s. AC: 50Hz, up to 20mm p-p, $\pm 2.5\%$ f.s.; 100Hz, up to 10mm p-p, $\pm 2.5\%$ f.s. PEAK range DC~1MHz, $\pm 5\%$ f.s.; Using 50:1 probe, $\pm 6\%$ f.s.
Single-shot phenomena recording characteristics	Within -25% when reproducing a pulse with a width of 500ns, peak value equivalent to full-scale.
Frequency response	PEAK range, DC~10MHz (-3dB)
Input impedance	R=1M Ω , C \approx 10pF
Maximum allowable input	DC 250V, or AC 250V peak. (with 50:1 probe, peak voltage 1500V.)
CMRR	Greater than -100dB (50/60Hz) Note: For AC 10V, 1MHz signal, greater than -40dB when cable input terminals are shorted, and signal applied between input and chassis GND.
Accessories	1: 1 input cable (9118), 1 ea; 50: 1 input cable (9119), 1 ea.

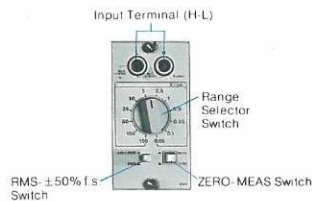
● Measuring RMS value of distorted waveforms.

The accompanying example is a current measurement taken from an inverter type power supply. A clamp-on sensor was used to detect primary-side current, and the recordings were made by switching output to RMS and $\pm 50\%$ RMS.



The instrument can be switched between "RMS" and " $\pm 50\%$ f.s." during use. This makes it easy to measure signals approaching or even exceeding full-scale value.

■ RMS Amp 8301-2(8924) (8924-01)



Amp Specifications

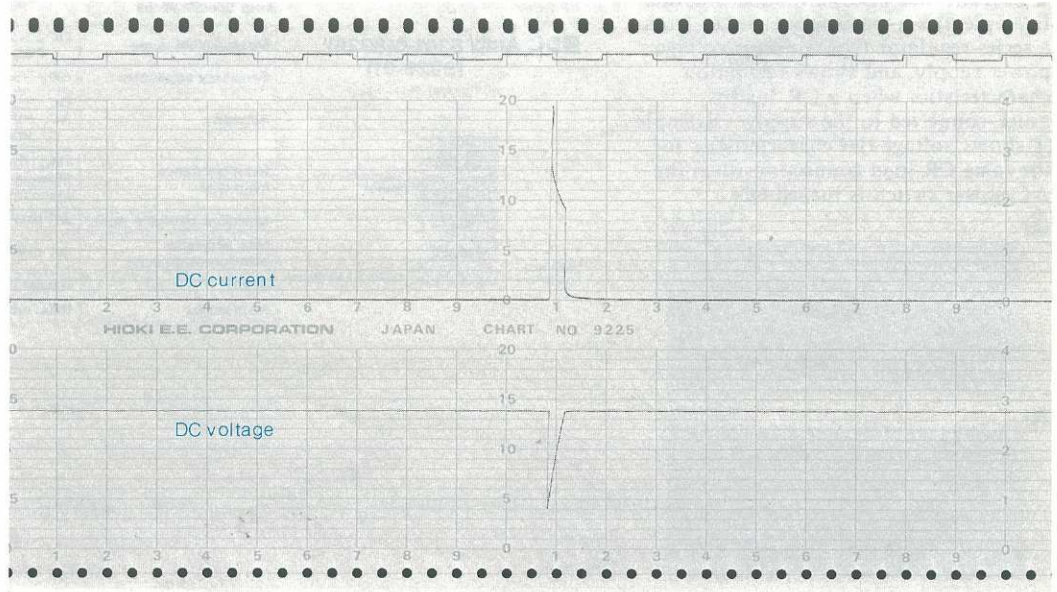
Measurement range	RMS and $\pm 50\%$ f.s. RMS 0.05-0.1-0.25-0.5-1-2.5-5-10-25-50-100-150V/cm, or $\pm 50\%$ of these values in the 50% f.s. RMS range.
Accuracy	2.5% f.s. (DC~10kHz)
Frequency response	DC~20kHz (-3dB)
RMS conversion time	Within 100ms (rise time 0~90% f.s.)
Crest factor	Four (4-times f.s. value) (In $\pm 50\%$ range, 4-times center value.)
Input resistance	2M Ω fixed
Maximum allowable input	DC 1000V, or AC 1000V peak
Accessories	Low-voltage input cable (9116), 1 ea; Standard-voltage input cable (9096), 1 ea.

● Units having both DC and RMS ranges available through special order.

8302 recording examples

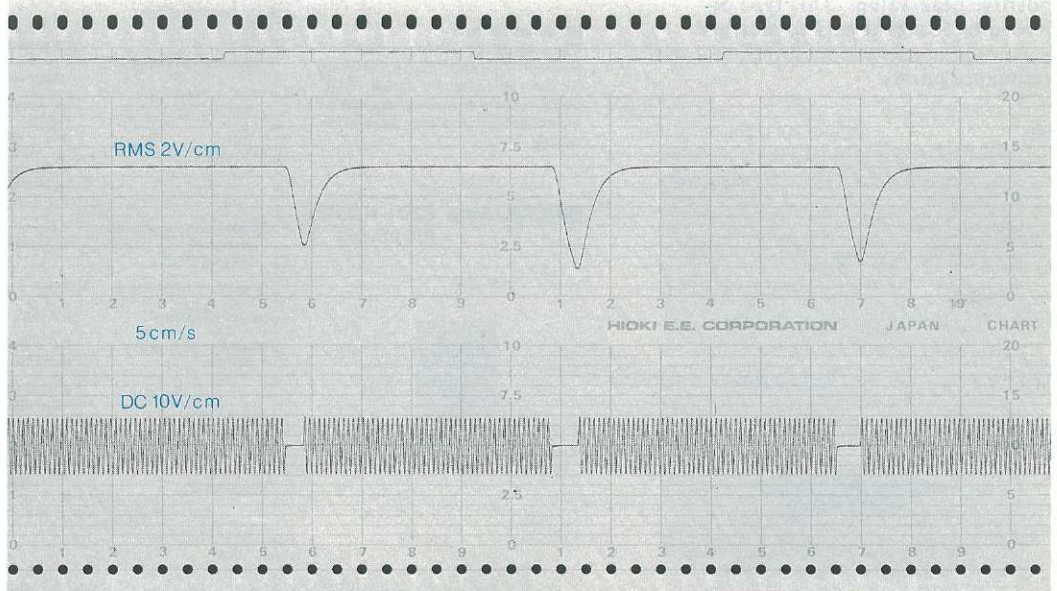
DC-DC

Voltage and current waveform resulting when a CR load is quick-connected to a constant-voltage power supply.



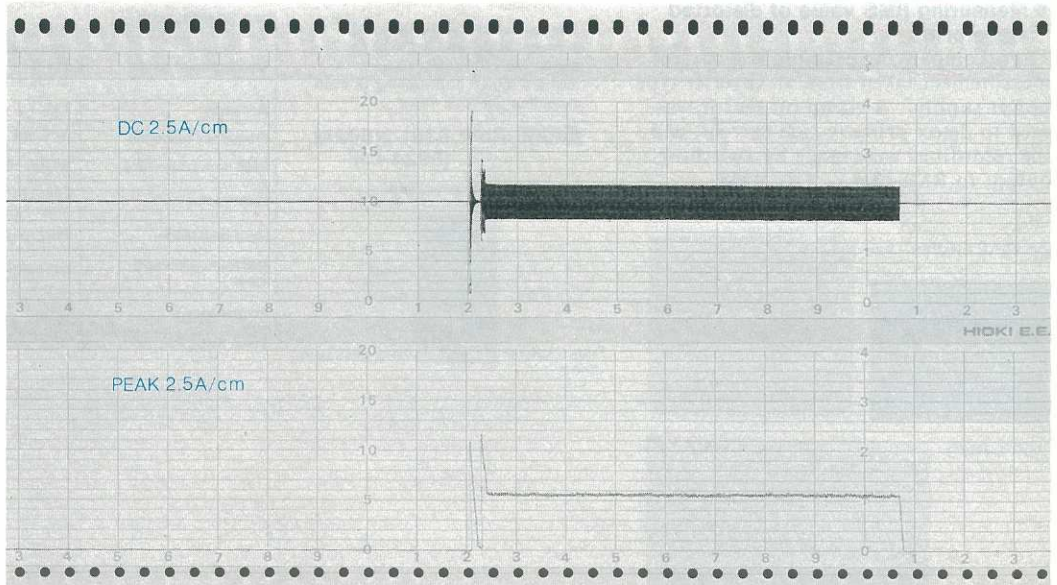
DC-RMS

RMS and DC waveforms produced when an AC power supply is switched OFF.



DC-Peak

Rush current for a switching type power supply.

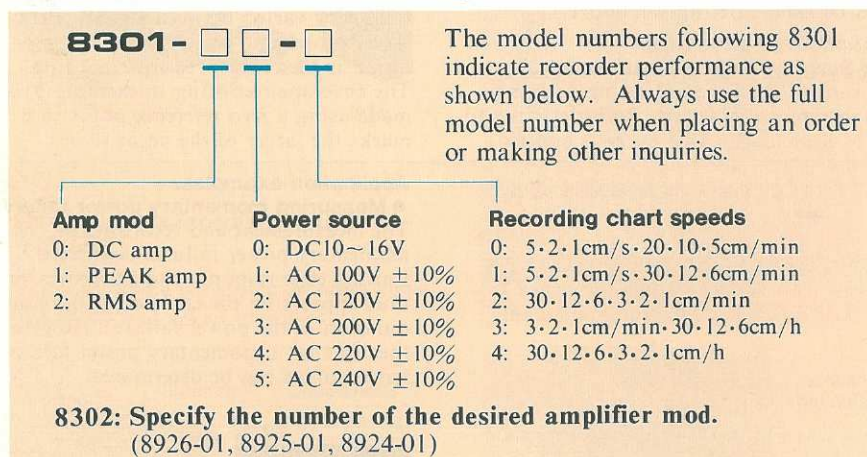


Common Specifications

	8301	8302
Recording method	DC servo, electric-discharge recording	
No. of channels	Waveform recording: 1 CH Marker recording: 1 CH	Waveform recording: 2 CH Marker recording: 1 CH
Recording chart	70mm×30mm roll (9076) Span: 40mm	120mm×30mm roll (9225) Span: 40mm
Zero position adj.	Adjustable to any point within recording span. (Marker fixed.)	
Recording chart speed	Stepper-motor drive (0.075mm steps), 6 speed settings. 0: 5·2·1cm/s·20·10·5cm/min 1: 5·2·1cm/s·30·12·6cm/min 2: 30·12·6·3·2·1cm/min 3: 3·2·1cm/min·30·12·6cm/h 4: 30·12·6·3·2·1cm/h	Stepper-motor drive, 12 speed settings. 5·2·1cm/s 30·12·6·3·2·1cm/min 30·12·6cm/h
Chart feed accuracy	Better than ±1%	
Markers	Straight line recorded by marker electrode.	Square-wave marker recorded using marker electrode signal
Event marker Time marker	Activated by manual switch or EXT. control	Three-step setting, 1 sec, 1 min, 1 hour
External control		TTL level signal (I _{IL} ÷ -0.4mA, I _{IH} = 400μA), or contact signal. Event marker, chart feed START and STOP, EXT clock synchronous chart feed, 0.0375mm per drive motor step.
Signal output		TTL level signal, marker (composite signal for event and time marker), pulse signal used for start, stop, and feed of the chart.
Operating temperature	0~40°C	
Power source/Power consumption	0: DC 10~16V, balanced 12W, unbalanced 50W 1: AC 100V ± 10%, 50/60Hz, bal. 12VA, unbal. 50VA 2: AC 120V ± 10%, 50/60Hz, bal. 12VA, unbal. 50VA 3: AC 200V ± 10%, 50/60Hz, bal. 12VA, unbal. 50VA 4: AC 220V ± 10%, 50/60Hz, bal. 12VA, unbal. 50VA 5: AC 240V ± 10%, 50/60Hz, bal. 12VA, unbal. 50VA * Balanced.....Condition when recording signals of 10Hz or less. * UnbalancedCondition when recording 50Hz, 20mm p-p (approx.) or when pen is moving at normal speed.	AC 100V ± 10%, 50/60Hz, bal. 15VA, unbal. 120VA AC 120V ± 10%, 50/60Hz, bal. 15VA, unbal. 120VA AC 200V ± 10%, 50/60Hz, bal. 15VA, unbal. 120VA AC 220V ± 10%, 50/60Hz, bal. 15VA, unbal. 120VA AC 240V ± 10%, 50/60Hz, bal. 15VA, unbal. 120VA
Dimensions/Weight	148H×118W×337L (mm) 8301-□0 : 3.6kg(approx.), 8301-10 : 3.8kg 8301-□1~5: 4.5kg(approx.), 8301-11~15: 4.7kg	150H×168W×337L (mm) (excluding projections)/Approx. 7.1kg (excluding amplifier)
Accessories	Recording chart (9076), 1 roll; Power source cable (8301-□1~-□5), 1 ea. Spare fuse, 1 ea, 8301-□0(8A), 8301-□1~-□5(2A) (Special accessories for use with recorder mods listed in amp specifications)	Recording chart (9225), 1 roll; Spare fuse, 1; Instruction manual, 1.

* Balanced.....Condition when recording signals of 10Hz or less.
* Unbalanced ...Condition when recording 50Hz, 20mm p-p (approx.) or when pen is moving at normal speed.

Instrument Model Number Coding



Optional Accessories

9076 Recording Chart 10 rolls per box (for 8301)

9225 Recording Chart 10 rolls per box (for 8302)

9108 Battery (for 8301-□□)

Type: Small sealed lead-acid storage battery
Rating: 12V, 2.4A/H
Output protection: Thermal protector device

Max. Continuous Output: 18A
Charging Method: Cycle or trickle charge

Max. charging voltage 14.7V
Quick charge possible (Max. 5A)

Recharge Cycle Life: Approx. 500 times

I/O terminals: DC jack-connector type
Dimensions/Weight: 42W×98L×112H/880g (approx.)



9114 Carrying Case (for 8301)



Holds one 8301 main unit, one battery, and two input cable.

9115 Soft Case (for 8301)



Holds one spare battery, two rolls of chart, and input cable.

9116 Low-Voltage Input Cable

9118 1:1 Input Cable

9119 50:1 Input Cable

9096 Line-Voltage Input Cable

Standard Packing (double carton box)

Models	Sets	N.W.kg	G.W.kg	M ³
8301-□0	4	17	20	0.13m ³
8301-□1~5	4	20	24	0.13m ³
8302	2	15	18	0.13m ³

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