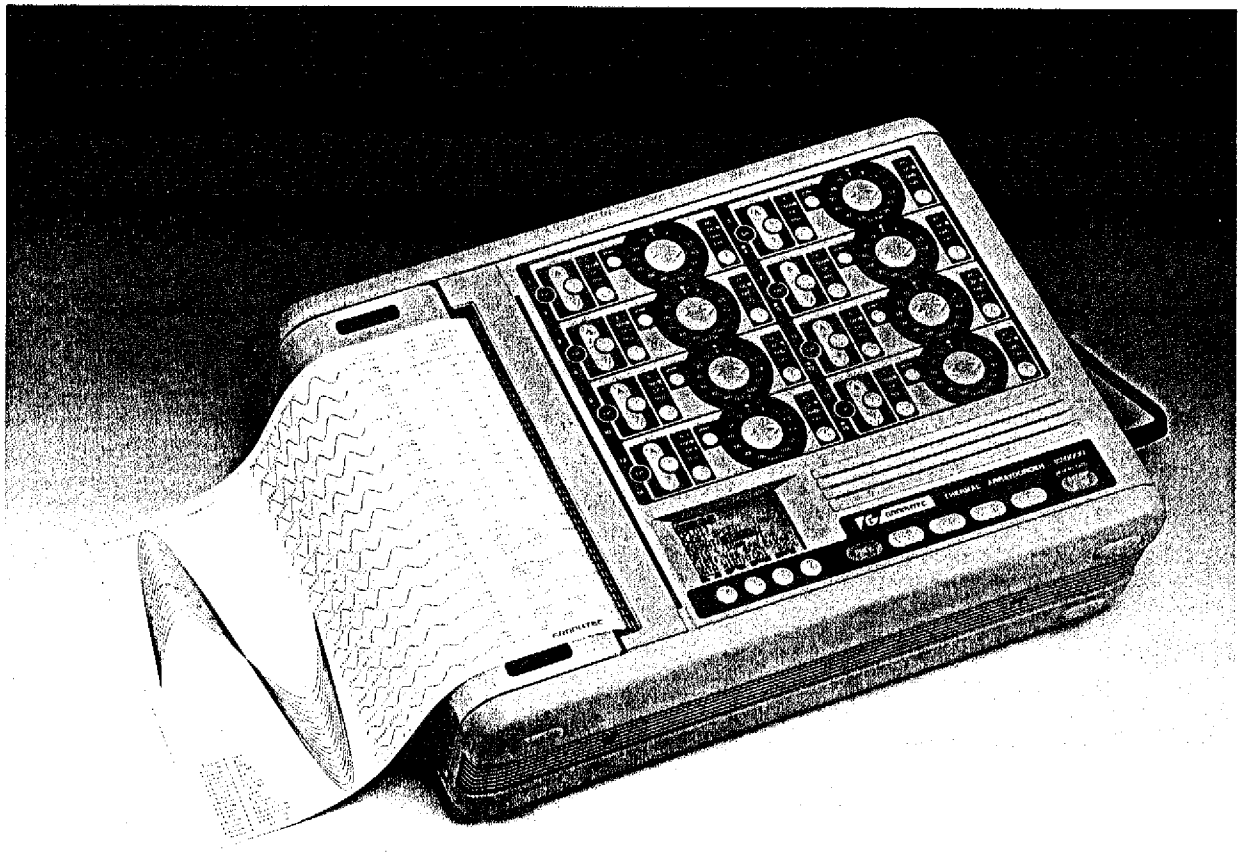
GRAPHTEC

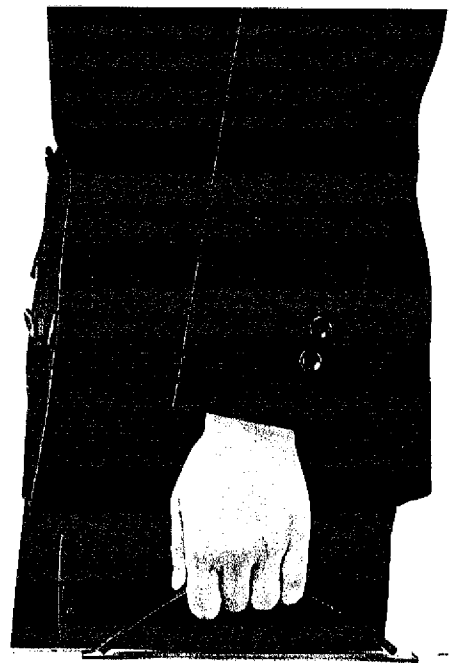
WR8000
Thermal Arraycorder



Portable, Lightweight 8- and 16-Channel Recording Instruments

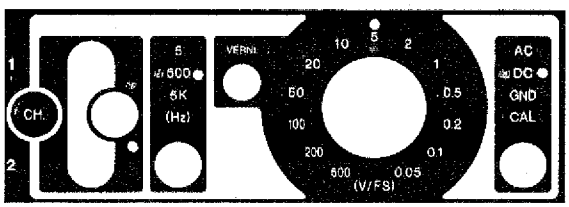
Powerful, Portable Recorders - - - - -

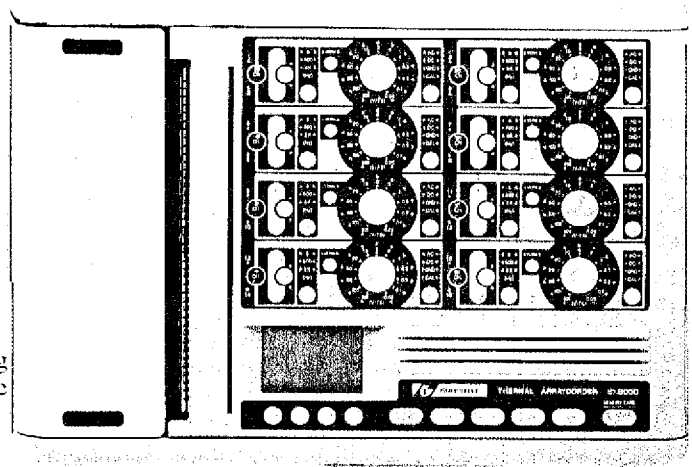
Graphtec's new WR8000 device, the world's first truly portable 16-channel recorder, represents the top end of the company's Thermal Arraycorder family. The WR8000 provides a full 200 mm wide recording width, 8 or 16-channel analog input, high resolution 14-bit A/D converters on each channel and a large front-panel LCD display, all in a package no larger than most briefcases. Acknowledged as a leading supplier of measuring instruments, Graphtec has set a new standard for portable recorders in the 1990s.



Built-in preamplifiers

Our exclusive built-in preamplifiers give you 50 mV to 500 V input ranges with zero suppression, AC and DC coupling, and a variable gain vernier. These are the best, most versatile preamplifiers Graphtec has ever put in a portable Arraycorder. The same keys are used for both channels, with odd number channels indicated by a red LED and even number channels by a green LED.



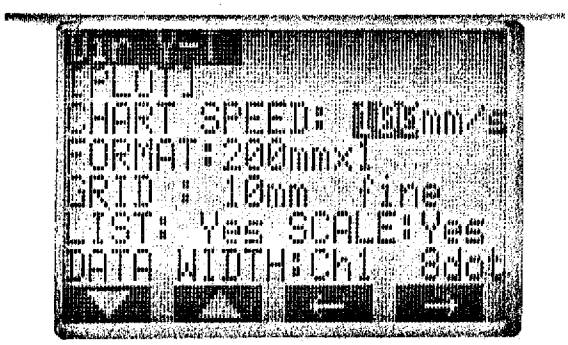


Input waveform monitor

An LED waveform monitor instantly shows you the recording position of each channel, covering the full 200 mm width of the chart paper.

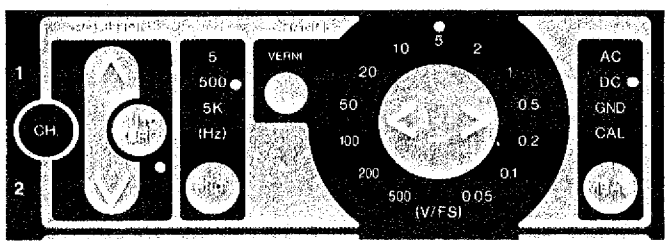
LCD display

With the WR8000's large LCD display, recorder set-up has never been easier or more convenient. Interactive menus help you program recording parameters, chart annotation, memory card settings, and much more. The display also shows you each channel's zero position and the voltage level of your input signals.



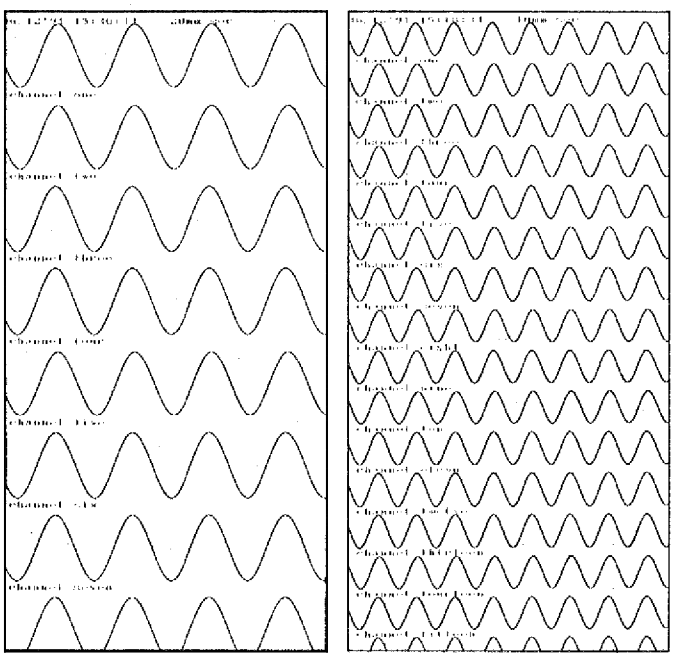
Ideal for Field Use

Up to 16 input channels, with built-in zero suppression



Your choice of 8 or 16 analog inputs

A choice of two models, with 8 or 16 analog recording channels, is available. The WR8000 gives you all the recording channels you need, each with its own annotation, plus "housekeeping" data like chart speed, date and time printed along the side of the chart. You can print your signals on separate grids, or overlap up to 16 signals on one 200 mm wide channel.

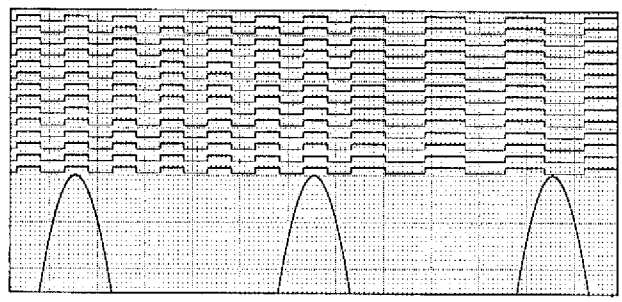


Wide range of voltage inputs

The WR8000's preamplifiers give you measuring ranges from 50 mV to 500 V full scale, with 11 steps in between. If you need a customized measuring range switch on the Gain vernier and set "Full Scale" where you want it, as low as 40% of the calibrated range. The inputs are floating and isolated channel-to-channel and channel-to-ground.

16-channel logic amplifier

If you need to record TTL or contact-closure signals, add the optional Logic Amplifier. In addition to the analog input channels which are provided as standard, it gives you an extra 16 input channels.



Built-in zero suppression

The WR8000 provides built-in zero offset from -260% to +360% of full scale so you can record voltages that are "off ground". Selection of the polarity and amount of offset you need is a straightforward operation using the front-panel LCD display.

Automatic zero calibration

With the WR8000, spending hours setting up your zero positions is a thing of the past. Plug in your input signal, press the AUTO ZERO key, and the WR8000 automatically calibrates to your zero position.

Low pass filter

Built-in low pass filters eliminate unwanted high frequency components from your data. Choose from 5 Hz, 500 Hz or 5 kHz cutoff frequencies. Each is pushbutton-selectable from the front panel.

Sharp, clean traces

With high resolution 14-bit A/D converters on each channel and 8 dot/mm recording density, the WR8000 measures your data faithfully and prints it with exceptional clarity.

Trace overlap

When you're printing data, the WR8000 offers you an unprecedented choice of recording formats. Print each signal on its own separate 10 mm grid, overlap up to 16 signals on one 200 mm-wide grid, or use any of 10 other recording formats.

General Specifications

Measuring functions	Realtime mode: Y-T, logging; Display mode; Memory recording mode: Y-T; Memory output formats: Y-T, X-Y, logging
Number of channels	8 or 16
Input types	Analog voltage
Memory size	16 kwords/channel (1 word = 14 bits)
Recording method	Thermal dot array
Recording density	Y axis: 8 dots/mm; Time axis: 20 dots/mm maximum
Recording paper	PR-231 - roll paper, 210 mm (W) x 40 m (L), black trace
Maximum recording width	205 mm (1,640 dots); Maximum signal amplitude: Y-T mode - 200 mm, X-Y mode - 150 mm
Channel expansion	1 x 200 mm channel, 1 x 160 mm channel, 1 x 100 mm channel, 2 x 100 mm channels, 2 x 80 mm channels, 2 x 50 mm channels, 4 x 50 mm channels, 4 x 40 mm channels, 8 x 25 mm channels, 8 x 20 mm channels, 16 x 12.5 mm channels*1, 16 x 10 mm channels*1 (*1 16-ch. models only)
Grid patterns	Provides 9 selections
Chart speeds	1, 1.25, 2, 2.5, 5, 10, 12.5, 20, 25, 50 mm/min. and hour; 1, 1.25, 2, 2.5, 5, 10, 12.5, 20, 25, 50, 100 mm/s; and synchronized to an external pulse input
Chart feed pitch	0.05 mm/pulse (1 mm/20 pulses)
Chart feed method	Friction feed
Chart feed accuracy	±2% ±0.5 mm
Operating environment	5 to 40°C, 35 to 85% RH
Power requirements	100 V AC series: 100 to 120 VAC ± 10% 200 V AC series: 200 to 240 VAC ± 10%
Power consumption	190 VA maximum
Dimensions	405 (W) x 290 (D) x 120 (H) mm; 16 (W) x 11.4 (D) x 4.7 (H) inches (excluding the rubber feet); height of rubber feet: 6 mm
Weight	Approximately 10 kg (22 lbs)

Analog Input Specifications

Input type	Single ended floating
Input impedance	1MΩ (between + and - terminals)
Input coupling	DC or AC coupling
Measuring ranges	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500 V/full scale
Sensitivity adjustment	Gain vernier allows you to set full scale anywhere from 40% to 100% of calibrated range
Measuring accuracy	Normal mode:± 0.3% of full scale; Offset mode: ±1.0% of full scale
Maximum input voltage	Between + and - input terminals: 500 V DC and AC p-p; between input terminals and chassis: 250 V AC rms
CMRR	100 dB typical (at 50 or 60 Hz)
A/D conversion	14 bits, 1 A/D converter per channel
Filter	5 Hz, 500 Hz, 5 kHz (-3 dB), OFF
Zero position	Normal mode: -10% to +110% of full scale; Offset mode: -260% to +360% of full scale (maximum input 500 V DC or peak AC)
Automatic zero calibration	Zero position is automatically calibrated to a user-supplied input signal

Realtime Y-T Recording

Sampling interval	500 µs
Recording interval	1.25 ms (at 50, 100 mm/s chart speeds); 2.5 ms (up to 25 mm/s chart speeds)
Recording density	8 dots/mm at a chart speed of 100 mm/s; 16 dots/mm at chart speeds of 12.5, 25, 50 mm/s; 20 dots/mm at charts speeds of 20, 10 or less than 10 mm/s
Frequency response	DC coupling: DC to 500 Hz (-3 dB); AC coupling: 10 Hz to 500 Hz (-3 dB)
Recording length	Continuous or programmable for a length of time or length of chart paper
Real/memory function	During realtime recording, a trigger signal causes a switch to memory recording. In this mode the sample interval is 500 µs
Annotation	Date, time, chart speed, channel annotation, channel number, list printout

Memory Recording

Sampling interval	10, 20, 50, 100, 200, 500 µs; 1, 2, 5, 10, 20, 50, 100, 200, 500 ms; 1, 2, 5 s
Time axis resolution	25 to 1,600 points/div.
Frequency response	DC coupling: DC to 10 kHz (10 samples/cycle, -3 dB); AC coupling: 10 Hz to 10 kHz (10 samples/cycle, -3 dB)
Memory blocks	From 16 kwords/channel to 128 kwords/channel in 4 steps
Memory segmentation	Two 8 kword memory blocks or one 16 kword block
Replay function	Captured data can be replayed in Y-T, X-Y and logging formats
Time axis format for Y-T output	Standard: 10 mm/div.; Expanded: x2, x4, x8; Compressed: x1/2, x1/4, x1/8; A4
Interpolation	Line
Recording range specification	In 10% steps from the trigger point
Annotation	Trigger marks, time axis scale, channel numbers, channel annotation, scale printing, list, trigger times, print numbers, distance marks

X-Y Recording

Channel configuration	Any channels can be programmed for X and Y input (one X channel, up to 3 Y channels)
Memory mode sampling interval	Depends on Y-T memory mode setting
Grid pattern	10 divisions, fixed
Partial memory output	From 0% to 100% of the selected memory size can be output in 10% steps

Logging Recording

Output parameters	Realtime: Date, time and actual values for each channel (in 8-channel blocks); Memory: Time from trigger point, actual values for each channel (in 8-channel blocks)
Recording interval	Realtime logging: 1s, 10s, 1 min, 10 min
Sampling interval	Realtime logging: Same as for realtime recording; Memory logging: Depends on Y-T memory mode setting
Partial memory output	From 0% to 100% of the selected memory size can be output in 10% steps (memory logging only)
Annotation	Average, maximum and minimum values for each channel, list printing

Display

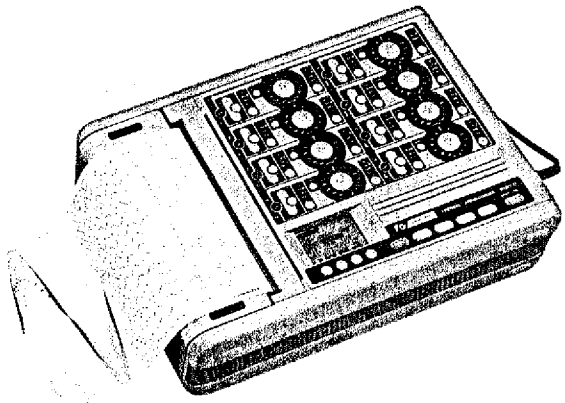
Display screen	Backlit LCD
Dot density	120 x 64 dots
Items displayed	Set-up menus, zero position values (%), input data values (mV, V)

Trigger

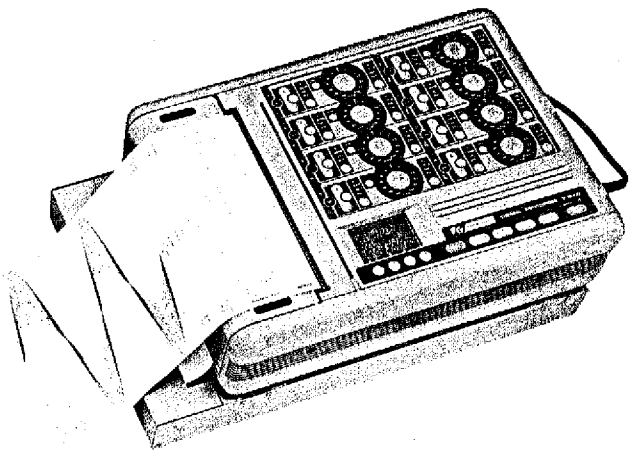
Trigger modes	Manual, External, A, B, A or B, A and B, Window In, Window Out, All OR, All AND
Trigger conditions	Manual: Start/stop key or TG0 command via the interface; External: TTL "L" level, shorted to GND, or contact closure signal; Other: Menu-specified
Trigger slope	Rising or falling
Trigger channels	1 to 8 (16 if 16-channel model)
Trigger level	From 0 to 100% of full scale in 1% steps
Trigger functions (realtime mode only)	Start, stop, start & stop, trigger memory, trig & trig, trigger zoom
Trigger delay	-100% to +100% (memory mode)
Trigger action (memory mode only)	Single: only one triggering signal is recognized; Repeat: The recorder rearms automatically following a triggering signal

Other Functions

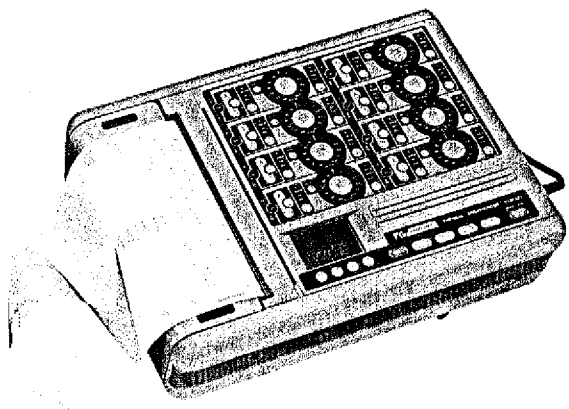
Channel annotation	Up to 64 characters per channel
Interface	RS-232C functions: data transmission, remote control, readout of recording parameters; baud rates: 9600, 4800, 2400, 1200, 600, 300; data length: 7 or 8 bits; parity: even, odd, or none; stop bit(s): 1 or 2
List print	Details of all parameters can be printed at the end of each record
Trace intensity/width	Trace intensity is adjustable and width is programmable from 8 selections in the range 0.1 mm to 1.0 mm (approx.) for each channel.
Channel ID	All traces are identified in overlapped recording modes (can be turned on or off)
Clock	Records and displays date and time
Battery back-up	Clock is backed up by a built-in battery (life is approx. 1 month on a full charge)
Reprint	Data captured in the Memory Y-T mode can be printed in Y-T, X-Y and Logging formats
Optional trigger	Trigger input can be restricted to a specified time or during a specified interval (memory Y-T mode)
Auto start	If a power outage occurs, the WR8000 will automatically resume operating when power is restored (effective in Direct Y-T, Memory Y-T and Logging modes)
Engineering units	Up to 6 characters can be programmed for each channel instead of the mV and V units
Remote control	Start and stop, external feed synchronization, external control via remote signals
Beeper	Beeper sounds on key input, trigger input, and when an error occurs
Key lock	Amplifier operation keys, recorder data settings and all other setttings (except for the key lock setting) can be locked



Standard 8-channel or 16-channel model with AC drive



With B-330 - optional Z-fold paper unit



With B-332 - optional 12 V DC drive

Logic Amplifier Specifications

Number of inputs	16 channels in four groups of four
Input level	1) 0 to + 24 V (max) Threshold level: +1.4 or +2.5 V (switchable for each group of four channels individually) 2) Contact input H: Open input terminal (50 kΩ min) L: Short input terminal to GND terminal (1 kΩ max) *Note* Threshold level is set to +1.4 V
Input configuration	Single ended (ground level is common to all channels)
Sampling interval	Realtime Y-T: From 1.25 ms to 180 s depending on the chart speed Memory Y-T: Depends on memory sampling interval
Trigger setting	16 channels, all OR or all AND 16 15 14 13 12 . . . . . 1 H L X X L . . . . . L H: High level L: Low level X: Don't care
Print on/off	Set for groups of four channels in menu screen

DC/AC Power Supply Unit

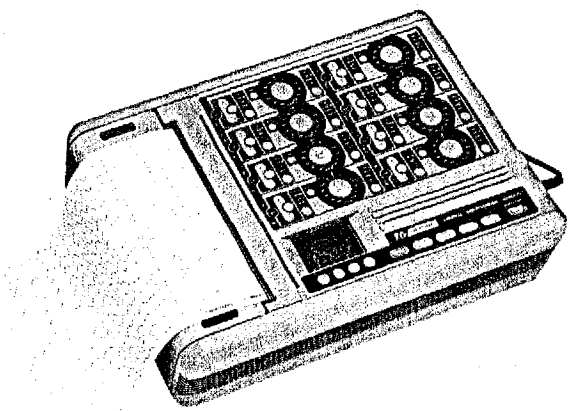
Input voltage and current	12 V DC (rated) 11 to 17 V, 17 A (rated input, maximum load) 100 V Series: 100 to 120 V AC (rated) ±10% 200 V Series: 200 to 240 V AC (rated) ±10% *Note:* 100 to 120 or 200 to 240 V AC must be specified at the time of ordering
Input power capacity	DC input: 200 VA (at rated input and maximum load); line power: 190 VA (AC rated input and maximum load)
Inverter output capacity	190 VA (maximum)
Operation method	Continuous line power
Output switching time	80 ms (maximum)
Output switching detection level	(1) DC inverter output switched in when the voltage drops to approx. 80% of the rated voltage. (2) Line power is restored when the voltage rises to approx. 85% of the rated voltage.

Z-fold Paper Unit Specifications

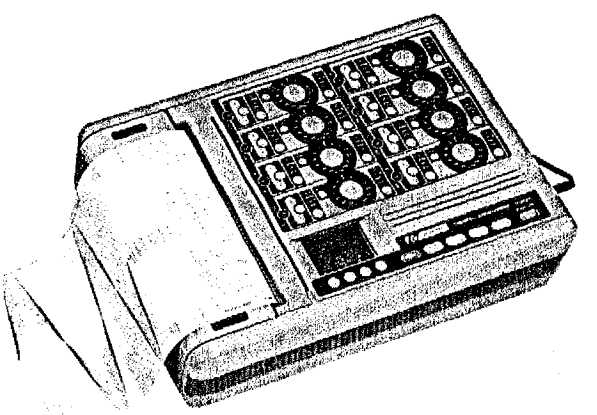
Recording paper	PZ-231 thermal-sensitive Z-fold paper, 100 m length
Maximum chart feed speed	25 mm/s
Dimensions	470 (W) x 290 (D) x 55 (H) excluding height of the rubber feet (rubber feet: 14 mm)
Weight	Approximately 3.3 kg

GP-IB Interface Specifications

Standard	Conforms to IEEE Std 488
Control functions	Amplifiers, control panel operation, menu settings
Transmission data	Control panel and menu setup conditions; amplifier setup conditions; data recorded in memory mode, direct logging mode
Interface settings	DIP switch setting of address and mode; menu selection of GP-IB or RS-232C interface



With B-333 - optional logic amp, GP-IB interface



With B-334 - optional 12 V DC drive, logic amp, GP-IB interface