

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

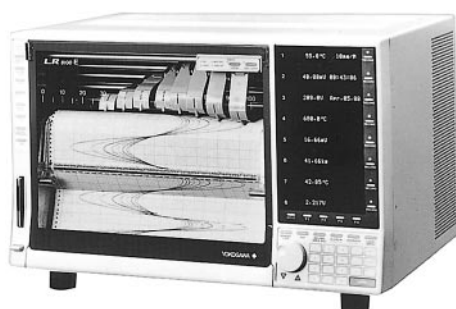


LR12000E

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



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



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



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



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 Thermocouple (12 types) R, S, B, K, E, J, N, T, W, L [DIN], U [DIN], KPvsAu7Fe 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. *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 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 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).

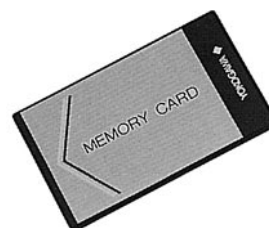
The measurement data can also be saved to FD via the internal buffer memory provided by the FDD option.



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.

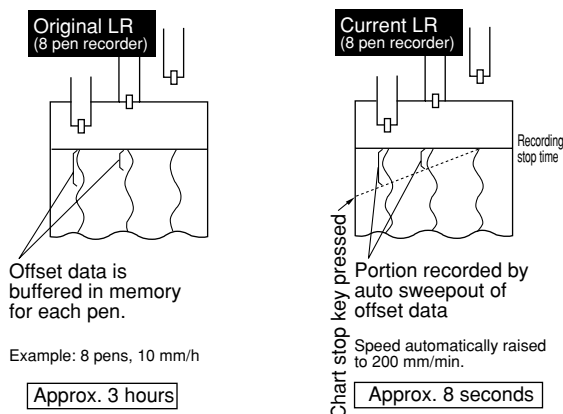


Capture Detailed Measurement Data (Optional Function)

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.



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RECORDING EXAMPLE

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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

SPECIFICATIONS

Item		Model	LR12000E	LR8100E	LR4100E		LR4200E																																																												
					LR4110E	LR4120E	LR4210E	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), KPsAu7Fe 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)* Thermocouples: R, S ±(0.05% of rdg +1°C) Below 100°C ±3.7°C 100 to 300°C: ±1.5°C B ±(0.05% of rdg +1°C) 400 to 600°C: ±2.0°C (not guaranteed below 400°C) K, E, T, L, U ±(0.05% of rdg +0.5°C) J ±(0.05% of rdg +0.5°C) -200 to 100°C: ±0.7°C N ±(0.05% of rdg +0.5°C) W ±(0.05% of rdg +1°C) KPsAu7Fe ±(0.05% of rdg +0.5°C) (not guaranteed below 4 K or above 280 K) RTD: Pt100, JPt100, Ni100 ±(0.05% of rdg +0.2°C) 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 <table><tr><td>Pen</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Color</td><td>Red</td><td>Green</td><td>Blue</td><td>Brown</td><td>Black</td><td>Purple</td></tr><tr><td></td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td></td><td>Orange</td><td>Violet</td><td>Light blue</td><td>Yellow green</td><td>Pink</td><td>Yellow</td></tr></table>			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 <table><tr><td>Pen</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Color</td><td>Red</td><td>Green</td><td>Blue</td><td>Brown</td></tr><tr><td></td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td></td><td>Black</td><td>Purple</td><td>Orange</td><td>Violet</td></tr></table>		Pen	1	2	3	4	Color	Red	Green	Blue	Brown		5	6	7	8		Black	Purple	Orange	Violet	1, 2, 3 or 4 <table><tr><td>Pen</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Color</td><td>Red</td><td>Green</td><td>Blue</td><td>Brown</td></tr></table>			Pen	1	2	3	4	Color	Red	Green	Blue	Brown
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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)																																																																	

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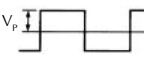
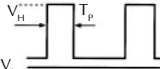
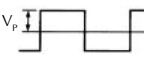
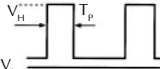
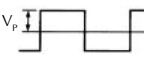
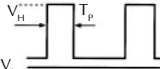
Model		Item	LR12000E	LR8100E	LR4100E		LR4200E			
					LR4110E	LR4120E	LR4210E	LR4220E		
Printing	Printout Types	TAG No. print:	User-set tag can be printed in place of channel number (7 characters max.)							
		Alarm print:	Channel number, alarm type, ON/OFF time							
		Scale print:	Prints 0% and 100% 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.							
Other Functions	Alarm	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.							
		General Specifications	Chart speed and printing interval for LR8100E/4100E/4200E	mm/min		mm/h	Printing interval			
				1200 to 300	—	1 minute				
General Specifications	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	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						
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		299 to 30	—	10 minutes						
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		—	119 to 60	2 hours						
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		299 to 30	—	10 minutes						
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		—	119 to 60	2 hours						
		—	59 to 40	3 hours						
		—	39 to 20	6 hours						
		—	19 to 10	12 hours						
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				600 to 300	—	1 minute				
299 to 30	—			10 minutes</						

LR SERIES RECORDERS



LR12000E/LR8100E/LR4100E/LR4200E

OPTIONAL SPECIFICATIONS

Item	Specifications	Remarks																																		
GP-IB Interface (/GP-IB)	Conforms to IEEE Std 488-1978 Talker functions: - Measured value input/output (ASCII and binary output; ASCII input) - Setup information input/output (ASCII) - Memory data output (ASCII and binary) Listener functions: - All functions can be remotely controlled and set except the following: 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: Personal computer used: 80286 CPU, 8 MHz GP-IB board N88 BASIC (86) (MS-DOS version) Disk is hard disk																																		
RS-232-C interface (/RS232C)	Conforms to EIA RS-232-C Modes: - Measured value input/output (ASCII and binary output, ASCII input) - Setup information input/output (ASCII) - Memory data output (ASCII and binary) Communication rate: 75, 150, 300, 600, 1200, 2400, 4800, or 9600 bps	<table border="1"> <thead> <tr> <th colspan="2">(GP-IB communications)</th> <th>(Readout time)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">ASCII</td> <td>4 CH model</td> <td>Approx. 80 ms</td> </tr> <tr> <td>8 CH model</td> <td>Approx. 140 ms</td> </tr> <tr> <td>12 CH model</td> <td>Approx. 170 ms</td> </tr> <tr> <td rowspan="3">Binary</td> <td>4 CH model</td> <td>Approx. 30 ms</td> </tr> <tr> <td>8 CH model</td> <td>Approx. 50 ms</td> </tr> <tr> <td>12 CH model</td> <td>Approx. 60 ms</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">(RS-232-C communications)</th> <th>(Readout time)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">ASCII</td> <td>4 CH model</td> <td>Approx. 110 ms</td> </tr> <tr> <td>8 CH model</td> <td>Approx. 200 ms</td> </tr> <tr> <td>12 CH model</td> <td>Approx. 250 ms</td> </tr> <tr> <td rowspan="3">Binary</td> <td>4 CH model</td> <td>Approx. 60 ms</td> </tr> <tr> <td>8 CH model</td> <td>Approx. 100 ms</td> </tr> <tr> <td>12 CH model</td> <td>Approx. 120 ms</td> </tr> </tbody> </table> * 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.	(GP-IB communications)		(Readout time)	ASCII	4 CH model	Approx. 80 ms	8 CH model	Approx. 140 ms	12 CH model	Approx. 170 ms	Binary	4 CH model	Approx. 30 ms	8 CH model	Approx. 50 ms	12 CH model	Approx. 60 ms	(RS-232-C communications)		(Readout time)	ASCII	4 CH model	Approx. 110 ms	8 CH model	Approx. 200 ms	12 CH model	Approx. 250 ms	Binary	4 CH model	Approx. 60 ms	8 CH model	Approx. 100 ms	12 CH model	Approx. 120 ms
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Binary	4 CH model	Approx. 60 ms																																		
	8 CH model	Approx. 100 ms																																		
	12 CH model	Approx. 120 ms																																		
IC Memory Card	Functions: Storage of setup information and measured values Data format: MS-DOS Sampling modes and sampling rates: - Free mode (manual start) or Trigger mode (started by trigger condition) - Sampling rate: 135, 9, 5, 3, 1, 0.5, 0.2, 0.1, 0.05, 0.02, or 0.01 Hz Memory capacity: 256, 512KB, 1MB Data length: 1000, 2000, 4000, 8000, 16000, or 32000 samples/channel (setting shared by all channels; data is 2 bytes/sample) Number of files: 47 files max. Trigger conditions: Alarm detection, CHART END, or external contact input (optional) Pre-trigger: 0 to 100% (set in 10% increments) Memory data: Measured data, communications input data, computed data Output: Communications output, or playback recording Battery backup: Lithium battery																																			
Remote Control (/REM)	Functions: - Chart start/stop (paper feed start/stop) - Chart speed change (toggle between speed 1 and 2) * Manual print (print time and measured data values) - Chart speed control (control chart speed using external signal source) <table border="1"> <thead> <tr> <th>Waveform</th><th>Sine, triangle or square wave</th><th>Pulse train</th></tr> </thead> <tbody> <tr> <td>Level</td><td>  $4\text{ V} < V_p < 24\text{ V}$ </td><td>  $+4\text{ V} < V_p < +24\text{ V}$ $-24\text{ V} < V_L < +0.5\text{ V}$ $TP > 300\text{ }\mu\text{s}$ </td></tr> <tr> <td>Source output impedance</td><td>600Ω max.</td><td>50Ω max.</td></tr> <tr> <td>Chart speed</td><td colspan="2">0.15 f cm/min (f in Hz or pps)</td></tr> <tr> <td>Max. frequency</td><td>800 Hz</td><td>800 pps</td></tr> </tbody> </table> * Message print (time, and message of up to 70 characters; 4 numbered messages available) * Pen lift (all pens lifted/lowered simultaneously) * Record ON/OFF selection (ON: Measurement + recording; OFF: Measurement only) * External trigger (start writing of data to accessory IC memory card) * Other (fail, chart end output) ** Reroll (reroll start/stop)	Waveform	Sine, triangle or square wave	Pulse train	Level	 $4\text{ V} < V_p < 24\text{ V}$	 $+4\text{ V} < V_p < +24\text{ V}$ $-24\text{ V} < V_L < +0.5\text{ V}$ $TP > 300\text{ }\mu\text{s}$	Source output impedance	600Ω max.	50Ω max.	Chart speed	0.15 f cm/min (f in Hz or pps)		Max. frequency	800 Hz	800 pps	- Input signals may be TTL, open collector, or contact point. - Alarms and variations in the remote contact input are detected at 125-ms intervals. - Functions marked with * not available in LR4120E or LR4220E. - Function marked with ** available on LR4200E with /REROL only.																			
Waveform	Sine, triangle or square wave	Pulse train																																		
Level	 $4\text{ V} < V_p < 24\text{ V}$	 $+4\text{ V} < V_p < +24\text{ V}$ $-24\text{ V} < V_L < +0.5\text{ V}$ $TP > 300\text{ }\mu\text{s}$																																		
Source output impedance	600Ω max.	50Ω max.																																		
Chart speed	0.15 f cm/min (f in Hz or pps)																																			
Max. frequency	800 Hz	800 pps																																		
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) Contact capacity: 24 V DC/AC, 1 A Other: Fail and chart end outputs	- AK-04 (for LR4100E, LR4200E) - AK-08 (for LR8100E) - AK-12 (for LR12000E)																																		
Computing Functions (/MATH)	Functions: Arithmetic operations, SQR (square root), ABS (absolute value), LOG (logarithm), EXP (exponent) Number of channels: Max. 8 channels (LR8100E), or max. 4 channels (LR4100E and LR4200E) Computational expressions: Up to 18 characters 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.) - 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) 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)	Available on LR8100E and LR4100E only.
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) Accessories: Reel	Available on LR4200E only. This function includes /ROL.
3.5-inch Floppy Disk Drive (/FDD)	Number of drives: 1* Medium: 2HD Data capacity: 1.44 MB fixed ** Models in which FDD can be installed: LR4100E, LR8100E, LR12000E *** Buffer memory capacity: LR4100E /Built-in 256 Kbyte SRAM LR8100E /Built-in 512 Kbyte SRAM LR12000E /Built-in 768 Kbyte SRAM Data backup: It can save data for approx. 1 day 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.	* 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, ** 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. *** The 3.5-inch option (/FDD) cannot be specified for the LR4200E . **** If a power failure occurs while data is being recorded 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. However, 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.

LR SERIES RECORDERS



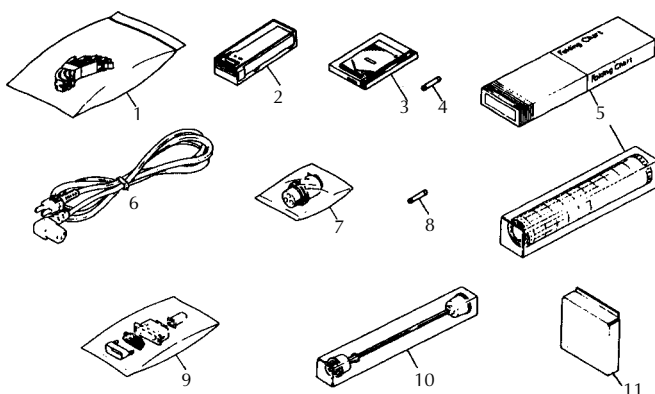
LR12000E/LR8100E/LR4100E/LR4200E

STANDARD ACCESSORIES

No.	Name	Part No.	Quantity	Remarks
1	Pen cartridge	B9586YR B9586YS B9586YT B9937PB	1 unit 1 unit 1 unit 1 unit	4 pens (1 pen color) /unit, standard 6 pens (1 pen color) /unit, standard 8 pens (1 pen color) /unit, standard 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 B9585BH B9619BC B9622DK	1 1 1 1	For LR12000E For LR8100E *2 For LR4100E *2 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.

Can be used with Windows 95.

RS-232-C:

■ 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.

Windows 95

OS:

CRT:

Video:

Display that is compatible with Windows 95

640 × 480 minimum, at least 256 colors

(at least 1024 × 768 is recommended)

Compatible with Windows 95

Mouse:

Printer:

FDD:

Compatible with Windows 95 (driver is necessary)

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 redisplay 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

■ LR4200E

Model	Suffix Cpde	Description
3721 Number of channels	1	1-pen model
	2	2-pen model
	3	3-pen model
	4	4-pen model
3722 Number of channels	1	1-pen model
	2	2-pen model
	3	3-pen model
	4	4-pen model
Input types & max. 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/LR4200E)
/DC	DC power (for LR8100E/LR4100E)
/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 battery	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/LR4200E/8100E
Instruction manual	DOCIM	If another copy is requested

● APPLICATION SOFTWARE

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

AVAILABLE MODELS

■ LR12000E

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

■ LR8100E

Model	Suffix Cpde	Description
3701 Number of channels	4	4-pen model
	6	6-pen model
	8	8-pen model
Input types & max. 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

■ LR4100E

Model	Suffix Cpde	Description
3711 Number of channels	1	1-pen model
	2	2-pen model
	3	3-pen model
	4	4-pen model
3712 Number of channels	1	1-pen model
	2	2-pen model
	3	3-pen model
	4	4-pen model
Input types & max. 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

LR SERIES RECORDERS



LR12000E/LR8100E/LR4100E/LR4200E

■ 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	B9586QA	Red (3 pens/unit), standard	1 unit
Pen cartridge for pen 2	B9586QB	Green (3 pens/unit), standard	1 unit
Pen cartridge for pen 3	B9586QC	Blue (3 pens/unit), standard	1 unit
Pen cartridge for pen 4	B9586QD	Brown (3 pens/unit), standard	1 unit
Pen cartridge for pen 5	B9586QE	Black (3 pens/unit), standard	1 unit
Pen cartridge for pen 6	B9586QF	Purple (3 pens/unit), standard	1 unit
Pen cartridge for pen 7	B9586QG	Orange (3 pens/unit), standard	1 unit
Pen cartridge for pen 8	B9586QH	Violet (3 pens/unit), standard	1 unit
Pen cartridge set, pens 1-4	B9586QR	4 pens (1 pen color)/unit	1 unit
Pen cartridge set, pens 1-6	B9586QS	6 pens (1 pen color)/unit	1 unit
Pen cartridge set, pens 1-8	B9586QT	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

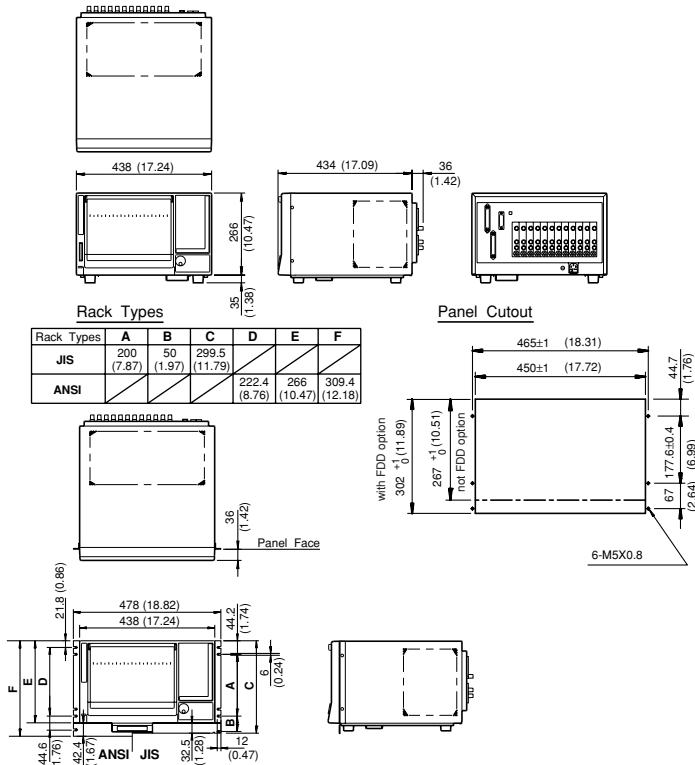


LR12000E/LR8100E/LR4100E/LR4200E

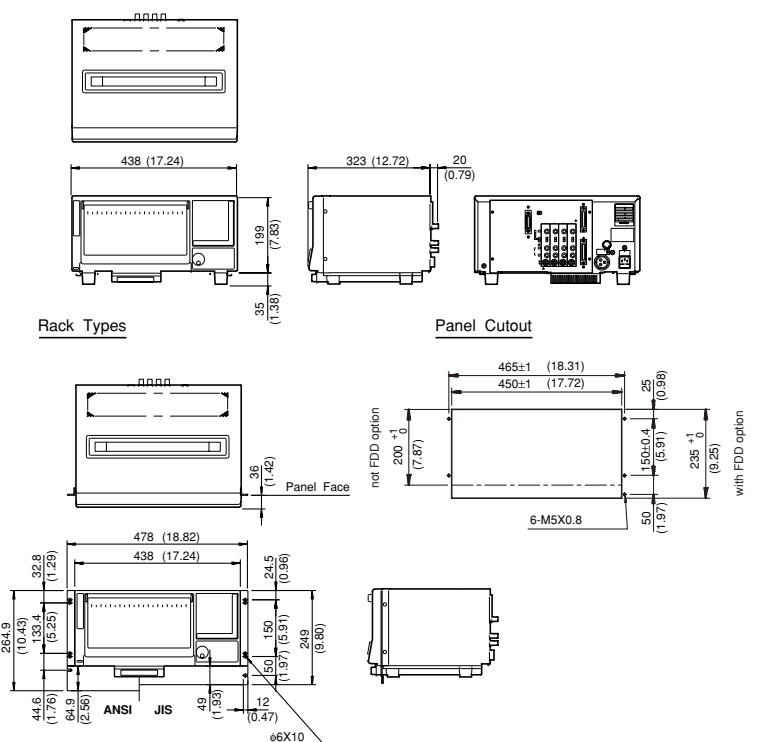
DIMENSIONS

Unit : mm (inch)

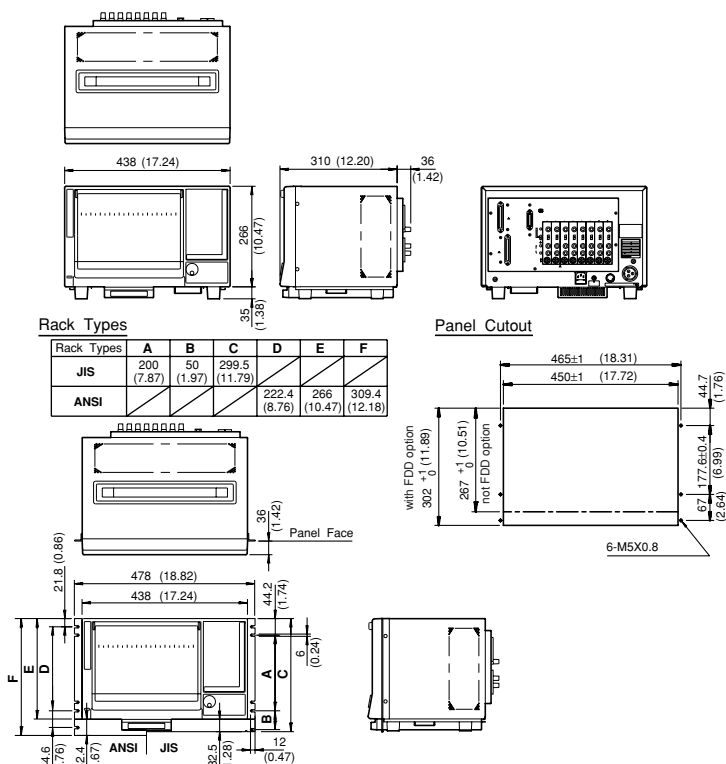
● LR12000E



● LR4100E



● LR8100E



● LR4200E

