Instruction Manual

Model VR202/VR204/VR206
VR200 Wide View Recorder

IM 4N2A1-01E

YOKOGAWA ◆
Yokogawa Electric Corporation

IM 4N2A1-01E
3rd Edition

Please note the following alterations to the IM4N2A1-01E

■Page 4 "CHECKING THE PACKAGE CONTENTS"

· Accessories

No.	Name/Description	Part Number	Quantity	Remarks
1	Fuse	A1360EF	1	250V, 500mA time lag (except for /P1 model)
		A1102EF	1	250V, 5A time lag (for /P1 model) Recorders with a blue power switch (delivered before July 6th 1998)
		A1512EF	1	250V, 800mA time lag (except for /P1 model)
		A1513EF	1	250V, 5A time lag (for /P1 model) Recorders with a white power switch (delivered after July 7th 1998)

·Optional Accessories

No.	Name/Description	Model(Part)Number	Quantity	Specification
4	Fuse	A1360EF	4	250V, 500mA time lag (except for /P1 model)
		A1102EF	4	250V, 5A time lag (for /P1 model) Recorders with a blue power switch (delivered before July 6th 1998)
		A1512EF	4	250V, 800mA time lag (except for /P1 model)
		A1513EF	4	250V, 5A time lag (for /P1 model) Recorders with a white power switch (delivered after July 7th 1998)

■Page 2-11

Massage 1
to
Massage 5

Displays the present massages and marks. If the waveform is being displayed horizontally, only the marks are displayed.

■Page 3-8 3.5 "Writing the Massage"

Displays the present massages and marks. If the waveform is being displayed horizontally, only the marks are displayed.

■Page 7-6 7.5 "Recommended Replacement Periods for Consumable Parts"

Item	Replacement Period	Part Name	Part Number	Remarks	Quantity Used
Fuse	2 years	Fuse	A1360EF A1102EF	250V 500mA time lag (except for /P1 model) 250V 5A time lag (for /P1 model) Recorders with a blue power switch (delivered before July 6th 1998)	1 1
			A1512EF A1513EF	250V 800mA time lag (except for /P1 model) 250V 5A time lag (for /P1 model) Recorders with a white power switch (delivered after July 7th 1998)	1 1
LCD unit	5 years	LCD module	A1049VA		1

■For the VR200 with the large memory option

If your model has the 'large memory' installed, alter the following:

1. The format type of the floppy disk must be fixed to 1.44 MB.

2. Select one of the below methods when saving measurement data to the floppy disk:

   A. ALL(default): Save all measurement data from the VR200 internal memory.

   B. UNSAVED : Save only the measurement data newly loaded to the VR200 internal memory, after the last time you saved to the floppy disk.

   Set the saving method as follows:

   1. Press the MENU key for three seconds to enter the SET mode. Select the "SET=AUX display using the [△]/[▽] keys. Then press the [↵] key.
   2. Select the "MODE = SPECIAL" display using the [△]/[▽] keys. Then press the [↵] key.
   3. Push the [↵] key three times. "FD SAVE MODE = ALL" appears.
   4. Select the method when saving measurement data to the floppy disk Then press the [↵] key.

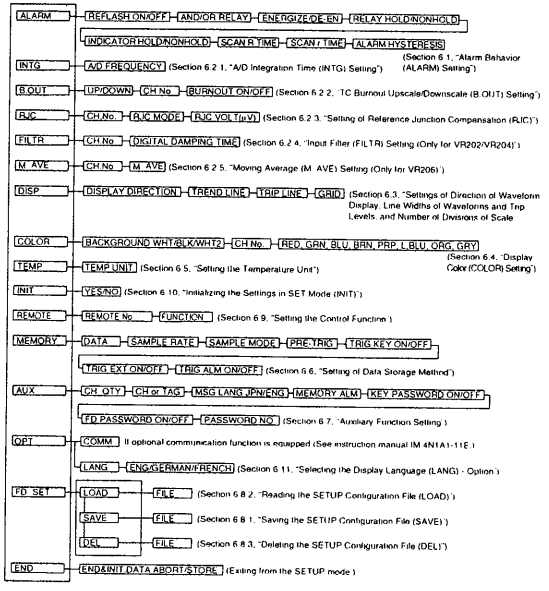
   The setting is completed.

   Press the [↵] key to return to the " DISP TIME/DIV= □ " display; or press the ESC key to go to the "SET=AUX" display; or press the MENU key for three seconds to return to the Operation mode.

CUT ALONG THIS LINE

To Enter SETUP Mode

While pressing the [↵] key, turn on the power to begin the following setup procedure:



To return to the operation mode, select the 'END&INIT.DATA=ABORT' display (to discard the new settings) or select the 'END&INIT.DATA=STORE' display (to store and make the new settings take effect), then press the [↵] key.

CAUTION

⚠ This marking on the product indicates that the operator must refer to an explanation in the instruction manual in order to avoid the risk of injury or death, or damage to the product. The manual describes special precautions that must be taken by the operator to avoid electric shock or other dangers that could result in injury or loss of life.

FOLD ALONG THIS LINE

Quick Reference

Model VR204/206 VR200 View Recorder

Use this quick reference together with the instruction manual (IM 4N2A1-01E).

Screen Switching

Standard screen ⟷ [←] / [→] key ⟷ Past-data reference screen (Section 3.4, "Referencing the Past Measured Data")

[DISP] key
(or after a specified time has elapsed)

Relationship Between Waveform Span Rate and Data Storage Span (Standard model)

(When the file definitions are "1 event file and 1 display data file" or "16 event files and 1 display data file")
Diplay data file (when using all channels, i.e., two channels for VR202, four channels for VR204 and six for VR206)

Waveform Span Rate (min/div)	Storage Time Span (VR202)	Storage Time Span (VR204/VR206)
1 min	Approx. 52 hours	Approx. 26 hours
5 min	Approx. 11 days	Approx. 5 days
10 min	Approx. 22 days	Approx. 11 days
20 min	Approx. 44 days	Approx. 22 days
30 min	Approx. 66 days	Approx. 33 days
60 min	Approx. 132 days	Approx. 66 days

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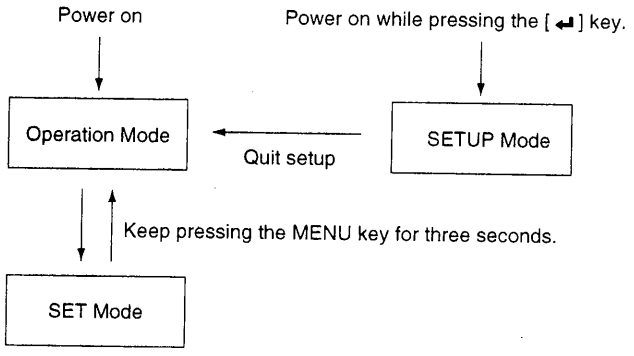
FD No. MR07
3rd Edition: July 1998 (YK)

IM 4N2A1-90E
3rd Edition

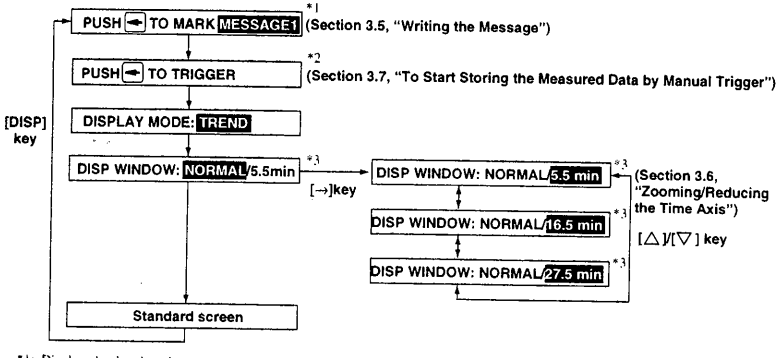
Relationship Between Modes

***Operation mode*:** Default mode after power-on
SET mode (modifying the settings)**:** Press the **MENU** key for three seconds.
SETUP mode (modifying the basic configuration)**:** While pressing the [↵] key, turn on the power.



To Enter the Operation Mode

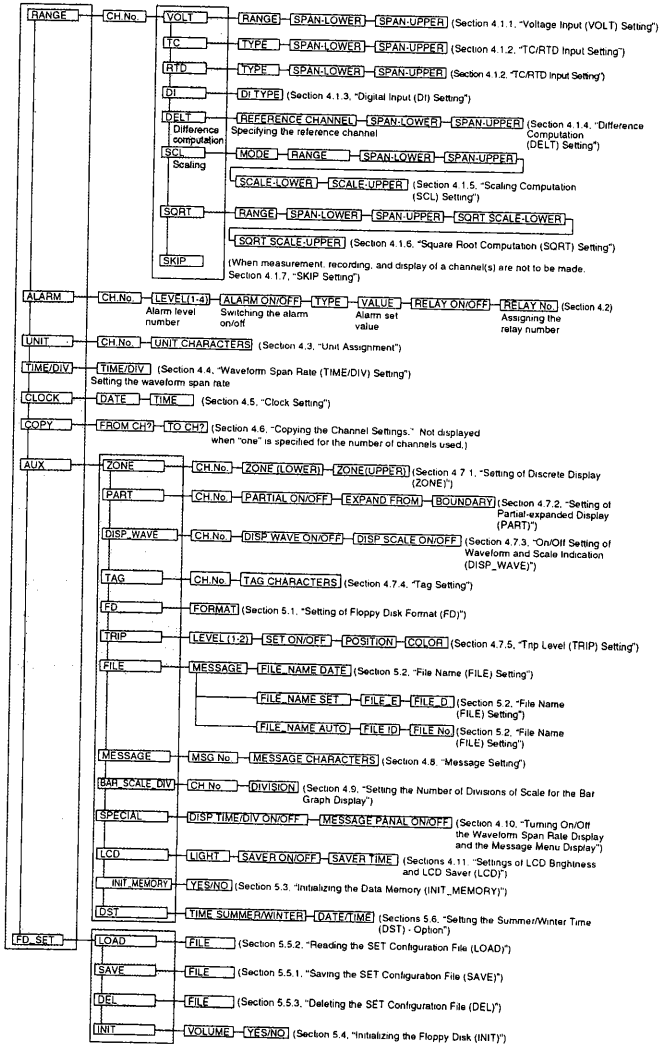
Turn the power on to enter the operation mode. The operation flow in this mode is as shown below:



*1: Displayed only when the message menu display (MESSAGE PANEL) is set to ON in the SET mode.
*2: Displayed only when the "key trigger" is set.
*3: Displayed only when the display mode is set to trend.
The example above shows the display sequence of the display span time called up when the direction of the waveform display is set as vertical. If it is set as horizontal, the display sequence is 8, 24, and then 40 minutes.
Fixed to "5.5 minutes" (8 minutes) if the VR200 has the computation function.

To Enter SET Mode

Press the **MENU** key for three seconds to begin the following setting procedure:



PREFACE

Thank you for purchasing the Yokogawa VR200 Wide-view Recorder.
To take full advantage of all the functions of the VR200 Wide-view Recorder, and to use this instrument correctly and efficiently, please read this instruction manual carefully before use.

Notes

- In this manual, eguipment of style number 2 is explained.
  The following functions are added from style number 2.
  - Bar graph display, digital value display, information display and list display.
  - Writing message (section 3.5)
  - On/off setting of waveform (section 4.7.3)
  - Number of trip level (section 4.7.5)
  - Message setting (section 4.8)
  - Setting the number of divisions of scale for the bar graph display (section 4.9)
  - On/off setting of the waveform span rate display and the message menu display (section 4.10)
  - Setting the remote cntrol function (section 6.9)
- Yokogawa reserves the right to change this manual at any time without notice.
- If you find any ambiguities or errors in this manual, please inform Yokogawa.
-

Revision Record

- March 1997: First edition
- October 1997: Second edition
- July 1998: Third edition

Trademarks

- "IBM" is a trademark of International Business Machines Corp.
- "MS-DOS" and "Windows" are trademarks of Microsoft Corporation.
- "PC-9801" is a trademark of NEC Corp., Japan.

Disk No. MR30
3rd Edition: July 1998 (YK)

SAFETY PRECAUTIONS

This recorder conforms to IEC 348 under the following two conditions:

- The VR200 is a Safety Class I instrument (provided with a terminal for protective earthing) and CAT II (IEC1010).
- The VR200 is an EN55011 (EMI standard), Group 1, Class A instrument.

The following general safety precautions must be observed at all times of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates the safety standards of design, manufacture, and intended use of the instrument.
YOKOGAWA Electric Corporation assumes no liability for the customer's failure to comply with these requirements.

General Definitions of Safety Symbols Used on Equipment

CAUTION: To avoid injury, death of personnel or damage to the instrument, the operator must refer to the explanation in the instruction manual.

Function grounding terminal: The terminal marked with this symbol must not be used as a protective grounding terminal.

Protective grounding terminal: Used to protect against electrical shock in case of a fault. This symbol indicates that the terminal must be connected to ground before using the equipment.

High temperature: To avoid injury caused by hot surfaces, do not touch the heatsink.

WARNING

Power Supply
Ensure the source voltage matches the voltage of the power supply before turning on the power.

Power Cable and Plug (for Desk-top Model)
For the power cable, use those provided by Yokogawa to prevent fire and electric shock.
Connect the power cable of the VR recorder to a 3-pole power socket with a protectibe grounding pole.
Do not use an extension cable without a protective grounding wire, since this invalidates the protection.

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 grounding wire or disconnect the wiring of the protective grounding terminal, since doing so creates the risk of shock.

Defective Protective Grounding and Fuse
Do not operate the instrument if the protective grounding or fuse might be defective. Before operating this product, check that there is no defect in the protective grounding and fuses.

Fuse
To prevent a fire, use the fuse of the specified standard (current, voltage, type). Before replacing the fuse, turn off the power and disconnect the power source. Do not use a different fuse nor short-circuit the fuse holder.

Do Not Operate in an Explosive Atmosphere
Do not operate the instrument in the presence of flammable liquids or vapors. Operation of any electrical instrument in such an environment constitutes a safety hazard.

Never Touch the Interior of the Instrument
Inside this instrument there are areas of high voltage; never touch the interior if the power supply is connected. This instrument contains parts which can be adjusted inside; however, internal inspection and adjustments should be done by qualified personnel only.

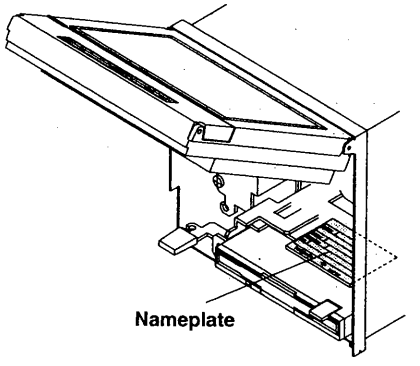
External Connection
To ground securely, connect the protective grounding before connecting to a measurement or control unit.

CHECKING THE PACKAGE CONTENTS

After opening the package, please check the following before use. If there are any differences in the specifications or quantity, or any defect in appearance, please contact the supplier.

VR200

Check the descriptions for **MODEL** and **SUFFIX** on the nameplate on the low inside the recorder casing to make sure that the product is the same as you ordered. To see the internal hardware, first remove the screw located right side of the power switch, then swing open the front panel.



MODEL (Model Number)

VR202	VR200 panel-mounting, two-channel wide-view recorder
VR204	VR200 panel-mounting, four-channel wide-view recorder
VR206	VR200 panel-mounting, six-channel wide-view recorder

SUFFIX (Suffix Code)

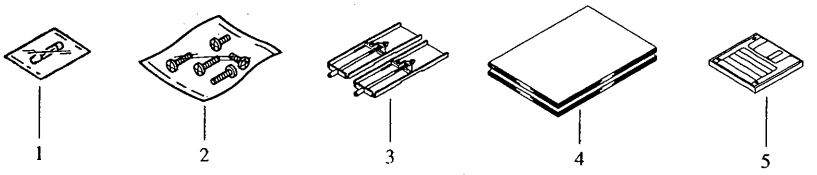
Model	Suffix Code	Description
Software	-0	Without application software
	-2	Provided with English version software for IBM PC/AT compatible personal computers
Power cable	-W	Screw terminals for power supply (power cable not provided)
Options	/A1	Two alarm output contacts
	/A2	Four alarm output contacts
	/A3	Six alarm output contacts
	/C3	RS-422-A communication interface
	/D2	Fahrenheit degree display
	/E4	Large memory
	/F1	Fail/Memory End output relay
	/H5D	Disk top type. Power cord UL st'd
	/H5F	Disk top type. Power cord VDE st'd
	/H5R	Disk top type. Power cord SAA st'd
	/H5J	Disk top type. Power cord BS st'd
	/M1	Mathematical functoin
	/M2	Mathematical functoin with VA200-02
	/N1	Cu10, Cu25 resistance temperature detector input
	/R1	Remote Control contact input
	/P1	24 V DC power supply
	/H2	Clamped input terminals

NO. (Serial Number)

When contacting the supplier for repair, etc., please quote this serial number.

Accessories

The VR200 should come with the following accessories. Check that all are present in the correct quantities and are not damaged.



No.	Name/Description	Part Number	Quantity	Remarks
1	Fuse	A1360EF	1	250 V, 500 mA time lag (except for /P1 model)
		A1102EF	1	250 V, 5 A time lag (for /P1 model) Recorders with a blue power switch (delivered before July 6th 1998)
		A1512EF	1	250 V, 800 mA time lag (except for /P1 model)
		A1513EF	1	250 V, 5 A time lag (for /P1 model) Recorders with a gray power switch (delivered after July 7th 1998)
2	Terminal screws		5	M4
3	Mounting brackets	B9900CW	2	For panel mounting.
4	Instruction manual	IM 4N2A1-01E	1	This document
		IM 4N2A1-11E	1	Provided only when "/C3" is specified for the suffix code.
		IM 4N1A1-61E	1	Provided only when "-2" is specified for the suffix code.
		IM 4N2A1-51E	1	Provided only when "/M1" and "/M2" are specified for the suffix code.
		IM 4N1A1-63E	1	Provided only when "/M2" are specified for the suffix code.
5	Application software	VP100-02	1	Provided only when "-2" is specified for the suffix code. For MS-DOS(/V), Windows 3.1
6	Power cord (only for /H5)	A1006WD	1	Provided only when "/H5D" is specified for the suffix code.
		A1009WD	1	Provided only when "/H5F" is specified for the suffix code.
		A1024WD	1	Provided only when"/H5R" is specified for the suffix code.
		A1023WD	1	Provided only when "/H5J" is specified for the suffix code.

Optional Accessories

The items listed below are optional accessories that can be provided at extra cost. If you have ordered these, please check that all are present in the correct quantities and are not damaged.
For questions and orders for these optional accessories, please contact the supplier of the VR200 recorder.

No.	Name/Description	Model (Part) Number	Quantity	Specification
1	3.5-inch floppy disks	7059 00	10	2HD, blank
2	Shunt resistors (for screw terminals)	4159 20	1	250 Ω ±0.1%
		4159 21	1	100 Ω ±0.1%
		4159 22	1	10 Ω ±0.1%
3	Shunt resistors (for clamped terminals)	4389 20	1	250 Ω ±0.1%
		4389 21	1	100 Ω ±0.1%
		4389 22	1	10 Ω ±0.1%
4	Fuse	A1360EF	4	250 V, 500 mA time lag (except for /P1 model)
		A1102EF	4	250 V, 5 A time lag (for /P1 model) Recorders with a blue power switch (delivered before July 6th 1998)
		A1512EF	4	250 V, 800 mA time lag (except for /P1 model)
		A1513EF	4	250 V, 5 A time lag (for /P1 model) Recorders with a gray power switch (delivered after July 7th 1998)
5	Mounting brackets	B9900CW	2	—

Optional Software

The items listed below are optional software packages that can be provided at extra cost.

Name	Model Number	Required O/S
VR application software package	VP100–02	MS-DOS or Windows 3.1
VR Enhanced Data Viewer	VA100–02	Windows 3.1 or Windows 95
VR Data Viewer for Windows 95	VA200–02	Windows 95

HOW TO USE THIS MANUAL

Objectives of Each Chapter

This manual is composed of nine chapters, an appendix, and index. To help use this manual, please refer to the following table. The table shows which chapter to refer to depending on what you want to do.

Purchase and Installation	First Time Setup	Daily Operation	Changing Settings	Maintenance & Trouble-shooting	Chapter
●	●	●	●	●	SAFETY PRECAUTIONS (2 pages)
●					Checking the Package Contents (4 pages)
○	●	●	●	○	1 OVERVIEW OF VR200
●					2 BEFORE OPERATION
		●			3 DAILY OPERATIONS (OPERATIONS IN OPERATION MODE)
	●		●		4 BASIC SETTINGS (OPERATIONS IN SET MODE)
	○		○		5 FLOPPY DISK AND FILES (OPERATIONS IN SET MODE)
	○		○		6 OPERATIONAL PREFERENCES SETUP (OPERATIONS IN SETUP MODE)
				●	7 MAINTENANCE
	○		○	●	8 TROUBLESHOOTING
○	○		○	○	9 GENERAL SPECIFICATIONS

● : Requisite

○ : Read as appropriate

For details on how to use options that are not described in this manual, please refer to the separate option manuals.

Note

Although the versatility of the VR200 recorder allows the user to select whether to display the waveforms (trend graphs) vertically or horizontally, most of the descriptions in this manual are based on a horizontal waveform display.

Signs and Abbreviations Used Throughout This Manual

Signs

K 1024. For example, 768K (file capacity)
M 1024K. For example, 1.2M (floppy disk capacity)

Notation Conventions

The following symbol conventions are used in this manual.

⚠ This marking on the product indicates that the operator must refer to an explanation in the instruction manual in order to avoid injury or death, or damage to the product. The manual describes that the operator must take special care to avoid electric shock or other dangers that may result in injury or loss of life.

WARNING This sign denotes a hazard, and calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or loss of life.

CAUTION This sign denotes a hazard, and calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part of the product.

Note This sign denotes important information which must be noted when handling this product.

Conventions in Descriptions of Operation Procedures

In the descriptions of operation procedures, the following conventions are used throughout this manual.

Bold or [ ] Denotes the keys on the front panel, e.g., **MENU** key, **DISP** key, [↵], etc.
‘ ’ Denotes a comment displayed on the screen, e.g., ‘SET=RANGE.’
□□□ Denotes an arbitrary item, e.g., ‘SET= □□□.’

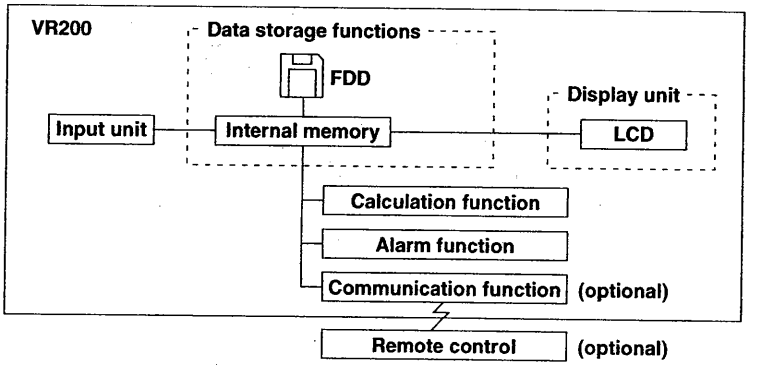
CONTENTS

Chapter 1 OVERVIEW OF VR200

1.1 Functional Overview

1.1.1 Functional Configuration

The functions of the VR200 recorder are illustrated below.



1.1.2 Input Unit

The following table outlines the possible input types for this recorder, measuring period, and measuring ranges. For details, see Section 9.1, "Input Specifications."

Item	Description
Number of inputs	VR202: Up to two channels (can be set from one to two *1) VR204: Up to four channels (can be set from one to four *1) VR206: Up to six channels (can be set from one to six, except five*1)
Input types	DCV: DC voltage TC: Thermocouple RTD: Resistance temperature detector DI: On/off (contact) input DCA: DC current *2
Measuring period	VR202/VR204: 125 ms , VR206: 1 s or 2 s
Measuring range	DCV: ±20 mV to ±20 V TC, RTD: Corresponding to the range specified for each element type DI: For voltage input; detecting **off** when less than 2.4 V, and **on** when 2.4 V or greater For contact input; on/off of contact

*1: To be defined in the SETUP mode.
*2: A DC current input requires an external shunt resistor. For details of the shunt resistors, see "Checking the Package Contents" in the beginning part of this document.

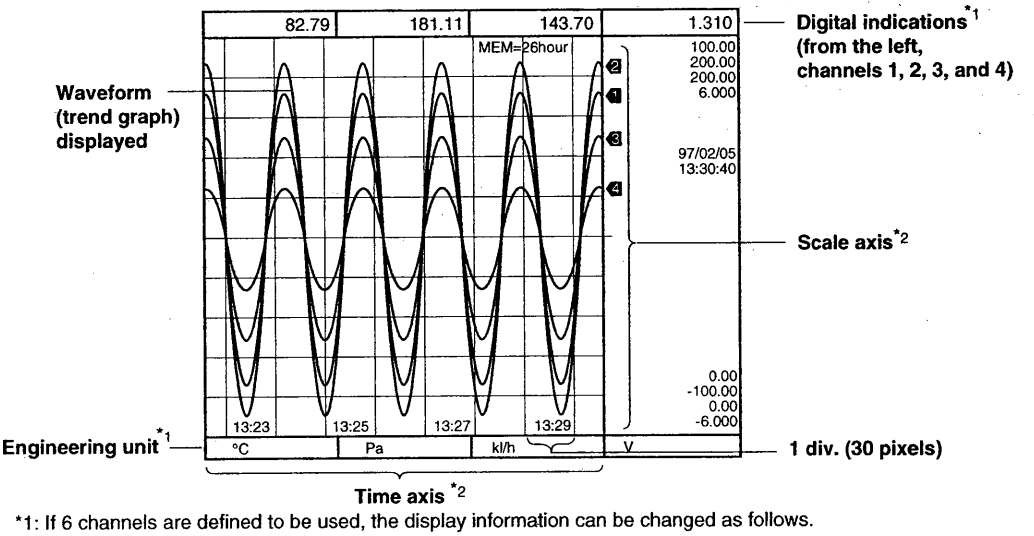
In the measurement of each input channel, the following processing can be performed depending on your setup.

Function	Description
Burnout upscale/downscale	Forcibly clamps the measured value reading to zero or full scale when the thermocouple burns out.
Filter	Suppresses the fluctuations of the input signals.

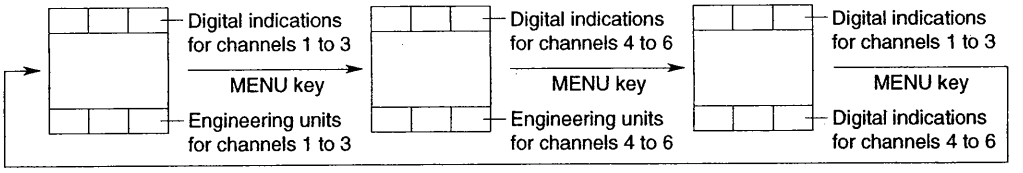
1.1.3 Display Unit

5.5-inch Color LCD

This recorder has a 5.5-inch TFT color LCD on which it displays the measured results (240 (vertical) × 320 (horizontal) pixels).



*1: If 6 channels are defined to be used, the display information can be changed as follows.



*2: If the direction of the waveform (trend graph) display is set as vertical, the horizontal axis is the scale axis and the vertical axis is the time axis.

Waveform Span Rate

The waveform(s) moves along with the time axis at a speed determined by the *waveform span rate*. The waveform span rate, which is equivalent to the chart speed in a conventional pen recorder and which determines the time span in each division (grid interval) of the time scale, can be selected from six rates as shown in the following table. To trace the waveform on the screen, the maximum and minimum values of the measured values, which are sampled at the measurement period* within the interval equivalent to one pixel of the time scale, are handled as the data to be traced on that time-axis pixel. *The measurement period is 125 ms for the VR202/VR204, and 1 s or 2 s for the VR206. The following table shows the relation between the waveform span rate and trend speed.

Waveform span rate (time span per division of time axis)	1 min (2 S)	5 min (10 S)	10 min (20 S)	20 min (40 S)	30 min (60 S)	60 min (120 S)
Trend speed (mm/h) (approximate)	615.0	123.0	61.5	30.7	20.5	10.2

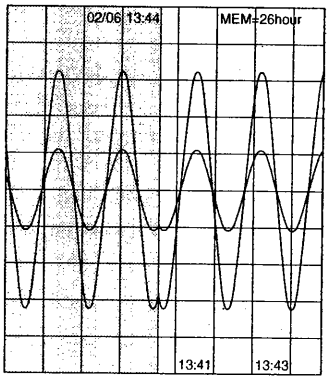
The updating period of the digital indications at the top of the screen is fixed to one second, regardless of the above. However, for the VR206, it is fixed to two seconds if the measurement period is set as two seconds.

Operation Functions on Screen

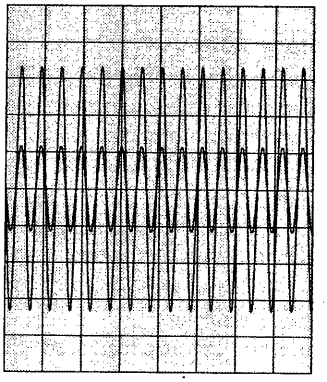
The following operation functions are provided on the screen.

Function	Description
Referencing past trend data	Past trends stored in the internal memory are displayed on the left half of the screen. All data stored in the internal memory can be viewed by scrolling the screen.
Magnifying/reducing the time axis	In addition to the normal trend screen determined by the waveform span rate, the display span (= 8 divisions) can be switched to 8, 24, or 40 minutes to magnify/reduce the time axis of the trend graphs.
Writing time-axis marks	Time-axis marks can be displayed on arbitrary points on the time axis. The information at the points of time thus marked is stored in the internal memory as time-axis mark information.

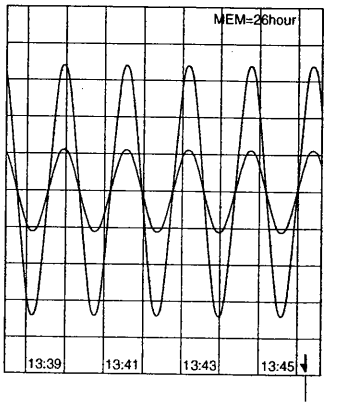
Referencing past trend data



Magnifying/reducing the time axis



Writing time-axis marks



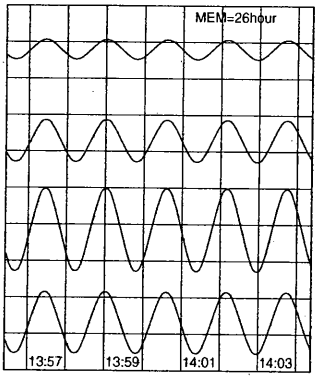
Time-axis mark

Various Screen Settings

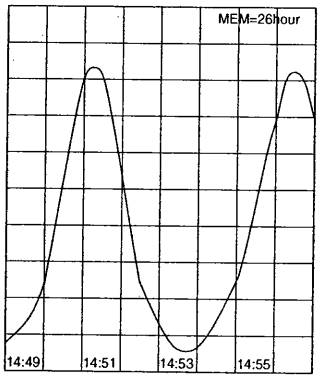
In addition to the standard screen where the trends of all channels are displayed on a common scale axis, the following display settings are available.

Function	Description
Discrete display	Splits the display area into zones for individual channels for viewing the trends discretely.
Partial expansion	Zooms in on a portion you want to view in detail.
Trip level indications	Certain key levels can be drawn as horizontal lines (or vertical lines when the waveform(s) moves vertically) on the graph.
Tag indications	Displays the tag numbers corresponding to channels.
Waveform display on/off	Switches on/off the display of the waveform for each channel.
Scale indication on/off	Switches on/off the indication of the scale for each channel.

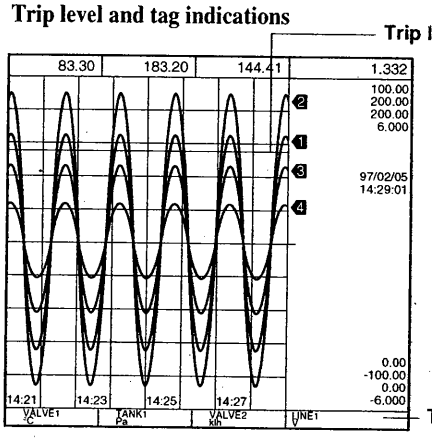
Discrete display



Partial expansion



Trip level and tag indications



LCD Display Preferences

The following display preferences can be set.

Preference	Option
Display color	The color of each waveform (trend) trace can be set to red, green, blue, brown, red-purple, orange, light-blue and gray.
Background color	The background color can be selected from among bright white, white, and black.
Direction of waveform display	The direction of the waveform (trend graph) display can be switched between horizontal and vertical.
Line width	The width of trace lines for waveforms and trip levels can be selected from among 1, 2, or 3 pixels.
Number of divisions of scale	The number of divisions of the scale can be selected from 4 to 12 divisions.
LCD brightness	The brightness can be selected from fifteen levels.
LCD saver	The backlight of the LCD automatically dims if no key is pressed for a certain preset time (can be set from 1 to 60 minutes). This increases the life of the backlight.

1.1.4 Data Storage Functions

Data Storage Action

For storing data, this recorder has 1 MB (for VR202/VR204) or 1.44 MB (for VR206) of internal memory and is equipped with a 3.5-inch floppy disk drive (1.44 MB 2HD for DOS). (Floppy disks formatted as 1.2 MB 2HD can be used only for the VR202/VR204 for users of an NEC 9800 series PC with Japanese-version OS (DOS/V).) The measured data are always stored in the internal memory. Once the floppy disk is inserted, the recorder starts copying the measured data from the internal memory to the floppy disk automatically, together with the following data.

- Major setup parameters
- Information on time-axis marks, power failures, and alarms

Data Types

The table below shows the data types and contents which are saved on FDC.

Data Type		Storage Contents and Action	File Format	File (Extension)	File Naming Method
Measured data	Display data	• These are the data used to display the traces on the LCD. • The data are stored up to the predefined memory length and overwritten when the memory becomes full.	Yokogawa standard format Note	Display data file (.DAT)	Automatic setting or user specified
	Event data	• Collected and stored at the specified sampling period. • The data writing action differs depending on the trigger setting. (For details, see Section 6.6.1.)	Yokogawa standard format Note	Event file (.DAT)	Automatic setting or user specified
Time-axis mark information		• Information at the points of time where the time-axis marks are drawn (for the latest 32 marks) is saved.	ASCII format	Information file (.INF)	The file name of the measured data is set automatically.
Power failure information		• Information at the times of (the latest ten) power failures is saved.			
Alarm information		• Information on (the latest fifty) alarms is saved.			
Setup parameter list		• These data are used to view the list of major parameters to set up in the SET and SETUP modes. • The file is automatically created when measured data starts to be saved, and is saved together with the measured data.	ASCII format	Parameter list file (.LST)	The file name of the measured data is set automatically.
Parameter settings		• These data are used to view the parameter settings made in the SET and SETUP modes. (The user can set up the recorder using these data.) • The contents can be saved, read, or modified in the SET or SETUP mode.	ASCII format	SET/SETUP configuration files (• Settings in the SET mode: .PNL) (• Settings in the SETUP mode: .PNS)	User specified

Note: • The same file format as used in other Yokogawa recorders.
• The power failure information is not stored when sixteen event files and one data file are created. For details of the event and data files, see Section 6.6, "Setting of Data storage Method (MEMORY)."

For details of the SET and SETUP modes, see Section 1.3, "Run Mode."

Collection of Event Data

The processing which occurs when collecting the event data is determined by
- File definitions (types and number of files defined);
- Sampling period; and
- Trigger action type (in the sample mode).

The following table shows the selections available for these specifications.

Definition	Description
File definitions	The types and number of files to be created can be selected from the following three combinations. (a) Event file + display data file One event file and display data file for each are created. (b) Event file x 16 + display data file This combination can be selected only when the sample mode is set to *trigger-on* or *trigger-rotation* (see the second next row). Sixteen event files, in which the measured data are to be stored after the trigger is raised, are created together with one display data file. (c) Event file only Only one event file is created.
Sampling period	The sample period at which to store the data can be selected from: VR202/VR204: 125 ms, 250 ms, 500 ms, or 1 s VR206: Fast, 2 s, 10 s , 30 s, 60 s, or 120 s
Sample mode	The trigger action can be selected from the following three types. When "trigger-on" or "trigger-rotation" is selected, various other trigger settings can be made. Trigger-free: Data collection starts after power-on. When the file in the internal memory becomes full, the data are overwritten. Trigger-on: Data collection starts when a trigger is raised. When the file in the internal memory becomes full, the data collection stops. Trigger-rotation: Data collection starts when a trigger is raised. After the file in the internal memory becomes full, the data are overwritten.

Relation Between Measuring Period and Sampling Period

This recorder captures the input data into its A/D converter at the *measuring period* shown below. The *sampling period* denotes the interval used to sample and store the measured data in memory. If the sampling period is set to the same value as the measuring period, all measured data values are stored in the memory.

Measuring period:

VR202/VR204:125 ms

VR206: 1 s (when the A/D integration frequency is set as 50 Hz, 60 Hz, or "AUTO")

2 s (when the A/D integration frequency is set as 100 ms)

Trigger

This recorder is usually used such that, upon power-on, it runs the self-diagnostics and then automatically starts data collection into the memory. However, this recording action can be set to be suspended upon power-on and started by a certain key. This key is called the *trigger*. There are three types of triggers that can be set for this recorder.

Key trigger: Pressing the key starts data storage.

External trigger: When the contact input signal is closed, data storage starts.

Alarm trigger: When a specified alarm occurs, data storage starts.

The *pre-trigger* function, which means that data is always collected in the leading part of the event file, is useful when data needs to be collected before the trigger occurs.

1.1.5 Alarm Function

Alarm Types

The following six alarm types can be set:
High limit (H), low limit (L), differential high limit (h), differential low limit (l), rate-of-change on increase (R), and rate-of-change on decrease (r) alarms

Alarm Preferences

The following preferences can be specified for alarms.

Preference	Description
Hysteresis	Activates/inactivates the hysteresis of 0.5% of span.
Alarm output relay (option)	Outputs the contact signal linking with an alarm status.
Re-annunciation of subsequent alarm (option)	Using a single alarm relay, re-alerts the occurrence of a subsequent alarm (re-flashing) during occurrence of an alarm.
Fail/memory end output (option)	The relay contact output on the rear panel alerts the occurrence of a system error and when the memory is almost full.

1.1.6 Calculation Functions

The following calculations can be specified.

Function	Description
Differential computation	Calculates the difference between the measured values of two channels.
Linear scaling	Used to convert an input value to fit a different unit system.
Square root	Extracts the square root of an input value.

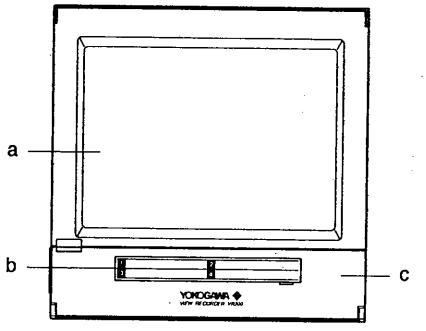
1.1.7 Other Functions

Function	Description
Communication functions (option)	RS-422A interface added.
Remote control (option)	This option allows the event trigger (start of event data collection), writing of time-axis marks, and time adjustment functions to be controlled remotely by contact input.

1.2 Component Names and Functions

1.2.1 Front Panel

When the operation panel cover is closed

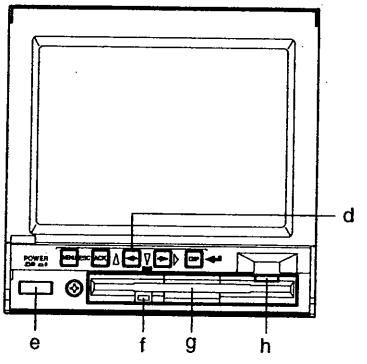


a. LCD Panel
Displays the trend graphs and the digital readouts of the measured data.

b. Label
Specified by the user to identify the signal corresponding to each channel.

c. Operation Panel Cover
To access the power switch or panel keys or to insert or eject the floppy disk, pull the cover open by placing a finger in the recess at the top of the cover. Always keep the cover closed other than when performing these operations.

When the operation panel cover is opened



d. Panel Keys
Used to switch the screen and mode, select the menu, and enter data and characters.

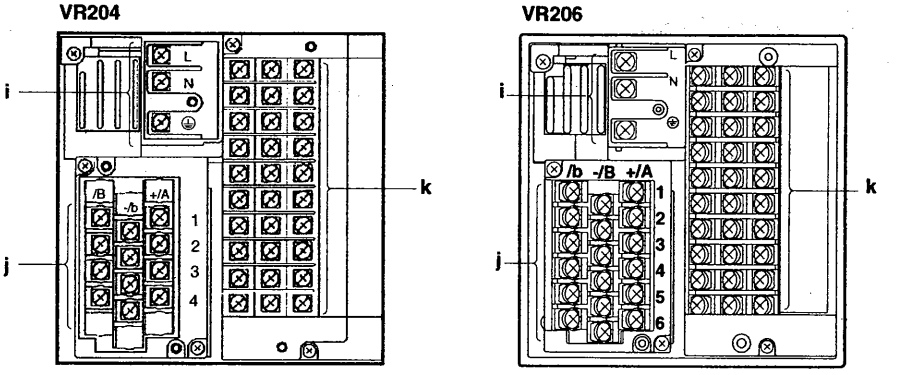
e. Power Switch
Used to turn the power on and off.

f. Access Lamp
Indicates that the floppy disk is being accessed.

g. Floppy Disk Drive
Used to save the measured data, setup parameters, etc. to a floppy disk.

h. Eject Button
Used to eject the floppy disk.

1.2.2 Rear Panel



Terminal screw: ISO M4 screw, nominal length 6 mm

i. Power Terminals

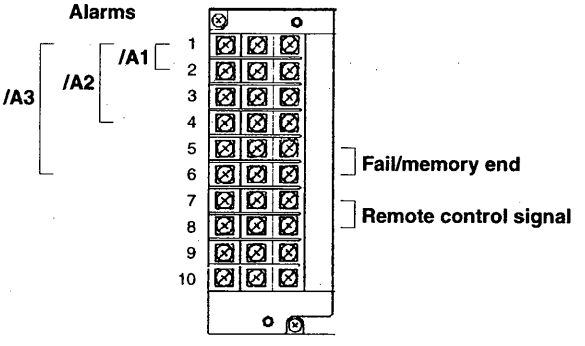
Connect the power and protection grounding cables.

j. Input Terminals

Connect the input signal cables.

k. Option Terminals

Connect the input/output signals for optional functions.



1.3 Run Mode

1.3.1 Modes

There are three modes of operation of this recorder, and the available screens and valid keys depend on the mode.

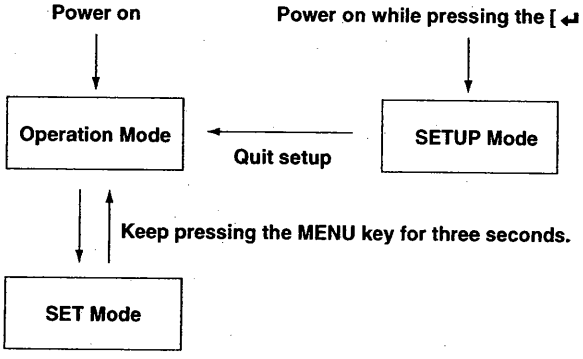
Mode	Description	Valid Operations
Operation mode	Normal run mode. Selected automatically when the power is turned on.	• Monitoring and operation • Storing and saving the measured data
SET mode	Used to set parameters such as input ranges and waveform span rate. Pressing the **MENU** key for three seconds in the operation mode switches the mode to SET.	• Basic setting • Operations on floppy disk and files • Measured data can be stored in memory, but not saved on a floppy disk.
SETUP mode	Used to set the operation environment for the recorder such as inputting method and data storage method. Turning on the power while pressing the [↵] key starts up the recorder in the SETUP mode.	• Settings of operation environment • Displaying, storing, or saving the measured data is not allowed.

Note

- If a password is set, the password must be entered when entering the SET mode.
- Modifying the input range or waveform span rate clears the measured data stored in the internal memory, as does modifying a setting in the SETUP mode.
- Measurement, waveform (trend graph) display, and alarm detection are not performed in the SETUP mode.

1.3.2 Mode Transition

The figure below shows the transitions between the operation, SET, and SETUP modes.

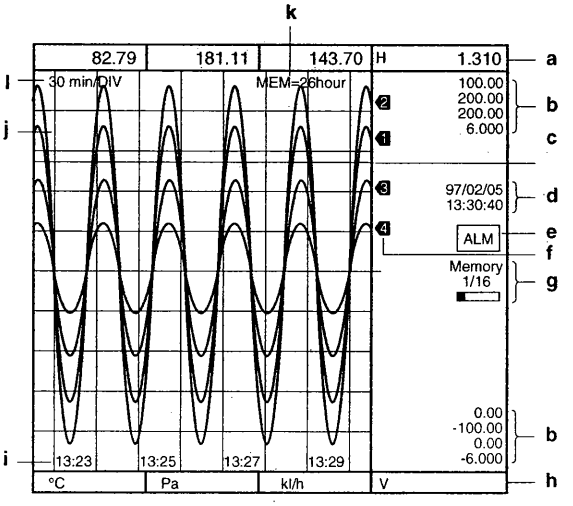


1.4 Display Format

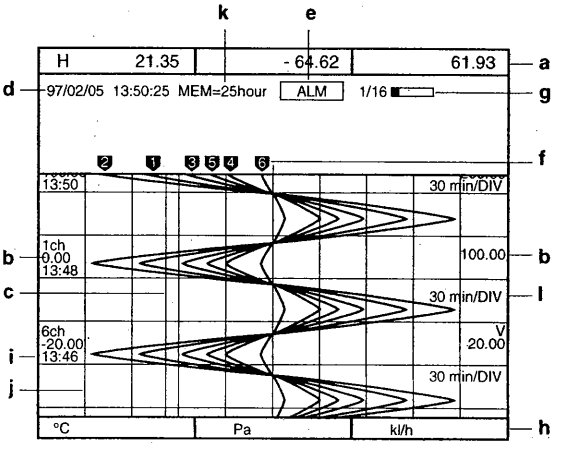
1.4.1 Waveform display

Waveform display

When four channels are used and the direction of waveform display is horizontal



When six channels are used and the direction of waveform display is vertical



a. Digital Indications

Displays the current measured value of each channel at the update period of 1 second (or 2 seconds for the VR206 if the A/D integration frequency is set as 100 ms).
If 6 channels are defined to be used, the values for channels 1 to 3 or channels 4 to 6 are displayed. To switch over the channels to be displayed, press the **MENU** key.
When 3 or 4 channels are used: Only the digital values are displayed. The engineering units are displayed in **h** at the bottom.
When 1 or 2 channels are used: The digital values and engineering units are displayed together. When the display of tag numbers is set on, each column for the engineering unit is split into two rows and the tag number and unit are displayed in the upper and lower rows, respectively. (See also Section 4.7.4.)

b. Scale Values

The upper and lower limits of recording scale for all channels are displayed. If scaling computation is used, the values displayed are the scale values after scaling computation.

Note

In the trend graph, all measured values are displayed in 0-100% ranges corresponding to the (vertical or horizontal) scales defined.

c. Trip Level

A horizontal line used to note a particular level

For details on how to draw this line, see Section 4.7.5, "Trip Level (TRIP) Setting."

d. Time Indication

When 3, 4 or 6 channels are used, the current time is displayed here. When 1 or 2 channels are used, the current time is displayed in **h** at the bottom. The display format is as follows:
Nov.10.95 15:20:00

e. Alarm (ALM) Indication

Displays the alarm when an alarm occurs. The behavior of the alarm indication varies depending on the setting.

For details on the behavior of the alarm indication, see Section 3.3, "Resetting an Alarm Output."

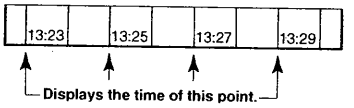
f. Current Value Pointers
Indicates the current values of all channels at the update period of 125 ms (VR202/VR204), 1 s or 2 s (VR206).

g. Memory Status Indicator
Shows how much area of memory is occupied when the measured data are collected into the event file by the key trigger.

h. Engineering Unit (or Time Indication)
When 3, 4 or 6 channels are used: The engineering unit for each current value indication (**a**) is displayed. When the display of tag numbers is set on, each column is split into two rows and the tag number and unit are displayed in the upper and lower rows, respectively. (See also Section 4.7.4.)
If 6 channels are defined to be used, the measured values for channels 4 to 6 may be displayed when the **MENU** key is pressed.
When 1 or 2 channels are used: The current time is displayed in the format described in **d** above.

i. Time-axis Values
The beginning time of the division is displayed for every other division in the format hh:mm.

When the direction of waveform display is horizontal



j. Grid
Grids are displayed at intervals corresponding to the specified number of divisions for the scale axis and at the waveform span rate for the time axis. The grid moves together with the trend graph.

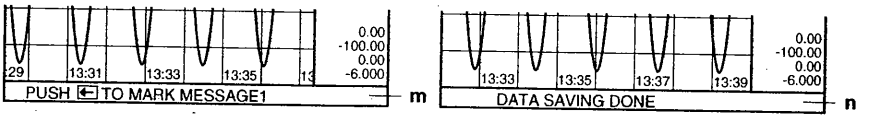
Note

The grid lines of the time axis are usually displayed at every interval of the selected waveform span rate. However, if the power is switched off and on during the measurement, the trends (waveforms) start to be traced again continuously from the point of time of the power-off and this causes the interval of the grid lines to be different from the waveform span rate in this case.

k. Display of Remaining Time Before Overwriting Measured Data (or Remaining Time Until Memory Becomes Full If Sampling Mode Is Set As Trigger-on)
If the sampling mode is *not* set as trigger-on:
This field displays the remaining time until the measured data start being overwritten after saving data to an FDC. When the data are saved to an FDC, the displayed time is reset. If the entire data storage memory is used for one event file, no information is displayed while the recorder is waiting for the trigger. The remaining time is displayed as 'MEM=99hour,' which then shows the time in minutes when the remaining time is less than one hour. When the display shows 'MEMORY FULL,' the measured data is currently being overwritten.
If the sampling mode *is* set as trigger-on (and if the entire data storage memory is used for one event file):
This field displays the remaining time until the memory becomes full; however, no information is displayed while the recorder is waiting for the trigger. When the memory becomes full, data sampling to the memory stops.

l. Waveform span rate
Displayed only during the horizontal display of the trend display. You can set whether or not to display the waveform span rate in the SET mode.

When displaying the processing mode **When displaying the message**



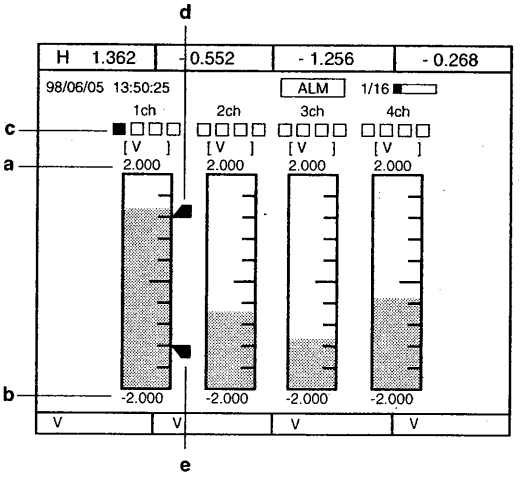
m. Processing Mode Display

Pressing the **DISP** key while the standard screen is displayed switches the processing mode and displays the processing mode at the bottom of the screen.

n. Message Display

Displays operation messages, alarm messages, and error messages for the user during operation.

• Bar graph display



a. Upper limit of scale

Displayed in green when the alarm is reset and red when it is occurring.

b. Lower limit of scale

Displayed in green when the alarm is reset and red when it is occurring.

c. Alarm condition display

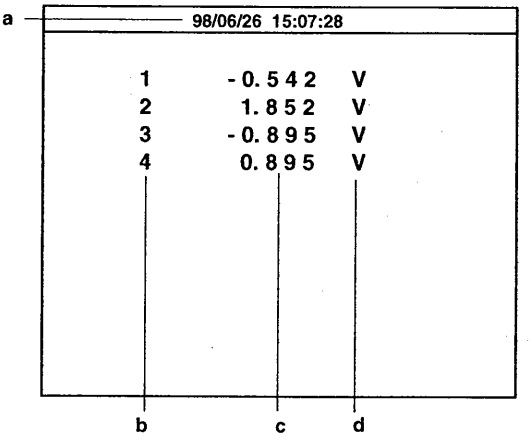
Displays the alarm condition of each alarm level for each channel.

Unfilled rectangle: No alarm setting
Green rectangle: Alarm reset
Red rectangle: Alarm in progress

d. High limit alarm point

e. Low limit alarm point

• Digital value display



a. Date and time

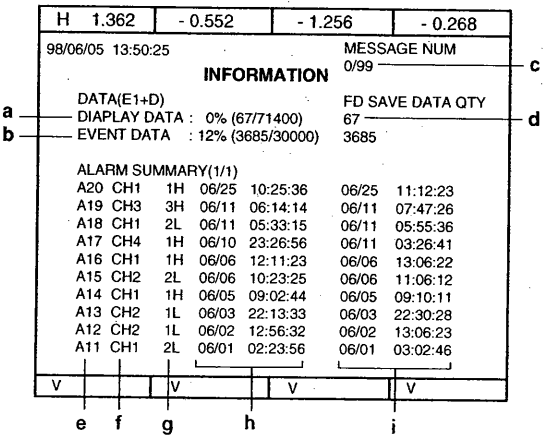
b. Channel number

Displays channel numbers or tags.

c. Measured data
Displayed in red during an alarm.

d. Unit

• Information display
Displays the internal memory condition and the past alarm information.



a. Memory condition of the display data file
After saving to the floppy disk, the number of newly measured data points, the number of data points that can be saved, and the percentages are displayed.

b. Memory condition of the event file
After saving to the floppy disk, the number of newly measured data points, the number of data points that can be saved, and the percentages are displayed.

c. Number of messages
Displays the number of messages that are currently written and the number of messages that can be written.

d. The number of data points to save to the floppy disk.

e. Alarm number
Displayed in order from the oldest alarm occurrence.

f. Channel number

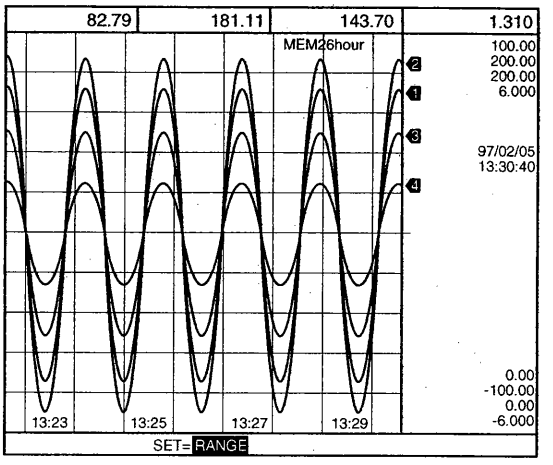
g. Alarm level and alarm type

h. Time of alarm occurrence

i. Time of alarm reset

• List display screen
Displays the setting parameters of the SET mode and SETUP mode. If a SET mode setting is changed on the list display screen, the setting is immediately updated on the list.

1.4.2 Screen in SET Mode



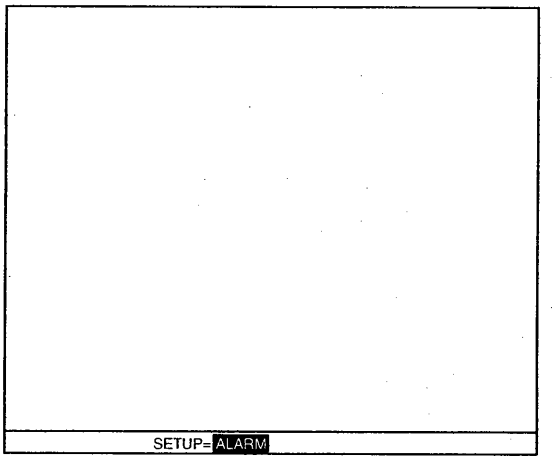
Menu Display

Displays the menus available in the set mode. Warning and error messages for parameter setting are also displayed here.

Note

All display contents other than the bottom field are the same as those in the operation mode.

1.4.3 Screen in the SETUP Mode



Menu Display

Displays the menus available in the setup mode. Warning and error messages for parameter setting are also displayed here.

Note

Except for the bottom field, nothing is displayed on the LCD.

1.5 How to Use the Panel Keys

1.5.1 Keys Used in Operation Mode

The following five keys are used in the operation mode.

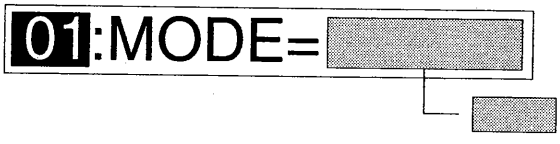
Key	Description in This Manual	Function
MENU	**MENU** key	Changes the mode to SET if this key is kept pressed for three seconds. If 6 channels are defined to be used, pressing this key changes the channels for which the measured values are to be displayed.
ACK	**ACK** key	Used to acknowledge the alarm currently displayed (when the alarm is not recovered: changes from blinking to lit; when already recovered: changes to off). Also resets the alarm output relay (option). This key is valid only when the hold type is selected for the alarm behavior (see Section 3.3).
◄	[←] key	On the normal operation screen, used to switch the standard screen to the past-data reference screen. While displaying the processing mode or operation message, used to select or execute the processing.
►	[→] key	
DISP	**DISP** key	Each time this key is pressed while the standard screen is displayed, the processing mode switches in the sequence of standard, writing of time-axis marks, zooming of time-axis, activation of manual trigger (if the "key-trigger" is set), and then back to standard.

1.5.2 Keys Used in SET and SETUP Modes

SET Menu and Entry Value

The user interface in the SET and SETUP modes is interactive: a menu appears on the bottom of the screen and prompts entry of the necessary data. All data can be entered using the panel keys. If the set value you entered needs another associated parameter to be set, the screen automatically changes to prompt entry of that associated parameter. The display usually consists of two parts:

In this manual, the shaded entry field as shown below denotes that the actual display shows the value you set previously.



The display '*SET OK*' or '*XXX SET*' (XXX is the value you entered) appears when all the necessary parameters have been entered successfully for a menu item and means that settings for that menu item has been completed. The following five panel keys are used for data entry and, in the SET and SETUP mode, the functions pictured on the right of (not "on") the individual keys are valid.

Entry of Alphanumeric Characters

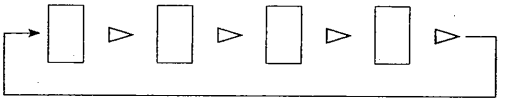
To enter alphanumeric characters, use the **UP/DOWN** ([△]/[▽]) keys. Pressing the [△] key calls up the alphanumeric characters on the entry field in the sequence as shown below and the [▽] key reverses the sequence.

[△]key →

[▽]key ←

A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z	a	b	c	d
e	f	g	h	i	j	k	l	m	n
o	p	q	r	s	t	u	v	w	x
y	z	0	1	2	3	4	5	6	7
8	9	#	%	(	)	+	-	*	/
.	°	μ	Ω	ʊ					

Panel Keys Used

Key	Description in This Manual	Functions
MENU ESC	**ESC** key	Used to abandon the setting before the '*SET OK*' (or '*XXX SET*') display appears. The display will return to the primary level in the menu, 'SET=xxx' or 'SETUP=xxx.'
ACK △	[△] key	Used to move through multiple selections. In the case of setting messages or units for example, these keys are used to select an alphanumeric character in a digit where the entry cursor is located. **UP** calls the next choice, **DOWN** calls the previous choice.
▽	[▽] key	
▷	[▷] key	Used to move the entry cursor to the next digit while entering a value. Since there is no backspace key provided, this key will move to the first digit after the last digit. 
DISP ↵	[↵] key	Used to confirm your highlighted entry. After pressing this key, you will be prompted to enter the next parameters. If there are two values to be set on one display, pressing this key to confirm the first set value then highlights and enables entry of the other parameter.
MENU	**MENU** key	To change the mode back to the operation mode, keep pressing this key for three seconds.

Note

When entering a numeric value, be sure to enter all digits including the decimal point. The entered number is placed at the last digit.

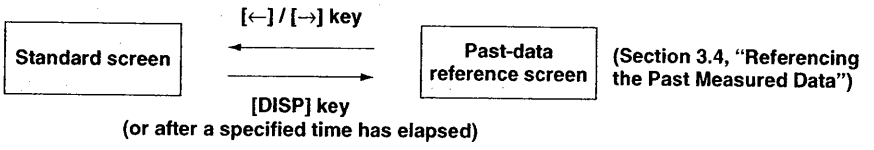
	Value entered	Value identified	
Bad entry:	2.	0.02	(For a fixed decimal point)
Good entry:	2.00	2.00	(For a fixed decimal point)

1.6 Flow of Operation and Setting

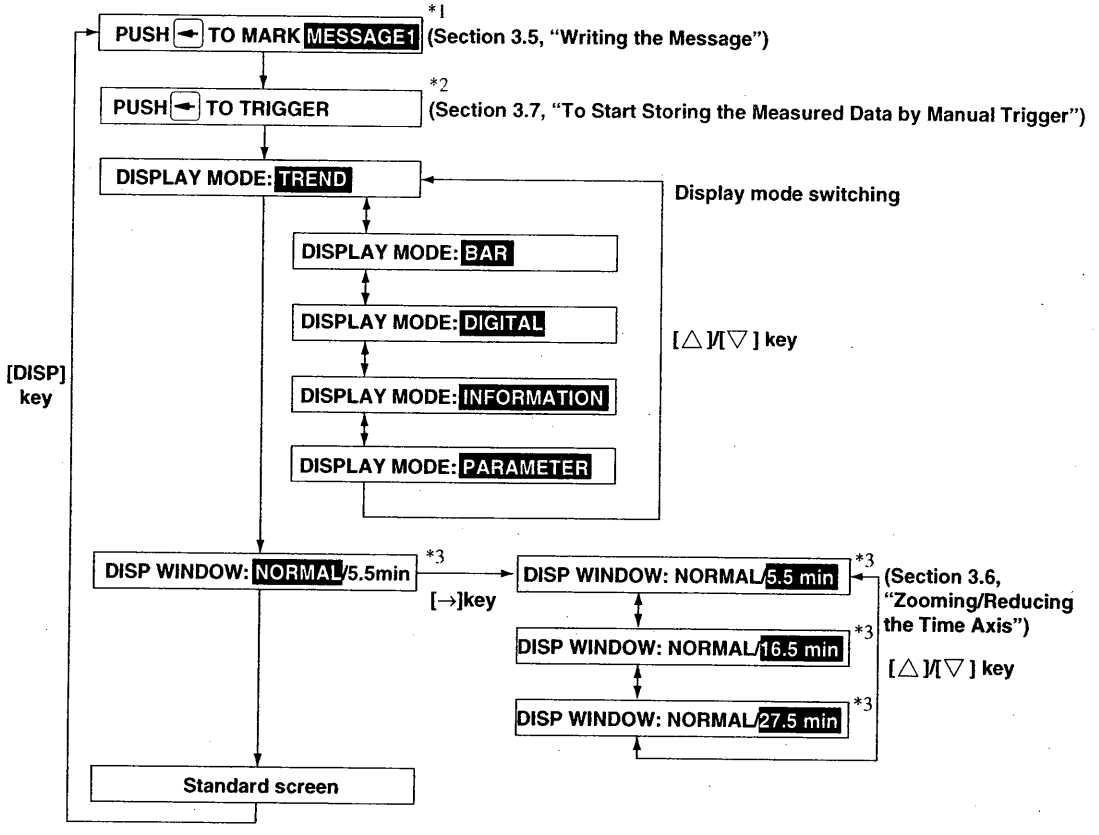
1.6.1 Operation Mode

In the operation mode, the switching between the standard screen and past-data reference screen differs from the other operations. The following shows the flows of these two types of operation.

Screen Switching



Other Operations

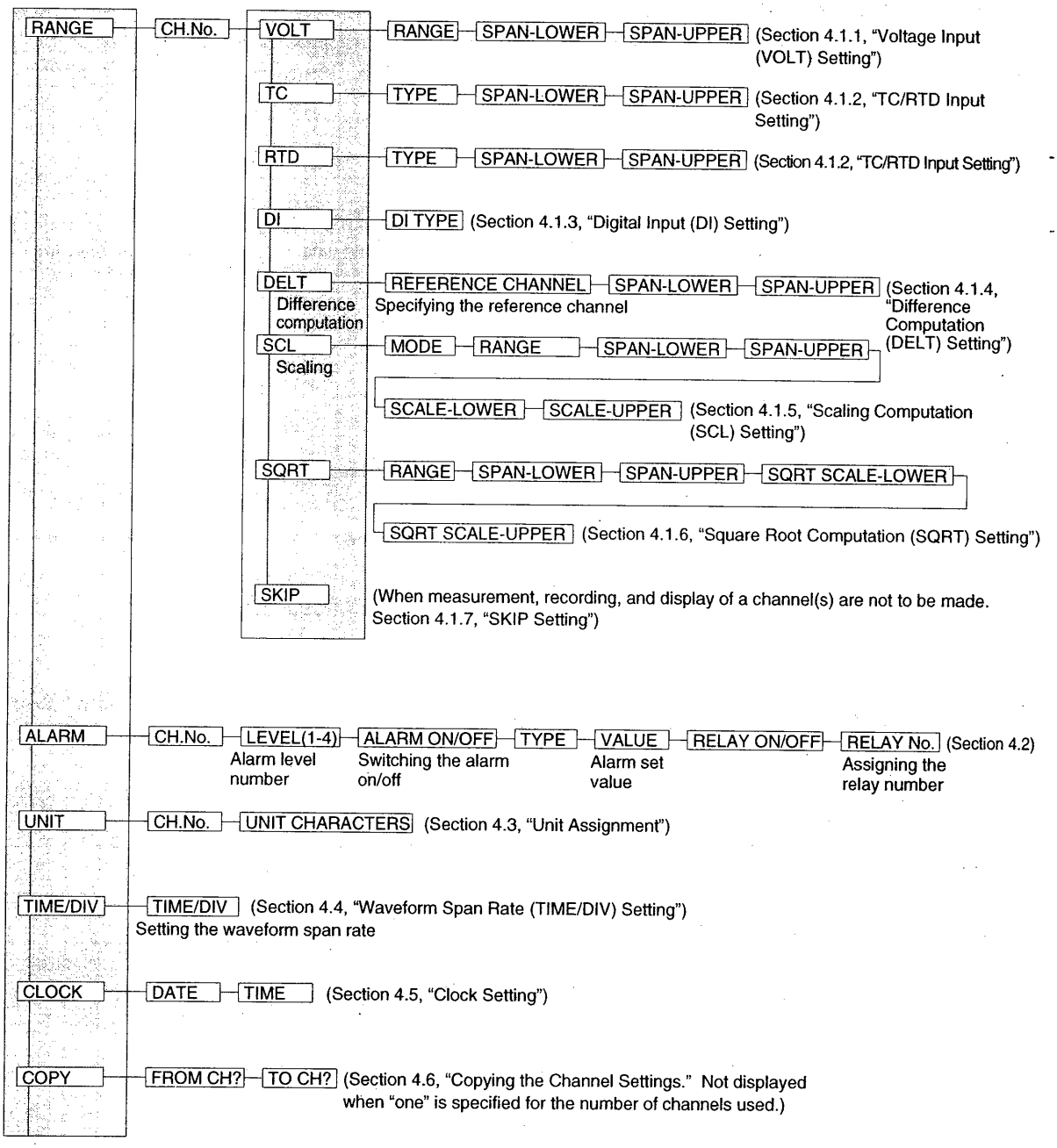


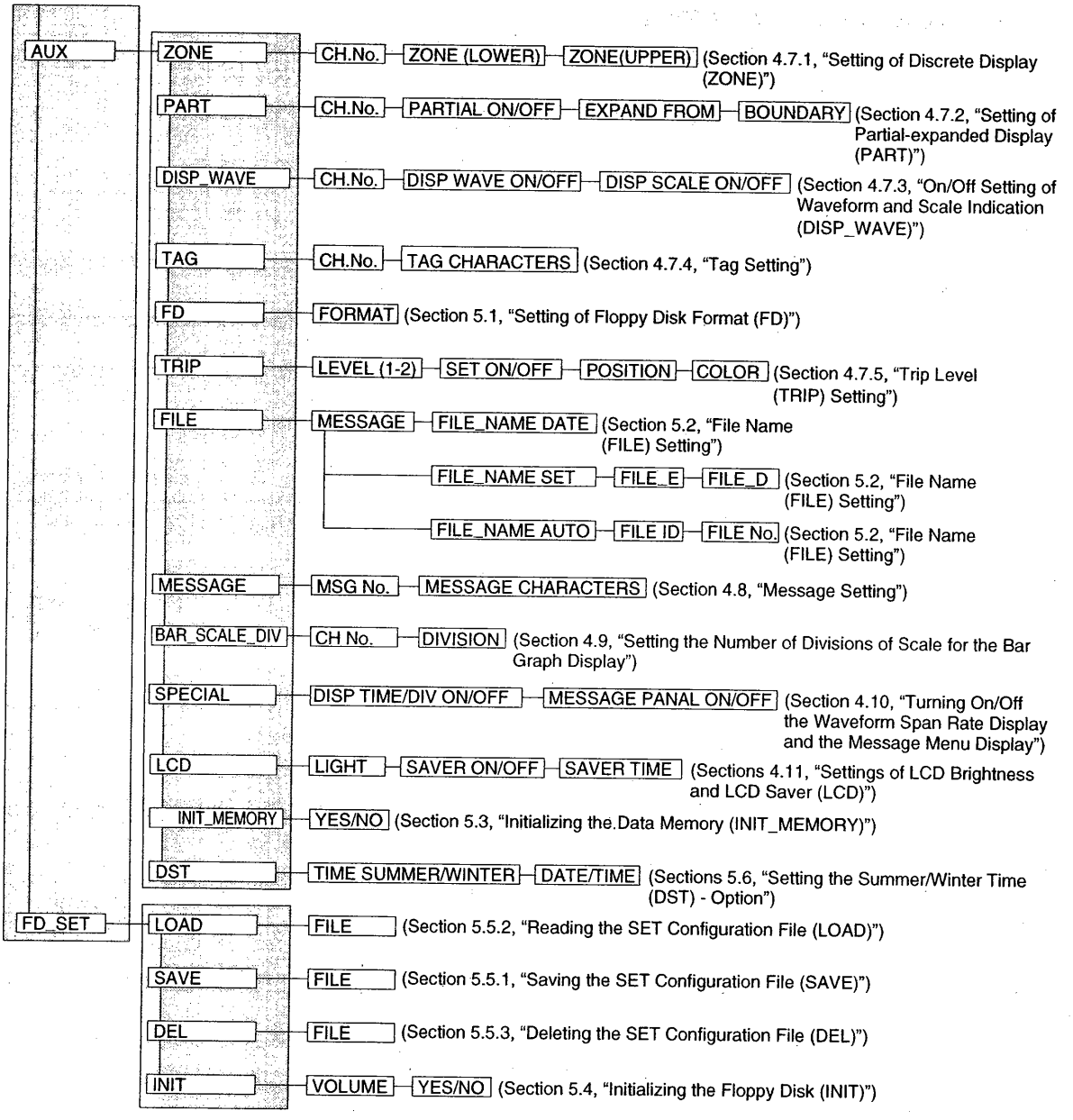
*1: Displayed only when the message menu display (MESSAGE PANEL) is set to ON in the SET mode.
*2: Displayed only when the "key trigger" is set.
*3: Displayed only when the display mode is set to trend.
The example above shows the display sequence of the display span time called up when the direction of the waveform display is set as vertical. If it is set as horizontal, the display sequence is 8, 24, and then 40 minutes.
Fixed to "5.5 minutes" (8 minutes) if the VR200 has the computation function.

If the VR200 has the computation function, "MATH START"/"MATH STOP"/"MATH CLEAR" is displayed after the manual trigger.

1.6.2 Flow Chart of SET Mode

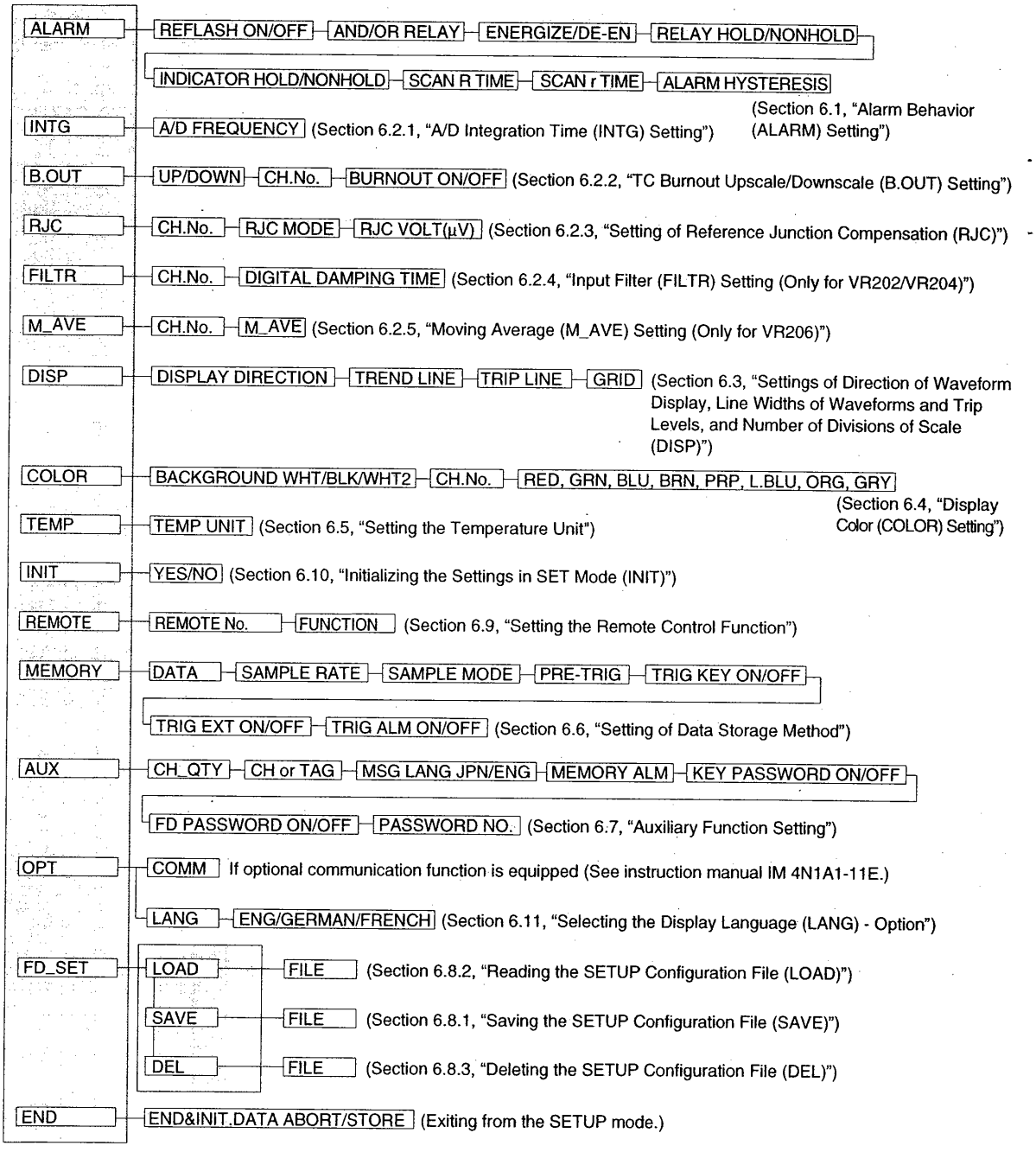
The figure below shows the flow of settings in the SET mode.




AUX
ZONE
CH.No.
ZONE (LOWER)
ZONE(UPPER)
(Section 4.7.1, "Setting of Discrete Display (ZONE)")
PART
CH.No.
PARTIAL ON/OFF
EXPAND FROM
BOUNDARY
(Section 4.7.2, "Setting of Partial-expanded Display (PART)")
DISP_WAVE
CH.No.
DISP WAVE ON/OFF
DISP SCALE ON/OFF
(Section 4.7.3, "On/Off Setting of Waveform and Scale Indication (DISP_WAVE)")
TAG
CH.No.
TAG CHARACTERS
(Section 4.7.4, "Tag Setting")
FD
FORMAT
(Section 5.1, "Setting of Floppy Disk Format (FD)")
TRIP
LEVEL (1-2)
SET ON/OFF
POSITION
COLOR
(Section 4.7.5, "Trip Level (TRIP) Setting")
FILE
MESSAGE
FILE_NAME DATE
(Section 5.2, "File Name (FILE) Setting")
FILE_NAME SET
FILE_E
FILE_D
(Section 5.2, "File Name (FILE) Setting")
FILE_NAME AUTO
FILE ID
FILE No.
(Section 5.2, "File Name (FILE) Setting")
MESSAGE
MSG No.
MESSAGE CHARACTERS
(Section 4.8, "Message Setting")
BAR_SCALE_DIV
CH No.
DIVISION
(Section 4.9, "Setting the Number of Divisions of Scale for the Bar Graph Display")
SPECIAL
DISP TIME/DIV ON/OFF
MESSAGE PANAL ON/OFF
(Section 4.10, "Turning On/Off the Waveform Span Rate Display and the Message Menu Display")
LCD
LIGHT
SAVER ON/OFF
SAVER TIME
(Sections 4.11, "Settings of LCD Brightness and LCD Saver (LCD)")
INIT_MEMORY
YES/NO
(Section 5.3, "Initializing the Data Memory (INIT_MEMORY)")
DST
TIME SUMMER/WINTER
DATE/TIME
(Sections 5.6, "Setting the Summer/Winter Time (DST) - Option")
FD_SET
LOAD
FILE
(Section 5.5.2, "Reading the SET Configuration File (LOAD)")
SAVE
FILE
(Section 5.5.1, "Saving the SET Configuration File (SAVE)")
DEL
FILE
(Section 5.5.3, "Deleting the SET Configuration File (DEL)")
INIT
VOLUME
YES/NO
(Section 5.4, "Initializing the Floppy Disk (INIT)")

1.6.3 Flow Chart of SETUP Mode

The figure below shows the flow of settings in the SETUP mode.



Chapter 2 BEFORE OPERATION

2.1 Precautions

Read these precautions before using this recorder and the floppy disk.

2.1.1 Handling Precautions

Cleaning
This recorder contains many plastic parts. To clean, use a soft, dry cloth. Do not use chemicals such as benzene or thinner, since these may cause discoloration or damage.

Static electricity
Do not bring any object charged with static electricity near the signal terminals. This may cause malfunction.

Insecticide sprays, rubber, vinyl, etc.
Do not allow any volatile substances such as insecticides, etc. to come in contact with the LCD panel, panel keys, etc. Do not allow rubber or vinyl to remain in contact with the recorder for long periods.

After use
Ensure that the power switch is turned to the OFF position.

In case of malfunction
Never continue to use the instrument if there are any symptoms of malfunction such as unusual sounds, smell, or smoke coming from the instrument. Immediately disconnect the power supply and stop using the instrument. If such abnormal symptoms persist, contact your sales representative or nearest service center (see the list on the rear cover).

2.1.2 Cautions When Handling the Floppy Disk

After saving
Be sure to eject the floppy disk after saving the measured data in the operation mode.

Powering on/off
Do not power on or off the recorder while a floppy disk is inserted.

Access lamp
Do not eject the floppy disk while the access lamp is lit, since this may destroy the data on the disk.

Write-protection
Files cannot be saved to or deleted from a write-protected floppy disk, nor can the disk be initialized.

General handling precaution
For other general precautions, follow the instructions given with the floppy disks you use.

2.2 Installation

This section describes how to install the recorder including the location and mounting of it. Read this section before installing the recorder.

2.2.1 Installation Location

Install the recorder in a location which meets the following conditions. See also Section 9.6, "General Specifications," which describes the required operating environment.

Instrument panel/rack
This recorder is designed for panel or rack mounting.

Ventilation
The recorder should be placed in a well ventilated area to prevent the internal temperature rising.

Minimum vibrations
Choose an installation location with minimal mechanical vibration.

Horizontal
The recorder should be installed horizontally (however, mounting may be inclined up to 30° backwards from the vertical).

AVOID:

Direct sunlight, near a heater
The recorder will be adversely affected if exposed to direct sunlight or installed near a heater. Choose a location near room temperature (23°C) with minimal temperature fluctuations.

Soot, steam, moisture, dust, corrosive gases, etc.
Exposing the recorder to soot, steam, moisture, dust, corrosive gases, etc. will adversely affect it. Avoid such locations.

Near electromagnetic objects
Using the recorder in a strong electromagnetic field may cause errors in reading. Avoid installing it near electromagnetic objects or bringing such objects near the recorder.

Bad angle for viewing screen
The display unit of the recorder is a 5.5-inch TFT color LCD, which may not be clearly visible if viewed from a steep angle. Install the recorder in a location where the panel can be viewed from directly in front of it.

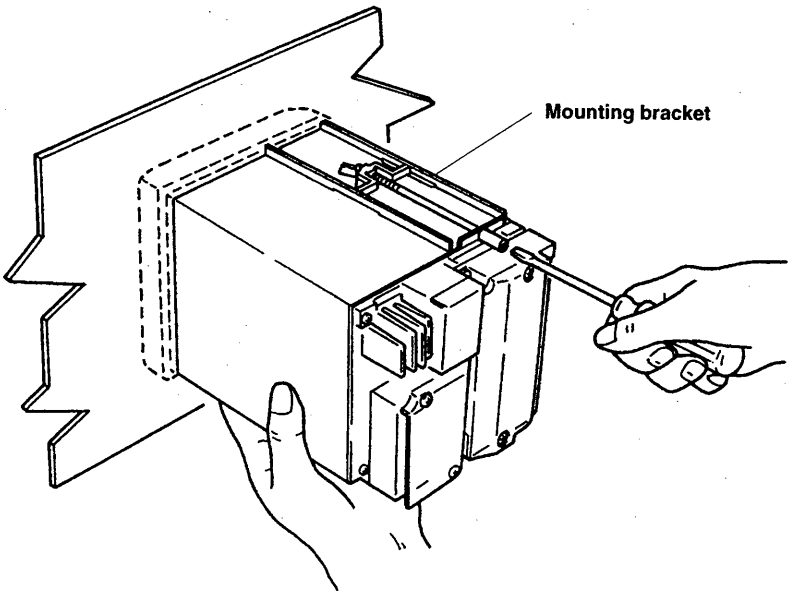
2.2.2 Mounting

The recorder should be mounted on a steel panel from 2 to 26 mm thick.

1 Insert the recorder into the panel cutout.
2 Use the mounting brackets supplied with the recorder to mount it on the panel, as shown in the following figure.
   - Use the mounting brackets to support the top and bottom of the recorder or both sides. (If still in place, remove the seals covering the holes for the mounting brackets.)
   - The proper tightening torque for the mounting screw is 0.8 to 1.2 Nm (8 to 12 kg•cm).

CAUTION Tightening at a greater torque may deform the case or damage the bracket.

Mounting



For details of the panel cutout and external dimensions, see Section 9.7, "External Dimensions."

2.3 Input Signal Wiring ⚠

This section describes the wiring for the input signals. Read this section before wiring the input signals cables.

CAUTION

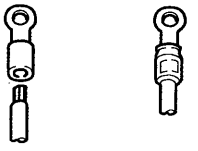
If a large tensile force is applied to the cable connected to the recorder, it may damage the terminal of the recorder and/or cable. Make sure to fasten the wiring cables at the rear wall of the mounting panel and use something to prevent excessive strain between the rear wall and the terminals of the recorder.

2.3.1 Input Signal Wiring ⚠

Wiring Precautions

Be sure to follow the instructions below when wiring the input signal cables.

It is recommended to use "crimp on" lugs (for 4 mm screws) with insulation sleeves for the leadwire ends. However, this does not apply for the optional clamped terminals (suffix code /H2).



Crimp-on Lug

Since the input terminal is affected by changes in temperature (e.g. due to wind), always replace the transparent cover after wiring.
Even after replacing the cover, take care not to expose the terminals to fans, etc.
Suggestions for minimizing noise pickup:

- The measuring circuit wiring should be run as far as possible away from the power and ground wires.
- Shielded wires should be used to minimize noise pickup from electrostatic induction sources. The shielding wire of the cable should be connected to the ground terminal of the recorder (only one ground line).
- To minimize noise from an electromagnetic induction source, twist the measuring line cables at short, equal intervals.
- The measured object should be free from noise. However, if it isn't, make sure that the measuring circuit is isolated and that the measured object is grounded.

If TC and RJC are used, the temperature of the input terminals should be as stable as possible. Therefore, always use the transparent cover. The thermal capacity of the wiring should be small (recommended dia. ≤ 0.3 mm).
Try not to wire the input parallel, but if you do wire it parallel, then

- do not use the burnout upscale/downscale function (see Section 6.2.2);
- ground the instruments at the same point;
- turning ON/OFF the power may cause malfunction; and
- RTD cannot be wired parallel.

WARNING

To prevent electric shock, ensure the main power supply is turned OFF and connect the ground terminal using a class 3 resistance of 100Ω or less.

CAUTION

If you have an input of DC ≤ 2 V or a TC, do not apply an input voltage exceeding ±10 V DC.
If you have an input of 6 to 20 V DC, do not apply an input voltage exceeding ±30 V DC.
Do not apply a maximum common-mode noise voltage of more than 250 Vrms AC (50/60 Hz), since the recorder and measured values will be adversely affected.
This instrument complies with Installation Category II.

Note

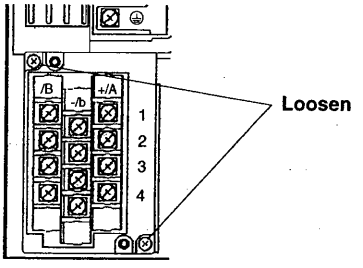
To prevent the generation of electromagnetic disturbances, separate the input wires from the other wires by at least 0.1 m, and preferably by more than 0.5 m.

Wiring Procedure

1 Make sure the power switch is turned OFF and remove the transparent cover of the input terminals.
2 Connect the input signal wires to the input terminal.
3 Replace the transparent terminal cover.

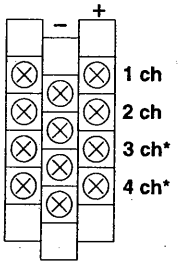
Note

The terminal block itself can be removed by loosening the two screws at the top left and bottom right of the block. This makes the wiring work easier. To avoid a contact failure, make sure to tighten the terminal-block fixing screws after wiring.

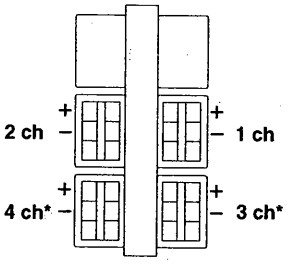


VR202/VR204 Terminal Arrangements

For DC Voltage, DC A (Current), TC, and DI Inputs

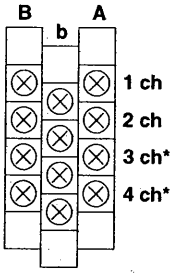


Standard Input Terminals

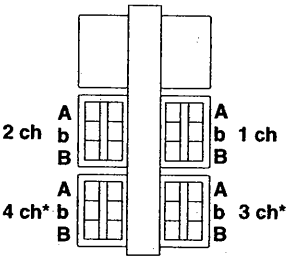


Clamped Input Terminals (/H2 option)
(Max. wiring cable dia. ≤ 2.5 mm)

For RTD Input



Standard Input Terminals

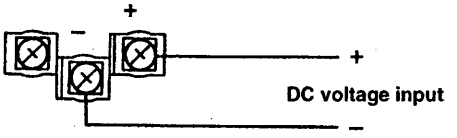


Clamped Input Terminals (/H2 option)
(Max. wiring dia. ≤ 2.5 mm)

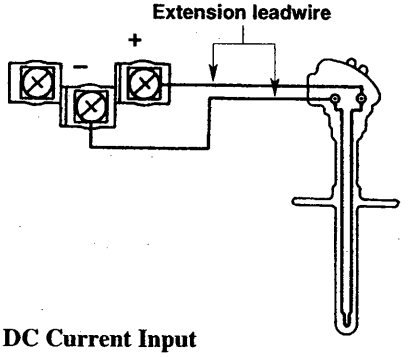
*:Only for VR204

Wiring Diagram

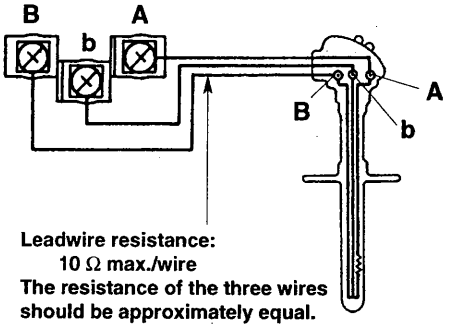
DC Voltage and DI (Contact) Input



Thermocouple Input

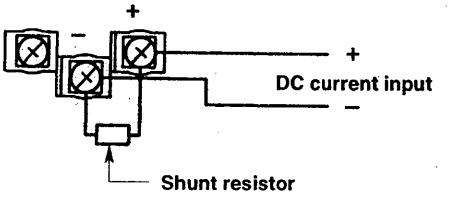


Resistance Temperature Detector Input



Leadwire resistance:
10 Ω max./wire
The resistance of the three wires should be approximately equal.

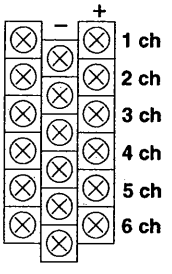
DC Current Input



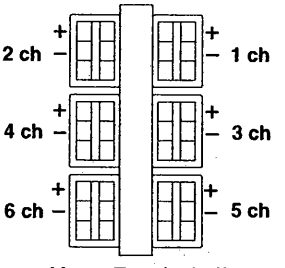
NOTE: For a 4 to 20 mA input, use a shunt resistor of 250 Ω ±0.1%.

VR206 Terminal Arrangements

For DC Voltage, DC A (Current), TC, and DI Inputs

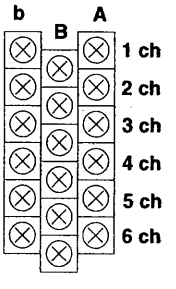


Standard Input Terminals

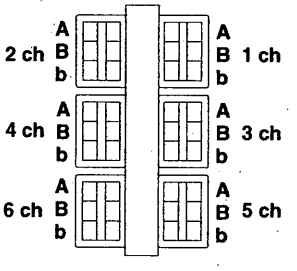


Clamped Input Terminals (/H2 option)
(Max. wiring cable dia. ≤ 2.5 mm)

For RTD Input



Standard Input Terminals



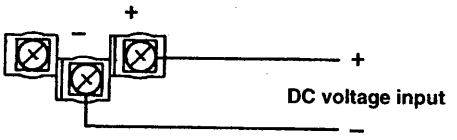
Clamped Input Terminals (/H2 option)
(Max. wiring cable dia. ≤ 2.5 mm)

Note

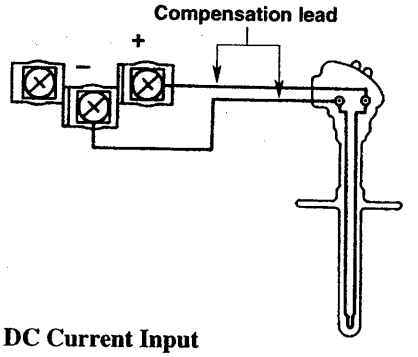
Terminals b's for all RTD input channels are short-circuited inside the recorder.

Wiring Diagram

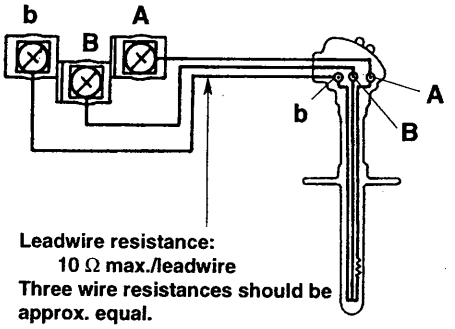
DC Voltage Input/DI Input (Contact)



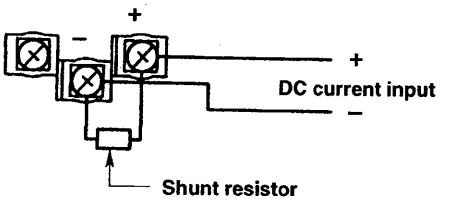
Thermocouple Input



Resistance Temperature Detector Input



DC Current Input



NOTE: For 4 to 20 mA input, shunt resistance value should be 250 Ω ±0.1%.

2.3.2 Alarm Output Wiring ⚠

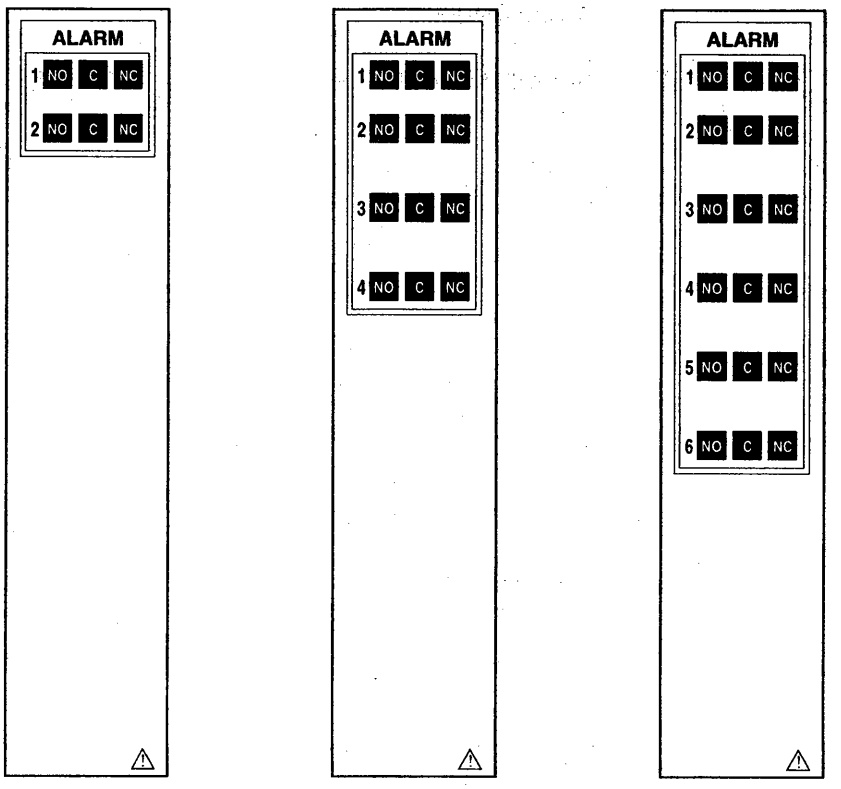
WARNING

To prevent electric shock, ensure the main power supply is turned OFF during wiring and ensure the ground terminal is connected using a class 3 resistance of 100Ω or less.

Use ring-tongue "crimp-on" lugs with insulation sleeves for all connections if a voltage of more than 30 V AC or 60 V DC is applied to the alarm output, to prevent the wire from slipping off even when the screw is loosened. Furthermore, use double-insulated wires (withstand voltage performance: more than 2300 V AC) for those wires which apply 30 VAC or 60 V DC. All other wires can be basic-insulated (withstand voltage performance: more than 1350 V AC). To prevent electric shock, do not touch the terminal after wiring and make sure to re-attach the cover.

Wiring Procedure

1 Make sure the power switch is turned OFF and remove the transparent cover of the option terminals.
2 Connect the alarm output wires to the option terminal. Do NOT change the location of the terminal block!
Depending on your option, your alarm output terminal will be arranged like one of the following:

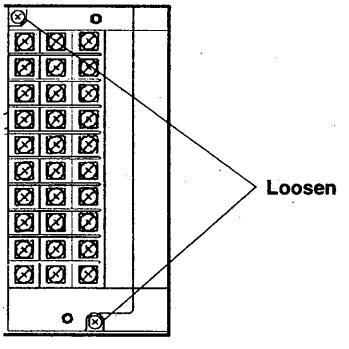


Option /A1 (2-contact outputs) **Option /A2 (4-contact outputs)** **Option /A3 (6-contact outputs)**

3 Replace the transparent terminal cover.

Note

- The terminal block itself can be removed by loosening the two screws at the top left and bottom right of the block. This makes the wiring work easier. To avoid a contact failure, make sure to tighten the terminal-block fixing screws after wiring.



- To prevent the generation of electromagnetic disturbances, separate the alarm output wires from the power supply and input wires by at least 0.1 m, and preferably by more than 0.5 m.

Contact Specifications

Item	Specification
Output type	Relay transfer contact (energized/de-energized when alarm switchable)
Output capacity	250 V AC (50 or 60 Hz), 3A 250 V DC, 0.1 A (resistive load)
Dielectric strength	1500 V AC (50 or 60 Hz) for one minute between output terminals and ground terminal

For details of the alarm behavior settings such as switch-over between energized and de-energized when an alarm occurs, see Section 6.1, "Alarm Behavior (ALARM) Setting."

2.3.3 FAIL/Memory End Wiring ⚠

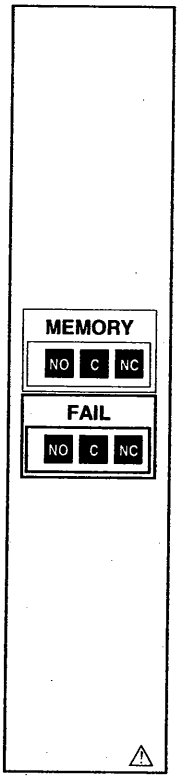
WARNING

To prevent electric shock, ensure the main power supply is turned OFF during wiring and ensure the ground terminal is connected using a class 3 resistance of 100 Ω or less.

Use ring-tongue "crimp-on" lugs with insulation sleeves for all connections if a voltage of more than 30 V AC or 60 V DC is applied to the fail/memory end output, to prevent the wire from slipping off even when the screw is loosened. Furthermore, use double-insulated wires (withstand voltage performance: more than 2300 V AC) for those wires which apply 30 V AC or 60 V DC . All other wires can be basic-insulated (withstand voltage performance: more than 1350 V AC). To prevent electric shock, do not touch the terminal after wiring and make sure to re-attach the cover.

Wiring Procedure

1 Make sure the power switch is turned OFF and remove the transparent cover of the option terminals.
2 Connect the FAIL/Memory End output wires to the option terminals.
The FAIL/Memory End terminals (option) are arranged as follows:



3 Replace the transparent terminal cover.

Note

- The terminal block itself can be removed by loosening the two screws at the top left and bottom right of the block. This makes the wiring work easier. To avoid a contact failure, make sure to tighten the terminal-block fixing screws after wiring.
- To prevent the generation of electromagnetic disturbances, separate the FAIL/Memory end wires from the power supply and input wires by at least 0.1 m, and preferably by more than 0.5 m.
- The FAIL output relay is of the de-energize type (de-energized at occurrence).
- The Memory End output relay is of the energize type.

For the FAIL/Memory End output, see also Section 3.7, "Confirming the Fail/Memory End."

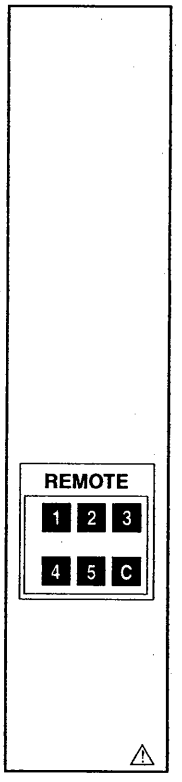
2.3.4 Remote Control Wiring

WARNING To prevent electric shock, ensure the main power supply is turned OFF during wiring and ensure the ground terminal is connected using a class 3 resistance of 100 Ω or less.

Wiring Procedure

1 Make sure the power switch is turned OFF and remove the transparent cover at the rear of the recorder.
2 Connect the REMOTE output wires to the REMOTE output terminal. Make sure to connect every signal with the common terminal. Use shielded wires to prevent electromagnetic interference.

The remote control terminal (option) is arranged as follows:



3 Replace the transparent cover.

Note

- The terminal block itself can be removed by loosening the two screws at the top left and bottom right of the block. This makes the wiring work easier. To avoid a contact failure, make sure to tighten the terminal-block fixing screws after wiring.
- Use shielded wires to prevent electromagnetic interference. The outer conductor must be grounded at the ground terminal of the recorder.
- To prevent the generation of electromagnetic disturbances, separate the Remote Control wires from the power supply and input wires by at least 0.1 m, and preferably by more than 0.5 m.

Input Specifications

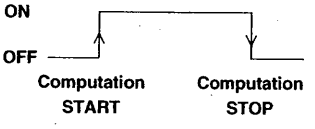
Item	Specification
Input signals	Voltage-free (dry) contact or open-collector (TTL or transistor)
Input conditions	ON voltage: 0.5 V maximum (30 mA DC) Leakage current in OFF state: 0.25 mA maximum Signal duration: 250 ms minimum
Input type	Photocoupler isolation (one side common) Internal isolated power source (5V ±5%)
Dielectric strength	500 VDC for one minute between input terminals and ground terminal

Input Types for Individual Functions

<table>
<tr><th>Function</th><th>Input Type</th></tr>
<tr><td>Writing of time-axis mark - writes a time-axis mark on the display and file.</td><td rowspan="3">Trigger (250 ms or longer duration): energized when on</td></tr>
<tr><td>External trigger - inputs the external trigger signal to start storing data in the event file.</td></tr>
<tr><td>Time adjustment - depending on the time when the trigger is raised, corrects the internal clock as follows.
<table>
<tr><th>Time of Trigger-on</th><th>Processing</th></tr>
<tr><td>hh:00:00 to hh:01:59</td><td>Cut off readings of less than one minute. E.g., 10:01:50 is corrected as 10:00:00.</td></tr>
<tr><td>hh:58:00 to hh:59:59</td><td>Round up readings of less than one minute. E.g., 10:59:50 is corrected as 11:00:00.</td></tr>
<tr><td>hh:02:00 to hh:57:59</td><td>No processing is to be performed.</td></tr>
</table></td></tr>
<tr><td>Computation start/stop (when the VR has the /M1 and /M2 option)</td><td>See figure below</td></tr>
<tr><td>Computation clear (when the VR has the /M1 and /M2 option)</td><td rowspan="2">Trigger (250 ms or longer duration): energized when on</td></tr>
<tr><td>Message 1
to
Message 5
Writes the preset messages, and displays marks.</td></tr>
</table>

The five types of controls shown above are assigned arbitrarily to the remote control terminals. (See section 6.9 "Setting the Remote Control Functions")

The relationship between the computation start/stop and the input.



2.4 Power Supply Wiring ⚠

This section describes how to connect the power supply cable. Read this section before wiring the power supply cables.

Precautions for Power Supply Wiring

To prevent electric shock and damage to the recorder, note the following warnings.

WARNING

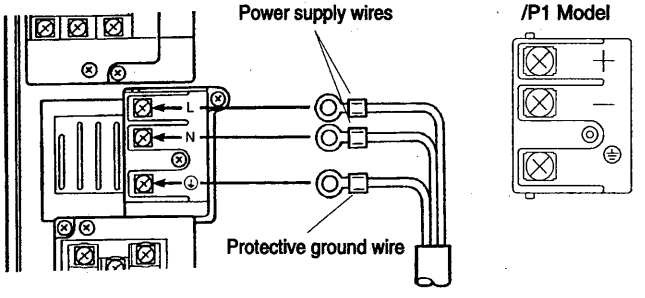
To prevent electric shock, ensure the main power supply is turned OFF and connect the ground terminal using a class 3 resistance of 100 Ω or less.
For power and ground wiring termination, use "crimp on" lugs (for 4 mm screws) with insulation sleeves (see Section 2.3.1).
To prevent fire, use 600 V PVC insulated wire (AWG18) for power and ground wiring (cross sectional area of 0.83 mm^2 or more, anti-galvanic corrosion finish, insulation thickness should be more than 0.8 mm, and insulation resistance should be more than 50 MΩKm at 20°C, approved EN60 320 (VDE0625)).
To prevent electric shock, attach the transparent terminal cover when the power is on.
Make sure to provide a power switch on the power supply line having the following specifications:

Except for /P1 model	**/P1 model**
Rated power current > 1 A	Rated power current > 3 A
Rated rush current > 60 A	Rated rush current > 70 A

Also provide fuse(s) of 2 to 15 A on the power supply line.
The power switch and fuse used on the power supply line should be
- CSA approved (for use in North America) or
- VDE approved (for use in Europe).

Wiring Procedures

1 Make sure the power switch is turned OFF and remove the transparent cover of the power supply terminals.
2 Connect the power supply wires and the protective ground wire to the power terminals and the ground terminals as shown in the figure below.



3 Replace the transparent terminal cover.

Note

- Avoid using a power supply of 132 to 180 V AC, since this may affect the measuring accuracy.
- To prevent the generation of electromagnetic disturbances, separate the power supply wires from the other wires by at least 0.1 m, and preferably by more than 0.5 m.

CAUTION

If a large tensile force is applied to the cable connected to the recorder, it may damage the terminal of the recorder and/or cable. Make sure to fasten the wiring cables at the rear wall of the mounting panel and use something to prevent excessive strain between the rear wall and the terminals of the recorder.

• For Desk-top Model

Precautions When Plugging in Power Cable

To prevent electric shock and damage to the recorder, note the following warnings.

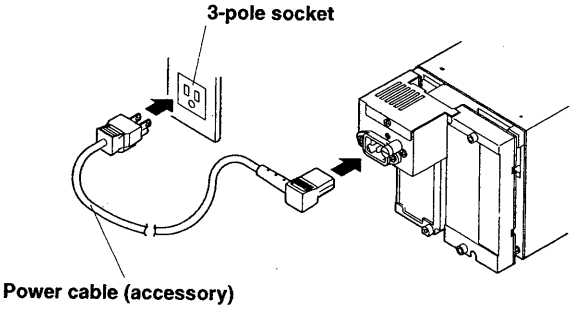
WARNING

Confirm that the supply voltage meets the rated power supply voltage of the Desi-top Model before connecting the cable.
To prevent electric shock, ensure the power switch of the Desi-top Model is turned OFF and connect the ground terminal using a class 3 resistance of 100 or less.
For the power cable be sure to use ones provided by Yokogawa to prevent fire and electric shock.
To prevent electric shock, be sure to connect the protective grounding. Connect the power cable, of the Desi-top Model to a 3-pole power socket with a protective grounding pole.
Do not use an extension cable without the protective grounding wire, since this invalidates the protection.

Connection Procedures

1 Make sure the power switch of the recorder is turned OFF.
2 Connect the power cable (supplied with the recorder) to the power connector on the rear panel of the recorder.
3 Connect the other side of the power cable to a power socket which meets the following requirements. The socket should be a 3-pole power socket with a protective grounding pole.

- Rated power supply voltage
  Except for /P1 model: 100 to 120 V AC or 200 to 240 V AC
  /P1 model: 24 V DC
- Allowable fluctuation of power supply voltage
  Except for /P1 model: 90 to 132 V AC or 180 to 250 V AC
  /P1 model: 21.6 to 26.4 V DC
- Rated power supply frequency: 50/60 Hz
- Allowable frequency range: 48 to 63 Hz
- Maximum power consumption: 60 VA (100 V AC)
  70 VA (200 V AC)
  50 VA (24 V DC, /P1)



Chapter 3 DAILY OPERATIONS (OPERATIONS IN OPERATION MODE)

3.1 Turning On/Off the Power Switch

This section describes how to turn on and off the power. Read this section before turning the power on or off.

CAUTION

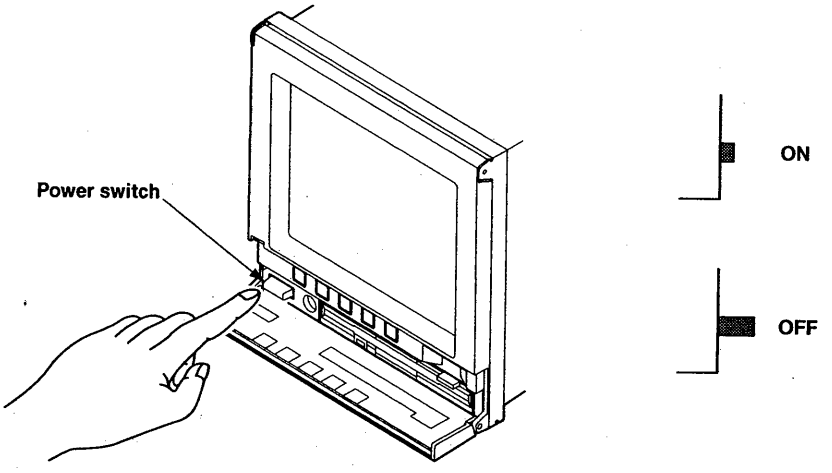
- Do not leave the floppy disk inserted when turning the power on or off.
- If the input signal is connected in parallel with another instrument, avoid turning on/off either the recorder or that instrument while one is being operating, since this may affect the reading.

Location of Power Switch

The power switch is located at the bottom behind the operation panel cover.

Turning On/Off the Power Switch

The power switch is an alternate pushbutton. Pressing it once turns on the power and pressing it again turns the power off (see the figure below).



Turning on the power runs the self-diagnostic function, which runs for opproximately ten seconds. The standard screen in the operation mode then appears on the LCD.

Note

- The warm-up time of the recorder is thirty minutes; however, it may take longer the first time after wiring.
- If an error message appears at the bottom of the screen, take action according to Section 8.1, "Error Messages."

3.2 Saving the Measured Data on Floppy Disk

This section describes how to save the measured data on a floppy disk. Read this section before inserting or ejecting a floppy disk and saving the measured data.

CAUTION

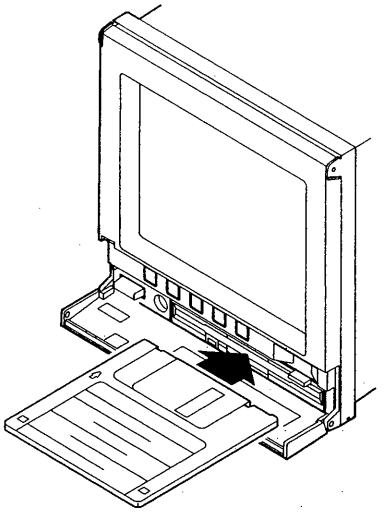
- Always eject the floppy disk after saving the measured data on it. Leaving the disk in the drive may damage the recorder.
- The measured data cannot be saved on a write-protected disk. Use another disk or release the write-protection.

Automatic Saving

Simply inserting a floppy disk into the drive while the standard screen in the operation mode is displayed starts saving the internal memory data on the floppy disk automatically. While any other screen is displayed, this does not occur. In this case, the saving starts when the screen is switched to the standard screen.

Inserting the floppy disk (to save the measured data)

1 Open the operation panel cover.
2 Insert a floppy disk into the drive until it clicks.
3 If the password is specified as required when saving measured-data, enter the password.



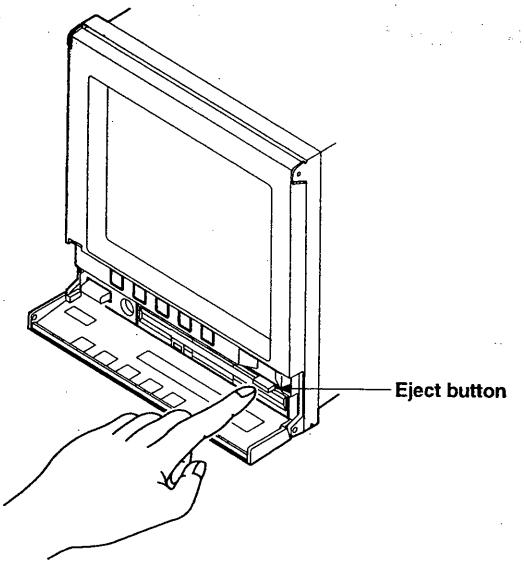
The access lamp then lights and the message 'SAVING DATA...' appears at the bottom of the screen. Saving the measured data takes approximately two minutes. If the VR has the /E4 (large memory) option, a message appears prompting you to insert the next floppy disk. Insert another floppy disk according to the message. When the saving completes, the message 'DATA SAVING DONE' appears. If any other message appears, see "When a Message Appears" later on in this section.

CAUTION

Do not eject the floppy disk while the access lamp is lit. This may destroy the data.

Ejecting the floppy disk (to complete the data saving)

1 Confirm that the message 'DATA SAVING DONE' is displayed at the bottom of the screen.
2 Press the eject button.



The floppy disk is then ejected and the message 'DATA SAVING DONE' disappears. This completes the saving of the measured data.

Note

- Regardless of the operation on the floppy disk, the measured data are continuously stored in the internal memory, and if a trigger is set, then storing of the measured data starts when the trigger is raised. The capacity of the data stored in the internal memory varies depending on the configuration of the memory. (For details of the capacity of the data storage, see Section 6.4, "Setting of Data Storage Method.")
- When the key trigger (trigger-on or trigger-rotation) is set, saving the data on floppy disk clears the event files in the internal memory.
- After the display data file becomes full, the data are overwritten. If the optional Memory End output is installed, the relay contact alerts the end of memory at the preset time before it becomes full.
- On the VR with the /E4 (large memory) option, three to four floppy disks are needed.

When a Message Appears

The following messages may appear on the screen when you insert a floppy disk. In such cases, follow the guidance given by the message.

Operation Message

When inserting a floppy disk which is not formatted:

PUSH [←] TO FORMAT FD

1 To format the floppy disk, press the [←] key.
The floppy disk is then formatted and the data saving starts.
2 To avoid formatting the floppy disk, press a key other than the [←] key.
The message 'DATA SAVING ABORTED' appears. Eject the floppy disk.

When a file having the same file name already exists in the floppy disk:

PUSH [←] TO OVERWRITE

1 To overwrite the file, press the [←] key.
The file is then overwritten.
2 To avoid overwriting the file, press a key other than the [←] key.
The message 'DATA SAVING ABORTED' appears. Eject the floppy disk.

Error Message

If a wrong operation is performed, an error message appears such as the example message shown below.

E202:FD WRITE PROTECTED

1 Eject the floppy disk. The message then disappears.
2 Clear the cause of the error and perform the operation properly.

For details of troubleshooting for error messages, see Section 8.1, "Error Messages."

3.3 Resetting an Alarm Output

Alarm Behavior

Digital Indication

When an alarm occurs on a channel, the digital indication for that channel on the screen changes color from white to yellow, and a character which represents the alarm status (as shown below) is displayed at the head of the digital indication.

H: high limit alarm	L: low limit alarm
h: differential high limit alarm	l: differential low limit alarm
R: high rate-of-change limit alarm	r: low rate-of-change limit alarm

"ALM" Indications and Alarm Relays

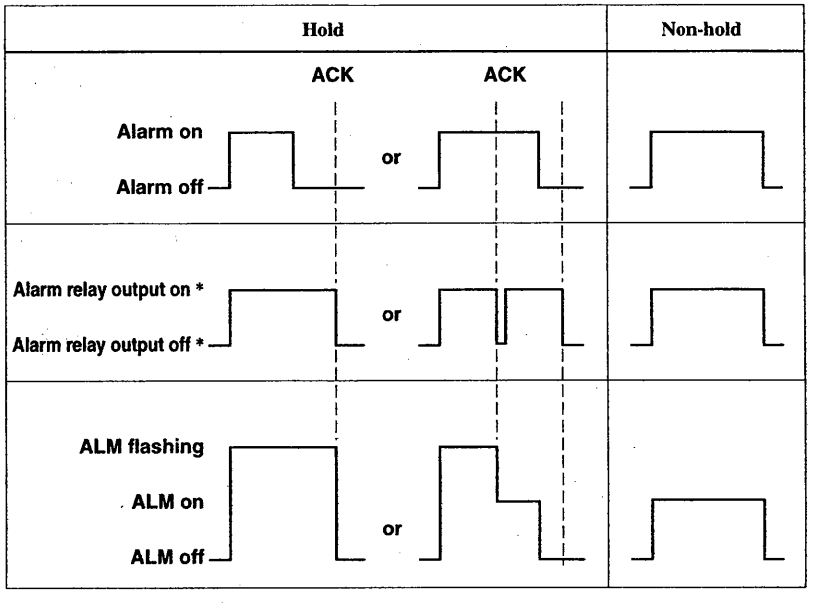
When an alarm occurs, the alarm output relay (optional) and the **ALM** indication behaves as shown in the table below.

Alarm Type	Alarm Behavior *2		
Non-hold Type *1	Upon occurrence of alarm	Alarm output relay:	on
		ALM indication:	lit
	Recovery of alarm	Alarm output relay:	off
		ALM indication:	off
Hold type	Upon occurrence of alarm	Alarm output relay:	on
		ALM indication:	flashing (stopped and lit by pressing the **ACK** key.)
	Recovery of alarm	Alarm output relay:	kept on (reset by pressing the **ACK** key.)
		ALM indication:	kept flashing (stopped and light goes off by pressing the **ACK** key.)

*1 When the non-hold type is selected, the **ACK** key is not effective.
*2 The behavior of the alarm output relay shown in this table is for a normally-opened terminal. The behavior of a normally-closed terminal is the reverse.

For details on selecting non-hold/hold type, see Section 6.1, "Alarm Behavior (ALARM) Setting."

The time chart below shows the relation between the behaviors of the alarm output relay and **ALM** indication.



* For a normally-opened terminal. The behavior of a normally-closed terminal is the reverse.

Resetting the Alarm Output

When the hold type is selected for the alarm behavior, pressing the **ACK** key resets the **ALM** indication and alarm output if the alarm status is recovered. For details on how the **ACK** key operates on the **ALM** indication and alarm output, see the time chart on the preceding page.

Note

The alarm information is written in the internal memory when an alarm occurs. Up to the fifty most recent sets of alarm information are stored.

For details on the alarm information, see Appendix 2, "Data Formats of Parameter List File and Information File."

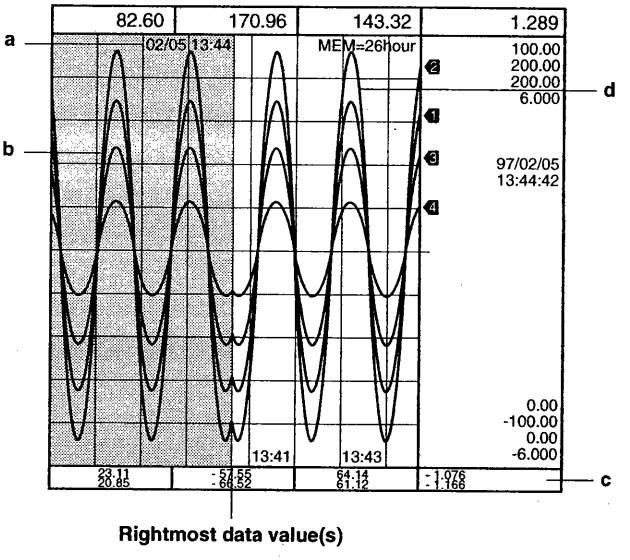
3.4 Referencing the Past Measured Data (Historical Trend)

The past measured data stored in the internal memory can be viewed together with the current waveforms.

Screen Switching

1 Press the [←] or [→] key.
The past-data reference screen is displayed.
2 Any of the following brings back the standard screen.
- When the **DISP** key is pressed while the past-data reference screen is displayed
- When no key operation is performed for a specified time interval (four times the waveform span rate when the direction of the waveform display is horizontal, and two and a half times the waveform span rate when the direction is vertical)
- When a floppy disk is inserted and data saving is attempted.

Display Format of Past-data Reference Screen (when direction of waveform display is horizontal)



a. Time Indication

Displays the date and time at which the rightmost (within that division of the time axis) data values of the past data being referenced are measured. If the number of power failures occurring after the time when the referenced data are stored up to the current time exceeds ten, no time indication is displayed.

b. Referenced Waveform (Trend)

Displays the trend graph of the past measured data stored in the internal memory.

c. Digital Indications of Referenced Data

Shows the digital readings of the rightmost data values of the referenced data. The maximum and the minimum values are displayed in the upper and lower rows, respectively. If 6 channels are defined to be used, the values for channels 1 to 3 or channels 4 to 6 are displayed. To switch over the channels to be displayed, press the **MENU** key.

d. Current Waveform

Shows the trend graph of the current measured data. The current readings are displayed in the top row.

Note

- The background color of the past waveform being referenced is black when the current waveform is displayed on a bright white or white background, and is white when the current waveform is displayed on a black background.
- The scale values are not displayed if the direction of waveform display is set as vertical.
- Although the discrete display (ZONE) or partial expanded (PART) setting was changed at some time in the past, the past data referenced on this screen are displayed according to the current discrete display (ZONE) and partial expanded (PART) settings. Namely, the past data displayed on this screen does not follow the settings that existed when the data were saved in the memory.

Scrolling the Referenced Waveform

On the past-data reference screen, the referenced waveform can be scrolled using the cursor keys.

Type of Scroll	Procedure
Scroll by one-pixel increment	Press the [←] or [→] key. The reference waveform is scrolled as follows: [→] key: moves the referenced waveform to the left or upward (advances the time scale). [←] key: moves the referenced waveform to the right or downward (turns back the time scale).
Scroll by 2-division increment	Keep pressing the [←] or [→] key. The referenced waveform is then scrolled by two divisions of the time axis.
Fast scroll	Keep pressing the [←] or [→] key and press the **DISP** key together.

3.5 Writing the Message

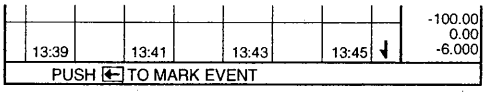
Message can be written in the internal memory, and time axis mark can be drawn on the time axis on the screen. When writing a message, the information at the mark is written in the internal memory. Information for the ninety-nine most recent time-axis marks can be stored.

For details of the information on the time-axis mark, see Appendix 2, "Data Formats of Parameter List File and Information File."

The written messages are set initially in the SET mode.
There are five types of messages and each message correspond to the color of time axis mark.

Massage number	Color of time axis mark
Message 1	red
Message 2	green
Message 3	blue
Message 4	brown
Message 5	red purple

1 Press the **DISP** key when the waveform is displayed.
The message 'PUSH [←] TO MARK MESSAGE' appears at the bottom of the screen.
2 Press the [△]/[▽] key to select the message number.
3 Press the **[←]** key to write the message. A light-blue ↓ mark is then written at the current time on the time axis on the screen.



To avoid writing a mark, do not press the **[←]** key and proceed to step 4.
4 To return to the standard screen, press the **DISP** key twice (or three times when the key trigger is set).

Note

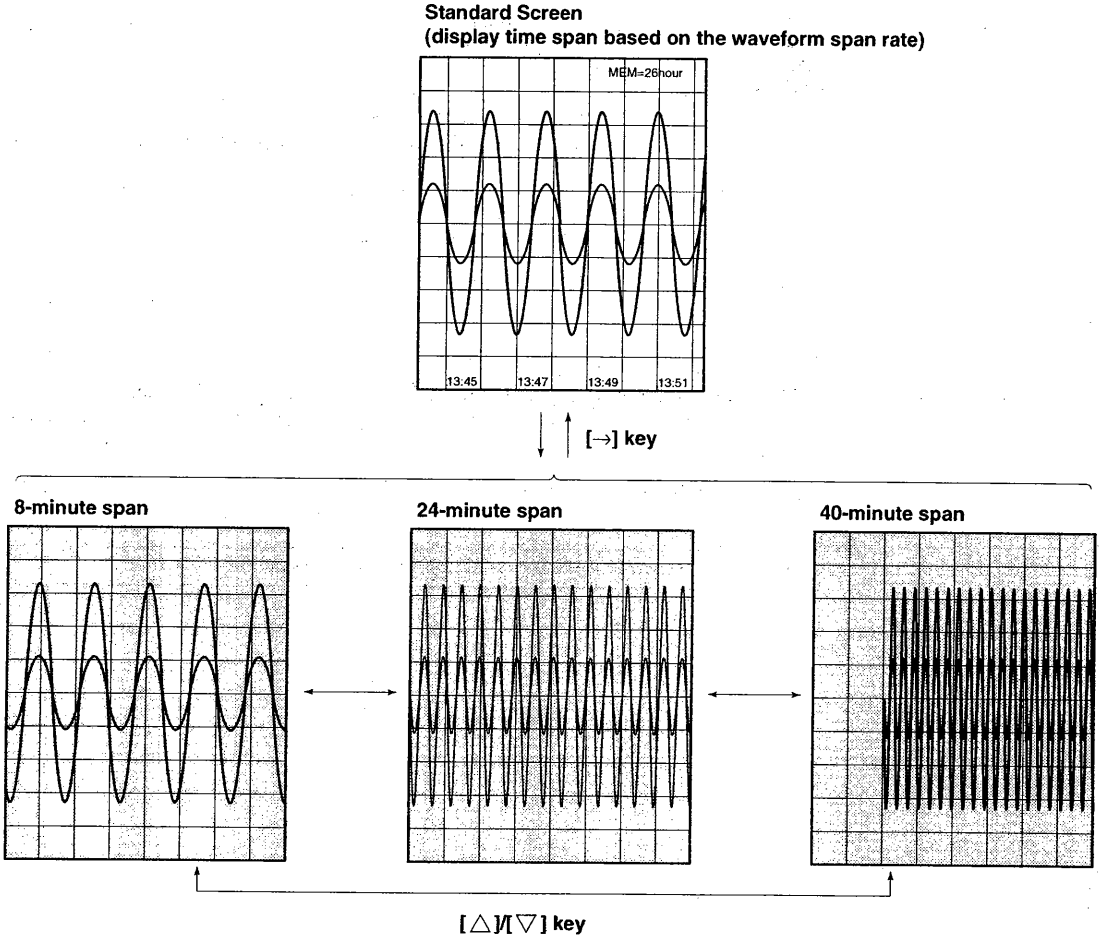
The messages can also be displayed using remote control.
For remote control wiring, see page 2-10.
In the SET mode, set it so that the menu for writing messages is not displayed.
For details, see Section 4.10, "Turning ON/OFF the Waveform Span Rate Display and the Message Menu Display."

3.6 Zooming/Reducing the Time Axis

The time axis can be zoomed and reduced in the standard screen.

1 Press the **DISP** key twice.
The message 'DISP WINDOW:NORMAL/□min' appears at the bottom of the screen. (The display span used last time is called first, i.e., it could be '. . . ./8min', '. . . ./24min', etc.)
2 Press the [→] key.
The characters '□min' are then highlighted.
3 Each time the [△]/[▽] key is pressed the display span changes over 5.5, 16.5, and 27.5 minutes sequentially (8, 24, and 40 minutes if the direction of the waveform display is horizontal), to zoom and reduce the display time span.
Fixed to "5.5 minutes" (8 minutes) if the VR200 has the computation function.
4 To switch back to the standard display time span (based on the waveform span rate defined), press the [→] key.
5 Pressing the **DISP** key once (or twice when the key trigger is set) clears the guidance message at the bottom of the screen and returns the standard screen.

Example: when the direction of waveform display is vertical



Note

- 30 minutes of the waveform are displayed. Therefore, even if you set "40" minutes when the display direction is horizontal, only 30 minutes of the waveform are displayed. Similarly, if the VR200 has the computation function, six minutes of the waveform are displayed. Thus, only six minutes of the waveform are displayed even when the display direction is set to horizontal.
- When the time axis is zoomed or reduced, the background color changes: if the standard screen is displayed on a bright white or white background, it is switched to black, and if the standard background is black, it is switched to white.
- While zooming and reducing the time axis, past data cannot be referenced. Also, neither time indications, memory status indicator, nor time-axis marks are displayed.
- The screen that appears first after turning on the power is the standard screen, regardless of what was displayed before the power was turned off.
- If a power failure is recorded, both maximum and minimum data values during that power failure are set to 7F7FH.
- When the time axis is zoomed or reduced, the trends (waveforms) are displayed according to the current discrete display (ZONE) and partial expanded (PART) settings in the full display span. although on the standard screen, the time at which the discrete display (ZONE) or partial expanded (PART) setting was changed can be identified (each part of each waveform is displayed according to the settings at the time of data sampling). When switching back to the standard screen, the waveforms are now displayed according to the current discrete display (ZONE) and partial expanded (PART) settings in the full display span. Hence, the time at which the discrete display (ZONE) or partial expanded (PART) setting was changed cannot be identified in this case.

3.7 To Start Storing the Measured Data by Manual Trigger

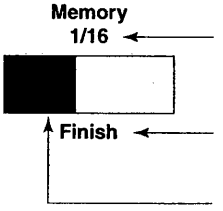
This section describes how to use the panel key to start storing the measured data (i.e., manual trigger). To start storing the data by the manual trigger, select the "trigger-on" or "trigger-rotation" in the SETUP mode and set the key trigger to on, in advance.

For details on how to set the key trigger, see Section 6.6.3, "Setting of Data Storage Method as Trigger-on or Trigger-rotation."

Memory status indicator

When using the panel key to start storing the data, the memory status indicator as shown in the figure below is displayed on the right of the screen. This is not displayed when "trigger-free" is selected.

Example:



Block number*1 of the memory in which the data are currently written

Finish: Writing completed
Stop: Writing stopped due to write-protected floppy disk

Ratio of the area where the data have already been written
Blue: Waiting for trigger *2
Red: Written after trigger is raised

*1 Displayed when sixteen event files are created.
*2 When the pre-trigger is set, the measured data are always stored in part (specified by the ratio) of the memory.

To start storing data by manual trigger

1 Confirm that the memory status indicator is displayed on the screen.
2 Press the DISP key three times to call up the message 'PUSH [←] TO TRIGGER.'
3 Press the [←] key. The memory status indicator changes color from blue to red and the data start being stored in the internal memory.

Note

Once the event files are saved on floppy disk, the event files in the internal memory are all initialized.

3.8 Switching the Display Screen

You can select any of the following display screens.

Trend display :	Displays the measured data as a waveform.
Bar graph display :	Displays the measured data on a bar graph.
Digital value display :	Displays the measured data with digital values.
Information display :	Displays the condition of the data collection and the alarm condition (alarm summary).
List display :	Lists the setting parameters of the SET mode and SETUP mode.

1 Press the **DISP** key several times when the standard screen is displayed.
The message 'Display mode: □' appears at the bottom of the screen.
2 Press the [△]/[▽] key to select the screen to display.
3 To return to the standard screen, press the **DISP** key several times.

3.9 Detecting the FAIL and Memory End (Option)

If the fail/memory end output option is equipped, contact outputs alert the occurrence of a system error (FAIL) and when the memory is almost full. An output relay is provided for each of the "memory end" and "FAIL" contacts.

For the wiring, see Section 2.3.3, "FAIL/Memory End Wiring."

Operation at Memory End

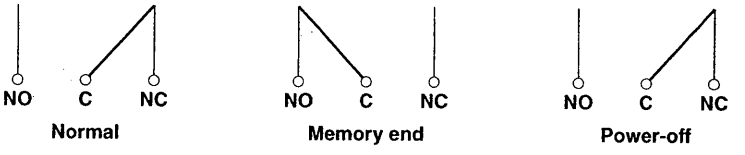
The relay is energized when the time specified until end of memory before the display data file is full is reached. This relay action cannot be reversed to "de-energized on memory end." (The figure at the bottom of this page shows the relay contact actions.) When the memory end occurs, promptly save the data to a floppy disk.

Operation at System Failure

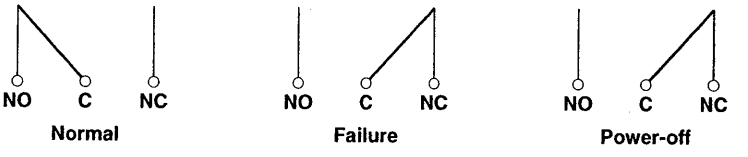
The relay is de-energized if the CPU fails. This relay action cannot be reversed to "energized on failure" and thus this relay is de-energized also upon power-off (including a power failure). If this relay contact is activated during power-on, it means that a system failure occurred. Please contact your nearest Sales & Service Office; addresses may be found on the back cover of this manual.

Relay Contact Actions

Memory End Relay Output (Energized on Memory End)



FAIL Relay Output (De-energized on Failure)



Note: NO, C, and NC denote normally-opened, common, and normally closed, respectively.

Chapter 4 BASIC SETTINGS (OPERATIONS IN SET MODE)

4.1 Setting the Input Range and Display Span

MODE	Description	Section
VOLT	Measures and displays a DC voltage.	4.1.1
TC	Measures and displays a temperature using a thermocouple.	4.1.2
RTD	Measures and displays a temperature using a resistance temperature detector.	4.1.2
DI	Detects and displays the on/off status of a contact or voltage input.	4.1.3
DELT	Performs difference computation between two channels which have the same input range and displays the difference.	4.1.4
SCL	Performs scaling on the measured data of a voltage, TC, or RTD input and displays the scaled value. *	4.1.5
SQRT	Extracts the square root (√) of the measured data of a DC voltage input and performs scaling for display. *	4.1.6
SKIP	Skips the scan of a specified channel, i.e., prevents that input channel from being measured and displayed.	4.1.7

* Scaling is typically used to convert an actual measured value to a value in the desired unit system (physical value) to be displayed.

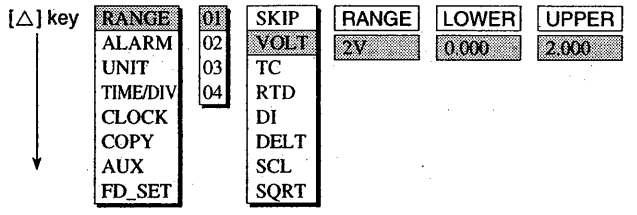
Note

Setting these input specifications initializes the data memory (which can then not be restored) and the information file. If necessary, save the data in memory to a floppy disk before setting.

4.1.1 Voltage Input (VOLT) Setting

To measure and display a DC voltage signal, follow the procedure below to set the input range.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=RANGE	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=RANGE' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	01:MODE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP↵	01:MODE=VOLT	Select 'VOLT' using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP↵	01:RANGE=2V	Select the desired range using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄▽►▷ DISP↵	01:LOWER=0.000	Specify the low limit value of the display span (lower span limit). Use the [△]/[▽] keys to increment/decrement the value of each digit and the [▷] key to shift the digit, then press the [↵] key.
6	ACK △/◄▽►▷ DISP↵	01:UPPER=2.000	In the display which then appears, enter the high limit value of the display span (upper limit). Enter it the same way as for the low limit value, then press the [↵] key.
7	ACK △/◄▽ DISP↵	INIT. DATA_MEMORY=YES	If the settings are changed, this message appears. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not changed.
8	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:MODE=VOLT' display. To return to the 'SET=RANGE' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

Display	Range
20 mV	–20.00 to 20.00 mV
60 mV	–60.00 to 60.00 mV
200 mV	–200.0 to 200.0 mV
2 V	–2.000 to 2.000 V
6 V	–6.000 to 6.000 V
20 V	–20.00 to 20.00 V

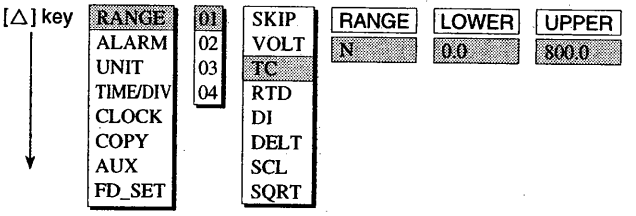
Note

The display span cannot exceed the input range, nor can the LOWER setting be equal to the UPPER setting.

4.1.2 TC/RTD Input Setting

To measure and display a TC (Thermocouple) or RTD (Resistance Temperature Detector) signal, the range can be set the same way as if it were a DC-voltage.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=RANGE	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=RANGE' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	01:MODE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP↵	01:MODE=TC	Select either 'TC' or 'RTD' using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP↵	01:TYPE=N	Select the desired element type using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄▽►▷ DISP↵	01:LOWER=0.0	Specify the low limit value of the display span (lower span limit). Use the [△]/[▽] keys to increment/decrement the value of each digit and the [▷] key to shift the digit, then press the [↵] key.
6	ACK △/◄▽►▷ DISP↵	01:UPPER=800.0	In the display which then appears, enter the high limit value of the display span (upper limit). Enter it the same way as for the low limit value, then press the [↵] key.
7	ACK △/◄▽ DISP↵	INIT. DATA_MEMORY=YES	If the settings are changed, this message appears. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not changed.
8	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:MODE=TC' (or '□:MODE=RTD') display. To return to the 'SET=RANGE' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

TC Type	
Display	**Range**
R	0.0 to 1760.0°C
S	0.0 to 1760.0°C
B	0.0 to 1820.0°C
K	-200.0 to 1370.0°C
E	-200.0 to 800.0°C
J	-200.0 to 1100.0°C
T	-200.0 to 400.0°C
N	0.0 to 1300.0°C
W	0.0 to 2315.0°C
L (Fe-CuNi)	-200.0 to 900.0°C
U (Cu-CuNi)	-200.0 to 400.0°C

RTD Type	
Display	**Range**
PT (Pt100Ω)	-200.0 to 600.0°C
JPT (JPt100Ω - JIS 1989)	-200.0 to 550.0°C
CU1 to 6(Cu10Ω) *1	-200.0 to 300.0°C
CU25(Cu25Ω) *1	-200.0 to 300.0°C

*1 Can be specified when the /N1 option is equipped.
CU1: Cu 10Ω detector based on GE standard
CU2: Cu 10Ω detector based on L&N standard
CU3: Cu 10Ω detector based on WEED standard
CU4: Cu 10Ω detector based on BAILEY standard
CU5: Cu 10Ω, α = 0.00392 at 20°C
CU6: Cu 10Ω, α = 0.00393 at 20°C
CU25: Cu 25Ω, α = 0.00425 at 20°C

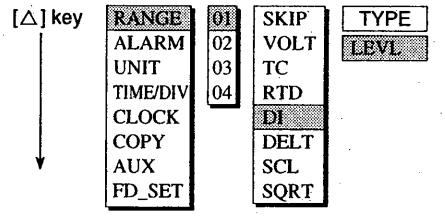
Note

The display span cannot exceed the input range, nor can the LOWER setting be equal to the UPPER setting.

4.1.3 Digital Input (DI) Setting

To measure and display the status of a digital input signal (contact input/voltage level input), follow the procedure below to set the input specification.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=RANGE	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=RANGE' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	01:MODE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP ↵	01:MODE=DI	Select 'DI' using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	01:TYPE=LEVL	There are two input types: (voltage) level and contact. LEVL: Voltage level signal Less than 2.4 V: off (0) 2.4 V or greater: on (1) CONT: Contact signal Opened: off (0) Closed: on (1) Select the desired type using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP ↵	INIT. DATA_MEMORY=YES	If the settings are changed, this message appears. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not changed.
6	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:MODE=DI' display. To return to the 'SET=RANGE' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

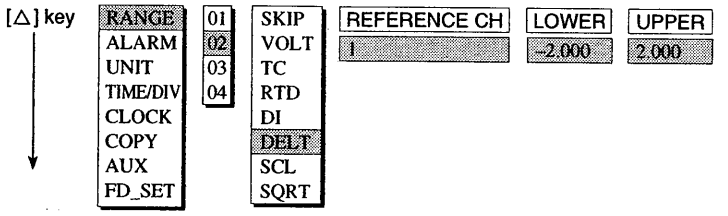
Note

The above settings will result in a recording trace from the top end to the bottom end of the graph between the contact statuses OFF and ON. If desired, a discrete display for an on/off status recording can be set so that the recording trace appears within the limited band of the graph. See Section 4.7.1.

4.1.4 Difference Computation (DELT) Setting

To display the difference between the measured values of two channels, follow the procedure below to set up the differential calculation. This setting can only be used if the reference channel is a VOLT, TC or RTD input.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP↵	SET=RANGE	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=RANGE' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	02:MODE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP↵	02:MODE=DELT	Select 'DELT' using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP↵	02:REFERENCE CH=01	Select the reference channel number using the [△]/[▽] keys, then press the [↵] key. The input range of the channel currently selected is automatically set to the same as that of the reference channel. The difference of the measured value from the reference channel becomes the value displayed in this channel.
5	ACK △/◄▽►▷ DISP↵	02:LOWER=-2.000	The display which appears will show the same low limit value of the display span for the reference channel. Specify the low limit value of the desired display span (lower span limit). Use the [△]/[▽] keys to increment/decrement the value of each digit and the [▷] key to shift the digit, then press the [↵] key.
6	ACK △/◄▽►▷ DISP↵	02:UPPER=2.000	The display which appears will show the same high limit value of the display span for the reference channel. Specify it the same way as for the low limit value, then press the [↵] key.
7	ACK △/◄▽ DISP↵	INIT. DATA_MEMORY=YES	If the settings are changed, this message appears. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not changed.

Note

The channel number of the input to be compared to the reference channel must be greater than that of the reference channel. Thus, Channel 1 cannot be selected here.

Note

For a TC and RTD input, the display span cannot exceed the +/- value of the input range width. E.g., if the input range of the TC type L is -200 to 900°C, then the maximum display span for DELT is ±1100°C.
For a VOLT input, the display span cannot exceed the input range, and the UPPER setting cannot be equal to the LOWER setting.

8 DISP ↵/MENU ESC 3 sec

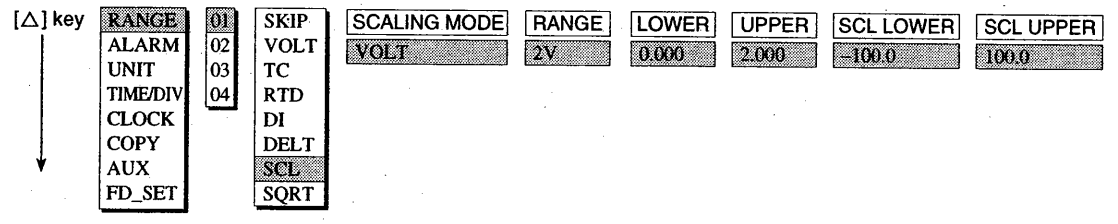
SET OK

The setting is completed.
To continue setting another channel, press the [↵] key to return to the '□:MODE=DELT' display.
To return to the 'SET=RANGE' display, press the **ESC** key.
To return to the operation mode, press the **MENU** key for three seconds.

4.1.5 Scale (SCL) Setting

To assign a different scale to the measured data, the range can be set as described below. Note that the measured data for which a different scale can be set is the voltage (VOLT), thermocouple (TC) or resistance temperature detector (RTD) type. To assign a unit to this new scale, refer to Section 4.3, "UNIT Assignment."

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP↵	SET=RANGE	Press the MENU key for three seconds to enter the SET mode. Select the 'SET=RANGE' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	01:MODE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP↵	01:MODE=SCL	Select 'SCL' using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP↵	01:SCALING MODE=VOLT	Select the input type using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄▽ DISP↵	01:RANGE=2V	Select the desired input range using the [△]/[▽] keys, then press the [↵] key.
6	ACK △/◄▽►▷ DISP↵	01:LOWER=0.000	Set the low limit value of the desired display span (lower span limit). Use the [△]/[▽] keys to increment/decrement the value of each digit and the [▷] key to shift the digit, then press the [↵] key.
7	ACK △/◄▽►▷ DISP↵	01:UPPER=2.000	Set the high limit value of the desired display span (upper span limit) the same way as for the low limit value, then press the [↵] key.

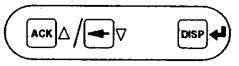
Note

The display span cannot exceed the input range, nor can the LOWER setting be equal to the UPPER setting.

8	ACK △/◄▽►▷ DISP↵	01:SCL LOWER=-100.0	Set the lower scale limit (including the decimal point) corresponding to the low limit value of the display span using the [△]/[▽] and [▷] keys. Note that the allowable range is –20000 to 20000. Then press the [↵] key.
9	ACK △/◄▽►▷ DISP↵	01:SCL UPPER=100.0	Set the upper scale limit corresponding to the high limit value of the display span. Select it the same way as the lower scale limit, then press the [↵] key. Note that the decimal point will be in the same position as for SCL LOWER. SCL UPPER cannot be equal to SCL LOWER. In this example, 0.000 V is to be converted to -100.0, and 2.000 V to 100.0.

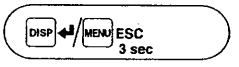
Note

In this recorder, the measured value is converted at a resolution determined by the range from the upper to the lower scale limit excluding the decimal point. Namely, if the scale is set to -5 to 5, the resolution is 1/10; and if set to -5.0 to 5.0, it is 1/100, which is a better display resolution.
If the upper scale limit subtracted by the lower scale limit excluding the decimal point is 100 or less (the resolution is 1/100 or worse), the message 'W001=RESOLUTION IS LOW' is displayed. You can leave the settings as they are, but the resolution on the screen will be poor. The settings should therefore be modified to increase the resolution.

10 

INIT. DATA_MEMORY=YES

If the settings are changed, this message appears. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not changed.

11 

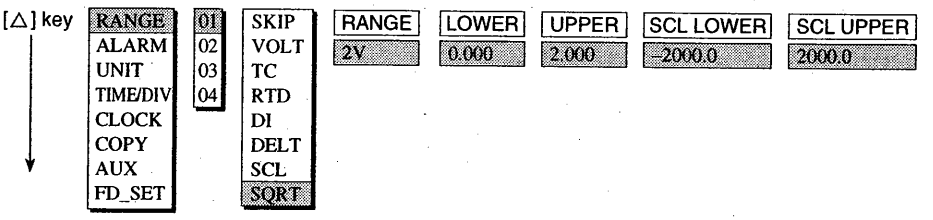
SET OK

The setting is completed.
To continue setting another channel, press the [↵] key to return to the '□:MODE=SCL' display.
To return to the 'SET=RANGE' display, press the **ESC** key.
To return to the operation mode, press the **MENU** key for three seconds.

4.1.6 Square Root Computation (SQRT) Setting

To compute the square root of a DC voltage input signal and display it as the measured value with your desired scale, follow the procedure below. To assign the unit, refer to Section 4.3, "UNIT Assignment."

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◁▽ DISP ↵	SET=RANGE	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=RANGE' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◁▽ DISP ↵	01:MODE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◁▽ DISP ↵	01:MODE=SQRT	Select 'SQRT' using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◁▽ DISP ↵	01:RANGE=2V	Select the desired input range using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◁▽▷ DISP ↵	01:LOWER=0.000	Set the low limit value of the desired display span (lower span limit) using the [△]/[▽] and [▷] keys, then press the [↵] key.
6	ACK △/◁▽▷ DISP ↵	01:UPPER=2.000	Set the high limit value of the desired display span (upper span limit) the same way as for the low limit value, then press the [↵] key.

Note

The display span cannot exceed the input range, nor can the LOWER setting be equal to the UPPER setting.

7	ACK △/◁▽ DISP ↵	01:SCL LOWER=-2000.0	Set the lower scale limit (including the decimal point) corresponding to the low limit value of the display span using the [△]/[▽] and [▷] keys. Note that the allowable range is –20000 to 20000. Then press the [↵] key.
8	ACK △/◁▽▷ DISP ↵	01:SCL UPPER=2000.0	Set the upper scale limit corresponding to the high limit value of the display span. Select it the same way as the lower scale limit, then press the [↵] key. Note that the decimal point will be in the same position as for SCL LOWER. SCL UPPER cannot be equal to SCL LOWER.
9	ACK △/◁▽ DISP ↵	INIT. DATA_MEMORY=YES	If the settings are changed, this message appears. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not changed.
10	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:MODE=SQRT' display.

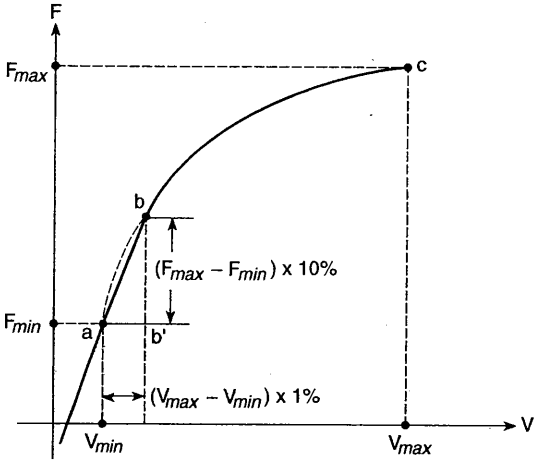
To return to the 'SET=RANGE' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

EXPLANATION OF SQUARE ROOT:

The VR200 uses the following square-root computation:
Using the following expressions:

V_{min} = minimum value of display span (LOWER)
V_{max} = maximum value of display span (UPPER)
F_{min} = minimum value of scale (SCL LOWER)
F_{max} = maximum value of scale (SCL UPPER)
V_x = input voltage
F_x = scaled value

then the relationship between V_x (input voltage) and F_x (scaled value) is as shown in the graph below (the graph is approximate).



Between b and c in the graph, the following relation exists between F_x and V_x:

$$Fx = (F\,max - Fmin)\sqrt{\frac{Vx - Vmin}{Vmax - Vmin}} + F\,min$$

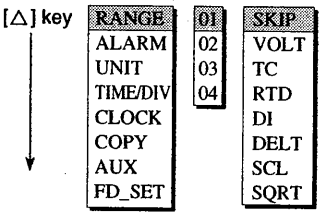
and the relation between a and b can be expressed as:

$$Fx = \frac{10(Fmax - Fmin)}{Vmax - Vmin}(Vx - Vmin) + Fmin$$

4.1.7 SKIP Setting

Unused channels can be skipped, which means that these channels will not be measured or displayed. Follow the procedure below to skip a channel.

MENU:



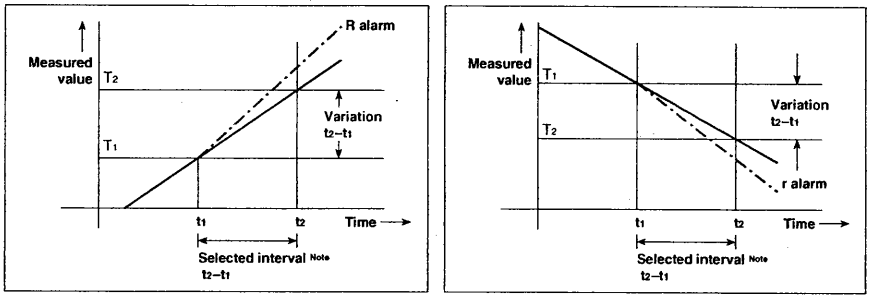
PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=RANGE	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=RANGE' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	01:MODE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP ↵	01:MODE=SKIP	Select 'SKIP' using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	INIT. DATA_MEMORY=YES	If the settings are changed, this message appears. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not changed.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:MODE=SKIP' display. To return to the 'SET=RANGE' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.2 Alarm Setting

Alarms can be set for the measured data of any channel.
If an alarm is set and an alarm occurs, the ALM indication will appear on the screen. If the optional alarm output relays are equipped, these will be activated by the occurrence of an alarm (see Section 6.1). Up to four alarm levels from among the following six types of alarms can be set per channel.

H High limit alarm: generated when the measured value is higher than, or equal to, the alarm setting.
L Low limit alarm: generated when the measured value is lower than, or equal to, the alarm setting.
R Rate-of-change limit on increase: generated when the measured value variation in the ascending direction during a selected interval is greater than, or equal to, the alarm setting.
r Rate-of-change limit on decrease: generated when the measured value variation in the descending direction during a selected interval is greater than, or equal to, the alarm setting.



Note

The interval is set at the same time as the rate-of-change alarm in the SETUP mode. See Section 6.1.6.

h Difference high-limit alarm: generated when the [measured value of the channel – measured value of a specified reference channel] is equal to or greater than the alarm setting. (This type of alarm can only be set when the corresponding channel is set as the differential value display (DELT).)
l Difference low-limit alarm: generated when the [measured value of a specified reference channel – measured value of the channel] is equal to or greater than the alarm setting. (This type of alarm can only be set when the corresponding channel is set as the differential value display (DELT).)

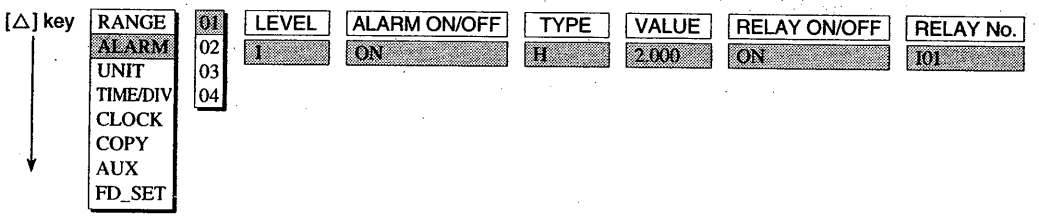
Note

Alarm settings are automatically canceled on the affected channel when any of the following changes occurs:
- input type (VOLT, TC, etc.) or input range (2V, etc.) is changed.
- decimal point for linear scaling and square root is changed.
- high or low limit value of the display span is changed (in case of linear scaling and square root).
- upper or lower scale limit is changed (in case of linear scaling and square root).

For a channel displaying a differential value, alarm settings are canceled when any of the following changes occur:
- reference channel is changed.
- input type or range of the reference channel is changed.

The initial value is 'OFF' for all channels and all levels. To set an alarm, follow the procedure on the next page.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=ALARM	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=ALARM' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP↵	01:ALARM LEVEL=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP↵	01:ALARM LEVEL=1	Select the desired level of alarm using the [△]/[▽] keys (up to four levels can be set), then press the [↵] key.
4	ACK △/◄ ▽ DISP↵	01/1:ALARM=ON	Check the channel and alarm level numbers displayed and select the status of the alarm (ON or OFF) using the [△]/[▽] keys. Initially all are set to OFF. Then press the [↵] key. When OFF is entered, the message '*SET OK*' appears to show the end of setting. Alarms cannot be set for a SKIPped or DI channel.
5	ACK △/◄ ▽ DISP↵	01/1:TYPE=H	Enter the type of alarm using the [△]/[▽] keys (one of six types), then press the [↵] key. Types h and 1 will appear only if the corresponding channel is the DELT type.
6	ACK △/◄ ▽ ► ▷ DISP↵	01/1:VALUE=2.000	Enter the alarm value using the [△]/[▽] and [▷] keys, then press the [↵] key.
7	ACK △/◄ ▽ DISP↵	01/1:RELAY=ON	Specify whether an output relay should be activated (ON) or not (OFF) using the [△]/[▽] keys. Note that output relays are optional (/A1, 2 or 3). If the option is not installed, data entry will be ignored. Then press the [↵] key.
8	ACK △/◄ ▽ DISP↵	01/1:RELAY No.=I01	Use the [△]/[▽] keys to specify the output relay number (depending on the option) from I01 to I06.

Note

If you specify a relay number which your recorder does not have, no alarm will be output.

After selection, press the [↵] key.

9	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:ALARM LEVEL=□' display. To return to the 'SET=ALARM' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

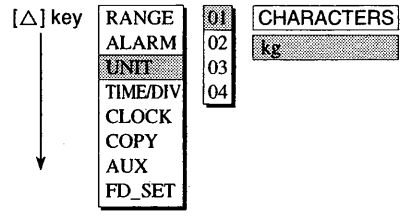
Note

- The alarm output behavior can be selected as either hold or non-hold (see Section 6.1.4).
- Multiple alarms can be assigned to an alarm output relay, representing the AND or OR logic status of those alarms. For details on selecting the logic, see Section 6.1.2.

4.3 Unit Assignment

When you are using the scaling (SCL) or square root (SQRT) setting, you can assign an engineering unit to the scale of that channel, using up to six characters.
To set the engineering unit, follow the procedure below.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=UNIT	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=UNIT' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	01:UNIT=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key. If the selected channel is not the SCL or SQRT type, data entry will be ignored.
3	ACK △/◄ ▽ ► ▷ DISP ↵	01:UNIT=kg	Enter the desired unit (up to six characters) using the [△]/[▽] and [▷] keys, then press the [↵] key.
4	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:UNIT=□□□□□' display. To return to the 'SET=UNIT' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.4 Setting of Waveform Span Rate (TIME/DIV)

The waveform span rate, which corresponds to the "chart speed" for a conventional strip chart recorder and indicates the span for each division of the time axis on the screen, can be selected from the following six speeds. The table below shows the relationship between the waveform span rate, time per pixel, and trend speed.

Waveform span rate (time span per division of time axis)	Time per pixel	Trend speed (approximate)
1 min	2 s	615.0 mm/h
5 min	10 s	123.0 mm/h
10 min	20 s	61.5 mm/h
20 min	40 s	30.5 mm/h
30 min	60 s	20.5 mm/h
60 min	120 s	10.2 mm/h

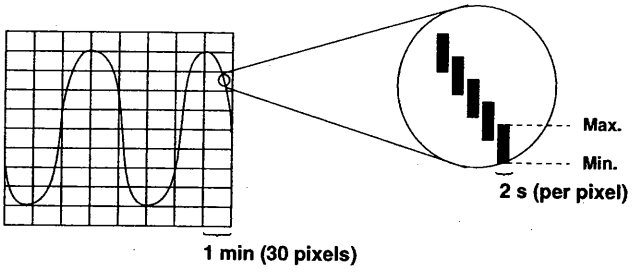
CAUTION

Changing the waveform span rate initializes the following databases:
- the data memory, which can then not be restored;
- the time-axis mark information in the information file; and
- the power failure information records related to the display data file.

If necessary, save the data in memory to a floppy disk before setting.

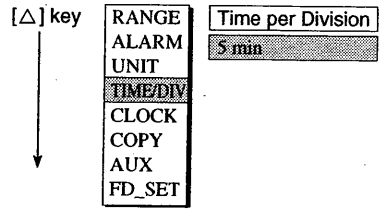
Note

- When tracing the waveform (trend graph), the range of the measured values—from the maximum value to the minimum—sampled within the interval for each pixel at the scanning period of 125 ms for VR204 or 1 s/2 s for VR206 is traced for each pixel on the screen.
  Example: When the waveform span rate is 1 minute



- When the display data file has been created, the maximum and minimum values for each pixel are then also recorded in the file.

MENU:



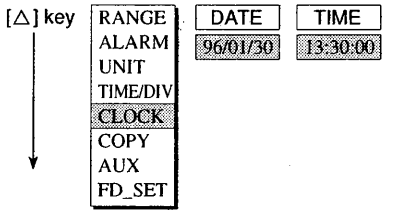
PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=TIME/DIV	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=TIME/DIV' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	TIME/DIV=5 min	Select the desired rate from 1, 5, 10, 20, 30, and 60 minutes using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP↵	INIT. DISP_DATA=YES	If you do not mind initializing the display data file, use the [△]/[▽] key to select 'YES', then press the [↵] key.
4	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To modify the setting, press the [↵] key to return to the 'TIME/DIV=□min' display. To return to the 'SET=TIME/DIV' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.5 Clock Setting

To set the date and time of the internal clock, follow the procedure below:

MENU:



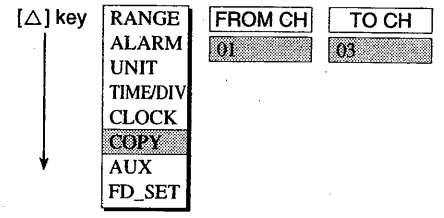
PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP ↵	SET=CLOCK	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=CLOCK' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽►▷ DISP ↵	DATA=96/01/30	Enter the correct date, which is written as year/month/day (YY/MM/DD) using the [△]/[▽] and [▷] keys, then press the [↵] key. (The date will be automatically updated, regardless of whether the power is turned on or off. Leap years are automatically included.)
3	ACK △/◄▽►▷ DISP ↵	TIME=13:30:00	Enter the correct time, which is written as hour:minute:second (HH:MM:SS) using the [△]/[▽] and [▷] keys, then press the [↵] key. Upon pressing the [↵] key, the clock starts.
4	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To modify the setting, press the [↵] key to return to the 'DATE= □□/□□/□□ ' display. To return to the 'SET=CLOCK' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.6 Copying the Channel Settings

It is possible to copy settings from one channel to another. All settings concerning range, alarm, unit, zone display, partial expanded display, and tag number are copied. For details of the settings concerning zone display, partial expanded display, and tags, see Section 4.7. These settings are all copied, and it is impossible to copy certain settings only, such as alarm settings.
Exactly the same values as these settings are copied to the specified channel.
To copy the settings, follow the procedure below.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=COPY	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=COPY' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	COPY FROM 01 TO	Enter the channel number from which you want to copy using the [△]/[▽] keys.

Note
You can only copy from a lower channel number to a higher channel number.

Then press the [↵] key.

3	ACK △/◄ ▽ DISP ↵	COPY FROM 01 TO 03	Enter the channel number to which you want to copy using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	INIT. DATA_MEMORY=YES	This message then appears to announce that copying the channel settings initializes the data memory. If you do not mind initializing the data memory, select 'YES' and press the [↵] key. Selecting 'NO' does not initialize the data memory, and the settings are not copied.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue copying the channel settings to another channel, press the [↵] key to return to the 'COPY FROM □ TO □' display. To return to the 'SET=COPY' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.7 Settings of Discrete Display (ZONE), Partial Expanded Display (PART), Scale Indication On/Off (DISP_SCALE), Tags (TAG) and Trip Level (TRIP)

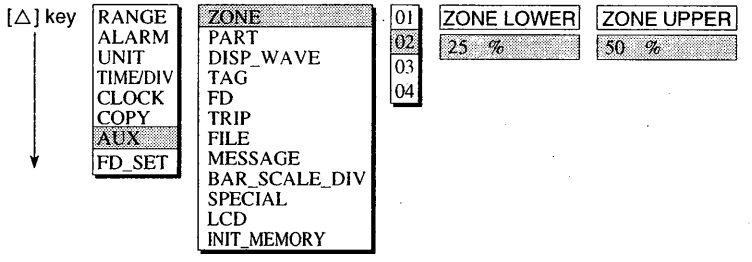
The following sections describe the procedures for the settings listed below.

MODE	Description	Section
ZONE	Enables the trend trace (waveform) of each channel to be displayed in discrete zones on the screen.	4.7.1
PART	Enables part of the display range to be compressed in order to examine another part of the range in more detail.	4.7.2
DISP_SCALE	Sets whether to display the scale values for each channel.	4.7.3
TAG	Defines the tag numbers for identifying channels.	4.7.4
TRIP	Draws a horizontal line on the trend graph (waveform) on the screen in order to represent a specific signal level to be noted.	4.7.5

4.7.1 Setting of Discrete Display (ZONE)

Discrete (zone) display enables you to define different bands for each channel on the screen. The traces of the trend graph will then not overlap, making it easier to see each trend (waveform).

MENU:



PROCEDURE:

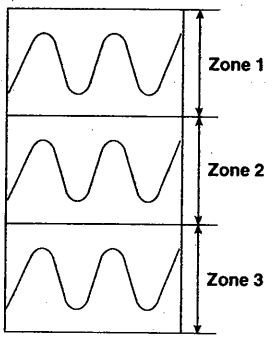
	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP ↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP ↵	MODE=ZONE	Select the 'MODE=ZONE' display using the [△]/[▽] keys. Then press the [↵] key.
3	ACK △/◄▽ DISP ↵	02:ZONE LOWER=25 %	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽►▷ DISP ↵	02:ZONE LOWER=25%	Specify the lower boundary on the graph using the [△]/[▽] and [▷] keys. On the trend graph screen, this lower boundary value corresponds to the lower span limit. (For example, if channel 2 has a display span of –2V to 2V, and if you specify the zone to start from 25%, then the display at 25% of the full span on the graph will correspond to the value of –2V.) Then press the [↵] key.
5	ACK △/◄▽►▷ DISP ↵	02:ZONE UPPER=50%	Specify the upper boundary value using the [△]/[▽] and [▷] keys, then press the [↵] key.
6	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the ' □ :ZONE LOWER= □□□ %' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

Note

The upper boundary must be greater than the lower boundary by at least 5%.

EXPLANATION:

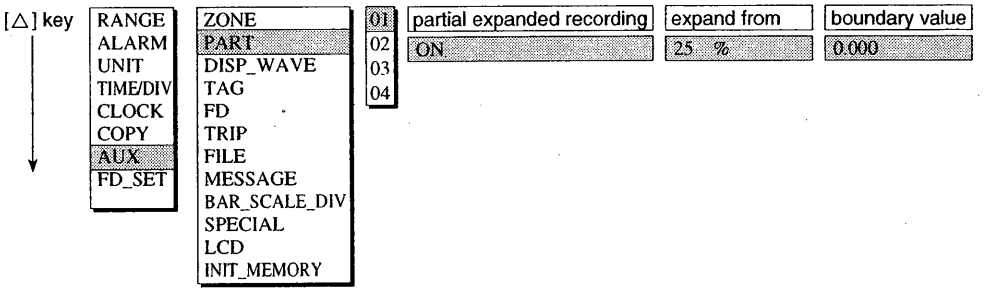
The following figure shows an example of the display after discrete display has been set.



4.7.2 Setting of Partial Expanded Display (PART)

Partial expanded display enables you to compress part of the display span in order to examine the expanded (other) part of the range in more detail. The initial value is 'OFF'. To set partial expanded display, follow the procedure below.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	MODE=PART	Select the 'MODE=PART' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP↵	01:PARTIAL=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP↵	01:PARTIAL=ON	Select ON (or OFF if you set partial expanded display before and want to reset it now) using the [△]/[▽] keys, then press the [↵] key. If you selected OFF, the setting is now completed.
5	ACK △/◄▽►▷ DISP↵	01:EXPAND FROM=25%	Specify the percentage (1 to 99%) of the full display span which is to be compressed, using the [△]/[▽] and [▷] keys, then press the [↵] key.
6	ACK △/◄▽►▷ DISP↵	01:BOUNDARY=0.000	The display which then appears prompts you to set the boundary value. The boundary value corresponds to the compressed part which was previously set. See also the figure on the next page. Set this value using the [△]/[▽] and [▷] keys.

Note

This boundary value must be within the display span. (If scaling is ON, this value must be within the scaling range.)

Then press the [↵] key.

7	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:PARTIAL=□□' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

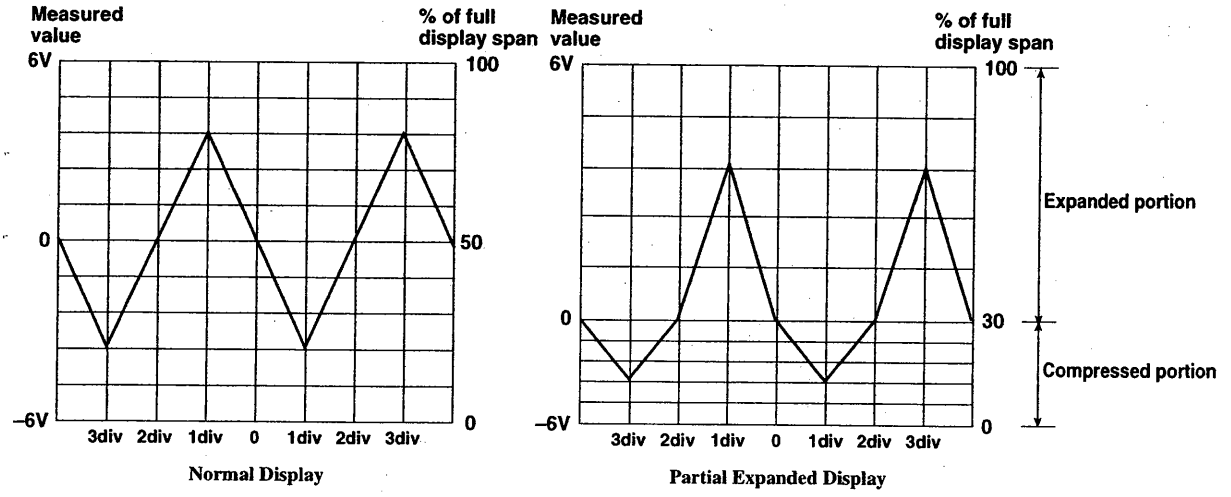
Note

The settings of the partial expanded display are automatically canceled when any of the following changes occur:

- input type (VOLT, TC, etc.) or input range (2V, etc.) is changed.
- decimal point for linear scaling and square root is changed.
- high or low limit value of the display span is changed (in case of linear scaling and square root).
- upper or lower scale limit is changed (in case of linear scaling and square root).
- For the differential value display; the reference channel, or the input type or range of the reference channel is changed.

EXPLANATION:

The following figures show the displays before and after the above settings have been completed:

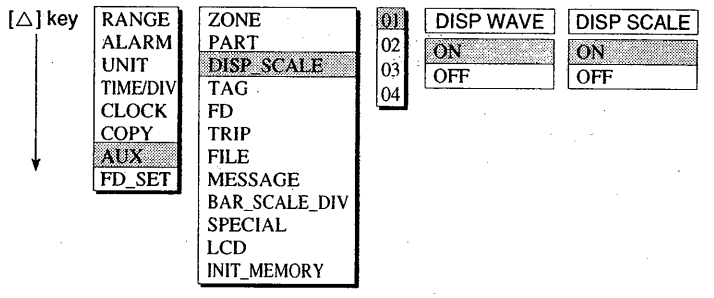


As can be seen from these figures, the lower side of the boundary (0 V) shows at 30% of the full span of the screen the data in the range –6V to 0V. On the upper side of the boundary, the range 0V to 6V is shown at 70% of the full span of the screen. Thus the scales differ on the upper and lower sides of the boundary.

4.7.3 On/Off Setting of Waveform and Scale Indication

To set whether to display the scale values for each channel, follow the procedure below.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	MODE=DISP_WAVE	Select the 'MODE=DISP_WAVE' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP ↵	01:DISP WAVE=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	01:DISP WAVE=ON	Select ON or OFF using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP ↵	01:DISP SCALE=ON	Select ON or OFF using the [△]/[▽] keys, then press the [↵] key.
6	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:DISP SCALE=□□' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.7.4 Tag Setting

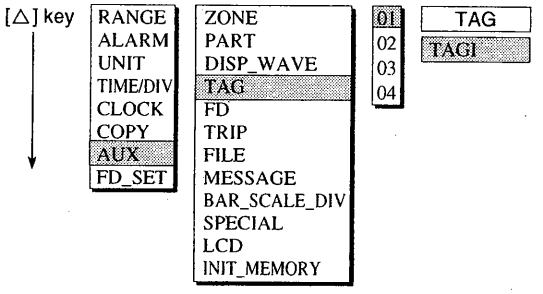
Depending on the setting in the SETUP mode, the tag numbers can be used instead of the channel numbers for identifying the channels. The tag numbers which are set are displayed in the upper row of the unit display area on the screen and stored in files together when the data is saved. The maximum length of a tag number that can be specified for each channel is seven characters.

Note

To make the tag numbers take effect, you must switch from the channel numbers to tag numbers. (For details of the procedure, see Section 6.6.)

Follow the procedure below to set a tag number.

MENU:



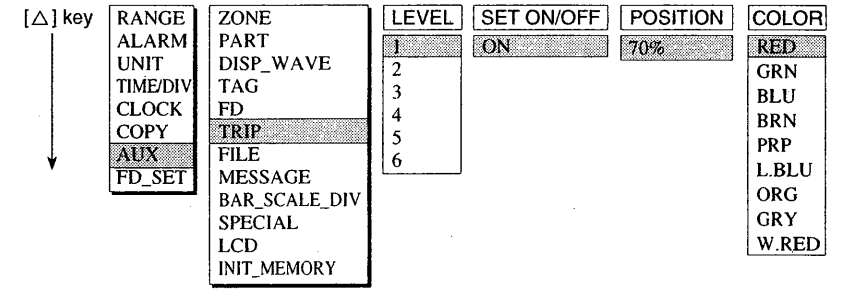
PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP ↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP ↵	MODE=TAG	Select the 'MODE=TAG' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP ↵	01:TAG=	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP ↵	01:TAG=TAG1	Enter the desired characters (up to seven) using the [△]/[▽] and [▻] keys, then press the [↵] key.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the '□:TAG=□□□□' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.7.5 Trip Level (TRIP) Setting

This setting allows you to draw up to six lines perpendicular to the scale axis on the trend graph (waveform) display to represent particular or critical levels. In the SETUP mode, the width of these lines can be specified (from among 1, 2, or 3 pixels).

MENU:



PROCEDURE:

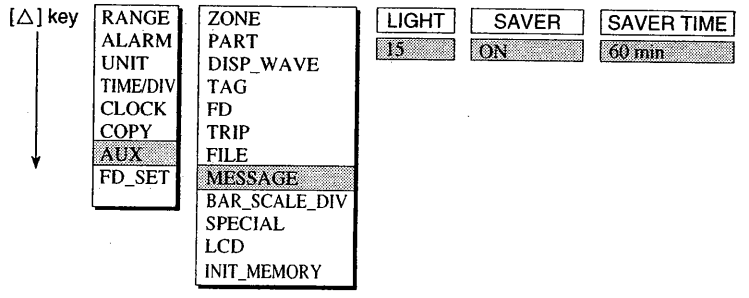
	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	MODE=TRIP	Select the 'MODE=TRIP' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP ↵	TRIP LEVEL=1	Select the trip level using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	TRIP SET=ON	Select ON or OFF using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP ↵	TRIP POS=70%	Specify the position of the line to be drawn as a percentage (0 to 100%) of the full display span, using the [△]/[▽] and [▷] keys, then press the [ø] key.
6	ACK △/◄ ▽ DISP ↵	TRIP COLOR=RED	Use the [△]/[▽] keys to select the color among 'RED,' 'GRN,' 'BLU,' 'BRN,' 'PRP,' 'L.BLU,' 'ORG,' 'GRY,' or 'W.RED,' then press the [↵] key.
7	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting the other trip level, press the [↵] key to return to the 'TRIP LEVEL= □ ' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.8 Message Setting

This setting allows you to select the message content that is written in the internal memory.
Up to 5 types of messages can be selected. Use 16 characters or less for each message.
There are two ways to write the messages.

- By using the panel key (see Section 3.5, "Writing Message")
- By remote control (see Section 2.3.4, "Remote Control Wiring")

MENU:



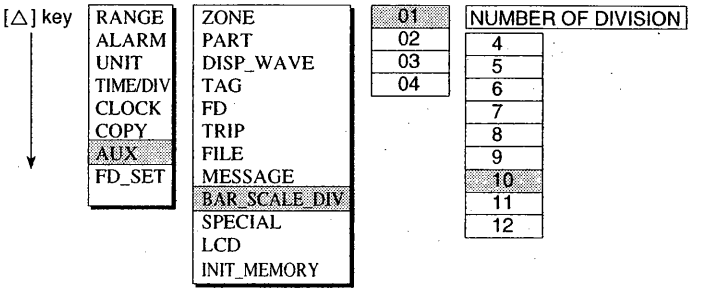
PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	MODE=MESSAGE	Select the display 'MODE=MESSAGE' using the [△]/[▽] keys. Press the [↵] key.
3	ACK △/◄ ▽ DISP ↵	MESSAGE=1	Use the [△]/[▽] keys to select the message number from '1' to '5', then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	MESSAGE1=	Enter the desired characters (up to sixteen) using the [△]/[▽] keys, then press the [↵] key.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. Pressing the [↵] key in this step returns to the display 'MESSAGE No.= □ ' Pressing the **ESC** key in this step returns to the display To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.9 Setting the Number of Divisions of Scale for the Bar Graph Display

This setting allows you to select the number of divisions of scale to display for the bar graph.
For details on how to display the bar graph, see section 3.8 "Switching the Display Screen."

MENU:



PROCEDURE:

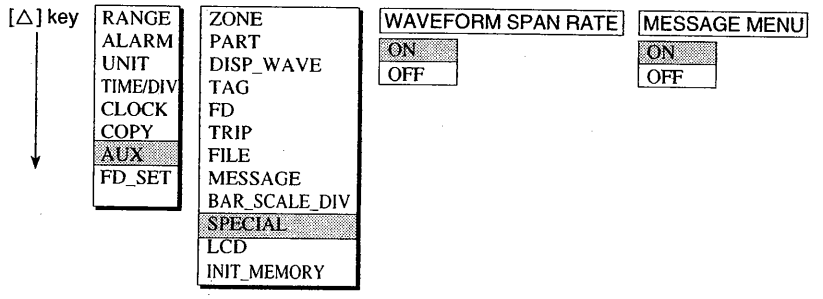
	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP ↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP ↵	MODE=BAR_SCALE_DIV	Select the display 'MODE=BAR_SCALE_DIV' using the [△]/[▽] keys. Press the [↵] key.
3	ACK △/◄▽ DISP ↵	01:BAR_SCALE_DIV=10	Select the desired channel using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP ↵	01:BAR_SCALE_DIV=10	Select the number of divisions using the [△]/[▽] keys, then press the [↵] key.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. Pressing the [↵] key in this step returns to the display 'BAR_SCALE_DIV = □ ' Pressing the **ESC** key in this step returns to the display To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

4.10 Turning ON/OFF the Waveform Span Rate Display and the Message Menu Display

Waveform Span Rate Display : Select whether or not to display the waveform span rate on the upper left of the screen.

Message Menu Display : Select whether or not to display the menu for enabling the message display on the SET menu of the operation mode.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP ↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP ↵	MODE=SPECIAL	Select the display 'MODE=SPECIAL' using the [△]/[▽] keys. Press the [↵] key.
3	ACK △/◄▽ DISP ↵	DISP TIME/DIV=ON	Select whether or not to display the waveform span rate (ON/OFF) using the [△]/[▽] key and press the [↵] key.
4	ACK △/◄▽ DISP ↵	MESSAGE PANEL=ON	Select whether or not to display the message menu on the SET menu of the operation mode using the [△]/[▽] key and press the [↵] key.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. Pressing the [↵] key in this step returns to the display 'DISP TIME/DIV= □ ' Pressing the **ESC** key in this step returns to the display To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

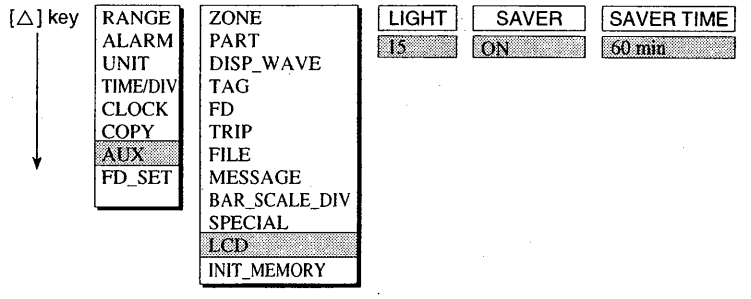
4.11 Settings of LCD Brightness and LCD Saver (LCD)

Follow the procedure below to set the brightness and saver for the LCD.
Brightness (LIGHT): Select from levels 1 to 15. The initial setting is 8.
LCD saver (SAVER): This function dims the backlight automatically when there have been no key operations for a certain time, in order to prolong the life of the backlight. The initial setting is off.

Note

When the saver is set to on, the backlight is automatically dimmed after a certain time. Pressing any key or inserting a floppy disk when the backlight is dimmed returns the brightness to the original level set in 'LIGHT.'

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	MODE=LCD	Select the display 'MODE=LCD' using the [△]/[▽] keys. Press the [↵] key.
3	ACK △/◄▽ DISP↵	LIGHT=15	Use the [△]/[▽] keys to select the brightness level from '01' to '15' ('01' is the darkest and '15' is the brightest), then press the [↵] key.
4	ACK △/◄▽ DISP↵	SAVER=ON	Select 'ON' or 'OFF' using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄▽ DISP↵	SAVER TIME=60min	If you selected 'ON,' select the time after which to dim the backlight. Select 1, 2, 5, 10, 30, or 60 minutes using the [△]/[▽] keys, then press the [↵] key.
6	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. Pressing the [↵] key in this step returns to the display 'LIGHT= □ ' Pressing the **ESC** key in this step returns to the display To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

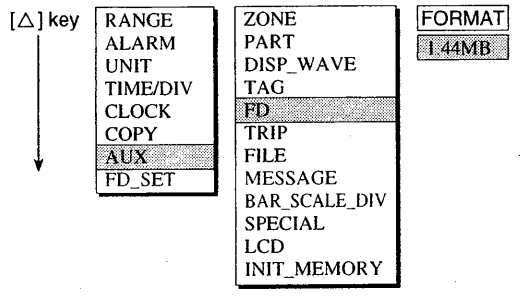
Chapter 5 FLOPPY DISK AND FILES (OPERATIONS IN SET MODE)

5.1 Setting the Floppy Disk Format (AUX–FD) (Only for VR202/VR204)

Follow the procedure below to set the formatting type for floppy disks—be sure to select 1.44 MB when using the English version software even though 1.2 MB can be selected in the following procedure. The type set by this procedure will automatically be selected when formatting a floppy disk. For the VR206, this menu item is not displayed and the formatting type is always 1.44 MB.

For details on how to format a floppy disk, see Section 5.4, "Formatting a Floppy Disk."

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	MODE=FD	Select the 'MODE=FD' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP ↵	FORMAT=1.44M	Select '1.44M' (or '1.2M' only if you are using the Japanese version software and NEC PC-9801 series computer) using the [△]/[▽] keys, then press the [↵] key.
4	DISP ↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To change the setting, press the [↵] key to return to the 'FORMAT= □□□ ' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

5.2 Setting the Data File Name (AUX-FILE)

Select the method of setting the names of event files and display data files from the following three:

Automatic setting (DATE)
User-defined (SET)
Automatic increment (AUTO)

If you select the automatic setting method, files names to be set indicate the date and time when the trigger is raised or when data are saved to the floppy disk.

If you select the user-defined method, enter the file names individually for event and display data files. The default names are blanks if you select the user-defined method. Even when there is no display data file to be saved, enter the file names for both event and display data files. A comment can also be attached to the event and display data files.

If you select the automatic increment method, enter three desired characters and a three-digit number. Beginning with the value you entered, the three-digit number will be incremented by one automatically each time measured data are saved. The default values are "AAA" and "001," respectively. These are set to the second to seventh characters of each file name.

Note

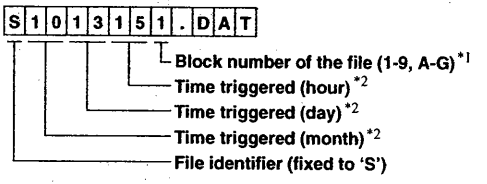
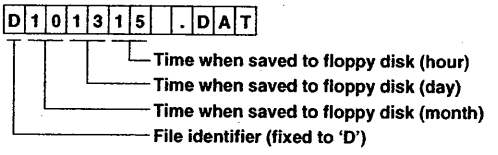
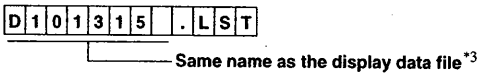
Once user-defined names have been set, they will remain the same until changed. Note that if there is already a file with the same file name in the floppy disk when saving the measured data to that floppy disk, the file will be overwritten.

File Names

- When specifying the file names, follow the rules below.
  - The maximum length is follows.
    User-defined: seven characters
    Automatic increment: three characters
  - The following system-reserved names cannot be used:
    CON, PRN, AUX, AUX1, AUX2, NUL, CLOCK, blanks.
  - The following characters cannot be used:
    * (asterisk), . (period), + (plus sign), / (slash).
- For a user-defined file name, the suffix code as shown below is appended automatically (when saving data to a floppy disk).

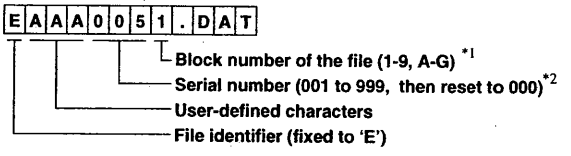
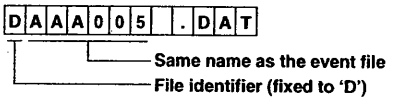
File	Suffix Code
Event file	.DAT
Display data file	.DAT
Parameter list file	.LST
Information file	.INF

When the file name is set automatically, the file names are set (when saving data to a floppy disk) as follows.

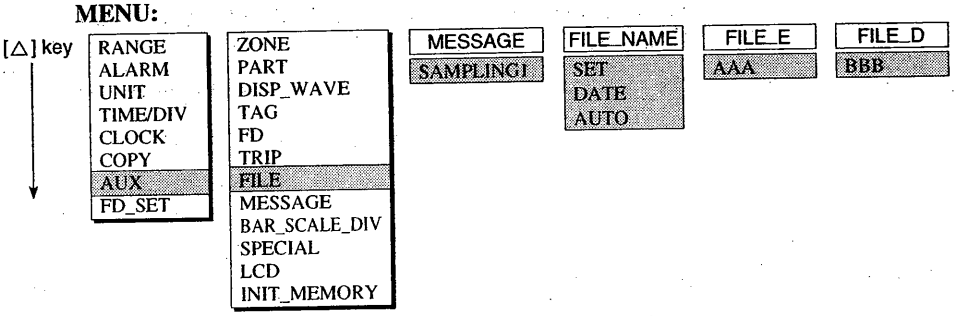
File	Format of File Name (Automatic Setting)
Event file	
Display data file	
Parameter list file	
Information file	

*1 If multiple event files are created, the event file number is appended. (This also occurs when user-defined names are used.)
*2 When the trigger is set as trigger-free, these are the times when the data are saved to the floppy disk.
*3 When there is no display data file to be saved, these names are the same as the file name of the event file.

When the file name is set automatic increment, the file name are set (when saving data to a floppy disk) as follows.

File	Format of File Name (Automatic Increment)
Event file	
Display data file	
Parameter list file	
Information file	

*1 If multiple event files are created, the event file number is appended. (This also occurs when user-defined names are used.)
*2 Each time measured data are saved, the number is incremented by one automatically.
*3 When there is no display data file to be saved, these names are the same as the file name of the event file.



PROCEDURE:

(1) When setting user-defined file names

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP↵	MODE=FILE	Select the 'MODE=FILE' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ ► ▷ DISP↵	MSG=SAMPLING1	Enter a comment for the files using up to thirty-two characters if necessary. Use the [△]/[▽] keys to select the character in each digit on the entry cursor and the [▷] key to move the entry cursor. After the entry, press the [↵] key.
4	ACK △/◄ ▽ DISP↵	FILE_NAME=SET	Select 'SET' using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ ► ▷ DISP↵	FILE_E=AAA	Enter the file name for the event file using up to seven characters. Use the [△]/[▽] keys to select the character in each digit on the entry cursor and the [▷] key to move the entry cursor. After the entry, press the [↵] key.

Note

If no file name is entered or if the entered name is illegal, the message 'E217: INVALID FILE NAME' appears. In this case, press any key. The message then disappears and the display is returned to the status before the file name was entered.

6	ACK △/◄ ▽ ► ▷ DISP↵	FILE_D=BBB	Enter the file name for the display data file using up to seven characters. Use the [△]/[▽] keys to select the character in each digit on the entry cursor and the [▷] key to move the entry cursor. After the entry, press the [↵] key.

Note

- If no file name is entered or if the entered name is illegal, the message 'E217: INVALID FILE NAME' appears. In this case, press any key. The message then disappears and the display is returned to the status before the file name was entered.
- The same name as the one for the event file cannot be specified for the display data file.

7	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To modify the settings, press the [↵] key to return to the 'MSG= □□□□ ' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

(2) When using automatically assigned file names

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	MODE=FILE	Select the 'MODE=FILE' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽►▷ DISP↵	MSG=SAMPLING1	Enter a comment for the files using up to thirty-two characters if necessary. Use the [△]/[▽] keys to select the character in each digit on the entry cursor and the [▷] key to move the entry cursor. After the entry, press the [↵] key.
4	ACK △/◄▽ DISP↵	FILE_NAME=DATE	Select 'DATE' using the [△]/[▽] keys, then press the [↵] key.
5	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the 'MSG= □□□□ ' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

(3) When using automatically incrementing file names

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	MODE=FILE	Select the 'MODE=FILE' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽►▷ DISP↵	MSG=SAMPLING1	Enter a comment for the files using up to thirty-two characters if necessary. Use the [△]/[▽] keys to select the character in each digit on the entry cursor and the [▷] key to move the entry cursor. After the entry, press the [↵] key.
4	ACK △/◄▽ DISP↵	FILE_NAME=AUTO	Select 'AUTO' using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄▽►▷ DISP↵	FILE_ID=AAA	Enter three characters for the second to fourth digits of the file names. Use the [△]/[▽] keys to select the character in each digit on the entry cursor and the [▷] key to move the entry cursor. After the entry, press the [↵] key.

Note

If the characters you entered are illegal, the message 'E217: INVALID FILE NAME' appears. In this case, press any key. The message then disappears and the display is returned to the status before the file name was entered.

6	ACK △/◄▽►▷ DISP↵	FILE_No.=__1	Enter the three-digit starting number (for the fifth to seventh digits of the file names). Use the [△]/[▽] keys to select the character in each digit on the entry cursor and the [▷] key to move the entry cursor. After the entry, press the [↵] key.
7	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. To continue setting another channel, press the [↵] key to return to the 'MSG= □□□□ ' display. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

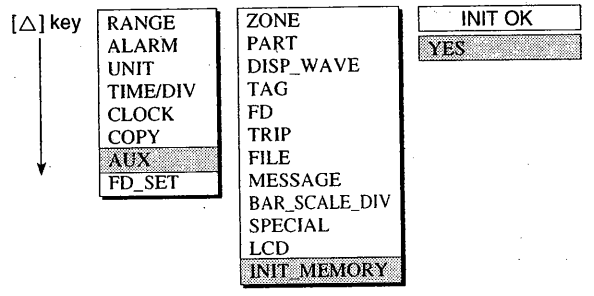
5.3 Initializing the Data Memory (AUX–INIT_MEMORY)

Follow the procedure below to initialize the contents of the event files, display data file, and information file in the internal memory. After initialization, all contents are cleared and the files are returned to the status before measurement.

Note

Once initialized, the data memory can not be restored. Save the data in memory to a floppy disk before initializing, if necessary.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄ ▽ DISP ↵	MODE=INIT_MEMORY	Select the 'MODE=INIT_MEMORY' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP ↵	INIT OK=YES	Select 'YES' to execute initialization or 'NO' to cancel initialization using the [△]/[▽] keys, then press the [↵] key. If 'YES' is selected, the data memory is initialized.
4	DISP ↵/MENU ESC 3 sec	*SET OK*	Initialization is completed (when 'YES' was entered) or canceled (when 'NO' was entered). To return to the 'INIT OK= □□ ' display, press the [↵] key. To return to the 'SET=AUX' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

5.4 Formatting a Floppy Disk (FD_SET–INIT)

Follow the procedure below to format a floppy disk. The format type set in Section 5.1, "Setting the Floppy Disk Format (FD)" is used. When formatting a floppy disk, you can also set the volume name (can be omitted).

Note

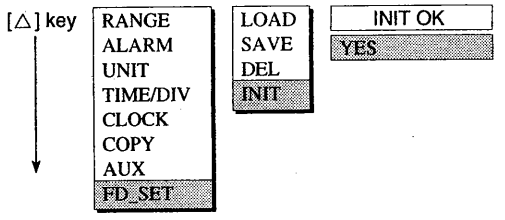
Formatting a floppy disk clears all the data on it.

Volume Name

When specifying the volume name, follow the rules below.

- The maximum length is eleven characters.
- The following characters cannot be used:
  * (asterisk), . (period), + (plus sign), / (slash).

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec	SET=FD_SET	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=FD_SET' display using the [△]/[▽] keys, then press the [↵] key.
	ACK △/◄ ▽ DISP ↵		
2	ACK △/◄ ▽ DISP ↵	SET=INIT	Select the 'SET=INIT' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ ► ▷ DISP ↵	VOLUME=VR100	Enter the volume name using up to eleven characters (can be omitted). Use the [△]/[▽] keys to select a character in each digit on the entry cursor and the [▷] key to move the entry cursor. After entering all characters, press the [↵] key. If you omit the volume name, simply press the [↵] key without entering any character.
4	ACK △/◄ ▽ DISP ↵	INIT OK=YES	Use the [△]/[▽] keys to select 'YES' to execute formatting or 'NO' to cancel, then press the [↵] key.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	If 'YES' is selected, the floppy disk is formatted. The floppy disk has been formatted (when 'YES' was entered) or formatting has been canceled (when 'NO' was entered). To format another floppy disk, press the [↵] key to return to the 'SET=INIT' display. To return to the 'SET=FD_SET' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

5.5 Operations on SET Configuration File

The following sections describe how to save, read, and delete the file which contains the settings made in SET mode.

5.5.1 Saving the SET Configuration File (FD_SET–SAVE)

Follow the procedure below to save to a floppy disk the settings made in SET mode.

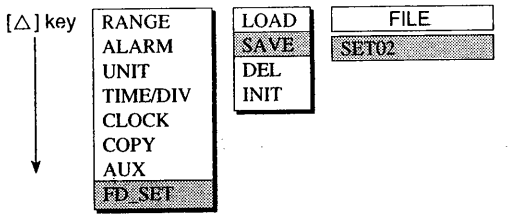
File Names

- When specifying the file name, follow the rules below.
  - The maximum length is eight characters.
  - The following system-reserved names cannot be used:
    CON, PRN, AUX, AUX1, AUX2, NUL, CLOCK.
  - The following characters cannot be used:
    * (asterisk), . (period), + (plus sign), / (slash).
- The suffix code ".PNL" is appended to the file name automatically.

Space in FDC

If the space remaining in the FDC is less than 4 K bytes, the SET configuration file cannot be saved to it. In this case, the message 'E201: INSUFFICIENT DISK SPACE' appears.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=FD_SET	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=FD_SET' display using the [△]/[▽] keys, then press the [↵] key.
			Insert a floppy disk into the drive.
2			
3	ACK △/◄ ▽ ► ▷ DISP ↵	SET=SAVE	Select the 'SET=SAVE' display using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	file= FILE=SET02	• To overwrite an existing file: Pressing the [△]/[▽] keys calls up the names of the configuration files stored on the floppy disk. Call up the desired file name and press the [↵] key. The display then changes to 'FILE=<file name>.' Pressing the [↵] key again overwrites the file. • To save as a new file: Press the [↵] key. The display then changes to 'FILE=' to allow the file name to be entered. Enter the file name (using up to eight characters) and press the [↵] key. If no file name is entered or if the entered name is illegal, the message 'E217: INVALID FILE NAME' is displayed. In this case, press any key to return to the preceding state, then enter a proper name.
		Saving....*	The file is saved.

5 DISP ↵/MENU ESC 3 sec

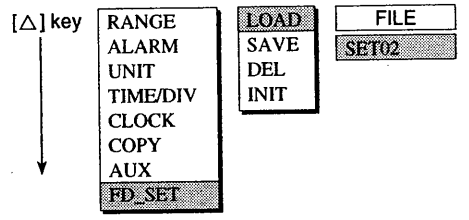
SET OK

Saving is completed.
To return to the 'SET=SAVE' display, press the [↵] key.
To return to the 'SET=FD_SET' display, press the **ESC** key.
To return to the operation mode, press the **MENU** key for three seconds.

5.5.2 Reading the SET Configuration File (FD_SET–LOAD)

Follow the procedure below to load a file (suffix .PNL) which contains the settings made in SET mode, from a floppy disk to the internal memory.

MENU:



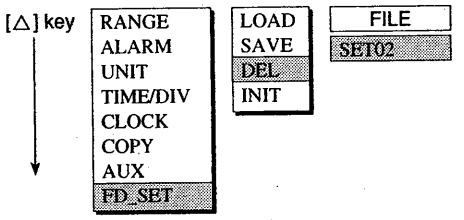
PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP ↵	SET=FD_SET	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=FD_SET' display using the [△]/[▽] keys, then press the [↵] key.
2			Insert a floppy disk into the drive.
3	ACK △/◄ ▽ DISP ↵	SET=LOAD	Select the 'SET=LOAD' display using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP ↵	FILE=SET02	Select which of the files is to be loaded using the [△]/[▽] keys, then press the [↵] key.
		Loading....*	The file is loaded. When loading is completed, the mode is automatically switched back to the operation mode.

5.5.3 Deleting the SET Configuration File (FD_SET–DEL)

Follow the procedure below to delete from a floppy disk a file (suffix .PNL) which contains the settings made in SET mode.

MENU:



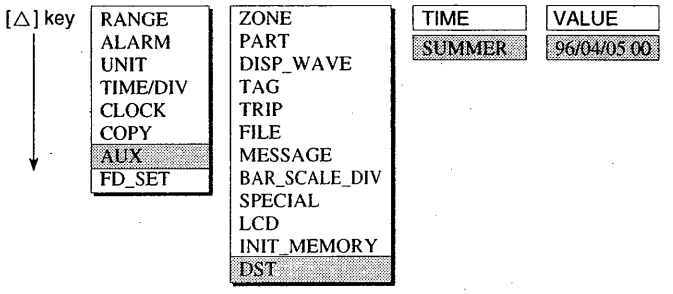
PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄ ▽ DISP	SET=FD_SET	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=FD_SET' display using the [△]/[▽] keys, then press the [↵] key.
2			Insert a floppy disk into the drive.
3	ACK △/◄ ▽ DISP	SET=DEL	Select the 'SET=DEL' display using the [△]/[▽] keys, then press the [↵] key. If an error message appears, see Section 8.1, "Error Messages."
4	ACK △/◄ ▽ DISP	FILE=SET02	Select which of the files is to be deleted using the [△]/[▽] keys, then press the [↵] key.
5	DISP ↵/MENU ESC 3 sec	*SET OK*	The file is deleted. To delete another file, press the [↵] key to return to the 'SET=DEL' display. To return to the 'SET=FD_SET' display, press the **ESC** key. To return to the operation mode, press the **MENU** key for three seconds.

5.6 Setting the Summer/Winter Time (AUX–DST) – Option

Using this function the VR200 will automatically change its date and time to the summer time or winter time when appropriate. Follow the procedure below to set the automatic change between summer time and winter time. In this setting, you enter the date and time when the summer or winter time will go into effect.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	MENU ESC 3 sec ACK △/◄▽ DISP↵	SET=AUX	Press the **MENU** key for three seconds to enter the SET mode. Select the 'SET=AUX' display using the [△]/[▽] keys, then press the [↵] key.
2	ACK △/◄▽ DISP↵	MODE=DST	Select the 'MODE=DST' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄▽ DISP↵	TIME=SUMMER	Select whether you want to enter the summer time or the winter time using the [△]/[▽] keys, then press the [↵] key. If you specify SUMMER, the time will be adjusted to one hour later when the specified date and time is reached. If you specify WINTER, the time will be adjusted to one hour earlier when the specified date and time is reached. When the set time is reached, the setting will return to its initial value of 50/01/01 00.
4	ACK △/◄▽►▷ DISP↵	96/04/05 00 SUMMER=96/04/05 00	Then set the date using the [△]/[▽] and [▷] keys. The date should be entered as year/month/day. The values of the years are as follows: 00 to 49 stand for the year 2000 to 2049, whereas 50 to 99 stand for the years 1950 to 1999. Then set the time. The time when the summer (or winter) time should go into effect should be entered at the last two digits of the display. You can only enter the hour. Then press the [↵] key.
5	DISP↵/MENU ESC 3 sec	*SET OK*	The setting is completed. Press the [↵] key to return to the 'TIME=SUMMER' display, or press the **ESC** key to go to the 'SET=AUX' display; or press **MENU** key for three seconds to return to the Operation Mode.

Note

- If the power is off when the set date and time are reached, the time is not adjusted.
- Depending on the number of channels used, the VR206 may store more than one-year's worth of data. In this case, the summer/winter time switching occurs more than once in the stored data; however, the time of summer/winter time switching that is stored in the information file of the event files is only the most recent time when switching occurred.

Chapter 6 OPERATIONAL PREFERENCES SETUP (OPERATIONS IN SETUP MODE)

Note

The measurements, display, and alarm detection are suspended while the recorder is in SETUP mode.

CAUTION

- Selecting the 'SETUP=END' and then 'END&INIT. DATA=STORE' display and pressing the [↵] key at the end of each procedure (described in this chapter) initializes the data memory and information file. If necessary, save the data memory contents (e.g., measured data) to a floppy disk before setting.
- Do not turn off the power before switching back to the operation mode after executing 'SETUP=END' and 'END&INIT.DATA=STORE,' otherwise the calibration data in the recorder may be destroyed.

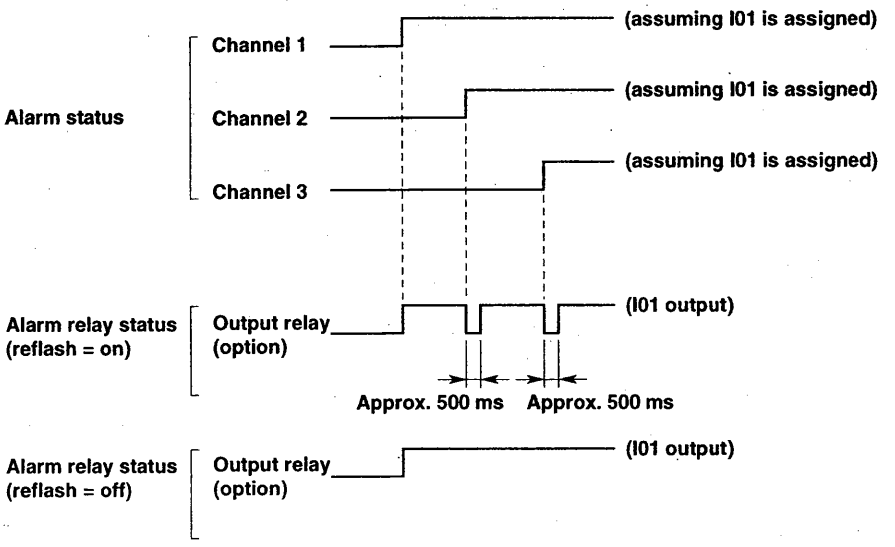
6.1 Changing the Initial Settings for the Alarm Function (ALARM)

The following sections describe how to change the initial settings for the alarm function.

6.1.1 Setting the reflash function on/off (initial value = 'OFF')
6.1.2 Setting the logic of representative alarm output relay, AND or OR (initial value = 'NONE')
6.1.3 Setting the output relay to be energized/de-energized when an alarm occurs (initial value = 'ENERG')
6.1.4 Setting the alarm output behavior, hold or non-hold (initial value = 'NONHOLD')
6.1.5 Setting the ALM indication behavior, hold or non-hold (initial value = 'NONHOLD')
6.1.6 Setting the sampling interval for rate-of-change alarms (initial value = '01')
6.1.7 Setting the alarm hysteresis on/off (initial value = 'ON')

6.1.1 Setting the Reflash Function On/Off

The reflash function indicates repeating alarms occurring among a group of alarms sharing the same output relay. When the optional alarm output relays are not installed, data entry will be ignored. Note that only I01 to I03 (which should be assigned in the alarm setting also) can be used for the reflash function.
The initial value is 'OFF'.



PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=ALARM	Select the display 'SETUP=ALARM' using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	REFLASH=ON	Select ON or OFF using the [△]/[▽] keys, then press the [↵] key. The display is switched to the procedure in Section 6.1.2. Pressing the **ESC** key in this step makes this new setting invalid. Before leaving the SETUP mode, you must store the new setting in the internal memory.
4	DISP	*ALARM SET*	Press the [↵] key several times, or proceed to and finish other alarm settings, until the display '*ALARM SET*' appears.
5	MENU/ESC ACK △/◄ ▽ DISP	SETUP=END	Press the **ESC** key to return to the 'SETUP=ALARM' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
6	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

Note

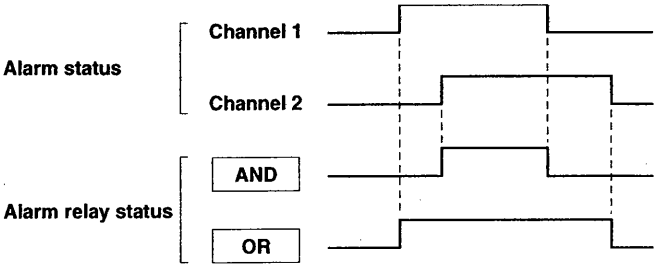
- When I01 to I03 are used for the reflash function, they cannot be used to represent the AND logic of multiple alarms (see Section 6.1.2).
- Once this reflash function is set on, I01 to I03 will be exclusively used for the reflash function regardless of the number of alarm output relays.

6.1.2 Setting the Logic of Representative Alarm Output Relay, AND or OR

When a group of alarms is assigned to (optional) output relays, the logic of the relay action to represent these alarms can be set to either AND or OR. The default is 'NONE,' which means that all the relays are set to use OR logic.
AND: True (1) when all the alarms assigned occur
OR: True (1) when any one of the alarms assigned occurs
If the optional alarm output relays are not installed, data entry will be ignored.

Note

When you set the I01 to I03 relays to reflash, only I04 to I06 can be specified for the AND/OR representative alarms.

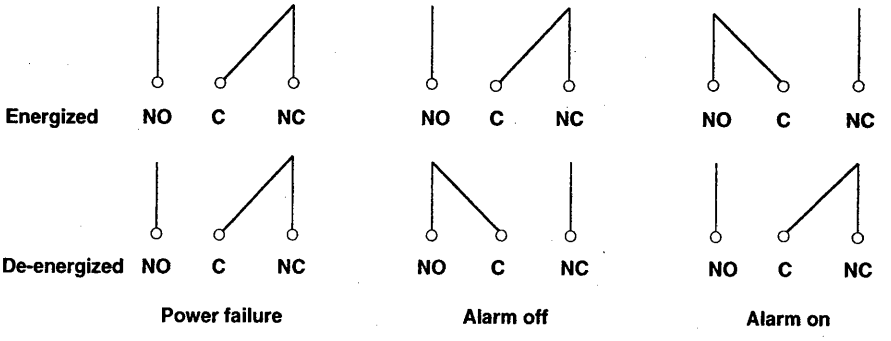


PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=ALARM	Select the display 'SETUP=ALARM' using the [△]/[▽] keys, then press the [↵] key.
3	DISP	AND=I01-I02	Press the [↵] key repeatedly until the display 'AND=□□' appears.
4	ACK △/◄ ▽ DISP	AND=I01-I06	Use the [△]/[▽] keys to select which relays are to use AND logic. If you specify 'I01-I06' for example, all six relays (I01 to I06) will use AND logic. (Note that 'I01' is always displayed on the left side of the entry field, i.e., the beginning number of the relays.) Selecting 'NONE' means that all relays will use OR output. After making a selection, press the [↵] key. The display is switched to the procedure in Section 6.1.3. Pressing the **ESC** key in this step makes this new setting invalid.
5	DISP	*ALARM SET*	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the [↵] key several times, or proceed to and finish other alarm settings, until the display '*ALARM SET*' appears.
6	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Press the **ESC** key to return to the 'SETUP=ALARM' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.1.3 Setting the Output Relay to Be Energized/De-energized When an Alarm Occurs

The action of the alarm output relays can be selected between "energized on alarm" or "de-energized on alarm." Setting the "de-energized on alarm" action allows the contact to output the same signal when a power failure occurs as when an alarm occurs. (This setting applies to all the alarm output relays.)
The default is "energized on alarm" (set as 'ENERG').



NO = Normally opened; C = common; and NC = normally closed

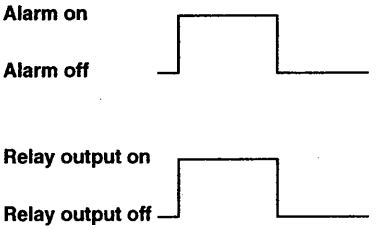
PROCEDURE:

	Key Sequence	Display	
1	[DISP]		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	[ACK] [△]/[◄–] [▽] [DISP]	SETUP=ALARM	Select the display 'SETUP=ALARM' using the [△]/[▽] keys, then press the [↵] key.
3	[DISP]	ALARM=ENERG	Press the [↵] key repeatedly until the display 'ALARM=□□' appears.
4	[ACK] [△]/[◄–] [▽] [DISP]	ALARM=ENERG	Use the [△]/[▽] keys to select • 'ENERG' for "energized on alarm" or • 'DE_EN' for "de-energized on alarm" and press the [↵] key. The display is switched to the procedure in Section 6.1.4. Pressing the **ESC** key in this step makes this new setting invalid.
5	[DISP]	*ALARM SET*	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the [↵] key several times, or proceed to and finish other alarm settings, until the display '*ALARM SET*' appears.
6	[MENU/ESC] [ACK] [△]/[◄–] [▽] [DISP]	SETUP=END	Press the **ESC** key to return to the 'SETUP=ALARM' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7	[ACK] [△]/[◄–] [▽] [DISP]	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.1.4 Setting the Alarm Output Behavior, Hold or Non-hold

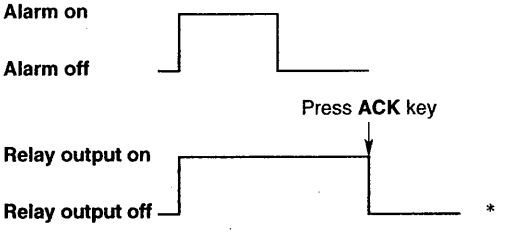
You can set the behavior of the alarm output relays to either hold or non-hold. The default is non-hold (set as 'NONHOLD') This setting applies to all the alarm output relays.
If you have set the I01 to I03 relays to reflash, the non-hold type must be set.

Non-hold Type ('NONHOLD'):
The alarm contact is set and reset in synchronization with the alarm status.



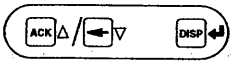
* Shows the status of the normally-opened (NO) contact of the relay. The status is the reverse for the normally-closed contact.

Hold Type ('HOLD'):
Set when an alarm occurs, the alarm contact is not reset even if the alarm recovers until the **ACK** key is pressed.



PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=ALARM	Select the display 'SETUP=ALARM' using the [△]/[▽] keys, then press the [↵] key.
3	DISP	RLY=NONHOLD	Press the [↵] key repeatedly until the display 'RLY=□□' appears.
4	ACK △/◄ ▽ DISP	RLY=NONHOLD	Use the [△]/[▽] keys to select • 'HOLD' for the hold type or • 'NONHOLD' for the non-hold type then press the [↵] key. The display is switched to the procedure in Section 6.1.5. Pressing the **ESC** key in this step makes this new setting invalid.
5	DISP	*ALARM SET*	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the [↵] key several times, or proceed to and finish other alarm settings, until the display '*ALARM SET*' appears.
6	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Press the **ESC** key to return to the 'SETUP=ALARM' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.

7 

Finally,

- to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or
- to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key.

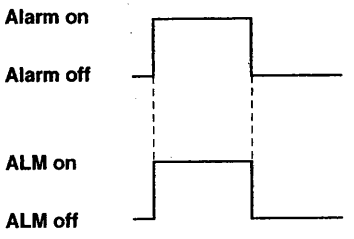
The mode is then released from SETUP to operation.

6.1.5 Setting the ALM Indication Behavior, Hold or Non-hold

You can set the behavior of the ALM indication to either hold or non-hold. The default is non-hold (set as 'NONHOLD') This setting applies to all the alarms.

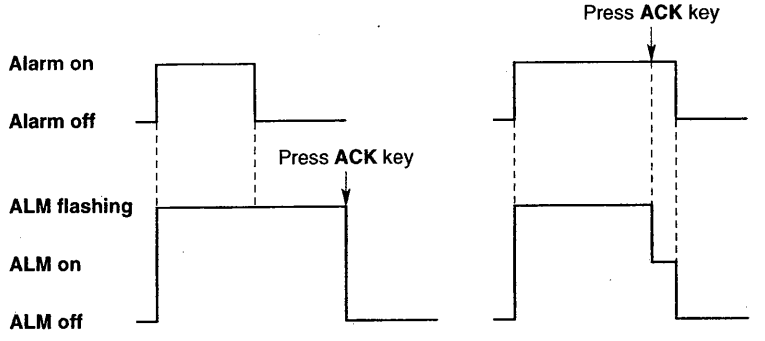
Non-hold Type ('NONHOLD'):

The ALM indication is displayed in synchronization with the alarm status.



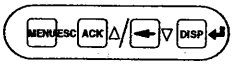
Hold Type ('HOLD'):

The ALM indication starts flashing when an alarm occurs, and it remains flashing even if the alarm is recovered until the **ACK** key is pressed. When the **ACK** key is pressed, the ALM indication stops flashing, or it disappears if the alarm has already recovered.

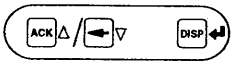


PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄- ▽ DISP	SETUP=ALARM	Select the display 'SETUP=ALARM' using the [△]/[▽] keys, then press the [↵] key.
3	DISP	IND=NONHOLD	Press the [↵] key repeatedly until the display 'IND=□□' appears.
4	ACK △/◄- ▽ DISP	IND=NONHOLD	Use the [△]/[▽] keys to select • 'HOLD' for the hold type or • 'NONHOLD' for the non-hold type and press the [↵] key. The display is switched to the procedure in Section 6.1.6. Pressing the **ESC** key in this step makes this new setting invalid.
5	DISP	*ALARM SET*	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the [↵] key several times, or proceed to and finish other alarm settings, until the display '*ALARM SET*' appears.

6 

Press the ESC key to return to the 'SETUP=ALARM' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.

7 

Finally,

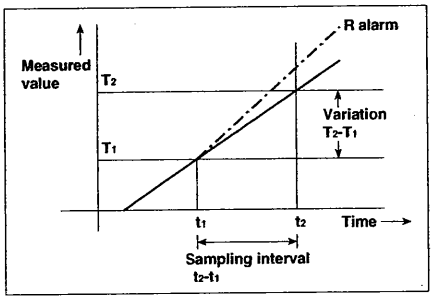
- to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or
- to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key.

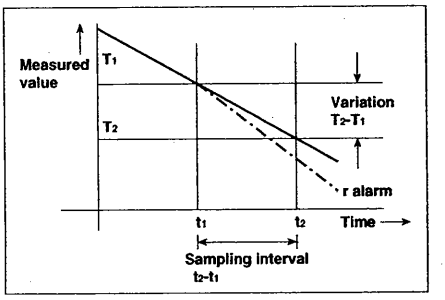
The mode is then released from SETUP to operation.

6.1.6 Setting the Sampling Interval for Rate-of-change Alarms

Follow the procedure below to set the sampling interval for rate-of-change alarms (effective for all channels).
The value you enter for this setting is the number of sampling times, and the initial value is '1'. The resultant sampling interval for rate-of-change alarms is as follows.

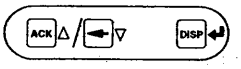
- For VR202/VR204:
  interval to be set = 125 ms × number of sampling times
- For VR206, when the A/D integration frequency is set as 50/60 Hz or AUTO:
  interval to be set = 1 s × number of sampling times
- For VR206, when the A/D integration frequency is set as 100 ms:
  interval to be set = 2 s × number of sampling times





PROCEDURE:

	Key Sequence	Display	
1	DISP ↵		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP ↵	SETUP=ALARM	Select the display 'SETUP=ALARM' using the [△]/[▽] keys, then press the [↵] key.
3	DISP ↵	R_TIME=01	Press the [↵] key repeatedly until the display 'R_TIME=□□' (prompting you to enter the interval for monitoring the rate-of-change alarm on increase) appears.
4	ACK △/◄ ▽ DISP ↵	R_TIME=01	Select the number of sampling times using the [△]/[▽] keys, then press the [↵] key. The interval to be set is expressed using the number of sampling times on increase, R_TIME, as: interval to be set = measuring period × number of sampling times
5	ACK △/◄ ▽ DISP ↵	r_TIME=01	The display 'r_TIME=□□' then appears, prompting you to enter the interval for monitoring the rate-of-change alarm on decrease. In the same manner as above, select the number of sampling times using the [△]/[▽] keys, then press the [↵] key. The display is switched to the procedure in Section 6.1.7. Pressing the **ESC** key in this step makes this new setting invalid.
6	DISP ↵	*ALARM SET*	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the [↵] key several times, or proceed to and finish other alarm settings, until the display '*ALARM SET*' appears.
7	MENU/ESC ACK △/◄ ▽ DISP ↵	SETUP=END	Press the **ESC** key to return to the 'SETUP=ALARM' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.

8 

END&INIT.DATA=STORE

Finally,

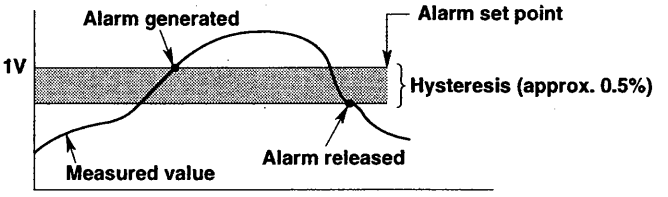
- to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or
- to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key.

The mode is then released from SETUP to operation.

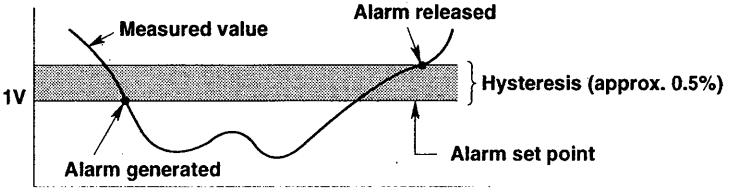
6.1.7 Setting the Alarm Hysteresis On/Off

The alarm hysteresis is the gap between the levels of alarm occurrence and recovery (applies to all alarms). You can choose between two levels of hysteresis: 0% (= off) and approximately 0.5% of recording span (= on).
The initial value is 'ON.'

High Limit Alarm (H)



Low Limit Alarm (L)



Note

This hysteresis setting applies to all alarms on all channels. You can not activate or inactivate the hysteresis for a particular channel or alarm.

PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=ALARM	Select the display 'SETUP=ALARM' using the [△]/[▽] keys, then press the [↵] key.
3	DISP	ALM_HYS=ON	Press the [↵] key repeatedly until the display 'ALM_HYS=□□' appears.
4	ACK △/◄ ▽ DISP	ALM_HYS=ON	Select ON or OFF using the [△]/[▽] keys, then press the [↵] key.
		ALARM SET	The settings for alarm behavior are completed. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
5	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=ALARM' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
6	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.2 Changing the Initial Settings for Input Processing

The following sections describe how to change initial settings for the input processing.

6.2.1 A/D Integration Frequency (INTG) Setting
6.2.2 TC Burnout Upscale/Downscale (B.OUT) Setting
6.2.3 Setting of Reference Junction Compensation (RJC)
6.2.4 Input Filter (FILTR) Setting

6.2.1 A/D Integration Frequency (INTG) Setting

This setting specifies which A/D integration frequency will be used: 50 Hz, 60 Hz, or 100 ms (100 ms is available for the VR206 only).
Depending on the power supply, the integration frequency affects the effectiveness of noise rejection and therefore the recording.

For VR202/VR204:
If the power supplies of the recorder and the measuring object are the same and if the integration frequency is set as 'AUTO' (automatic switching between 50 and 60 Hz depending on the frequency of the power supply; fixed to 50 Hz for the /P1 mode (24 V DC supply)), the integration frequency is automatically switched and the effect of noise is automatically minimized. 'AUTO' is therefore the recommended setting in this case.
If the power supplies are different, select the integration frequency as either 50 Hz or 60 Hz depending on the power supply of the instrument with the highest noise level.
The initial setting is 'AUTO.'

For VR206:
To have the most effective noise reduction, select 100 ms; however, 50 Hz, 60 Hz, or AUTO (automatic switching between 50 and 60 Hz depending on the frequency of the power supply; fixed to 50 Hz for the /P1 mode (24 V DC supply)) may be selected to increase the calculation speed.

PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=INTG	Select the display 'SETUP=INTG' using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	INTG=AUTO	Select either 50 Hz, 60 Hz, 100 ms, or AUTO using the [△]/[▽] keys, then press the [↵] key. For the VR202/VR204, the measuring period is fixed to 125 ms regardless of this integration frequency setting. For the VR206, the measuring period is 1 s unless 100 ms is set for this integration frequency setting, in which case it is 2 s.
		INTG SET	The setting for the integration frequency is completed. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
4	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=INTG' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or

- to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key.

The mode is then released from SETUP to operation.

6.2.2 TC Burnout Upscale/Downscale (B.OUT) Setting

This setting specifies where the reading should be placed if a thermocouple input burns out: upscale ('UP,' clamped to 100%) or downscale ('DOWN,' clamped to 0%), and on/off of this burnout function itself.
The selection of upscale or downscale applies to all channels; however, the function can be set on or off for each channel.
The initial settings are 'UP' and 'OFF' for all channels.

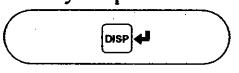
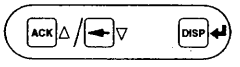
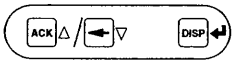
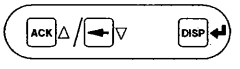
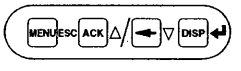
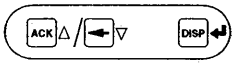
PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=B.OUT	Select the display 'SETUP=B.OUT' using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	B.OUT=UP	Select 'UP' (burnout upscale) or 'DOWN' (downscale) using the [△]/[▽] keys, then press the [↵] key.
			Note This setting applies to all channels.
4	ACK △/◄ ▽ DISP	01:B.OUT=	Select the channel to which the burnout upscale/downscale function is to be set using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP	01:B.OUT=OFF	Select 'ON' or 'OFF' as required using the [△]/[▽] keys, then press the [↵] key.
		B.OUT SET	The setting for the TC burnout upscale/downscale function is completed for the selected channel. To set the function on or off for another channel, press the [↵] key. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
6	MENU/ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=B.OUT' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.2.3 Setting of Reference Junction Compensation (RJC)

This setting specifies whether internal or external reference junction compensation values are used, for each channel when inputting a thermocouple.
If set to 'INT,' the reference junction compensation is performed by the internal RJC circuit.
If set to 'EXT,' the reference junction compensation is based on the voltage set.
The initial value is 'INT.'

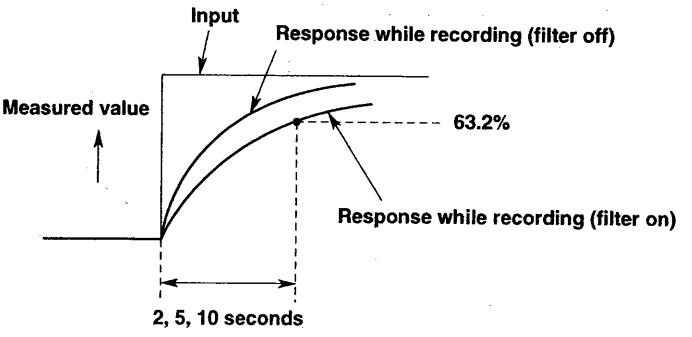
PROCEDURE:

	Key Sequence	Display	
1			While pressing the [↵] key, turn on the power to enter the SETUP mode.
2		SETUP=RJC	Select the display 'SETUP=RJC' using the [△]/[▽] keys, then press the [↵] key.
3		01:RJC=	Select the channel using the [△]/[▽] keys, then press the [↵] key.
4		01:RJC=INT	Select 'INT' or 'EXT' as required using the [△]/[▽] keys, then press the [↵] key. If you selected 'EXT,' enter the RJC voltage to be added to the input (from -20,000 to 20,000 μV, default 0 μV), then press the [↵] key.
		RJC SET	The setting is completed. To continue setting another channel, press the [↵] key. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
5		SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=RJC' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
6		END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.2.4 Input Filter (FILTR) Setting (Only for VR202/VR204)

Noise in the measured signal can be suppressed in the final reading using an input damping filter. This setting specifies for each channel the time constant of damping as zero (off), 2, 5, or 10 seconds. The initial setting is off.

A filter works as follows:



Note

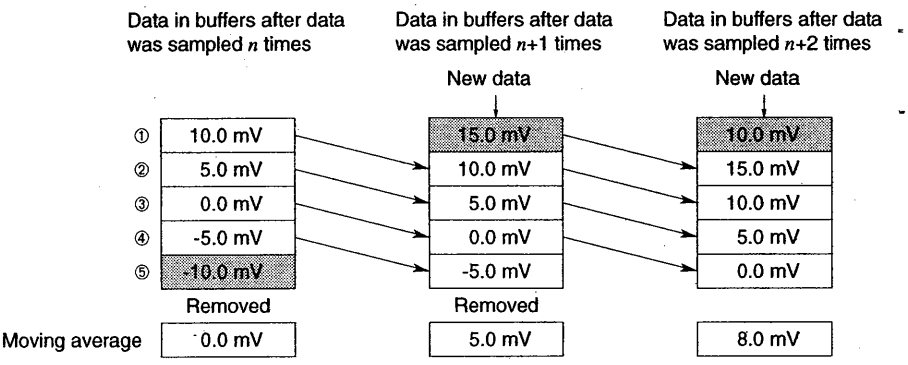
Use of the input filter degrades the response to fast input changes, so the filter should be turned off if a precise record of the original trend is required. The filter is useful when a smooth recording trend is preferred, for example, when recording a flow rate. The time constant depends on the application; try varying from the shortest time constant and increasing it to find the most suitable one.

PROCEDURE:

	Key Sequence	Display	
1	DISP↵		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK△/◄▽ DISP↵	SETUP=FILTR	Select the display 'SETUP=FILTR' using the [△]/[▽] keys, then press the [↵] key.
3	ACK△/◄▽ DISP↵	01:FILTR=	Select the channel using the [△]/[▽] keys, then press the [↵] key.
4	ACK△/◄▽ DISP↵	01:FILTR=OFF	Select 2 seconds, 5 seconds, 10 seconds, or off as required using the [△]/[▽] keys, then press the [↵] key.
		FILT SET	The setting is completed. To continue setting another channel, press the [↵] key. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
5	MENU/ESC ACK△/◄▽ DISP↵	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=FILTR' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
6	ACK△/◄▽ DISP↵	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.2.5 Moving Average (M_AVE) Setting (Only for VR206)

The VR206 can average the most recently sampled 2 to 16 measured values. Using this moving average function, fluctuations of an input signal can be filtered, providing a smooth record. The number of samples to be used for average calculation can be selected from 2 to 16 or off. The initial setting is 'OFF,' which switches off the average calculation. The sampling period is one second, or two seconds only when the A/D integration frequency is set as 100 ms.



Moving Average Calculation Buffers When Calculating Average of 5 Most Recent Samples

PROCEDURE:

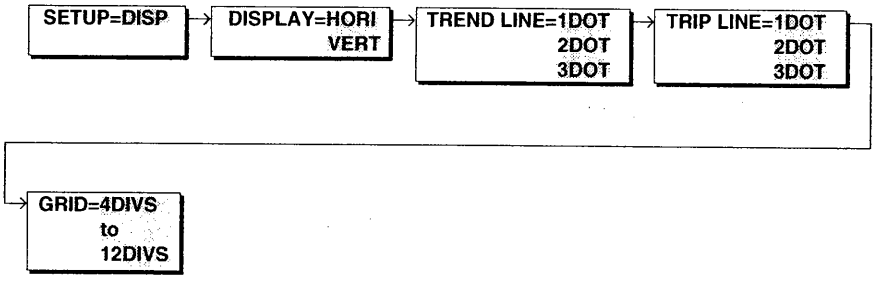
	Key Sequence	Display	
1	[DISP]		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	[ACK] [△] / [◄] [▽] [DISP]	SETUP=M_AVE	Select the display 'SETUP=M_AVE' using the [△]/[▽] keys, then press the [↵] key.
3	[ACK] [△] / [◄] [▽] [DISP]	01:M_AVE=	Select the channel using the [△]/[▽] keys, then press the [↵] key.
4	[ACK] [△] / [◄] [▽] [DISP]	01:M_AVE=OFF	Select the number of samples to be averaged, from 2 to 16 or off, as required using the [△]/[▽] keys, then press the [↵] key.
		M_AVE SET	The setting is completed. To continue setting another channel, press the [↵] key. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
5	[MENU/ESC] [ACK] [△] / [◄] [▽] [DISP]	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=M_AVE' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
6	[ACK] [△] / [◄] [▽] [DISP]	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.3 Settings of Direction of Waveform Display, Line Widths of Waveforms and Trip Levels, and Number of Divisions of Scale (DISP)

Follow the procedure below to set the direction of the waveform (trend graph) display, line widths of waveforms and trip levels, and number of divisions of scale. The available settings are as follows.

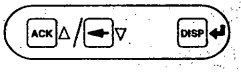
Direction of waveform display: Horizontal (HORI) or vertical (VERT). The initial setting is vertical. For the display format when this is set as vertical, refer to page 1-10.
Line widths of waveforms: 1, 2, or 3 pixels. The initial setting is 2 pixels.
Line widths of trip levels: 1, 2, or 3 pixels. The initial setting is 2 pixels.
Number of divisions of scale: 4, 5, 6, 7, 8, 9, 10, 11, and 12 divisions. The initial setting is 10 divisions.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	DISP↵		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK△/◄▽ DISP↵	SETUP=DISP	Select the 'SETUP=DISP' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK△/◄▽ DISP↵	DISPLAY=HORI	Select 'HORI' or 'VERT' for the direction of the waveform display using the [△]/[▽] keys, then press the [↵] key.
4	ACK△/◄▽ DISP↵	TREND LINE=3DOT	Select the width of the trace lines for waveforms from 1, 2, and 3 pixels using the [△]/[▽] keys, then press the [↵] key.
5	ACK△/◄▽ DISP↵	TRIP LINE=3DOT	Select the width of the trace lines for trip levels from 1, 2, and 3 pixels using the [△]/[▽] keys, then press the [↵] key.
6	ACK△/◄▽ DISP↵	GRID=5DIVS	Select the number of divisions of scale from 4 to 12 using the [△]/[▽] keys, then press the [↵] key.
		DISP SET	The setting is completed. Pressing the [↵] key returns to the 'DISPLAY= □ ' display. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
7	MENU ESC ACK△/◄▽ DISP↵	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=DISP' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
8	ACK△/◄▽ DISP↵	END&INIT.DATA=STORE	Finally,

8 

Finally,

- to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key;

or

- to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key.

The mode is then released from SETUP to operation.

6.4 Display Color (COLOR) Setting

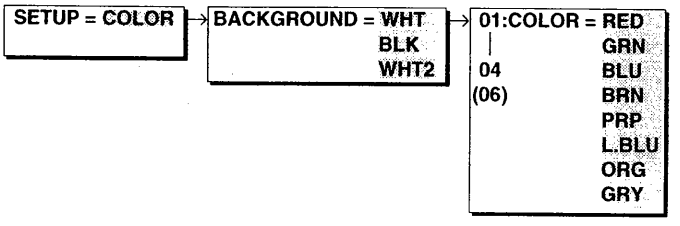
Follow the procedure below to set the colors of the background and recording traces on the screen. The available colors are as follows.

Background: Bright white (WHT), white (WHT2), or black (BLK). The initial setting is bright white.

Recording trace colors: Select for each channel from red (RED), green (GRN), blue (BLU), brown (BRN), or red-purple (PRP), light blue (L.BLU), orange (ORG), or gray (GRY). The initial settings are:

Channel 1: red
Channel 2: green
Channel 3: blue
Channel 4: red-purple
Channel 5: orange
Channel 6: light blue

MENU:



PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=COLOR	Select the display 'SETUP=COLOR' using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	BACKGROUND=WHT	Select the background color from 'WHT2', 'BLK' and, 'WHT', using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP	02:COLOR=RED	Select the channel for which you want to set the trace color using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP	02:COLOR=PRP	The entry cursor then moves to the color entry field. Use the [△]/[▽] keys to select the trace color from among 'RED,' 'GRN,' 'BLU,' 'BRN,' 'PRP', 'L.BLU,' 'ORG,' or 'GRY', then press the [↵] key.
		COLOR SET	The setting is completed. To continue setting the color for another channel, press the [↵] key to return to the display 'BACKGROUND:□.' Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
6	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=COLOR' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the

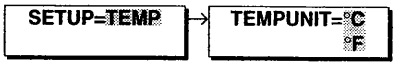
- to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key.

The mode is then released from SETUP to operation.

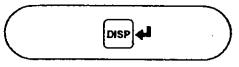
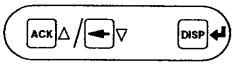
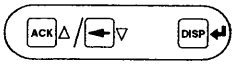
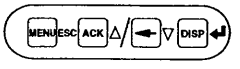
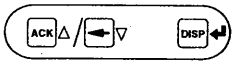
6.5 Setting the Temperature Unit (TEMP)

For the TC or RTD type, the VR200 will automatically append the temperature unit (°C or °F).
The initial setting is '°C', and common for all channels.

MENU:



PROCEDURE:

	Key Sequence	Display	
1			While pressing the [↵] key, turn on the power to enter the SETUP mode.
2		SETUP=TEMP	Select the display 'SETUP=TEMP' using the [△]/[▽] keys, then press the [↵] key.
3		TEMPUNIT=°C	Select '°C' or '°F' using the [△]/[▽] keys, then press the [↵] key.
		TEMP SET	The setting is completed. Pressing the [↵] key in this step returns to the display 'TEMPUNIT=□' Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
4		SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=TEMP' display, then select the 'SETUP=END' display using the [△]/[▽] keys, and then press the [↵] key.
5		END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, and then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

CAUTION

When you change this setting, all settings in the SET mode will return to their initial values. In the SETUP mode, the RJC setting (6.2.3) and the input filter setting (6.2.4) will return to their initial values. Other settings in the SETUP mode will not be affected. For details of the initial settings, see Appendix 1.

6.6 Setting of Data Storage Method (MEMORY)

There are two types of files where measured data is stored.

Display data file: Stores the data required to display the trends (waveforms) at the specified waveform span rate.

Event file: Stores the data sampled at the specified sampling period. Settings associated with the event file(s) other than the sampling period include the division of memory and trigger.

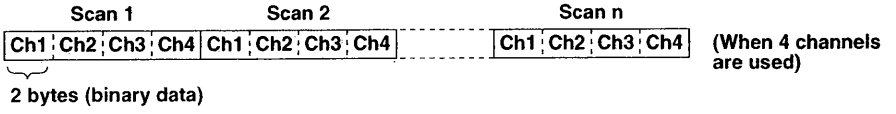
The following sections describe the items to be set for the event file(s) and display data file, then describe how to set the data storage method for the two cases where the trigger is set (trigger-on or trigger-rotation) and where the trigger is not set (trigger-free).

6.6.1 Precautions Before Setting

(1) Event File

Data Format

The measured values sampled at the specified period are stored according to the scanning sequence shown below.



Memory Length

The memory length of an event file is determined by how the memory is divided (file definitions). The relationship between the memory length and file definitions is as follows.

File Definitions	Memory Length	Description
a. Event file + display data file (1E + 1D)	Display data file (VR202/ VR204: 768K VR206: 1140K) / Event file (256K) / 0	• One event file and display data file for each are created. • If the VR has the /E4 (large memory) option, then the memory length is approximately three times that of a standard VR.
b. Event file × 16 + display data file (16E + 1D)	Display data file (VR202/ VR204: 768K VR206: 1140K) / 0 / Event file (16K)	• Sixteen event files and one display data file are created. • This combination can be selected only when the sample mode is set to trigger-on or trigger-rotation. • If the VR has the /E4 (large memory) option, then the memory length is approximately three times that of a standard VR.
c. Event file only (1E)	Event file (VR202/ VR204: 960K VR206: 1344K) / 0	• Only an event file is created. • If the VR has the /E4 (large memory) option, then the memory length is approximately three times that of a standard VR.

The number of data values that can be stored in an event file depends on not only the memory length but also the number of channels used. The table below shows the number of data values that can be stored for each channel and storage time span for each case.

If the VR has the /E4 (large memory) option, then the number of data values and storage time span is approximately three times.

VR202/VR204

File Definitions	Number of Channels Used	Number of Data Values (approx.)	Storage Time Span (approx.)	
			Sampling Speed: 1 s	Sampling Speed: 125 ms
a. 1E + 1D	1	120, 000	33.2 hours	4 hours
	2	60, 000	16.6 hours	2 hours
	3*	40, 000	11 hours	1.3 hours
	4*	30, 000	8.3 hours	1 hour
b. 16E + 1D	1	8, 000	132 minutes	16.4 minutes
	2	4, 000	66 minutes	8.2 minutes
	3*	2, 600	43 minutes	5.4 minutes
	4*	2, 000	33 minutes	4.1 minutes
c. 1E	1	480, 000	133.2 hours	16.4 hours
	2	240, 000	66.6 hours	8.2 hours
	3*	160, 000	44.4 hours	5.5 hours
	4*	120, 000	33.3 hours	4.1 hours

*:Only for VR204

VR206

File Definitions	Number of Channels Used	Number of Data Values (approx.)	Storage Time Span (approx.)	
			Sampling Speed: 60 s	Sampling Speed: 1 s
a. 1E + 1D	1	120, 000	83.2 days	33.2 hours
	2	60, 000	41.6 days	16.6 hours
	3	40, 000	27.7 days	11.0 hours
	4	30, 000	20.8 days	8.3 hours
	6	20, 000	13.8 days	5.5 hours
b. 16E + 1D	1	8, 000	132 hours	132 minutes
	2	4, 000	66 hours	66 minutes
	3	2, 600	43 hours	43 minutes
	4	2, 000	33 hours	33 minutes
	6	1, 300	21 hours	21 minutes
c. 1E	1	672, 000	466.0 days	186.4 hours
	2	336, 000	233.0 days	93.2 hours
	3	224, 000	155.2 days	62.1 hours
	4	168, 000	116.5 days	46.6 hours
	6	112, 000	77.5 days	31.0 hours

Sampling Period

The sampling period can be selected from the following four:

VR202/VR204: 125 ms, 250 ms, 500 ms, or 1 s

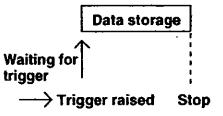
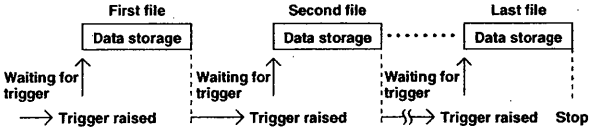
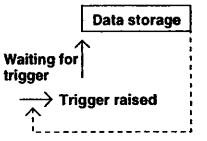
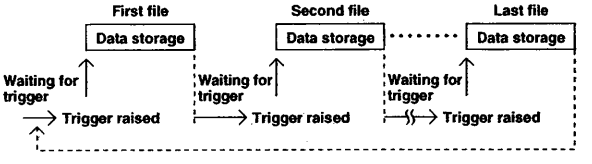
VR206: Fast, 2 s, 10 s, 30 s, 60 s, 120 s

If the sampling period is set to "Fast," the sampling period is determined by the A/D integration frequency as follows:

A/D Integration Frequency	Sampling Period
50 Hz, 60 Hz, auto	1 s
100 ms	2 s

Trigger Mode (Sampling Mode)

The trigger mode, which determines how to start and stop storing the measured data, can be selected from the following three.

Sampling Mode	Action
Trigger-free (FREE)	Data collection starts after power-on. The data are stored after the previously stored data. When the file in the internal memory becomes full, the data are overwritten.
Trigger-on (TRIG)	Data collection starts when a trigger is raised, and the subsequent action is as follows. • When there is only one event file: When the specified data values are collected (the event file becomes full), the collection stops. After this, data collection cannot be started again until the data are saved to a floppy disk or the data memory is initialized.  • When there are multiple event files: When the specified data values are collected (the event file becomes full), the collection stops and the recorder waits for the next trigger. When the next trigger is raised, data collection starts in the next event file. When all event files become full, the data collection sequence stops. This data collection sequence will start storing the data in the first event file again after the data are saved to a floppy disk or the data memory is initialized. 
Trigger-rotation (ROTATE)	Data collection starts when a trigger is raised, and the subsequent action is as follows. • When there is only one event file: When the specified data values are collected (the event file becomes full), the collection stops and waits for the next trigger.  • When there are multiple event files: When the specified data values are collected (the event file becomes full), the collection stops and the recorder waits for the next trigger. When the next trigger is raised, data collection starts in the next event file. When all event files become full, the first event file is overwritten and this data collection sequence is repeated until the data are saved to a floppy disk. This data collection sequence will begin again with the first event file after the data are saved to a floppy disk or the data memory is initialized. 

Note

If an error occurs while saving the data to a floppy in the trigger-on or trigger-rotation mode:
- The process of storing data in the internal memory is suspended until the data are successfully saved to the floppy disk.
- In the above case, the action of storing data into memory can be restarted forcibly by initializing the data memory; however, this deletes the display data at the same time.
- If a floppy disk is inserted while waiting for the trigger, the data stored in the file(s) until that time are saved to the floppy disk.

Pre-trigger (PRE.TRIG)

The pre-trigger function always stores the measured data in part of the memory, to allow a specified amount of data to be stored before the trigger (referred to as the pre-trigger data). The size of the area used for storing the pre-trigger data can be specified in increments of ten percent (from 0 to 100%). Setting the pre-trigger to 0% means that the entire file is used to store the data after the trigger, and setting it to 100% means that the entire file is used to store the data before the trigger.

Setting the Trigger Type

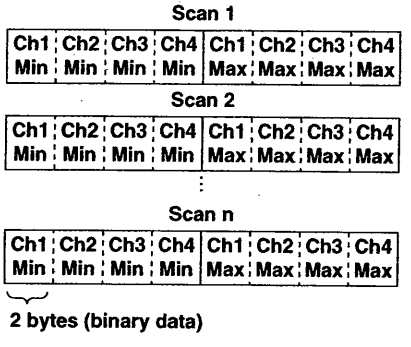
When you set the trigger mode to trigger-on or trigger-rotation, the following trigger types can be set on/off. The settings for these trigger types work as OR logic, so the recorder regards that a trigger is raised if any of the conditions corresponding to the trigger types which are set on is met.

Trigger Type	Condition to Raise a Trigger
Key trigger (TRIG KEY)	The trigger is raised manually on request. Pressing the [←] key when the message 'PUSH [←] TO TRIGGER' is displayed (called up using the **DISP** key in the operation mode) raises the trigger.
External trigger (TRIG EXT)	The trigger is raised when an external contact (Remote Control input) is set on.
Alarm trigger (TRIG ALM)	The trigger is raised when any alarm occurs.

(2) Display Data File

Data Format

The display data file stores the maximum and minimum data values within the time interval corresponding to each pixel of the trend graph (waveform) on the LCD from among the values measured every 125 ms.



For the time interval corresponding to each pixel, see Section 1.1.3, "Display Unit."

Note

By storing the data in the display data file, you can then retrieve trend graphs (waveforms) on a PC, etc.

Memory Length

When defining the file configuration as "one event file + one display file" (1E + 1D) or "sixteen event files + one display data file" (16E + 1D), the display file is created. The table below shows the number of data values that can be stored and the data storage span.

If the VR has the /E4 (large memory) option, then the number of data values and storage time span is approximately three times.

VR202/VR204

Number of Channels Used	Number of Data Values	Data Storage Span *
1	192,000	133 days
2	96,000	66 days
3*	64,000	44 days
4*	48,000	33 days

* Only for VR204

VR206

Number of Channels Used	Number of Data Values	Data Storage Span *
1	285,600	198 days
2	142,800	99 days
3	95,200	66 days
4	71,400	49 days
6	47,600	33 days

* When the waveform span rate (TIME/DIV) is set as 30 minutes.

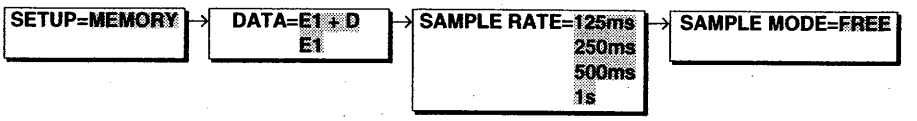
Note

The display data are also stored in a separate area from the display data file. Therefore, even if only an event file is created (file configuration: 1E), the data stored in this separate area can be retrieved on the past-data reference display (file capacity: twenty times the display area when four channels are used, or fifteen times the display area when six channels are used). If the display data file is also used, data are retrieved to the past-data reference display from the display data file, not from this separate area.

6.6.2 Setting of Data Storage Method as Trigger-free

Follow the procedure below to store the data in the event file in the trigger-free mode.

MENU:



Example for VR204

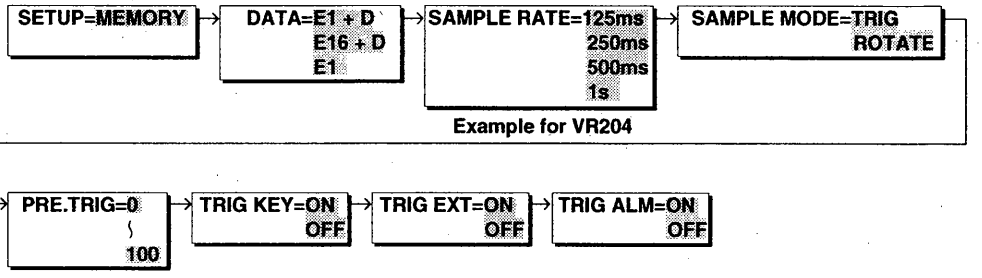
PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=MEMORY	Select the display 'SETUP=MEMORY' using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	DATA=E1 + D	Select 'E1+D' (= 1E + 1D, one event file and one display data file) or 'E1' (= 1E, one event file only) using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP	SAMPLE RATE=125ms	Select the sample rate the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP	SAMPLE MODE=FREE	Select 'FREE' using the [△]/[▽] keys, then press the [↵] key.
		SETUP MEMORY SET	The setup is completed. To proceed to another setting in the SETUP mode, press the **ESC** key.
6	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=MEMORY' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.6.3 Setting of Data Storage Method as Trigger-on or Trigger-rotation

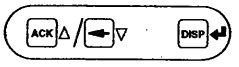
Follow the procedure below to store the data in the event file in the trigger-on or trigger-rotation mode.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=MEMORY	Select the display 'SETUP=MEMORY' using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	DATA=E16 + D	Select 'E1+D' (= 1E + 1D, one event file and one display data file), 'E16+D' (= 16E + 1D, sixteen event files and one display data file), or 'E1' (one event file only) using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP	SAMPLE RATE=1s	Select '125ms,' '250ms,' '500ms,' or '1s' using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP	SAMPLE MODE=TRIG	Select 'TRIG' (trigger-on) or 'ROTATE' (trigger-rotation) using the [△]/[▽] keys, then press the [↵] key.
6	ACK △/◄ ▽ DISP	PRE.TRIG=40%	Use the [△]/[▽] keys to select the percentage of the file size to be used for storing the pre-trigger data, then press the [↵] key.
7	ACK △/◄ ▽ DISP	TRIG KEY=ON	Use the [△]/[▽] keys to select 'ON' or 'OFF' to determine whether to use the key trigger, then press the [↵] key.
8	ACK △/◄ ▽ DISP	TRIG KEY=OFF	Use the [△]/[▽] keys to select 'ON' or 'OFF' to determine whether to use the external trigger, then press the [↵] key.
9	ACK △/◄ ▽ DISP	TRIG ALM=ON	Use the [△]/[▽] keys to select 'ON' or 'OFF' to determine whether to use the alarm trigger, then press the [↵] key.
		SETUP MEMORY SET	The setup is completed. To proceed to another setting in the SETUP mode, press the **ESC** key.
10	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=MEMORY' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.

11 

END&INIT.DATA=STORE

Finally,

- to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or
- to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key.

The mode is then released from SETUP to operation.

6.7 Auxiliary Function (AUX) Setting

The following are the settings in the AUX menu.

Number of channels to be used: Define the number of channels to be used. Set this to the minimum required number for effective use of memory. The default setting is four (for the VR204) or six (for the VR206).

Tag number display: Define whether to display the tag number on the screen or not (simply displaying the traces and digital indications in different colors). When switching on the tag number display, tag numbers are also used to identify the data in files. The default setting is 'CH' (tag number display disabled).

Message language: Define whether the messages appearing in the operation mode or when using a floppy disk are to be shown in English ('ENG') or Japanese ('JPN'). The default setting is 'ENG.'

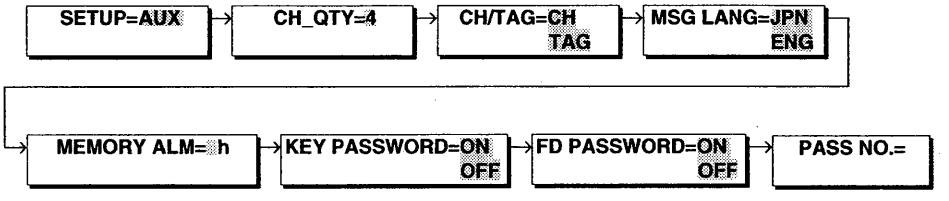
Memory End timer (option): Define the remaining time at which the Memory End contact output is to be set before the display data file becomes full. The remaining time means the time interval after which the data not yet saved on floppy disk start to be overwritten. The default setting is one hour.

Password: The password setting allows you to define whether a password needs to be entered in order to perform either of the following two kinds of operation: entry to the SET mode and saving of measured data. Once the password is specified as required on entry to the SET mode, password entry is requested when the **MENU** key is pressed to enter the SET mode. The password must then be entered in order to enter the SET mode. If the password is specified as required on saving of measured data, password entry is requested when a floppy disk is inserted. The password must then be entered in order to save data to the floppy disk. The password is a four-digit number. The initial settings are 'OFF' (no password) for both kinds of operation.

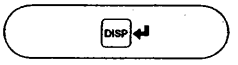
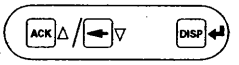
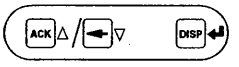
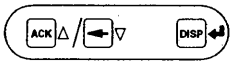
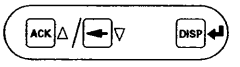
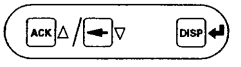
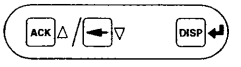
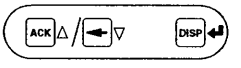
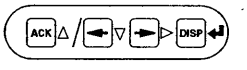
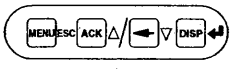
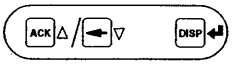
Note

- Regardless of the setting of the Memory End timer, the memory status indicator reduces the reading from 99 hours.
- Do not forget the password once it has been set, otherwise it may not be possible to perform any operations in the SET mode and/or to save measured data.

MENU:



PROCEDURE:

	Key Sequence	Display	
1			While pressing the [↵] key, turn on the power to enter the SETUP mode.
2		SETUP=AUX	Select the display 'SETUP=AUX' using the [△]/[▽] keys, then press the [↵] key.
3		CH_QTY=4	Select the number of channels to be used using the [△]/[▽] keys, then press the [↵] key.
4		CH/TAG=CH	Select 'CH' (tag number display inactive) or 'TAG' (tag number display active) using the [△]/[▽] keys, then press the [↵] key.
5		MSG LANG=JPN	Select 'ENG' (message language: English) or 'JPN' (Japanese) using the [△]/[▽] keys, then press the [↵] key.
6		MEMORY ALM=2h	Select the remaining time when the Memory End contact output is to be set from among 1, 2, 5, 10, 20, 50, or 100 hours using the [△]/[▽] keys, then press the [↵] key.
7		KEY PASSWORD=ON	Use the [△]/[▽] keys to select 'ON' (requests) or 'OFF' (does not request) to determine whether the password must be entered for entry to the SET mode, then press the [↵] key.
8		FD PASSWORD=ON	Use the [△]/[▽] keys to select 'ON' (requests) or 'OFF' (does not request) to determine whether the password must be entered for saving of measured data, then press the [↵] key.
9		PASS NO.=0	If you set 'ON' for either or both of the above two items (password is used), enter a four-digit number as the password. Use the [△]/[▽] key to increment/decrement the number in each digit on the entry cursor and the [▷] key to move the cursor. After setting the number, press the [↵] key.
		SETUP AUX SET	The setup is completed. To return to the display 'CH_QTY=□,' press the [↵] key. To proceed to another setting in the SETUP mode, press the **ESC** key. The display then returns to 'SETUP=AUX.'
10		SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=AUX' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
11		END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.8 Operations on SETUP Configuration File

The following sections describe how to save, read, and delete the file which contains the settings made in the SETUP mode.

6.8.1 Saving the SETUP Configuration File (FD_SET–SAVE)

Follow the procedure below to save to a floppy disk the settings made in the SETUP mode.

Note

- If you have made any modification in the SETUP mode, the data you modified will be saved to the floppy disk, and not those stored in the internal memory. This means that the data on the floppy disk may not always be the same as the data in the internal memory. To equalize the two sets of data, store the new settings also to the internal memory after saving them to the floppy disk.
- The configuration file is saved in the ASCII file format.

File Names

- When specifying the file names, follow the rules below.
  - The maximum length is eight characters.
  - The following system-reserved names cannot be used:
    CON, PRN, AUX, AUX1, AUX2, NUL, CLOCK.
  - The following characters cannot be used:
    * (asterisk), . (period), + (plus sign), / (slash).
- The suffix code ".PNS" is appended to the file name automatically.

Space in FDC

If the space remaining in the FDC is less than 4 K bytes, the SET configuration file cannot be saved to it. In this case, the message 'E201: INSUFFICIENT DISK SPACE' appears.

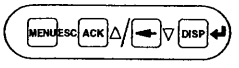
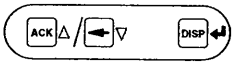
MENU:

SETUP=FD_SET → SET=SAVE → FILE=SETUP02

PROCEDURE:

	Key Sequence	Display	
1	DISP↵		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2			Insert a floppy disk into the drive.
3	ACK△/◄►▽ DISP↵	SETUP=FD_SET	Select the 'SETUP=FD_SET' display using the [△]/[▽] keys, then press the [↵] key.
4	ACK△/◄►▽ DISP↵	SET=SAVE	Select the 'SET=SAVE' display using the [△]/[▽] keys, then press the [↵] key.
5	ACK△/◄►▽ DISP↵	file= FILE=SETUP02	• To overwrite an existing file: Pressing the [△]/[▽] keys calls up the names of the configuration files stored on the floppy disk. Call up the desired file name and press the [↵] key. The display then changes to 'FILE=<file name>.' Pressing the [↵] key again overwrites the file. • To save as a new file: Press the [↵] key. The display then changes to 'FILE=' to allow the file name to be entered. Enter the file name (using up to eight characters) and press the [↵] key.

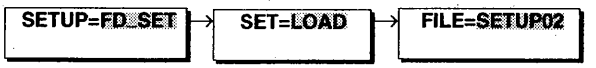
If no file name is entered or if the entered name is illegal, the message 'E217: INVALID FILE NAME' is displayed. In this case, press any key to return to the preceding state, then enter a proper name.

		Saving.....*	The file is saved.
		SAVE COMPLETED	Saving is completed. To return to the 'SET=SAVE' display, press the [↵] key. To proceed to another setting in the SETUP mode, press the **ESC** key. The display then returns to 'SETUP=FD_SET.'
6		SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory if needed. Press the **ESC** key to return to the 'SETUP=FD_SET' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7		END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.8.2 Reading the SETUP Configuration File (FD_SET–LOAD)

Follow the procedure below to load a file (suffix .PNS) which contains the settings made in the SETUP mode, from floppy disk to the internal memory.

MENU:



PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2			Insert a floppy disk into the drive.
3	ACK △/◄▽ DISP	SETUP=FD_SET	Select the 'SETUP=FD_SET' display using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP	SET=LOAD	Select the 'SET=LOAD' display using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄▽ DISP	FILE=SETUP02	Select which files are to be loaded using the [△]/[▽] keys, then press the [↵] key.
		Loading....*	The file is loaded.
		LOAD COMPLETED	Loading is completed. To return to the 'SET=LOAD' display, press the [↵] key. To proceed to another setting in the SETUP mode, press the **ESC** key. The display then returns to 'SETUP=FD_SET.'
6	MENU ESC ACK △/◄▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory if needed. Press the **ESC** key to return to the 'SETUP=FD_SET' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7	ACK △/◄▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from the SETUP to operation.

6.8.3 Deleting the SETUP Configuration File (FD_SET–DEL)

Follow the procedure below to delete from floppy disk a file (suffix .PNS) which contains the settings made in the SETUP mode.

MENU:

SETUP=FD_SET → SET=DEL → FILE=SETUP02

PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2			Insert a floppy disk into the drive.
3	ACK △/◄▽ DISP	SETUP=FD_SET	Select the 'SETUP=FD_SET' display using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄▽ DISP	SET=DEL	Select the 'SET=DEL' display using the [△]/[▽] keys, then press the [↵] key. If an error message appears, see Section 8.1, "Error Messages."
5	ACK △/◄▽ DISP	FILE=SETUP02	Select which files are to be deleted using the [△]/[▽] keys, then press the [↵] key.
		DELETE COMPLETED	The file is deleted. To return to the 'SET=DEL' display, press the [↵] key. To proceed to another setting in the SETUP mode, press the **ESC** key. The display then returns to 'SETUP=FD_SET.'
6	MENU/ESC ACK △/◄▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory if needed. Press the **ESC** key to return to the 'SETUP=FD_SET' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
7	ACK △/◄▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from the SETUP to operation.

6.9 Setting the Remote Control Functions

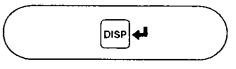
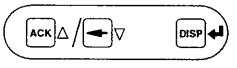
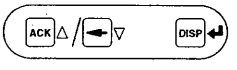
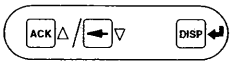
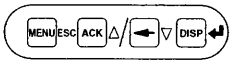
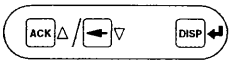
Arbitrarily assign control functions listed below to the five remote control terminals.

- EXT_TRIG : External trigger to start saving to the event file.
- ADJ_TIME : The internal clock of the VR200 is changed depending on when the signal is applied to the terminal, as follows:

Time of Input	Change in Time
hh:00:00 to hh:01:59	Round off to the nearest hour. E.g., 10:01:50 becomes 10:00:00.
hh:02:00 to hh:57:59	No change.
hh:58:00 to hh:59:59	Round up to nearest hour. E.g., 10:59:50 becomes 11:00:00.

- MATH_START/STOP : Starts/stops the computation (for /M1 and /M2 option only).
- MATH_CLEAR : Clears the computed data. (for /M1 and /M2 option only).
- MESSAGE1 to MESSAGE5 : Writes messages in the internal memory showing the time of signal input.

PROCEDURE:

	Key Sequence	Display	
1			While pressing the [↵] key, turn on the power to enter the SETUP mode.
2		SETUP=REMOTE	Select the display 'SETUP=FILTR' using the [△]/[▽] keys, then press the [↵] key.
3		REMOTE NO.=1	Select the number of the remote control terminal using the [△]/[▽] key and press the [↵] key.
4		REMOTE1=MESSAGE1	Select the control function to assign to the remote control terminal using the [△]/[▽] key and press the [↵] key.
		REMOTE SET	The setting is completed. To continue setting another number, press the [↵] key. Pressing the **ESC** key in this step enables you to proceed to other settings in the SETUP mode.
5		SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=REMOTE' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
6		END&INIT.DATA=STORE	Finally, • to store and make the new settings take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new settings, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from SETUP to operation.

6.10 Initialization of Setup (INIT)

The following procedure initializes all the settings made in the SET mode other than the ranges and engineering units. This does not affect the settings made in the SETUP mode.

For details of the initial settings of the parameters to be set in the SET mode, see Appendix 1, "Setting Parameters and Initial Settings."

PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=INIT	Select the 'SETUP=INIT' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	INIT OK=YES	Select 'YES' (to initialize) or 'NO' (to cancel) using the [△]/[▽] keys, then press the [↵] key.
		INIT SET	Initialization is set. To proceed to another setting in the SETUP mode, press the **ESC** key.
4	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory. Press the **ESC** key to return to the 'SETUP=INIT' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
5	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to actually initialize the settings which have been made in the SET mode and stored in the internal memory, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to cancel the initialization of the settings in the internal memory, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from the SETUP to operation.

6.11 Selecting the Display Language (LANG) – Option

Follow the procedure below to select the display language from English, German, or French.

PROCEDURE:

	Key Sequence	Display	
1	DISP		While pressing the [↵] key, turn on the power to enter the SETUP mode.
2	ACK △/◄ ▽ DISP	SETUP=OPT	Select the 'SETUP=OPT' display using the [△]/[▽] keys, then press the [↵] key.
3	ACK △/◄ ▽ DISP	OPT=LANG	Select the 'LANG' display using the [△]/[▽] keys, then press the [↵] key.
4	ACK △/◄ ▽ DISP	LANG=ENG	Select the language using the [△]/[▽] keys, then press the [↵] key.
5	MENU ESC ACK △/◄ ▽ DISP	SETUP=END	Before leaving the SETUP mode, you must store the new setting in the internal memory if needed. Press the **ESC** key to return to the 'SETUP=OPT' display, then select the 'SETUP=END' display using the [△]/[▽] keys, then press the [↵] key.
6	ACK △/◄ ▽ DISP	END&INIT.DATA=STORE	Finally, • to store and make the new setting take effect, select the 'END&INIT.DATA=STORE' display using the [△]/[▽] keys, then press the [↵] key; or • to discard the new setting, select the 'END&INIT.DATA=ABORT' display using the [△]/[▽] keys, then press the [↵] key. The mode is then released from the SETUP to operation.

Chapter 7 MAINTENANCE

7.1 Periodic Maintenance

Check the recorder operation periodically to keep the recorder in good working order condition.
Perform the following checks and replace consumable parts as needed.

- Is the display functioning properly?
  If not, see Chapter 8, "Troubleshooting."
- Is the message 'LOW BATTERY' displayed at the bottom on the screen? This message warns that the lithium battery needs to be replaced. For replacement, contact your nearest Sales & Service Office; addresses may be found on the back cover of this manual. (See also Section 7.3.)
- Has the brightness of the LCD deteriorated? For replacement of the LCD unit, see Section 7.5.

CAUTION To avoid injury, do not replace the lithium battery yourself.

7.2 Replacing the Fuse ⚠

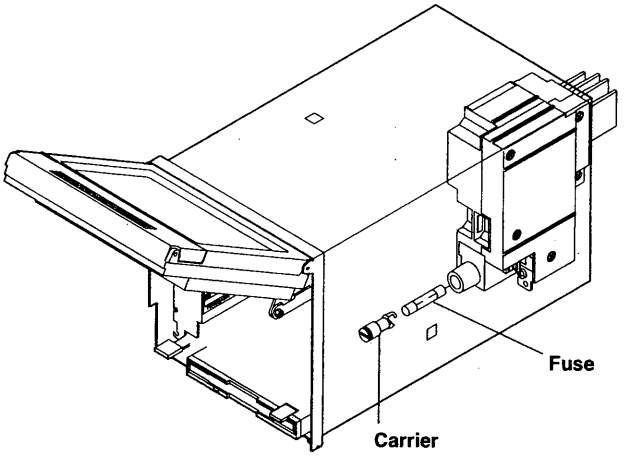
Replace the fuse at least once every two years for preventive maintenance.

WARNING

Before replacing the fuse, turn off the power supply and disconnect the power source. Use only the specified fuses, which should be obtained from your nearest Sales & Service Office. Using any other fuses could cause fire.

Follow the procedure below to replace the fuse.

1. Turn off the power.
2. Disconnect the power source.
3. Remove the screw above the power switch and swing open the front panel.
4. The fuse carrier is visible in the right lower side of the internal hardware. Turn the knob of the fuse carrier counterclockwise, and the carrier will slide out together with the fuse.



5. Make sure that the new fuse rating is correct and mount the new fuse by turning the knob clockwise.
6. Close the front panel and fix it with the screw.

7.3 Replacing the Battery

The message 'LOW BATTERY' displayed at the bottom on the screen warns that the lithium backup battery needs to be replaced.
This battery will last for ten years under normal operating conditions. For replacement, please contact your nearest Sales & Service Office; addresses may be found on the back cover of this manual.

WARNING

To avoid injury, do not replace the lithium battery yourself nor disassemble this recorder to attempt the replacement.

7.4 Checking the Accuracy

Check the accuracy of the readings once a year to ensure the measuring accuracy.

Required Instruments

DC Voltage Standard
Model 2552 from Yokogawa Electric Corporation or equivalent
Major specifications:
- Accuracy for output of 20 mV to 20 V: ±0.005%

Decade Resistance Box:
Model 2793-01 from Yokogawa Instruments Corporation or equivalent
Major specifications:
- Accuracy in range of 0.1 to 500 Ω: ±0.001%
- Resolution: 0.001 Ω

(To purchase these instruments, please ask the supplier of this recorder.)

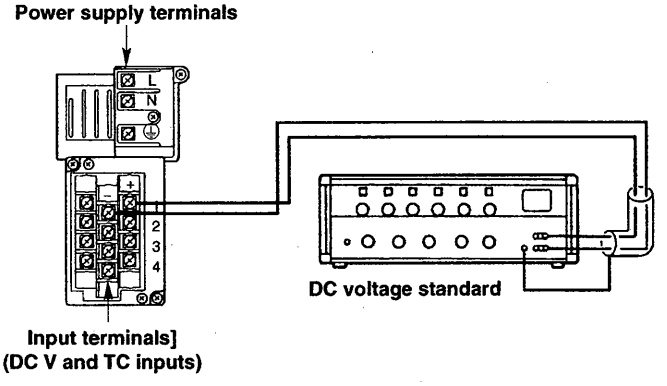
Procedure

1. Connect the aforementioned calibration instruments to the input terminals of the recorder as shown in the following figures and allow the recorder to warm up for at least 30 minutes.
   Allow the calibration instruments to warm up according to their respective specifications.
2. Check that the ambient temperature and humidity are within the normal operating conditions (see Chapter 9, "General Specifications").
3. Apply an input corresponding to 0, 50 and 100 percent of the entered setting range, and calculate the errors from the readings on the display.
4. If the error at any point is outside the accuracy limits (for details of the accuracy, see Chapter 9, "General Specifications"), contact your nearest Sales & Service Office; addresses may be found on the back cover of this manual.

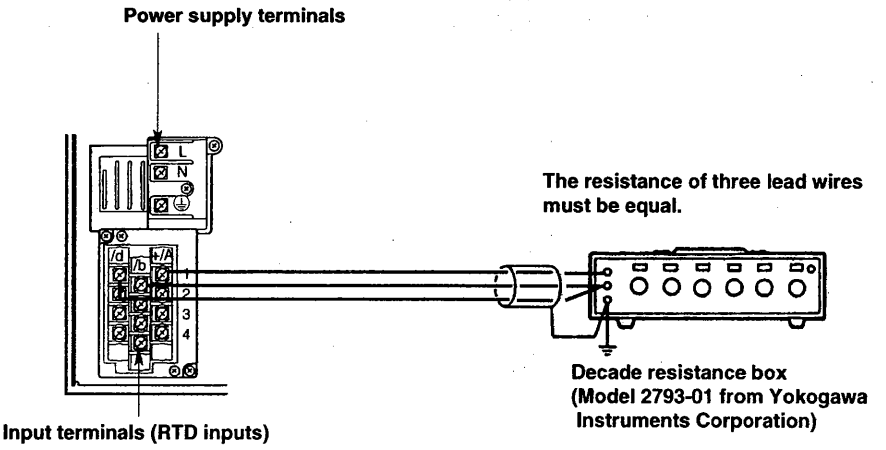
Note

For a TC input, the temperature of the input terminals must be measured, and a voltage corresponding to the temperature at the reference junction must be added.

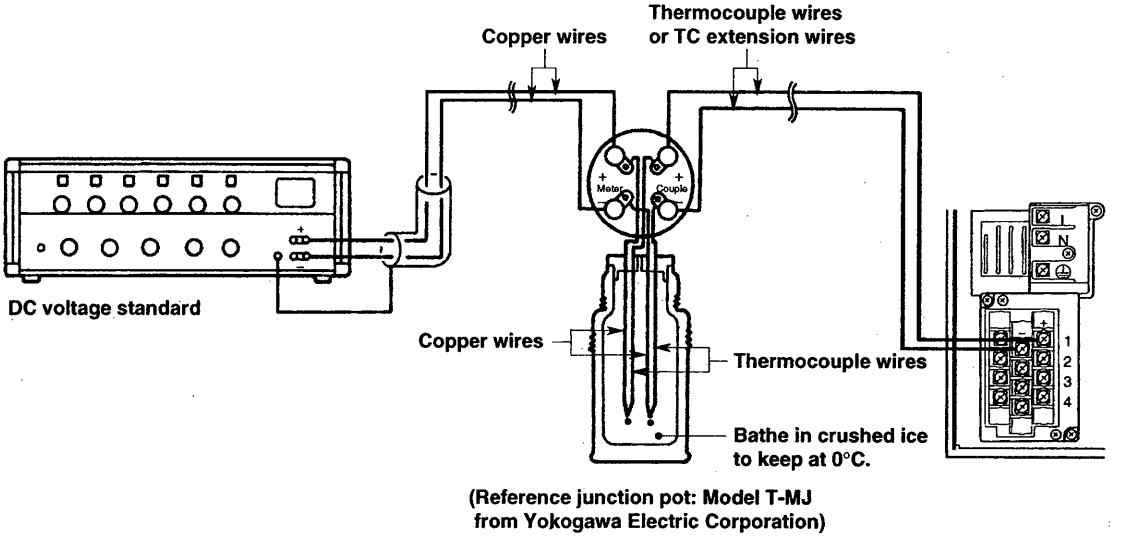
DC Voltage Measurement (Example for VR204)



Temperature Measurement Using RTD (Example for VR204)



Temperature Measurement Using TC (Example for VR204)



Reference Junction Compensation for Thermocouple Input

As the temperature at the measurement terminal of the recorder is generally equal to room temperature, a voltage is applied to the inside circuit to obtain the equivalent of 0°C. Therefore, when the measurement terminals are shorted (equivalent to 0°C at detector tip in the reference table) the room temperature (equals the temperature at the measurement terminal) is displayed. As a result, the recorder is measuring the temperature of the input terminal and compensates this value. When calibrating the recorder, the input voltage without subtracting the compensation voltage should be applied (for example, use the Yokogawa Model T-MJ reference junction pot shown above).

7.5 Recommended Replacement Periods for Consumable Parts

To maintain the reliability of this recorder and to allow this recorder to deliver outstanding performance for a long time, periodic replacement of consumable parts is recommended.

The recommended replacement periods for consumable parts are shown in the following table. The periods shown in this table assume that the recorder is operating at the reference operating conditions. The periods to be applied to your recorder should be determined in consideration of the actual operating conditions.
Replacement of the LCD must be conducted by qualified Yokogawa staff. When required, contact your nearest Sales & Service Office; addresses may be found on the back cover of this manual.

Item	Replacement Period	Part Name	Part Number	Remarks	Quantity Used
Fuse	2 years	Fuse	A1360EF	250 V 500 mA time lag (except for /P1 model)	1
			A1102EF	250 V 5 A time lag (for /P1 model) Products delivered before July, 1998	1
			A1512EF	250 V 800 mA time lag (except for /P1 model)	1
			A1513EF	250 V 5 A time lag (for /P1 model) Products delivered after July, 1998	1
LCD unit	5 years	LCD module	B9960VA		1

Note

The recommended replacement period for the LCD unit is the period when the brightness falls to half. The speed of degradation of the brightness varies depending on the operating conditions and the judgment is subjective. The period recommended in this table should thus be used as a guideline when determining the actual replacement period.

Chapter 8 TROUBLESHOOTING

8.1 Error Messages

8.1.1 Error Messages at Boot-up (Power-on)

Error Message	Description	Countermeasure
E100: MAIN ROM ERROR	Main ROM failure	Contact your nearest Service Center.
E101: MAIN RAM ERROR	Main RAM failure	Contact your nearest Service Center.
E102: A/D ROM ERROR	A/D ROM failure	Contact your nearest Service Center.
E103: A/D RAM ERROR	A/D RAM failure	Contact your nearest Service Center.
E104: NV ERROR1	Failure of main non-volatile memory	Contact your nearest Service Center.
E105: NV ERROR2	Failure of all input A/D converter memories	Contact your nearest Service Center.
E106: A/D CARD ERROR	A/D card failure	Contact your nearest Service Center.
E11x: A/D NV ERRx	Failure of A/D converter memory for channel x	Contact your nearest Service Center.
E12x: A/D ADJ ERRx	Failure of calibration data for A/D for channel x	Contact your nearest Service Center.
E130: MEMORY ERROR	Acquisition memory failure	Contact your nearest Service Center.
LOW BATTERY	Low voltage of back-up battery	Contact your nearest Service Center.

8.1.2 Error Messages When Using Floppy Disk

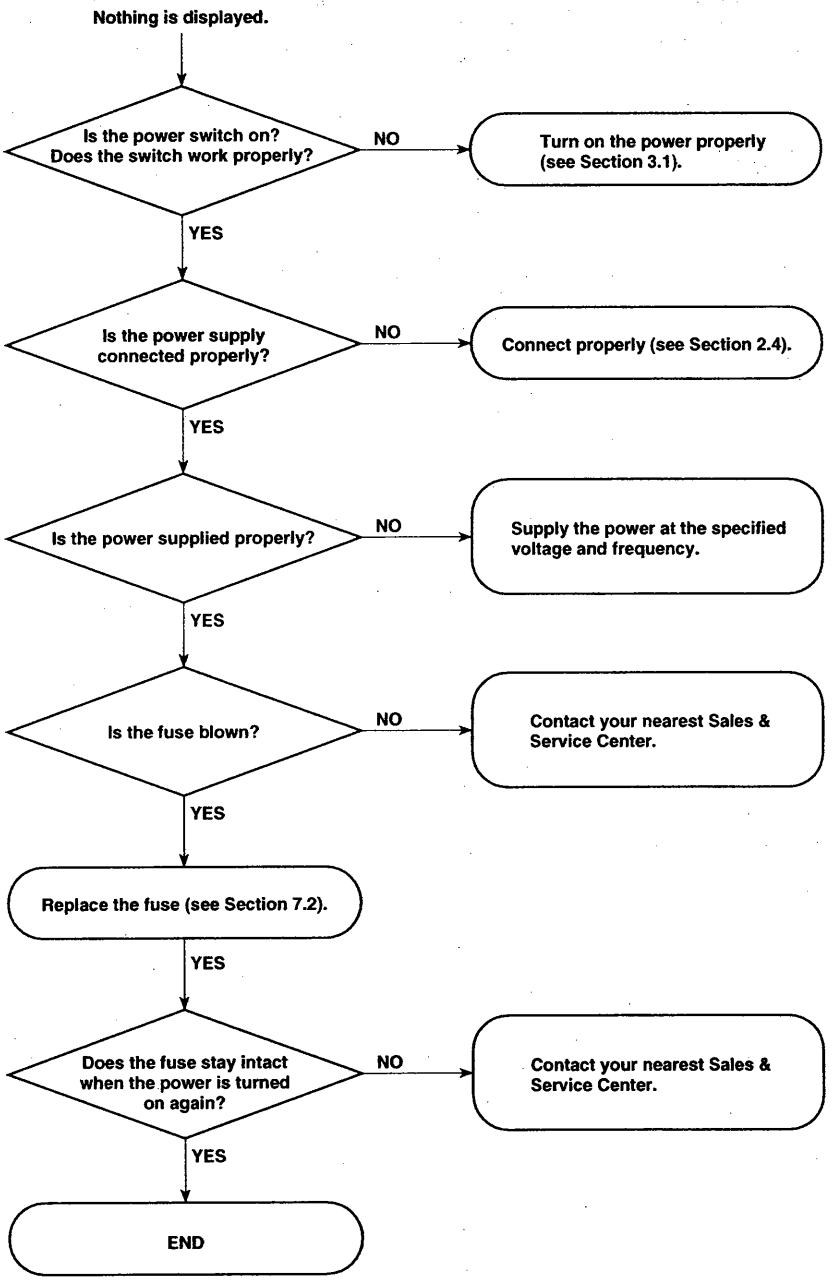
Error Message*	Description	Countermeasure
E200: FD ERROR	An error was detected on the floppy disk. Saving is aborted.	Attempt saving on another floppy disk. If the same message still appears, contact your nearest Service Center.
E201: INSUFFICIENT DISK SPACE	Insufficient space on the floppy disk.	Delete unnecessary files or use another floppy disk.
E202: FD WRITE PROTECTED	Floppy disk is write-protected.	Release the write-protection or use another floppy disk.
E203: NO DATA TO SAVE	There are no data to be saved on the floppy disk.	If use of the trigger is set to ON, attempt saving after the trigger is raised.
E210: FD REMOVED	Floppy disk is ejected while being accessed.	Clear the error and attempt the same operation. Do not eject the floppy disk while it is being accessed.
	Operation on a file or formatting of the floppy disk was attempted with no floppy disk inserted.	Insert a floppy disk and attempt the same operation.
E211: FORMATTING FAILED	Failure in formatting the floppy disk	Insert another floppy disk and attempt to format it. If the same message still appears, contact your nearest Service Center.
	Operation on a file was attempted with a floppy disk which has not yet been formatted or formatted in a different format.	Insert a properly formatted floppy disk and attempt the same operation.
E212: WRITE PROTECTED FILE NAME	There is a write-protected file on the floppy disk which has the same name as the one designated.	Change the attribute of the file to write-enabled.
E214: NO FILE	There are no files to be processed on the floppy disk.	Insert a floppy disk which contains files to be processed and attempt the same operation.
E216: NO. OF FILES EXCEED LIMIT	The number of files exceeds the limit that can be created on a floppy disk.	Delete unnecessary files or use another floppy disk. Then attempt the same operation.
E217: INVALID FILE NAME	File name was not entered or the name entered is illegal.	Enter a proper file name.
E218: INVALID FILE FORMAT	The file attempted to be loaded is not a SET/SETUP configuration file.	Specify a SET/SETUP configuration file (suffix: .PNL or .PNS).

* This table shows the messages that are displayed when the message language is set as English (ENG). The corresponding messages in Japanese are not covered in this manual. For details on how to select the message language, see Section 6.7.

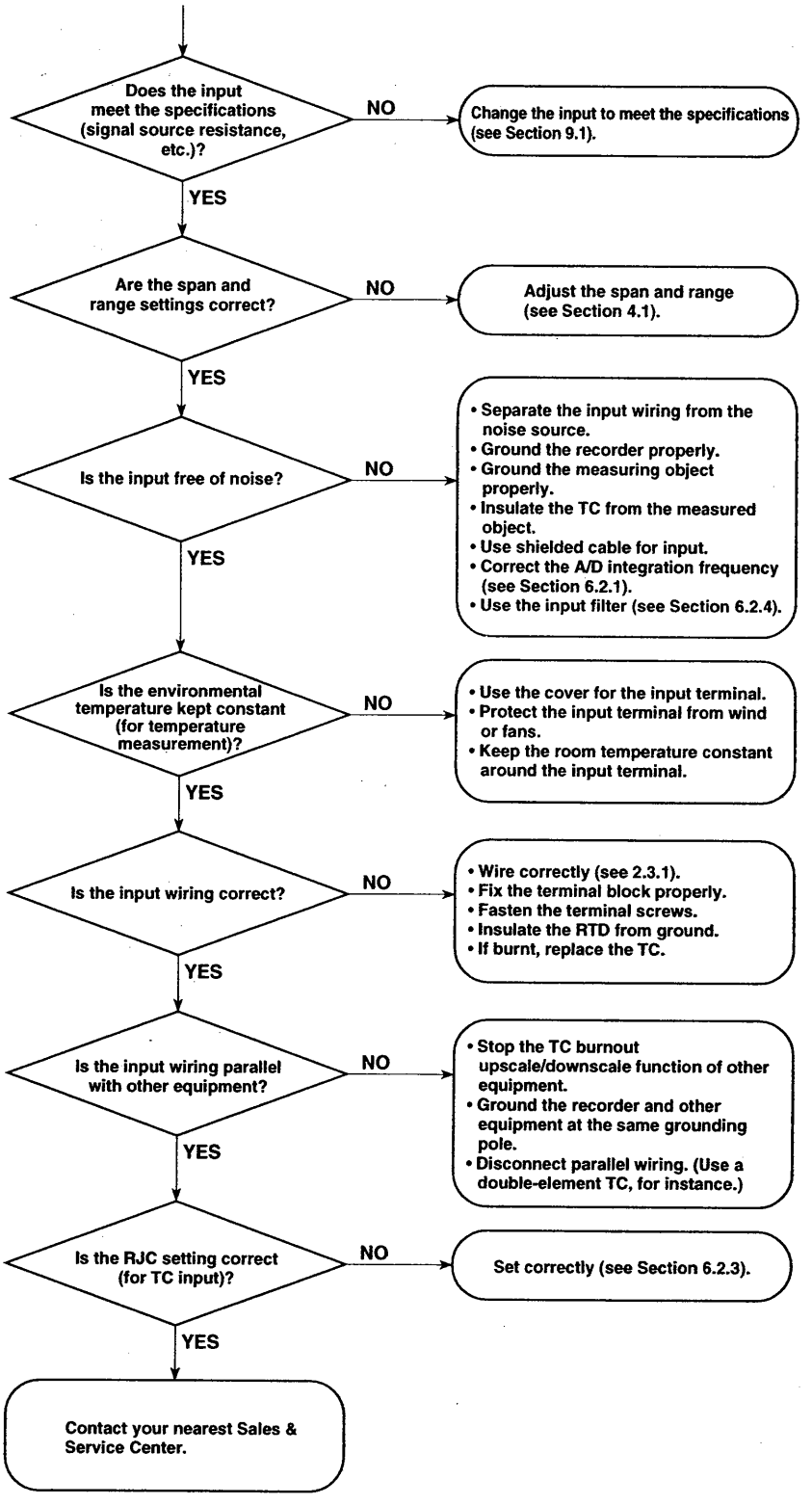
8.1.3 Error Messages During Parameter Setting Operations

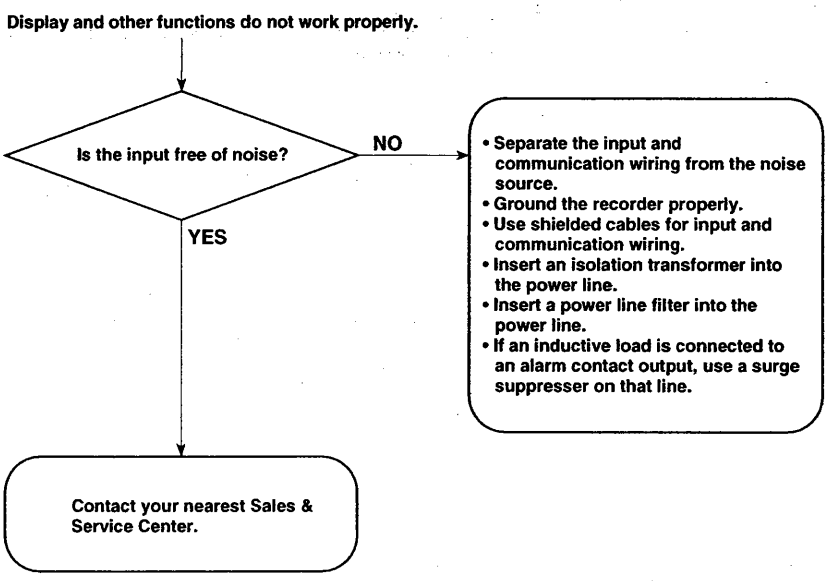
Error Message	Description	Countermeasure
E001: SYNTAX ERROR	There is an error in the recorder hardware other than the errors listed below.	Contact your nearest Service Center.
E002: VALUE OUT OF RANGE	Value entered is out of range.	Enter a proper value.
E003: INCORRECT TIME SETTING	Date or time is set incorrectly.	Enter a proper date and time.
E004: INVALID CHANNEL NUMBER	A disabled channel is selected.	Select an enabled channel.
E005: INVALID PARAMETER	• A wrong parameter is set via communication or when loading a SET/SETUP configuration file. • Reading of a configuration file that was saved from a different model or version is attempted. In this case, only the data valid for the model and version that is reading it are read.	Enter the correct parameter.
E006: NO SUCH OPTION	Setting for an option which is not built in is attempted.	Set the parameters according to the model specifications.
E020: INVALID SAMPLE MODE	Trigger-free cannot be selected if the file configuration is set so that multiple event files are created.	Change the file configuration setting to create a single event file or set the mode to trigger-on or trigger-rotation.
E021: NO EFFECTIVE TRIGGERS	Even though trigger-on or trigger-rotation is selected, all trigger types are set to OFF.	Set a trigger to ON.
E040: (DELTA CH) <= (REF CH)	The channel number assigned as the reference channel is equal to or greater than that of the channel to be compared for difference measurement ('DELT').	Change the reference channel number.
E041: REF CH = SKIP	The reference channel number assigned in difference measurement is set to be skipped.	Release the SKIP setting or assign another channel as the reference channel.
E042: REF CH = DI	The reference channel number assigned in difference measurement is a DI input channel.	Change the input type from DI or assign another channel as the reference channel.
E043: REF CH = SCALE, SQRT	Scaling or square root computation is specified for the reference channel number assigned in difference measurement.	Release the setting of scaling or square root computation or assign another channel as the reference channel.
E045: SPAN LOWER = UPPER	The maximum and minimum limits of the span are equal.	Correct the span setting so that the maximum limit is greater than the minimum.
E046: SCALE LOWER = UPPER	The upper and lower scale limits are equal.	Correct the scale setting so that the upper scale limit is greater than the lower limit.
E060: ALARM CH = SKIP	Alarm is set ON for a channel which is set to be skipped.	Release the SKIP setting or set the alarm on another channel.
E061: ALARM CH = DI	Alarm is set ON for a channel whose input is DI.	Change the input type from DI or set the alarm on another channel.
E083: PARTIAL CH = SKIP	Partial-extended display is set ON for a channel which is set to be skipped.	Release the SKIP setting or set the partial-extended display on another channel.
E084: PARTIAL CH = DI	Partial-extended display is set ON for a channel whose input is DI.	Change the input type from DI or set the partial-extended display on another channel.
E086: ZONE LOWER = UPPER	The upper and lower limits of the display band are equal.	Correct the setting so that the lower limit is less than the upper limit.
E087: ZONE LOWER > UPPER	The lower limit of the display band is greater than the upper limit.	Correct the setting so that the lower limit is less than the upper limit.
E088: ZONE TOO NARROW	The display band set is narrower than 5% of the entire display.	Correct the setting of the upper or lower limit to increase the band to 5% or greater.

8.2 Troubleshooting Flow Chart



- The reading error is large.
- The digital indication or trend trace (waveform) is unstable.
- The trend trace (waveform) stays at 0 or 100%.




Display and other functions do not work properly.
Is the input free of noise?
NO
YES
• Separate the input and communication wiring from the noise source.
• Ground the recorder properly.
• Use shielded cables for input and communication wiring.
• Insert an isolation transformer into the power line.
• Insert a power line filter into the power line.
• If an inductive load is connected to an alarm contact output, use a surge suppresser on that line.
Contact your nearest Sales & Service Center.

Chapter 9 GENERAL SPECIFICATIONS

9.1 Input Specifications

Number of Inputs:
VR202: Up to two channels (can be set up one or two)
VR204: Up to four channels (can be set up from one to four.)
VR206: Up to six channels (can be set up from one to six.)

Measurement Period:
VR202/VR204:125 ms
VR206: 2 s when the A/D integration time is set as any value other than 100 ms
1 s when the A/D integration time is set as 100 ms

Input Types:
DCV: Direct Voltage input, ±20 mV to ±20 V range
TC: Thermocouple
RTD: Resistance Temperature Detector
DI: Digital Input (contact or DC Voltage, TTL level)
DCA: Direct Current Input (using external shunt resistor (10 Ω, 100 Ω, 250 Ω))

Measuring Range:
Selectable for each channel

Input type	Range	Measuring Range
DC voltage (DCV)	20 mV	-20.00 to 20.00 mV
	60 mV	-60.00 to 60.00 mV
	200 mV	-200.0 to 200.0 mV
	2 V	-2.000 to 2.000 V
	6 V	-6.000 to 6.000 V
	20 V	-20.00 V to 20.00 V

Input type	Range	Measuring Range °C	Measuring Range °F
Thermocouple (TC)	R*1	0.0° to 1760.0°C	32° to 3200°F
	S*1	0.0° to 1760.0°C	32° to 3200°F
	B*1	0.0° to 1820.0°C	32° to 3308°F
	K*1	-200.0° to 1370.0°C	-328° to 2498°F
	E*1	-200.0° to 800.0°C	-328° to 1472°F
	J*1	-200.0° to 1100.0°C	-328° to 2012°F
	T*1	-200.0° to 400.0°C	-328° to 752°F
	N*2	0.0° to 1300.0°C	32° to 2372°F
	W*3	0.0° to 2315.0°C	32° to 4199°F
	L*4	-200.0° to 900.0°C	-328° to 1652°F
	U*4	-200.0° to 400.0°C	-328° to 752°F

Input type	Range	Measuring Range °C	Measuring Range °F
Resistance temperature detector (RTD)	Pt100*5	-200.0° to 600.0°C	-328° to 1112°F
	JPt100*5	-200.0° to 550.0°C	-328° to 1022°F
	CU1 to CU6 (Cu10)*6	-200.0° to 300.0°C	-328° to 572°F
	CU25 (Cu25)*6	-200.0° to 300.0°C	-328° to 572°F

Input type	Range	Measuring Range
Event recording (DI)	DCV input	Less than 2.4 V: off; 2.4 V or greater: on
	Contact input	Contact on/off

*1 R, S, B, K, E, J, T: ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
*2 N: Nicrosil-Nisil, IEC 584, DIN IEC 584
*3 W: W-5% Re/W-26% Re (Hoskins Mfg. Co.)
*4 L: Fe-CuNi, DIN43710
U: Cu-CuNi, DIN43710
*5 Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751
JPt100: JIS C 1604-1981, JIS C 1606-1989
*6 Option

9.2 Calculation Function Specifications

Scaling (Linear): Available for DCV, TC and RTD range
Scaling limits: –20000 to 20000
Decimal point: user selectable (should be specified when entering scale value)
Engineering unit: user settable, up to 6 characters (alphanumeric and special characters)

Differential Computation: Between any two channels, however reference channel number must be less than measuring channel number.
Available for DCV, TC, and RTD range; however, both channels must have the same range.

Square Root: Available for DCV range
Scaling limits: –20000 to 20000
Decimal point: user selectable
Engineering unit: user settable, up to 6 characters (alphanumeric and special characters)

Measuring and Recording Accuracy:
(The following specifications apply to operation of the recorder under standard operation conditions: temperature 23±2°C, humidity 55±10%RH, power supply voltage according to the specifications, power supply frequency 50/60 Hz ±1%, warm-up time of at least 30 minutes, other ambient conditions should not adversely affect the recording operation.)

Input	Range	Measurement Accuracy (Digital Display)	Max. Resolution of Digital Display
DCV	20 mV	±(0.2% of rdg + 3 digits)	10 µV
	60 mV	±(0.2% of rdg + 2 digits)	10 µV
	200 mV	±(0.2% of rdg + 2 digits)	100 µV
	2 V	±(0.1% of rdg + 2 digits)	1 mV
	6 V	±(0.3% of rdg + 3 digits)	1 mV
	20 V	±(0.3% of rdg + 2 digits)	10 mV
TC (excluding the reference junction compensation accuracy)	R S B	±(0.15% of rdg + 1°C) However, R, S: ±3.7°C at 0° to 100°C ±1.5°C at 100° to 300°C B: ±2°C at 400° to 600°C accuracy at less than 400°C is not guaranteed.	0.1°C .18°F
	K	±(0.15% of rdg + 0.7°C) However, ±(0.15% of rdg + 1°C) at -200° to -100°C	
	E	±(0.15% of rdg + 0.5°C)	
	J T	±(0.15% of rdg + 0.5°C) However, ±(0.15% of rdg + 0.7°C) at -200° to -100°C	
	N	±(0.15% of rdg + 0.7°C)	
	W	±(0.15% of rdg + 1°C)	
	L U	±(0.15% of rdg + 0.5°C) However, ±(0.15% of rdg + 0.7°C) at -200° to -100°C	
RTD	Pt100 JPt100	±(0.15% of rdg + 0.3°C)	
	Cu10 (CU1 to CU6)	±(0.4% of rdg + 1.0°C)	
	Cu25	±(0.3% of rdg + 0.8°C)	

Accuracy in Case of Scaling:

Accuracy during scaling (digits) =
measuring accuracy (digits) × multiplier + 2 digits (rounded up)
where the multiplier = scaling span digits / measuring span digits.

Example: Assuming that
- range: DCV 6 V
- measuring span: 1.000 to 5.000 V
- scaling span: 0.000 to 2.000

Then,
Measuring accuracy = ± (0.3% × 5 V + 2 digits)
= ± (0.015 V [15 digits] + 2)
= ± (17 digits)
Multiplier = 2000 digits (0.000 to 2.000) / 4000 digits (1.000 to 5.000 V)
= 0.5
Accuracy during scaling = 17 digits × 0.5 + 2 = 11 digits (rounded up)

Maximum Allowable Input Voltage:

Less than 2 VDC ranges and TC ranges: ±10 VDC (cont.)
6 V to 20 VDC: ±30 VDC (cont.)

Reference Junction Compensation:

INT (internal compensation)/EXT (adding external voltage) selectable

Reference Junction Compensation Accuracy (above 0°C):

Types R, S, B, W: ±1°C
Types K, J, E, T, N, L, U: ±0.5°C (when measured 0°C)

A/D Integration Time:

AUTO: 20 ms (50 Hz), 16.7 ms (60 Hz) or 100 ms, selected automatically
50 Hz: 20 ms
60 Hz: 16.7 ms
100 ms: Available only for VR106

TC Burnout:

On/off selectable
Burnout upscale/downscale selectable (common for all channels)
Normal: less than 2 kΩ, burnout: 10 MΩ or greater
Detection current: approx. 100 nA

Filter (Only for VR204):

Signal damping (on/off selectable for each channel, in case of on: time constant selectable from 2, 5, or 10 seconds for each channel).

Moving Average (Only for VR206):

The specifications can be set for individual channels. Specification: off or on, and if on, the number of samples (selected from 2 to 16) to be averaged.

9.3 Display Specifications

Display Unit: 5.5-inch TFT color LCD (240 × 320 pixels)

Maximum Resolution of Analog Display:

Waveform (trend graph) display:

When the direction of waveform display is horizontal: 200× 240 pixels (70 × 84 mm)

When the direction of waveform display is vertical: 165 × 320 pixels (57 × 111 mm)

Pixel pitch: 0.348 (vertical) mm × 0.348 (horizontal) mm

Analog Display Color: VR204: Default – red for channel 1, green for channel 2, blue for channel 3, red-purple for channel 4.

VR206: Default – red for channel 1, green for channel 2, blue for channel 3, red-purple for channel 4, orange for channel 5, light blue for channel 6 .

Waveform Span Rate: User-selectable from 1, 5, 10, 20, 30, and 60 min/div (6 divisions on full screen)

Digital Indication: Measured values (updated every second), engineering units (up to 6 characters), and tag numbers (up to 7 characters)

Memory Status Indicator:

The memory status is displayed when sampling the event input signals and storing them in an event file in the trigger mode.

Other Display Contents: Scale values (0 and 100%), hour:minute on grid, current time (year/month/date, hour:minute:second), trip level, time-axis mark, alarm (ALM)

Direction of Waveform Display:

User-selectable between vertical and horizontal

Data Referencing Function:

By splitting the waveform display area into two, current waveforms and reference waveforms can be compared on both halves of the display.

Display Magnification/Reduction Function:

The time scale of the analog display can be magnified and reduced by selecting a time scale of 6, 18, or 30 minutes for the display area.

LCD Saver Function: The LCD backlight automatically dims if no key is touched for a certain preset time (can be set from 1 to 60 minutes).

Discrete Display: Span bandwidth: 5% or greater, set in increments of 1%.

Partial Expanded Display:

Boundary of portion to be expanded/compressed: 1 to 99%

Boundary value: within the display span

9.4 Data Saving Specifications

Storage Medium: 3.5-inch floppy disk (2HD)
(1.2 or 1.44 MB; however, 1.2 MB is not available for the VR206.)

Saving Method: Copying of data from internal memory (1 MB) to floppy disk

Data Saving Period: Depends on the specified sampling rate (for the event file) or the waveform span rate (for a display data file).

Event File Sampling Rate:
VR202/VR204: Selectable from 125 ms, 250 ms, 500 ms, and 1 s
VR206: Selectable from Fast, 2 s, 10 s, 30 s, 60 s, and 120 s

File Configuration: Files can be created in the internal memory in the following combinations:
(a) 1 Event file + 1 display data file
(b) 16 Event files + 1 display data file
(c) 1 Event file only

Data Storage Time Span: If the VR has the /E4 (large memory) option, then the number of data values and storage time span is approximately three times.
In cases (a) and (b) above,
Display data file (when using all channels, i.e., two channels for VR202, four channels for VR204 and six for VR206)

Waveform Span Rate (min/div)	Storage Time Span (VR202)	Storage Time Span (VR204/VR206)
1 min	Approx. 52 hours	Approx. 26 hours
5 min	Approx. 11 days	Approx. 5 days
10 min	Approx. 22 days	Approx. 11 days
20 min	Approx. 44 days	Approx. 22 days
30 min	Approx. 66 days	Approx. 33 days
60 min	Approx. 132 days	Approx. 66 days

Event file
VR202 (when using all two channels), VR204 (when using all four channels)

Sampling period	Sampling time (VR202)	Sampling time (VR204)
125 ms	Approx. 2.1 hours	Approx. 1 hour
250 ms	Approx. 4.2 hours	Approx. 2.1 hours
500 ms	Approx. 8.3 hours	Approx. 4.2 hours
1 s	Approx. 16.6 hours	Approx. 8.3 hours

VR206 (when using all six channels)

Sampling period	Sampling time
1 s	Approx. 5.5 hours
2 s	Approx. 11.1 hours
10 s	Approx. 2.3 days
30 s	Approx. 6.9 days
60 s	Approx. 3.8 days
120 s	Approx. 27.7 days

Note: In case (b), each value in this table shows the total of sixteen event files.

In case (c) above,
Event file
VR202 (when using all two channels), VR204 (when using all four channels)

Sampling period	Sampling time (VR202)	Sampling time (VR204)
125 ms	Approx. 8.3 min	Approx. 4.1 min
250 ms	Approx. 16.6 min	Approx. 8.3 min
500 ms	Approx. 33.3 min	Approx. 16.6 min
1 s	Approx. 66.6 min	Approx. 33.3 min

VR206 (when using all six channels)

Sampling period	Sampling time
1 s	Approx. 31 hours
2 s	Approx. 2.6 days
10 s	Approx. 13 days
30 s	Approx. 38.9 days
60 s	Approx. 77.8 days
120 s	Approx. 155.5 days

Other Files: Configuration files (data set in the SET and SETUP modes), information file (event, power failure, and alarm information)

Event Recording: An external contact, key on the recorder panel, or an alarm can be assigned as the trigger to start saving data in an event file.
A pre-trigger function is available. (The trigger point is set in increments of 10% of the memory size.)

9.5 Alarm Function Specifications

Number of Alarm Levels: Up to four levels for each channel (high and low limits, differential high and low limits, and rate-of-change limits on increase and decrease)
Interval time of rate-of-change alarms: measurement interval times 1 to 15 (common to both increase and decrease)

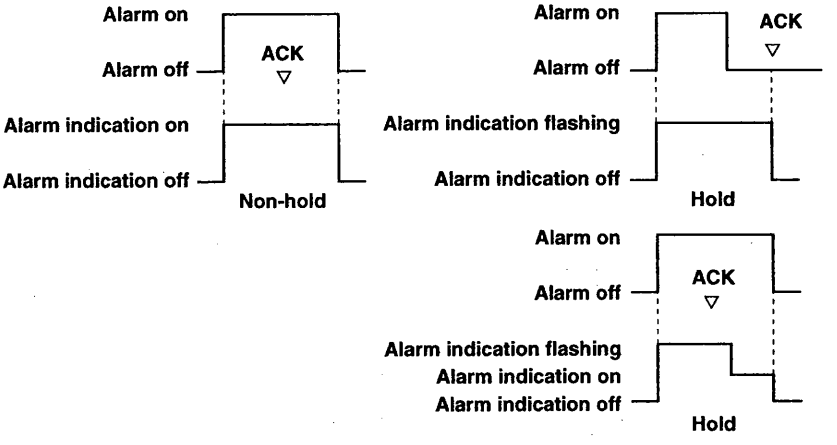
Display: Alarm status (type) displayed in the digital value display area when an alarm occurs for each channel, and common ALM indication

Output Contacts: 2, 4, or 6 points (optional)

Memory: The times of alarm occurrence/recovery, alarm types, etc. are stored in the memory. (Up to fifty alarm events for all channels are stored.)

Hysteresis: On (0.5% of span, effective for high and low limit alarms)/off switchable, common for all channels

Alarm Behavior (Relation with ACK Key):
Non-hold type: Not affected by the **ACK** key.
Hold type: The alarm indication starts flashing when an alarm occurs. After the **ACK** key is pressed, it stops flashing and the current alarm status is displayed.



9.6 General Specifications

Performance and Characteristics

Input Resistance: Approximately 10 MΩ or more for DC V ranges of 2 V or less and TC
Approximately 1 MΩ for 6 V and 20 V DC ranges

Input Source Resistance: DCV, TC: 2 kΩ or less
RTD: 10 Ω or less for each wire (The resistance of all three wires must be equal.)

Input Bias Current: 10 nA or less (however, when burnout is specified for TC: 100 nA)

Maximum Common Mode Voltage:
250 Vrms AC (50/60 Hz)

Maximum Differential Noise Between Channels (50/60 Hz):
250 Vrms AC

Interference Between Channels:
120 dB (Rg = 500 Ω, the deviation when 30 V is applied to another channel)

Common Mode Rejection Ratio:
120 dB (50/60 Hz ±0.1%, 500 Ω imbalance between terminal and ground)

Normal Mode Rejection Ratio:
40 dB (50/60 Hz ±0.1%)

Insulation Resistance: Each terminal to ground terminal: 20 MΩ or greater (at 500 V DC).

Dielectric Strength: Power supply to ground terminal: 1500 V AC (50/60 Hz), 1 minute
Contact output terminal to ground: 1500 V AC (50/60 Hz), 1 minute
Measuring input terminal to ground: 1000 V AC (50/60 Hz), 1 minute
Between measuring input terminals: 1000 V AC (50/60 Hz), 1 minute
(except for RTD of VR206)
Remote Control terminal to ground: 500 V DC, 1 minute

Construction

Mounting: Flush panel mounting (on a vertical plane), or horizontal side-by-side mounting
Mounting may be inclined up to +30°, rear below front (with horizontal base).

Allowable Panel Thickness:
2 to 26 mm

Material: Case: drawn steel, bezel: polycarbonate

Case Color: Lamp black (Munsell 0.8Y2.5/0.4 or equivalent)

Dimensions: 144 (W) × 144 (H) × 300 (D) mm
144 (W) × 197.8 (H) × 346 (D) mm (/H5)

Weight (without optional feature):
VR202: approx. 2.8 kg (/H5 : approx. 4.3kg)
VR204: approx. 2.9 kg (/H5 : approx. 4.4kg)
VR206: approx. 2.8 kg (/H5 : approx. 4.3kg)

Power Supply

Rated Power Voltage: Except for /P1 model: 100 to 240 V AC, automatically selected depending on the power supply voltage.
/P1 model: 24 V DC

Dimensions: 144 (W) × 144 (H) × 300 (D) mm
144 (W) × 197.8 (H) × 346 (D) mm (/H5□)

Weight (without optional feature):
VR202: approx. 2.8 kg (/H5□: approx. 4.3kg)
VR204: approx. 2.9 kg (/H5□: approx. 4.4kg)
VR206: approx. 2.8 kg (/H5□: approx. 4.3kg)

Power Supply

Rated Power Voltage: Except for /P1 model: 100 to 240 V AC, automatically selected depending on the power supply voltage.
/P1 model: 24 V DC

Usable Power Voltage Ranges:
90 to 132, 180 to 250 V AC (except for /P1 model)
21.6 to 26.4 V DC (/P1model)

Rated Power Frequency: 50/60 Hz, switches need not be changed

Power Consumption:

Power Supply Voltage	When LCD Saver On	Consumption During Normal Operation	Maximum Consumption
100 V AC	Approx. 25 VA	Approx. 30 VA	Approx. 60 VA
240 V AC	Approx. 35 VA	Approx. 40 VA	Approx. 70 VA
24 V DC (/P1)	Approx. 15 VA	Approx. 20 VA	Approx. 50 VA

Normal Operating Conditions

Power Voltage: 90 to 132, 180 to 250 VAC

Power Frequency: 50 Hz ±2%, 60 Hz ±2%

Ambient Temperature: 0 to 50°C (5 to 40°C when using floppy disk)

Ambient Humidity: 20 to 80% RH (at 5 to 40°C)

Vibration: 10 to 60 Hz, 0.2 m/s^2 or less

Shock: Not permissible

Magnetic Field: 400 A/m or less (DC and 50/60 Hz)

Noise: Normal mode (50/60 Hz):
DCV Peak value including signal must not be greater than 1.2 times the measured range.
TC Peak value including signal must not be greater than 1.2 times the measured mV.
RTD 50 mV or less
Common mode (50/60 Hz): 250 Vrms AC or less for all ranges
Maximum differential noise between channels (50/60 Hz): 250 Vrms AC or less

Operating Position: Can be inclined up to 30° backward.

Warm-up Time: At least 30 minutes after power on

Effect of Operating Conditions

Effect of Ambient Temperature:
Within ±(0.1% of rdg + 1 digit) for ambient temperature variation of 10°C (excluding RJC-error)

Effect of Power Supply:
Effect of variation in power supply voltage within 90 to 132 and 180 to 250 V AC (expect for /P1), or 21.6 to 26.4 V DC (for /P1): within ±1 digit
Effect of rated power frequency variation of ±10%: within ±(0.1% of rdg + 1 digit)

Effect of Magnetic Field: Effect of AC (50/60 Hz) or DC 400 A/m field: within ±(0.1% of rdg + 10 digit)

Effect of Input Source Resistance:

Effect of input source resistance variation of +1 kΩ:
(1) DCV range:
Ranges less than 2 V: within ±10 μV
Ranges more than 6 V: within –0.1% of rdg
(2) TC range: within ±10 μV (±100 μV when TC burnout upscale/downscale function is set)
(3) RTD range:
- Effect of variation of 10 Ω for each wire (resistance of three wires must be equal): within ± (0.1% of rdg + 1 digit)
- Effect of difference between three wires: approx. 0.1°C of rdg for each 40 mΩ

Effect of Operating Position:

Within ±(0.1% of rdg + 1 digit) within 30° backward

Vibration: Effect when sine-wave motion of frequency 10 to 60 Hz and acceleration of 0.02G is applied to the instrument in the direction of each of the three axes for two hours: Within ±(0.1% of rdg + 1 digit)

Transport and Storage Conditions

The transportation and storage conditions are specified below, including during shipment, start of service, storage, and when this instrument is temporarily taken out of service.

Temperature: –25 to 60°C

Humidity: 5 to 95% RH (no condensation)

Vibration: 10 to 60 Hz, 4.9 m/s^2 or less

Shock: 392 m/s^2 (40G) or less (inside package as shipped from factory)

Other Specifications

Clock: With calendar function (Western calendar)

Accuracy: ±100 PPM, not including error due to turning on/off power

Memory Backup: Built-in lithium battery preserves parameters set. Life is approximately ten years at room temperature. A "low voltage" alarm is displayed at the bottom of the screen prompting the user to replace the battery.
The measured values are stored in the flash memory, and thus the backup time is not limited.

Safety and EMI Standards

Safety standards: Complies with CSA1010, IEC1010

EMC Conformity Standard

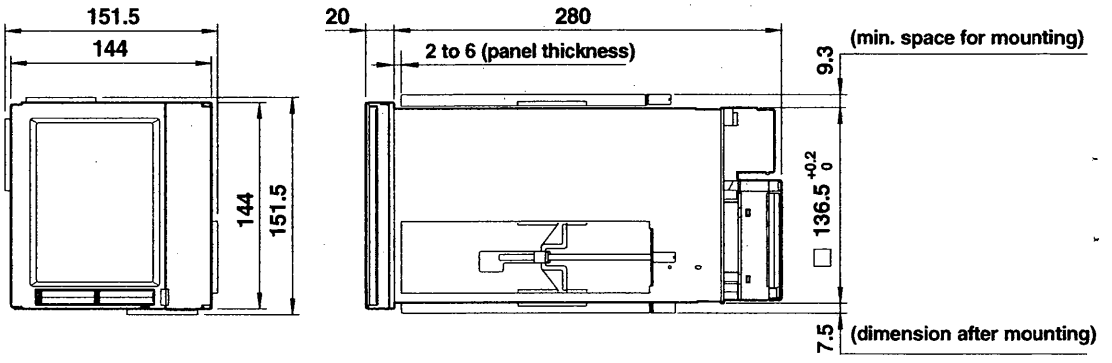
- Emission EN55011: Class A
- Immunity EN50082-2

IEC1000-4-2	Electrostatic Discharge 8 kV (Air), 4 kV (Contact)	Performance Criteria A*
IEC1000-4-3	Radiated fields 80 to 1000 MHz, 10 V/m	Performance Criteria A*
IEC1000-4-4	Fast Transients Power line 2 kV, others 1 kV	Performance Criteria B*
IEC1000-4-6	Conducted Disturbance 0.15 to 80 MHz, 10 V	Performance Criteria A*
	IEC1000-4-8 30 A/m	Magnetic Field Performance Criteria A*

* Effect on accuracy: ±50 % of range

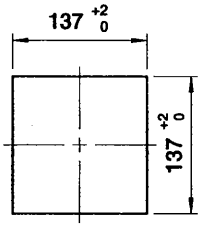
9.7 Dimensional Drawings

Unit: mm

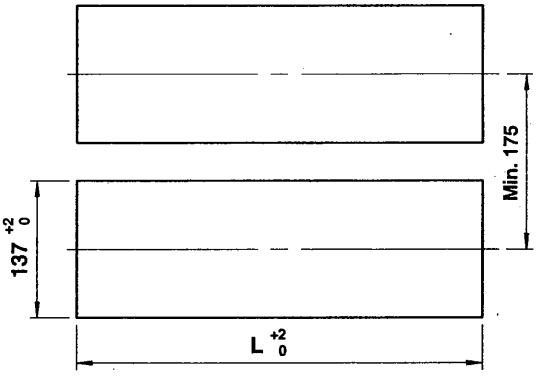


Panel Cutout

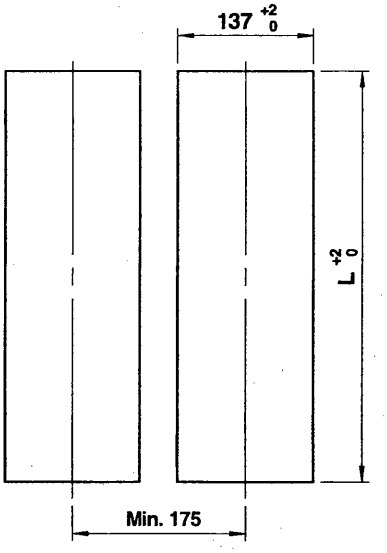
Single-unit Mounting



Side-by-side Mounting



Stacked Mounting (up to three)



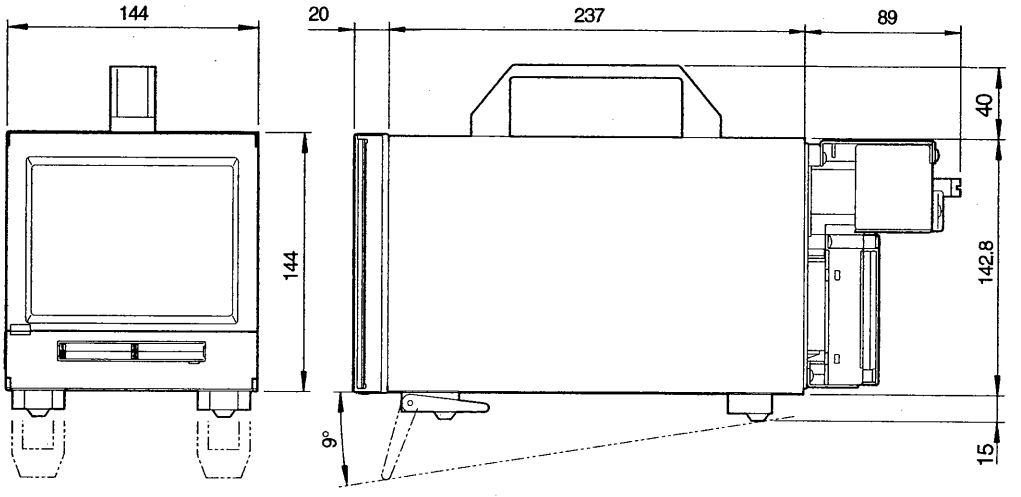
No. of recorders	L +2 0 (mm)
2	282
3	426
4	570
5	714
6	858
7	1002
8	1146
9	1290
10	1434
n	(144×n) -6

Note

- When mounting to a panel, use two brackets, one on each of the top and bottom of the recorder, or on the left and right sides.
- The dimensional tolerance is ±3% unless otherwise specified. (However, the tolerance for dimensions less than 10 mm is ±0.3 mm.)

•Desk-Top Model

unit:mm



Note

- The dimensional tolerance is ±3% unless otherwise specified. (However, the tolerance for dimensions less than 10 mm is ±0.3mm.)

APPENDIX

Appendix 1 Parameters and Initial Settings

Parameters in SET Mode

Setting Parameters			Available Settings				Remarks
RANGE	MODE	VOLT	20mV	60mV	200mV	2V	DC voltage input
			6V	20V			
		TC	R	S	B	K	Thermocouple input
			E	J	T	N	
			W	L	U		
		RTD	PT	JPT			Resistance temperature detector input
		DI	LEVL	CONT			LEVL: voltage input; CONT: contact input
		DELT					Differential computation
		SCL	VOLT	TC	RTD		Scaling
		SQRT	20mV	60mV	200mV	2V	Computing the square root of measured
			6V	20V			data
		SKIP					Skips a channel
ALARM	LEVEL		1	2	3	4	Alarm level
	ALARM		ON	OFF			Alarm detection on/off
	TYPE		H	L	h	l	Types h and l can only be selected for a
			R	r			differential computation channel.
	VALUE						Alarm setpoint
	RELAY		ON	OFF			Output relay on/off
	RELAY No.		I01-I06				Relay number to be assigned for output
UNIT							Engineering unit
TIME/DIV			1	5	10	20	Waveform span rate
			30	60			
CLOCK							Date and time
COPY							Copies the settings of a channel
AUX	ZONE						Discrete (zone) display
	PART	PART	ON	OFF			Partial extended display
		EXPANDED FROM					%
		BOUNDARY					Boundary value
	DISP_WAVE	DISP WAVE	ON	OFF			Display waveform
		DISP SCALE	ON	OFF			Scale values to be indicated or not
	TAG						Tag number (up to seven characters)
	FD	Format	1.2M	1.44M			Formatting type (only for VR200/VR204)
	TRIP	LEVEL	1	2	3	4	Trip level number (1 or 2)
			5	6			
		SET	ON	OFF			To be drawn/not to be drawn
		POS	0-100				Trip level (%)
		COLOR	RED	GRN	BLU	BRN	
			PRP	L.BLU	ORG	GRY	
			W.RED				
	FILE	MSG					Comment (up to thirty-two characters)
		FILE_NAME	DATE	SET	AUTO		Date (automatic setting) or user-specified
		FILE_E					Event file
		FILE_D					Display data file

Setting Parameters			Available Settings				Remarks
AUX	MESSAGE						Massage characters (up to sixteen characters)
	BAR_SCALE_DIV		01 to 12				Number of divisions of scale for the bar graph display
	SPECIAL	DISP TIME/DIV	ON	OFF			Waveform span rate dispaly
		MESSAGE PANEL	ON	OFF			Massage menu display
	LCD	LIGHT	01 to 15				LCD brightness
		SAVER	OFF	ON			On/off of saver
		SAVER TIME	01	02	05	10	Timer setting for saver
			30	60			
	INIT_ MEMORY	INIT OK	YES	NO			Initializes the data memory
	DST	TIME SUMMER					Sets the time to switch over the summer/ winter time (optional)
		TIME WINTER					
FD_SET	LOAD						Loads (reads) a SET configuration file
	SAVE						Saves the SET configuration file
	DEL						Deletes a SET configuration file
	INIT						Formats a floppy disk

Parameters in SETUP Mode

Setting Parameters		Available Settings				Remarks
ALARM	REFLASH	ON	OFF			Reflashing alarm
	AND	NONE	I01	I01-I02	I01-I03	Logic of alarms by output relay: AND or OR
		I01-I04	I01-I05	I01-I06		
	ALARM	ENERG	DE_EN			Relay action: energized or de-energized when alarm occurs
	RLY	NONHOLD	HOLD			Alarm action of relay: hold or non-hold
	IND	NONHOLD	HOLD			Alarm action of ALM indication: hold or non-hold
	R_TIME	01 to 15				Sampling interval for rate-of-change alarms on increase
	r_TIME	01 to 15				Sampling interval for rate-of-change alarms on decrease
	ALM_HYS	ON	OFF			Alarm hysteresis
INTG		AUTO	50Hz	60Hz		Integration frequency of input A/D converter
		AUTO	50Hz	60Hz	100ms	(Upper row: for VR202/VR204; lower row: for VR206)
B. OUT	B. OUT	UP	DOWN			Burnout upscale/downscale
	B. OUT	ON	OFF			On/off (to be set for each channel)
RJC	RJC	INT	EXT			Reference junction compensation (to be set for each channel)
	(EXT voltage)					Compensation voltage
FILTR	FILT	OFF	2s	5s	10s	Input filter (to be set for each channel, only for VR202/VR204)
M_AVE	M_AVE	OFF	2	3	4	Moving average (only for VR206)
		5	6	7	8	
		9	10	11	12	
		13	14	15	16	
DISP	DISPLAY	HORI	VERT			Direction of waveform display: horizontal or vertical
	TREND LINE	1DOT	2DOT	3DOT		Width of drawing lines for waveforms
	TRIP LINE	1DOT	2DOT	3DOT		Width of drawing lines for trip levels
	GRID	4DIVS	5DIVS	8DIVS	10DIVS	Number of divisions of scale axis
COLOR	BACKGROUND	WHT	BLK	WHT2		Background color
	COLOR	RED	GRN	BLU	BRN	Display color for each channel.
		PRP	L.BLU	ORG	GRY	
TEMP	TEMPUNIT	°C	°F			Temperature unit
INIT	INIT	NO	YES			Initializes the settings
REMOTE	REMOTE1 to	EXT_TRG	ADJ_TIME	MATH	MATH_CLR	Arbitrarily assign control functions to the control terminal
	REMOTE5	MESSAGE1	MESSAGE2	MESSAGE3	MESSAGE4	
		MESSAGE5				
MEMORY	DATA	E1 + D	E16 + D	E1		File configuration
	RATE	125ms	250ms	500ms	1s	Sampling period
		Fast	2s	10s	30s	(Upper row: for VR202/VR204; lower row: for
						VR206)
		60s	120s			
	MODE	FREE	TRIG	ROTATE		Sample mode
	PRE.TRIG	0	10	20	30	Pre-trigger data area
		40	50	60	70	
		80	90	100		
	TRIG KEY	ON	OFF			Enables/disables manual trigger
	TRIG EXT	ON	OFF			Enables/disables external trigger
	TRIG ALM	ON	OFF			Enables/disables alarm trigger

Setting Parameters			Available Settings				Remarks
AUX	CH_QTY		1	2			Number of channels to be used
			1	2	3	4	(Upper row: for VR202; middle row: for VR204;lower
			1	2	3	4	row: for VR206)
			6				
	CH/TAG		CH	TAG			Activate/inactivate tag number display
	MSG LANG		JPN	ENG			Message language selection: Japanese or English
	MEMORY ALM		1h	2h	5h	10h	Timer for remaining time until memory full
			20h	50h	100h		
	KEY PASSWORD		OFF	ON			Determines whether the password is required for entry to the SET mode.
	FD PASSWORD		OFF	ON			Determines whether the password is required for saving of measured data.
	PASS NO.		0 to 9999				Password number
FD_SET	LOAD						Loads (reads) a SETUP configuration file
	SAVE						Saves the SETUP configuration file
	DEL						Deletes a SETUP configuration file
OPT*	COMM	ADDRESS	01 to 16				Specifies the address
		B. RATE	1200	2400	4800	9600	Baud rate
		D. LEN	7bit	8bit			Data length
		PARITY	ODD	EVEN	NONE		Parity bit
		STOP BIT	1	2			Stop bit length
	LANG		ENG	GERMAN	FRENCH		Display language (option)
END	END&INIT. DATA		ABORT	STORE			End of setup

* The OPT parameters are displayed when the optional communication function is installed.

Initial Setting Values

SET Mode

Range	RANGE	VOLT (-2.000 to 2.000 V)
Alarm	ALARM	OFF
Engineering unit	UNIT	Blanks
Waveform span rate	TIME/DIV	30 min
Discrete display	ZONE	0 to 100%
Partial extended display	PART	OFF
Waveform and scale value indication	DISP_WAVE	ON
Tag number	TAG	Blanks
Floppy disk format	FORMAT	1.44M (only for VR202 and VR204)
Trip level	TRIP SET	OFF
File name (automatic or user-specified)	FILE_NAME	DATE
Number of division for the bar graph	BAR_SCALE_DIV	10
Waveform span rate display	DISP TIME/DIV	ON
Massage menu display	MESSAGE PANEL	OFF
LCD brightness	LIGHT	8
LCD saver	SAVER	OFF

SETUP Mode

Reflashing alarm	REFLASH=	OFF
Alarm output relay logic: AND/OR	AND=	NONE (OR)
Alarm output relay: energized/de-energized when alarm occurs	ALARM=	ENERG (energized on alarm)
Alarm output relay behavior: hold/non-hold	RLY=	NONHOLD
ALM indication behavior: hold/non-hold	IND=	NONHOLD
Sampling interval for rate-of-change alarms on increase	R TIME=	01
Sampling interval for rate-of-change alarms on decrease	r TIME=	01
Alarm hysteresis	ALM HYS=	ON (approx. 0.5% of span)
Input A/D converter integration frequency	INTG=	AUTO
TC burnout upscale/downscale	B.OUT=	UP
On/off of TC burnout upscale/downscale	B.OUT=	OFF (all channels)
Reference junction compensation	RJC=	INT (all channels)
Input filter	FILT=	OFF (all channels, only for VR202/VR204)
Moving average	M_AVE=	OFF (all channels, only for VR206)
Direction of waveform display	DISPLAY=	VERT
Width of drawing lines for waveforms	TREND LINE=	2DOT
Width of drawing lines for trip levels	TRIP LINE=	2DOT
Number of divisions of scale axis	GRID=	10DIVS
Background color	BACKGROUND=	WHT (bright white)
Display color	COLOR=	1 = red; 2 = green (for VR202) 1 = red; 2 = green; 3 = blue; 4 = red-purple (for VR204) 1 = red; 2 = green; 3 = blue; 4 =red-purple; 5 = orange; 6 = light blue (for VR206)
Temperature unit	TEMPUNIT=	°C
Assigning control function	REMOTE=	REMOTE1 = EXT_TRG, REMOTE2 = ADJ_TIME REMOTE3 = MESSAGE1, REMOTE4 = MESSAGE2 REMOTE5 = MESSAGE3
File configuration	DATA=	E1+D (one event file and display data file each)
Sampling period	SAMPLE RATE=	1s
Sample mode	SAMPLE MODE=	FREE
Number of channels	CH_QTY=	2 (VR202), 4 (VR204), 6 (VR206)
Tag number display	CH/TAG=	CH (tag number display: inactive)
Message language	MSG LANG=	ENG (English)
Memory end (relay contact output) timer	MEMORY ALM=	1h
Use of password for entry to SET mode	KEY PASSWORD=	OFF
Use of password for saving of measured data	FD PASSWORD=	OFF

Appendix 2 Data Formats of Parameter List File and Information File

Data Format of Parameter List File

The parameter list file is an ASCII text file which lists the parameters in the format as shown below and can be viewed and edited on the CRT screen of a PC.

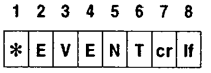
Example of Parameter List File (VR204, ASCII Text File)

```
*** List ***          Mar.01.96 01:27:23

TIME/DIV :  1min

CH  RANGE                LOWER    UPPER     SCALE LOWER  UPPER  UNIT
 1  Type R(SCALE)          0.0   1760.0 C         30.00  100.00 J
 2  2V                  - 2.000    2.000V
 3  2V(DELTA 2 CH)      - 2.000    2.000V
 4  20V(SQRT)           - 20.00    20.00V          50.00  100.00 Ws

CH  ALARM1     RLY   ALARM2     RLY   ALARM3     RLY   ALARM4       RLY
 1  r  700.0   03
 2  H  2.000       R  2.000   04
 3  H  2.000                        H  2.000   05
 4                                                  L  60.00     01

CH   TAG No.     ZONE(%)     PARTIAL
 1   AA          10-100      50%       350.0J
 2   BB           0-80       70%       1.500V
 3   CC           0-100      20%     - 1.500V
 4   DD           0-60

TRIP LEVEL      SET      POS
    1           ON        70%
    2           ON       100%

MESSAGE : YOKOGAWA
FILE_NAME : DATE
FD_FORMAT : 1.44MB

LCD
LIGHT      SAVER      SAVER TIME
08         OFF        60min


*** Setup List ***

ALARM
REFLASH  AND      ALARM    RLY      IND      R_TIME   r_TIME   ALM_HYS
OFF      NONE     ENERG    NONHOLD  HOLD     01       01       ON

CH       B.OUT       RJC           FILTR      COLOR
 1       OFF         INT           OFF        RED
 2       OFF         INT           OFF        GRN
 3       OFF         INT           OFF        BLU
 4       OFF         INT           OFF        PRP

INTG        B.OUT        BACKGROUND        TEMPUNIT
AUTO        UP           WHT               C

MEMORY
DATA     RATE     MODE     PRE-TRIG    TRIG KEY    TRIG EXT    TRIG ALM
E16+D    125ms    TRIG      90%        ON          OFF         OFF

CH/TAG       MSG LANG       MEMORY ALM       PASSWORD
CH           ENG            1h               OFF

COMM
ADDRESS      B.RATE      D.LEN      PARITY      STOP BIT
01            9600       8bit       EVEN          1
```

Data Format of Information File

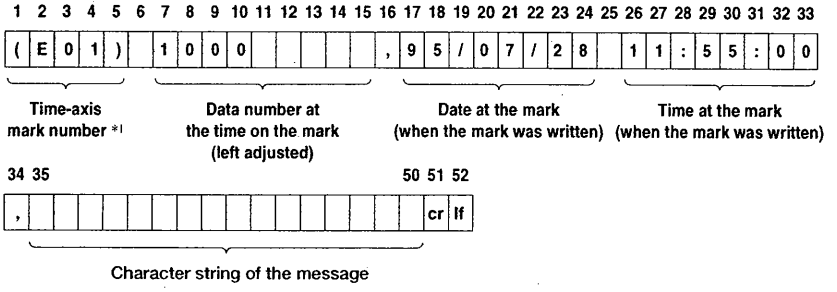
Time-axis Mark Information

Header line



Information lines

The following format is repeated as many times as the number of time-axis marks written, for up to the ninety-nine most recent marks.



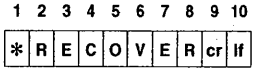
*1 Time-axis mark number: E01 to E99

Example of stored data

```
*EVENT
(E01) 5140      ,95/11/24 16:25:10
(E02) 5176      ,95/11/24 16:25:45
(E03) 5348      ,95/11/24 16:28:38
(E04) 5700      ,95/11/24 16:34:29
```

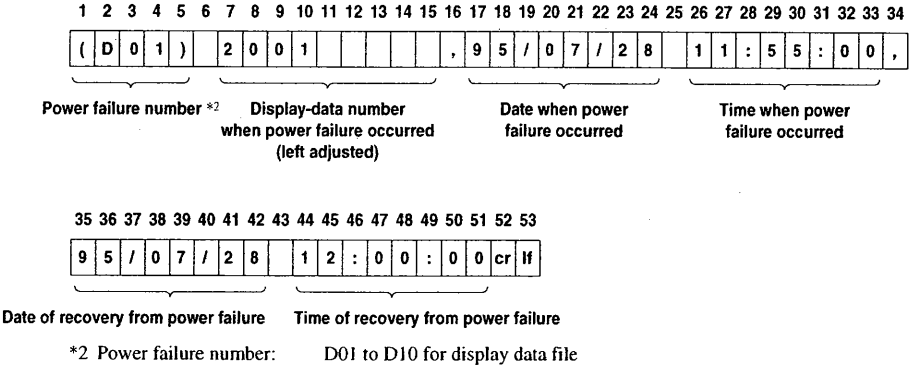
Power Failure Information

Header line



Information lines

The following format is repeated as many times as the number of power failures that occurred, for up to the ten most recent power failures.



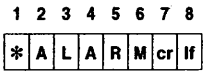
*2 Power failure number: D01 to D10 for display data file
E01 to E10 for event file (not stored when there are multiple event files)
D** or E** when the stored data are lost

Example of stored data

```
*RECOVER
(D01) 2001      ,95/11/24 11:55:00,95/11/24 12:00:00
(D02) 3001      ,95/11/24 12:55:00,95/11/24 13:00:00
(E01) 4000      ,95/11/24 11:55:10,95/11/24 11:59:58
```

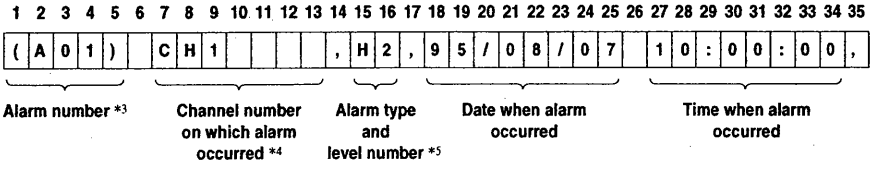
Alarm Information

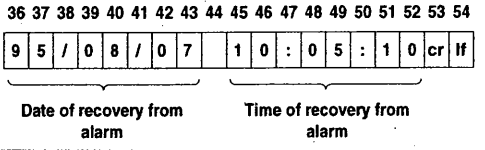
Header line



Information lines

The following format is repeated as many times as the alarm occurred, for up to the fifty most recent alarms.





*3 Alarm number: A01 to A50
*4 Tag number used instead of the channel number if the tag number display is active.
*5 Alarm types: H, L, h, l, R, r

Example of stored data

```
*ALARM
(A01) CH3     ,H1,95/12/20 16:57:50,95/12/20 16:57:54
(A02) CH4     ,L2,95/12/20 16:58:10,95/12/20 16:58:29
(A03) CH1     ,R2,95/12/20 17:03:09,95/12/20 17:03:37
(A04) CH3     ,H1,95/12/20 17:03:29,95/12/20 17:03:33
```

Appendix 3 Glossary

allowable input voltage	The maximum input voltage that can be applied to the input terminals
burnout	Failure of a device due to excessive heat
common-mode rejection ratio	The ability of an amplifier to cancel a common-mode voltage
common-mode voltage	A voltage that appears equally and in phase from each signal conductor with respect to ground. Also known as common-mode noise. The power noise induced from a power transformer is a typical example of this noise (voltage).
dead band	In static characteristics, the range through which an input signal can be varied without initiating an observable change in the output signal
DI	Digital Input (contact & voltage level)
dielectric strength	The potential gradient at which electric failure or breakdown occurs
EMI	An abbreviation for Electromagnetic Interference. Impairment of a wanted electromagnetic signal due to an electromagnetic disturbance.
error	Any discrepancy between a measured quantity, set-point, or rated value and the ideal value of the measured signal
hysteresis	An effect wherein a given value of a parameter may result in multiple values
input resistance	Resistance measured at the input terminals of an instrument under operating conditions
input source resistance	Resistance of the measuring circuit outside the instrument
ISO	An abbreviation for International Organization for Standardization
LCD	An abbreviation for Liquid Crystal Display
noise	An unwanted disturbance superimposed upon an indicated or supplied value, which obscures its information content
normal mode rejection ratio	The ability of certain amplifiers to cancel normal mode noise, usually expressed in decibels
normal mode voltage	An unwanted input (noise) voltage superimposed on the measurement voltage
reference junction	That thermocouple junction which is at a known or reference temperature
reference junction compensation	A means of counteracting the effect of temperature variations of the reference junction when allowed to vary within specified limits, by measuring the temperature at the terminal
reflash	Function to indicate repeating alarm occurrences among a group of alarms sharing the same output relay
resistance temperature detector	A detector for measuring temperatures with a change in electrical resistance that is a known function of temperature
resolution	The minimum detectable change of some variables in a measurement system, or a minimum change in a supplied quantity that can be set

RJC	*See* reference junction compensation.
RS-422-A	The EIA (Electronics Industries Association) approved standard, which established the requirements for serial communications between computers
scaling	Recording of an input in terms of the engineering variable
shunt resistor	Resistor used at the input terminal to convert a current into a voltage
step response	The behavior of a system when its input signal is zero before a certain time and is equal to a non-zero value after this time
TFT	An abbreviation for Thin Film Transistor
thermocouple	A pair of dissimilar conductors joined at two points so that an electromotive force is developed by the thermoelectric effect when the junctions are at different temperatures
TTL	An abbreviation for Transistor/Transistor Logic
warm-up time	The time (after power turn-on) required before its rated performance characteristics apply

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