Technical Information

View Recorder
VR100 Sales Guide

VR100

VR104P
(Panel-mount model)

VR104D
(Desk-top model)

YOKOGAWA ◆

Yokogawa Electric Corporation

TI 4N1A1-E
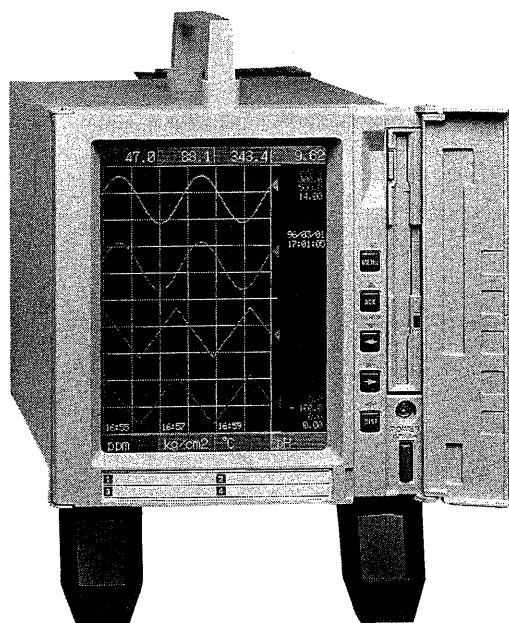
Contents

Introduction

How to use this sales guide

This sales guide has been prepared to facilitate a better understanding of the latest paperless recorder, the VR100 View Recorder. The guide covers the major features, functions, and applications of the VR100, and is thus a useful sales tool.

This guide consists of the following five chapters:

1. Overview
This chapter briefly outlines the background of R&D, specifications and features of the VR100. Since this is basic information required for sales, read this chapter at least once.

2. Functions
This chapter describes the functions specific to the VR100, and the information is thus useful when explaining the VR100 to potential users while showing the catalogue. Read this chapter so that you will be able to explain all applications to the customer.

3. Target Users and Applications
This chapter provides the information on the target users and applications for reference purposes.

4. Q & A
This chapter lists questions commonly asked by customers and the answers to them. For questions concerning the VR100, read this chapter.
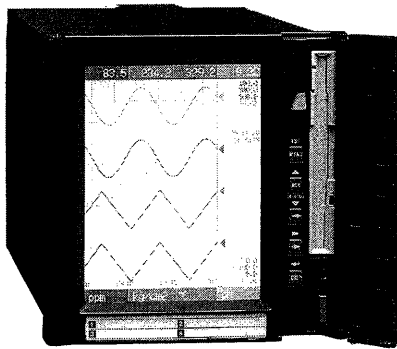
5. Appendix (Competitor Information)
This appendix outlines the competitors of the VR100. Use this list as required.

Note: This sales guide is based on the latest information, but is subject to minor changes. Use the catalogue or GS when providing any information to customers.

1.1 Product Overview

VR104P (Flush panel-mounted model)   **VR104D (Desk-top model)**
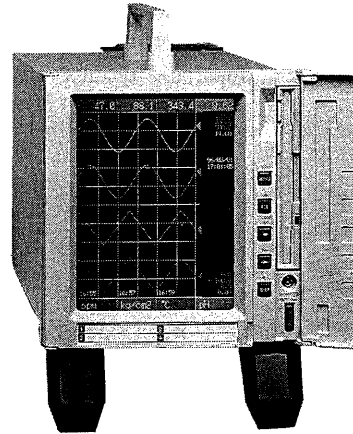
The VR100 View Recorder is a paper-less recorder that displays real-time measured data on the LCD in an analog or digital form. The data stored in its internal memory can also be copied to a 3.5-inch floppy disk.

1.2 Background of R&D

Typical users of paper-less recorders

• Electric power industry

→ Require monitoring of data but need to reduce replacement and maintenance costs.

• Hydropower plants and environmental engineering

→ Want to eliminate such problems as paper jams and running out of paper or ink since data must be obtained from unmanned power plants or water distribution stations.

• Food and chemical industries

→ Need to process measured data on a PC.

1. Overview

1.1 Product Overview

The VR100 View Recorder is a paper-less recorder that displays real-time measured data on the LCD in an analog or digital form. The data stored in its internal memory can also be copied to a 3.5-inch floppy disk.

There are 2 types of VR100: VR104P (flush panel-mounted) and VR104D, a portable recorder suitable for maintenance and inspection.

1.2 Background of R&D

The VR100 has been developed to meet the following market needs:

- Electric power industry
  - → Replacement and maintenance costs must be reduced, but data must be monitored.
- Hydropower plants and environmental engineering (e.g. water supply/sewerage)
  - → To obtain data more reliably from unmanned power plants or water distribution stations, problems such as paper jams or running out of paper or ink must be eliminated.
- Food or chemical industry
  - → Analyzing measured data on a PC is more flexible.

The VR100 successfully solves these problems (reduces replacement costs, eliminates troubles, allows PC analysis), and is ideally placed for the coming paper-free age following the PC boom.

1.3 Positioning of the VR100
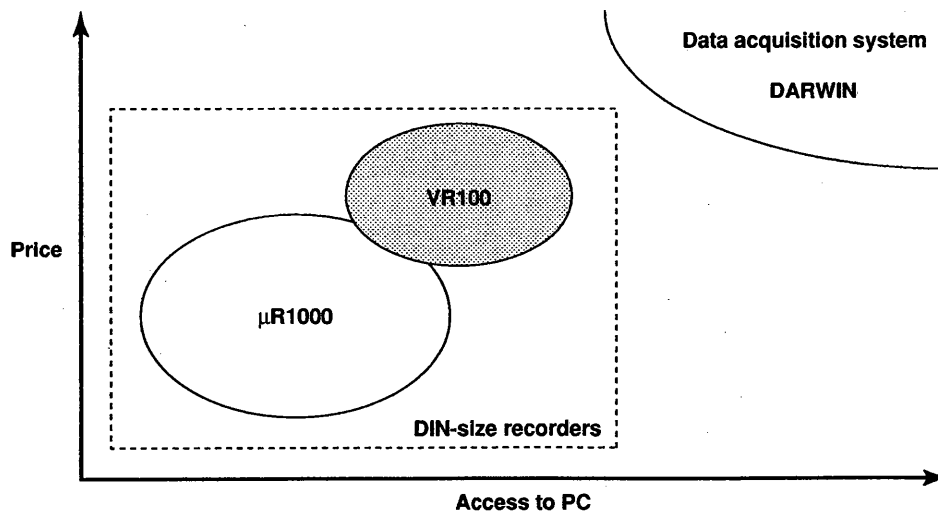
- Next generation, PC-compatible recorder
- Recorder has been developed to suit future needs of paper-free age

1.3 Positioning of the VR100

Both the VR100 and μR1000 are DIN-size industrial recorders. However, the floppy disk as a storage medium makes the VR100 compatible with PCs, so the VR100 is a next-generation recorder that will obviate the need for paper.

These two types of recorders should be marketed according to the needs of prospective users. The μR series is suitable for those who must keep records on paper or those who prefer the use of paper because of its readability. The VR100, on the other hand, is suitable for those who want to process measured data on a PC or who want to reduce replacement costs.

1.4 Features (1)

- **Computer-friendly**
- Measured data can be reproduced or processed on a PC by using data conversion/viewer software.

- **High-precision recording based on digital data**
- Even if a signal is very fast and small, it can accurately be detected as digital data by the high-speed (125 ms), high-resolution (14 bits) sampling.

- No pen-recording mechanism means that displayed or copied data are not affected by pen speed.

1.4 Features (2)

- **Easy inspections and maintenance**
- 3.5-inch floppy disk is used as a storage medium.

- Maintenance of mechanical recording system is unnecessary.

- **Simplified operations**
- Measured data are automatically saved on a floppy disk by inserting a disk into the VR100.

- Settings can easily be made interactively.

- **Clear display**
- High resolution (320 x 240 pixels) TFT color LCD ensures a clear display.

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1.4 Features

- **Computer-friendly**
  - Measured data stored on a floppy disk (one floppy can hold data sampled every 60 s for approximately one month using four channels) can easily be reproduced or processed on a PC by using the supplied data conversion/viewer software.

- **High-precision recording based on digital data**
  - Measured data are sampled digitally at high speed (125 ms) with high resolution (14 bits), allowing the VR100 to detect even rapid or small changes in a signal which can not be detected by conventional chart recorders.
  - Unlike conventional chart recorders, waveforms are correctly displayed on the LCD or reproduced on a PC without being affected by pen speed.

- **Easy inspection and maintenance**
  - The low-cost 3.5-inch floppy disk as a storage medium greatly reduces running costs (chart paper and ink).
  - Since there is no recording servo mechanism nor paper-feed mechanism in the VR100, daily maintenance of mechanical parts such as lubrication is unnecessary.

- **Simplified operations**
  - Measured data are always stored in the internal memory. To copy data to a floppy disk, simply insert a disk into the VR100 (there is no need to touch any key). The data are then saved on the floppy disk automatically.
  - Settings can easily be made interactively.

- **Clear display**
  The high resolution (320 x 240 pixels) 5.5-inch TFT color LCD allows the VR100 to display analog waveforms very clearly.

1.5 Specifications (1)

General Specifications

<1> Construction
Material: Drawn steel (case); polycarbonate (bezel)

External dimensions:

VR104P: 144(W) x 144(H) x 280(D) mm

VR104D: 144(W) x 191.5(H) x 326(D) mm

<2> Input
Number of inputs: Up to four channels (user-selectable)

Measurement interval: 125 ms

Inputs: DCV, TC, RTD, DI (universal input)

Measurement accuracy (2V range): ±(0.1% of rdg + 2 digits)

<3> Display
Display unit: 5.5-inch TFT color LCD

Analog display color (default): Red for channel 1, green for channel 2, blue for channel 3, and magenta for channel 4

(These colors as well as brown are user-selectable for each channel.)

Waveform span rate: User-selectable from 1, 5, 10, 20, 30, and 60 min/div

Other display contents: Scale values (0 and 100%), grid, present time, trip point, event mark, alarm (ALM)

Digital indication: Measured values (updated every second), engineering units (up to 6 characters), and tags (up to 7 characters)

Data referencing function: The waveform display area is split horizontally into two, allowing present waveforms to be compared with reference waveforms on the same display.

Display magnification/reduction function: The time scale of the analog display can be magnified or reduced.

LCD saver function: The LCD backlight automatically dims if no key is touched for the preset time (can be set from 1 to 60 minutes).

1.5 Specifications (2)

<4> Data saving function

Storage medium: 3.5-inch floppy disk (2HD) (Either 1.2 or 1.44 MB can be selected)

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

Data saving period: At a specified sampling interval (for event files) or linked with the waveform span rate (for display data files)

Event file sampling interval: Selectable from 125 ms, 250 ms, 500 ms, and 1 s

File:

(a) 1 event file + 1 display data file

(b) 16 event files + 1 display data file

(c) 1 event file only

Other files: Setup parameter file (setup parameter list), 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 a 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 length.)

Memory capacity:

Display data file (33 days at 60 s) and event file (8.3 hours at 1 s, or 1 hour at 125 ms)

Event file only (approx. 33 hours at 1 s, or approx. 4 hours at 125 ms)

<5> Alarm function

Number of alarm levels: Up to four levels for each channel

Alarm types: High and low limits, differential high and low limits, and high and low rate-of-change limits

Display: The alarm status is displayed in the digital value display area when an alarm occurs. A common alarm indication is also displayed.

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

Memory: The times of alarm occurrences/recoveries, alarm types, etc. are stored in the memory (up to 50 alarm events).

<6> Power supply

Rated power supply: 100 to 240 V AC (automatically switched)

Allowable power supply voltage range: 90 to 132 or 180 to 250 V AC

Rated power supply frequency: 50/60 Hz

1.5 Specifications (3)

Optional Specifications

Alarm output relays: Selectable from 2, 4, and 6 points

RS-422A communication interface: With this interface, the host computer controls the VR100, makes parameter settings, and also receives data from the recorder.

Fail/memory end output: This output indicates that a system error has occurred or the memory is full (preset time (1 to 100 hours) before the data in a continuously storing file is overwritten).

Cu10 & Cu25 RTD inputs: This option allows Cu10 and Cu25 inputs to be added.

Remote control: Event trigger, writing of event marks, and time adjustment

Application software

Data conversion software

Function overview: Converts data saved on a floppy disk to ASCII, Lotus 1-2-3, or Microsoft Excel format data.

Operating system: MS-DOS

Viewer software

Function overview:

(a) Converts data saved on a floppy disk to ASCII, Lotus 1-2-3, or Microsoft Excel format data

(b) Displays the waveform of specified data.

(c) Prints out waveforms.

Operating system: MS-Windows Ver3.1 and MS-DOS running MS-Windows Ver3.1

1.6 Model Code (1)

• Main Unit & Options

Model Code	Suffix Code	Option Code	Description
VR104P			View Recorder VR100 (Panel mount type)
VR104D			View Recorder VR100 (Desk top type)
Application software	–0		No application software
	–2		with application software for IBM PC-AT
Power input code	–D		Power cord UL, CSA st' d *1
	–F		Power cord VDE st' d *1
	–R		Power cord SAA st' d *1
	–J		Power cord BS st' d *1
	–W		Screw type power input terminal (w/o power code)*2
Option		/A1	Alarm output relay (2 points) *3
		/A2	Alarm output relay (4 points) *3
		/A3	Alarm output relay (6 points) *3
		/C3	RS-422-A interface
		/D2	deg F display
		/F1	FAIL/memory end detection and output *4
		/N1	Cu10, Cu25 RTD input
		/R1	Remote control

*1 A power cord (–D, –F, –R, or –J) can only be specified for the VR104D
*2 Screw type power terminal (–W) must be specified for the VR104P.
   This cannot be specified for the VR104D
*3 /A1, /A2 and /A3 cannot be specified together.
*4 If /F1 is specified, /A3 cannot be specified.

1.6 Model Code (2)

• Application Software

Model Code	Description	OS	PC
VR100-02	VR100 application software package	MS-DOS, Windows 3.1	IBM-PC/AT compatible

2.1 Display Function (1)

• Data referencing function

By splitting the waveform display area into two (right and left sides), present waveforms can be compared to past data on the same display.

Past reference data

Present data
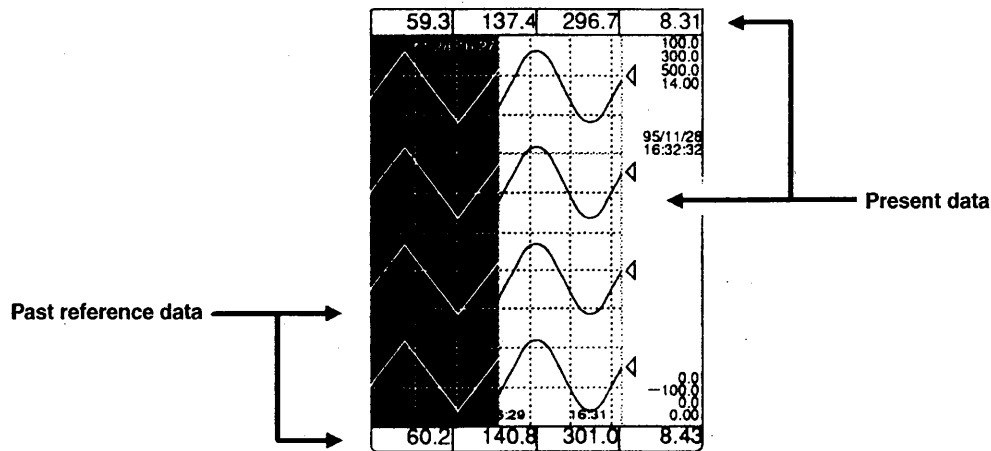
2.1 Display Function (2)

• Display magnification/reduction function

The time scale of the analog display can be magnified or reduced.

Ordinary display

Time scale magnified

2. Functions

2.1 Display Function

The 5.5-inch TFT color LCD with high resolution (320 x 240 pixels) offers various display features not found on conventional recorders.

These unique features include:

• Data referencing function
Past data can be displayed on the left side of the analog display area simply by touching a key, with the present data remaining on the right side of the display.
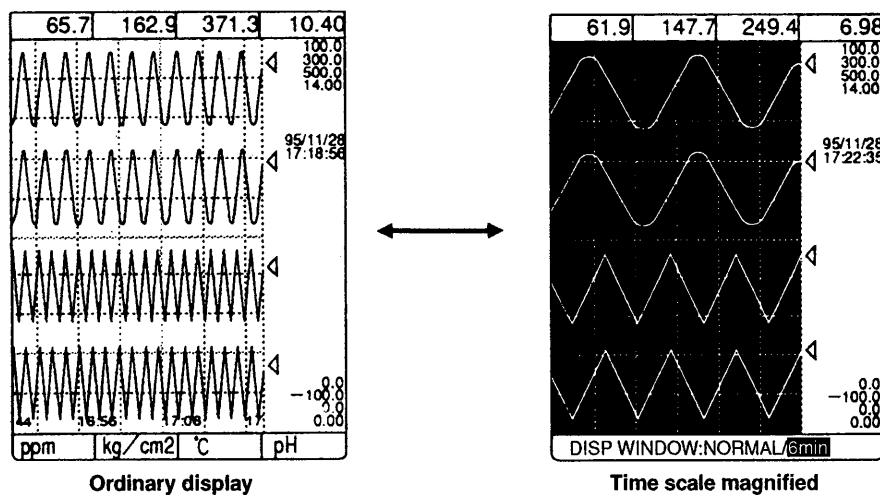
The time and digital values corresponding to the past analog waveforms are also displayed, making it easy to compare present data with past data. Of course, reference data can also be scrolled using the scroll key. All data saved in the display data file can be referenced. If only the event file is set, waveforms for approximately 20 display panels (the time equivalent to 6 div x 20) can be referenced.

• Display magnification/reduction function
The ability to magnify or reduce the time scale is very useful for analyzing waveforms in detail or observing a trend for a long time. The time scale for one display panel (6 div) can be selected from among 6, 18, and 30 minutes.
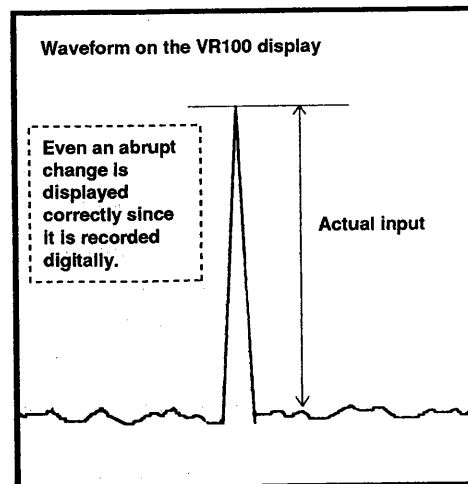
With the waveform span rate of 5 min/div, for example, the time for one display panel (6 div) becomes 30 minutes. If the time scale is set to 6 minutes using the magnification function, then the waveforms on the display are magnified 5 times.

2.1 Display Function (3)

• High-precision analog display

Unlike conventional recorders whose recording accuracy is affected by the pen speed, the VR100 correctly displays waveforms even if they abruptly change.

(The following sketches are for explanation only, and are not actual recording data or display.)

Waveform recorded by a conventional recorder

The pen cannot follow an abrupt change in the waveform.

Actual input

Waveform on the VR100 display

Even an abrupt change is displayed correctly since it is recorded digitally.

Actual input
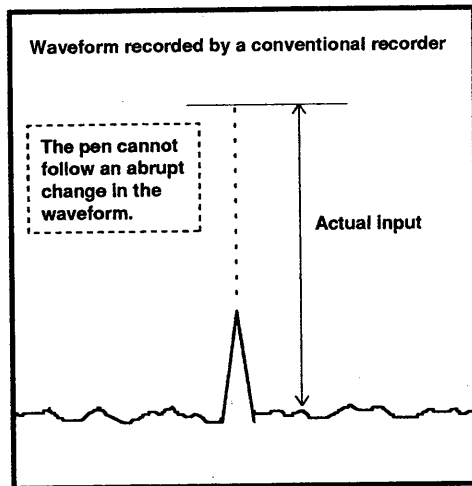
2.1 Display Function (4)

• Display of trip points, event marks, etc.

Trip points, event marks, etc. are displayed graphically. Conventionally, they are marked with a sticker on the scale plate or handwritten on the chart.

| 76.5 | 205.9 | 325.9 | 9.13 |

100.0
300.0
500.0
14.00

95/11/28
17:39:51

ALM

Trip point

Event mark

0.0
−100.0
0.00

| ppm | kg/cm2 | | pH |

- **High-precision analog display**

Unlike conventional recorders whose recording accuracy is affected by the pen speed, the VR100 correctly displays waveforms even if they abruptly change.
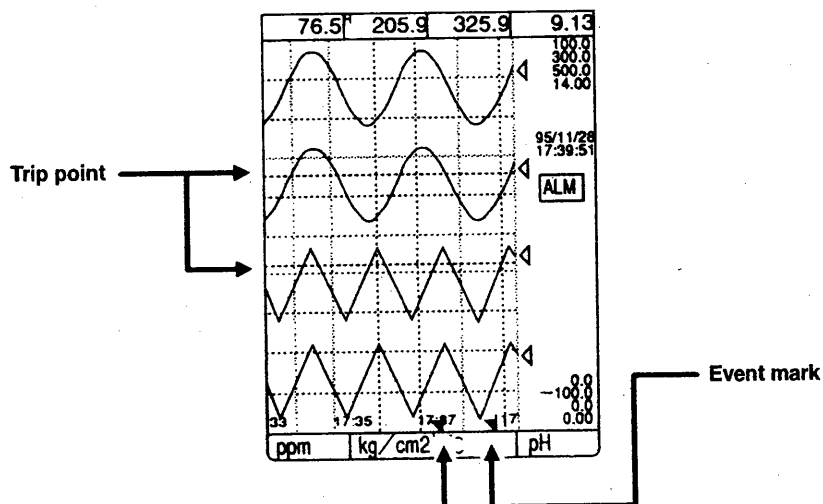
Input signals are sampled as digital data at high speed (125 ms) with high resolution (approx. 14 bits). These digital data are then displayed as waveforms on the LCD, reproduced on a PC, or printed out. The digital data recording allows the VR100 to catch even very quick, small changes in the input.

- **Display of trip points, event marks, etc.**

Conventionally, trip and alarm points are marked by placing a sticker on the scale plate, and event marks are handwritten on the chart. With the VR100, however, they are displayed graphically on the display.

Two levels of trip point can be set. Event marks are displayed by touching a key on the recorder panel or an external contact (optional). In addition, event information (event number, display data number, time and date of the event) is saved in ASCII format in the memory.

2.2 Data Saving Function (1)

Two types of files are created: a display data file (linked with the waveform span rate) and an event file (sampled at a specified period).

<1> Display data file

The data in this file are equivalent to the chart data of conventional recorders.
The basic specifications are as follows:
(a) Sampling interval .... Linked with waveform span rate

[Waveform span rate]	[Sampling interval]
60 min/div	120 s
30 min/div	60 s
20 min/div	40 s
10 min/div	20 s
5 min/div	10 s
1 min/div	2 s

(b) Data .... The maximum and minimum values of data sampled every 125 ms are stored.
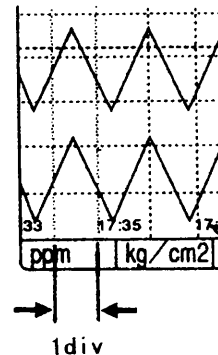
<2> Event file

This file is used for analyzing measured data on a PC. The basic specifications are as follows:
(a) Sampling interval .... Selectable from 125 ms, 250 ms, 500 ms, and 1 s
(b) Data .... The data sampled at a specified sampling rate are stored.

2.2 Data Saving Function (2)

The two types of files (display data file and event file) can be created in the following combinations to suit the application:

• 1 display data file (768 KB) + 1 event file (256 KB)

• 1 display data file (768 KB) + 16 event files (16 KB each)

• 1 event file (960 KB) only

* Measured data are saved in Yokogawa's standard format (binary; 2 bytes/data value).

2.2 Data Saving Function

The VR100 uses a 3.5-inch floppy disk as a storage medium instead of conventional recording paper. This electronic recording system enables the VR100 to offer various recording (file) formats. The following two types of files can be created simultaneously:

- Display data file (sampled in accordance with the waveform span rate)

The data in this file are obtained over a long period of time at a relatively slow sampling rate (2 to 120 s). The data are thus equivalent to conventional chart records: the analog data actually displayed on the VR100 are stored in this file as they are.

- Event file (sampled at a specified sampling rate)

The data in this file are sampled at a relatively fast sampling rate (125 ms, 250 ms, 500 ms, or 1 s), and used for analysis on a PC. This file stores data when a problem occurs or when a detailed analysis is required.

The following combinations are available to suit the application:

• **1 display data file + 1 event file**
This combination is useful when acquiring a trend record over a long period of time, and also to acquire detailed data obtained for a few hours before the floppy disk was inserted.

• **1 display data file + 16 event files**
In addition to a trend record over a long period of time, detailed data on two or more phenomena are required for analysis. These data are obtained using an alarm or an external contact as a trigger.

• **1 event file only**
It is unnecessary to keep a trend record at a slow sampling rate for a long time. Instead, detailed data for analysis should be obtained at a higher sampling rate for as long as possible.

2.2 Data Saving Function (3)

• 1 event file + 1 display data file

Display data file (for four channel inputs)

Waveform span rate (min/div)	1 min	5 min	10 min	20 min	30 min	60 min
Sampling time	Approx. 26 hours	Approx. 5 days	Approx. 11 days	Approx. 22 days	Approx. 33 days	Approx. 66 days

Event file (for four channel inputs)

Sampling interval	125ms	250ms	500ms	1 s
Sampling time	Approx. 1 hour	Approx. 2.1 hours	Approx. 4.2 hours	Approx. 8.3 hours

• 16 event files + 1 display data file

The sampling times for the display data file are the same as those in the table above.
Event file (one of sixteen; for four channel inputs)

Sampling interval	125ms	250ms	500ms	1 s
Sampling time	Approx. 4.1 min	Approx. 8.3 min	Approx. 16.6 min	Approx. 33 min

• 1 event file only

Event file (for four channel inputs)

Sampling interval	125ms	250ms	500ms	1 s
Sampling time	Approx. 4.1 hours	Approx. 8.3 hours	Approx. 16.6 hours	Approx. 33 hours

Note: The sampling time varies depending on the channel settings. For instance, the sampling times for each channel are double the times shown above when using only two channels.

2.2 Data Saving Function (4)

The sampling mode (trigger mode) for the event file can be set as follows:

• FREE sampling mode

The sampling starts when the power is turned on, and the oldest data are overwritten when the internal memory becomes full.

• TRIGGER sampling mode

The sampling starts when a trigger is raised. After the internal memory becomes full, new triggers are ignored and the stored data remains. If there are two or more blocks in an event file, sampled data are saved to the next block when a trigger is raised. As soon as all the blocks become full, the sampling is stopped and the stored data remains.

• ROTATE sampling mode

The sampling starts when a trigger is raised. If the internal memory becomes full, the VR100 waits for the next trigger. When the next trigger occurs, the contents of the file (the first block if there are multiple blocks in the event file) are cleared, and storage of new data begins.

The tables on the previous page show the sampling times (the time duration during which data are saved) for each combination. These data, however, are for four channel inputs. The sampling time varies depending on the number of channels used (if only two channels are used instead of four, each sampling time will be doubled).

Trigger function

With an event file, writing of data can be started by a trigger. There are the following three sampling modes (trigger modes) which can be set by the user:

• **FREE sampling mode**

This mode is used when the trigger function is unnecessary (writing of data to an event file starts when the power is turned on).

• **TRIGGER sampling mode**

In this mode, the next trigger is ignored and the stored data remain after the event file becomes full.

• **ROTATE sampling mode**

The data obtained via the latest trigger are always stored (the contents of the file are overwritten when the next trigger is raised).

2.3 Application Software

The data obtained by the VR100 can easily be reproduced on a PC or printed out, using the data conversion software or viewer software supplied with the VR100.

- **Data conversion software**

Function overview: Converts data saved on a floppy disk to ASCII, Lotus 1-2-3, or Microsoft Excel format data.
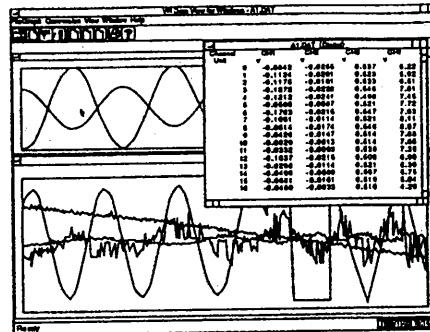
Operating system: MS-DOS

- **Viewer software**

Function overview:
(a) Converts data saved on a floppy disk to ASCII, Lotus 1-2-3, or Microsoft Excel format data
(b) Displays the waveform of the specified data.
(c) Prints out waveforms.
Operating system: MS-Windows Ver3.1 and MS-DOS running MS-Windows Ver3.1

Viewer software

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2.3 Application Software

The data obtained by the VR100 are saved on a floppy disk, then reproduced or printed out using a PC. To make these data compatible with the Windows operating system, the data conversion software and viewer software are supplied with the VR100 (they can also be purchased separately from the VR100). The conversion/viewer software allows a PC to access the data saved on a floppy disk and to display the waveforms or digital values on the PC.

Data can be converted into Lotus 1-2-3 and Microsoft Excel formats in addition to the ASCII format. Using common spreadsheet software, the VR100 data can easily be analyzed or graphically represented on a PC.

• **Easy to use for Windows 3.1**
The Graphical User Interface (GUI) and mouse makes the software easy to use, and easy to copy or convert the data.

• **Waveform/digital value display and printing**
Using the measured data saved on a floppy disk, waveforms and digital values are easily reproduced on a PC via the data conversion/viewer software. The displayed data can also be printed out as a graph on paper.

• **Processing using commercially available spreadsheet software**
Data saved on a floppy disk can be converted into Lotus 1-2-3 and Microsoft Excel formats as well as ASCII format, by simply using a mouse while checking the measured data on the display. The converted data can then be processed in any way using familiar spreadsheet software.

• **High-precision recording based on digital data**
The digital data obtained at a maximum 125 ms sampling interval can be analyzed in detail, something which is not possible with conventional chart recording. The displayed or printed waveforms are an exact reproduction of the digital data. Unlike conventional recorders whose records are affected by the pen speed, the VR100 reliably detects even abrupt and small changes in the signal.

3.1 Target Users

- **Electric power industry**
- Require monitoring of data but need to reduce replacement and maintenance costs.

- **Hydropower plants and environmental engineering**
- Want to eliminate such problems as paper jams and running out of paper or ink since data must be obtained from unmanned power plants or water distribution stations.

- **Food and chemical industries**
- Need to process measured data on a PC.

3.2 Applications (1)

- **Electric power industry**

Detailed data for analysis in case of trouble are obtained for 8 hours each (3 times each day). As an alternative to conventional recorders, long-term recording at a sampling interval of approximately 60 s is also possible.

Display data file

Approx. one month at sampling interval of 60 s

| Event file | Event file | Event file |

Approx. 8.3 hours x 3 at sampling interval of 1 s

Approx. 25 hours
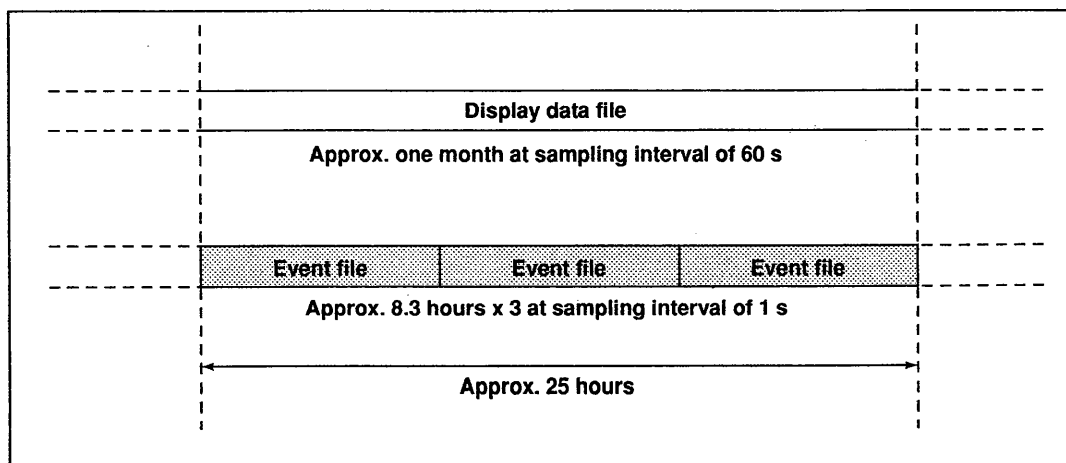
3. Target Users and Applications

3.1 Target Users

The VR100 has been developed to satisfy the following needs of users:

- **Electric power industry**
Since many recorders are used, their replacement cost and storage space must be reduced.

- **Hydropower plants and environmental engineering (e.g., water supply/sewerage)**
Recorders at unmanned power plants or water distribution stations frequently suffer problems such as paper jams and running out of consumables such as ink.

- **Food or chemical industry**
Recorder data should be analyzed on a PC, but the additional costs of IC cards and a card reader are significant, and the software is often inconvenient to use.

The VR100 should be sold to the above types of users. Tell them that there is a recorder that is ideally suited for them, and they will be interested in it.

3.2 Applications

- **Electric power industry**
In this case, the VR100 uses both the display data file and event file. One of the major advantages over conventional recorders is that the VR100 can keep two types of records (files) at the same time: a long-term trend record and a detailed record for analysis. A single recorder can thus keep records at two different recording speeds at the same time. Simply insert a floppy disk to then save these data (files). There is no need for the VR100 to change the chart speed like conventional recorders.

3.2 Applications (2)

• Hydropower plants

The temperature of impeller wheel bearings must be measured and recorded to judge the service life.

The temperature is measured at a sampling interval of 60 s during normal operation, and also measured at a sampling interval of 1 s when the impeller wheel is started or stopped to provide data for analysis.
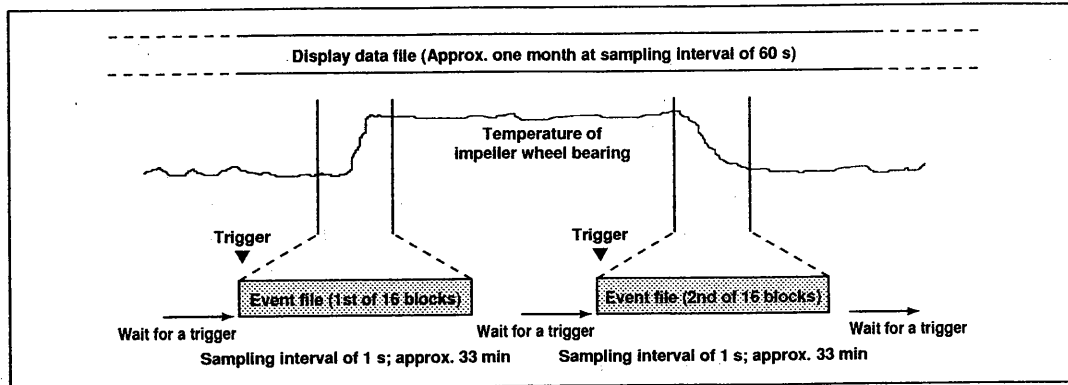
• Application in hydropower plants

This application makes good use of multiple blocks in an event file and the trigger function. As shown in the figure on the previous page, the trigger function is very useful when only *part* of a phenomenon is to be analyzed in detail. Since a trigger can be set as an alarm, external contact, or key on the recorder panel, to suit the case. The VR100 also has a pre-trigger function, which obtains detailed data before and after a trigger point.

The VR100 with its versatile file and trigger functions is suitable for a wide range of applications, and you should be able to identify other possible applications and market the VR100 worldwide.

4. Q & A

This chapter summarizes questions and answers which will provably arise during your sales activities. Read this chapter if there is a question that you cannot answer, or you cannot find the necessary information on the previous pages of this sales guide

4.1 Inputs

Question	Answer
What types of sensor inputs can be accepted?	DCV: 20 mV, 60 mV, 200 mV, 2 V, 6 V, 20 V Thermocouple: R, S, B, K, E, J, T, N, W, L, U Resistance temperature detector: Pt100, JPt100 (Cu10 and Cu25 are optional) Event recording: Contact input, TTL DC current (with external shunt resistor attached)
Can different types of inputs be set for individual channels?	Yes. Set the appropriate inputs using the keys on the recorder panel.
Is it possible to use the optional Cu input and Pt100/JPt100 input together?	Yes.
Is it possible to use Cu10 inputs with different temperature coefficients together?	Yes.
Is the input isolated at each channel?	Yes.
How long is the measurement period?	125 ms.
How high is the A/D resolution?	20,000 counts (approx. 14 bits).
Is it possible to turn on or off the reference junction compensation?	Either INT (internal) or EXT (external) can be set for all channels together.
Is it possible to set the thermocouple burnout function?	Yes. The burnout function can be set to 'on' or 'off' (common to all channels). Burnout upscale (0 %) and downscale (100%) are selectable. The burnout conditions are as follows: • Normal: 2 kΩ or less • Disconnection: 10 MΩ or more • Detected current: Approx. 100 nA
Is input scaling possible?	Yes. Linear scaling can be set in the DC voltage, thermocouple, and resistance temperature detector ranges. Engineering units can also be set (up to 6 characters).

4.2 Display functions

Question	Answer
How can the waveform span rate be set?	Any of the following can be set by the user (equivalent chart speed in parentheses): (a) 60 min/div (approx. 10.2 mm/h): Sampling interval of 120 s (b) 30 min/div (approx. 20.5 mm/h): Sampling interval of 60 s (c) 20 min/div (approx. 30.8 mm/h): Sampling interval of 40 s (d) 10 min/div (approx. 61.5 mm/h): Sampling interval of 20 s (e) 5 min/div (approx. 123.0 mm/h): Sampling interval of 10 s (f) 1 min/div (approx. 615.0 mm/h): Sampling interval of 2 s
What does "div" mean, such as "60 min/div of the waveform span rate"?	This means the time scale (grid) displayed in the analog display area. "60 min/div" for example, means that it takes 60 minutes to advance one scale.
What is the update period of the analog display indicator (triangle pointer)?	125 ms. This can be regarded as the same speed as the pen in the μR (although they are actually different).
If values are changed abruptly while the analog display is being updated, how does the display show the data?	The VR100 obtains the maximum and minimum values of data (sampled every 125 ms) in each waveform updating span. These values are then displayed as waveforms and saved in the display data file. That is, the maximum and minimum values in each span are always displayed and saved regardless of the speed of the waveform span rate. Even if a flow rate is changed abruptly, for example, then the VR100 provides a linear analog display just like a pen-type recorder.
Is there phase synchronization?	There is no phase difference between scales.
What data can be referred to using the data referencing function?	All data in the display data file can be displayed for reference.
If only the event file used, what does the data referencing function display?	This function can display waveforms for approximately 20 display panels (or during the time equivalent to 6 div x 20).
How long does the LCD last?	The LCD service life depends on that of the backlight. The backlight life is approximately 5 years (varies depending on the LCD saver function or the brightness setting). The LCD must be replaced by YSV or our service representative.
How often are digital values updated on the display?	Every 1 s.
Is it possible to use tags?	Yes. Up to 7 characters can be displayed above the indication of an engineering unit.
Is there a zone display function and the partial magnification/reduction function?	Yes, both functions are available.

4.3   Data Saving Function

Question	Answer
How much data can a display data file or an event file hold?	The capacity of each file is as follows: Display data file: 768 KB Event file: 256 KB* * If an event file is divided into 16 blocks, each block can hold 16 KB. If only the event file is used, the capacity is 960 KB.
What data format is used?	The Yokogawa standard format (binary; 2 bytes/data value) is used for measured data, and the ASCII format is for parameter settings, events, power failure and alarm information.
Can setting values be saved on a floppy disk?	Yes, both the values in set mode and setup mode can be saved.
How is a floppy disk formatted?	The formatting is either 1.2 MB or 1.44 MB; floppy disks can be formatted by the VR100.
Are measured data backed up during a power failure?	Measured data are written to flash ROM (nonvolatile memory); thus the backup time is unlimited.
How is the remaining volume of the internal memory indicated?	With the display data file, the remaining time indication starts when there are only 99 hours left. It is also possible as an optional function to output a contact signal at a specified time (1 to 100 hours before the memory becomes full).
What happens if the memory becomes full?	With the display data file, the oldest data are overwritten. With event files, the oldest data are overwritten in the FREE and ROTATE sampling modes or the stored data are stored in the TRIGGER mode (for details, refer to Section 2.2, "Data Saving Function").
Is alarm information saved?	Yes. The channel in which the alarm occurred, alarm type and level, time and date of alarm occurrence/recovery are saved in ASCII format (for up to 50 alarm events).

4.4   Application Software

Question	Answer
Can the application software be purchased separately from the VR100 unit?	Yes. Refer to Section 1.6, "Model Code."
Is the application software Windows95 compatible?	It will be in the near future.

Appendix (Competitor Information)

VR100 vs. VGR4 (Esterline ANGUS)

Smart View (Westronics)

Mini Trend/DGR100 (Penny & Giles/Honeywell)

RSX Video Recorder (Leeds + Northrup)

Model 363 VIEWPAC (Moore)

	YOKOGAWA	Esterline ANGUS	Westronics	Penny & Giles/Honeywell
Model	VR100(View Recorder)	VGR4(Video Graphic Recorder)	Smart View	P&G: Mini Trend Honeywell: DGR100
Input				
Number of inputs	4ch	4ch, 6ch(optional)	6ch	4ch
Scan speed	125ns(max.)	200ms/4ch, 250ms/6ch	65ns/ch	125ms
Input Types				
DCV	20,60,200mV,2,6,20V	30mV to 24V	50mV to 10V	0-5V, (1-5V,0-10V,100mV,optional)
DCA	With shunt resister	0-1mA, 4-20mA	2mA, 4-20mA, 10-50mA	0-20mA, 4-20mA (0-10mA,optional)
TC	R,S,B,K,E,J,T,N,W,L,U	R,S,B,K,E,J,T,N,W,PT2	R,S,B,K,E,J,T,N,C	(K,J,T,R,S,E,B,N, optional)
RTD	Pt100,JPt100	Pt100,Cu10	Pt386(100,500 Ω),Pt392(100 Ω)	Pt100(optional)
Others	Contact input	-	-	-
Accuracy(2V range)	±(0.1% of rdg + 2digits)	0.1% of range	0.05%	0.5%
Display				
Display method	TFT color LCD (5.5", 320 × 240 pixels)	Active matrix color LCD (5.7", 240 × 240 pixels)	Active matrix color LCD (5", 320 × 240 pixels)	TFT color LCD(4")
Analog display renewal rate	1,5,10,20,30,60min/div	12s to 1hr	-	5sec to 48hrs/div
Special function	Historical data reference function Data magnification/reduction display function	Bar graph display, Pop up windows for setting	Touch screen Bar graph display Zoom/compressed display	Bar graph display Multi screen
Memory				
Medium	Int. memory: flash ROM Ext. memory: 3.5"FD	Int. memory: EEPROM(for setting) Ext. memory: 3.5"FD	Int. memory: RAM Ext. memory:3.5"FD,IC card(PCMCIA)	Int. memory: RAM Ext. memory: 3.5"FD
Memory size	Int. memory: 1MB Ext. memory: 1,2,1.44MB (33days/60s* saving interval + 8.3hrs/1s saving interval,4ch) * saving max./min. data	Ext. memory: 1.44MB (29days/60s saving interval,4ch)	Int. memory: 128KB,256KB(optional) Ext. memory: 1.44MB	Int. memory: 128KB Ext. memory: 1.44MB (3.6months/60s saving interval,4ch)
Communication	RS-422-A(optional)	RS-232-C, RS-485, Printer	RS-232-C, RS-485, Printer	RS-232-C, RS-485

Alarm					
	Alarm types	H/L, dH/dL, rate of change	H/L, rate of change	H/L, rate of change	H/L, rate of change
	Number of output	2,4,6 contacts(optional)	6 contacts(optional)	6 contacts	8 contacts(optional)
Power supply					
	Power voltage	90-132,180-250VAC	100-265VAC	117, 230VAC	90-250VAC
	Power frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Operating condition					
	Temperature	0-50°C(when using FDD 5-40°C)	0-50°C(when using FDD 5-40°C)	0-50°C(when using FDD 0-40°C)	0-40°C
	Humidity	20-80%RH(at 5-40°C)	5-50RH(at 50°C) 5-95RH(at or below 40°C)	0-95%RH	10-90%RH
Others					
	Insulation resistance	Each terminal-ground: 20M Ω(at 500VDC)	-	-	
	Dielectric strength	Power supply-ground:1500VAC(1min) Each input terminal-ground: 1000VAC(1min)	-	Power supply-ground:300VDC or AC peak	-
Dimension(mm)		VR104P:144(W)×144(H)×288(D) VR104D:144(W)×191.5(H)×326(D)	170(W)×180(H)×390(D)	144(W)×144(H)×204(D)	144(W)×144(H)×300(D)
Optional functions		Alarm relay output, RS422A, deg F display, Remote control FAIL/memory end output, Cu10,25 input	6ch model, Alarm relay output, Desk top type, French language	-	Alarm relay output, RS-232-C,RS-485, Universal input card, Transmitter power supply
Application software		Data conversion/viewer software (for MS-DOS.Windows3.1)	Viewer software(attached) AEnet software(for communication) Data conversion software	-	Viewer software (for Windows3.1)

Model	YOKOGAWA	Leeds + Northrup	Moore
	VR100(View Recorder)	RSX Video Recorder	Model 363 VIEWPAC
Input			
Number of inputs	4ch	6ch	6ch
Scan speed	125ms(max.)	500ms	500ms
Input Types			
DCV	20,60,200mV,2,6,20V	0.25mV,75mV,-200mV-1V,-200mV-5V	0-5V (mV, optional)
DCA	With shunt resister	With shunt resister	With shunt resister
TC	R,S,B,K,E,J,T,N,W,L,U	R,S,B,K,E,J,T,N,W,Ni-Ni/Mo,PlatII	(R,S,B,K,E,J,T,N, optional)
RTD	Pt100,Pt100	Pt100	-
Others	Contact input	-	-
Accuracy(2V range)	±(0.1% of rdg + 2digits)	±10.00mV	±0.05% of span
Display			
Display method	TFT color LCD (5.5", 320×240 pixels)	Active matrix color LCD (5.7", 240×240 pixels)	Color LCD
Analog display renewal rate	1,5,10,20,30,60min/div	5min to 24hrs/screen	-
Special function	Historical data reference function Data magnification/reduction display function	Time base change, Scroll, Zoom Find function, etc.	Sprit-screen, Zoom
Memory			
Medium	Int. memory: flash ROM Ext. memory: 3.5"FD	Int. memory: RAM Ext. memory: 3.5"FD	Int. memory: RAM Ext. memory: IC memory card
Memory size	Int. memory: 1MB Ext. memory: 1.2,1.44MB (33days/60s* saving interval + 8.3hrs/1s saving interval,4ch) * saving max./min. data	Int. memory: - Ext. memory: 1.44MB	Int. memory: 256,512,768,1MB Ext. memory: 256,512,1MB
Communication	RS-422-A(optional)	RS-485	RS-422-A(optional)
Alarm			
Alarm types	H/L, dH/dL, rate of change	H/L, dH/dL, rate of change	H/L

Number of output	2,4,6 contacts(optional)	Discrete output(optional)	24 contacts(optional)
Power supply			
Power voltage	90-132,180-250VAC	85-265VAC	120/240VAC, 24VAC/DC(optional)
Power frequency	50/60Hz	50/60Hz	47-63Hz
Operating condition			
Temperature	0-50°C(when using FDD 5-40°C)	0-50°C	0-50°C
Humidity	20-80%RH(at 5-40°C)	10-90%RH	5-95%RH
Others			
Insulation resistance	Each terminal-ground: 20M Ω (at 500VDC)	-	
Dielectric strength	Power supply-ground:1500VAC(1min) Each input terminal-ground: 1000VAC(1min)	-	
Dimension(mm)	VR104P:144(W)×144(H)×288(D) VR104D:144(W)×191.5(H)×326(D)	183(W)×170(H)×295(D)	144(W)×145.5(H)×425.4(D)
Optional functions	Alarm relay output, RS422A, deg F display, Remote control FAIL/memory end output, Cu10,25 input	Discrete I/O, Analog retransmission output PID control, RS-485, Math package, Totalizer	24VDC/AC power supply, Universal input, Digital I/O, RS-422-A
Application software	Data conversion/viewer software (for MS-DOS.Windows3.1)	Data analysis/configuration software (for Windows3.1)	Configuration software