Data loggers/Thermometers/Scanner

Portable Logger Suitable for Field Data Logging

R7326A/7326B

■ **High Scanning Speed of Up to 60 Points/200 ms with High Precision**
Maximum speed: (DC voltage measurement, calibration OFF, at FIFO buffer memory)
60 points/200 ms (Semiconductor scanner)
60 points/500 ms (Mechanical scanner)
■ **Maximum Input Channel of 60 Channels + Pulse (2 Points)**
■ **Compact Size and Light Weight (Approx. 10 kg, 20 ch)**
■ **Built-In Large-Capacity Buffer Memory of 512 K to 2 MBytes (Optional)**

(Photo is R7326B)

R7326A/7326B
Data Loggers

The R7326A/7326B are compact and light weight portable loggers suitable for on-site measurement in automobile, machine industries and plants for simplified logging of electrical component data. In particular, provided with DC power supply, standard floppy disk drive, temperature/voltage/pulse measurement capabilities, compact size and light weight, the R7326B allows configuration of optimum applications. When used together with a controller, the R7326A best suits applications in which immunity to environment is required as a data logging terminal.

■ Number of Measurement Points

The measurement input configuration is based on terminals and scanners. Terminals and scanners come with two types and can be used together.
A single set allows up to 20 measurement points and up to three sets can be installed on for a single R7326A/7326B.

■ Portable and Powerful for On-Site Measurement

■ 3-Way Power Supply

An AC power supply is available for use in laboratories and a 12- to 24-VDC power supply for mobile use. In addition, the use of the R15806 battery pack (optional) makes it possible to make measurement for more than one hour in places without power lines.

■ Data Logging Software Available (Optional Accessory)

■ Portable Measurement

By storing measured data in the built-in buffer memory, low-power measurement is realized.
With DC-powered operation, it is very convenient to store measured data in floppy disks with the MS-DOS format for off-line processing on a personal computer (R7326B only). By connecting a notebook personal computer and the logger through EIA-232D, online processing can be performed on measurement sites.

■ Large-Capacity Buffer Memory with a Capacity of 512 K to 2 Mbytes

Example of the number of captured date items and capturing time (when the buffer memory is used)
With a Semiconductor scanner (With 1ms integration time), for DC voltage measurement

Number of scan channels(SC)	Memory capacity (M)	Store mode	Number of data items (D)	Number of logging items (LN)	Logging time (L1) (ms)	Maximum continuous logging time (m)
60	524,288 (512 kB)	fix,ring	83,520	1,392	200 to 300	4.6
20	524,288 (512 kB)	fix,ring	77,060	3,853	100 to 200	6.4
Calculation	–	–	D=SC* (M/(SC*6+16)-2)	LN=D/SC	–	–

■ Standard MS-DOS Format Floppy Disk Drive (R7326B Only)

Examples of the number of captured date items and capturing time (When floppy disks are used)
With a semiconductor scanner, for voltage measurement

Number of scan channels(SC)	Memory capacity (M)	Type	Number of data items (D)	Number of logging items (LN)	Logging time (L1) (s)	Maximum continuous logging time (m)
60	730,112 (720 KB)	2DD	56,916	948	4	63.2
20	730,112 (720 KB)	2DD	52,128	2,606	2	86.9
Calculation	–	–	D=0.9*SC* (M/(32+(11*SC))-1)	LN=D/SC	–	–

■ Standard GPIB and EIA-232D* Interfaces

* Compatible with RS-232C.
Throughput including data transmission
with fifo (CAL OFF)

Scanner type	Integration time	DC voltage			Temperature		
		20 CH	40 CH	60 CH	20 CH	40 CH	60 CH
Semiconductor	1 ms	100 ms	200 ms	200 ms	300 ms	400 ms	500 ms
	1 PLC	500 ms	1.0 s	1.4 s	700 ms	1.2 s	1.7 s
Mechanism	1 ms	200 ms	400 ms	500 ms	400 ms	600 ms	800 ms
	1 PLC	600 ms	1.1 s	1.7 s	800 ms	1.4 s	2.0 s

With out fifo, GPIB trans mission included (CAL OFF) *With the PC-9801T

Scanner type	Integration time	DC voltage			Temperature		
		20 CH	40 CH	60 CH	20 CH	40 CH	60 CH
Semiconductor	1 ms	200 ms	300 ms	400 ms	300 ms	400 ms	500 ms
	1 PLC	500 ms	1.0 s	1.4 s	700 ms	1.2 s	1.7 s
Mechanism	1 ms	200 ms	400 ms	500 ms	400 ms	600 ms	800 ms
	1 PLC	600 ms	1.1 s	1.7 s	800 ms	1.4 s	2.0 s

High Scanning Speed of 60 ch/200 ms

R7326A/7326B

Specifications

Input

Number of input points: (Can be extended in units of 20.)
Solderless terminal/Clamp terminal: 20 to 60 points
Pulse input: 2 points

Input scanner type:
Mechanical scanner: Low-cost scanner using mechanical relays
Semiconductor scanner: High-speed and high-endurance scanner using semiconductors

Input signal type:
Thermocouple type: T, J, E, K, S, R, B, N, W
DC voltage: ±50 mV, ±500 mV, ±5 V, ±50 V
Non-voltage contact: ON for 2 k Ω or less/OFF for 30 k Ω or more
Pulse: Accumulation, 1-second gate, measurement capacity of 51999
Contact input: 10 Hz max. (With a chattering of 30 ms or less and a pulse width of 50 ms or more)
Non-contact input: 10 kHz max., TTL level

Voltage measurement range and accuracy:
Guaranteed for six months at an ambient temperature of 23°C ± 5°C and a relative humidity of 80% or less.

High-precision DC voltage measurement: (with an integrating time of 1 PLC to 5 PLC)

Type	Resolution	Measurement range	Accuracy
50 mV	1 μV	-51.999 to +51.999 mV	±0.04% of rdg. ± 6d
500 mV	10 μV	-519.99 to +519.99 mV	±0.03% of rdg. ± 2d
5 V	100 μV	-5.1999 to +5.1999 mV	±0.03% of rdg. ± 2d
50 V	1 mV	-51.999 to +51.999 mV	±0.03% of rdg. ± 2d

High-speed DC voltage measurement (with an integrating time of 1 ms to 10 ms)

Type	Resolution	Measurement range	Accuracy
50 mV	1 μV	-51.999 to +51.999 mV	±0.04% of rdg. ± 80d
500 mV	10 μV	-519.99 to +519.99 mV	±0.03% of rdg. ± 6d
5 V	100 μV	-5.1999 to +5.1999 mV	±0.03% of rdg. ± 3d
50 V	1 mV	-51.999 to +51.999 mV	±0.03% of rdg. ± 3d

Measurement range and accuracy: Guaranteed for six months at an ambient temperature of 23°C ± 5°C and a relative humidity of 85% or less.

High-precision temperature measurement: (with an integrating time of 1 PLC to 5 PLC)

Type	Resolution	Measurement range	Accuracy
T	0.1°C	-260 to -250°C	±0.5% of rdg. ±3.8°C
		-250 to -180°C	±0.1% of rdg. ±1.4°C
		-180 to +400°C	±0.04% of rdg. ±0.5°C
J	0.1°C	-210 to 0°C	±0.04% of rdg. ±0.8°C
		0°C to +1200°C	±0.04% of rdg. ±0.3°C
E	0.1°C	-270 to -250°C	±0.8% of rdg. ±3.9°C
		-250 to -200°C	±0.1% of rdg. ±1.1°C
		-200 to +1000°C	±0.04% of rdg. ±0.4°C
K	0.1°C	-270 to -250°C	±1.0% of rdg. ±7.0°C
		-250 to -200°C	±0.2% of rdg. ±2.0°C
		-200 to +1372°C	±0.04% of rdg. ±0.6°C
S	0.1°C	-50 to 0°C	±0.04% of rdg. ±1.7°C
		0 to +500°C	±0.04% of rdg. ±1.3°C
		+500 to +1769°C	±0.04% of rdg. ±0.7°C
R	0.1°C	-50 to 0°C	±0.04% of rdg. ±1.7°C
		0 to +350°C	±0.04% of rdg. ±1.3°C
		+350 to + 1769°C	±0.04% of rdg. ±0.7°C
B	0.1°C	+100 to +500°C	±0.05% of rdg. ±7.0°C
		+500 to +1140°C	±0.04% of rdg. ±1.4°C
		+1140 to +1820°C	±0.04% of rdg. ±0.7°C
N	0.1°C	0 to +1300°C	±0.04% of rdg. ±0.7°C
W	0.1°C	0 to +300°C	±0.04% of rdg. ±1.2°C
		+300 to +2320°C	±0.04% of rdg. ±1.4°C

High-speed temperature measurement: (with an integrating time of 1 ms to 10 ms)

Type	Resolution	Measurement range	Accuracy
T	0.1°C	-250 to -180°C	±0.2% of rdg. ±13.5°C
		-180 to +400°C	±0.04% of rdg. ±4.5°C
J	0.1°C	-210 to 0°C	±0.04% of rdg. ±4.3°C
		0 to +1200°C	±0.04% of rdg. ±1.7°C
E	0.1°C	-250 to -200°C	±0.2% of rdg. ±5.1°C
		-200 to +1000°C	±0.04% of rdg. ±3.3°C
K	0.1°C	-250 to -200°C	±0.3% of rdg. ±20.3°C
		-200 to +1372°C	±0.04% of rdg. ±5.5°C
S	0.1°C	-50 to 0°C	±0.04% of rdg. ±1.7°C
		0 to +500°C	±0.04% of rdg. ±1.3°C
		+500 to +1769°C	±0.04% of rdg. ±0.7°C
R	0.1°C	-50 to 0°C	±0.04% of rdg. ±20.3°C
		0 to +350°C	±0.04% of rdg. ±1.3°C
		+350 to + 1769°C	±0.04% of rdg. ±0.7°C
B	0.1°C	+500 to +1140°C	±0.02% of rdg. ±16.2°C
		+1140 to +1820°C	±0.04% of rdg. ±8.1°C
N	0.1°C	0 to +1300°C	±0.04% of rdg. ±3.5°C
W	0.1°C	0 to +300°C	±0.04% of rdg. ±6.6°C
		+300 to +2320°C	±0.04% of rdg. ±5.4°C

About temperature measurement accuracy:
(Reference contact compensation angle is not included.)
Calibration of T, J, E, K, S, R, and B is performed, conforming to JIS-C1602-1981.
Calibration of N depends on the NBS table.
Calibration of W depends on Hoskins calibration table.

Input terminal type: Solderless type/Clamp type, 2-terminals, 2-wire

Thermocouple disconnection detection: 2 k Ω or less: Normal
30 k Ω or more: Disconnected

Input impedance: 100 M Ω or more (10 M Ω ±0.5% for 50-V range)

Allowable applied voltage:

Noise rejection: (With an integrating time of 1 PLC or more)

Item	Thermocouple/voltage measurement
Between terminals of the same channel	±100 V
Between terminals of different channels	±250 VDC
Between input terminal and chassis	

AC effective CMRR: 120 dB or more (with an imbalance of 1 k Ω and an AC frequency of 50/60 Hz ±0.1%)
DC effective CMRR: 120 dB or more (with an imbalance of 1 k Ω)
NMRR: Approx. 60 dB (at an AC frequency of 50/60 Hz ±0.1%)
Cross-talk: 110 dB or more (between channels, at DC voltage)

Pulse measurement range and accuracy: Guaranteed for six months at an ambient temperature of 0 to +50°C and a relative humidity of 80% or less

Type	Measurement range	Gate time accuracy
Counter mode (1 second)	0 to 10.000 kHz*	+0.006% of rdg. ± 1 digit
Total mode	0 to 51999	Log time error ± 100 ms

* Display range: 0 to 51.999

Reference contact compensation: Internal/External selectable
< Internal> Terminal board temperature measurement system

Linearization: Digital correction system

Portable Logger Suitable for Field Data Logging

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Measurement Operation
Measurement commands:
Log scan: Scans the specified channel at specified intervals to log data.
Single log scan: Scans the specified channel once only to log data.
Call channel scan: Displays 2 points at intervals of approx. 1 second.
Measurement modes:
Log mode: Performs fixed-time log scan and outputs data.
Alarm 1 mode: Performs fixed-time log scan and outputs data if an error occurs for the first time.
Alarm 2 mode: Performs fixed-time log scan and outputs data if an error occurs for the first time or when an error is cancelled.
Log/alarm mode: Performs fixed-time log scan and outputs data for duration of an error.
Settings
Scan format:
Date/time: Year, month, day / hour, minute
Scanned channel: Start and end channels can be set.
Log scan interval: Continuous to 24 hours (at 100-ms intervals)
Measurement mode: Log, Alarm 1, Alarm 2, Log/alarm
Integrating time: Selected from 1 ms, 5 ms, 10 ms, 1 PLC, 2 PLC, or 5 PLC.
Scan speed:

Scanner type	Integrating time	DC voltage measurement			Temperature measurement		
		20 ch	40 ch	60 ch	20 ch	40 ch	60 ch
Semiconductor scanner	1 ms	100 ms	200 ms	200 ms	300 ms	400 ms	500 ms
	1 PLC	500 ms	1.0 sec	1.4 sec	700 ms	1.2 sec	1.7 sec
Mechanical scanner	1 ms	200 ms	400 ms	500 ms	400 ms	600 ms	800 ms
	1 PLC	600 ms	1.1 sec	1.7 sec	800 ms	1.4 sec	2.0 sec

Channel group:
Range: 9 types of thermocouples, 4 types of DC voltages, one type of contact input, 2 types of input pulses
Scaling: Calculated from expression (X-A)/B, where X is a measured value.
A and B can be set within the range from 0.0000 to ±9.9999,
Primary operation:

Item	Contents
ΔI	Difference from the initial value
ΔN	Difference from any input point

Upper limit: Upper alarm limit set for each channel
When data > upper limit value, an alarm occurs.
Lower limit: Lower alarm limit set for each channel
When data < lower limit value, an alarm occurs.
Floppy disk: (R7326B only)
Media: 3.5 inch-2DD/2HD, MS-DOS format
Buffer memory (Option):
- OPT. 7326A/B+80 (512KB)
- OPT. 7326A/B+82 (2MB)

Memory select: fix. ring, fifo
fix: Stores measured data in succession until memory full occurs. If memory full occurs, stops storing data automatically.
ring: Stores measured data in succession until memory full occurs. If memory full occurs, replaces old data with new data.
fifo: If data output speed cannot follow measurement speed, fifo memory is used for buffering.

Display
Display system: 16 characters × 2 lines, LCD character mode (Back light can be turned on or off.)
Displayed items: Time, call channel measured data, indicators, parameter settings
External Control
External input:
External log scan start input (EXT START): Log scan can be started and stopped by means of external contact.
External single log scan start input (EXT SRQ): Single log scan can be started by means of external contact input.
External SRQ input (EXT REQ): Service request via GPIB is possible by means of external contact input.
External output:
Alarm output (ALARM OUT): Contact output is ON during alarm occurrence (1 point).
External start output: Turns contact output on during log scan operation, to connect to log scan start input of other loggers.
Log busy output (LOG BUSY): Notifies log scan measurement by means of negative-logic voltage level.
External Control:
GPIB interface:
Settings: All parameter settings can be controlled.
Output: Time and measured data can be output with four different formats.
Control signal mode: Remote/local selectable
Talk-only function
SRQ issuance
Measurement end, Syntax error, Alarm generation, Memory full or SRQ by means of external contact, Query data error, etc.
Electrical/mechanical specifications: Conforming to IEEE Std. 488-1978
Interface functions: SH1, AH1, T5, L4L SR1, RL1, PP0, DC1, DT1, C0, E2
Serial interface:
Standard: EIA-232D (Compatible with RS-232C.)
Synchronization: Start-stop
Busy control: XON/XOFF control
Transmission rate: 19200, 9600, 4800, and 2400 bps
Word configuration: Data: 8 bits
Parity: NON/EVEN/ODD
Start bit: 1 bit
Stop bit: 2 bits

High Scanning Speed of 60 ch/200 ms

R7326A/7326B

General Specifications

A/D conversion system: Variable integrating type (with an integrating time of 1 ms, 5 ms, 10 ms, 1 PLC, 2 PLC, 5 PLC)
Input system: Floating system
Power failure processing: Protects parameter settings, contents of data buffer memory and clock operation. When a battery pack is installed, battery-powered operation mode is entered automatically.
Battery: Nickel cadmium battery
Time stability: 5 seconds/day or less
Panel lock: Panel operation is disabled by lock condition.
Operating environment:

	R7326A	R7326B
Operating temperature range	±0°C to +40°C *1 +0°C to +50°C *2	+5°C to +40°C
Relative humidity	80% or less	80% or less
Storage temperature range	-20°C to +65°C	-20°C to +60°C
Storage relative humidity	90% or less	90% or less

*1 With battery pack *2 Without battery pack

Power supply: AD/DC battery (Optional battery pack: R15806)
Power consumption: 70 VA or less (R7326A/R7326B)
Power requirement modification: Specified at the time of ordering.

Option No.	Standard	40
Power voltage	90 V to 132 V	198 V to 250 V

Dimensions: Approx. 350(W) × 132(H) × 450(D) mm
Mass: 11 kg max.
Accessories

Item	Model
Power cable	A01402

Options
Data buffer memory: 512 kbytes

Option No.	80	82
Memory capacity	512 kbytes	2 Mbytes

Accessories (Optional)

R73201A Solderless Terminal (20 ch)
R73201B Clamp Terminal (20 ch)
R73202A Mechanical Scanner (20 ch)
R73202B Semiconductor Scanner (20 ch)
R15806 Battery Pack
R16069 Transit Case
A02307 Panel Mount Set
A02462 EIA Rack-Mount Set
A02262 JIS Rack-Mount Set
A02702 Handle Kit
A01906 Charger Cable
A01242-200 PC98 RS-232C Connection Cable
A01282 RS232 Connection Cable for DOS/V
TR1103-100 Sheath-Type T Thermocouple
TR1103-110 Sheath-Type J Thermocouple
TR1103-120 Sheath-Type E Thermocouple
TR1103-130 Sheath-Type K Thermocouple
TR1108-001 Sheet-Type T Thermocouple
TR7021 Automatic Reference Cold Contact Unit

PR732603-FK Data Logging Software (for Windows95)

Windows95 compatible data logging software packages are available for the R7326A/B automatic measurement systems (RS-232 or GPIB).

Data logging function

Number of connected data loggers ; No. of ports (RS-232) or 15 (GPIB)
Number of channels : 900 max. (with 15 loggers) depending on the number of connected data loggers
Measuring interval: 3 seconds to 24 hours (depending on the number of channels, computers, etc.)
Data is saved in real-time on the hard disk, etc.
Data is displayed as all-channel values, values, history, or graphic windows. The contents of displays are refreshed real-time for each measurement.

Data processing function

Numeric display: The numeric display of data from a selected file; data can be added, deleted, or edited.
Graphic display: Graphic display of data from a selected file
Tabulation: Integration, maximum, maximum activation time, minimum, minimum activation time, or numbers may be selected for tabulation.
Data processing
Outputs intervals and day range data.
Outputs monthly and annual data after tabulation.

Battery Pack: R15806

Used cell: Compact sealed lead acid battery
Operating time: From full charge
Continuous floppy disk drive operation: Approx. 40 minutes
Without floppy disk drive operation: Approx. 1 hour
Charging time: When mounted on the main unit: Approx. 10 hours
When the following recommended charger is used:
Approx. 4 hours
Weight: 1.3 kg max.
Recommended charger: BQ-50106T (Matsushita Electric)
For connection of the R15806 and the charger, use optional charger cable (A01906).

Recommended External Thermal Printer:

Manufacturer: Epson
Main unit: TM-T88M (EIA-232D)
AC power unit: PS-170
Printer paper: NTP080-80
Connection cable: A01242

Note: No terminal or scanner is supplied for the R7326A/7326B main unit. At the time of ordering, also order terminals and scanners for necessary number of channels.

Can be purchased directly from the manufacturer or through ADVANTEST (a handling fee will be added). In all cases, see the manufacturer regarding maintenance or other points.