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ISO 9002 CERTIFIED CORPORATE QUALITY MANCHESTER, UK



RD1800B Programmable Recorder



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice. **WARNING:** These products are not designed for use in, and should not be used for, human applications.

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Foreword

Thank you for purchasing the OMEGA RD1800B Recorder. This manual describes concisely the operating procedures of the RD1800B Recorder. To ensure correct use, please read this manual thoroughly before beginning operation.

The following two manuals, in addition to this one, are provided as manuals for the RD1800B Recorder. Please read all of them.

Electronic Manuals Provided on the Accompanying CD-ROM

Manual Title Manual No. RD1800B Recorder User's Manual M-4242 Explains all the functions and procedures of the recorder excluding the communication functions. M-4233

RD100B/RD1800B Communication

Interface User's Manual

Explains the communication functions using Ethernet interface and the RS-422A/485 communication interface.

Opening the Electronic Manuals

The PDF files of the manuals are provided on the accompanying CD-ROM. When the CD-ROM is inserted in the PC's CD-ROM drive, a list of manuals on the CD-ROM is displayed. Click a manual title to open the manual.

If the list of manuals is not displayed automatically, open the manual in the My Computer > RD100B_RD1800B_manual > English directory.

Notes

- · The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact OMEGA as listed on the cover of this manual.
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Revisions

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Safety Precautions

The general safety precautions described here must be observed during all phases of operation.

Safety Standards and EMC Standards

This recorder conforms to IEC safety class I (provided with terminal for protective grounding), Installation Category II, Measurement category II (CAT II), and EN61326-1 (EMC standard), class A (use in a commercial, industrial, or business environment). This recorder is designed for indoor use.

About This Manual

- This manual should be read by the end user.
- Read this manual thoroughly and have a clear understanding of the product before operation.
- This manual explains the functions of the product. OMEGA does not guarantee that the product will suit a particular purpose of the user.
- Under absolutely no circumstances may the contents of this manual be transcribed or copied, in part or in whole, without permission
- The contents of this manual are subject to change without prior notice.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors or omissions, please contact OMEGA.
- Precautions Related to the Protection, Safety, and Alteration of the Product
 - The following safety symbols are used on the product and in this manual.

"Handle with care." To avoid injury and damage to the instrument, the operator must refer to the explanation in the manual.

Protective ground terminal

AC



"High temperature." To avoid injury caused by hot surface, do not touch locations where this symbol appears.

- For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety that are stated in this manual whenever you handle the product. Take special note that if you handle the product in a manner that violate these instructions, the protection functionality of the product may be damaged or impaired. In such cases, OMEGA does not guarantee the quality, performance, function, and safety of the product.
- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system or designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of the processes and lines that use the product and the control system, the user should implement these using additional devices and equipment.
- If you are replacing parts or consumable items of the product, make sure to use parts specified by OMEGA.
- This product is not designed or manufactured to be used in critical applications that directly affect or threaten human lives. Such applications include nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities, and medical equipment. If so used, it is the user's responsibility to include in the system additional equipment and devices that ensure personnel safety.
- Do not modify this product.

WARNING

- **Power Supply** Ensure that the source voltage matches the voltage of the power supply before turning ON the power.
- Protective Grounding
 Make sure to connect the protective grounding to prevent electric shock before turning ON the power.
- Necessity of Protective Grounding
 Never cut off the internal or external protective earth wire or
 disconnect the wiring of the protective earth terminal. Doing so
 invalidates the protective functions of the instrument and poses
 a potential shock hazard.
- Defect of Protective Grounding
 Do not operate the instrument if the protective earth or fuse
 might be defective. Make sure to check them before operation.
- Do Not Operate in an Explosive Atmosphere
 Do not operate the instrument in the presence of flammable
 liquids or vapors. Operation in such environments constitutes a
 safety hazard.

Do Not Remove Covers

The cover should be removed by OMEGA's qualified personnel only. Opening the cover is dangerous, because some areas inside the instrument have high voltages.

External Connection

Connect the protective grounding before connecting to the item under measurement or to an external control unit.

Damage to the Protective Structure
 Operating the recorder in a manner not described in this
 manual may damage its protective structure.

Exemption from Responsibility

- OMEGA makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
- OMEGA assumes no liability to any party for any loss or damage, direct or indirect, caused by the user or any unpredictable defect of the product.

Handling Precautions of the Software

- OMEGA makes no warranties regarding the software accompanying this product except those stated in the WARRANTY that is provided separately.
- Use the software on a single PC.
- You must purchase another copy of the software, if you are to use the software on another PC.
- Copying the software for any purposes other than backup is strictly prohibited.
- Please store the original media containing the software in a safe place.
- Reverse engineering, such as decompiling of the software, is strictly prohibited.
- No portion of the software supplied by OMEGA may be transferred, exchanged, sublet, or leased for use by any third party without prior permission by OMEGA.

Handling Precautions

- Use care when cleaning the recorder, especially any plastic parts. When cleaning, wipe using a dry soft cloth. Do not use chemicals such as benzene or thinner, since these may cause discoloring and deformation.
- Keep electrically charged objects away from the signal terminals. This may damage the recorder.
- Do not apply volatile chemicals to the door glass, display, panel keys, etc. Do not allow rubber and vinyl products to remain in contact with the recorder for long periods of time. This may damage the recorder.
- When not in use, make sure to turn OFF the power switch.
- If there are any symptoms of trouble such as strange odors or smoke coming from the recorder, immediately turn OFF the power switch and the power supply source. Then, contact OMEGA.

How to Use This Manual

This manual covers information regarding the recorders with English as the display/recording language (suffix code "2"). The following markings are used in this manual.



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attentions to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

Note

Calls attention to information that is important for proper operation of the instrument.

Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. If some of the contents are not correct or missing or if there is physical damage, contact the dealer from which you purchased them.

RD1800B Recorder

A name plate is affixed to the case. Check that the model name and suffix code given on the name plate on the rear panel match those on your order.



NO. (Instrument Number)

When contacting the dealer from which you purchased the instrument, please give them the instrument number.

Model	Suffix	Optional Code	Description	
RD1801B	Coue	0000	RD1800B 1 pen recorder	
RD1802B			RD1800B 2 pen recorder	
RD1803B			RD1800B 3 pen recorder	
RD1804B			RD1800B 4 pen recorder	
RD1806B			RD1800B 6 dot recorder	
RD1812B			RD1800B 12 dot recorder	
RD1818B			RD1800B 18 dot recorder	
RD1824B			RD1800B 24 dot recorder	
	1			
	-2		English & deg F / DST	
	·	/A1	Alarm output relay 2 points ¹	
		/A2	Alarm output relay 4 points ¹	
		/A3	Alarm output relay 6 points ¹	
		/A4	Alarm output relay 12 points ^{1,2}	
		/A5	Alarm output relay 24 points ^{1,2}	
		/C3	RS-422A/485 interface ³	
		/C7	Ethernet (10BASE-T) interface ³	
		/F1	Fail/Chart end detection and output ²	
		/H2	Clamped input terminal ⁴	
		/H3	Non-glare door glass	
		/M1	Mathematical function	
		/N1	Cu10, Cu25 RTD input	
		/N2	3 legs isolated RTD ^{4,5}	
		/N3	Expansion inputs ⁶	
		/R1	Remote control 5 points	

- /A1, /A2, /A3, /A4, and /A5 cannot be specified simultaneously. /A5 is valid on the dot models. 1
- 2 /A5 and /F1 cannot be specified simultaneously on the dot
- models. /A4 and /F1 cannot be specified simultaneously on the pen
- 3
- models. /C3 and /C7 cannot be specified simultaneously. /H2 and /N2 cannot be specified simultaneously. 4
- 5 6
- Valid only on the dot models. 14 types of input including Pt50 RTD, PR40-20, and Platinel TC

Standard Accessories



	Plotter pen	1	1	1	1	-	
Mounting bracket			2	2	2	2	2
	Manuals for the RD100B/RD1800B (CD-ROM)			1	1	1	1
	RD1800B Recorder Operation Guide M-4243			1	1	1	1

Software (Sold Separately, see next page)

Item	Model	Note				
Configuration coffware	RD100B-SW1					
Configuration software	RD100B-SW2	With interface unit				
The Configuration Software is planned to be released in						
November, 2005.						

Optional Accessories (Sold Separately)

The optional accessories below are available for purchase separately. If you make an order, make sure that all contents are present and undamaged.

For information about ordering accessories, contact the dealer from which you purchased the recorder.

Item		Model	Quantity	Note
Z-fold chart paper		RD110-ZFP	1	10 pcs.
Ribbon cassett	е	RD110-RC	1	
	Red	RD100A-01	1	3 pcs.
Disposable	Green	RD100A-02	1	3 pcs.
felt pen	Blue	RD100A-03	1	3 pcs.
	Violet	RD100A-04	1	3 pcs.
Plotter pen Purple		RD100A-11	1	3 pcs.
Mounting brack	ket	B9900BX	2	
Shunt resistor		415920	1	$250~\Omega\pm0.1\%$
for the screw terminal (standard)		415921	1	$100~\Omega\pm0.1\%$
		415922	1	$10~\Omega\pm0.1\%$
Shunt resistor		438920	1	$250~\Omega\pm0.1\%$
for the clampe	d	438921	1	$100~\Omega\pm0.1\%$
input terminal (/H2)		438922	1	$10 \ \Omega \pm 0.1\%$

Removing the Packing Materials

Open the door, hold the left and right tabs and pull the display and key panel section toward you. The section opens upward.



Remove all packing materials.



Dot Model •



Memo

Function Introduction/Names of Parts

Function Introduction

The RD1800B Recorder (hereafter referred to as the recorder) can be used to assign DC voltage, 1-5V, thermocouple, RTD, and contact or voltage ON/OFF signal to channels for measurement. The measured results are recorded with pens or dots on a chart paper that is fed at a constant speed. The pen model can record up to 4 channels; the dot model can record up to 24 channels.



Alarms

For each channel, various alarms such as high limit alarm and low limit alarm can be assigned to monitor the measured values. Alarm output relays can be used to output contact signals when alarms occur (/A1, /A2, /A3, /A4 and /A5 options).

Recording

The measured results are recorded with pens or dots on a chart paper (trend recording). The chart speed can be selected from 5 to 12000 mm/h on the pen model and 1 to 1500 mm/h on the dot model.

In addition to trend recording, various types of information can be printed on the chart paper such as numeric measured values, alarm occurrence/release, and predefined messages.

Also, the recorder settings can be printed.

Internal Light

A light is provided for easier viewing of the recording area of the chart paper.

Display

Measured values can be displayed numerically or using bar graphs on the large display. Also, alarm status and chart speed can be displayed.

Communication Functions

Using the Ethernet communication interface (/C7 option) or the RS-422A/485 communication interface (/C3 option), the measured values on the recorder can be output to a computer or a computer can be used to control the recorder. For details on communication functions, see the *RD100B*/*RD1800B* Communication Interface User's Manual (M-4233) on the CD-ROM.

Other Main Functions

The computation function (/M1 option) can be used to perform various computations from four arithmetic operations to statistical calculations on 8 and 24 computation channels on the pen model and dot model, respectively. The computed results can be recorded.

The remote control function (/R1 option) can be used to control the recording start/stop and other operations of the recorder by applying contact signals to the dedicated terminals.

The FAIL/chart end detection and output function (/F1 option) can be used to output contact signals when errors are detected on the recorder or when the chart paper runs out.





Heatsink Dissipates the internal heat.

Display and Key Panel



Installing/Wiring the Recorder

Installation Location

Install the recorder indoors in a location that meets the following conditions.

Instrument Panel

The recorder is designed for panel mounting.

Well-Ventilated Location

To prevent overheating, install the recorder in a well-ventilated location. For the panel cut dimensions when arranging multiple recorders, see the next page. Follow the panel cut dimensions providing adequate space between instruments when other instruments are arranged on the panel.

Minimum Mechanical Vibrations

Choose an installation location with the minimum mechanical vibration. Installing the recorder in a location with large mechanical vibration not only causes adverse effects on the mechanism but also may hinder normal recording.

Horizontal

Install the recorder horizontally (However, the recorder can be inclined up to 30 degrees backwards for panel mounting).

Note _

- Condensation may occur if the recorder is moved to another place where both the ambient temperature and humidity are higher, or if the temperature changes rapidly. In addition, measurement errors will result when using thermocouples. In this case, let the recorder adjust to the new environment for at least one hour before using it.
- The chart paper may be adversely affected by a rapid change in the ambient temperature and humidity.

Do not install the recorder in the following places.

- Outdoors
- In Direct Sunlight or Near Heat Sources

Install the recorder in a place with small temperature fluctuations near room temperature (23°C). Placing the recorder in direct sunlight or near heat appliances can cause adverse effects on the internal circuitry.

• Where an Excessive Amount of Soot, Steam, Moisture, Dust, or Corrosive Gases Are Present

Soot, steam, moisture, dust, and corrosive gases will adversely affect the recorder. Avoid such locations.

Near Strong Magnetic Field Sources

Do not bring magnets or instruments that produce electromagnetic fields close to the recorder. Operating the recorder in strong magnetic fields can cause errors in the measurements.

Installation Procedure

The recorder should be mounted on a steel panel of thickness 2 mm to 26 mm.

- **1.** Insert the recorder from the front side of the panel (see the mounting diagram on the next page).
- **2.** Mount the recorder to the panel using the mounting brackets that come with the package.
 - Use two brackets to support the top and bottom or the left and right sides of the case (remove the seal that is covering the holes for the mounting brackets beforehand).
 - The proper torque for tightening the mounting screws is 0.7 to 0.9 Nm.
 - Mount the recorder to the panel according to the procedure below.
 - First, attach the two mounting brackets and temporarily fasten the attachment screws.

• Next, fix the recorder in place by tightening the attachment screws with the appropriate torque. When the recorder is approximately perpendicular to the panel as you fasten the screws, press the mounting bracket against the case so that they are in contact with each other.

CAUTION

Tightening the screws too much can deform the case or damage the bracket.



Unless otherwise specified, tolerance is $\pm 3\%$ (however, tolerance is ± 0.3 mm when below 10 mm).

281 +8 (11.06)

Input Signal Wiring



WARNING

To prevent electric shock while wiring, ensure that the power supply source is turned OFF.

CAUTION

- If a strong tension is applied to the cable wired to the recorder, the terminals of the recorder and/or the cable can be damaged. In order to prevent tension from being applied directly on the terminals, fasten all wiring cables to the rear of the mounting panel.
- Do not apply a voltage exceeding the following value to the input terminals as this may damage the recorder.
 - Maximum input voltage
 - Voltage range less than or equal to 200 mVDC, TC, RTD, and DI: ± 10 VDC Ranges other than those listed above: ± 60 VDC
 - Maximum common-mode voltage
 - ±60 VDC (under measurement category II conditions)
- The recorder is an INSTALLATION CATEGORY II product.

Precautions to Be Taken While Wiring

Take the following precautions when wring the input signal cables. It is recommended that crimp-on lug with insulation sleeves (designed for 4-mm screws) be used when connecting the input/output signal wires to the terminals. However, this does not apply clamped terminals (/H2).

For clamped terminals (/H2), the following wire is recommended.

- Conductive cross-sectional area for single wire: 0.14 mm² to 1.5 mm², stranded wire: 0.14 mm² to 1.0 mm²
- · Length of the stripped section of the wire: Approx. 5 mm

Take measures to prevent noise from entering the measurement circuit.

- Move the measurement circuit away from the power cable (power circuit) and ground circuit.
- It is desirable that the object being measured does not generate noise. However, if this is unavoidable, isolate the measurement circuit from the object. Also, ground the object being measured.
- Shielded wires should be used to minimize noise caused by electrostatic induction. Connect the shield to the ground terminal of the recorder as necessary (make sure you are not grounding at two points).
- To minimize noise caused by electromagnetic induction, twist the measurement circuit wires at short, equal intervals.
- Make sure to earth ground the protective ground terminal through minimum resistance (less than 100 Ω).

When using internal reference junction compensation on the thermocouple input, take measures to stabilize the temperature at the input terminal.

- Always use the terminal cover.
- Do not use thick wires which may cause large heat dissipation (cross sectional area of 0.5 mm² or less recommended).
- Make sure that the ambient temperature remains reasonably stable. Large temperature fluctuations can occur if a nearby fan turns ON or OFF.

Connecting the input wires in parallel with other devices can cause signal degradation, affecting all connected devices.

If you need to make a parallel connection, then

- Turn the burnout detection function OFF.
- Ground the instruments to the same point.
- Do not turn ON or OFF another instrument during operation. This can have adverse effects on the other instruments.
- RTDs cannot be wired in parallel.

Installing/Wiring the Recorder

Measuring input

terminal block

Terminal cover attachment screws

Wiring Procedure

A terminal cover is screwed in place on the measuring input terminal block on the rear panel. A label indicating the terminal arrangement is affixed to the cover.

- **1.** Turn OFF the recorder and remove the terminal cover.
- **2.** Connect the signal wires to the terminals.

Note

Input signal wires of diameter less than or equal to 0.3 mm may not be secured firmly for clamped terminals (/H2). Fold over the conducting section of the wire, for example, to make sure that the wire is securely connected to the clamped terminal.

3. Replace the terminal cover and fasten it with screws. The proper torque for tightening the screws is 0.6 N-m.



RTD input terminals A and B on the dot model are isolated on each channel. Terminal b is shorted internally across all channels. However, for 3 legs isolated RTDs (/N2 option), input b is also isolated for each channel.

Optional Terminal Wiring



WARNING

- To prevent electric shock while wiring, ensure that the power supply source is turned OFF.
- If a voltage of more than 30 VAC or 60 VDC is to be applied to the output terminals, use ring-tongue crimp-on lugs with insulation sleeves on all terminals to prevent the wires from slipping out when the screws become loose.
 Furthermore, use double-insulated wires (dielectric strength of 2300 VAC or more) for the signal wires on which a voltage of more than 30 VAC or 60 VDC is to be applied. For all other wires, use basic insulated wires (dielectric strength of 1390 VAC). To prevent electric shock, attach the terminal cover after wiring and make sure not to touch the terminals.

CAUTION

- To prevent fire, use signal wires having a temperature rating of 70°C or more.
- If a strong tension is applied to the cable wired to the recorder, the terminals of the recorder and/or the cable can be damaged. In order to prevent tension from being applied directly on the terminals, fasten all wiring cables to the rear of the mounting panel.

Wiring Procedure

As shown in the figure below, the optional terminal block is located on the rear panel. The optional terminal block is provided on the recorder when an option that requires input/output is installed such as the alarm output relay (/A1, /A2, or /A3 option), FAIL/chart end output (/F1 option), and remote control function (/R1 option). A terminal cover is screwed in place on the measuring input terminal block. A label indicating the terminal arrangement is affixed to the terminal block.



- 1. Turn OFF the recorder and remove the terminal cover.
- 2. Connect the input signal wires to the terminals.
- **3.** Replace the terminal cover and fasten it with screws. The proper torque for tightening the screws is 0.6 N-m.

Note

To reduce noise, use a shielded cable for the wiring of the remote control input terminals. Connect the shield to the ground terminal of the recorder.

/Δ1	/A1/F1	/A1/R1	/A1/F1/R1	/E1	/ D1
	101 102 103 104	NO C NC I01 NO C NC I02 O O O O O O O O 1 2 3 (/R1)	101 102 102 102 102 102 102 102 123 (/R1)	 ○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○	000 000 000 000 000 000 000 000 000 00
/ A2	/ A2/F1	/A2/R1	/A2/F1/R1	/F1/R1	
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/A5/R1			
Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system	10 C 111 10 C 112 10 C 113 10 C 114 10 C 114 10 C 115 10 C 115 10 C 116	121 120 122 120 122 120 122 120 121 122 123 100 124 125 126 126	131 132 132 132 133 134 135 136

Alarm Output Relay Terminals and FAIL/Chart End Output Relay Terminals

NC (Normally Closed), C (Common), NO (Normally Opened)

Alarm output terminals are expressed as I01 to I06, I11 to I16, I21 to I26, and I31 to I36 in the alarm output relay settings.

Remote Control Input Terminals

1 to 5 (Remote control input terminals), C (Common)

Remote control input terminals 1 to 5 are expressed as numbers 1 to 5 in the remote control input settings.









Relay Contact Output Specifications

	Output format:	Relay contact
	Contact rating:	250 VAC (50/60 Hz)/3 A, 250 VDC/0.1 A (for resistor load)
	Dielectric strength:	1500 VAC at 50/60 Hz for one minute (between output terminals
		and the ground terminal)
Re	elay Contact Input/	Transistor Input Specifications
•	Voltage-free contac	t: Contact closed at 200 Ω or less and contact open at 100 k Ω
		or greater
•	Open collector:	0.5 V or less (30 mADC) when turned ON, leakage current of
		0.25 mA or less when turned OFF

Input format: Photocoupler isolation (shared common)

Dielectric strength: 500 VDC for one minute between input terminals and the ground terminal

Power Supply Wiring



WARNING

- To prevent electric shock when wiring, ensure the main power supply is turned OFF.
- To prevent the possibility of fire, use 600 V PVC insulated wire (JISC3307) or an equivalent wire for power wiring.
- Make sure to earth ground the protective earth terminal through a grounding resistance less than 100 Ω before turning ON the power.
- Use crimp-on lugs (designed for 4 mm screws) for power and ground wiring termination.
- To prevent electric shock, make sure to close the transparent cover for the power supply wires.
- Make sure to provide a power switch (double-pole type) on the power supply line in order to separate the recorder from the main power supply. Put an indication on this switch as the breaker on the power supply line for the recorder and indications of ON and OFF.
 - Switch specifications
 - Rated power current: 1 A or more
 - Rated rush current: 60 A or more
 - Use a switch complied with IEC 60947-1, 3.
- Connect a fuse between 2 A and 15 A in the power supply line. Use a fuse approved by CSA (for the use in North America) or VDE (for the use in Europe).
- Do not add a switch or fuse to the ground line.

Use a power supply that meets the following conditions:

Item	Power Supply Specifications
Rated supply voltage	100 to 240 VAC
Allowable power supply voltage range	90 to 132/180 to 264 VAC
Rated power supply frequency	50/60 Hz
Allowable power supply frequency range	50/60 Hz ± 2%
Maximum power consumption	Pen model: 55 VA, dot model: 55 VA

Note

Do not use a supply voltage in the range 132 to 180 VAC, as this may have adverse effects on the measurement accuracy.

Wiring Procedure

The power supply terminals and protective ground terminals are located on the rear panel.

- **1.** Turn OFF the power switch on the recorder and open the power terminal cover.
- Wire the power cord and the protective ground cord to the power supply terminals. Use ring-tongue crimp-on lugs (designed for 4 mm screws).
- **3.** Close the power supply terminal cover and secure it with the screw. The proper torque for tightening the screws is 0.6 N-m.

Turning ON/OFF the Power Switch

The power switch is located inside the door at the lower right. The power switch is a push button.



Press once to turn it ON and press again to turn it OFF. When the power switch is turned ON, a self-diagnosis program runs for a few seconds, and the recorder is ready for operation.

Common Operations and Menu Structure

Execution Modes

The recorder has three execution modes.

Operation Mode

This mode is used for normal recording operation. The recorder enters this mode when the power is turned ON.

Setting Mode

This mode is used to set the input range, alarms, chart speed, and other parameters. These settings can be changed while recording is in progress. However, the input range of measurement channels and the computing equation, unit, constant, and TLOG setting of computation channels cannot be changed while computation (/M1 option) is in progress.

Basic Setting mode

This mode is used to set the basic specifications of the recorder such as the thermocouple burnout detection function and the alarm output relay operation. This mode cannot be entered while the recorder is recording or while computation is in progress on the computation function (/M1 option). Measurement, recording, and alarm detection cannot be carried out in this mode.



Operation Sequence

This section explains the operations that need to be carried out when using the recorder for the first time.

• Preparing to Record

Load the chart paper and pens (pen model) or ribbon cassette (dot model). Change the date/time if necessary.

For the operating procedure, see page 24.

Setting the Channel Input Range and Other Parameters

Set the measurement conditions suitable for the object being measured. This manual explains the following operations.

- Setting the input range and alarm (see page 31 for the procedure)
- Changing the chart speed (see page 38 for the procedure)

Recording/Displaying Data

Start/Stop the recording operation and carry out various types of printouts. Also, switch the display screen and change the displayed contents. For the operating procedure, see page 37.

Key Operation

Entering Setting Mode

Hold down the MENU key for 3 seconds.

The Setting mode display appears. The top and bottom lines are the setup item and comment, respectively.

The section that is blinking is the setup item that you change. In this manual, the section that you change appears shaded.



In Setting mode, the panel keys are set to the functions marked above the keys.

(CHARACTER	$\nabla \Delta$	$\triangleleft \triangleright$	ESC/?	SHIFT	<₽)
RCD	MENU	(DISP)	•)FUNC	(VMENU)	FEED)	CH UP

Exiting from Setting Mode (Returning to Operation Mode)

Hold down the MENU key for 3 seconds.

The recorder returns to operation mode.

Entering Basic Setting Mode

Hold down the MENU key for 3 seconds to enter Setting mode. Next, hold down both the $\nabla\Delta$ (DISP) key and the $\Delta \triangleright$ (FINC) key for 3 seconds.

The Basic Setting mode display appears. The top and bottom lines are the setup item and comment, respectively.

The section that is blinking in the setup item that you change.

Setup item →	Basic=Alar	.m <		The item to be controlled blinks.
Comment ->	Auxiliary	alarm	functi	i

Exiting from Basic Setting Mode (Returning to Operation Mode)

Press the **ESC** (**I**) key several times to return to the **Basic**= screen.

Press the $\nabla \Delta$ (DISP) key to select **End** and then press the $\langle \exists UP \rangle$ key. The setup save screen appears.

Basic=End

Save Settings

Press the $\nabla\Delta$ (DISP) key to select **Store** and then press the \triangleleft (CHUP) key. The setting is applied, and the screen returns to Operation mode. If you select **Abort** and press the \triangleleft (CHUP) key, the setting is discarded, and the screen returns to Operation mode.

```
End=Store
```

Save settings and rest

Changing the Settings

Note .

The comment line shows useful information such as a description of the setup item and the range of selectable values. Read the comment and change the items as necessary.

The selected item change each time you press the $\nabla \Delta$ (DISP) key. The selected item change in reverse order if you press the $\nabla \Delta$ (DISP) while holding down the **SHIFT** ((FEED) key.



to the instrument, the operator must refer to the explanation in the manual.

Protective ground terminal

AC



"High temperature." To avoid injury caused by hot surface, do not touch locations where this symbol appears.

"Handle with care." To avoid injury and damage

This manual denotes the operation of pressing a key while holding down the **SHIFT** ($\overline{(FEED)}$) key as **SHIFT** + the other key (for example: **SHIFT** + $\nabla \Delta$ key).

After you make a selection, press the <- (CHUP) key. The next screen appears.

When the Setting complete screen is displayed, the changed item is applied.

01-01 Ch	nannel	
Setting	complete	

Using the ESC Key

If you press the **ESC** (**W**EW) key, the operation is cancelled, and the display returns to a higher level menu. In other words, if you do not show the **Setting complete** screen, the changes you made up to that point are discarded.

Press the **ESC** ([[WEN]) key while holding down the **SHIFT** ([FED) key to show or hide the comment that is displayed at the bottom half of the screen.

Entering Values

Press the $\triangleleft \triangleright$ (\neg FUNC) key to move the cursor to the right. Press the **SHIFT** (FEED) + $\triangleleft \triangleright$ (\neg FUNC) to move the cursor to the left.

Press the $\nabla\Delta$ (DISP) key to increment the value. Press the **SHIFT** (FEED) + $\nabla\Delta$ (DISP) key to decrement the value.

You repeat these steps to enter the value.



When you press the <> (CHUP) key, the change is applied and the next screen is displayed.

Entering Characters





The character type changes each time you press the **CHARACTER** (MENU) key. The character type changes in reverse order each time you press the **SHIFT** (FEED) + **CHARACTER** ((MENU)) key.

The character type changes in the following order: uppercase alphabet, lowercase alphabet, numbers, and symbols.

The character changes each time you press the $\nabla\Delta$ (DISP) key. The character changes in reverse order each time you press the **SHIFT** (FEED) + $\nabla\Delta$ (DISP) key.



You repeat these steps to enter the character.

When you press the $\lt = (CHUP)$ key, the change is applied and the next screen is displayed.

Inserting a Character

Press the $\triangleleft \triangleright$ ((by EUNC) key to move the cursor to the position where the character is to be inserted.

Press the $\nabla \Delta$ (DISP) key to show **Ins DISP** and then press the $\nabla \Delta$ (DISP) key. A space for one character is inserted. Enter the character.

Position to insert the character

Υ		
Unit=ppm		
CHR:Ins	DISP↓ ◄	 Display Ins DISP

• Deleting a Character

Use the $\triangleleft \triangleright$ (\square FUNC) key to move the cursor to the character to be deleted. Press the **CHARACTER** (\square ENU) key to show **Del DISP** and then press the $\nabla \triangle$ (\square SP) key. The character is deleted.

• Deleting an Entire Character String

Press the **CHARACTER** ((MENU)) key to show **Clear DISP** and then press the $\nabla\Delta$ ((DISP)) key. The entire character string is deleted.

Copying & Pasting a Character String

Show the copy source character string.

Press the **CHARACTER** (MENU) key to show **Copy DISP** and then press the $\nabla \Delta$ (**DISP**) key. The character string is saved to the memory.

Show the copy destination.

Press the **CHARACTER** (MENU) key to show **Paste DISP** and then press the $\nabla \Delta$ (DISP) key. The character string is pasted.

* When the ⊲ ▷ (⁽)FUNC), ▽△ ((DISP)), or CHARACTER ((MENU)) key is pressed while holding down the SHIFT ((FEED)) key, the operation is reversed as when the respective key is pressed by itself.

Menu Structure of Setting Mode

References to the *RD1800B Recorder User's Manual* (M-4242) are given in parentheses

	parentneses.		
Range	CH Volt	Range Span left Span right	
(section 5.1)	ТС	Range Span left Span right	
	RTD	Range Span left Span right	
	1-5V	Span left - Span right - Scale left	Scale right Low-cut
	Scale	Type Bange Span left Span	right Scale left Scale right
		Bef CH Span left Span right	
		Bange Span left Span right	
		Pange Spanier Spaninght	agle left - Seele vight -
	Ч БКІР		
Bias (section 6.12)	CH Bias Bias		
Alarm	CH Level Alarm	n - Type - Value - Relay - Relay nu	mber
Unit	CH Unit		
Chart (section 5.4) Clock	mm/h (Date/Time)		Key operation Hold down the MENU key for 3 seconds in Operation mode to enter Setting mode.
Aux	Trend M	ode	━━ : Use the <⊢ key.
	(section 6.1)	H H Left H Bight	\longrightarrow : Use the $\nabla \Delta$ key.
		H Partial Expand Boundary	Hold down the MENU key for 3 seconds in Setting mode to return to Operation mode.
	V (section 6.5) Print out C	H Trend Periodic	Hold down both the $\nabla \triangle$ and $\triangleleft \triangleright$ keys for 3 seconds in Setting mode to enter
	(section 6.6)		Basic Setting mode.
	V (section 6.7) Message	essage number 🛏 (Message)	
	↓ (section 6.8) Chart 2	m/h	
	(section 6.9)	H Number of samples	
	(section 6.3)		
	(section 6.2)		
	(section 6.10)		
	Brightness D (section 6.11)	isplay – Light	
	UST (section 6.13)	ST – Start month – Start day – Start tin	ne – End month – End day – End time
Math	Formula C	H Mode formula Span left Sp	pan right
		H – Unit	
	Constant N	umber K##	
	Alarm C	H Level Alarm Type Value	Relay Relay number
	TLOG	H – Timer number – SUM scale	
	(section 9.6)	CH Left Bight	
		(section 9.7) Partial CH Partial Expand	Boundary
are not displaye	d in the default	(section 9.8)	
condition. To d settings must b	e changed in Basic	(section 9.9)	J
Setting mode.		ag CH Tag (section 9.10)	
	4 <u>A</u>	larm delay itme CH Duration (section 9.11)	

Menu Structure of Basic Setting Mode

References to the RD1800B Recorder User's Guide (M-4242) are given in parentheses.

Alarm Diagnosis - Reflash - AND - Act - Behavior
(section 7.1)
A/D Integrate
Burnout CH Burnout
Volt Setting mode to enter this mode.
↓ (section 7.4)
$\longrightarrow: \text{Use the } \nabla \Delta \text{ key.}$
POC → POC ↓ (section 7.6)
Print CH/Tag Channel Alarm Record On Chart speed Scale Pen color
Print 1 Periodic Ref.Time Interval Mode
Print 2 CH Mode SUM scale
Bar graph CH Graph
V (section 7.9) Keylock Password (Free/Lock)
V (section 7.10)
v (section 7.11)
v (section 7.12)
$\bigvee (\text{section 7.13})$
Language Language
Date format Type
Temperature Temp
Personalize Add function Bias SQRT low-cut Alarm delay
(section 7.14) (section 7.15) Time print Alarm Message RCD On C.Speed
(section 7.16)
Initialize Mode Are you sure?
Remote Remote number (Nunber)
Math
Color Color
Quiput pen ← CH
Print 2 CH Mode SUM scale
Bar graph CH Graph
Error data
(section 9.17)
RS422/485 Address Baud rate Data length Parity Protocol
Ethernet Host Domain
Local IP A M G
DNS DNS DNS P Suffix P Suffix S
Login Login
Login set Level Register Vser Password
Timeout Timeout Duration
Keep alive
P_Adj Pen number (Value)
(sections 11.5, 11.6)
(section 4.2)

Preparing to Record

Loading or Replacing the Chart Paper

CAUTION

- Do not install or remove the chart cassette with the chart paper guide open. This may damage the stopper.
- Continuing to record or print without the chart paper on the dot model can cause damage to the chart cassette platen (the cylindrical section that holds the paper during the recording operation). Be sure to replace the chart paper ahead of time.

Loading the Chart Paper

- 1. Open the door.
 - If recording is in progress, press the RCD key to stop the recording.



2. Remove the chart cassette.

Gently press the center stopper inward. The bottom section of the chart cassette comes out. Gently lift the chart cassette and pull it out from the recorder case.



3. Open the front cover, the chart holder (transparent plastic) of the sprocket section, and the chart holder (black plastic). Open the chart holder (black plastic) while gently pressing the stopper on either side.



4. Load the chart paper.

Riffle the chart thoroughly before loading.

Make sure that the sprocket teeth of the chart drives are properly engaged in the chart paper perforations. Make sure not to load the chart paper backwards.





6. Replace the chart cassette back into the recorder case.

Align the left and right projections with the guide grooves of the recorder and press the entire chart cassette into the recorder case. The chart cassette is fixed in place with the stoppers.



Feeding the Chart Paper

7. Press the FEED key to assure that the chart moves two or more folds smoothly into the chart receiver.

If it moves unsteadily, do the installing procedure again.

Installing/Replacing Felt Pens (Pen Model)

CAUTION

- Do not press or pinch the felt tip to prevent deformation.
- Do not move the penholder left or right by force to protect the driving mechanism.
- Make sure to remove the pen cap before installation.
- Use pen caps of the same ink color. If a pen cap of a different ink color is used on the pen, the remaining ink in the cap may be absorbed through the pen tip, and the ink may change its color.
- **1.** Open the door.
 - If recording is in progress, press the RCD key to stop the recording.
- Open the display and key panel section.
 Hold the left and right tabs and pull the display and key panel section toward you. The section opens upward.
- **3.** Hold the felt pen cartridge and pull it out from the pen holder. If the pen (pen holder) is at a position that is not easily accessible, see "When the Pen (Pen Holder) Is at a Position That Is Not Easily Accessible" below.
- 4. Remove the cap from the new felt pen and insert the pen firmly into the pen holder.



5. Return the display and key panel section to its original position.

When the Pen (Pen Holder) Is at a Position That Is Not Easily Accessible

If the pen (pen holder) is at a position that is not easily accessible, carry out the procedure below to move it near the center position.

- 1. Press the **PUNC** key.
- Press the ∇∆ (DISP) key several times to display the Pen exchange screen.
 Func=Pen exchange
- **3.** Press the <≓ (CHUP) key.

The pen (pen holder) moves near the center position, and the **Pen exchange = End** screen appears.

Note .

When the pen moves, a line is drawn on the chart paper.

- 4. Replace the pen.

The screen returns to the data display screen.

* When the $\triangleleft \triangleright$ key or $\bigtriangledown \triangle$ key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Installing/Replacing the Plotter Pen (Pen Model)

- **1.** Open the door.
 - If recording is in progress, press the RCD key to stop the recording.
- **2.** Open the display and key panel section.
- **3.** Hold the plotter pen cartridge and pull it out from the pen holder.
- **4.** Remove the cap from the new plotter pen and insert the pen firmly into the pen holder.



5. Return the display and key panel section to its original position.

Installing/Replacing the Ribbon Cassette (Dot Model)

CAUTION

- Improper cassette insertion may cause the color to change or damage the ribbon.
- Do not apply upward force to the printer carriage. If you do, the carriage position may be offset, and the recorder may not print correctly.
- Open the door.
 If recording is in progress, press the RCD key to stop the recording.
- 2. Press the **Press** the **Press** key.
- Press the ∇∆ (DISP) key several times to display Ribbon exchange.
 Func=Ribbon exchange
- Press the <≓ (CHUP) key.
 The printer carriage moves near the center position, and Ribbon exchange = End is displayed.
- Open the display and key panel section.
 Hold the left and right tabs and pull the display and key panel section toward you. The section opens upward.

Note

If the recorder is OFF, hold the printer carrige and move it near the center position.

^{*} When the *⊲ ⊳* key or *▽△*key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

6. Remove the ribbon cassette.

Press the stopper of the ribbon cassette to the right and pull the ribbon cassette out.



7. Install a new ribbon cassette.

First, insert the right-hand part and then the left-hand part into the cassette holder.

Check that the cassette is properly engaged with the cassette holder tab. If inserting the ribbon cassette is difficult, turn the ribbon feeding knob in the direction of the arrow to align the ribbon feeding shaft of the cassette with the ribbon feeding shaft of the holder.



Ribbon feeding knob

- **8.** Turn the ribbon feeding knob in the direction of the arrow a half turn or more to check that the ribbon is feeding properly. If the ribbon is loose, turn the knob in the direction of the arrow to tighten it.

The screen returns to the data display screen.

Checking or Setting the Date/Time

Checking the Date/Time

The date/time is shown on the display when the DISP key is pressed several times.

Setting the Date/Time

- 1. Hold down the MENU key for 3 seconds to enter Setting mode.
- 2. Press the ∇∆ key to show Clock and then press the ⇐ key. Set=Clock
- **3.** Set the date and time and press the \triangleleft key.

Example: Changing from January to May in the figure below

Press the $\triangleleft \triangleright$ key three times to move the cursor to the month position. Next, press the $\neg \Delta$ key four times to change the value from 1 to 5.

Jui	umes	ιΟ	Chai	ige	uie	van
						ftor

- After change → 04/05/17 10:39:47
- 4. When the Setting complete screen appears, press the ESC/? key.

Clock Setting complete

04/01/17 10:39:47

Before change

5. Hold down the MENU key for 3 seconds to return to Operation mode.

Explanation

The date format can be changed by date format type of basic setting mode.

Setting the Input Range and Alarm on Measurement Channels

Setting the Input Range

Setup Example (1) of Thermocouple Input

Set channel 02 to thermocouple type K and measure temperatures in the range -50.0 to 450.0°C. The measurable range for thermocouple type K is -200.0 to 1370.0°C. The measured values in the range of -50.0 to 450.0°C are recorded in a width of 180 mm on the chart paper. This recording range is called a *recording span*, and the leftmost and rightmost values of the recording span are called span left and span right, respectively.



Entering Setting Mode

Hold down the [MENU] key for 3 seconds to enter Setting mode. 1.

Selecting the Channel

2. Press the <- key with **Range** shown on the screen.

Set=Range Input range and record -Displays a description of the setup item.

3. Press the $\nabla\Delta$ key to set the first channel to **02** and then press the $\triangleleft \forall$ key. First channel Last channel



CH=<mark>02</mark>-02 First channel 01-06 Displays the selectable range of channels.

4. Likewise, set the last channel to **02** and then press the \triangleleft key.

Selecting the Input Type

- 5. Press the $\nabla\Delta$ key to select **TC** and then press the \triangleleft key (see "Explanation"). Mode=TC Thermocouple
- 6. Press the $\nabla \Delta$ key to select **K** and then press the \triangleleft key.



Setting Span Left

7. Set Span left to **-50.0** and press the \triangleleft key. Press the $\triangleleft \triangleright$ key to select the desired digit.

Press the $\nabla\Delta$ key to select the value.

Span left= -50.0	Displays the measurable range of
------------------	----------------------------------

When the $\triangleleft \triangleright$ key or $\bigtriangledown \triangle$ key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Setting Span Right

8. Likewise, set Span right to **450.0** and press the \triangleleft key.

Γ	Span	right= 4	50.0
	-200.	0/1370.	0°C

The **Setting complete** screen is displayed. When this screen is displayed, the settings entered up to then are applied.

Finishing the Settings

9. When **Setting complete** screen is displayed, do either of the following: Press the <⊢ key to set other channels.

To finish setting the input range, press the ESC key.

02-02 Ch	nannel
Setting	complete

10. Hold down the MENU key for 3 seconds to return to Operation mode.

Setup Example (2) of 1-5V Input and unit

Set channel 03 to 1 to 5V standard signal input and 0.0 to 500.0% scale. The scaling range is –20000 to 30000.

The measured values in the range of 0.0 to 500.0% are recorded in a width of 180 mm on the chart paper.



Entering Setting Mode

1. Hold down the MENU key for 3 seconds to enter Setting mode.

Selecting the Channel

2. Press the <≓ key with Range shown on the screen.
<table>

 Set=Range

Input range and record - Displays a description of the setup item.

3. Press the $\nabla\Delta$ key to set the first channel to **03** and then press the $\prec \exists$ key. First channel Last channel

	۲	*		
CH=	03-	-03		
Fir	c+	cha	anne	1

4. Likewise, set the last channel to **03** and then press the \triangleleft key.

Selecting the Input Type

5. Press the $\nabla \Delta$ key to select **1-5V** and then press the \triangleleft key (see

"Explanation").



Setting Span Left

6. Set Span left to 1.000 and press the <→ key.
Press the <> > key to select the desired digit.
Press the <> △ key to select the value.



Displays the range of Span left.

Setting Span Right

7. Likewise, set Span right to **5.000** and press the \triangleleft key.

Span right= 5.000 4.800/ 5.200V

Displays the range of Span right.

Setting Scaling Left

8. Set Scale left to **0.0** and press the \triangleleft key.

Press the $\triangleleft \triangleright$ key to select the desired digit.

Press the $\nabla \Delta$ key to select the value.

Setting Scaling Right



−2000.0/ 3000.0 **→ Displays the scaling range**.

The **Setting complete** screen is displayed. When this screen is displayed, the settings entered up to then are applied.

Finishing the Settings

10. When Setting complete screen is displayed, press the ESC key.

The Set=Range screen is displayed.

03-03 Channel	Set=Ra	ange		
Setting complete	 Input	range	and	record

Setting the Unit

11. Press the $\nabla \Delta$ key to select **Unit** and then press the \triangleleft key (see "Explanation").

12. Press the $\nabla \Delta$ key to set the first channel to **03** and then press the \triangleleft key. First channel Last channel



13. Likewise, set the last channel to **03** and then press the \triangleleft key.

Selecting the Unit

14. Use the CHARACTER key and $\nabla \Delta$ key to set **unit character** and then press the $\langle \exists$ key (see "Explanation").

Unit: CHR:%-	

* When the *⊲ ⊳* key *▽△* key or **CHARACTER** key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Finishing the Unit Setting

- 15. When Setting complete screen is displayed, press the ESC key.
 - 03-03 Channel Setting complete
- **16.** Hold down the MENU key for 3 seconds to return to Operation mode.

Explanation

Note ____

If the range is changed after setting the alarm, the alarm setting becomes invaild. When you change the range, check the alarm setting.

In step 5 of setup examples (1) and (2), you can select an input type or a computation type on the table below.

Mode	Description
тс	Thermocouple
RTD	Resistance temperature detector
Volt	DC voltage
DI	ON/OFF input
1-5V	1-5VDC: 1-5V is scaled to values in the appropriate unit to be used as measured values.
Delta	The value obtained by subtracting the measured value of another channel (called the reference channel) from the input value of the channel set to delta computation is used as the measured value of that channel.
Scale	The input values are scaled to values in the appropriate unit to be used as measured values.
SQRT	The square root of the input value is calculated, the result is scaled to a value in the appropriate unit, and used as the measured value of the channel. Also, the low-cut function (input less than a given measured value is fixed to 0) can be used.
Skip	Measurement is not performed.

Input Type and Measurable Range

Thermocouple (Mode: TC)					
Range Type	Measurable Range				
R	0.0 to 1760.0°C				
S	0.0 to 1760.0°C				
В	0.0 to 1820.0°C				
К	–200.0 to 1370.0°C				
E	–200.0 to 800.0°C				
J	–200.0 to 1100.0°C				
Т	–200.0 to 400.0°C				
Ν	0.0 to 1300.0°C				
w	0.0 to 2315.0°C				
L	–200.0 to 900.0°C				
U	–200.0 to 400.0°C				
WRe	0.0 to 2400.0°C				

RTD (Mode: RTD)

•	,
Range Type	Measurable Range
PT(Pt100)	–200.0 to 600.0°C
JPT(JPt100)	–200.0 to 550.0°C

DC voltage (Mode: Volt)

Range Type	Measurable Range
20mV	-20.00 to 20.00 mV
60mV	-60.00 to 60.00 mV
200mV	-200.0 to 200.0 mV
2V	-2.000 to 2.000 V
6V	-6.000 to 6.000 V
20V	-20.00 to 20.00 V
50V	-50.00 to 50.00 V

ON/OFF input (Mode: DI)

Range Type	Measurable Range			
Level	0 to 1			
Cont	0 to 1			

Characters That Can Be Used for Units

A unit is set using up to six characters.

The available characters are as follows:

Alphabet, numbers, symbols (%, #, °, @, +, -, *, /, (,), μ , Ω , ², ³, .), and space

Setting the Alarm

Setup Example

Set a high limit alarm at 400.0°C on channel 02. The relay output (option) is not available.

Entering Setting Mode

1. Hold down the MENU key for 3 seconds to enter Setting mode.

Selecting the Channel

2. Press the <⊢ key with **Alarm** shown on the screen.

3. Press the $\nabla\Delta$ key to set the first channel to **02** and then press the $\prec \exists$ key. First channel Last channel

Y Y	
CH=01-01	
First channel 01-06	Displays the selectable range of channels.

4. Likewise, set the last channel to **02** and then press the $\leftarrow \exists$ key.

Setting the Alarm Condition

5. Press the ∇∆ key to select 1 and then press the <- key.
 Up to four alarms can be set on a single channel. Each alarm is distinguished by its level: alarm level 1 to 4. In this example, alarm level 1 is used.

- 6. Press the ∇∆ key to select On and then press the <-> key.
 On: Enables the alarm of the selected alarm level.
 Alarm=On On/Off
 Displays possible choices.
- Press the ∇∆ key to select H and then press the <⊢ key.
 The letter "H" represents the high limit alarm (see "Explanation").
 Type=H

8. Set the alarm value to **400.0** by carrying out the key operations below. Press the $\triangleleft \triangleright$ key to select the desired digit.

Press the $\nabla\Delta$ key to select the value.

When all digits have been set, press the \triangleleft key.

Value= 1.000 Displays the measu -200.07 1370.0°C input range specifi

Displays the measurable range of the input range specified on the channel.

Setting the Relay Output

9. Since the relay output is not used, press the \triangleleft key with **Off** selected.

Relay=Off	
On/Off	Displays possible choices.

The **Setting complete** screen is displayed. When this screen is displayed, the settings entered up to then are applied.

* When the $\triangleleft \triangleright$ key or $\bigtriangledown \triangle$ key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Finishing the Settings

10. When Setting complete screen is displayed, do either of the following:

Press the <→ key to set other alarms.

To finish setting the alarm, press the **ESC** key.

02-02 CH/level 1
Setting complete

11. Hold down the MENU key for 3 seconds to return to Operation mode.

Explanation

In step 7, you can select an alarm type on the table below.

Туре	Description
Н	High Limit Alarm: An alarm occurs when the input value exceeds the alarm value.
L	Low Limit Alarm: An alarm occurs when the input value falls below the alarm value.
h	Difference High Limit Alarm*: An alarm occurs when the difference in the input values of two channels is greater than or equal to the specified value.
Ι	Difference Low Limit Alarm*: An alarm occurs when the difference in the input values of two channels is less than or equal to the specified value.
R	High Limit on Rate-of-Change Alarm**: The rate-of-change of the measured values is checked over a certain time (interval). An alarm occurs if the rate-of-change of the measured value in the rising direction is greater than or equal to the specified value.
r	Low Limit on Rate-of-Change Alarm**: The rate-of-change of the measured values is checked over a certain time (interval). An alarm occurs if the rate-of-change of the measured value in the falling direction is greater than or equal to the specified value.
Т	Delay High Limit Alarm***: An alarm occurs when the measured value remains above the alarm value for a specified time period (alarm delay period).
t	Delay Low Limit Alarm***: An alarm occurs when the measured value remains below the alarm value for a specified time period (alarm delay period).
* C	an be specified on channels set to delta computation.

** Setting change in Basic Setting mode is necessary.
*** You can select T or t when the alarm delay function is enabled in Basic Setting mode.

Recording/Displaying Data

Starting the Recording



The recording examples may appear differently from the actual recording as a result of functional improvements made on the recorder after this manual was written.

Stopping the Recording

While recording is in progress, press the **RCD** key to stop recording. The word "RECORD" on the status display clears.

Feeding the Chart Paper

The chart paper is fed while the FEED key is held down.

Changing the Chart Speed

- 1. Hold down the MENU key for 3 seconds to enter Setting mode.
- **2.** Press the $\nabla \Delta$ key to show **Chart** and then press the \triangleleft key.

Set=Chart	
Chart speed	Displays a description of the setup item.

3. Set the chart speed and press the \triangleleft key.

mm/h= 25	Current chart speed.
	(Display example on the dot model)

On the pen model, press the $\nabla\Delta$ key to select the chart speed. Chart speed on the pen model (unit: mm/h)

5	6	8	9	10	12	15	16	18	20
24	25	30	32	36	40	45	48	50	54
60	64	72	75	80	90	96	100	120	125
135	150	160	180	200	225	240	250	270	300
320	360	375	400	450	480	500	540	600	675
720	750	800	900	960	1000	1080	1200	1350	1440
1500	1600	1800	2000	2160	2250	2400	2700	2880	3000
3600	4000	4320	4500	4800	5400	6000	7200	8000	9000
10800	12000								

10800 12000

On the dot model, enter a vale to set the chart speed The chart speed can be set in the range of 1 to 1500 mm/h in 1 mm steps.

Press the $\triangleleft \triangleright$ key to select the desired digit.

Press the $\nabla \Delta$ key to select the value.

4. When the **Setting complete** screen appears, the new chart speed is applied. Chart speed Setting complete

Press the **ESC** key to change the chart speed again. Hold down the WENU key for 3 seconds to return to Operation mode.

Viewing the Recorded Results

Pull the front cover tab of the chart cassette to open the front cover. The recorded chart paper can be pulled out for viewing.



* When the *⊲ ⊳* key or *▽*△key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Description of the Printout Contents



Printout Description Figure (Pen Model)

Printout Description Figure (Dot Model)

Manu	al printou	t									\Box
TI	Nov.0	9.04 1	6:00								
ΙQ	01	223.51	mg/cm ³		02	437.2µ	S/cm				$ \bigcirc $
	03 H	591.6	°C		04	-0.222V	r				
II	05	-0.665	v		06 L	-0.448V	ł				
19								N	lew chart	speed pri	ntout
0									0mm/h*	14:55	\Box
Perio	dic printo.	ıt				1		1			
	N 0	0.04									
IΥ	12.E0	9.04					Time	tick			
0	01		218.7m	a/cm ³)				$ \bigcirc $
	02		390.6µ	S/cm			/				
ΙŤ	03	н	598.4°	с							
ΙQ	04	d≁∖-	0.222V			1				Scale	
6	05	-	0.995V		/	<u> </u>				/	
	06	L -	-0.448V		(×	1	
IΥ	70.0									500.0	\mathbb{C}
0	`.01CH		<u>}(</u>	Delta co	mputatior	ງ)			m	g/cm ³	ίΟ.
	50mm/	n		Alorm			Buffer	r overflow	mark	Alarm pri	ntout
IΥ		<u>_</u>		Alarin							nioui
0			(Time ticl		X			▽01H3*1	0:09	$ \bigcirc $
		_	Ň				1		A01H3 1	0:05	
Chan	nel printo	ut)		Me	essage pri	ntout
ΙΥ							09:5	2*START	#205 AF	BCDEF	
6											$ \bigcirc $
						1	(Time	tick	Recording	g start pri	ntout
Ιĭ					· ·	_					
LQ_								└ ─ ~_0	8:00*25	mm/h	\bigcirc

The printout description figures are for explaining the printout contents. The font is different from the actual printout. The printout positions are also slightly different.

Manual Printout

Prints the current measured values and alarm statuses of all channels by operating the keys.

• New Chart Speed Printout

When the chart speed is changed, the time tick (dot model), the date/time of change, and the new chart speed are printed. The time ticks are marks that indicate the positions of the date/time on the chart paper. An asterisk (*) shows there are messages that cannot be printed.

Periodic Printout

Measured values and other items are printed at the preset interval.

Printout Contents

The date/time, time tick, measured value and channel status for each channel, the channel scale (the leftmost and rightmost values of the span), and the chart speed are printed. On the pen model, if a time tick is not printed at the correct position, a time tick cancel mark (!) is printed. Pen offset compensation mark is printed when the function to compensate the pen offset along the time axis is enabled. For details on the printout contents, see appendix 1 in the *RD1800B Recorder User's Guide* (M-4242) on the CD-ROM.

Printout Interval

The printout interval can be set by specifying the value or set automatically in sync with the chart speed.

Alarm Printout

Alarm information is printed when an alarm occurs or releases.

 $\triangle 01H2 * 10:00$



Alarms that occur while an alarm printout is in progress are temporarily saved to the buffer memory in a printout-wait condition. Alarms are cleared from the buffer memory when they are printed. A buffer overflow mark is printed when there are alarms that cannot be printed because the buffer is full.

Message Printout

An arbitrary character string from five character strings set in advance can be printed on the chart paper. Each message can be set using up to 16 characters. If message printout is executed while another message is being printed, the most recent message is temporarily stored to the buffer memory in a printout-wait condition. Messages are cleared from the buffer memory when they are printed. A buffer overflow mark is printed when there are messages that cannot be printed because the buffer is full.

Recording Start Printout

When recording is started, the time tick (dot model), the time, and the chart speed can be printed. By factory default, the recording start printout is disabled. An asterisk (*) shows there are messages that cannot be printed.

Channel Printout (Dot Model)
 Prints the channel No. or tag by the trend recording.

Switching the Display Screen

The screen switches each time the **DISP** key is pressed. Screen 01 through 15 are switched in order. Screens that are set to "Skip" are skipped. Below is a display example.

Display Example (1-channel digital + bar graph display)

Channel No.



• Channel Auto Switching

On screens that show the measured values and computed values, the displayed channel is automatically switched in ascending order. The switching interval can be set to 1 s, 2 s, 3 s, 4 s, or 5 s.

Switching the Displayed Channel Using Keys

If auto switching is not specified, the channel switches each time the CHUP key is pressed in ascending order. All channels are displayed in order.

Display Example (Flag Display)

Flag (the number indicates the channel No.)



Display Example (Alarm Status Display)



Display Example (Date/Time and Chart Speed Display)

The date format can be specified.



Display Example (Status Display)

Alarm status

Remaining amount of chart paper is less than approx. 2 cm (/F1 option)



Changing the Displayed Information

Different display types can be registered to screens 01 to 15. As an example, the procedure of assigning 1-channel digital display to screen 02 is explained below.

1. Hold the **I**MENU key for 3 seconds to show the data display setup screen.

Selecting the Screen Number

2. Press the $\nabla \Delta$ key to select screen number **02** and then press the \leftarrow key. Screen number=**02**

- Displays the current display type name.

A sample screen of the display type appears. A section of the display blinks to indicate that this is a data display setup screen.

Selecting the Display Type

3. The display switches each time the $\nabla \Delta$ key is pressed. Select the 1-channel digital display and then press the \triangleleft key.

Press the ∇∆ key to set the channel switching interval and then press the <⊨ key.

Interval: Sets the channel switching interval. Select the interval from 1 s, 2 s, 3 s, 4 s, 5 s, and manual.

Auto1s, Auto2s, Auto3s, Auto4s, Auto5s:

Switches the displayed channel at the specified time interval.Manual:Switch the displayed channel manually.

Interval=Auto2s

5. When the **Setting complete** screen appears, the new setting is applied.

Setting complete

Press the \triangleleft key to register display types to other screens.

Hold the **MENN** key down for 3 seconds to exit from the data display setup screen.

Display Types

Besides the types on page 41, display types listed below are available.

1-channel digital display	2-channel digital display
01dH-1999.9ABCDEF	01dH-1999.9ABCDEF 0AH9999999.9ABCDEF
4-channel digital display	6-channel digital display (Dot model)
01dH-1999.9ABC 02dH-1999.9ABC 0AH9999999.9AB 0BH9999999.9AB	01H-1999.9 02H-1999.9 03H-1999.9 04H-1999.9 05H-1999.9 06H-1999.9
12-channel digital display (12-, 18-, or 24-dot model)	1-channel digital display + 4-channel bar graph display
999.9 999.9 999.9 999.9 999.9 999.9 1 999.9 999.9 999.9 999.9 999.9 999.9	(Pen model) 01dH-1999.9ABCDEF
- "1": channels 1 to 12, "2": channels 18 to 24	
2-channel digital display + 2-channel bar graph display	4-channel bar graph display (Pen model)
01dH-1999.9ABC 02dH-1999.9ABC	
DI/DO status display	System display
DI: 20000 DO: 20000 22020 0000 00000	180mm Dot model Analog:24 Math:24
□:OFF ■:ON DI: Remote control inputs DO: Alarm output relays	The displayed contents switches every three sconds.
Lights off	1-channel digital display (Tag display)
No display.	TI00001dH-1999.9ABCD
2-channel digital display (Tag display)	
1-channel digital display + 1-channel bar graph display (Ta	ag display)

1-channel digital display + 4-channel bar graph display (Tag display) (Pen model)

Multiple display (Different screens can be assigned to the top and bottom sections.)

FUNC Key Operations in Operation Mode

The operations below can be carried out with the FUNC key in Operation mode. References to the *RD1800B Recorder User's Guide* (M-4242) provided on the CD-ROM are given in parentheses.



Printing Measured Values (Manual Printout)

The measured values of all channels are printed.

Starting the Manual Printout

1. Press the OFUNC key.

The FUNC= screen appears.

2. Press the $\nabla \Delta$ key to select **Print out** and then press the \triangleleft key.

3. Press the <⊨ key with **Manual Start** shown on the screen.

Manual printout starts. The screen returns to the data display screen.

Print=Manual Start

Note

- When manual printout is executed, trend recording is suspended. However, the recorder continues the measurement and alarm detection (in the background).
- · When manual printout is complete, trend recording resumes.
- If an alarm occurs during the manual printout, the alarm is printed after the recording resumes.
- * When the $\triangleleft \triangleright$ key or $\bigtriangledown \triangle$ key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Aborting the Manual Printout

- 1. Press the **DFUNC** key.
- **2.** Press the $\nabla \Delta$ key to select **Print out** and then press the \triangleleft key.
- **3.** Press the <→ key with **Manual Stop** shown on the screen. Manual printout stops. The screen returns to the data display screen.

Print=Manual Stop

Printing the Recorder Settings

This section explains the procedure for printing the recorder settings. There are two sets of settings that can be printed: List and Setup.

List: Prints the settings of Setting mode (input range for each channel, etc.)

Setup: Prints the settings of Basic Setting mode



Note _

- The printout takes several minutes to tens of minutes to complete.
- When printout is executed, trend recording is suspended. However, the recorder continues the measurement and alarm detection (in the background).
- When printout is complete, trend recording resumes.
- If an alarm occurs during the printout, the alarm is printed after the recording resumes.

Starting the List Printout

- 1. Press the **DFUNC** key.
- 2. Press the ∇∆ key to select Print out and then press the ⇐ key.

 Func=Print out
- 3. Press the ∇∆ key to show List Start and then press the <⊨ key. The List printout starts. The screen returns to the data display screen. Print=List Start

Aborting the List Printout

- 1. Press the **PFUNC** key.
- **2.** Press the $\nabla \Delta$ key to select **Print out** and then press the \triangleleft key.
- 3. Press the ∇∆ key to show List Stop and then press the <≓ key. The List printout stops. The screen returns to the data display screen. Print=List Stop

* When the $\triangleleft \triangleright$ key or $\bigtriangledown \triangle$ key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Starting/Stopping the Setup Printout

Setup printout can be started/stopped in a similar fashion to List printout. For Setup printout, select **Setup Start** and **Setup Stop**.

Clearing the Alarm Printout Buffer

Alarm information waiting to be printed is temporarily stored in the buffer memory. This operation clears all of the alarm information in the buffer. This function can be used to prevent unneeded alarm printouts from being executed.

- 1. Press the **WFUNC** key.
- 2. Press the ∇∆ key to select Buffer clear and then press the <⊢ key. Func=Buffer clear
- **3.** Press the \triangleleft key with **Alarm** shown on the screen.

The data in the alarm printout buffer is cleared. The screen returns to the data display screen.

Buffer clear=Alarm

Printing a Message

This section explains the procedure for printing the preset character strings. For details on setting the character strings, see section 6.8, "Setting the Message String" in the *RD1800B Recorder User's Guide* (M-4242) on the CD-ROM.

Note _

- Messages can be printed only during trend recording. However, regardless of whether trend recording is in progress or not, messages waiting to be printed are temporarily stored in the buffer memory.
- Message printouts are not performed when the chart speed is greater than or equal to 1600 mm/h and 101 mm/h on the pen model and dot model, respectively.

Printing a Message

- **1.** Press the [•]FUNC</sup> key.
- 2. Press the ∇∆ key to select Message and then press the <[⊥] key. Func=Message
- 3. Press the ∇∆ key to select the message number and then press the <≓ key. The message printout starts. The screen returns to the data display screen.
 Message=Message1
 Displays the preset message.

Clearing the Message Printout Buffer

Messages waiting to be printed are temporarily stored in the buffer memory. This operation clears the messages in the buffer.

- **1.** Press the **PUNC** key.
- **2.** Press the $\nabla \Delta$ key to select **Buffer clear** and then press the \triangleleft key.
- **3.** Press the $\nabla \Delta$ key to select **Message** and then press the \triangleleft key.

The data in the message printout buffer is cleared. The screen returns to the data display screen.

Buffer clear=Message

* When the *⊲ ⊳* key or *▽*△key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Releasing the Alarm Output (Alarm ACK Operation)

This operation releases the alarm indication or relay output (/A1, /A2, /A3, /A4, or /A5 option) when the alarm indication or output relay is set to hold operation. For details on the hold operation, see section 1.3, "Alarms" in the *RD1800B Recorder User's Guide* (M-4242) on the CD-ROM.

- **1.** Press the [•]FUNC</sup> key.
- 2. Press the <- key with Alarm ACK shown on the screen. The alarm indication or relay output is released. The screen returns to the data display screen.

Func=Alarm ACK

Description



Activating/Releasing the Key Lock

When the recorder is configured to use the key lock function, this operation activates or releases the key lock. For details on setting the key lock function, see section 7.10, "Setting the Key Lock Function" in the *RD1800B Recorder User's Guide* (M-4242) on the CD-ROM.

Activating the Key Lock

1. Press the [•]FUNC key.

 Press the ∇∆ key to select Keylock and then press the <⊢ key. The key lock is activated. The screen returns to the data display screen.

Releasing the Key Lock

Note _

A password is required to release the key lock.

- **1.** Press the **Press** key.
- **2.** Press the $\nabla \Delta$ key to select **Keylock** and then press the \triangleleft key.
- **3.** Enter the password for releasing the key lock. The password values are shown with asterisks.

Press the $\triangleleft \triangleright$ key to select the desired digit.

Press the $\nabla\Delta$ key to select the value.



Press the <→ key.

The key lock is released. The screen returns to the data display screen.

* When the $\triangleleft \triangleright$ key or $\nabla \triangle$ key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.

Setup Items and Default Values

Setup Items in Setting Mode and Their Default Values

The items with an asterisk are not displayed in the default condition. To display these items, settings must be changed in Basic Setting mode.

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
Range > CH	-	01 to 24	01
Range > Mode	-	Volt/TC/RTD/1-5V/Scale	Volt
C C		/Delta/DI/SQRT/Skip	
Range > Mode > Range	-	20mV/60mV/200mV/2V/6V/20V/50V/1-5V	2V
c c		/R/S/B/K/E/J/T/N/W/L/U/WRe/Pt/JPt/Level/Cont	
		/(Slections for /N1 and /N3 options)	
*Bias > CH	-	01 to 24	01
*Bias > Bias	-	On/Off	Off
*Bias > Bias	-	±10% of the span of the measurable range	-
	_	01 to 24	01
	_	1/2/3/4	1
	-	0x/0ff	1 Off
Alalini > Alalini Alarma Tuna	-		
Alarma Valua	-	Depende on the clarm type	п
	-	Depends on the alarm type.	- 04
Alarm > Relay	-		
Alarm > Relay No.	-	101 to 106, 111 to 116, 121 to 126, 131 to 136	101
Unit > CH	-	01 to 24	01
Unit > Unit	-	6 characters or less	Blank
Chart	Pen Model	82 types (pen model)	25 mm/h
	Dot Model	1 to 1500 mm/h (dot model)	25 mm/h
Clock	-	Date/Time	-
Aux > Trend	Dot Model	Auto/Fix	Auto
Aux > $7 \text{ one} > CH$	-	01 to 24	01
Aux > Zone > Left Right	-	Within the recording span range (mm)	Left: 0 Bight: 180
*Aux > Partial > CH	-	01 to 24	01
*Aux > Partial > Partial	-	On/Off	Off
*Aux > Partial > Expand	-	1 to 99%	50
*Aux > Partial > Boundary	-	Within the recording span range	-
Aux > Print out > CH	-	01 to 24	01
Aux > Print out > Trend	Dot Model	On/Off	On
Aux > Print out > Periodic	-	On/Off	On
Aux > Tag > CH	-	01 to 24	01
Aux > Tag > Tag	-	7 characters or less	01 to 24
Aux > Message > Message No.	-	1 to 5	1
Aux > Message > (Message)	-	16 characters or less	Blank
Aux > Chart2	Pen Model	82 types (pen model)	25 mm/h
	Dot Model	1 to 1500 mm/h (dot model)	25 mm/h
*Aux > Moving_AVE > CH	Dot Model	01 to 24	01
*Aux > Moving_AVE > No. of samples	Dot Model	Off, 2 to 16	Off
*Aux > Filter > CH	Pen Model	01 to 24	01
*Aux > Filter > Resp. Time	Pen Model	2s/5s/10s	Off
*Aux > Alm delay T > CH	-	01 to 24	01
*Aux > Alm delay T > Duration	-	0 to 3600s	10s
Aux > Brightness > Display	-	1/2/3/4/5/6/7/8	4
Aux > Brightness > Light	-	1/2/3/4	2
Aux > DST	-	Not/Use	Not
Aux > DST > Start month	-	Apr/May/Jun/Jul/Aug/Sep/Oct/Nov/Dec/Jan/Feb/Mar	Apr
Aux > DST > Strt day	-	1st-Sun//Last-Mon	1st-Sun
Aux > DST > Start time	-	0:00 to 23:00	0:00
Aux > DST > End month	-	Apr/way/Jun/Jul/Aug/Sep/Oct/Nov/Dec/Jan/Feb/Mar	Apr
Aux > DST > End day	-	151-5011//Last-IVI01	Last-IVION
	-	0.00 10 23.00	0.00

Computation function (/M1 option)

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
Math > Formula > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
Math > Formula > Mode	-	On/Off	Off
Math > Formula > formula	-	120 characters or less	01
Math > Unit > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
Math > Unit > Unit	-	6 characters or less	Blank
Math > Constant > No.	-	K01 to K30	K01
Math $>$ Alarm $>$ CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
Math > Alarm > Level	-	1/2/3/4	1
Math > Alarm > Alarm	-	On/Off	Off
Math > Alarm > Type	-	H/L (*/T/t)	Н
Math > Alarm > Value	-	-99999999 to 99999999 excluding the decimal	-
Math > Alarm > Relay	-	On/Off	Off
Math > Alarm > Relay No.	-	101 to 106	101
Math > TLOG > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
Math > TLOG > Timer No.	-	Periodic/1/2	Periodic
Math > TLOG > SUM scale	-	Off, /s, /min, /h, /day	Off
Math > Aux > Zone > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
Math > Aux > Zone > Left, Right	-	Within the recording span range (mm)	Left: 0, Right: 180
*Math > Aux > Partial > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
*Math > Aux > Partial > Partial	-	On/Off	Off
*Math > Aux > Partial > Expand	-	1 to 99%	50
*Math > Aux > Partial > Bound	-	Within the recording span range	-
Math > Aux > Print out > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
Math > Aux > Print out > Trend	Dot Model	On/Off	On
Math > Aux > Print out > Periodic	-	On/Off	On
Math > Aux > Tag > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
Math > Aux > Tag > Tag	-	7 characters or less	0A to 1P
*Math > Aux > Alm delay T > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
*Math > Aux > Alm delay T > Duration	-	0 to 3600s	10s

Setup Items in Basic Setting Mode and Their Default Values

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
Alarm > Diagnosis	-	On/Off	Off
Alarm > Reflash	-	On/Off	Off
Alarm > AND	-	None/I01/I01-I02/I01-I03/I01-I04/I01-I05/	None
		101-106/101-111/101-112/101-113/101-114/	
		101-115/101-116/101-121/101-122/101-123/	
		101-124/101-125/101-126/101-131/101-132/	
AL		101-133/101-134/101-135/101-136	_ .
Alarm > Act	-	Energize/De_energize	Energize
Alarm > Benavior	-	Nonnoid/Hold	Nonnold
	-		
Alarm > Decrease	-	01 to 15	01
Alarm > Hysteresis	-	Off/0.1% to 1.0%	0.5%
Alarm > M_Hysteresis	-	Off/0.1% to 1.0%	Off
A/D > Integrate	-	Auto/50Hz/60Hz/100ms	Auto
Burnout > CH	-	01 to 24	01
Burnout > Burnout	-	Off/Up/Down	Off
RJC > CH	-	01 to 24	01
RJC > RJC	-	Internal/External	Internal
RJC > RJC > Volt	-	–20000 to 20000 µV	0 μV
Color > Channel	Dot Model	01 to 24	01, 07, 13, 19: Purple
Color > Color	Dot Model	Purple/Red/Green/Blue/Brown/Black	02, 08, 14, 20: Red
			03, 09, 15, 21: Green
			04, 10, 16, 22: Blue
			05, 11, 17, 23: Brown
			06, 12, 18, 24: Black
POC > POC	Pen Model	On/Off	Off
Print > CH/Tag	-	CH/Tag	CH
Print > Channel	Dot Model	On/Off	On
Print > Alarm	-	On1/On2/Off	On1
Print > Record On	-		Off
Print > Chart speed	-		On
Print > Den color	- Pen Model	On/Off	On
	1 ch Model	Auto (Manual	Auto
Print I > Periodic Print I > Pof Timo	-	Auto/Manual Hour 0 to 22 (1 hour stops)	
Print1 > Interval	-	10min/15min/20min/30min/1h/2h/3h/4h	1h
		/6h/8h/12h/24h	
Print1 > Mode	-	Inst/Report/Off	Inst
Print2 > CH	-	01 to 24	01
Print2 > Mode	-	AVE/MIX/SUM/MIN/MAX/INST	AVE
Print2 > SUM scale	-	Off, /s, /min, /h, /day	Off
Bar graph > CH	-	01 to 24	01
Bar graph > Graph	-	Normal/Center	Normal
Keylock > Keylock	-	Not/Use	Not
Keylock > Password	-	Numbers and spaces within 4 digits	Blank
Keylock > RCD	-	Free/Lock	Free Free
Keylock > Feed	-	Free/Lock	Free
Keylock > Nenu	-	Free/Lock	Free
Kevlock > Alarm ACK	-	Free/Lock	Free
Keylock > Math	-	Free/Lock	Free
Keylock > Print out	-	Free/Lock	Free
Keylock > Message	-	Free/Lock	Free
Keylock > Buffer clear	-	Free/Lock	Free
Keylock > Periodic	-	Free/Lock	Free
Keylock > Pen exchange	Pen Model	Free/Lock	Free
Keylock > Ribbon exchange	Dot Model	Free/Lock	Free

Moving_AVE > Moving_AVE	Dot Model	Not/Use	Not
Filter > Filter	Pen Model	Not/Use	Not
Partial > Partial	-	Not/Use	Not
Language > Lang	-	English/Japanese	English
Date format > Type	-	Y/M/D M/D/Y D/M/Y D.M.Y M.D.Y	M.D.Y
Temperature > Temp	-	C/F	С
Personalize > Add function > Bias	-	Not/Use	Not
Personalize > Add function > SQRT low-cut	-	Not/Use	Use
Personalize > Add function > 1-5V low-cut	-	Not/Use	Not
Personalize > Add function > Alarm delay	-	Not/Use	Not
Personalize > Time print > Alarm	-	HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S	HH:MM
Personalize > Time print > Message	-	HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S, None	HH:MM
Personalize > Time print > RCD On	-	HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S	HH:MM
Personalize > Time print > C.Speed	-	HH:MM, HH:MM:SS, M/D H:M, M/D H:M:S, YMD H:M:S	HH:MM

Setting initialization

Initialize > Mode	-	Setup+Set/Set	Setup+Set
Initialize > Mode > Are you sure?	-	No/Yes	No

Remote control function (/R1 option)

• •	•		
Remote > Remote No.	-	1/2/3/4/5	1
Remote > Remote No. > No.	-	Record On Off /Chart speed/Time adjust/ Math start stop/Math reset/Manual print/ Alarm ACK/Message1/Message2/Message3/ Message4/Message5/None	Record On/Off

Computation function (/M1 option)

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
Math > Timer (TLOG) > Timer No.	-	1/2	1
Math > Timer (TLOG) > Mode	-	Off/Relative/Absolute	Absolute
Math > Timer (TLOG) > Interval (Relative)	-	10 min to 24 h (1 min steps)	01:00
Math > Timer (TLOG) > Interval (Absolute)	-	10min/12min/15min/20min/30min/1h/2h/3h /4h/6h/8h/12h/24h	1h
Math > Timer (TLOG) > Ref. Time	-	Hour 0 to 23 (1 hour steps)	00:00
Math > Timer (TLOG) > Reset	-	On/Off	On
Math > Timer (TLOG) > Print	-	On/Off	On
Math > Color > Channel	Dot Model	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	0A
Math > Color > Color	Dot Model	Purple/Red/Green/Blue/Brown/Black	Purple: 0A/0G/1A/1G Red: 0B/0J/1B/1J Green: 0C/0K/1C/1K Blue: 0D/0M/1D/1M Brown: 0E/0N/1E/1N Black: 0F/0P/1F/1P
Math > Output pen > Pen ← CH	Pen Model	Pen: 1 to 4, Channel: 01 to 04/0A to 0J	1pen: 01, 2pen: 02, 3pen: 03, 4pen: 04,
Math > Print2 > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P	0A
		1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	
Math > Print2 > Mode	-	AVE/MIX/SUM/MIN/MAX/INST	AVE
Math > Print2 > SUM scale	-	Off, /s, /min, /h, /day	Off
Math > Bar graph > CH	-	0A/0B/0C/0D/0E/0F/0G/0J/0K/0M/0N/0P 1A/1B/1C/1D/1E/1F/1G/1J/1K/1M/1N/1P	0A
Math > Bar graph > Graph	-	Normal/Center	Normal
Math > Error data > Error	-	+Over/–Over	+Over
Math > Error data > Over	-	Skip/Limit	Skip

Setup Items and Default Values

RS-422A/485 communication interface function (/C3 option).

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
RS-422/485 > Address	-	1 to 32	1
RS-422/485 > Baud rate	-	1200/2400/4800/9600/19200/38400	9600
RS-422/485 > Data length	-	7/8	8
RS-422/485 > parity	-	Odd/Even/None	Even
RS-422/485 > Protocol	-	NORMAL/MODBUS	NORMAL

Ethernet communication interface function (/C7 option)

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
Ethernet > Host > Host	-	64 characters or less	Blank
Ethernet > Host > Domain	-	64 characters or less	Blank
Ethernet > Local IP > A	-	IP address	0.0.0.0
Ethernet > Local IP > M	-	IP address (Subnet mask)	0.0.0.0
Ethernet > Local IP > G	-	IP address (Default gateway)	0.0.0.0
Ethernet > DNS > DNS	-	On/Off	Off
Ethernet > DNS > P	-	IP address (Primary DNS sever)	0.0.0.0
Ethernet > DNS > S	-	IP address (Secondary DNS sever)	0.0.0.0
Ethernet > DNS > Suffix_P	-	Primary domain suffix	Blank
Ethernet > DNS > Suffix_S	-	Secondary domain suffix	Blank
Ethernet > Login > Login	-	Use/Not	Not
Ethernet > LoginSet > Level	-	Admin/User1 to User6	Admin
Ethernet > LoginSet > Register	-	On/Off	Admin and User1
Ethernet > LoginSet > User	-	16 characters or less	Admin: admin User1 to 6: user1 to user6
Ethernet > LoginSet > Password	-	4 characters or less	Administrator: 0 User1 to 6: 1 to 6
Ethernet > Timeout > Timeout	-	On/Off	Off
Ethernet > Timeout > Duration	-	1 to 120 min	1 min
Ethernet > K. Alive > Keep alive	-	On/Off	On

Adjustment

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
P_Adj > P_Adj	Dot Model	Hysteresis/Zero/Full	Hysteresis
	Pen Model	Zero/Full	Zero
P_Adj > Pen No.	Pen Model	1/2/3/4	1

Store

Setup Item	Pen/Dot	Selectable Range or Selections	Default Value
End > End	-	Store/Abort	Store

To preserve the reliability of the recorder and to use the recorder in good condition for an extended time, it is recommended that periodic replacements be made on parts. The table below shows the recommended replacement period for expendable parts. The replacement period shown here applies when the recorder is used under standard operating conditions. For the actual replacement period, consider the actual conditions of use. Replacement of parts other than the chart paper, pen, ribbon cassette, and internal light LED will be carried out by a OMEGA engineer or an engineer certified by OMEGA. Contact OMEGA when such replacement is necessary.

Note _

The replacement period of the display and the internal light LED is the half life of the brightness. The deterioration of brightness varies depending on the condition of use, and its determination is subjective. Consider these facts for determining the actual replacement period.

Pen Model

Item	Replacement Period	Part Name	Part No.	Note	Quantity Used
Z-fold chart paper	41 days 33 days	CHART	RD110-ZFP	When used at 20 mm/h When used at 25 mm/h	1
Felt pen	2 km	PEN ASSY	RD100A-01 RD100A-02 RD100A-03 RD100A-04	Red Green Blue Violet — At a pen speed of 10 cm/s	1 each
Plotter pen	100,000 characters	PEN ASSY	RD100A-11	When printing continuously	1
Display	5 years*	DISPLAY ASSY	B8802CA	For pens 1 to 4	1
Chart paper feed motor	5 years	MOTOR ASSY	B9905GS		1
Plotter carriage	5 years	CARRIAGE ASSY	B9905NB		1
Plotter motor	5 years	MOTOR ASSY	B9900RG	For the X-axis	1
Lever	5 years	Lever ASSY	B9900RH	For the plotter	1
Pen servo	5 years	SERVO ASSY	B8802EF	Shared by all pens (excludes the pen arm ASSY)	1 to 4
Internal light LED	2 years*	LED ASSY	B8800CR		2

* The half life of the brightness at the factory default brightness setting.

Dot Model

Item	Replacement Period	Part Name	Part No.	Note	Quantity Used
Z-fold chart paper	41 days 33 days	CHART	RD110-ZFP	When used at 20 mm/h When used at 25 mm/h	1
Ribbon cassette	3 months	RIBBON CASSETTE	RD110-RC		1
Display	5 years*	DISPLAY ASSY	B8802CA		1
Chart paper feed motor	5 years	MOTOR ASSY	B9905GS		1
Pulley	3 years	PULLY	B9901EY	For the carriage	2
Carriage motor	5 years	MOTOR ASSY	B9906FX		1
Carriage	5 years	CARRIAGE ASSY	B8803BB		1
Ribbon shift motor	5 years	MOTOR ASSY	B9906GM		1
Ribbon shift gear	5 years	GEAR	B8801BW B8801BX		1 each
Ribbon feed motor	5 years	MOTOR ASSY	B9906GM		1
Ribbon feed gear	5 years	GEAR	B9906GN B9901HM B9901HN		1 each
Internal light LED	2 years*	LED ASSY	B8800CR		2

 * $\,$ The half life of the brightness at the factory default brightness setting.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

- 1. Purchase Order number under which the product was PURCHASED,
- 2. Model and serial number of the product under warranty, and
- 3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

- 1. Purchase Order number to cover the COST of the repair,
- 2. Model and serial number of the product, and
- 3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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