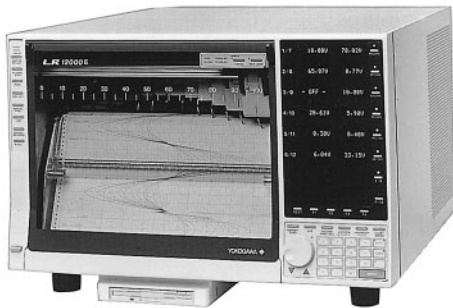# LR SERIES RECORDERS

YOKOGAWA ◆

## 3702/3701/3711 & 3712/3721 & 3722 Recorders
## LR12000E/LR8100E/LR4100E/LR4200E



**LR12000E**
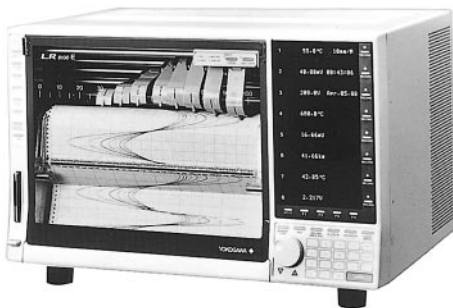438 × 301 × 470 mm  20.5 kg
(17.24 × 11.85 × 18.51"   45.2 lbs)

★
Safety Standards; EN61010-1
EMI Standard; EN55011 Group 1 Class A
Immunity Standard; EN50082-2 : 1995

RS-232-C
GP-IB



**LR8100E**
438 × 301 × 346 mm  18.5 kg
(17.24 × 11.85 × 13.62"   40.8 lbs)

★
Safety Standards; EN61010-1
EMI Standard; EN55011 Group 1 Class A
Immunity Standard; EN50082-2 : 1995

RS-232-C
GP-IB



**LR4110E**
438 × 234 × 343 mm  14.5 kg (4-pen)
(17.24 × 9.21 × 13.51"   32.0 lbs)

★
Safety Standards; EN61010-1
EMI Standard; EN55011 Group 1 Class A
Immunity Standard; EN50082-2 : 1995

RS-232-C
GP-IB



**LR4210E**
448 × 185 × 445 mm  14.5 kg (4-pen)
(17.6 × 7.27 × 17.9"   32.0 lbs)

★
Safety Standards; EN61010-1
EMI Standard; EN55011 Group 1 Class A
Immunity Standard; EN50082-2 : 1995

RS-232-C
GP-IB

The best-selling LR Recorder Series has revolutionized the pen recorder world with its outstanding reliability and performance. How was it done?  Electrical contacts and gears were eliminated in the recording mechanism.  Data processing was digitized.  A full range of models of up to 12 pens was developed.  A memory function to facilitate PC-based data recording and analysis was created. A variety of application software is available.  In today's PC-driven world, only the LR recorder truly delivers the required functionality.
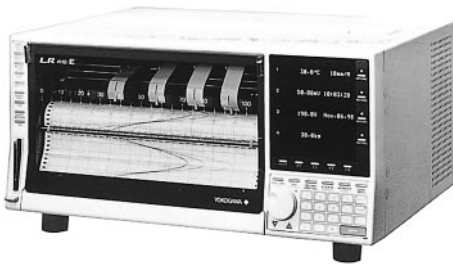
## FEATURES

● **Crisp Color Analog Recording in up to 12 Colors**
● **As Simple to Use as an Analog Pen Recorder**
The LR series offers easy dialog-based operation on a large vacuum-tube fluorescent display and multiple display functions.
● **Wealth of Digital Printing and Analog Recording Functions**
Packed with a wealth of digital printing functions, including zone recording, partial compression and enlargement recording, a rapid pen response of 1600 mm/s and a phase synchronization function, the LR series captures the target event faithfully, records it, and makes playback a cinch.
● **Multiple Measurement Type**
The LR series offers DC voltage, thermocouple, and RTD universal inputs, computation functions, IC memory card, a 3.5-inch FDD, and application software to cover every type of measurement.
● **3.5-Inch Floppy Disk Drive (Option)**
● **Windows 95 (32-bit) Application Software**
YOKOGAWA's genuine software lets you set the measurement range and recording conditions, control the motion of the pen such as pen up/down, and even record and analyze the data on a PC.

∗ The specifications for LR series recorders changes according to the type of power cord.  Only the recorders having specification codes for power cords -D, -F, -G, or -J, which relate to the power cord attached, conform to EMC and safety standards; recorders with a -B specification code (with a JIS power cord attached) do not.

# LR SERIES RECORDERS
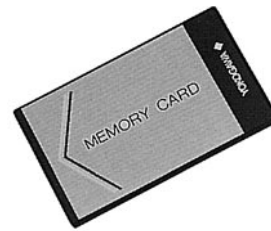
## LR12000E/LR8100E/LR4100E/LR4200E

### ■ SELECTION GUIDE

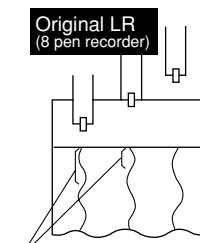| Models / Features | LR12000E | LR8100E | LR4100E | | LR4200E | |
|---|---|---|---|---|---|---|
| | | | LR4110E | LR4120E | LR4210E | LR4220E |
| Form | Vertical | | | | Flatbed | |
| Recording width | 250 mm | | | | | |
| No. of pens | 10, 12 | 4, 6, 8 | 1, 2, 3, 4 | | | |
| Input ranges | Voltage (20 ranges): 0.1 mV to 200 V<br>Thermocouple (12 types)  R, S, B, K, E, J, N, T, W, L [DIN], U [DIN], KPvsAu7Fe<br>RTD (5 types): Pt100, JPt100, Pt50, Ni100, J263*B | | | | | |
| Printing functions | Periodic print, manual print, change of range print, message print, change of chart speed print, pen offset compensation ON/OFF print, alarm print, scale marking print, and program list print.<br>*Printing functions not provided in **LR4120E** and **LR4220E**. | | | | | |
| Display | Digital values,  Bar graph (2.5% resolution), Range | | | | | |
| | Switches between display of the first-half 6 pens and the second-half 6 pens. *1 | All channels, simultaneous easy-to-read fluorescent screen | | | | |
| Math | Standard: Scaling function, difference computation | | | | | |
| | Optional *2: Arithmetic operations, exponentials, logarithms, absolute value, square root | | | | | |
| IC memory card*3 | 8, 256, 512 KB, or 1 MB (8 KB card provided as standard) | | | | | |
| FDD *3 (option) | Built-in FDD with 768 KB RAM | Built-in FDD with 512 KB RAM | Built-in FDD with 256 KB RAM | | —— | |
| PC software | Can be used with all models for 4, 8, 12-pen applications | | | | | |
| Chart speed | 10 to 600 mm/min<br>10 to 600 mm/hour | 10 mm/hour to 1,200 mm/min | | | | |
| Chart length | Z-fold: 30 m | | Z-fold: 20 m | | Z-fold: 20 m; Roll: 20 m | |
| Power | Allowable voltage:  90 to 132 VAC / 180 to 250 VAC (automatic switching) 48 to 63 Hz<br>Rated voltage:  100 to 120 VAC / 200 to 240 VAC 50/60 Hz | | | | | |
| | —— | +10 to +32 V DC (optional) | | | —— | |

*1  Digital measurement data can be displayed for all channels simultaneously.
*2  These  optional functions cannot be specified for the **LR12000E**.
*3  IC memory card function is not available for suffix code /FDD.

## FUNCTIONS

### ■ FLOPPY DISK DRIVE

Install the floppy disk drive option (FDD) and you can save the LR recorder settings to several files on a floppy disk (FD). The measurement data can also be saved to FD via the internal buffer memory provided by the FDD option.



### ■ IC MEMORY CARDS

### ● Save Settings for Permanent Storage (Standard Function)

By saving recorder settings such as range to an IC memory card, you can retrieve them later and start recording immediately—quicker than re-setting the parameters one by one.
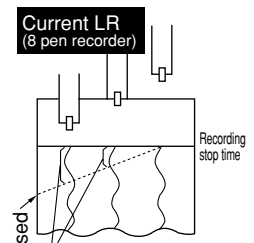


### ● Capture Detailed Measurement Data (Optional Function)

The optional IC memory cards with 256 KB or more (sold separately) let you capture and store up to 32000 samples/channel. The data can be retrieved later in a variety of ways, and up to 47 files of settings can be stored.

### ● Auto Sweepout of Pen Offset Data

When you use pen offset compensation, the recorder stores data to compensate for the pen offsets in order to record all traces in real-time.  Thus when recording stops, the pens must continue recording until all the data is plotted.  Auto sweepout saves you time by automatically increasing the chart speed during this interval - a real advantage at slow chart speeds.  For example, at 10 mm/h chart speed on an 8-pen LR, it would take nearly three hours after measurement to record all the stored offset data.  In the current LR Series recorders, however, touching the chart stop key automatically increases the chart speed to 200 mm/min and stops it after all pen offset data have been swept out.  This takes just eight seconds.  This new function, not available on previous LR recorders, has been added at the request of many users.

## ■ RECORDING EXAMPLE

LR12000E, 12 analog channels + digital printing
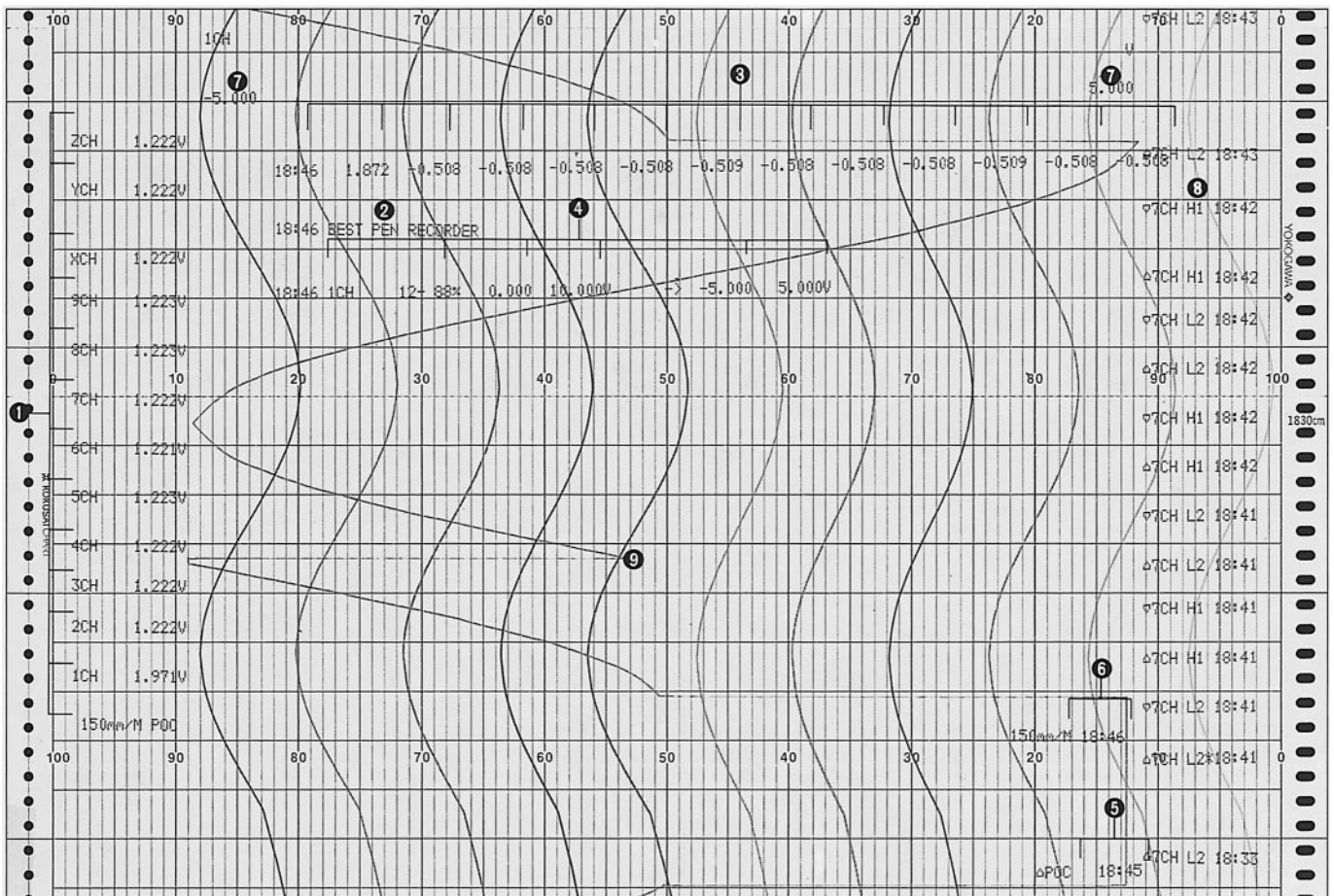


**1  Periodic Print**
Prints digital data at a fixed time interval (min. 1 minute).

**2  Message Print**
Prints user-defined messages up to 70 characters long (with time of day)
MESSAGE (0): Printed when MESSAGE key is pressed
MESSAGE (1 to 4): Available with REMOTE, GP-IB, or RS-232-C options

**3  Manual Print**
Prints the time and measured values for all channels when the MANUAL PRINT key is pressed.

**4  Change-of-Range Print**
When in auto span shift mode, prints the time and nature of change whenever the range changes.

**5  Pen Offset Compensation ON/OFF Print**
Prints an ON/OFF mark and the time whenever you turn pen offset compensation ON or OFF.

**6  Change-of-Chart-Speed Print**
When the chart speed changes, prints out the post-change chart speed and the time of the change.
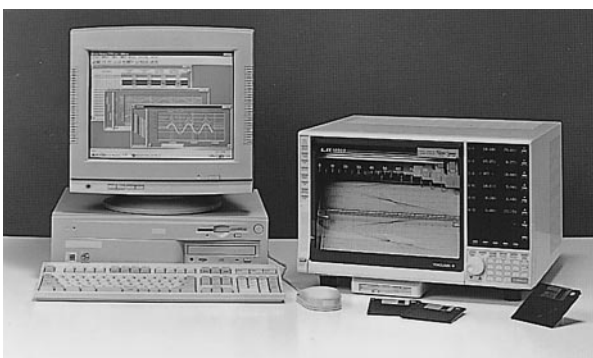
**7  Scale Marking Print**
Prints out the 0 and 100% scale values with the same timing as the periodic print.

**8  Alarm Print**
Prints out the channel number, alarm type and ON or OFF time.

**9  Auto Span Shift**
This function automatically shifts an input's span ±50% when its signal reaches its span limits, so that recording continues without data loss.



## ■ LR PC SOFTWARE

LR PC software, a package software for PCs created exclusively for the LR series, runs under Windows 95 (32-bit), letting you set the LR recorder, control operations, perform real-time data logging and trend monitoring online (GP-IB or RS-232-C), and even redraw data that has been saved to an FD, or convert between Excel, Lotus 1-2-3 and ASCII formats offline.

The redraw function comes with both cursor and high-speed scroll functions to take advantage of the ease of use and performance of Windows 95.  The software comes in three types, for up to 12, 8, or 4 pens (maximum number of pens) to suit your LR recorder model.

# LR SERIES RECORDERS

## LR12000E/LR8100E/LR4100E/LR4200E

YOKOGAWA

## SPECIFICATIONS

| Model / Item | LR12000E | LR8100E | LR4100E LR4110E | LR4100E LR4120E | LR4200E LR4210E | LR4200E LR4220E |
|---|---|---|---|---|---|---|
| **Measurement** | | | | | | |
| Drive System | Automatic null-balancing digital servo | | | | | |
| Input Circuitry | Floating, guarded inputs (no guard in low-sensitivity model) | | | | | |
| Measuring Ranges | DC voltage (DC V): Low-sensitivity: 10 mV to 200 V F.S. Medium-sensitivity: 1 mV to 200 V F.S. High-sensitivity: 0.1 mV to 200 V F.S. Thermocouple (TC): R, S, B, K, E, J, T, N, W, L (DIN), U (DIN), KPvsAu7Fe RTD: Pt100 (1 mA), JPt100 (1 mA), Pt50 (1 mA), JPt50 (1 mA), J263*B,. Ni100 (1 mA)/DIN, Ni100 (1 mA)/SAMA | | | | | |
| Measurement Accuracy (at 23±2°C, 55±10% RH) | DC voltage: ±(0.05% of rdg +0.03% of range +1.0 µV)* <br> Thermocouples: R, S ±(0.05% of rdg +1°C) Below 100°C ±3.7°C 100 to 300°C: ±1.5°C <br> B ±(0.05% of rdg +1°C) 400 to 600°C: ±2.0°C (not guaranteed below 400°C) <br> K, E, T, L, U ±(0.05% of rdg +0.5°C) <br> J ±(0.05% of rdg +0.5°C) -200 to 100°C: ±0.7°C <br> N ±(0.05% of rdg +0.5°C) <br> W ±(0.05% of rdg +1°C) <br> KPvsAu7Fe ±(0.05% of rdg +0.5°C) (not guaranteed below 4 K or above 280 K) <br> RTD: Pt100, JPt100, Ni100 ±(0.05% of rdg +0.2°C) <br> Pt50, J263*B ±(0.05% of rdg +0.3°C) | | * In case the measurement range is 1mV, a 0.1 Hz filter must be used. For ranges more than 1 mV, no filter is necessary. | | | |
| Reference Junction Compensation Accuracy | ±1°C for R, S, B; ±0.5°C for other (for measured temperature of −100°C or below, add 0.5°C) | | | | | |
| Allowable Source Resistance | 1 kΩ max. (DC voltage, thermocouple) | | | | | |
| Input Bias Current | 4 nA | | | | | |
| Input Resistance | Approx. 1 MΩ (DC voltage, thermocouple) | | | | | |
| Filter | 0.1, 1 Hz, or Off (selectable) | | | | | |
| Maximum Allowable Input Voltage | 250 V DC + AC rms (between input terminals and case, and between input channels) | | | | | |
| Common Mode Rejection Ratio | 150 dB (AC) | | | | | |
| Normal Mode Rejection Ratio | 50 dB min. at 50/60Hz | | | | | |
| Immunity to Noise in Pulses (input/power supply terminals) | ±1 kV: Pulsewise: 800 ns; Rise time: 1 ns (These data values are based on the in-house test standards.) | | | | | |
| Zero Point Adjustment | Freely adjustable | | | | | |
| Measuring Cycle | 135 Hz | | | | | |
| Pen Offset Compensation | Standard: (1) Average value recording or max./min. value recording selectable (2) Time axis resolution, 0.05 mm (3) ON/OFF switch provided (4) Auto sweepout function for pen offset data (5) Selectable pen offset compensation reference pen | | | | | |
| Temperature Coefficients | Zero: 0.05 µV/°C + 0.01% of range/°C; F.S.: 0.01% of range/°C | | | | | |
| External Input Span | Compensate for converter errors by setting the converter zero point and full-span voltages as the span left and span right values in the LR, and scale these values. | | | | | |
| **Recording** | | | | | | |
| Writing System | Disposable felt-tip pens | | | | | |
| Effective Recording Width | 250 mm | | | | | |
| Pen Offset Between Channels | Approx. 3.5 mm | Approx. 4.0 mm | | | | |
| Recording Accuracy | Measurement accuracy + ±0.2% of effective recording span (including linearity, dead band, error between ranges) | | | | | |
| Maximum Pen Speed | Approx. 1,600 mm/s | | | | | |
| Maximum Pen Acceleration | Approx. 78.4 m/s² | | | | | |
| Number of Recording Pens Pen Colors | 10 or 12 <br><br> Pen 1 2 3 4 5 6 / Color Red Green Blue Brown Black Purple / 7 8 9 10 11 12 / Orange Violet Light blue Yellow green Pink Yellow | 4, 6, or 8 <br><br> Pen 1 2 3 4 / Color Red Green Blue Brown / 5 6 7 8 / Black Purple Orange Violet | 1, 2, 3 or 4 <br><br> Pen 1 2 3 4 / Color Red Green Blue Brown | | | |
| Chart | 30 m Z-fold chart (DIN) | | 20 m Z-fold chart (DIN) | | 20 m Z-fold chart (DIN) 20 m roll (DIN) (Option/ROL or /REROL required) | |
| Chart Speed | 10 to 600 mm/min and mm/hour | 10 to 1,200 mm/min and mm/hour (1-mm steps) | | | | |
| Chart Speed Change | Selection between Speed 1 and Speed 2 using remote control signal (optional) | | | | | |
| Chart Drive | Pulse motor | | | | | |
| Chart Speed Accuracy | ±0.1% (When running 1 m or more continuously and related to the grid of the chart paper) | | | | | |
| Recording ON/OFF | 1 key per channel ON: Measurement + recording OFF: Measurement only (lifts pens and parks them far right) | | | | | |
| Pen Lift | Lifts or lowers all pens simultaneously (pens can be lifted/lowered individually with Recording ON/OFF keys) | | | | | |
| Partial Expansion/Compression | Both scale compression boundary values (measured values) and recording position (1% steps) can be set. | | | | | |
| Auto Span Shift | In auto span shift mode, span automatically shifts ±50% if input goes outside present span, and recording continues. | | | | | |
| **Printing** | | | | | | |
| Printing System | Wire dot, ink ribbon (one color) | | | | | |
| Printing Speed | Approx. 1.5 s/line | | | | | |
| Printing Character Set | Alphanumeric characters (upper-case) | | | | | |

# LR SERIES RECORDERS

## LR12000E/LR8100E/LR4100E/LR4200E

YOKOGAWA

| Item / Model | LR12000E | LR8100E | LR4100E LR4110E | LR4100E LR4120E | LR4200E LR4210E | LR4200E LR4220E |
|---|---|---|---|---|---|---|

### Printing

**Printout Types**

TAG No. print: User-set tag can be printed in place of channel number (7 characters max.)
Alarm print: Channel number, alarm type, ON/OFF time
Scale print: Prints 0% and 100% scale values at same interval as for periodic print.
Change of chart speed print: Prints time and post-change chart speed when chart speed changes.
List print: Prints all setup information (ranges, alarms, etc.) on chart.
Manual print: Prints time and measured values of all channels on one line when MANUAL PRINT key is pressed.
Message print: Prints user-defined messages up to 70 characters long, with time.
MESSAGE (0): Printed when MANUAL MESSAGE key is pressed.
MESSAGE (1 to 4): Provided with REMOTE option; printed on reception of external contact input (4 points max.)
Change of range print: Prints time and change when range changes in auto span shift mode.
Pen offset compensation ON/OFF print: Prints time and pen offset compensation ON/OFF mark when pen offset compensation is turned ON or OFF.
Periodic print: Prints time, chart speed, channel No. (TAG), measured data, and units at fixed intervals.

Chart speed and printing interval for **LR8100E/4100E/4200E**

| mm/min | mm/h | Printing interval |
|---|---|---|
| 1200 to 300 | — | 1 minute |
| 299 to 30 | — | 10 minutes |
| 29 to 10 | 1200 to 120 | 1 hour |
| — | 119 to 60 | 2 hours |
| — | 59 to 40 | 3 hours |
| — | 39 to 20 | 6 hours |
| — | 19 to 10 | 12 hours |

Chart speed and printing interval for **LR12000E**

| mm/min | mm/h | Printing interval |
|---|---|---|
| 600 to 300 | — | 1 minute |
| 299 to 30 | — | 10 minutes |
| 29 to 10 | 600 to 120 | 1 hour |
| — | 119 to 60 | 2 hours |
| — | 59 to 40 | 3 hours |
| — | 39 to 20 | 6 hours |
| — | 19 to 10 | 12 hours |

### Display

**Display**
Fluorescent display (5 × 7 dot, matrix). 20 characters per channel

**Display Modes**
(1) Digital data display: 7-digits measured value (sign, measurement data, unit, decimal point, alarm status), time, chart speed *(2) Bar graph display (2.5% resolution)*
(3) Range data display (zero, span)* (4) Digital data display for all channels (**LR12000E** only): 7-digits measured, unit, alarm status
Any of (1), (2), or (3) can be selected with the DISPLAY SELECT key.*: The **LR12000E** displays these items for the first six channels and the second six channels as selected.

### Other Functions

**Alarm**
Number of levels: 2 levels/channel: Types: High, low, delta high, delta low.
Outputs (optional): 12 internal points (**LR12000E**), 8 internal points (**LR8100E**) or 4 internal points (**LR4100E/LR4200E**), all with 24 V AC, 1 A contact rating

**Computation**
(1) Scaling Input voltage range: Must be within measurement range. Scaling range: –22000 to +22000 (user-set decimal point)
(2) Difference computation Between any two channels set to the same range code

**IC Memory Card**
Setup data memory (standard) Memory capacity: 8 KB (with lithium battery, life approx. 5 years) *Cannot be specified with suffix code/FDD at the same time . Setting life storage capacity **LR12000E**: Approx. 2 files; **LR8100E**: Approx. 3 files: **LR4100E/LR4200E**: Approx. 5 files

### General Specifications

**System Error Alarm (FAIL)**
If CPU fails, "FAIL" LED (red) lights and FAIL contact signal (optional) is output.

**Chart End Output**
When chart end is reached, "CHART" LED (red) lights, pens lift, and recorder is placed in monitor status (relay outpt is optional).
When chart end is reached, "CHART" LED (red) lights, pens lift, and recorder is placed in monitor status (relay output is optional; pens are not lifted in **LR4120E** and **LR4220E**).

**Power Consumption**

| | LR12000E | LR8100E | LR4100E | LR4200E |
|---|---|---|---|---|
| Max: | 10 pens: 380 VA / 12 pens: 450 VA | 4 pens: 240 VA / 6 pens: 290 VA / 8 pens: 340 VA | 1 pen: 155 VA / 2 pens: 180 VA / 3 pens: 205 VA / 4 pens: 230 VA | 1 pen: 155 VA / 2 pens: 180 VA / 3 pens: 205 VA / 4 pens: 230 VA |
| Balanced: | 10 pens: 170 VA / 12 pens: 190 VA | 4 pens: 120 VA / 6 pens: 135 VA / 8 pens: 150 VA | 1 pen: 90 VA / 2 pens: 100 VA / 3 pens: 105 VA / 4 pens: 110 VA | 1 pen: 90 VA / 2 pens: 100 VA / 3 pens: 105 VA / 4 pens: 110 VA |

**Dimensions (W) × (H) × (D)**
Approx. 438 × 301 × 470 mm | Approx. 438 × 301 × 346 mm | Approx. 438 × 234 × 343 mm | Approx. 448 × 185 × 455 mm

**Weight**

| LR12000E | LR8100E | LR4110E | LR4120E | LR4210E | LR4220E |
|---|---|---|---|---|---|
| 10 pens: Approx. 19.5 kg / 12 pens: Approx. 20.5 kg | 4 pens: Approx. 16.5 kg / 6 pens: Approx. 18 kg / 8 pens: Approx. 18.5 kg | 1 pen: Approx. 13 kg / 2 pens: Approx. 13.5 kg / 3 pens: Approx. 14 kg / 4 pens: Approx. 14.5 kg | 1 pen: Approx 12 kg / 2 pens: Approx. 12.5 kg / 3 pens: Approx. 13 kg / 4 pens: Approx. 13.5 kg | 1 pen: Approx. 13 kg / 2 pens: Approx. 13.5 kg / 3 pens: Approx. 14 kg / 4 pens: Approx. 14.5 kg | 1 pen: Approx. 12 kg / 2 pens: Approx. 12.5 kg / 3 pens: Approx. 13 kg / 4 pens: Approx. 13.5 kg |

**Clock**
With calendar function

**Position**
Veritical | Horizontal (recording surface) or in-clined (up to 10˚ forward or back)

**Memory Backup**
Internal lithium battery for memory backup (life approx. 10 years at room temperature)

**Operating Environment**
0 to 40°C, 30 to 80% RH (5 to 40°C, 30 to 80% RH if suffix code/FDD is specified)

**Recommended Calibration Conditions**
For measurement ranges less than 1 mV: 6 months
For measurement ranges not less than 1 mV: 12 months (environment with proper ventilation and at 23±5°C)

**Withstanding Voltage**
1,500 V AC between power supply and case for 1 minute

**Insulation Resistance**
100 MΩ min. at 500 V DC between power supply and case, and between input terminals and case

**Power Supply**
Allowable power supply voltage: 90 to 132 VAC/180 to 250 VAC 48 to 63 Hz. Rated power supply voltage: 100 to 120 VAC/200 to 240 V AC, 50/60 Hz (universal power supply for **LR8100E**, **LR4100E**, and **LR4200E**), (automatic power supply selection for **LR12000E**)

# LR SERIES RECORDERS

## LR12000E/LR8100E/LR4100E/LR4200E

YOKOGAWA

### ■ OPTIONAL SPECIFICATIONS

| Item | Specifications | Remarks |
|---|---|---|
| **GP-IB Interface (/GP-IB)** | Conforms to IEEE St'd 488-1978<br>Talker functions:    • Measured value input/output (ASCII and binary output; ASCII input)<br>     • Setup information input/output (ASCII)<br>     • Memory data output (ASCII and binary)<br>Listener functions:    • All functions can be remotely controlled and set except the following:<br>     POWER ON/OFF, KEY LOCK ON/OFF, CHART FEED | Example of time required to transfer measured values from an **LR8100E** and store them to disk on a personal computer:<br>Personal computer used:   80286 CPU, 8 MHz GP-IB board N88 BASIC (86) (MS-DOS version)<br>       Disk is hard disk |
| **RS-232-C interface (/RS232C)** | Conforms to **EIA RS-232-C**<br>Modes:     • Measured value input/output (ASCII and binary output, ASCII input)<br>     • Setup information input/output (ASCII)<br>     • Memory data output (ASCII and binary)<br>Communication rate:    75, 150, 300, 600, 1200, 2400, 4800, or 9600 bps | (GP-IB communications)       (Readout time)<br>  ASCII      4 CH model      Approx. 80 ms<br>            8 CH model      Approx. 140 ms<br>            12 CH model     Approx. 170 ms<br>  Binary     4 CH model      Approx. 30 ms<br>            8 CH model      Approx. 50 ms<br>            12 CH model     Approx. 60 ms<br><br>  (RS-232-C communications)    (Readout time)<br>  ASCII      4 CH model      Approx. 110 ms<br>            8 CH model      Approx. 200 ms<br>            12 CH model     Approx. 250 ms<br>  Binary     4 CH model      Approx. 60 ms<br>            8 CH model      Approx. 100 ms<br>            12 CH model     Approx. 120 ms<br><br>* Since data is output for 8 channels of an 8-channel model even if only 4 channels are to be measured, output rates cannot be improved. |
| **IC Memory Card** | Functions:            Storage of setup information and measured values<br>Data format:         MS-DOS<br>Sampling modes and sampling rates:<br>     • Free mode (manual start) or Trigger mode (started by trigger condition)<br>     • Sampling rate: 135, 9, 5, 3, 1, 0.5, 0.2, 0.1, 0.05, 0.02, or 0.01 Hz<br>Memory capacity:     256, 512KB, 1MB<br>Data length:         1000, 2000, 4000, 8000, 16000, or 32000 samples/channel    (setting shared by all channels; data is 2 bytes/sample)<br>Number of files:     47 files max.<br>Trigger conditions:    Alarm detection, CHART END, or external contact input (optional)<br>Pre-trigger:         0 to 100% (set in 10% increments)<br>Memory data:       Measured data, communications input data, computed data<br>Output:           Communications output, or playback recording<br>Battery backup:     Lithium battery | |
| **Remote Control (/REM)** | Functions:      • Chart start/stop (paper feed start/stop)<br>     • Chart speed change (toggle between speed 1 and 2)<br>   * • Manual print (print time and measured data values)<br>     • Chart speed control (control chart speed using external signal source)<br><br>| Waveform | Sine, triangle or square wave | Pulse train |<br>|---|---|---|<br>| Level | $4 V < V_P < 24 V$ | $+4 V < V_H < +24 V$<br>$-24 V < V_L < +0.5 V$<br>TP > 300 μS |<br>| Source output impedance | 600Ω max. | 50Ω max. |<br>| Chart speed | 0.15 f cm/min (f in Hz or pps) | |<br>| Max. frequency | 800 Hz | 800 pps |<br><br>   * • Message print<br>      (time, and message of up to 70 characters; 4 numbered messages available)<br>   * • Pen lift (all pens lifted/lowered simultaneously)<br>     • Record ON/OFF selection (ON: Measurement + recording; OFF: Measurement only)<br>     • External trigger (start writing of data to accessory IC memory card)<br>     • Other (fail, chart end output)<br>   ** • Reroll (reroll start/stop) | • Input signals may be TTL, open collector, or contact point.<br>• Alarms and variations in the remote contact input are detected at 125-ms intervals.<br><br><br>• Functions maked with * not available in **LR4120E** or **LR4220E**.<br>• Function marked with ** available on **LR4200E** with /REROL only. |
| **Alarm Output (/AK-04, /AK-08 or /AK-12)** | Number of output points: 12 internal points (**LR12000E**), 8 internal points (**LR8100E**) or 4 internal points (**LR4100E**, **LR4200E**)<br>Contact capacity:     24 V DC/AC, 1 A<br>Other:            Fail and chart end outputs | • AK-04 (for **LR4100E**, **LR4200E**)<br>• AK-08 (for **LR8100E**)<br>• AK-12 (for **LR12000E**) |
| **Computing Functions (/MATH)** | Functions:                Arithmetic operations, SQR (square root), ABS (absolute value), LOG (logarithm), EXP (exponent)<br>Number of channels:      Max. 8 channels (**LR8100E**), or max. 4 channels (**LR4100E** and **LR4200E**)<br>Computational expressions:   Up to 18 characters<br>Output:                 Computed data can be recorded, saved to memory, or output via communications. | • Channel number to obtain computation results must always be greater than the measuring channel number. (The computation results cannot be obtained on the measuring channel.)<br>• The **LR12000E** does not include computing functions (/MATH). |

# LR SERIES RECORDERS

## LR12000E/LR8100E/LR4100E/LR4200E

| Item | Specifications | | Remarks |
|---|---|---|---|
| **DC Drive** (/DC) | Normal operating voltage: | +10 to +32 VDC (ratings: 12 to 24 V) | Available on **LR8100E** and **LR4100E** only. |
| | Power consumption: | For **LR8100E**: 70 VA (when balanced), 200 VA (max.) | |
| | | For **LR4100E**: 50 VA (when balanced), 140 VA (max.) | |
| | Accessories: | Connector (1), fuse (1) | |
| **Roll Chart Function (/ROL)** | Function: | Enables both Z-fold and roll chart to be used. | Available on **LR4200E** only. |
| **Reroll Function (/REROL)** | Function: | Roll chart can be rewound in reverse direction using panel switch of external signal (contact closure, open collector, or TTL, when equipped with /REM option) | Available on **LR4200E** only. This function includes /ROL. |
| | Accessories: | Reel | |
| **3.5-inch Floppy Disk Drive (/FDD)** | Number of drives: | 1* | * When the recorder comes with the 3.5-inch FDD, an IC memory card slot is not provided, no IC memory card (8 KB) is installed, |
| | Medium: | 2HD | |
| | Data capacity: | 1.44 MB fixed ** | ** The medium is fixed at 1.44 MB. However, floppy disks formatted on a personal computer (1.44 MB, 1.2 MB, 720 KB) can be used. |
| | Models in which FDD can be installed: | | |
| | | **LR4100E**, **LR8100E**, **LR12000E** *** | *** The 3.5-inch option (/FDD) cannot be specified for the **LR4200E**. |
| | Buffer memory capacity: | **LR4100E**/Built-in 256 Kbyte SRAM | **** If a power failure occurs while data is being re-corded to the buffer memory, the data that has been stored in the buffer memory up until the power failure occurred will remain in the memory. How-ever, data recording will not resume after the power is restored; if a power failure occurs during an auto-save operation, the data must be separately copied to an FD. |
| | | **LR8100E**/Built-in 512 Kbyte SRAM | |
| | | **LR12000E**/Built-in 768 Kbyte SRAM | |
| | Data backup: | It can save data for approx. 1day at room temperature after the battery has been charged for 30 minutes and the power has been turned off. | |
| | | ∗ If a drop in the backup voltage is detected when the power is turned on, the data in the buffer memory is initialized. | |
| | Types of memory: | Set values (these values do not pass through the internal buffer memory), measurement values, computation values | |
| | Data saving method: | Buffer memory measurement values and computation values are stored, then data are copied to a floppy disk. Set values are stored directly to a floppy disk. | |
| | Data saving at power failure: | Data existing until the power failure occurred is saved. | |
| | | Sampling does not continue after the power is restored. **** | |
| | Data saving format: | YOKOGAWA standard binary format | |
| | | (However, data can be converted to ASCII when copied to floppy disk.) | |
| | Data length: | 1000, 2000, 4000, 8000, 16000, or 32000 data/ch | |
| | | (However, the total memory length must be within the memory capacity.) | |
| | Data capacity: | Measurement value = 2 bytes/data, Computation value = 4 bytes/data | |
| | Sampling rate: | Synchronized with the measurement interval of the recorder (135 Hz), or 9, 5, 3, 1, 0.5, 0.2, 0.1, 0.05, 0.02, or 0.01 Hz | |
| | Time axis accuracy: | Depends on time accuracy of the recorder. | |
| | Memory mode (free): | Sampling in the buffer memory starts when a key is pressed. | |
| | Memory mode (trigger): | Memory sampling starts when the trigger conditions are met. | |
| | | When the specified length is captured, memory operation stops. | |
| | Number of settable files: | Up to 47 files (If the number exceeds 47, an error is displayed.) | |
| | Filename: | Enter six standard-width characters. If the number of standard-width characters exceeds six, only the first six characters are displayed on the LR. | |
| | Trigger conditions: | Alarm detection, chart end, external contact input (option REM) | |
| | Pre-trigger: | 0 to 100% (in 10% increments) | |
| | Playback of buffer memory data: | | |
| | | Data stored in the buffer memory can be played back, recorded, and output to a communication circuit. | |
| | Playback of data from an FD: | Data can be recorded and output, or output to a communication circuit, after reading it into the internal buffer memory by a loading process. (Only possible for data saved to FD in binary format.) | |
| | ASCII conversion: | Data stored in the buffer memory in the YOKOGAWA standard binary format (measurement values, computation values) can be converted to ASCII format, then copied to a floppy disk. | |
| | Auto-save: | Measurement data is first recorded in the internal buffer memory, then automatically copied to an FD. | |
| | Auto-load: | Measurement data stored in an FD is first copied into the internal buffer memory, then automatically printed out on the recording paper. | |

YOKOGAWA

## ■ STANDARD ACCESSORIES

| No. | Name | Part No. | Quantity | Remarks |
|---|---|---|---|---|
| 1 | Pen cartridge | B9586YR | 1 unit | 4 pens (1 pen color) /unit, standard |
| | | B9586YS | 1 unit | 6 pens (1 pen color) /unit, standard |
| | | B9586YT | 1 unit | 8 pens (1 pen color) /unit, standard |
| | | B9937PB | 1 unit | For **LR12000E** (12 pens, standard) |
| 2 | Ribbon cassette | B9585SH | 1 | Black*1 |
| 3 | IC memory card | 378901 | 1 | 8 KB, for setup information memory |
| 4 | Fuse | A1111EF | 1 | 2 A time-lag (in fuse holder) (for **LR8100E**, **LR4100E**, and **LR4200E**) |
| | Fuse | A1113EF | 1 | 3.15 A time-lag (in fuse holder) (for **LR12000E**) |
| 5 | Z-fold chart | B9585AH | 1 | 30 m (for **LR12000E**,**LR8100E**) |
| | Z-fold chart | B9619AH | 1 | 20 m (for **LR4100E**, **LR4200E** without / ROL or /REROL option) |
| | Roll chart | B9622AH | 1 | 20 m (**LR4200E** with /ROL or /REROL option) |
| 6 | Power cord | A1007WD | 1 | Rated voltage, 125 V |
| 7 | DC power supply connector | A1053JC | 1 | For **LR8100E** or **LR4100E** with /DC option |
| 8 | Fuse (/DC) | B9586UV | 1 | For **LR8100E** or **LR4100E**, 20 A time-lag for DC option |
| 9 | Connector | A1005JD | 1 | For **LR8100E** with /AK-08, **LR4100E** or **LR4200E** with /AK-04 or /REM; AMPHENOL 57-30360 |
| | Connector | A1006JD | 2 | For **LR12000E** with /AK-12 |
| | Connector | A1006JD | 1 | For **LR8100E** with /AK-08, **LR12000E** or **LR8100** with /REM; AMPHENOL 57-30500 |
| 10 | Chart stock roller | B9623AA | 1 | For **LR4200E** with /ROL; For use with roll chart |
| — | Instruction manual | | 1 | Instruction manual for main unit (/DC) and IC memory card |
| — | Basic operation guidance | IM3712-90 | 1 | For **LR4200E** |
| 11 | Terminal Cover | B9937GK | 1 | For **LR12000E** |
| | | B9585BH | 1 | For **LR8100E**\*2 |
| | | B9619BC | 1 | For **LR4100E**\*2 |
| | | B9622DK | 1 | For **LR4200E** |

**Note** *1: Not included with LR4120E and LR4220E.
*2: LR8100E and LR4100E terminal covers come with two mounting screws.



● **Pen cartridge**



Pen cartridge for
LR8100E/LR4100E/LR4200E
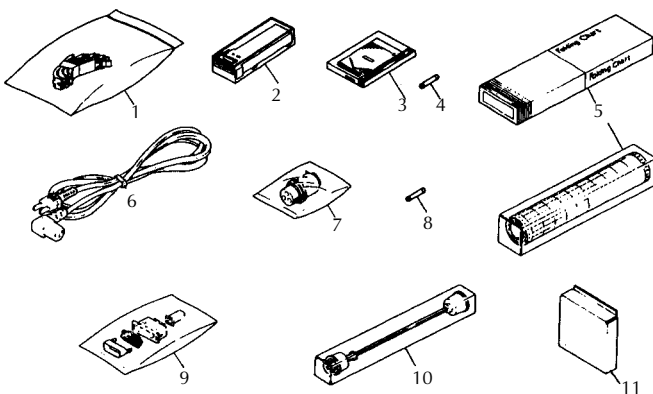
Pen cartridge for LR12000E

## ■ SPECIFICATIONS OF SOFTWARE PACKAGES

### Windows 95 software package

Operating conditions
■ Connection
Product name: LR PC software
1 to 12-pen model (**370013**)
Connectable recorders: **LR4100**, **LR4200**, **LR8100**, **LR12000**, **LR4100E**, **LR4200E**, **LR8100E**, **LR12000E**
Connectable number of recorders: 1
Maximum number of connectable channels: 1 to 12 ch
Communication interface: GP-IB or RS-232-C
■ Disks
Floppy disk: 3.5-inch FD (1.44 MB format)
Hard disk: Free space of at least 100 MB
■ Communication interface
GP-IB board: Made by National Instruments (Can be used with Windows 95.)
AT-GPIB/TNT is used with IBM PC-AT and compatible machines.
RS-232-C: Can be used with Windows 95.
■ Environment
PC: Personal computer that supports Windows 95.
The PC must have a CPU of at least Pentium 90MHz and at least 16 MB of RAM.
OS: Windows 95
CRT: Display that is compatible with Windows 95
Video: 640 × 480 minimum,at least 256 colors
(at least 1024 × 768 is recommended)
Mouse: Compatible with Windows 95
Printer: Compatible with Windows 95 (driver is necessary)
FDD: 2HD/1.44 MB

### Setting package

■ Outline
This package sets, controls, and changes the LR recorder measurement conditions, and also sets the operating environment online via a general communication interface (GP-IB or RS-232-C).
■ Setting
Setting of the measurement range (each channel), recording conditions, recording paper speed, measurement interval, alarm, memory, etc.
■ Control
Control of display switching, recording paper start/stop, pen lift, printing functions, etc.

### Data logging package

■ Outline
The data measured by the LR recorder are stored in the specified hard disk of the personal computer while being displayed in real-time.
■ Measurement interval
Sampling rate: 1, 2, 3, ..., 60 seconds
Display update rate: Same as the sampling rate
Data storage interval: An integral multiple between 1 and 128 of the sampling rate
* The measurement interval depends on the PC used and the operating system.
■ Display function
Display function: Analog range display, digital value display, level meter display, alarms
Number of display channels: 12 ch
Screen display: Size can be changed.

### Viewer package

■ Outline
This package redisplays data stored in the hard disk of the personal computer using the data logging package. The redisplayed data can then be analyzed, computed or converted. The data stored in the FD using the LR can also be displayed.
■ Redisplay
Number of displayed channels: 1 to 12ch
Redisplay: The specified files are displayed as an analog trend.
Redisplay format: User specification, Full range, Slide, Multi-axis
Time-axis span display: Zoom-in/-out of time axis, high-speed scroll
Display file: Multiple files can be displayed simultaneously.
Comment: Marks can be made and comments entered within the analog trend on the time axis.
Unit: Up to 6 standard-width characters. Displayed near the channel(s).
Grid: The span grid corresponding to each analog trend is displayed as numerical values and lines.
Magnification change: Selectable between 1/1000 and 20.
Data sheet: The analog trend screen switches to the numerical data sheet screen.
Date/time/number of data and MIN/MAX data for each channel can be displayed.
■ File conversion
File conversion: Conversion to Lotus 1-2-3, ASCII, or Excel format
Conversion range: The number of data points or cursors can be specified on the redisplay screen.
Conversion channel: Display screen group unit

# LR SERIES RECORDERS

## LR12000E/LR8100E/LR4100E/LR4200E



■ Print
Print output:                 Each file can be output in analog trend format or data sheet format.

## Environment setting package

■ Environment setting
Communication:                Sets the type of LR communication (GP-IB/RS-232-C).
Data directory:               Sets the directory in which measurement data is to be stored on the hard disk in the PC.

## Windows 3.1 data conversion package

■ Outline
When a data file is selected, the start and end times of measurement of the selected data file, number of channels, sampling rate, and other parameters are displayed. Next, select the conversion format on the file conversion screen, then set the data number for the start and end points of the conversion, thinning-out and channel range, then start the conversion itself. Finally, enter a new filename after the conversion process ends.
■ Operating conditions
Floppy disk:                  3.5-inch FD (1.44 MB format)
Hard disk:                    Free space of at least 10 MB
Operating environment
■ PC:                         Personal computer that supports Windows 3.1.
                              The PC must have a CPU of at least 80486DX2 (50 MHz), and at least 8 MB of RAM.
                              A Pentium CPU and at least 16 MB of RAM is recommended.
■ OS:                         Windows 3.1 and a version of MS-DOS /Windows 95 (16-bit) that supports Windows 3.1
■ CRT:                        A display compatible with Windows 3.1
■ Mouse:                      Compatible with Windows 3.1

## AVAILABLE MODELS

### ■ LR12000E

| Model | Suffix Cpde | | Description |
|---|---|---|---|
| **3702**<br>(with printer &<br>electrical pen lift) | 14 | ············· | 10-pen low sensitiviity (DCV, TC, RTD) |
| | 15 | ············· | 10-pen medium sensitivity (DCV, TC, RTD) |
| | 16 | ············· | 10-pen high sensitiviity (DCV, TC, RTD) |
| | 24 | ············· | 12-pen low sensitivity (DCV, TC, RTD) |
| | 25 | ············· | 12-pen medium sensitivity (DCV, TC, RTD) |
| | 26 | ············· | 12-pen high sensitiviity (DCV, TC, RTD) |
| Power cord | **-B** | ········ | |

### ■ LR8100E

| Model | Suffix Cpde | | | Description |
|---|---|---|---|---|
| **3701**<br>Number of<br>channels | 4 | | ············· | 4-pen model |
| | 6 | | ············· | 6-pen model |
| | 8 | | ············· | 8-pen model |
| Input types<br>& max.<br>sensitivity | | 1 | ············· | 10 mV F.S. (DC V, TC) |
| | | 2 | ············· | 1 mV F.S. (DC V, TC) |
| | | 3 | ············· | 0.1 mV F.S. (DC V, TC) |
| | | 4 | ············· | 10 mV F.S. (DC V, TC, RTD) |
| | | 5 | ············· | 1 mV F.S. (DC V, TC, RTD) |
| | | 6 | ············· | 0.1 mV F.S. (DC V, TC, RTD) |
| Version | | **-B** | ········ | |
| Power supply | | **-0** | ······ | 90 to 250 V AC |

*LR8100E Recorder (with printer & electrical pen lift)*

### ■ LR4100E

| Model | Suffix Cpde | | Description | |
|---|---|---|---|---|
| **3711**<br>Number of<br>channels | 1 | ············· | 1-pen model | **LR4110E** Recorder<br>(with printer &<br>electrical pen lift) |
| | 2 | ············· | 2-pen model | |
| | 3 | ············· | 3-pen model | |
| | 4 | ············· | 4-pen model | |
| **3712**<br>Number of<br>channels | 1 | ············· | 1-pen model | **LR4120E** Recorder<br>(without printer,<br>with manual pen lift) |
| | 2 | ············· | 2-pen model | |
| | 3 | ············· | 3-pen model | |
| | 4 | ············· | 4-pen model | |
| Input types<br>& max.<br>sensitivity | 1 | 10 mV F.S. (DC V, TC) | | |
| | 2 | 1 mV F.S. (DC V, TC) | | |
| | 3 | 0.1 mV F.S. (DC V, TC) | | |
| | 4 | 10 mV F.S. (DCV, TC, RTD) | | |
| | 5 | 1 mV F.S. (DC V, TC, RTD) | | |
| | 6 | 0.1 mV F.S. (DC V, TC, RTD) | | |
| Version | **-B** | | | |
| Power supply | **-0** | 90 to 250 V AC | | |

### ■ LR4200E

| Model | Suffix Cpde | | Description | |
|---|---|---|---|---|
| **3721**<br>Number of<br>channels | 1 | ············· | 1-pen model | **LR4210E** Recorder<br>(with printer &<br>electrical pen lift) |
| | 2 | ············· | 2-pen model | |
| | 3 | ············· | 3-pen model | |
| | 4 | ············· | 4-pen model | |
| **3722**<br>Number of<br>channels | 1 | ············· | 1-pen model | **LR4220E** Recorder<br>(without printer,<br>with manual pen lift) |
| | 2 | ············· | 2-pen model | |
| | 3 | ············· | 3-pen model | |
| | 4 | ············· | 4-pen model | |
| Input types<br>& max.<br>sensitivity | 1 | ············· | 10 mV F.S. (DC V, TC) | |
| | 2 | ············· | 1 mV F.S. (DC V, TC) | |
| | 3 | ············· | 0.1 mV F.S. (DC V, TC) | |
| | 4 | ············· | 10 mV F.S. (DCV, TC, RTD) | |
| | 5 | ············· | 1 mV F.S. (DC V, TC, RTD) | |
| | 6 | ············· | 0.1 mV F.S. (DC V, TC, RTD) | |
| Version | | **-B** | ··········· | |
| Power supply | | | **-0** ······ 90 to 250 V AC | |

### ● OPTIONS

| Suffix Code | Description |
|---|---|
| */GP-IB | GP-IB interface |
| */RS232C | RS-232-C interface |
| **/FDD | 3.5-inch floppy disk drive |
| /MATH | Math functions (Cannot be specified for **LR12000E**) |
| /AK-12 | Internal alarms (for **LR12000E**) |
| /AK-08 | Internal alarms (for **LR8100E**) |
| /AK-04 | Internal alarms (for **LR4100E/LR4200E**) |
| /REM | Remote function (for **LR12000E**) |
| /REM | Remote function (for **LR8100E**) |
| /REM | Remote function (for **LR4100E/4200E**) |
| /DC | DC power (for **LR8100E/4100E**) |
| /ROL | Roll chart drive (for **LR4200E**) |
| /REROL | Reroll function (for **LR4200E**), including /ROL |

* Specify one code (/GP-IB or /RS232C).
** The IC memory card cannot be used if /FDD is specified as optional specifications. This suffix code cannot be specified for the **LR4200E** recorder.

### ● SPARES

| Name | Part No. | Description | Order Q'ty |
|---|---|---|---|
| Ribbon Cassette | **B9585SH** | 1 chart/unit | 1 unit |
| Z-fold chart | **B9585AH** | 30 m (1 box/unit) (for **LR12000E**) | 10 units |
| Z-fold chart | **B9619AH** | 20 m (1 box/unit) (for **LR4100E** and **LR4200E**) | 10 units |
| Roll chart | **B9622AH** | 20 m (1 box/unit) (for **LR4200E**) | 10 units |
| IC memory card | **378901** | For setup info. memory, 8 KB | 1 unit |
| Soft cover | **B9585AY** | 1 pc/unit (for **LR8100E**) | 1 unit |
| Soft cover | **B9619AV** | 1 pc/unit (for **LR4100E**) | 1 unit |
| Soft cover | **B9622AV** | 1 pc/unit (for **LR4200E**) | 1 unit |
| Lithium battery | **B9588ZB** | For main unit (1 pc/unit) | 1 unit |
| Lithium battery | **B9586JU** | For **378901** (1 pc/unit) | 2 units |
| Lithium bttery | **B9586JV** | For **378904**, **05**, **06** (1 pc/unit) | 2 units |

### ● ORDER IF NECESSARY

| Name | Code No. | Number of Copies |
|---|---|---|
| Test certificate | DOCTC | For **LR12000E** |
| | | For **LR4100E/4200E/8100E** |
| Instruction manual | DOCIM | If another copy is requested |

### ● APPLICATION SOFTWARE

| Name | Part No. | Description |
|---|---|---|
| LR PC Scoftware | 370013 | Model equipped with 12 pens: Windows 95 (32-bit OS) |
| Data conversion software | 370092 | For Windows 3.1, converted to ASCII/Excel/Loutus |

## ■ PEN CARTRIDGE

### ● LR12000E

| Name | Color | Part No. | Pen speed | Description |
|---|---|---|---|---|
| Standard pen cartridge for pen 1 | Red | **B9937NA** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 2 | Green | **B9937NB** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 3 | Blue | **B9937NC** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 4 | Brown | **B9937ND** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 5 | Black | **B9937NE** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 6 | Purple | **B9937NF** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 7 | Orange | **B9937NG** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 8 | Violet | **B9937NH** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 9 | Light blue | **B9937NJ** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 10 | Yellow green | **B9937NK** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 11 | Pink | **B9937NL** | Standard | (3 pens/unit) |
| Standard pen cartridge for pen 12 | Yellow | **B9937NM** | Standard | (3 pens/unit) |
| Low speed pen cartridge for pen 1 | Red | **B9937NN** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 2 | Green | **B9937NP** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 3 | Blue | **B9937NQ** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 4 | Brown | **B9937NR** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 5 | Black | **B9937NS** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 6 | Purple | **B9937NT** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 7 | Orange | **B9937NU** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 8 | Violet | **B9937NV** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 9 | Light blue | **B9937NW** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 10 | Yellow green | **B9937NX** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 11 | Pink | **B9937NY** | Low speed | (3 pens/unit) |
| Low speed pen cartridge for pen 12 | Yellow | **B9937NZ** | Low speed | (3 pens/unit) |
| High speed pen cartridge for pen 1 | Red | **B9937PN** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 2 | Green | **B9937PP** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 3 | Blue | **B9937PQ** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 4 | Brown | **B9937PR** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 5 | Black | **B9937PS** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 6 | Purple | **B9937PT** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 7 | Orange | **B9937PU** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 8 | Violet | **B9937PV** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 9 | Light blue | **B9937PW** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 10 | Yellow green | **B9937PX** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 11 | Pink | **B9937PY** | High speed | (3 pens/unit) |
| High speed pen cartridge for pen 12 | Yellow | **B9937PZ** | High speed | (3 pens/unit) |
| Pen cartridge set for pens 1 to 10 | 10 colors | **B9937PA** | Standard | (10 pens/unit) |
| Pen cartridge set for pens 1 to 10 | 10 colors | **B9937PC** | Low speed | (10 pens/unit) |
| Pen cartridge set for pens 1 to 10 | 10 colors | **B9937PE** | High speed | (10 pens/unit) |
| Pen cartridge set for pens 1 to 12 | 12 colors | **B9937PB** | Standard | (12 pens/unit) |
| Pen cartridge set for pens 1 to 12 | 12 colors | **B9937PD** | Low speed | (12 pens/unit) |
| Pen cartridge set for pens 1 to 12 | 12 colors | **B9937PF** | High speed | (12 pens/unit) |

The models and selection criteria for pen cartridges are as follows:
  Standard: General-purpose recording at pen speeds up to approx. 800 mm/s
  High-speed: High-speed recording at pen speeds above approx. 800 mm/s
  Low-speed: Low-speed recording at chart speeds below approx. 100 mm/h

### ● LR8100E/LR4100E/LR4200E

| Name | Part No. | Description | Order Q'ty |
|---|---|---|---|
| Pen cartridge for pen 1 | **B9586□A** | Red (3 pens/unit), standard | 1 unit |
| Pen cartridge for pen 2 | **B9586□B** | Green (3 pens/unit), standard | 1 unit |
| Pen cartridge for pen 3 | **B9586□C** | Blue (3 pens/unit), standard | 1 unit |
| Pen cartridge for pen 4 | **B9586□D** | Brown (3 pens/unit), standard | 1 unit |
| Pen cartridge for pen 5 | **B9586□E** | Black (3 pens/unit), standard | 1 unit |
| Pen cartridge for pen 6 | **B9586□F** | Purple (3 pens/unit), standard | 1 unit |
| Pen cartridge for pen 7 | **B9586□G** | Orange (3 pens/unit), standard | 1 unit |
| Pen cartridge for pen 8 | **B9586□H** | Violet (3 pens/unit), standard | 1 unit |
| Pen cartridge set, pens 1-4 | **B9586□R** | 4 pens (1 pen color)/unit | 1 unit |
| Pen cartridge set, pens 1-6 | **B9586□S** | 6 pens (1 pen color)/unit | 1 unit |
| Pen cartridge set, pens 1-8 | **B9586□T** | 8 pens (1 pen color)/unit | 1 unit |

The models and selection criteria for pen cartridges are as follows:
  Standard: **B9586 Y□**, general-purpose recording at pen speeds up to approx. 800 mm/s
  High-speed: **B9586 Z□**, high-speed recording at pen speeds above approx. 800 mm/s
  Low-speed: **B9586 X□**, low-speed recording at chart speeds below approx. 100 mm/h

### ● OPTIONAL ACCESSORIES

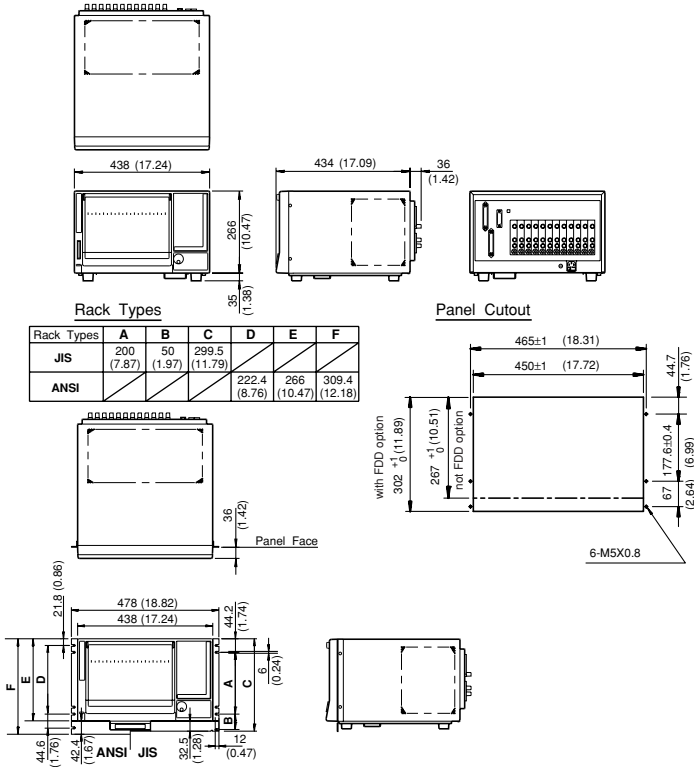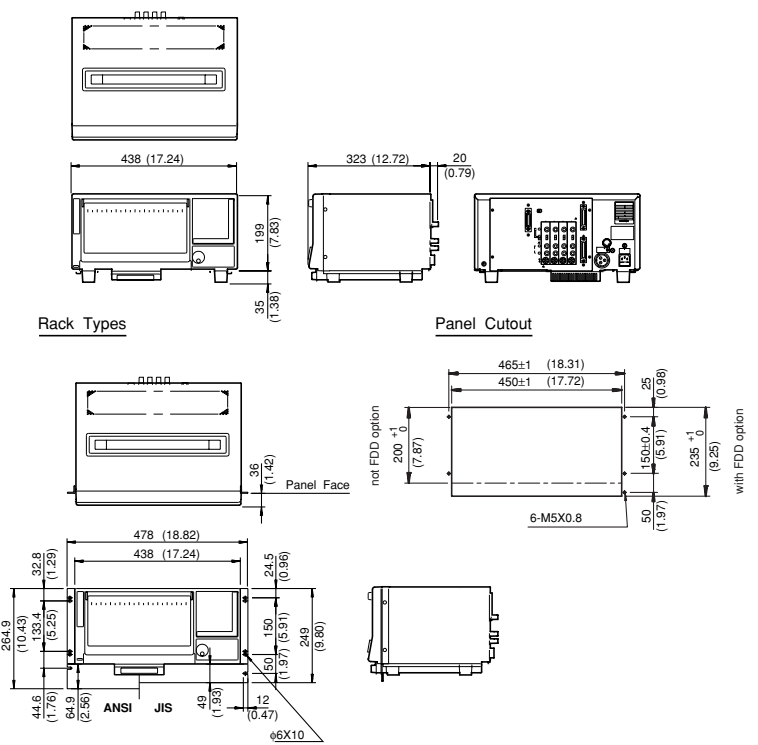| Name | Part No. | Description |
|---|---|---|
| Rack mount kit | 378981 | for **LR12000E/8100E** (w/o FDD) |
| Rack mount kit | 378982 | for **LR4100E** (w/o FDD) |
| Rack mounting kit | 378984 | for **LR12000E/8100E** w/FDD |
| Rack mounting kit | 378985 | for **LR4100E** w/FDD |
| IC memory card | 378904 | 256 KB, for setup information and measured value storage |
| IC Memory card | 378905 | 512 KB, for setup information and measured value storage |
| IC memory card | 378906 | 1 MB, for setup information and measured value storage |

# LR SERIES RECORDERS

## LR12000E/LR8100E/LR4100E/LR4200E
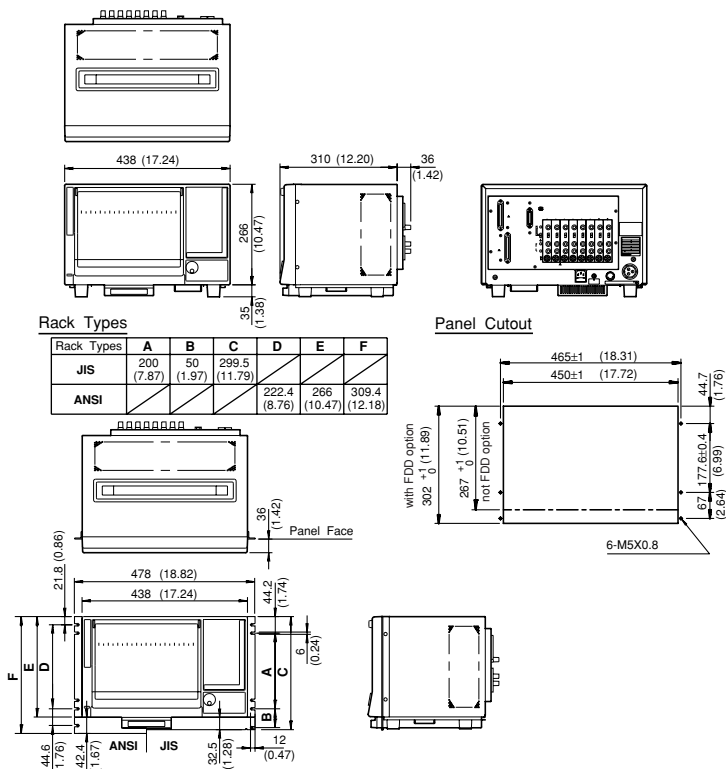
## DIMENSIONS

Unit : mm (inch)

● **LR12000E**



**Rack Types**

| Rack Types | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| JIS | 200 (7.87) | 50 (1.97) | 299.5 (11.79) | | | |
| ANSI | | | | 222.4 (8.76) | 266 (10.47) | 309.4 (12.18) |

**Panel Cutout**

● **LR4100E**



**Rack Types**

**Panel Cutout**

● **LR8100E**



**Rack Types**

| Rack Types | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| JIS | 200 (7.87) | 50 (1.97) | 299.5 (11.79) | | | |
| ANSI | | | | 222.4 (8.76) | 266 (10.47) | 309.4 (12.18) |

**Panel Cutout**

● **LR4200E**



/AK-04 Alarm Connector (option)

/REM Remote Control Connector (option)