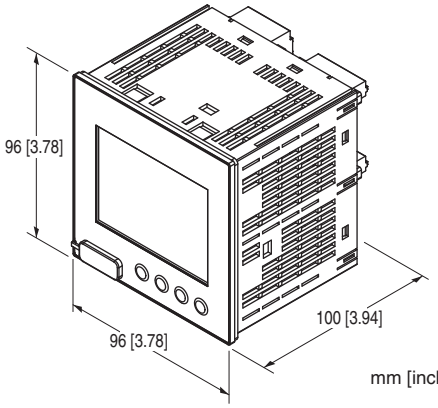
Paperless Recording System

PAPERLESS RECORDER

(color LCD display)

Functions & Features

- 96 × 96 mm square size
- IP55 front panel
- Records measurement data and operation status to SD card
- 100 msec. sampling rate
- SD card can be removed from the front
- Recorded data can be displayed and analyzed using the dedicated application
- DC voltage input, 8 points
- Discrete input 1 point, Photo MOSFET relay output 1 point
Usable to trigger input and alarm output



MODEL: VR96E-G8-[1]-R[2]

ORDERING INFORMATION

- Code number: VR96E-G8-[1]-R[2]

Specify a code from below for each of [1] and [2].
(e.g. VR96E-G8-1-R/C/E/Q)

- Specify the specification for option code /Q
(e.g. /C01)

COMMUNICATION

E: Ethernet communication

I/O TYPE

G8: DC voltage input, 8 points (non-isolated),
Discrete input, 1 point,
Photo MOSFET relay output, 1 point
(For input range, refer to analog input specifications.)

[1] ANALOG INPUT RANGE

Select input range from the following (ch 1 to ch 8).
1: DC input, 8 points (wide span voltage input, 8 points)
4: DC input, 8 points (middle span voltage input, 8 points)
6: DC input, 8 points (narrow span voltage input, 8 points)

POWER INPUT

DC Power

R: 24 V DC
(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)

[2] OPTIONS (multiple selections)

ANALOG INPUT CONNECTOR

blank: Voltage input connector (1 row)
/C: Current input connector (2 rows)
(For current input, specify "/C" in order to connect a precision resistor module.
"/C" can be selected only when the analog input range is "1".
Prepare a precision resistor module (model: REM6-250) by user.)

Language

blank: Japanese
/E: English
(Language (Japanese or English) can be chosen by front panel setting.)

Other Options

blank: none
/Q: Option other than the above (specify the specification)

SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to our web site.)

/C01: Silicone coating
/C02: Polyurethane coating
/C03: Rubber coating

RELATED PRODUCTS

- Precision resistor module (model: REM6-250)
- PC configurator software (model: VR96CFG)
- Viewer software (model: TRViewer)

Software downloadable at our web site.

- SD card

An SD card is required to store data in the device.
Use an SD card of the specified model number.
Consult us for purchase.
- Hagiwara Solutions MSDB-016GS(V01SLS

GENERAL SPECIFICATIONS

Construction: Panel flush mounting
Degree of protection: IP55; ensured for the front panel of the device independently mounted to a panel
Connection

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Ethernet: RJ-45 modular jack
Power supply: Separable tension clamp terminal
Applicable wire size: 0.2 - 2.5 mm^2,
stripped length 10 mm
I/O: Separable tension clamp terminal
Applicable wire size: 0.2 - 1.5 mm^2, stripped length 10 mm
Housing material: Flame-resistant resin (black)
Isolation: Analog input to contact input to contact output to Ethernet or FE to power
Calendar clock: Year (4 digits), month, date, day, hour, minute, second

■ **Display**
Display device: 3.5-inch TFT LCD
Display colors: 65 536
Resolution: 320 × 240 pixels
Backlight: LED
Backlight life: Approx. 50 000 hours
(The backlight can be replaced in our factory.
The LCD must be replaced at the same time.)
Screen saver standby time: 1 to 10 minutes
Display update interval: 100 msec.

ETHERNET COMMUNICATION

Communication Standard: IEEE 802.3u
Transmission: 10BASE-T, 100BASE-TX
Baud rate: 10/100 Mbps (Auto Negotiation function)
Protocol: IP, TCP, UDP, ICMP, SNTP, HTTP, DHCP, SMTP, SMTPS, TLS, Modbus/TCP, SLMP, Modbus/TCP server, FTP server, FTP client, FTPS client
Transmission media: 10BASE-T (STP, Category 5)
100BASE-TX (STP, Category 5e)
Max. length of fieldbus segment: 100 meters
Ethernet indicator LED: ACT, LNK
IP address: 192.168.0.10 (factory setting)

ANALOG INPUT SPECIFICATIONS

Input signal: DC voltage, 8 points

■ **Wide span voltage**
Input resistance: ≥ 1 MΩ
±10 V DC to ±0.8 V DC
Maximum input range: ±10.5 V DC

■ **Middle span voltage**
Input resistance: ≥ 100 kΩ
±0.8 V DC to ±80 mV DC
Maximum input range: ±0.84 V DC

■ **Narrow span voltage**
Input resistance: ≥ 100 kΩ
±80 mV DC to ±10 mV DC
Maximum input range: ±84 mV DC

CONTACT INPUT SPECIFICATIONS

Contact input: Dry contact
Common: Negative common
Rated detective voltage: Approx. 5 V DC (internal supply)
ON voltage / resistance: ≤ 0.5 V / ≤ 500 Ω
OFF voltage / resistance: ≥ 4.0 V DC / ≥ 20 kΩ
Input current: Approx. 3.8 mA
Input resistance: Approx. 1 kΩ
ON delay: ≤ 2.0 msec.
OFF delay: ≤ 2.0 msec.

OUTPUT SPECIFICATIONS

Photo MOSFET relay output
Rated load voltage: 48 V peak AC / DC
Rated output current: 0.2 A per point
Output ON resistance: ≤ 1 Ω
Leakage current at open circuit: ≤ 0.1 mA
ON delay: ≤ 50 msec.
OFF delay: ≤ 1 msec.
(Recommended to protect the contact and to eliminate noise when driving an inductive load.)

INSTALLATION

Power consumption
• **DC**: ≤ 2.4 W, ≤ 100 mA (@ 24 V DC)
Operating temperature: -10 to +55°C (14 to 131°F)
Operating humidity: 10 to 90 %RH (non-condensing)
Atmosphere: No corrosive gas or heavy dust
Mounting: Panel flush mounting
Weight: 400 g (0.88 lb)

PERFORMANCE

Conversion accuracy: ±0.1 % (narrow span voltage input ±20 mV DC: ±0.2 %, ±10mV DC: ±0.3 %)
Conversion rate: 100 msec.
Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)
(±0.03 %/°C [±0.02 %/°F] with ±10 mV DC)
Calendar clock (with battery backup):
Accuracy: Monthly deviation of ≤ 2 minutes at 25°C or 77 °F
Back up period: Approx. 2 months
Battery: Lithium secondary battery (non-removable)
Insulation resistance: ≥ 100 MΩ with 500 V DC
Dielectric strength: 1500 V AC @ 1 minute
(analog input to contact input to contact output to Ethernet or FE to power supply)

STANDARDS & APPROVALS

EU conformity:
EMC Directive

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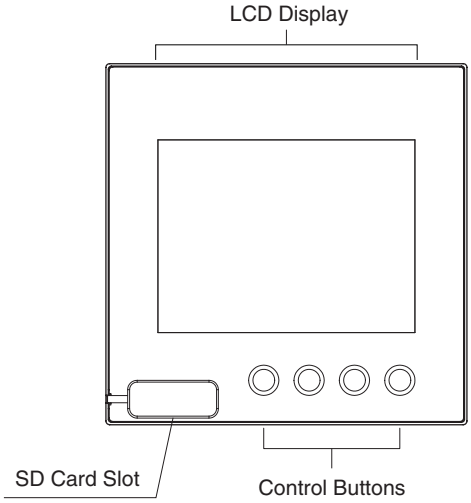
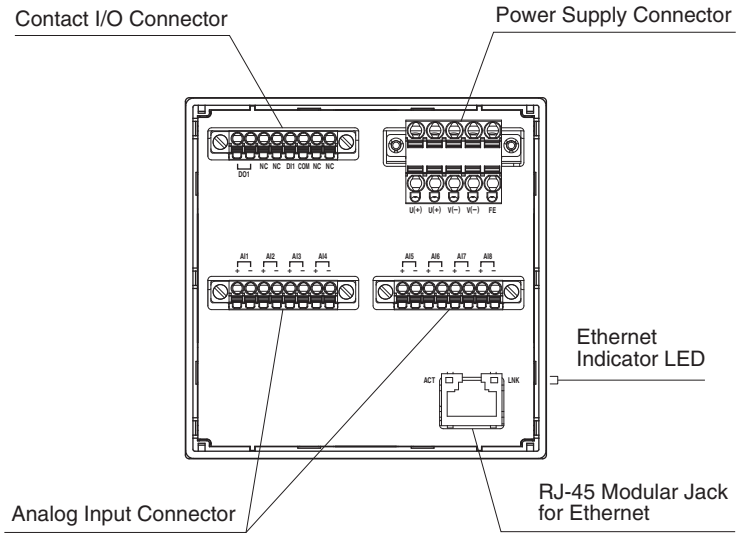
EMI EN 61000-6-4
EMS EN 61000-6-2
RoHS Directive

EXTERNAL VIEW

■ **FRONT VIEW**



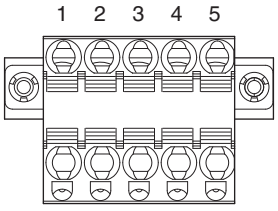
■ **REAR VIEW**



TERMINAL ASSIGNMENTS

■ **POWER SUPPLY TERMINAL ASSIGNMENT**

Device side connector: MSTB2,5/5-GF-5,08 (Phoenix contact)
Cable side connector: TFKC2,5/5-STF-5,08 (Phoenix contact) included in the package
Applicable wire size: 0.2–2.5 mm²
Stripped length: 10 mm
Recommended solderless terminal:
AI0,25-10YE 0.25 mm² (Phoenix contact)
AI0,34-10TQ 0.34 mm² (Phoenix contact)
AI0,5-10WH 0.5 mm² (Phoenix contact)
AI0,75-10GY 0.75 mm² (Phoenix contact)
AI1-10RD 1.0 mm² (Phoenix contact)
AI1,5-10BK 1.5 mm² (Phoenix contact)
AI2,5-10BU 2.5 mm² (Phoenix contact)



PIN NO.	ID	FUNCTION
1	+24V	Power supply (24V DC)
2	+24V	Power supply (24V DC)
3	0V	Power supply (0V)
4	0V	Power supply (0V)
5	FE	Function earth

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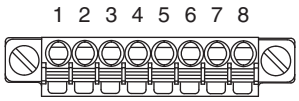
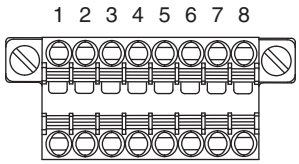
■ ANALOG INPUT TERMINAL ASSIGNMENT

Device side connector: MC1,5/8-GF-3,5 (Phoenix contact)
Cable side connector: Included in the package
• Voltage input connector: FMC1,5/8-STF-3,5 (Phoenix contact)
• Current input connector: TFMC1,5/8-STF-3,5 (Phoenix contact)
Applicable wire size: 0.2−1.5 mm²
Stripped length: 10 mm
Recommended solderless terminal:
AI0,25-10YE 0.25 mm² (Phoenix contact)
AI0,34-10TQ 0.34 mm² (Phoenix contact)
AI0,5-10WH 0.5 mm² (Phoenix contact)
AI0,75-10GY 0.75 mm² (Phoenix contact)
A1-10 1.0 mm² (Phoenix contact)
A1,5-10 1.5 mm² (Phoenix contact)

Voltage input connector



Current input connector

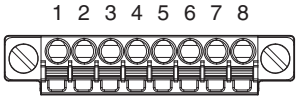


PIN NO.	ID	FUNCTION
1	AI1+	Input 1+
2	AI1−	Input 1−
3	AI2+	Input 2+
4	AI2−	Input 2−
5	AI3+	Input 3+
6	AI3−	Input 3−
7	AI4+	Input 4+
8	AI4−	Input 4−

PIN NO.	ID	FUNCTION
1	AI5+	Input 5+
2	AI5−	Input 5−
3	AI6+	Input 6+
4	AI6−	Input 6−
5	AI7+	Input 7+
6	AI7−	Input 7−
7	AI8+	Input 8+
8	AI8−	Input 8−

■ CONTACT INPUT/OUTPUT TERMINAL ASSIGNMENT

Device side connector: MC1,5/8-GF-3,5 (Phoenix contact)
Cable side connector: FMC1,5/8-STF-3,5 (Phoenix contact) included in the package
Applicable wire size: 0.2−1.5 mm²
Stripped length: 10 mm
Recommended solderless terminal:
AI0,25-10YE 0.25 mm² (Phoenix contact)
AI0,34-10TQ 0.34 mm² (Phoenix contact)
AI0,5-10WH 0.5 mm² (Phoenix contact)
AI0,75-10GY 0.75 mm² (Phoenix contact)
A1-10 1.0 mm² (Phoenix contact)
A1,5-10 1.5 mm² (Phoenix contact)



PIN NO.	ID	FUNCTION
1	DO1	Photo MOSFET relay output 1
2	DO1	Photo MOSFET relay output 1
3	NC	Unused
4	NC	Unused
5	DI1	Contact input 1
6	COM	Common
7	NC	Unused
8	NC	Unused

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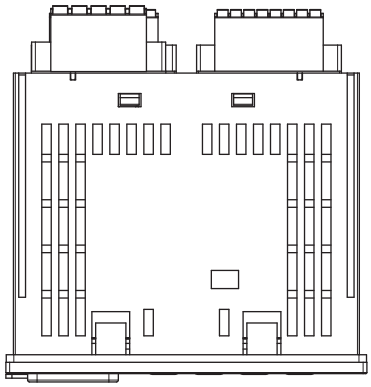
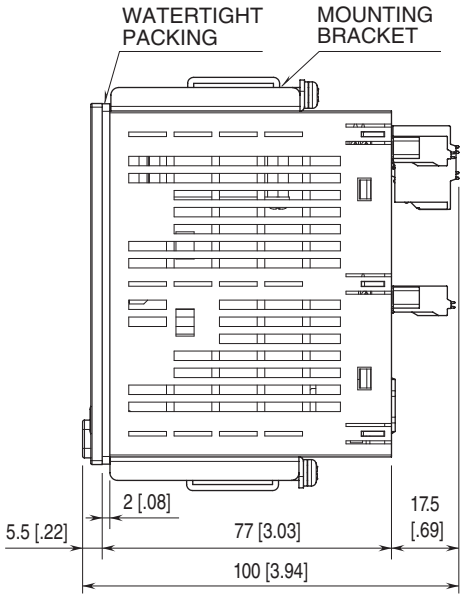
EXTERNAL DIMENSIONS unit: mm [inch]

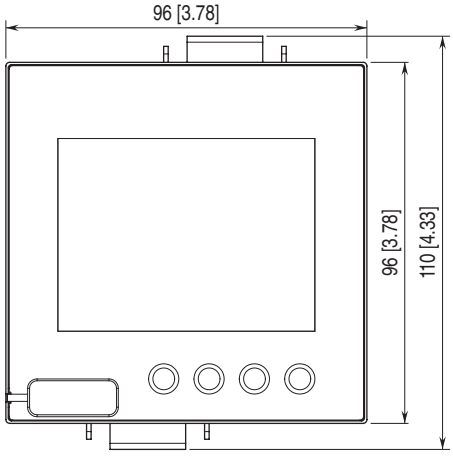
■ TOP VIEW



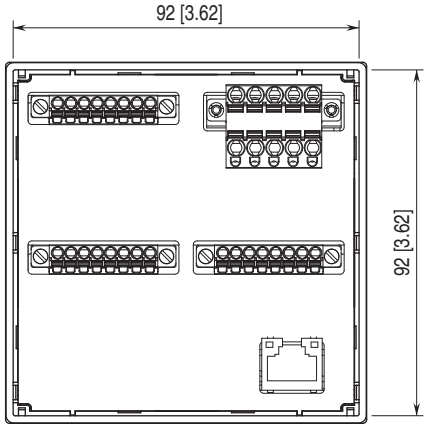
■ SIDE VIEW



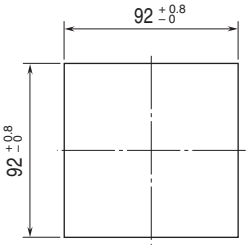
■ FRONT VIEW



■ REAR VIEW



MOUNTING REQUIREMENTS unit: mm



Panel thickness: 0.5 to 10 mm

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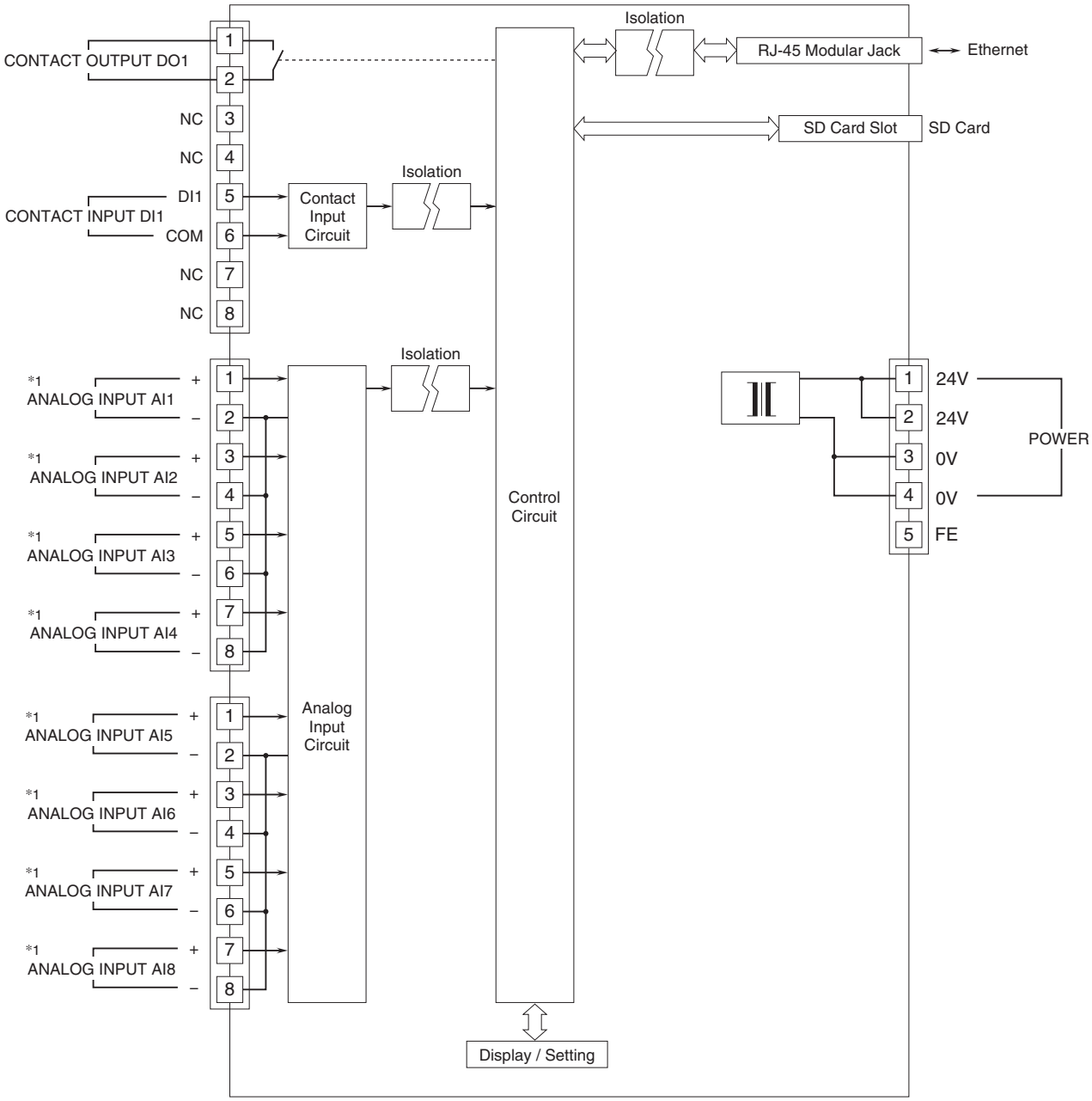
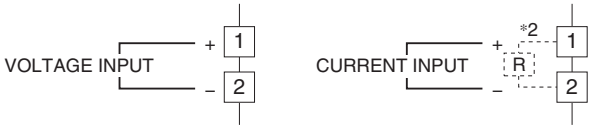
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

Note: In order to improve EMC performance, bond the FE terminal to ground.
Caution: FE terminal is NOT a protective conductor terminal.



Note 1. When the analog input connector is option "/C", it is possible to mount a precision resistor module (model: REM6-250), to convert the current input to voltage, and to measure it.

■ **ANALOG INPUT CONNECTION EXAMPLE**



Note 2. Connect precision resistor module (model: REM6-250) for current input.

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INPUT/OUTPUT FUNCTION

Selectable I/O signals among built-in I/O and remote I/O.
- Analog input (AI): max. 16 points
- Discrete input (DI): max. 8 points
- Discrete output (DO): max. 8 points
- Operational input (OI): max. 16 points

SCREEN DISPLAY

■ Trend view
Direction: Horizontal
Number of display points: 2 per view
Number of display views: 8
Maximum number of samples: 300
■ Overview
Number of display points: 8 per view
Displayed content: Name (up to 10 characters), bargraph
Number of display views: 1
■ Digital view
Number of display points: 2 per view
Displayed content: Name (full), value, bargraph
Number of display views: 4
■ Log view
Number of displayed events: 8 per page (display the latest 32 events)
Number of display views: 3 (event log, system log, communication log)
■ Maintenance view
Used to perform setting and maintenance.
■ Screen saver
Back light can be turned off if there is no operation for a certain period of time.
■ Auto view switching
Views can be switched automatically if there is no operation for a certain period of time.

TREND DATA STORING

When an SD card is placed, trend data, event data and comment data are recorded in the internal memory and then transferred to the SD card at the specified time intervals.
■ Recording method
• **Normal recording:** Recording continuously until recording is manually stopped.
• **Trigger recording (edge):** Recording up to 300 samples of data before and after the trigger condition is met, respectively.
• **Trigger recording (level):** Recording data during the trigger condition is met.
■ Sampling rate
• 100 ms
■ Storing rate
• 100 ms, 500 ms, 1 sec., 2 sec., 5 sec., 10 sec., 1 min., 2 min., 5 min., 10 min., 30 min., 1 hour
■ Trend data
• **Number of channels:** Max. 16 (select from AI, DI, DO, OI)
• **Number of events:** Max. 50000
sample × number of channels (per file)
■ Event data
• **Event:** Zone transition for AI and OI, change of DI status
• **Recorded content:** Time, event
• **Number of events:** 3000 (per file)
■ Comment data
• **Maximum number of input characters:** 32
• **Recorded content:** Time, comment
• **Number of events:** 1000 (per file)

■ **SD card writing timing**

STORING RATE	SD CARD WRITING TIMING
100 ms	10 min., 30 min., 1 hour
500 ms	30 min., 1 hour, 6 hours
1 sec.	1 hour, 6 hours, 12 hours
2 sec.	1 hour, 6 hours, 12 hours, 1 day
5 sec.	6 hours, 12 hours, 1 day
10 sec.	6 hours, 12 hours, 1 day
1 min.	1 day, 1 week
2 min.	1 day, 1 week
5 min.	1 day, 1 week, 1 month
10 min.	1 day, 1 week, 1 month
30 min.	1 day, 1 week, 1 month
1 hour	1 week, 1 month

■ Data format
Dedicated format (binary, extension “TRD”) or CSV format (UTF-8/SJIS).
■ Data file name
Files are named YYYYMMDDhhmmss when saved to the SD card.
e.g.)
Dedicated format:
20240611100000000.TRD
CSV format:
20240611100000_T.CSV (trend)
20240611100000_E.CSV (event)
20240611100000_C.CSV (comment)
■ Auto deleting function
• When the function is disabled, recording is possible until the SD card's storage capacity is exhausted.
• When the function is enabled, if the SD card's storage capacity falls below 100MB, the oldest data will be deleted.

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■ **Writing period**

Approx. recording time period for TRD format with a 16 GB micro SD card

STORING RATE	4 PENS	8 PENS	16 PENS
100 msec.	2 years	1 year	6 months
500 msec.	10 years	5 years	2 and a half years
1 sec.	10 years	10 years	5 years
2 sec.	10 years	10 years	10 years
5 sec.	10 years	10 years	10 years
10 sec.	10 years	10 years	10 years
1 min. – 1 hour	10 years	10 years	10 years

Note 1) Only the trend recording is enabled.

Approx. recording time period for CSV format with a 16 GB micro SD card

STORING RATE	4 PENS	8 PENS	16 PENS
100 msec.	1 year	6 months	3 months
500 msec.	5 years	2 and a half years	15 months
1 sec.	10 years	5 years	2 and a half years
2 sec.	10 years	10 years	5 years
5 sec.	10 years	10 years	10 years
10 sec.	10 years	10 years	10 years
1 min.– 1 hour	10 years	10 years	10 years

Note 2) Only the trend recording is enabled. (The values are calculated as 8 single-byte characters)

■ **Viewer software**

The data stored in the SD card can be displayed on dedicated Viewer Software (model: TRViewer). Also, data can be converted to CSV format file.

LOGGING

When an SD card is placed, each log file can be stored to the SD card.

■ **Event log**

Recording zone transitions for AI and OI, and events occurred when DI status changes.

■ **System log**

Recording a history of operations of the device, such as turning the power ON, time adjustment, or updating the setting.

■ **Communication log**

Recording a history of communications of the device such as SMTP (mail) or FTP client.

■ **Storing log files**

When accumulated log data exceeds 128 Kbyte, the data is finalized and stored in a file.

■ **Data format**

txt format (.txt)

■ **Log file name**

Files are named YYYYMMDDhhmmss when finalized the data.

e.g.)

20240611100000E.txt (event log)

20240611100000S.txt (system log)

20240611100000C.txt (communication log)

■ **No auto deleting function**

COMMUNICATION

■ **IP**

DHCP client function is supported. Manual setting of IP address, subnet mask, default gateway and DNS server is also available.

■ **Web server**

This device acts as a web server, communicates with the configurator software (model: VR96CFG), and allows for setting change and maintenance.

■ **Modbus/TCP client**

It is possible to connect to remote I/O such as R3 or R7, etc., enabling the expansion of I/O. Moreover, it can handle data from measuring points in multiple locations.

• **Connected products**

R3-NE1, R3-GE1
R5-NE1
R6-NE1, R6-NE2
R7E series
R30NE1
72EM2-M4
GR8-EM
DL8 series
DL30 series
TR30-G
IT series

■ **SLMP client**

It is possible to connect to the SLMP-compatible CPU unit of Mitsubishi programmable-controller MELSEC, enabling the expansion of I/O. Moreover, it can handle data from measuring points in multiple locations.

• **Connectable model:**

MELSEC iQ-R series
MELSEC iQ-F series
MELSEC Q series

■ **Max. number of connectable devices (Number of servers)**

4 connections (selectable from Modbus/TCP or SLMP)
Establishing connections for number of slaves connected.
Note) The number of connectable devices may depend on the specifications of each device.

■ **Modbus/TCP server**

2 connections
I/O data can be monitored by remote SCADA.

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ALARM OUTPUT

DO designated as alarm contact output can be turned ON at event occurrence.

■ Event

• Zone output of AI, DI, OI

• Communication failure in e-mail reporting, FTP client, Modbus/TCP and SLMP

EVENT REPORTING E-MAIL

E-mail reporting function is available at event occurrence or at the specified time.

Encrypted communication is supported. (SMTP over SSL)

• **Number of e-mail recipients:** 8

• **Number of event reporting messages:** 4

• **Number of regular reporting messages:** 4

• **Channel status:** AI, DI, OI, DO data status can be included in a mail.

FTP CLIENT

Files stored in the SD card can be uploaded to an FTP server.

• Supports FTPS (Explicit mode)

FTP SERVER

Reading and deleting files in the SD card by an FTP client is available.

Simultaneous connection: 1

Operation verified FTP client: FFFTP

TIMEKEEPING

■ SNTP client

• The recorder's internal time can be adjusted automatically.

• Time adjustment is performed when the power is turned on and at the specified time.

OTHER FUNCTIONS

■ Maintenance

The dedicated configurator software (model: VR96CFG) is used to configure the device.

■ Setting file

It is possible to save the settings of the device and network to an SD card as a configuration file (vr96cfg.json) and a network configuration file (vr96net.json).

It is possible to configure the device by reading the configuration file in the SD card.

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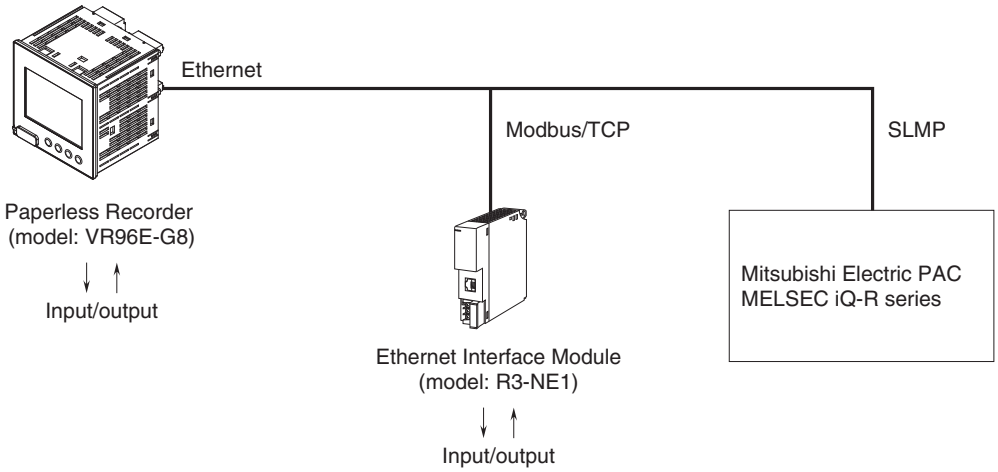
SYSTEM CONFIGURATION EXAMPLES

Devices other than the VR96E-G8 in below shall be provided by the user.



⚠ Specifications are subject to change without notice.

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