SELECTABLE INPUT MODULES
PAPERLESS RECORDER
Model: 73VR3100

Users Manual

INTRODUCTIONS

Thank you for choosing our Paperless Recorder.
The 73VR3100 Users Manual will guide you through the software program views and functions, including not only its operations but also the hardware installation, wiring and the I/O modules. Please read this manual carefully to ensure the safe use before getting started.
In addition to this document, the 73VR31BLD and 73VRWV users manuals are its companion documents, each providing helpful instructions and suggestions for configuring and using the 73VR3100. They are available in a CD-ROM package, 73VRPAC2, that came with your product.

Title	Document No.	Details
73VR3100 Users Manual	EM-7397-B	Basic users manual explaining how to set up the 73VR3100 hardware and the software, and its operations.
73VR31BLD Users Manual	EM-7397-C	Focuses on the features and operation of the PC configuration program named 73VR3100 Configuration Builder.
73VRWV Users Manual	EM-7394-D	Focuses on the features and operation of the PC program named 73VR Data Viewer.
73VR Modbus/TCP Reference Guide	EM-7395-D	Focuses on the Modbus/TCP specifications and functions supported by the 73VR Series.
Remote Mode Reference Manual	EM-7397-E	Focuses on the device settings and PLC commands specifics to Remote Mode, in combination with the R3 Series Interface I/O Modules (Gateway.)

The descriptions in this manual are applied to Version V4 or higher.
The Remote Mode explained in the Remote Mode Reference Manual, EM-7397-E, are applied to Version V6 or higher.

If you intend to use the 73VR3100 in the following environments or conditions, redundant and/or failsafe system designs should be used to ensure the proper degree of reliability and safety.

- Environments or conditions which are not defined in this manual
- Nuclear power control devices, railway control devices, aircraft control devices, transportation vehicles, fuel control equipment, medical equipment, recreational equipment, safety equipment, and other critical equipment for which safety must be secured according to relevant laws.
- Those devices which inherently require extremely high level of safety and reliability.

PACKAGE INCLUDES...

REF	ITEM	QUANTITY
1.	Paperless Recorder	(1)
2.	Mounting bracket*	(2)
3.	73VRPAC2 CD-ROM	(1)
4.	73VR3100 Startup Guide	(1)
5.	R3 I/O modules' instruction manual	(1) ... (4)

*Not included for desktop type.

Contents

1. GENERAL DESCRIPTIONS

1.1 73VR3100

■ DATA RECORDING FUNCTIONS

Number of channels:	20 millisec. storing rate: 8 analog inputs and 8 discrete inputs 100 millisec. storing rate: Total of 16 analog and/or discrete inputs 500 millisec. or longer storing rates: Total of 64 analog and/or discrete inputs
Storing rate:	20 millisec., 100 millisec., 500 millisec., 1 sec., 2 sec., 5 sec., 10 sec., 1 min., or 10 min.
Data storing method:	Normal, Auto, Event recording or Remote trigger
Data form:	Binary, floating or short integer
Data storage:	Compact Flash (CF) Card
Others:	Indicated interval can be recorded in USB memory as CSV file. (Ver 6.03.09 or later)

■ DATA DISPLAY FUNCTIONS

• Trend View — Shows data stored in real time on the trend graphs.

(View is updated even in stop mode from Ver. 6.03.09 or later)

Display channels:	2, 4, 6, 8 points per view selectable
Number of display views:	4 views
Display rate:	1 sec.
Chart direction:	Perpendicular or Horizontal
Chart speed:	4, 1, 1/5, 1/32, 1/160, 1/480, 1/960
Graph line thickness:	Normal or Thick
Digital display:	Shows momentary values on the digital indicators
Alarm display:	Shows alarm status for all displayed pens
Scale:	Linear or Square root; Scales in an engineering unit is selectable.
Comment:	Shows comments inserted on the trend graph.
Stop, scroll:	Stops or scrolls the view

• Overview — Shows real-time data for all channels.

(View is updated even in stop mode from Ver. 6.03.09 or later)

Displayay channels:	2, 4, 6, 8, 16 points per view selectable
Display rate:	1 sec.
Data display items:	Analog: Tag name, alarm status, momentary value (bargraph) Discrete: Tag name, alarm status, momentary value
Detailed data display:	Analog: Tag name, momentary value (bargraph + digital indicator), alarm event date/time (trigger & reset) Discrete: Tag name, momentary value, alarm event date/time

• Bargraph View — Shows data stored in real time on the bargraphs.

(View is updated even in stop mode from Ver. 6.03.09 or later)

Display channels:	2, 4, 6, 8 points per view selectable
Number of display views:	4 views
Display rate:	1 sec.
Bar direction:	Perpendicular or Horizontal
Digital display:	Shows momentary values on the digital indicators
Alarm display:	Shows alarm status for all displayed pens
Scale:	Linear or Square root; Scales in an engineering unit is selectable.

• Retrieve View — Shows data stored in the CF Card.

Display channels:	2, 4, 6, 8 points per view selectable
Number of display views:	4 views
Retrievable data:	Those stored in the CF Card
Data search:	By scrolling the window; by specifying the time index; or by specify a search parameter (Maximum or Minimum)
Data read out:	When a part of the screen for a specific time index is touched, digital indicators appear on the screen indicating the data at the specified time.

• Alarm History — Shows alarm event information.

Number of display views:	1 view
Displayed events:	16 events per view
Data display items:	Alarm event date/time (trigger & reset), tag name, pen No., alarm message
Search:	By scrolling the window or by specifying the time index
Acknowledge:	Individual or all events
Update:	Automatic
Jump:	Data at the time of an alarm event can be called up by specifying the event on the screen.

• Comment History

Number of display views:	1 view
Displayed comments:	16 comments per view
Data display items:	Comment and date/time
Search:	By scrolling the window or by specifying the time index
Jump:	Data at the time of the comment can be called up by specifying the comment on the screen.

■ OPERATION FUNCTIONS

Number of channels:	20 or 100 millisec. storing rates: 16 points 500 millisec. or longer storing rates: 64 points
Operations:	Arithmetic: Addition/subtraction, Multiplication, Division Logical: AND, OR, NOT, XOR Mathematical: Square root, Power Accumulation: Analog accumulation, Pulse accumulation Filter: Moving average, First order lag Peak hold: Peak (maximum value) hold, Peak (minimum value) hold F value calculation: F value calculation Others: Anemoscope (16 directions)
Alarm:	Alarm trip can be programmed for calculated results.

■ ALARM

Alarm setting:	Analog: 4 Upper (high) and Lower (low) alarm setpoints are selectable for each channel. Discrete: ON or OFF bit status alarm for each channel.
Deadband:	Analog: Deadband (hysteresis) is selectable in engineering unit value. Discrete: Delay time can be specified.
Output:	To Discrete Output Module (model: R3-DC16, R3-DC32A) and Discrete Input Output Module (model: R3-DAC16A), available only at 500 millisec. or longer storing rates.
Alarm history record:	Stored in the CF Card: Date/time of alarm events (trigger & reset), tag name and pen No., alarm message. Number of stored alarm events depends upon the CF Card capacity.: 250 events with 128 MB, 500 events with 256 MB, 1000 events with 512 MB or 1 GB

■ ETHERNET CONNECTIVITY

Real time communication:	Transmits specific data to a host PC installed with the PC Recorder Software (model: MSR128-V6).
FTP communication:	Transmits data stored in the CF Card using the FTP protocol to a host PC by the 73VR Data Viewer (model: 73VRWV) installed in it. Data can be transmitted even during recording.
Download, Upload:	A software configuration created on the 73VR3100 Configuration Builder (model: 73VR-31BLD) can be downloaded to the 73VR3100. The configuration set up on the 73VR3100 can be uploaded and displayed on the 73VR31BLD.
Modbus:	Communicates with the host PC using Modbus/TCP protocol. Detailed information is provided in 73VR Modbus/TCP Reference Guide.

■ OTHER FEATURES

Operation Lockout:	With a password setting, unauthorized operations on the Trend View, Bargraph View and Overview can be locked out.
Data File Used Volume Information:	A bargraph with % indication is provided on the screen to show how much percent of the data file memory has been used up. 0 – 49% used: Green bargraph 50 – 79% used: Amber bargraph 80 – 100% used: Red bargraph
Hot Swapping of the CF Card:	The CF Card is hot swappable: removable during data recording. However, there may be a slight disturbance in storing rate when the card is inserted.
Screen Saver:	The backlight is automatically turned off if the screen is untouched for a certain time period.
Bus Error Alert:	An alarm contact is output at a specified channel of the R3-DC16, R3-DC32A and R3-DAC16A in case of internal bus error. (Only 1 channel can be specified.)
Writing/Reading Setting:	The 73VR3100's present setting can be stored in a USB flash-memory. Setting stored in the memory can be read in to the 73VR3100.
Save Display View Data:	While the recording is stopped, trend view data can be recorded in CF card. (for chart speed 1 or 4) (Ver 6.03.09 or later)

NOTE

Please refer to the MSR128, 73VR31BLD and the 73VRWV Users Manuals for more information about respective software features.

1.2 I/O MODULES

R3–❑❑

MODEL

I/O TYPE
See the table below.

COMMUNICATION MODE
S : Single
W : Dual

TYPE		STORING RATE			DATA ALLOC MODE
		20 ms	0.1 s	≥0.5 s	
SS4	: DC current input, 4 ch.	Y	Y	Y	4
SS8	: DC current input, 8 ch.	---	Y	Y	8
SS8N	: DC current input, 8 ch.	---	Y	Y	8
SS16N	: DC current input, 16 ch.	---	Y	Y	16
SV4	: DC voltage input, 4 ch.	Y	Y	Y	4
SV4A	: DC millivolt input, 4 ch.	Y	Y	Y	4
SV4B	: DC voltage input, 4 ch.	Y	Y	Y	4
SV4C	: DC voltage input, 4 ch.	Y	Y	Y	4
SV8	: DC voltage input, 8 ch.	---	Y	Y	8
SV8A	: DC millivolt input, 8 ch.	---	Y	Y	8
SV8B	: DC voltage input, 8 ch.	---	Y	Y	8
SV8C	: DC voltage input, 8 ch.	---	Y	Y	8
SV8N	: DC voltage input, 8 ch.	Y	Y	Y	8
SV16N	: DC voltage input, 16 ch.	---	Y	Y	16
TS4	: Thermocouple input, 4 ch.	---	---	Y	4
TS8	: Thermocouple input, 8 ch.	---	---	Y	8
RS4	: RTD input, 4 ch.	---	---	Y	4
RS8	: RTD input, 8 ch.	---	---	Y	8
US4	: Universal input, 4 ch.	---	---	Y	4
DS4	: 4 – 20mA input (excitation), 4 ch.	Y	Y	Y	4
DS4A	: 4 – 20mA input (excitation), 4 ch.	Y	Y	Y	4
DS8N	: 4 – 20mA input (excitation), 8 ch.	---	Y	Y	8
CT4	: CT input, 4 ch.	---	---	Y	4
CT4A*1	: AC current (CLSA) input, 4 ch.	---	---	Y	4
CT4B*1	: AC current (CLSB) input, 4 ch.	---	---	Y	4
CT4C*1	: AC current (CLSB-R5) input, 4 ch.	---	---	Y	4
CT8A*1	: AC current (CLSA) input, 8 ch.	---	---	Y	8
CT8B*1	: AC current (CLSB) input, 8 ch.	---	---	Y	8
CT8C*1	: AC current (CLSB-R5) input, 8 ch.	---	---	Y	8
PT4	: AC voltage input, 4 ch.	---	---	Y	4
PA2	: Encoder input, 2 ch.	---	---	Y	8
PA4	: High speed pulse input, 4 ch.	---	---	Y	4
PA4A	: High speed totalized pulse input, 4 ch.	---	---	Y	8
PA4B	: Low speed totalized pulse input, 4 ch.	---	---	Y	8
PA8	: Totalized pulse input, 8 ch.	---	---	Y	16
PA16	: Totalized pulse input, 16 ch.	---	---	Y	16
WTU*1	: AC power (CLSE) input, 2 ch.	---	---	Y	*2
WT4	: AC power input, 4 points	---	---	Y	*3
WT4A*1	: AC current (CLSA) input, 4 ch.	---	---	Y	*3
WT4B*1	: AC current (CLSB) input, 4 ch.	---	---	Y	*3
MS4	: Potentiometer input, 4 ch.	Y	Y	Y	4
MS8	: Potentiometer input, 8 ch.	---	Y	Y	8
LC2	: Strain gauge input, 2 ch.	---	Y	Y	4
CZ4	: Zero-phase current input, 4 ch.	---	Y	Y	4
AS4	: DC current input alarm, 4 ch.	Y	Y	Y	1
AS8	: DC current input alarm, 8 ch.	---	Y	Y	4
AV4	: DC voltage input alarm, 4 ch.	Y	Y	Y	1
AV8	: DC voltage input alarm, 8 ch.	---	Y	Y	4

TYPE		STORING RATE			DATA ALLOC MODE
		20 ms	0.1 s	≥0.5 s	
AD4	: 4 – 20mA input alarm w/exc., 4 ch.	---	---	Y	1
AT4	: Thermocouple input alarm, 4 ch.	---	---	Y	1
AR4	: RTD input alarm, 4 ch.	---	---	Y	1
DA16	: Discrete input, 16 ch.	Y	Y	Y	1
DC32A	: Discrete output, 32 ch.	---	---	Y	4
DC16	: Discrete output, 16 ch.	---	---	Y	1
DAC16A	: Discrete Input Output Module	---	---	Y	1

[Legend] Y = Selectable, --- = Not selectable

R3Y–❑❑

MODEL

I/O TYPE
See the table below.

COMMUNICATION MODE
S : Single
W : Dual

TYPE		STORING RATE			DATA ALLOC MODE
		20 ms	0.1 s	≥0.5 s	
SS8	: DC current input, 8 ch.	---	Y	Y	8
SS8N	: DC current input, 8 ch.	---	Y	Y	8
SV8	: DC voltage input, 8 ch.	---	Y	Y	8
SV8N	: DC voltage input, 8 ch.	Y	Y	Y	8
SV16N	: DC voltage input, 16 ch.	---	Y	Y	16
RS8	: RTD input, 8 ch.	---	---	Y	8
MS8	: Potentiometer input, 8 ch.	---	Y	Y	8
PA16	: Totalized pulse input, 16 ch.	---	---	Y	16
DA16	: Discrete input, 16 ch.	Y	Y	Y	1
DC16	: Discrete output, 16 ch.	---	---	Y	1

[Legend] Y = Selectable, --- = Not selectable

*1. Clamp-on current sensors are not included. Order the models CLSA-x for the R3-CTxA or the R3-WT4A, CLSB-x for the R3-CTxB or R3-WT4B, CLSB-R5 for the R3-CTxC and CLSE for R3-WTU.

*2. Depends on the number of circuits and R3CON settings.

*3. Set with the side DIP switch of the unit.

2. BEFORE GETTING STARTED

2.1 POINTS OF CAUTION

■ SAFETY PRECAUTION

- This equipment is for use in general industrial environments, therefore may not be suitable for applications which require higher level of safety (e.g. safety or accident prevention systems) or of reliability (e.g. vehicle control or combustion control systems).
- For safety, installation and maintenance of this equipment must be conducted by qualified personnel.
- Before you remove the module, turn off the power supply and input signal for safety.
- Do not use the 73VR3100 in an environment where flammable gases are present. This may result in an explosion.
- Do not disassemble or modify the 73VR3100 in any way. Doing so may result in a fire or an electrical shock.
- Do not strike the panel of the 73VR3100 with a hard, heavy or pointed object, or press the panel with excessive force. Doing so may result in panel damage or injury.
- Do not block the 73VR3100's ventilation openings or use it in areas where heat accumulates. Additionally, do not store or use it under high-temperature conditions.
- Do not store or use the 73VR3100 in locations subject to direct sunlight, or where excessive dust or dirt is present.
- The 73VR3100 is a precision instrument. Do not store or use it where large shocks or excessive vibration can occur.
- Do not store or use the 73VR3100 in environments subject to chemical evaporation (such as that of organic solvents), or where there are chemicals and/or acids present in the air.
- Do not use paint thinner or organic solvents to clean the 73VR3100.
- Observe the environmental conditions when using the 73VR3100.
- Wait at least for 5 seconds before turning on the power supply after it has been turned off. The 73VR3100 may not start up if the time interval is less than 5 seconds.

■ ENVIRONMENT

- Indoor use.
- The 73VR3100 is designed to be mounted on a vertical panel. It is not suitable for a slanted or a horizontal panel surface.
- Environmental temperature must be within 0 to 50°C (32 to 122°F) with relative humidity within 30 to 85% RH in order to ensure adequate life span and operation.
- Desktop type cannot be mounted on a panel surface.
- The handle and rubber feet cannot be detached from desktop type unit.

■ GROUNDING

- Be sure to determine in advance the most stable grounding point in the environment and earth the 73VR3100's FG terminal and that of connected devices (PC) to it in order to prevent electric shock to the operator and to protect the devices from dielectric breakdown.
- Grounding is also effective to eliminate noise that could cause errors in the 73VR3100's operation.

■ LCD PANEL

- The LCD panel's liquid contains an irritant. If the panel is damaged and the liquid contacts your skin, rinse immediately the contact area with running water for at least 15 minutes. If the liquid gets in your eyes, rinse immediately your eyes with running water for at least 15 minutes and consult a doctor.
- The following phenomena are LCD characteristics, and NOT a product defect:
  - LCD screen may show uneven brightness depending upon displayed images or contrast settings.
  - The LCD screen pixels may contain minute blank-and-white-colored spots.
  - The color displayed on the LCD screen may appear different when seen from outside the specified viewing angle.
  - When the same image is displayed on the screen for a long time period, an afterimage may appear when the image is changed. If this happens, turn off the 73VR3100 and wait 10 seconds before restarting it.
- To prevent an afterimage:
  - Set the screensaver when you plan to display the same image for a long time period.
  - Plan to change the screen image periodically so that the same image does not remain for the long time period.

■ **BACKLIGHT**

• Even when the backlight is failed, the screen display can be controlled by touching it.
• Backlight failure is confirmed by the following phenomena:
  - The screen gets dark even when no screensaver setting is enabled.
  - If the screensaver is activated, the screen display does not recover when the screen is touched.
• The backlight can be replaced in our factory. The LCD must be replaced at the same time. Please consult us.

■ **I/O MODULES**

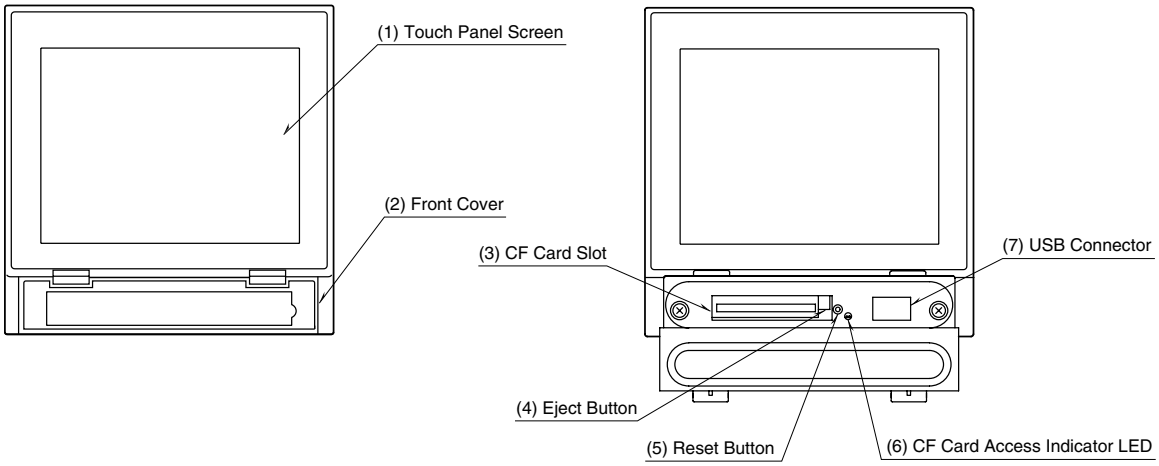
• Please refer to respective modules' instruction manuals for detailed information about them.

■ **AND....**

• We recommend use of an UPS (switching time: without delay, output: sine waveforms) to supply power backups.

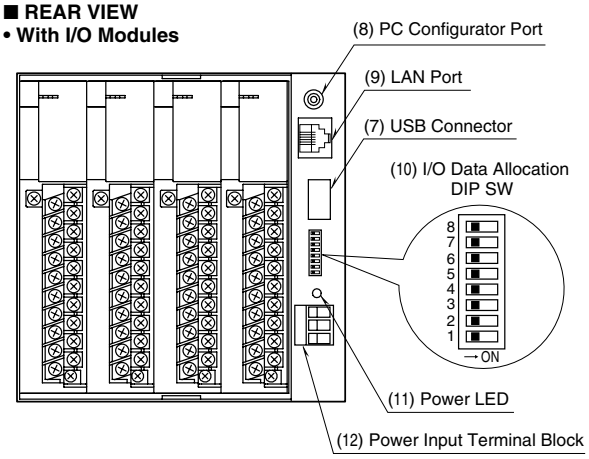
2.2 73VR3100 COMPONENT IDENTIFICATIONS

■ **FRONT VIEW**

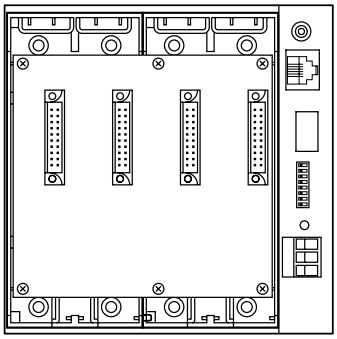


■ **REAR VIEW**

• With I/O Modules



• Without I/O Modules



• I/O Module Assignment

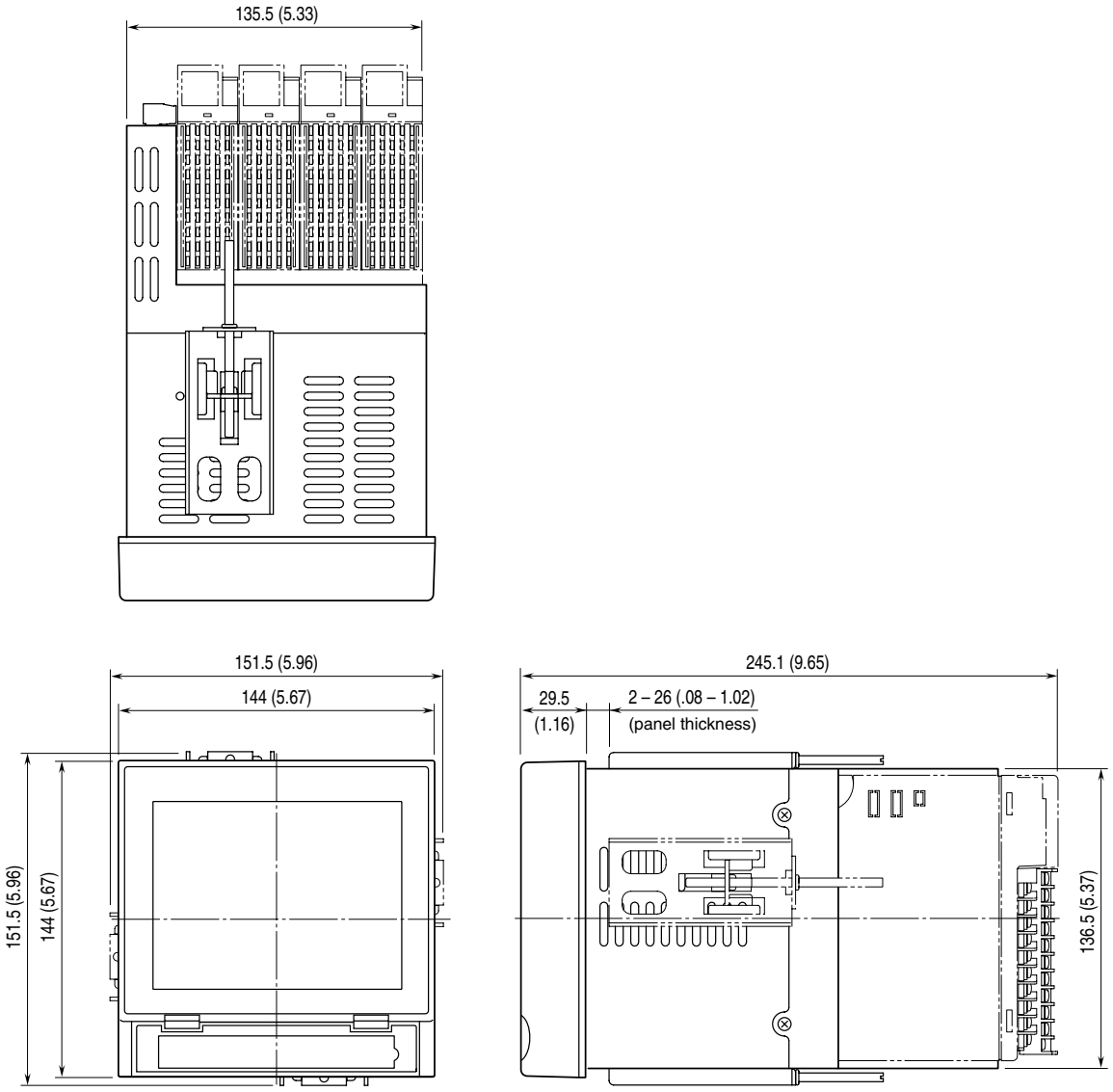
(1) Touch Panel Screen
Trend chart and other data views and setup views are displayed.
(2) Front Cover
Access to the CF Card Slot.
(3) CF Card Slot
(4) Eject Button
Used to retrieve the CF Card.
(5) Reset Button
Used to restart the 73VR3100.
(6) CF Card Access Indicator LED
Red LED turns on during the CF Card is accessed.
(7) USB Connector
Connect an USB flash-memory.

(8) PC Configurator Port
Used to program with the R3 Configurator Software.
(9) LAN Port
Connects the LAN cable (10BASE-T or 100BASE-TX)
(10) I/O Data Allocation DIP Switch
Assigns the required data area for each I/O module. Four (4) modes (1, 4, 8 and 16) are selectable depending upon the number of I/Os. See the table to the right.
(11) Power LED
LED turns on while the power is supplied.
(12) Power input terminal block

2.3 INSTALLING THE 73VR3100

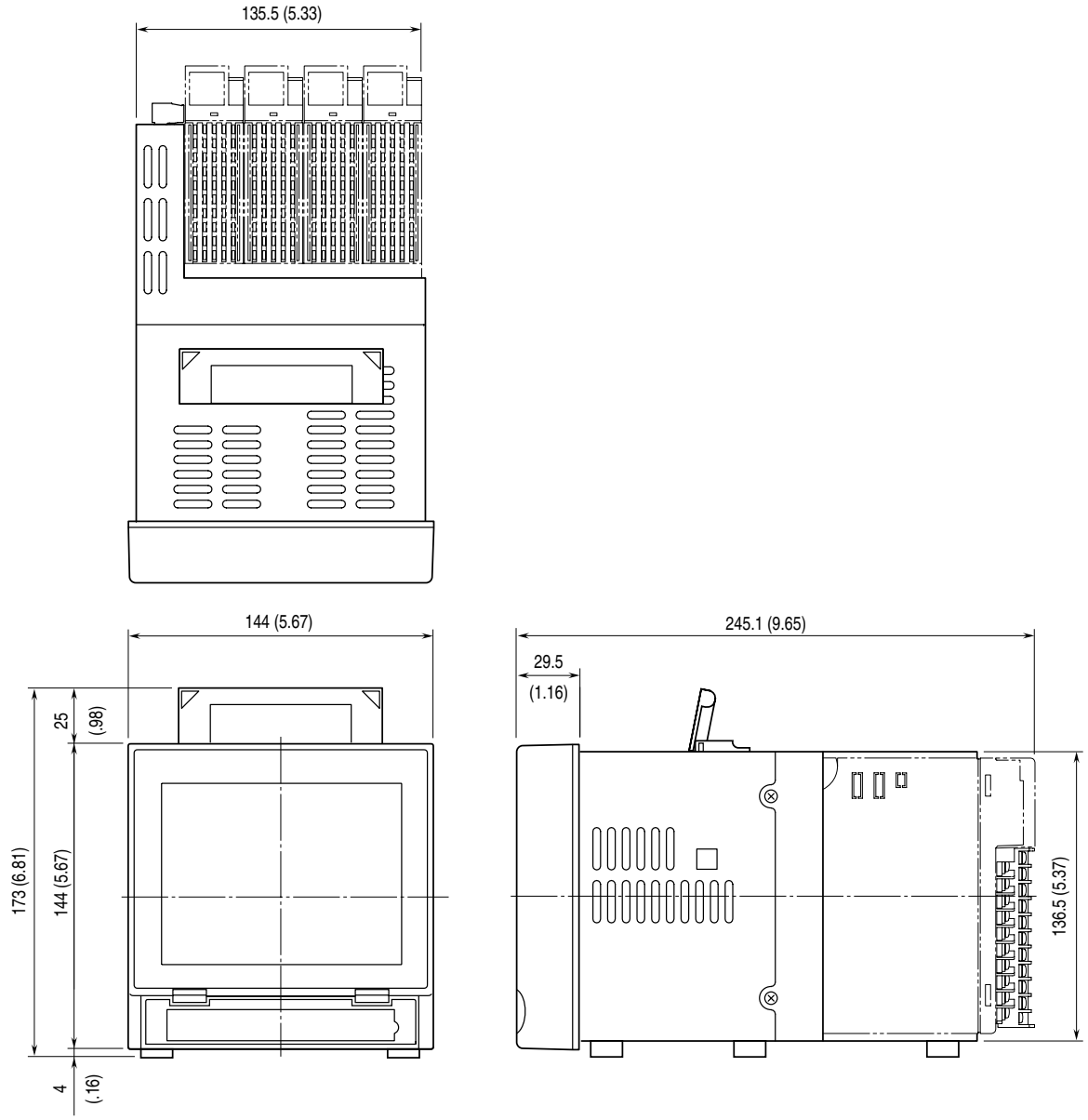
■ EXTERNAL DIMENSIONS unit: mm (inch)

• PANEL MOUNT TYPE



Attach the mounting bracket either on the top/bottom or on the sides.

- **DESKTOP TYPE**

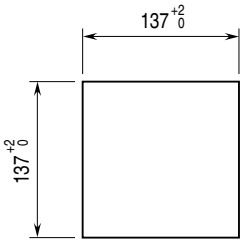


The handle and rubber feet cannot be detached from desktop type unit.

■ PANEL CUTOUT unit: mm

Usable panel thickness: 2 – 26 mm (0.08” – 1.02”)
Usable panel material: Steel

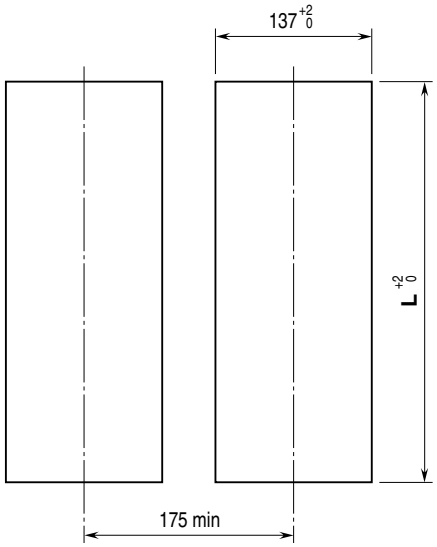
■ SINGLE MOUNTING



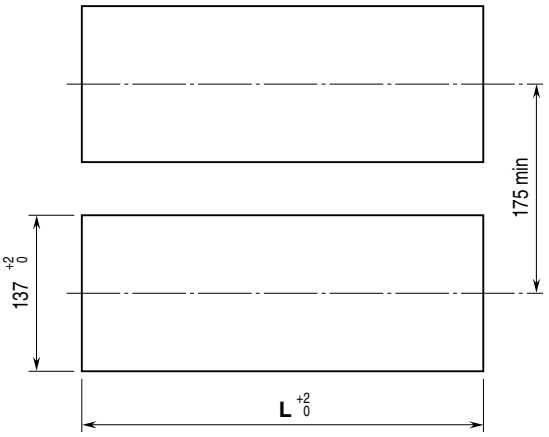
Number	**L** $^{+2}_{0}$ (mm)
2	282
3	426
4	570
5	714
6	858
7	1002
8	1146
9	1290
10	1434
n	(114 × n) – 6

Notes
1. The R3 I/O modules mounted on the second and the third 73VR3100 from the top cannot be removed in the vertical clustered mounting.
2. Dimensional tolerance ±3% unless otherwise specified. (±0.3 mm for <10 mm)
3. Desktop type cannot be mounted on a panel surface.

■ VERTICAL CLUSTERED MOUNTING (max. 3 units)

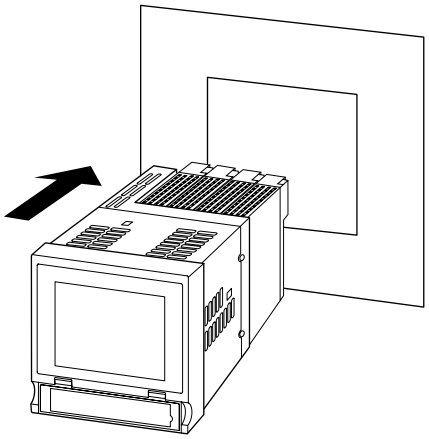


■ HORIZONTAL CLUSTERED MOUNTING

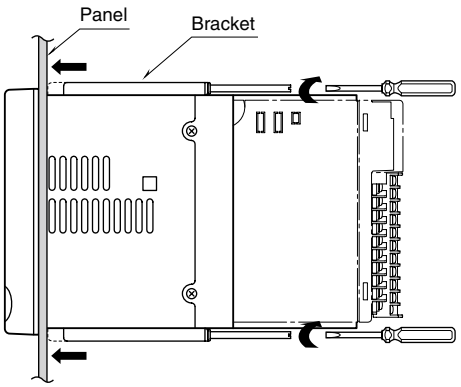


INSTALLATION PROCEDURE

1. Insert the 73VR3100 from the front side of the panel.



2. Remove the sheets covering the mounting bracket holes. Fix two mounting brackets either on the sides or on the top and bottom of the unit. Tighten screws.



CAUTION !

Adequate tightening torque for the screws used to mount the unit onto the panel is between 0.8 and 1.2 N·m. If an excessive force is applied, the unit's enclosure may be destroyed, or the panel may be distorted, which would cause a compromise in the unit's protection against water or liquid ingress.

2.4 CONNECTING TO THE POWER SOURCE

POWER INPUT

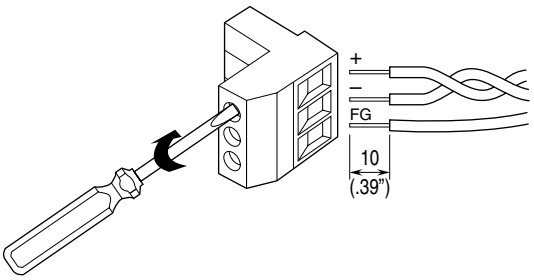
- Power input rating & operational range: Check the power rating for the unit on the specifications.
  100 – 240V AC rating: 85 – 264V, 47 – 66 Hz, approx. 27VA at 100V, approx. 46VA at 240V
  24V DC rating: 24V ±10%, approx. 24W
- Supplying any level of power other than specified above can damage the 73VR3100 or the power source.
- The power cables and the signal I/O cables for the 73VR3100 must be located separately.
- The main circuit cables (high voltage and high current), the signal I/O cables, and the power cables should not be bundled together or placed near each other.
- To increase noise resistance of the power input wires, twist the strands before connecting.

WIRING

Power input terminal: Euro type connector terminal
Wire specifications
Applicable wire size: 0.2 – 2.5 mm^2 or AWG 24 – 12
Core wire type: Stranded (use a pin terminal with stranded wires) or single core
Stripped length: 7 mm

HOW TO CONNECT POWER INPUT WIRES

1. Confirm that the power supply is turned off.
2. Loosen three (3) screws at the terminal block.
3. Insert wires into the connection.
4. Fix them with the screw. Adequate torque is between 0.5 and 0.6 N·m.



2.5 CF CARD

We will not guarantee the product's described performance if a CF Card other than purchased from us, or specified below, is used. CF card can be purchased from us. Consult us.

1. Manufacturer: Hagiwara Solutions
   Model No.: MCF10P-xxxxS
   Capacity: 128 MB through 1 GB
   (CFI-xxxxDG ... discontinued)
2. Manufacturer Apacer Technology
   Model name: CFC III
   Model No.: AP-CFxxxxRBNS-ETNDNRG Parts No.: 256 MB ... 81.28L10.UC08B
   512 MB ... 81.29L10.UC08B
   1 GB ... 81.2AL10.UC08B
   Capacity: 256 MB through 1 GB
   (AP-CFxxxxE3ER-ETNDNR, AP-CFxxxxE3ER-ETNDNRK, AP-CFxxxxE3NR-ETNDNRQ ... discontinued)

The 73VR3100 reads the setting file (e.g. storing condition, pen setting) in the CF Card during its startup. If you have started the 73VR3100 without the CF Card inserted in the unit, it reads settings stored in the unit.
The setting in the card is not read in if you inserted it after the unit has been started.
Be sure to have the CF Card inserted before the power supply is turned on.

CAUTION !

- DO NOT turn off the power supply to the 73VR3100 or reset it during data recording. The CF Card can be removed during recording, but observe a specific procedure described in Section 7.4 of this manual.
- Confirm the sides of the CF Card and the connector position. The side with label is the bottom side.

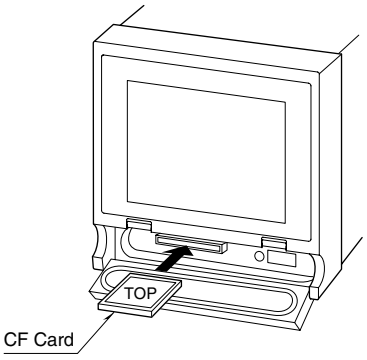
WARNING ! – Data in the CF Card May be Lost

Data file in the CF Card is reset by the following actions. Data in the file is deleted and overwritten when the card is reset. We recommend you to keep data backup files in an external device.

- Changing data format in System Configuration
- Changing storing interval in Store Setting
- Enabling/Disabling pens (including Function pens)
- Hot swapping the CF Card

INSERTING THE CF CARD

1. Open the front cover.
2. Insert the CF Card so that its side without label is on the top.
3. Push it in until EJECT button is popped up.
4. Close the front cover.



REMOVING THE CF CARD (DURING RECORDING)

1. According to “8.4 HOT SWAPPING THE CF CARD”, perform the hot swapping.
2. Push EJECT button to extract the CF Card.

REMOVING THE CF CARD (CF CARD IS SWAPPED DURING STOPPING)

1. When the CF card, which differs from the one inserted into 73VR3100, is going to inserted, follow the instruction below.
2. If the power is supplied to the 73VR3100, confirm with the LED behind the cover that the CF Card is not accessed.
3. According to “8.4 HOT SWAPPING THE CF CARD”, perform the hot swapping the CF card to remove the CF card.
4. Push EJECT button to extract the CF Card.
5. When inserting the CF card, According to “8.4 HOT SWAPPING THE CF CARD”, perform the hot swapping the CF card to insert the CF card. In this case, the data in the inserted CF card is deleted.

REMOVING THE CF CARD (STOPPING, WHEN SAME CF CARD IS SWAPPED)

1. When the CF card, which was inserted into 73VR3100, is going to inserted, follow the instruction below.
2. If the power is supplied to the 73VR3100, confirm with the LED behind the cover that the CF Card is not accessed.
3. Push EJECT button to extract the CF Card
4. Special operation is not required when CF card is inserted. In this case, the data in the inserted CF card is not deleted. (The inserted CF card must not be deleted or edited the file in the card with PC etc.)

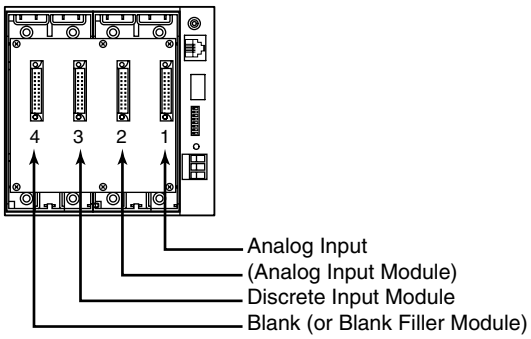
2.6 R3 SERIES I/O MODULES

2.6.1 MODULE LOCATIONS WITH 20 MSEC STORING RATE

Basically the R3 Series I/O Modules could be mixed and mounted at any position among the rear I/O module slots except for the following.

With 20 msec. storing rate, the I/Os are limited to 8 analog and 8 discrete inputs at the maximum. These input modules must be mounted at specified locations:

1. Mount analog modules to Slot 1 and 2. With an 8-channel input module, use only Slot 1.
2. Mount discrete module to Slot 3.



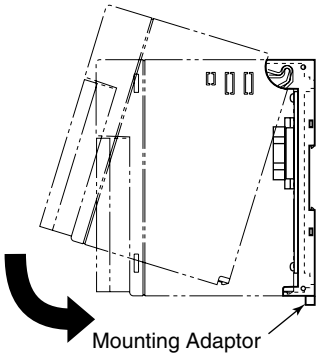
2.6.2 MOUNTING / REMOVING THE MODULES

HOW TO MOUNT

Insert the I/O module into an appropriate slot, hang it on the upper corner, and push in the lower until it is engaged with a locking mechanism with a clicking sound.

HOW TO REMOVE

Pull down the mounting adaptor at the bottom and pull up the module.



2.6.3 DIP SWITCH SETTING

Each I/O module must be pre-configured for a specific range and conversion rate using the DIP switch located on the side. The I/O module's conversion rate must be faster than the 73VR3100's storing rate. Refer to the tables in the following pages. (*) indicates the factory's default setting.

For detailed information, please refer to the data sheet for respective models.

■ **R3-SV4, DC Voltage Input Module, 4 points, isolated**

• **Input Range: SW1, SW2**

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	-10 – +10V (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-5 – +5V
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	-1 – +1V
ON	ON	OFF	OFF	ON	ON	OFF	OFF	0 – 10V
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	0 – 5V
ON	OFF	ON	OFF	ON	OFF	ON	OFF	1 – 5V
OFF	ON	ON	OFF	OFF	ON	ON	OFF	0 – 1V

• **Conversion Rate: SW3-1, 3-2**

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-SV8, DC Voltage Input Module, 8 points, isolated**

• **Input Range: SW1, SW2 (selectable per 4 channels)**

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	-10 – +10V (*)
ON	OFF	OFF	OFF	-5 – +5V
OFF	ON	OFF	OFF	-1 – +1V
ON	ON	OFF	OFF	0 – 10V
OFF	OFF	ON	OFF	0 – 5V
ON	OFF	ON	OFF	1 – 5V
OFF	ON	ON	OFF	0 – 1V

• **Conversion Rate: SW3-1, 3-2**

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **3-SV8N, DC Voltage Input Module, 8 points, non-isolated**

• **Input Range: SW1, SW2 (selectable per 4 channels)**

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	-10 – +10V (*)
ON	OFF	OFF	OFF	-5 – +5V
ON	ON	OFF	OFF	0 – 10V
OFF	OFF	ON	OFF	0 – 5V
ON	OFF	ON	OFF	1 – 5V

• **Conversion Rate: SW3-1, 3-2**

SW	CONVERSION RATE			
	100 ms (*)	50 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

Choose 50 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set respectively to 10 msec. or 100 msec.

■ **R3-SV16N, DC Voltage Input Module, 16 points, non-isolated**

• **Input Range: SW1, SW2 (selectable per 8 channels)**

INPUT 1 through INPUT 8 (SW1)				RANGE
INPUT 9 through INPUT 16 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	-10 – +10V (*)
ON	OFF	OFF	OFF	-5 – +5V
ON	ON	OFF	OFF	0 – 10V
OFF	OFF	ON	OFF	0 – 5V
ON	OFF	ON	OFF	1 – 5V

• **Conversion Rate: SW3-1, 3-2**

SW	CONVERSION RATE			
	100 ms (*)	50 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 50 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 100 msec.

■ **R3-SV4A, DC Millivolt Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	-100 – +100mV (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-50 – +50mV
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	0 – 100mV
ON	ON	OFF	OFF	ON	ON	OFF	OFF	0 – 60mV
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	0 – 50mV
ON	OFF	ON	OFF	ON	OFF	ON	OFF	-60 – +60mV

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 20 msec.

■ **R3-SV8A, DC Millivolt Input Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	-100 – +100mV (*)
ON	OFF	OFF	OFF	-50 – +50mV
OFF	ON	OFF	OFF	0 – 100mV
ON	ON	OFF	OFF	0 – 60mV
OFF	OFF	ON	OFF	0 – 50mV
ON	OFF	ON	OFF	-60 – +60mV

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-SV4B, DC Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	-30 – +30V (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-15 – +15V
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	0 – 30V
ON	ON	OFF	OFF	ON	ON	OFF	OFF	0 – 15V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-SV8B, DC Input Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	-30 – +30V (*)
ON	OFF	OFF	OFF	-15 – +15V
OFF	ON	OFF	OFF	0 – 30V
ON	ON	OFF	OFF	0 – 15V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-SV4C, DC Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	-50 – +50V (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-25 – +25V
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	0 – 50V
ON	ON	OFF	OFF	ON	ON	OFF	OFF	0 – 25V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-SV8C, DC Input Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	-50 – +50V (*)
ON	OFF	OFF	OFF	-25 – +25V
OFF	ON	OFF	OFF	0 – 50V
ON	ON	OFF	OFF	0 – 25V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-SS4, DC Current Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	4 – 20mA (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0 – 20mA
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	-20 – +20mA

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-SS8, DC Current Input Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	4 – 20mA (*)
ON	OFF	OFF	OFF	0 – 20mA
OFF	ON	OFF	OFF	-20 – +20mA

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-SS8N, DC Current Input Module, 8 points, non-isolated**

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-SS16N, DC Current Input Module, 16 points, non-isolated**

• Input Range: SW1, SW2 (selectable per 8 channels)

INPUT 1 through INPUT 8 (SW1)				RANGE
INPUT 9 through INPUT 16 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	4 – 20mA (*)
ON	OFF	OFF	OFF	0 – 20mA
OFF	ON	OFF	OFF	-20 – +20mA

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	100 ms (*)	50 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 50 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 100 msec.

■ **R3-DS4, 4 – 20mA Input Module with Excitation, 4 points, isolated**

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-DS8N, 4 – 20mA Input Module with Excitation, 8 points, non-isolated**

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-PT4, AC Voltage Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0 – 250V (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0 – 50V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	60 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CT4, CT Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0 – 5A (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0 – 1A

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CT4A: AC Current Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	CLSA–50 (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	CLSA–30
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	CLSA–12
ON	ON	OFF	OFF	ON	ON	OFF	OFF	CLSA–08

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CT8A: AC Current Input Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	CLSA–50 (*)
ON	OFF	OFF	OFF	CLSA–30
OFF	ON	OFF	OFF	CLSA–12
ON	ON	OFF	OFF	CLSA–08

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CT4B: AC Current Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	CLSB–60 (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	CLSB–40
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	CLSB–20
ON	ON	OFF	OFF	ON	ON	OFF	OFF	CLSB–10
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	CLSB–05

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CT8B: AC Current Input Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	CLSB–60 (*)
ON	OFF	OFF	OFF	CLSB–40
OFF	ON	OFF	OFF	CLSB–20
ON	ON	OFF	OFF	CLSB–10
OFF	OFF	ON	OFF	CLSB–05

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CT4C: AC Current Input Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0 – 5A (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0 – 1A

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CT8C, AC Current Input Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	0 – 5A (*)
ON	OFF	OFF	OFF	0 – 1A

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-CZ4, Zero-phase Current Input Module, with noise filter**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0 – 1.5mA (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0 – 0.1mA

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-PA4: High Speed Pulse Input Module, 4 points, isolated**

• Input Range: SW1, SW2 (independent range selectable)

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0 – 100 kHz (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0 – 10 kHz
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	0 – 1 kHz
ON	ON	OFF	OFF	ON	ON	OFF	OFF	0 – 100 Hz
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	0 – 10 Hz
ON	OFF	ON	OFF	ON	OFF	ON	OFF	0 – 1 Hz
OFF	ON	ON	OFF	OFF	ON	ON	OFF	0 – 0.1 Hz

• Gain: SW3-1, 3-2, 3-3, 3-4

SW	GAIN		INPUT
	1 (*)	2	
SW3-1	OFF	ON	Input 1
SW3-2	OFF	ON	Input 2
SW3-3	OFF	ON	Input 3
SW3-4	OFF	ON	Input 4

■ **R3-PA4A: High Speed Totalized Pulse Input Module, 4 points, isolated**

• Gain: SW3-1, 3-2, 3-3, 3-4

SW	GAIN		INPUT
	1 (*)	2	
SW3-1	OFF	ON	Input 1
SW3-2	OFF	ON	Input 2
SW3-3	OFF	ON	Input 3
SW3-4	OFF	ON	Input 4

■ **R3-PA4B: Low Speed Totalized Pulse Input Module, 4 points, isolated**

• Gain: SW3-1, 3-2, 3-3, 3-4

SW	GAIN		INPUT
	1 (*)	2	
SW3-1	OFF	ON	Input 1
SW3-2	OFF	ON	Input 2
SW3-3	OFF	ON	Input 3
SW3-4	OFF	ON	Input 4

■ **R3-PA2, Encode Input Module, 2 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)			INPUT RANGE
INPUT 2 (SW2)			
1	2	3	
OFF	OFF	OFF	1 – 100 kHz (*)
ON	OFF	OFF	0 – 10 kHz
OFF	ON	OFF	0 – 1 kHz
ON	ON	OFF	0 – 100 Hz
OFF	OFF	ON	0 – 10 Hz
ON	OFF	ON	0 – 1 Hz
OFF	ON	ON	0 – 0.1 Hz

• Count Mode: SW1, SW2

INPUT 1 (SW1)		COUNT MODE
INPUT 2 (SW2)		
4	5	
OFF	OFF	Mode 0 : 1 count / pulse (*)
ON	OFF	Mode 1 : 1 count / pulse
OFF	ON	Mode 2 : 2 count / pulse
ON	ON	Mode 3 : 4 count / pulse

• Start Count: SW3

SW	START COUNT AT POWER ON	
	0 count (*)	Stored count
SW3-1	OFF	ON

■ **R3-PA8, Totalized Pulse Input Module, pi 8 points, 32 bits**

• Count Reset: SW3-1

Resets the counter

SW	COUNT RESET	
	Nomal Operation	Count reset
SW3-1	OFF (*)	ON

Please make sure to turn it OFF when using it.

• Count Reset Signal: SW3-3

Configurate the Count reset signal.

SW	COUNT RESET SIGNAL	
	Unavailable	Available
SW3-3	OFF (*)	ON

■ **R3-TS4, T/C Input Module, 4 points, isolated**

• Thermocouple Type: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				T/C
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	K (CA) (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	E (CRC)
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	J (IC)
ON	ON	OFF	OFF	ON	ON	OFF	OFF	T (CC)
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	B (RH)
ON	OFF	ON	OFF	ON	OFF	ON	OFF	R
OFF	ON	ON	OFF	OFF	ON	ON	OFF	S
ON	ON	ON	OFF	ON	ON	ON	OFF	C (WRe 5-26)
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	N
ON	OFF	OFF	ON	ON	OFF	OFF	ON	U
OFF	ON	OFF	ON	OFF	ON	OFF	ON	L
ON	ON	OFF	ON	ON	ON	OFF	ON	P (Platinel II)
OFF	OFF	ON	ON	OFF	OFF	ON	ON	(PR)

• Burnout: SW3-1

SW3-1	BURNOUT
OFF	Upscale (*)
ON	Downscale

• Temperature Unit: SW3-2, 3-3

SW3-2	SW3-3	TEMP. UNIT
OFF	OFF	°C (*)
ON	OFF	°F
OFF	ON	(Absolute Temp)

• Conversion Rate: SW3-4

SW3-4	CONV. RATE
OFF	250 msec. (*)
ON	1 sec.

CAUTION !

Choose 250 msec. conversion rate when you need the 73VR3100's storing rate set to 500 msec. or 1 sec.

■ **R3-TS8, T/C Input Module, 8 points, isolated**

• Thermocouple Type: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				T/C
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	K (CA) (*)
ON	OFF	OFF	OFF	E (CRC)
OFF	ON	OFF	OFF	J (IC)
ON	ON	OFF	OFF	T (CC)
OFF	OFF	ON	OFF	B (RH)
ON	OFF	ON	OFF	R
OFF	ON	ON	OFF	S
ON	ON	ON	OFF	C (WRe 5-26)
OFF	OFF	OFF	ON	N
ON	OFF	OFF	ON	U
OFF	ON	OFF	ON	L
ON	ON	OFF	ON	P (Platinel II)
OFF	OFF	ON	ON	(PR)

• Burnout: SW3-1

SW3-1	BURNOUT
OFF	Upscale (*)
ON	Downscale

• Temperature Unit: SW3-2, 3-3

SW3-2	SW3-3	TEMP. UNIT
OFF	OFF	°C (*)
ON	OFF	°F
OFF	ON	(Absolute Temp)

• Conversion Rate: SW3-4

SW3-4	CONV. RATE
OFF	250 msec. (*)
ON	1 sec.

CAUTION !

Choose 250 msec. conversion rate when you need the 73VR3100's storing rate set to 500 msec. or 1 sec.

■ **R3-RS4, RTD Input Module, 4 points, isolated**

• RTD Type: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RTD
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Pt 100 (*) (JIS '97, IEC)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	Pt 100 (JIS '89)
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	JPt 100
ON	ON	OFF	OFF	ON	ON	OFF	OFF	Pt 50 Ω
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	Ni 100
ON	OFF	ON	OFF	ON	OFF	ON	OFF	Cu 10 @ 25°C
OFF	ON	ON	OFF	OFF	ON	ON	OFF	Pt 1000
ON	ON	ON	OFF	ON	ON	ON	OFF	Ni 508.4 Ω
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	Cu 50
ON	OFF	OFF	ON	ON	OFF	OFF	ON	Ni 1000

• Burnout: SW3-1

SW3-1	BURNOUT
OFF	Upscale (*)
ON	Downscale

• Temperature Unit: SW3-2, 3-3

SW3-2	SW3-3	TEMP. UNIT
OFF	OFF	°C (*)
ON	OFF	°F
OFF	ON	(Absolute Temp)

• Conversion Rate: SW3-4

SW3-4	CONV. RATE
OFF	250 msec. (*)
ON	1 sec.

CAUTION !

Choose 250 msec. conversion rate when you need the 73VR3100's storing rate set to 500 msec. or 1 sec.

■ **R3-RS8, RTD Input Module, 8 points, isolated**

• RTD Type: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RTD
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	Pt 100 (*) (JIS '97, IEC)
ON	OFF	OFF	OFF	Pt 100 (JIS '89)
OFF	ON	OFF	OFF	JPt 100
ON	ON	OFF	OFF	Pt 50 Ω
OFF	OFF	ON	OFF	Ni 100
ON	OFF	ON	OFF	Cu 10 @ 25°C
OFF	OFF	OFF	ON	Cu 50

• Burnout: SW3-1

SW3-1	BURNOUT
OFF	Upscale (*)
ON	Downscale

• Temperature Unit: SW3-2, 3-3

SW3-2	SW3-3	TEMP. UNIT
OFF	OFF	°C (*)
ON	OFF	°F
OFF	ON	(Absolute Temp)

• Conversion Rate: SW3-4

SW3-4	CONV. RATE
OFF	250 msec. (*)
ON	1 sec.

CAUTION !

Choose 250 msec. conversion rate when you need the 73VR3100's storing rate set to 500 msec. or 1 sec.

■ **R3-MS4, Potentiometer Input Module, 4 points, isolated**

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-MS8, Potentiometer Input Module, 8 points, isolated**

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-LC2, Strain Gauge Input Module, 2 points, isolated**

• Input Range: SW1, SW2

INPUT 1				INPUT 2				STRAIN GAUGE
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0.0 – 1.0mV/V (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0.0 – 3.0mV/V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-AS4, DC Current Input Alarm Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	4 – 20mA (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	0 – 20mA
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	-20 – +20mA

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-AS8, DC Current Input Alarm Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	4 – 20mA (*)
ON	OFF	OFF	OFF	0 – 20mA
OFF	ON	OFF	OFF	-20 – +20mA

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-AV4, DC Voltage Input Alarm Module, 4 points, isolated**

• Input Range: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RANGE
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	-10 – +10V (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-5 – +5V
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	-1 – +1V
ON	ON	OFF	OFF	ON	ON	OFF	OFF	0 – 10V
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	0 – 5V
ON	OFF	ON	OFF	ON	OFF	ON	OFF	1 – 5V
OFF	ON	ON	OFF	OFF	ON	ON	OFF	0 – 1V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 10 msec. conversion rate when you need the 73VR3100's storing rate set to 20 msec.

The 73VR3100 may store only a previously sampled data if the conversion rate is set to 10 msec.

■ **R3-AV8, DC Voltage Input Alarm Module, 8 points, isolated**

• Input Range: SW1, SW2 (selectable per 4 channels)

INPUT 1 through INPUT 4 (SW1)				RANGE
INPUT 5 through INPUT 8 (SW2)				
1	2	3	4	
OFF	OFF	OFF	OFF	-10 – +10V (*)
ON	OFF	OFF	OFF	-5 – +5V
OFF	ON	OFF	OFF	-1 – +1V
ON	ON	OFF	OFF	0 – 10V
OFF	OFF	ON	OFF	0 – 5V
ON	OFF	ON	OFF	1 – 5V
OFF	ON	ON	OFF	0 – 1V

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	160 ms (*)	80 ms	40 ms	20 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

CAUTION !

Choose 80 msec. or a faster conversion rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-AT4,Thermocouple Input Alarm Module, 4 points, isolated**

• Thermocouple Type: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				T/C
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	K (CA) (*)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	E (CRC)
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	J (IC)
ON	ON	OFF	OFF	ON	ON	OFF	OFF	T (CC)
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	B (RH)
ON	OFF	ON	OFF	ON	OFF	ON	OFF	R
OFF	ON	ON	OFF	OFF	ON	ON	OFF	S
ON	ON	ON	OFF	ON	ON	ON	OFF	C (WRe 5-26)
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	N
ON	OFF	OFF	ON	ON	OFF	OFF	ON	U
OFF	ON	OFF	ON	OFF	ON	OFF	ON	L
ON	ON	OFF	ON	ON	ON	OFF	ON	P (Platinel II)
OFF	OFF	ON	ON	OFF	OFF	ON	ON	(PR)

• Burnout: SW3-1

SW3-1	BURNOUT
OFF	Upscale (*)
ON	Downscale

• Temperature Unit: SW3-2, 3-3

SW3-2	SW3-3	TEMP. UNIT
OFF	OFF	°C (*)
ON	OFF	°F
OFF	ON	(Absolute Temp)

• Conversion Rate: SW3-4

SW3-4	CONV. RATE
OFF	250 msec. (*)
ON	1 sec.

■ **R3-AR4, RTD Input Alarm Module, 4 points, isolated**

• RTD Type: SW1, SW2

INPUT 1 (SW1)				INPUT 2 (SW1)				RTD
INPUT 3 (SW2)				INPUT 4 (SW2)				
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Pt 100 (*) (JIS '97, IEC)
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	Pt 100 (JIS '89)
OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	JPt 100
ON	ON	OFF	OFF	ON	ON	OFF	OFF	Pt 50 Ω
OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	Ni 100
ON	OFF	ON	OFF	ON	OFF	ON	OFF	Cu 10 @ 25°C
OFF	ON	ON	OFF	OFF	ON	ON	OFF	Pt 1000
ON	ON	ON	OFF	ON	ON	ON	OFF	Ni 508.4 Ω
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	Cu 50

• Burnout: SW3-1

SW3-1	BURNOUT
OFF	Upscale (*)
ON	Downscale

• Temperature Unit: SW3-2, 3-3

SW3-2	SW3-3	TEMP. UNIT
OFF	OFF	°C (*)
ON	OFF	°F
OFF	ON	(Absolute Temp)

• Conversion Rate: SW3-4

SW3-4	CONV. RATE
OFF	250 msec. (*)
ON	1 sec.

■ **R3-AD4, 4 – 20mA Input Alarm Module, 2-wire transmitter excitation supply; 4 points, isolated**

• Conversion Rate: SW3-1, 3-2

SW	CONVERSION RATE			
	80 ms (*)	40 ms	20 ms	10 ms
SW3-1	OFF	ON	OFF	ON
SW3-2	OFF	OFF	ON	ON

■ **R3-DA16, Discrete Input Module, 16 points**

• Excitation Monitor: SW3-1

SW	EXCITATION MONITOR	
	WITH (*)	WITHOUT
SW3-1	OFF	ON

• Read Rate: SW3-2, 3-3, 3-4

SW	READ RATE (≤msec.)							
	10 (*)	1	5	20	50	70	100	200
SW3-2	OFF	ON	OFF	ON	OFF	ON	OFF	ON
SW3-3	OFF	OFF	ON	ON	OFF	OFF	ON	ON
SW3-4	OFF	OFF	OFF	OFF	ON	ON	ON	ON

CAUTION !

Choose 10 msec. or a faster read rate when you need the 73VR3100's storing rate set to 20 msec.

Choose 70 msec. or a faster read rate when you need the 73VR3100's storing rate set to 100 msec.

■ **R3-DC16 Discrete Output Module, 16 points**

• Output Hold: SW3-1

SW	OUTPUT HOLD	
	HOLD (*)	OFF
SW3-1	OFF	ON

■ **R3-DC32A Discrete Output Module, 32 points**

• Output Hold: SW3-1

SW	OUTPUT HOLD	
	HOLD (*)	OFF
SW3-1	OFF	ON

■ **R3-DAC16A Discrete Input Output Module**

• Output Hold: SW3-1

Effective only in continuous output mode.

SW	OUTPUT HOLD	
	HOLD (*)	OFF
SW3-1	OFF	ON

• Output Mode: SW3-2, 3-3

SW		OUTPUT MODE
SW3-2	SW3-3	
OFF	OFF	One-Shot Output Mode (*)
ON	OFF	ON/OFF Control Output Mode
OFF	ON	Continuous Output Mode

• Data Length: SW3-4

Effective only in ON/OFF control output mode.

SW	DATA LENGTH	
	8 bit	4 bit
SW3-4	OFF (*)	ON

Note: Be sure to set unused SW2-4 through 2-7 to OFF.

2.6.4 CONFIGURING THE INPUT RANGE OF THE I/O MODULES

In order to use models R3-CTxA, R3-CTxB, the data range must be set up with the R3 Configurator Software (model: R3CON).

PREPARING

The R3CON Configurator is available for downloading at our web site. A special cable is required to connect the R3 modules to a PC.
Install the R3CON Configurator on your PC.

NOTE

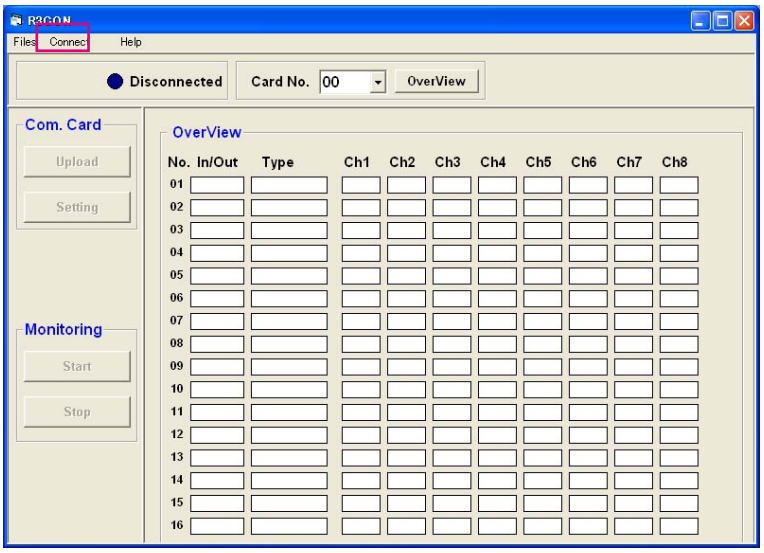
The R3CON Version 1.02 or higher is required to use with the R3-CTx models. The version number can be confirmed by choosing Help > Version on the R3CON menu bar.

CONNECTING TO THE PC

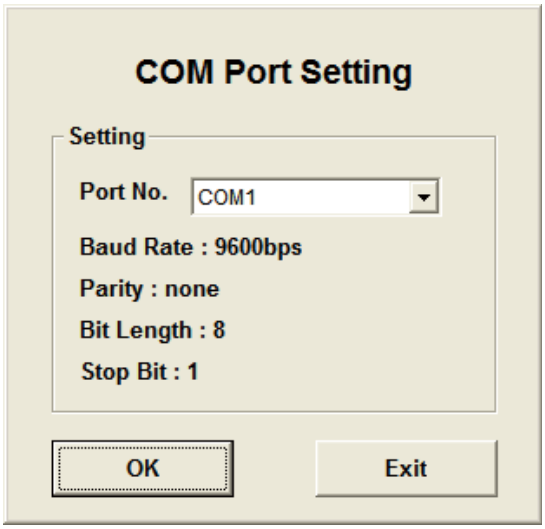
Connect between the PC's COM port and the 73VR3100's PC Configurator Port (See Section 2.2) with the dedicated cable.

SETTING UP THE INPUT MODULES

1. Connecting to the communication line.
   Choose Start > Program > R3CON on the task bar to start up the R3CON.

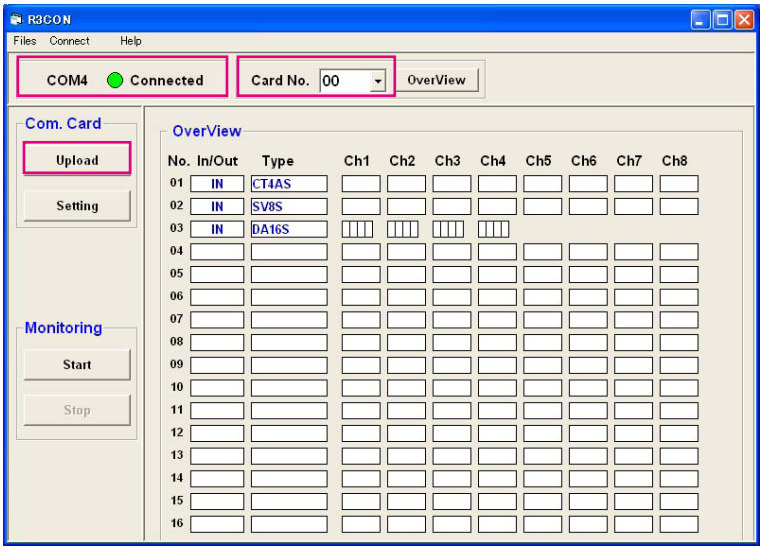


   Choose 'Connect' from 'Connect' on the menu bar and the following dialog box appears on the screen.

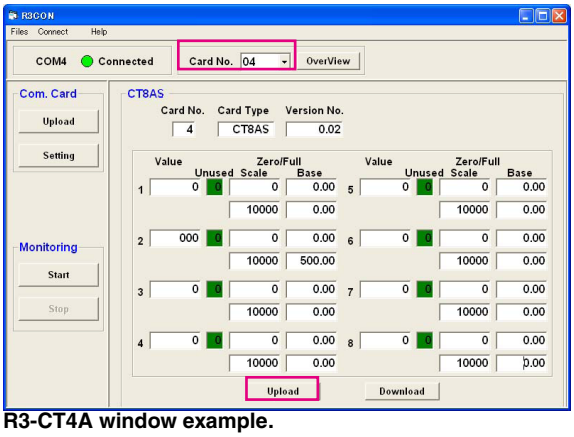


   Choose an appropriate Port No., and click OK. With the communication line established, the communication status lamp turns to green and 'COMx' is shown.

2. Confirming the hardware type and setting.
   Click Upload button on the left-top and the screen shows the I/O hardware configuration and input type setting as shown below.



3. Configuring the input module.
   Pull down the Card No. menu and choose the number (01 through 04) for the R3-CTx module. The main frame of 'Overview' is now replaced with the R3-CTx configuration view.
   Click Upload button at the bottom to read the present data in the module.



R3-CT4A window example.

Enter the values as shown in the table below.

PARAMETER	DESCRIPTION	SETTING
Zero Scale	0% scaling value	0
Full Scale	100% scaling value	10000
Zero Base	0% input value in engineering unit	0
Full Base	100% input value in engineering unit	Upper limit of the input range (500 for 0 – 500A)

4. Downloading new configuration to the module.
   Clicking Download button at the bottom writes the input module with new configuration you have entered on the screen.
5. Disconnecting the communication line.
   Choose 'Disconnect' from 'Connect' on the menu bar.

NOTES

The original data range is defined by an equation: Engineering unit data x 100, but changing this setting may lower the resolution of the stored data for certain input ranges.
For example, if you have an input range of "0 to 500A", the normal data range is "0 to 50000."
However the 73VR3100's data format is fixed at "0 to 10000." By changing the data range from "0 to 50000" to "0 to 10000", the data resolution will be lowered by the one-fifth.

2.6.5 CAUTION FOR USING THE I/O MODULES

For R3-PA2

-The R3-PA2 position data range is of "-1000000000 to +1000000000." However, the 73VR3100 cannot handle negative range, being such range of "0 to +1000000000." Be sure to set up the R3-PA2 channels within permissible range.
- Also the R3-PA2 alarm contact output is not usable for the 73VR3100.

For R3-WTU

-Set 32 bit active energy as 1e8 with R3CON. For other value settings refer to the R3-WTU instructions manual.
-It is required to set up 16 bit data with R3CON being sure it does not surpasses the value of "-32768 to +32767." At active energy count over, it does not return to "0", for this reason, do not use it for pulse accumulation function.

For R3-WT4

-Set 32 bit active energy as 1e8 with R3CON. For other value settings refer to the R3-WT4x instructions manual.

2.6.6 I/O DATA ALLOCATION

A data area appropriate for the type and channel number of the I/O module must be assigned. Set the I/O Data Allocation DIP SW located on the rear side of the 73VR3100 (See Section 2.2) referring to the table below.
If the DIP switch setting is changed while the power is supplied, be sure to restart the 73VR3100 after setting.

MODULE NUMBER								DATA ALLOC.
1		2		3		4		
SW1 MODE	SW2	SW3	SW4	SW5	SW6	SW7	SW8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1
ON	OFF	ON	OFF	ON	OFF	ON	OFF	4
OFF	ON	OFF	ON	OFF	ON	OFF	ON	8
ON	ON	ON	ON	ON	ON	ON	ON	16

NOTES

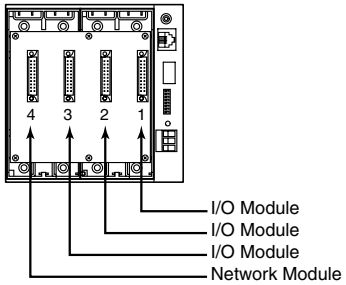
The DIP Switch is set at the factory according to I/O module types specified in Ordering Information Sheet. For example, Module 1 is set to '4' when the R3-SV4 is selected to be installed at this position. Set to '1' with the R3-DA16 and R3-DC16.

2.6.7 USING NETWORK MODULE

A extra network bus can be added to the 73VR3100 by mounting the R3 Network Module, which enables the I/O signals to be interfaced with another supervising software program or a PLC or DCS.
All R3 Series Network Modules are selectable.

CAUTIONS

(1) Choose the suffix code 'N' for the power supply of the module.
(2) Choose the suffix code 'W' for the I/O modules.
(3) Only one network module can be used. When it is mounted, up to three (3) I/O modules can be mounted.
(4) Mount the Network Module in the slot No. 4. No other position is selectable.
(5) Set the SW3-1 DIP switch (main/sub network bus) on the side of the network module to ON or 'sub.'
(6) Refer to the data sheet and the instruction manual for respective network modules when connecting the module.



2.6.8 INTERFACE I/O MODULE (GATEWAY MODULE)

R3–❑

Communication Type

Interface I/O Modules (Gateway)

MODEL	MODULE TYPE	DATA ALLOCATION
GC1	CC-Link Ver.1.10/Ver.2.00	16
GM1	Modbus	
GE1	Modbus/TCP (Ethernet)	
GD1	DeviceNet	
GFL1	FL-net (OPCN-2)	

· Interface I/O Modules (Gateway) support analog data only, not for digital data.
· 73VR3100 cannot output analog data. Only analog data input via Interface I/O Module is available.
· Storing Interval 20 msec. is not supported.
· Cyclic expansion 8 fold of CC-Link Ver.2.00 is not supported, except when R3-GC1 is used in remote mode.

2.7 SD CARD

The operation confirmed SD/CF conversion adapter and SD card described below are available for storing on SD card.
The SD/CF conversion adapter, which has SD card incorporated, can be handled as CF card.
SD card can be purchased from us (except SD/CF conversion adapter). Consult us.

SD/CF conversion adapter: DeLOCK adaptor CF II to SDHC,SDXC,
61796 (operation has been confirmed with the adaptor purchased in the year of 2016.)
62637 (operation has been confirmed with the adaptor purchased in the year of 2018.)

SD card: Hagiwara Solutions NSDA-004GT (discontinued), NSDA-004GL (discontinued),
NSD6-004GH (B21SEI

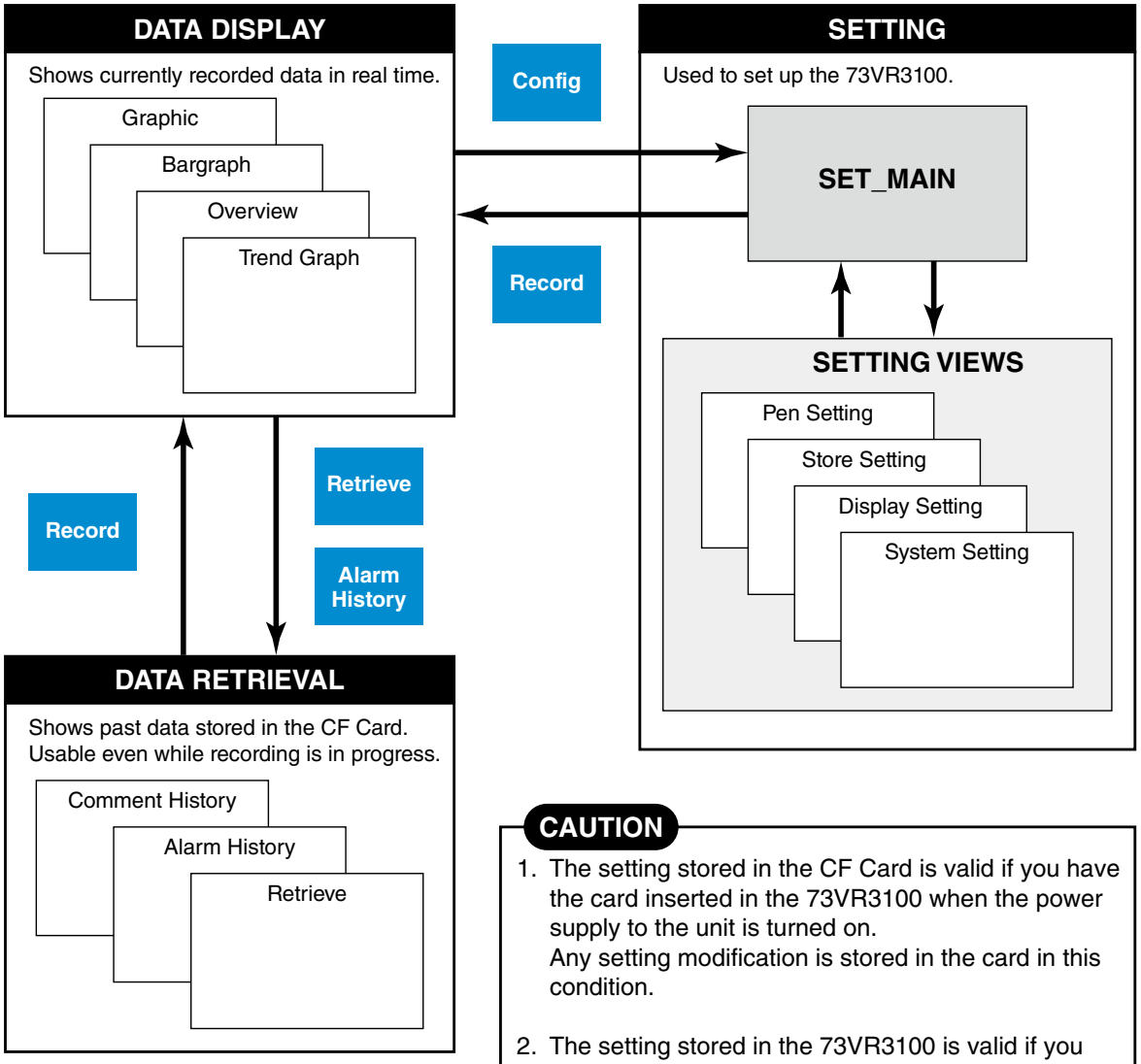
Note: The use of recommended device prevents loose of data, however correct operating it is not always guaranteed.

WARNING ! – SD card limitations

- SD card memory is 4 GB, however, only 1 GB will be used.
- Storing interval 20 msec. or 100 msec. setting is not available. Use the SD card in a storing interval slower than 0.5 sec.
- Do NOT hot swap the CF card every minute on the minute (at 00 second). The data of one cycle may be lost.
- FTP data transfer setting is not available. If FTP data transfer operation starts during storing data on SD card, data on SD card may be lost.
- When formatting SD card, use a dedicated software “SD Card Formatter”.
  “SD Card Formatter” is downloadable at SD Association’s web site.
  https://www.sdcard.org

3. 73VR3100 VIEWS & BASIC OPERATIONS

Views used in the 73VR3100 are grouped in three functions: Data display, Setting and Data retrieval. Groups and views are related to each other as shown in the figure below.



CAUTION

1. The setting stored in the CF Card is valid if you have the card inserted in the 73VR3100 when the power supply to the unit is turned on.
   Any setting modification is stored in the card in this condition.

2. The setting stored in the 73VR3100 is valid if you have no card in the 73VR3100 when the power supply is turned on.
   Any setting modification is stored in the unit in this condition.

You can copy the setting stored in the unit to a card using the Builder Software or the reading/writing operation of the unit via USB Flash Memory.

4. SETTING UP THE 73VR3100

Touching Menu key on one of the display views (Trend, Overview and Bargraph) opens selectable menu items on the right half of the screen. Touch Config key to open Main view listing the name of detailed setting windows.

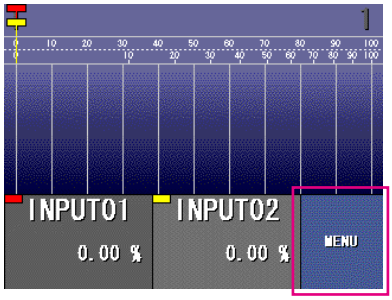


Figure: Menu key.

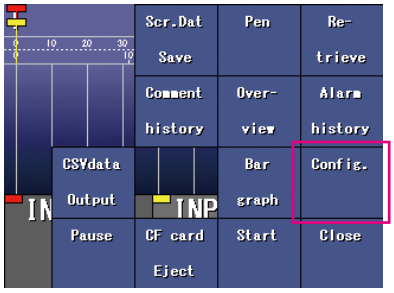


Figure: Config key.

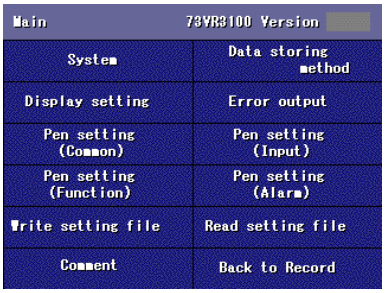


Figure: Main view.

In order to enable new setting, touch Back to Record key and go back to the previously displayed recording view (Trend, Overview and Bargraph).

■ MAIN MENU & SUB MENU LIST

MODIFY : Y = Can be modified during recording, N = Not)

MAIN MENU	SUB MENU	MODIFY
System	Operating mode	N
	Temperature unit	N
	Start mode	N
	Data storing form	N
	Data overwrite	N
	Screen saver	Y
	Touch panel beep	Y
	Date and time	N
	IP address	N
	Password	N
Data storing method	Storing interval	N
	Storing setting	N
Display setting	Chart speed	N
	Graph direction	Y
	Digital display type	Y
	Digital display	Y
	Data file used volume	Y
	Display pen number	Y
	Display pen number (Overview)	Y
	Auto pen switching	Y
	Chart color	Y
Error output	Enable / Disable	N
	Output ch.	N
	Contact logic	N
Pen setting (Common)	Enable / Disable	N
	Analog / Discrete	N
	Channel No.	N
	Tag	N
	Unit	N
	Decimal place	Y
	Color	Y
	Line thickness	Y

MAIN MENU	SUB MENU		MODIFY
Pen setting (Input)	Analog	Analog type	N
		Input range	N
		Engineering range	N
		Plot position	Y
		Scale shift	Y
		Normal / Log (Exp. scale, Log. plot position)	N
		Square root	N
		Overview color	Y
	Discrete	OFF description	N
		ON description	N
Pen setting (Function)	Common	Function	N
		Equation (Gain, Bias)	N
	Analog	Plot range	Y
		Scale shift	Y
		Normal / Log (Exp. scale, Log. plot position)	N
		Square root	N
		Overview color	Y
	Discrete	OFF description	N
		ON description	N
Pen setting (Alarm)	Analog	Limit 1...4	Y
		Deadband 1...4	Y
		Normal zone	Y
		Zone color 0...4	Y
		Relay 0...4 (Enable / Ch)	Y
		Relay output 1...4	Y
		Up message	Y
		Down message	Y
	Discrete	OFF output	Y
		ON output	Y
		Delay	Y
		Normal state	Y
		OFF color (Normal / Alarm)	Y
		ON color (Normal / Alarm)	Y
		OFF Alarm / Message	Y
		ON Alarm / Message	Y
		OFF Message	Y
		ON Message	Y
Comment	Comment direct input		Y
	Group name		Y
	Group color		Y
	Comment (Group 7 comment can be modified during recording)		Y
Write setting file			N
Read setting file			N

■ TIPS FOR KEY OPERATIONS

Alphanumeric Keypads

When you need to enter alphabets and numbers during a setting process, the alphanumeric keypads consisting three pages are used: Small letters, Capital letters and Numbers as shown below.

Figure: Small letters.

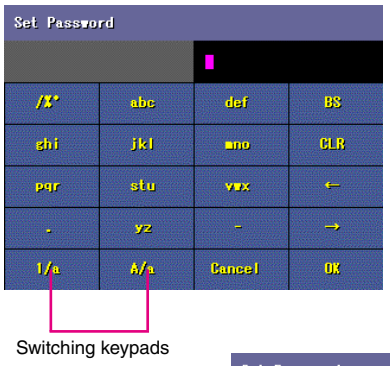
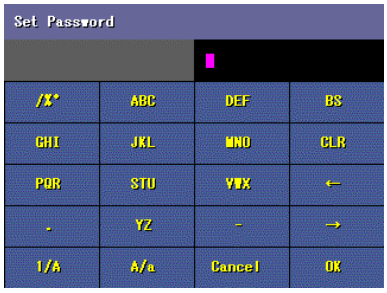


Figure: Capital letters.



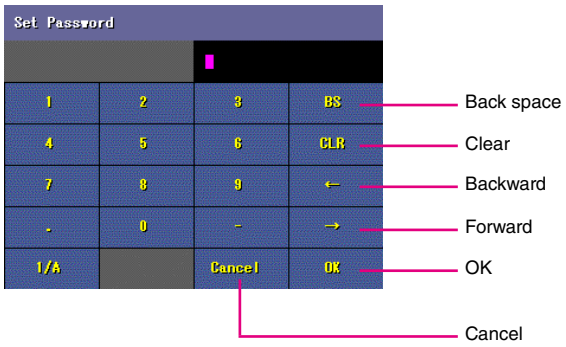


Figure: Numbers.

For example, the key showing 'abc' is used to enter characters 'a,' 'b,' or 'c.' 'a' is entered by touching the key once, 'b' for twice, and 'c' for three times. Other letters can be selected in the same manner. When you need to enter the same character or another character on the same key in series, move the cursor before choosing the second character.

OK and Cancel Keys

When you are satisfied with changes you applied, touch OK to confirm the setting and move to the next window. If you do not want to apply the changes, touch Cancel key.

Page, Next and Previous Keys

When more than one page exist for one menu item, use Page key to switch from one page to another.
Next and Previous keys are used to move between different channels for the same setting item.

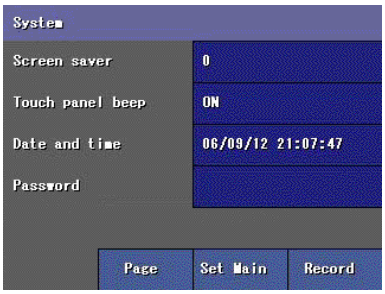
Record Key

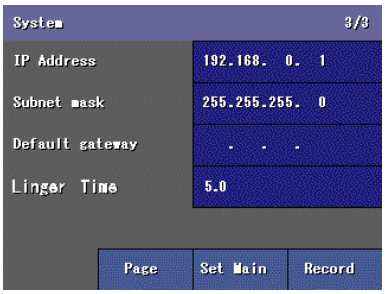
Important !

In order to apply new setting, touch Record key to save and return to one of the Display views (Trend, Overview or Bargraph).

4.1 SYSTEM SETTING

The System setting menu consists of three views as shown below.





Touch Page key to switch between pages.

4.1.1 OPERATING MODE

Touching the current selection of the Operating mode shows selectable options at the bottom of the screen. Choose among the following options.

DEMO	Demonstration mode	You can run the 73VR3100 program without actual signal input for learning, evaluation and demonstration when you choose DEMO.
Normal	Running mode	Choose this option when you connect actual input signals to the 73VR3100.

4.1.2 TEMPERATURE UNIT

Touching the current selection of the Temperature Unit shows selectable options at the bottom of the screen. Choose among the following options.
When 100 msec. storing rate (interval) has been or to be selected, temperature unit setting is invalid since temperature input modules are usable only for 500 msec. or longer intervals.

Centigrade	Centigrade (Celsius)
Fahrenheit	Fahrenheit

4.1.3 START MODE

Touching the current selection of the Start Mode shows selectable options at the bottom of the screen. Choose among the following options.

Cold Start	At a restart, the 73VR3100 stands by showing the initial view.
Hot Start	At a restart, the 73VR3100 automatically starts recording.

4.1.4 DATA STORING FORM

Touching the current selection of the Data Storing Form shows selectable options at the bottom of the screen. Choose among the following options.

Float	Floating point	1 data size: 4 bytes Decimal fraction: max. 4 decimal places (effective number of digits: 6 or 7) Float is to be selected when you need to store data including decimal fractions. The 4-byte-long data is better in data precision but the total storable time in the CF Card becomes shorter compared from Short Int.
Short int	Short integer	Integer data multiplied by 10. The 2-byte-long data is not as precise (one decimal place) as Float type is, but the total storable time in the CF Card is longer.

CAUTION !

Be sure to choose Float form for the R3-PA4A, R3-PA4B, R3-PA8 or R3-PA2 position data in order to store these data correctly.

WHICH FORM TO CHOOSE? -- EXAMPLE

If you have selected Short integer, and when an input range 1 – 5V is converted in an engineering unit range of 0 – 10, the actual converted values are: 0 at 1V input, 0.25 at 1.1V. In this case, the 73VR3100 can store only one decimal place, and '0.25' is saved only as '0.2.' Likewise, the input 1.15V is converted into 0.275 in the engineering unit range, but is saved also as '0.2.' 1.1V and 1.15V inputs make no difference in the short integer form.
Choose Float if you want to make difference between 1.1V and 1.15V.

WARNING !

When the data storing form setting is changed, new data stored in the same data file overwrite previously stored data.

4.1.5 DATA OVERWRITE

You can specify if you want to stop recording or continue recording by overwriting the oldest data when the CF card capacity is full. Detailed explanations on the data file is given in Section 8.1.

OFF	Recording is stopped.
ON	Recording continues by overwriting the oldest data.

4.1.6 SCREEN SAVER

The LCD display's backlight can be turned off when the screen is untouched for a specific time period.
Touching the current selection of the Screen saver replaces the screen with a numeric keypad. The setting can be modified even while recording is in progress.
Enter a desired time in minutes to initiate the screen saver.

Screen saver time setting	Selectable range: 0 to 99 (minutes) The screensaver function is deactivated with the time set to zero (0).

Touching the screen cancels the screen saver mode. The screen saver is automatically cancelled when an alarm is output.

4.1.7 TOUCH PANEL BEEP

You can specify if you want a beep sound or not whenever you touch the screen.
Touching the current selection of the Touch panel beep shows selectable options at the bottom of the screen. The setting can be modified even while recording is in progress.

OFF	Beep sound is off.
ON	Beep sound is on.

4.1.8 DATE AND TIME

Date / time is indicated in the format: YY / MM / DD HH : MM : SS.
Touching the current time index replaces the screen with a numeric keypad. Enter a correct time and touch OK.

CAUTION !
If incorrect date is entered, OK button turns grey and becomes disabled.

WARNING ! STORED DATA MAY BE LOST

Stored data files (data, alarm history and comment history) will be reset (data deleted) when a new recording cycle starts after you have SET BACK the clock (e.g. 10:00:34 to 10:00:00). Save the data in an external device in advance. You may or may not be warned of deleting depending upon the start mode setting:

1. Cold start (manual starting): When you touch Start button, the 73VR3100 compares the internal clock with the time index of the last data entry in the files. If it is behind the clock, a warning message appears on the screen. If you touch OK, the data will be deleted. With the conditional storing modes, they will be deleted when the first recording is triggered.
   If you touch Cancel, the recorder stops without deleting them.
2. Hot start (automatic starting): They will be deleted without warning if the time index of the last data entry is behind the clock at the moment when the first recording is triggered.
3. Remote control (from the 73VRBLD or the MSR128): They will be deleted without warning if the time index of the last data entry is behind the clock at the moment when the first recording is triggered.

If you have set forward the clock, the data will not be deleted.

4.1.9 PASSWORD

Password setting prevents unauthorized access to data displays and changes in the setting. When you have set a password and returns to one of the Display views, the password will be requested every time you touch a control key on the screen.
Once the password lock is released, you can access control keys and move to other views including Config.

Password	Max. 6 alphanumeric characters

The following functions are available without needing a password:
• Switching Pages within the same function view.
• Updating digital displays
• Switching the standard scale and the engineering unit scale
• Zooming in a digital display
The following function is locked by a password.
• Operating Menu buttons

CAUTION !

The password lock function is valid only on the Display view (Trend, Overview or Bargraph). If another view is left open in unlocked state, anyone can change its setting.
If you forgot your password, please contact us.

4.1.10 IP ADDRESS

In order to connect the 73VR3100 to a PC via Ethernet when using the 73VR31BLD (Builder) or the 73VRWV (Data Viewer), set an appropriate IP address.
Touching the current selection of the IP address replaces the screen with a numeric keypad. Enter a desired IP address on the keypad and touch OK.

IP address	Factory default setting: 192.168.0.1

CAUTION !

In order to apply new IP address setting, the 73VR3100 must be restarted. Be sure to return to one of the Display views to save the new setting. All new setting will be lost otherwise.

4.1.11 SUBNET MASK

Touching the current selection of the subnet mask replaces the screen with a numeric keypad. Enter a desired value on the keypad and touch OK.

Subnet mask	Factory default setting: 255.255.255.0

CAUTION !

In order to apply new subnet mask setting, the 73VR3100 must be restarted. Be sure to return to one of the Display views to save the new setting. All new setting will be lost otherwise.
Consult your network administrator for subnet mask.

4.1.12 DEFAULT GATEWAY

Touching the current selection of the default gateway replaces the screen with a numeric keypad. Enter a desired value on the keypad and touch OK.

Default gateway	Factory default setting: None

CAUTION !

In order to apply new default gateway setting, the 73VR3100 must be restarted. Be sure to return to one of the Display views to save the new setting. All new setting will be lost otherwise.
Consult your network administrator for default gateway.

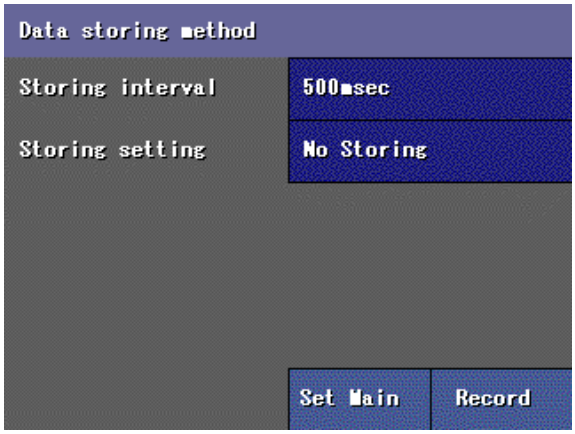
4.1.13 LINGER TIME

TCP Socket is closed after no communication is detected for a preset Linger Time. This setting is used when connecting to a host PC via Modbus/TCP.
Touching the current selection of the linger time replaces the screen with a numeric keypad. Enter a desired value on the keypad and touch OK.

Linger time	0.0 to 3000.0 seconds (100 msec. increments)

4.2 DATA STORING METHOD

The initial view for the Data storing method setting is as shown below.



4.2.1 STORING INTERVAL

The data is stored in time intervals preset as the Storing interval.
Touching the current selection of the Storing interval shows selectable options at the bottom of the screen. Choose among the following options:

20msec	20 milliseconds
100msec	100 milliseconds
500msec	500 milliseconds
1sec	1 second
2sec	2 seconds
5sec	5 seconds
10sec	10 seconds
1min	1 minute
10min	10 minutes

Total recording time in a CF Card depends upon the storing interval selection. Selecting greater storing interval allows longer recording time, though the data are more thinned, which may jeopardize the data accuracy.

WARNING !

When the storing interval setting is changed, previously stored data are overwritten with new data.

4.2.2 STORING SETTING

Five storing methods are selectable.
Touching the current selection of the Storing interval shows selectable options at the bottom of the screen. Choose among the following options. For the F value calculation, choose 500 milliseconds:

No storing	No recording	Data is plotted on the chart or displayed on the digital meter or bargraph, but no data is stored in the CF Card. Alarm is output and alarm history is recorded. Comment is not recorded.
Normal	Normal storing mode	Recording is manually initiated and stopped. Data is continuously stored while the recording is on.
Remote trigger	Remote trigger recording mode	Data is automatically recorded while the external trigger condition (analog or discrete input) is true. (See 4.2.3)*1
Event recording	Event recording mode	The 73VR3100 detects an external event by trigger signal, and stores preset number of samples (max. 1200 respectively) before and after the moment of event. (See 4.2.4)*1
Time specified	Store at defined time mode	Recording is automatically initiated and stopped at predefined time. (See 4.2.5)*1

*1. Irrespective of the status after start, alarm output and alarm history recording are performed. Comment is displayed and recorded only during recording.

WARNING !

During stopped: Data recording is not performed but view is displayed. Alarm is not output; alarm history and comment history recording is not performed.

4.2.3 REMOTE TRIGGER RECORDING

In the remote trigger recording mode, data is automatically stored while the external trigger condition (analog or discrete input) is true.
With an analog trigger, the signal are continuously compared with a preset threshold, and the 73VR3100 starts and stops recording when it is in a pre-determined condition (higher or lower than the threshold).
With a discrete trigger, the signal logic state is continuously monitored, and the 73VR3100 starts and stops recording when it is turned to a pre-determined state (ON or OFF).

■ Trigger Conditions for Analog

Value > Threshold	Data is stored while the trigger input signal value is higher than the threshold setpoint.
Value < Threshold	Data is stored while the trigger input signal value is lower than the threshold setpoint.
Value ≥ Threshold	Data is stored while the trigger input signal value is equal to or higher than the threshold setpoint.
Value ≤ Threshold	Data is stored while the trigger input signal value is equal to or lower than the threshold setpoint.

■ Trigger Conditions for Discrete

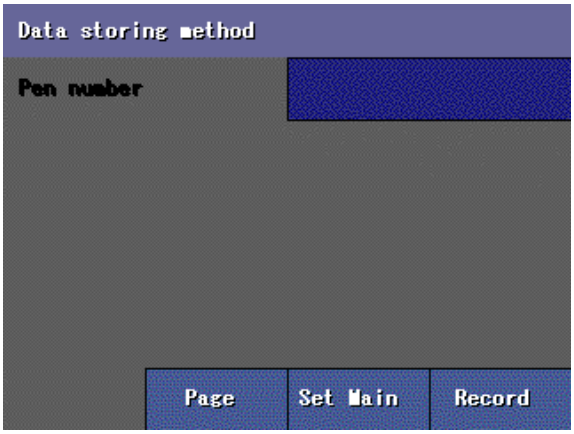
ON	Data is stored while the trigger input signal logic is ON.
OFF	Data is stored while the trigger input signal logic is OFF.

CAUTION !

If you touch Record button while the trigger condition is true, no recording starts until it turns true for a next time.

HOW TO SET THE REMOTE TRIGGER RECORDING

1. Storing setting: Select Remote trigger as explained in 4.2.2. Choosing the Remote trigger on the Data storing method view changes the subsequent menu items to those suitable for the remote trigger recording mode.



2. Discrete / Analog: Choose a type of trigger signal.

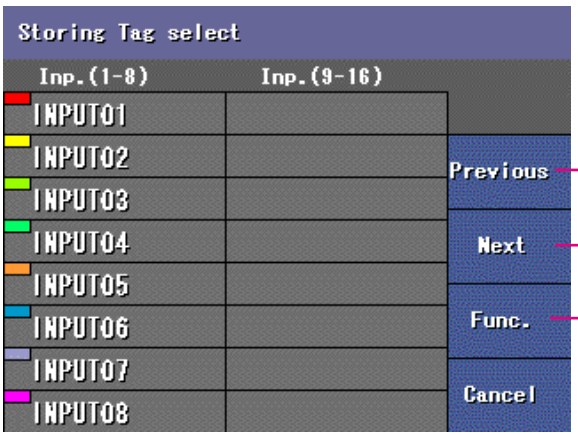
Discrete	Contact signal trigger	A discrete signal triggers recording.
Analog	Analog signal trigger	An analog signal triggers recording.

3. Threshold: For analog signals, set a threshold in an engineering unit value.

Threshold	Engineering unit value. Max. 6 digits including decimal point and minus (–) sign. 'e' is used to set an exponential value.

4. Condition: Choose among the options mentioned above.

5. Pen number: Choose a pen to be designated as trigger. Touching the current selection of Pen number opens the Storing pen select view which listing all available (meaning the enabled pens) tag names.



Previous / Next keys
A page can show max. 16 pens. Touch Previous / Next keys to show other pens.
These keys are unavailable with 20 msec. or 100 msec. storing intervals.

Function key
Switches the window to pens assigned to the operation functions.
This key is replaced with Input key while the window shows Function tag selections.

4.2.4 EVENT RECORDING

In the event recording mode, the 73VR3100 detects an external event by trigger signal, and stores preset number of samples (max. 1200 respectively) before and after the moment of event.
With an analog trigger, the trigger signal is continuously compared with a preset threshold, and the 73VR3100 initiates recording when it is in a pre-determined condition (higher or lower than the threshold).
With a discrete trigger, the signal logic state is continuously monitored, and the 73VR3100 initiates recording when it is turned to a pre-determined state (ON or OFF).

■ Trigger Conditions for Analog

Value > Threshold	Data recording is initiated when the trigger input signal value goes above the threshold setpoint.
Value < Threshold	Data recording is initiated when the trigger input signal value goes below the threshold setpoint.
Value ≥ Threshold	Data recording is initiated when the trigger input signal values is equal to or goes above the threshold setpoint.
Value ≤ Threshold	Data recording is initiated when the trigger input signal values is equal to or goes below the threshold setpoint.

■ Trigger Conditions for Discrete

Up	Rising pulse edge	Data recording is initiated at a rising edge of the trigger input pulse.
Down	Sinking pulse edge	Data recording is initiated at a sinking edge of the trigger input pulse.

CAUTION !
If you touch Record button while the trigger condition is true, no recording starts until it turns true for a next time.

HOW TO SET THE EVENT RECORDING

1. Storing setting: Select Event recording as explained in 4.2.2. Choosing the Event recording on the Data storing method view changes the subsequent menu items to those suitable for the event recording mode.

2. Discrete / Analog: Choose a type of trigger signal.

Discrete	Contact signal trigger	A discrete signal triggers recording.
Analog	Analog signal trigger	An analog signal triggers recording.

3. Threshold: For analog signals, set a threshold in an engineering unit value.

Threshold	Engineering unit value. Max. 6 digits including decimal point and minus (–) sign. 'e' is used to set an exponential value.

4. Condition: Choose among the aforementioned options.
5. Pen number: Choose a pen to be designated as trigger. Touching the current selection of Pen number opens the Storing pen select view (See 4.2.3) which listing all available (meaning the enabled pens) tag names.
6. Pretrigger / Posttrigger: Specify numbers of samples to be stored before (Pretrigger) and after (Posttrigger) the event respectively.

Pretrigger	Number of pretrigger samples	Max. 1200 samples. Pretrigger recording is NOT applicable with the storing intervals set to 2 seconds or longer.
Posttrigger	Number of posttrigger samples	Max. 1200 samples.

4.2.5 STORE AT A DEFINED TIME MODE

In the Store-at-a-Defined Time mode, recording is automatically initiated and stopped at a predefined time. Choose either 'One Time Only' or 'Every Day' under Condition option.

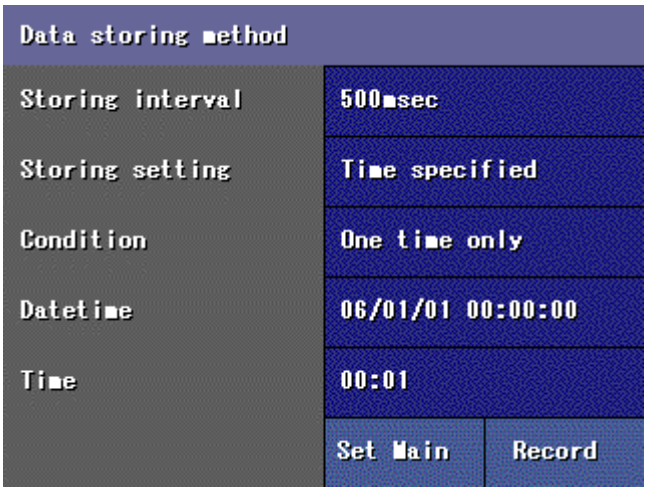
One Time Only	Data is stored once at a predefined time. Specify Year-Month-Day and Hour-Min-Sec. to start the recording and the time duration.
Every Day	The 73VR3100 runs recording once per day at a predefined time. Specify Hour-Min-Sec. to start the recording and the time duration.

CAUTION !

If you touch Record button while in the specified time, no recording starts until a next specified time.

HOW TO SET THE STORE-AT-A-DEFINED-TIME MODE

1. Storing setting: Select Time Specified as explained in 4.2.2. Choosing the Time Specified recording on the Data storing method view changes the subsequent menu items to those suitable for the storing mode.



2. Touching the current selection opens a numeric keypad to enter a new setting. Specify when you want to start recording (Datetime) and the time duration (Time). With Every day setting, 'Date' is not indicated.

Datetime or time	Recording started at	Specify YY/MM/DD HH:MM:SS.
Time	For	Specify HH:MM between 00:00 and 23:59.

4.3 DISPLAY SETTING

The Display setting view is available with the following menu items:

4.3.1 CHART SPEED

Touching the current selection of the Chart speed shows selectable options at the bottom of the screen.
Choose among the options in the table below. The numbers show how many pixels are used for one sample data. For example, if you choose '4,' one sample is plotted 4 pixels further than the previous one, and two sample points are connected to create a trend graph.
The chart speed options may be limited when certain storing intervals are selected. Refer to the table below.

CHART SPEED / STORING INTERVAL	4	1	1/5	1/32	1/160	1/480	1/960
20 msec.	No	Yes	Yes	Yes	No	No	No
100 msec.	Yes	Yes	Yes	Yes	No	No	No
≥ 500 msec.	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The following tables indicates actual time spans expressed on the chart depending upon different storing intervals.

■ Storing Interval 20 msec.

CHART TYPE / CHART SPEED	Perpendicular with digital display	Perpendicular without digital display	Horizontal
1	2.2 seconds	3.8 seconds	5.4 seconds
1/5	11 seconds	19 seconds	27 seconds
1/32	70.4 seconds	121.6 seconds	172.8 seconds

■ Storing Interval 100 msec.

CHART TYPE / CHART SPEED	Perpendicular with digital display	Perpendicular without digital display	Horizontal
4	2.7 seconds	4.7 seconds	6.7 seconds
1	11 seconds	19 seconds	27 seconds
1/5	55 seconds	1 min., 35 sec.	2 min., 15 sec.
1/32	5 min., 52 sec.	10 min., 8 sec.	14 min., 24 sec.

■ **Storing Interval 500 msec. or longer**

CHART SPEED \ CHART TYPE	Perpendicular with digital display	Perpendicular without digital display	Horizontal
4	13.5 seconds	23.5 seconds	33.5 seconds
1	55 seconds	1 min., 35 sec.	2 min., 15 sec.
1/5	4 min., 35 sec.	7 min. 52 sec.	11 min., 15 sec.
1/32	29 min., 20 sec.	50 min., 40 sec.	1 hour, 12 min.
1/160	2 hours, 26 min., 40 sec.	4 hours, 13 min., 20 sec.	6 hours
1/480	7 hours, 20 min.	12 hours, 40 min.	18 hours
1/960	14 hours, 40 min.	1 day, 1 hour, 20 min.	1 day, 12 hours

4.3.2 GRAPH DIRECTION

You can specify if you want to show the chart in the perpendicular direction or the horizontal direction.
Touching the current selection of the Graph direction shows selectable options at the bottom of the screen. The setting can be modified even while recording is in progress. Choose among the following options:

Perpendicular	Perpendicular direction
Horizontal	Horizontal direction

4.3.3 DIGITAL DISPLAY TYPE

Touching the current selection of the Digital display type shows selectable options at the bottom of the screen to specify either to show only the tag name or the value, or both. Choose among the following options:

Tag + Value		The momentary value and the tag name of the data displayed on the screen.
Tag		The tag name of the data displayed on the screen.
Value		The momentary value of the data displayed on the screen.

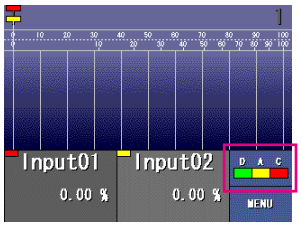
4.3.4 DIGITAL DISPLAY

Touching the current selection of the Digital Display shows selectable options at the bottom of the screen to show or hide the digital display on the data display view. This option can be changed while recording.

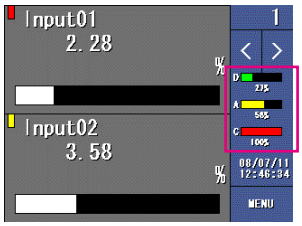
Auto hide	Digital display is automatically hidden in 30 seconds after it appears on the screen. Touch the area of the display to call it up.
Continuous	Digital display remains on the screen.

4.3.5 DATA FILE USED VOLUME SETTING

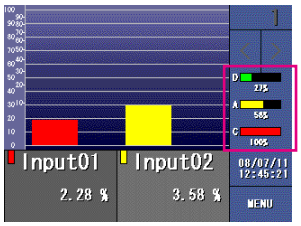
The Trend view, the Overview and the Bargraph view can show a bargraph how much volume in data (D), alarm history (A) and comment history (C) files has been used.



Trend view



Overview



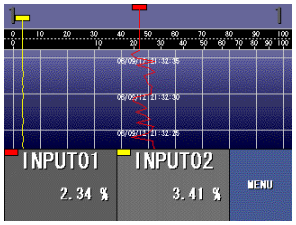
Bargraph

Files are automatically created when the 73VR3100 has started up. 0% is shown when there is no data in the file. Used-up rate is shown in the percentage of the total volume.
These indicators are replaced with those for the backup files created in the internal memory during hot-swapping the CF card or FTP data transfer conducted at once with normal recording.
This option can be changed while recording. For detailed information refer to Section 8.1.

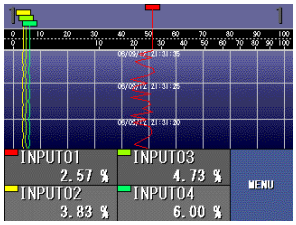
Not shown	Data file used volume bargraph is not shown.
Show	Data file used volume bargraph is shown.

4.3.6 DISPLAY PEN NUMBER

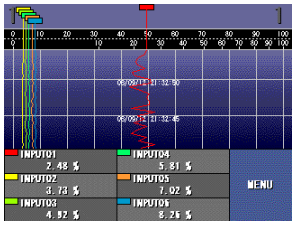
You can specify the number of pens to show on the screen in Trend View and Bargraph View.
Touching the current selection of the Display Pen Number shows selectable options at the bottom of the screen. The setting can be modified even while recording is in progress. Choose among the following options:



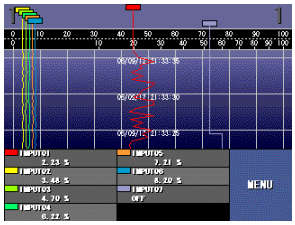
2 pens



4 pens



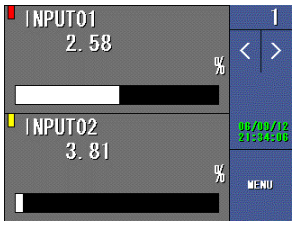
6 pens



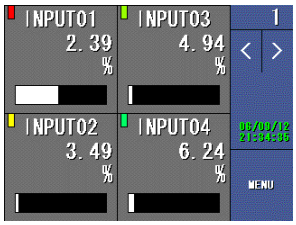
8 pens

4.3.7 DISPLAY PEN NUMBER (OV)

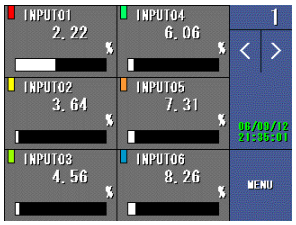
You can specify the number of pens to show on the screen in Overview.
Touching the current selection of the Display Pen Number shows selectable options at the bottom of the screen. The setting can be modified even while recording is in progress. Choose among the following options:



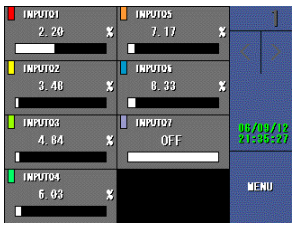
2 pens



4 pens



6 pens



8 pens

16 pens

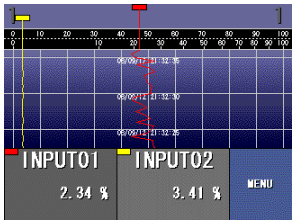
4.3.8 AUTO PEN SWITCHING

You can automatically switch the pens on the enlarged digital display on the screen.

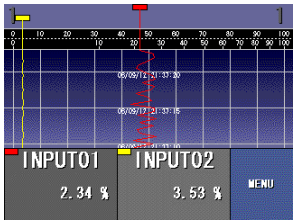
Enable	Once the enlarged digital display is activated on the screen, pens are automatically switched from one to another.
Disable	Digital display remains on the same pen when the enlarged digital display is activated.

4.3.9 CHART COLOR

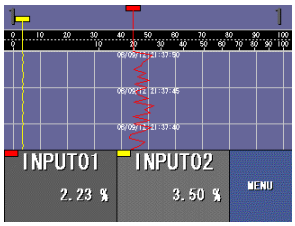
You can specify different types of chart colors.
Touching the current selection of the Chart Color shows selectable options at the bottom of the screen. The setting can be modified even while recording is in progress. Choose among the following options:



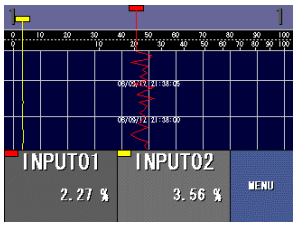
Gradation 1



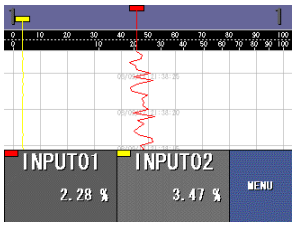
Gradation 2



Plain (Light)



Plain (Dark)



Plain (White)

4.4 ERROR OUTPUT

With the error output setting is enabled, the 73VR3100 outputs an alarm contact at a specified channel of the R3-DC16 R3-DC32A and R3-DAC16A module when an internal bus error continues for 1 minute or longer. Only 1 channel can be specified.

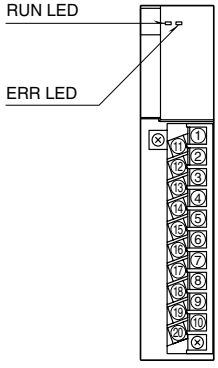
1. Choose Enable or Disable. When Enable is selected, the following selections appears.
2. Output ch.: Specify a channel number where the alarm output is supplied.

Output ch.	Output channel number	Specify within 1 to 256.

3. Contact logic: Specify whether you want to open (OFF) or close (ON) the contact at alarm.

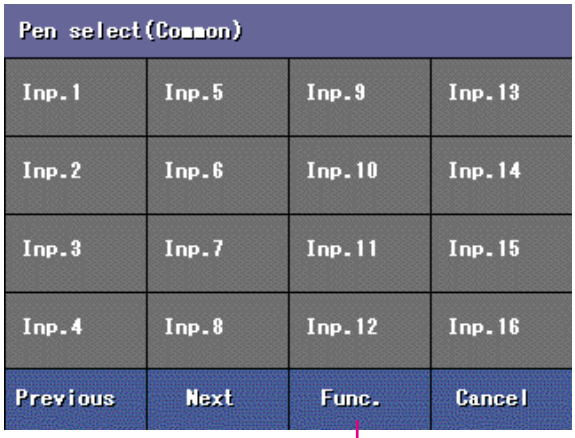
CAUTION !

- The error output setting has priority over the pen setting. If the same output channel is specified for an alarm output of a pen, it is disregarded.
- The error output setting is enabled when Record key is pressed.
- In case of Ver. 5 or lower, an alarm is output while the recorder is stopped, because the internal bus communication is stopped. In case of Ver. 6 or higher, an alarm is not output while the recorder is stopped, because the bus communication is running to confirm a remote command. An alarm is output only when the internal bus communication is stopped more than one minute due to some error.
- The RUN and ERR LEDs on the I/O modules are turned on during an internal bus error.



4.5 PEN SETTING

Three pen setting keys are on the main menu: Pen setting (Common), Pen setting (Function) and Pen setting (Alarm). Touching one of these three keys opens up Pen selector as shown below.



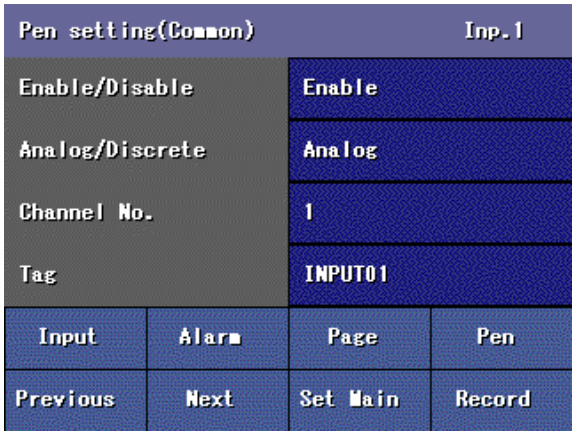
Pen selectors
Open each pen's detailed setting view.

Previous & Next keys
Touch Previous or Next key to move to previous or next group of pens.
With 20 msec. and 100 msec. storing intervals, these keys are not available, as the maximum number of pens are limited to the maximum of 16 pens.

Func. (Function)
Switches the pen selector view to that for Function pens. In Function pen selector view, Input key returns you to the Input pen selector view.

4.5.1 PEN SETTING (COMMON)

Touching Pen setting (Common) and choosing one of the pens opens the Pen setting (Common) view for the selected. It consists of two pages as shown below.



Enable / Disable

Enable / Disable the recording. The pen's input data is stored when this selection is set to Enable.

Analog / Discrete

Analog / Discrete signal. Select pen's signal type. With 20 msec. storing interval, this selection is greyed out as the signal allocation is fixed: Pens 1 through 8 for analog, Pens 9 through 16 for discrete.

Channel No.

Assign the R3 series modules' channel No. to each pen.

• Storing interval 20 msec.

As the signal allocation is fixed for 20 msec. storing interval, there is no need of setting Channel No.

Input Pen	Signal Type	73VR3100 Channel No.
1 through 8	Analog	1 through 8
9 through 16	Discrete	1 through 8

The R3 series modules' channel numbers depend upon the type of analog modules and their data allocation. Please refer to the table below.

Slot 1 Mode	Ch. No.	Slot 2 Mode 1 Ch. No.	Mode 4 Ch. No.	Mode 8 Ch. No.
1	1	2	2...5	2...8
4	1...4	5	5...8	5...8
8	1...8	----	----	----

• Storing Intervals Other Than 20 msec.

The R3 series modules' channel numbers depend upon the module types and their data allocation.
For analog modules, the data allocation mode assigned to each module, is then assigned to consecutive channel No. from Slot 1. For example, when 4 data areas (allocated units) are assigned to Slot No. 1 through 3, 1 data area is assigned to Slot No. 4, the module No. 1 takes Channels from 1 to 4, No. 2 from 5 to 8, No. 3 from 9 to 12, and No. 4 takes 13.

Slot No.	Data Allocation Mode	Channel No.
1	4	1 through 4
2	4	5 through 8
3	4	9 through 12
4	1	13

CAUTION FOR ASSIGNING CHANNEL NUMBERS FOR THE R3-PA4A, R3-PA4B, R3-PA8 & R3-PA2

The R3-PA4A and R3-PA4B takes 8 data areas for 4 input points. The R3-PA8 takes 16 data areas for 8 input points. Set 'Previous Channel + 2' for the second and the following points.

For example, if the R3-PA4A, R3-PA4B or R3-PA8 is located at Slot 1 position, set Channel 1 to the first point, Channel 2 for the second.

The R3-PA2 takes 8 data areas for 2 input points. Each point contains 2 sets of data, the speed and position conversion data, on which channel numbers assignment depends.

Refer to the figure to the right.

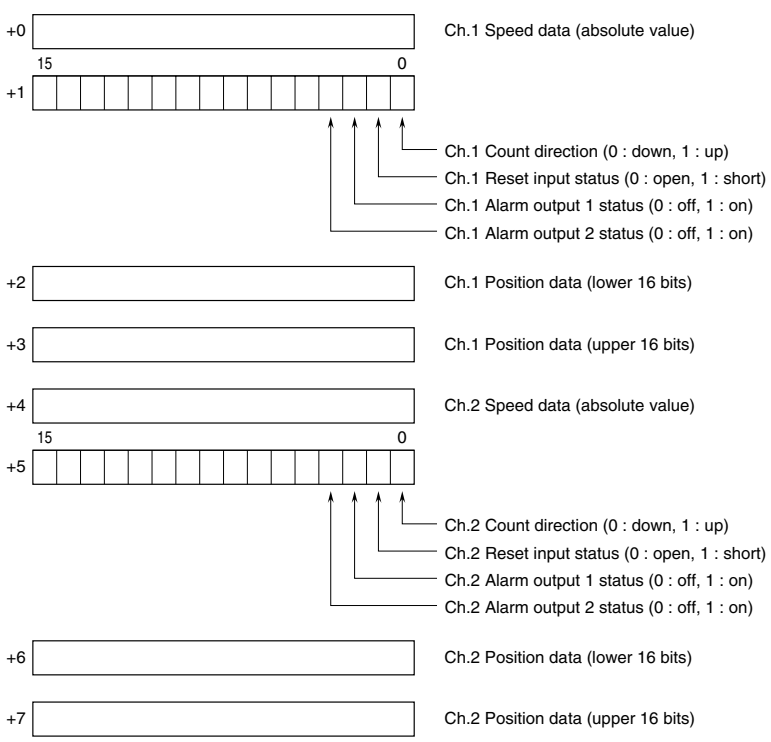


Figure: R3-PA2 data description.

For example, if the R3-PA2 is located at Slot 1 position, channel assignment on the 73VR3100 is as shown below:

R3-PA2S Ch.	Data Type	73VR3100 Channel No.
1	Speed	1
	Position	3
2	Speed	5
	Position	7

For discrete modules, the data allocation mode 1 takes 16 channels (1 x 16), and the mode 4 takes 64 (4 x 16), and the mode 8 and 16 takes automatically 64 data areas. For example, when 4 data areas are assigned to Slot No. 1, and 1 data area to Slot No. 2 through 4, the module No. 1 takes Channels from 1 through 64, No. 2 from 65 to 80, No. 3 from 81 to 96, and No. 4 from 97 to 112.

Slot No.	Data Allocation Mode	Channel No.
1	4	1 through 64
2	1	65 through 80
3	1	81 through 96
4	1	97 through 112

CAUTION FOR ASSIGNING CHANNEL NUMBERS FOR THE R3-WTU

R3-WTU takes 16 data areas (with option code "/D", virtual module's data area is also 16.)
Measurands and assigned word numbers are specified using the R3CON PC Configurator.
Data length (1 or 2-word) can be set up for every channel with the Configurator software R3CON.
The analog type of the channel set as 2-word length is set as "COUNT32."
Set 'Previous Channel + 2' for the second and the following points.

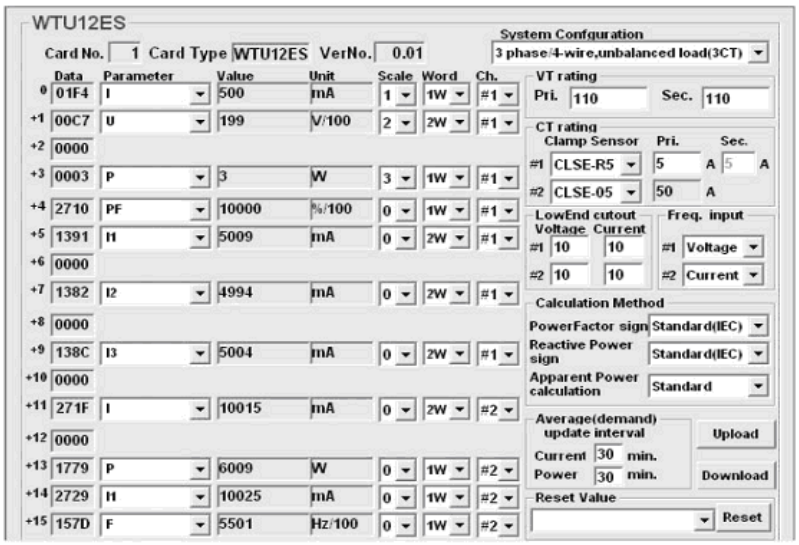


Figure: R3CON setting with R3-WTU (without option code) mounted on the module slot.

The channels indicated with the numbers +1, +5, +7, +9, and +11 on the left of the figure are set with 2-word length.

I.D.	Parameter	Data length	Channel No. set on the 73VR1100
0	I	1	1
+1	U	2	2
+3	P	1	4
+4	PF	1	5
+5	I1	2	6
+7	I2	2	8
+9	I3	2	10
+11	I	2	12
+13	P	1	14
+14	M	1	15
+15	F	1	16

CAUTION FOR ASSIGNING CHANNEL NUMBERS FOR THE R3-WT4, R3-WT4A & R3-WT4B

R3-WT4x data length can be set with the DIP switch.
1-word and 2-word length data mixed setting is also available. (Refer to each specifications and instruction manual for details)
Set 'Previous Channel + 2' for the second and the following points.

Touching the current selection of the Channel No. opens a numeric keypad.

Channel No.	Selectable between 1 through 256

Tag name

Touching the current selection of the Tag name opens an alphanumeric keypad.

Tag name	Max. 8 characters

Unit

Touching the current selection of the Unit opens an alphanumeric keypad.

Unit	Max. 4 characters

Color

Touching the current selection of the Color opens a color palette. Choose a desired color from the palette.

Line thickness

This setting is selectable even during recording.

Normal	Normal line
Thick	Thick line

Decimal place

Decimal places for the digital indicator can be specified. This setting is selectable even during recording.

3	3 decimal places
2	2 decimal places
1	1 decimal place
0	No decimal point

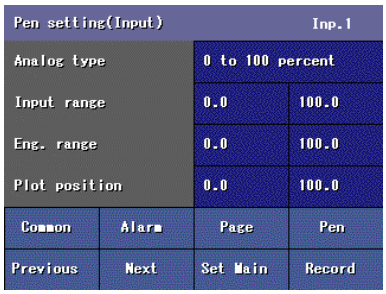
Plot range with decimal place on the scale

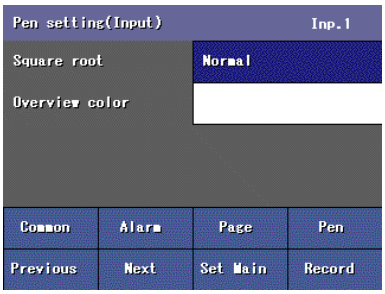
Plot range in an engineering unit can be indicated on the scale in Trend and Bargraph views. For example, when the lower range is set to 0, and the upper range is set to 1000, the scale shows 10 divisions (0, 100, 200, ... 900, 1000). How many decimal places are to be shown depends upon the 'Decimal place' setting. For example, when '2' decimals are selected, the scale shows two decimal places.
For thermocouple and RTD input, only '0' or '1' is selectable.
For Count16 and Count32 input setting, decimal place setting is invalid (Only integer is used).

4.5.2 PEN SETTING (INPUT)

■ ANALOG SETTING

Touching Pen setting (Input) and choosing one of the pens specified as analog channel opens the Pen setting (Input) view for the selected. It consists of three pages as shown below.





Analog type and Input range

With 20 msec. and 100 msec. storing intervals, the type is fixed: 0 to 100 percent.
Selectable signal types and input ranges are as shown in the tables in the following pages. For DC input, choose the upper and lower range values (0% and 100%) within the measurable range. For temperature input, the input range is equal to the measurable range, thus fixed.

Input range	Max. 6 digits including a decimal point and minus sign

MEMO

'e' key on the keypad is used to enter a very large number or a very small number. For example, for '6.2×10^{6},' enter '6.2e6.' For '3.5×10^{-3},' enter '3.5e-3.'

MODEL	I/O TYPE	SELECTIONS	USABLE RANGE	MEASURABLE RANGE
R3-SV4 R3(Y)-SV8 R3(Y)-SV8N R3(Y)-SV16N	DC voltage input	0 to 100 percent	0 – 100%	-10 – 10V
				-5 – 5V
				0 – 10V
				0 – 5V
				1 – 5V
				-1 – 1V *1
				0 – 1V *1
R3-SV4A R3-SV8A	DC voltage input	0 to 100 percent	0 – 100%	-100 – 100mV
				-60 – 60mV
				-50 – 50mV
				0 – 100mV
				0 – 60mV
				0 – 50mV
R3-SV4B R3-SV8B	DC voltage input Wide range	0 to 100 percent	0 – 100%	-30 – 30V
				-15 – 15V
				0 – 30V
				0 – 15V
R3-SV4C R3-SV8C	DC voltage input Wide range, ±50V	0 to 100 percent	0 – 100%	-50 – 50V
				-25 – 25V
				0 – 50V
				0 – 25V
R3-SS4 R3(Y)-SS8 R3(Y)-SS8N R3-SS16N	DC current input	0 to 100 percent	0 – 100%	-20 – 20mA *2
				0 – 20mA *2
				4 – 20mA
R3-DS4 R3-DS4A R3-DS8N	4 – 20mA input Excitation supply	0 to 100 percent	0 – 100%	4 – 20mA
R3-PT4	AC voltage input	0 to 100 percent	0 – 100%	0 – 250V AC
				0 – 50V AC
R3-CT4	CT input	0 to 100 percent	0 – 100%	0 – 5A AC
				0 – 1A AC
R3-CT4A R3-CT8A	AC current input	0 to 100 percent	0 – 100%	CLSA-50 (0 – 500A AC)
				CLSA-30 (0 – 300A AC)
				CLSA-12 (0 – 120A AC)
				CLSA-08 (0 – 80A AC)
R3-CT4B R3-CT8B	AC current input	0 to 100 percent	0 – 100%	CLSB-60 (0 – 600A AC)
				CLSB-40 (0 – 400A AC)
				CLSB-20 (0 – 200A AC)
				CLSB-10 (0 – 100A AC)
				CLSB-05 (0 – 50A AC)
R3-CT4C R3-CT8C	AC current input	0 to 100 percent	0 – 100%	CLSB-R5 (0 – 5A AC)
R3(Y)-PA16	Totalized pulse input	COUNT16	0 – 10000	0 – 10000 *3
R3-PA4	High speed pulse input	COUNT16	0 – 10000	0 – 100 kHz
				0 – 10 kHz
				0 – 1 kHz
				0 – 100 Hz
				0 – 10 Hz
				0 – 1 Hz
				0 – 0.1 Hz
R3-PA4A R3-PA4B R3-PA8	Totalized pulse input	COUNT32	0 – 1e8	0 – 100 000 000

MODEL	I/O TYPE	SELECTIONS	USABLE RANGE	MEASURABLE RANGE
R3-PA2	Encoder pulse input	COUNT16 (speed data)	0 – 10000	0 – 100 kHz 0 – 10 kHz 0 – 1 kHz 0 – 100 Hz 0 – 10 Hz 0 – 1 Hz 0 – 0.1 Hz
		COUNT32 (position data)	0 – 1e8	0 – 100 000 000
R3-WTU	AC current input	0 to 100 percent	0 – 100%	-327.68 – 327.67 *4
		COUNT32	0 – 1e8	0 – 1e8 *4
R3-WT4 R3-WT4A R3-WT4B	AC current input	COUNT16	0 – 10000	0 – 10000
		COUNT32	0 – 1e8	0 – 1e8 *5
R3-MS4	Potentiometer input	0 to 100 percent	0 – 100%	0 – 100%
R3(Y)-MS8				
R3-LC2	Strain gauge input	0 to 100 percent	0 – 100%	0 – 100%
R3-CZ4	Zero-phase current input	0 to 100 percent	0 – 100%	0 – 100%
R3-US4	DC Volt/Potentiometer input	0 to 100 percent	0 – 100%	0 – 100%
	T/C RTD input	US4(Temp.) *6	Same as meas. range	Refer to the specifications sheet

*1. Not usable with the R3(Y)-SV8N, R3-SV16N or R3Y-SV16N.
*2. Not usable with the R3(Y)-SS8N.
*3. Max. count can be modified using the PC Configurator Software (model: R3CON). For the R3(Y)-PA16, do not modify to more than 32767. When the count exceeds 32767, it will be an invalid number. Refer to Users Manual for the R3CON.
*4. Set 32 bit active energy as 1e8 with R3CON. For other value settings refer to the R3-WTU instructions manual. It is required to set up 16 bit data with R3CON being sure it does not surpasses the value of "-32768 to +32767." At active energy count over, it does not return to "0," for this reason, do not use it for pulse accumulation function.
*5. Set 32 bit active energy as 1e8 with R3CON. For other value settings refer to the R3-WT4x instructions manual.
*6. To measure temperature with R3-US4 (T/C or RTD), select "US4(Temp.)" for Analog type in the Pen setting regardless of sensor type. Measurable range is not displayed when "US4(Temp.)" is selected. For measurable range, refer to the specification sheet of R3-US4.

Interface I/O Modules (Gateway)

MODEL	SELECTIONS	USABLE RANGE	MEASURABLE RANGE
R3-GC1 R3-GM1 R3-GE1 R3-GD1 R3-GFL1	0 to 100 percent	0 - 100 %	-327.68 - 327.67
	COUNT16	0 - 10000	-32768 - 32767
	COUNT32*7	0 – 1e8	-2147483648 -2147483647

*7. When COUNT32 is used, two set of 16 bits data for 2 channels are required. Send the lower 16 bits data, the higher 16 bits data in turn, to the input channel of the 73VR3100.
Example: R3-GC1 is installed in slot 1.
RWw0: Lower 16 bits data => Input channel 1 of the 73VR3100
RWw1: Higher 16 bits data => Input channel 2 of the 73VR3100
In above case, select "COUNT32" for Analog type in the Pen setting, and then select Channel 1. Do not configure Channel 2.

MODEL	I/O TYPE	SELECTIONS	USABLE RANGE	MEASURABLE RANGE
R3-TS4 R3-TS8	T/C input	(PR)	0 – 1760	-62 – 3200
		K (CA)	-270 – 1370	-454 – 2498
		E (CRC)	-270 – 1000	-454 – 1832
		J (IC)	-210 – 1200	-346 – 2192
		T (CC)	-270 – 400	-454 – 752
		B (RH)	100 – 1820	212 – 3308
		R	-50 – 1768	-58 – 3214
		S	-50 – 1768	-58 – 3214
		C (WRe 5-26)	0 – 2315	32 – 4199
		N	-270 – 1300	-454 – 2372
		U	-200 – 600	-328 – 1112
		L	-200 – 900	-328 – 1652
		P (Platinel II)	0 – 1395	32 – 2543
R3-RS4 R3(Y)-RS8	RTD input	Pt 100 (JIS '97, IEC)	-200 – 850	-328 – 1562
		Pt 100 (JIS '89)	-200 – 660	-328 – 1220
		JPt 100 (JIS '89)	-200 – 510	-328 – 950
		Pt 50 Ω (JIS '81)	-200 – 649	-328 – 1200
		Ni 100	-80 – 250	-112 – 482
		Cu 10 @25°C	-50 – 250	-58 – 482
		Pt 1000 *8	-200 – 850	-328 – 1562
		Ni 508.4 Ω *8	-50 – 200	-58 – 392
		Cu 50	-50 – 150	-58 – 302
		Ni 1000 *8	-56 – 152	-68 – 305

*8. Not usable with the R3(Y)-RS8.

Eng. Range

Set up physical representation of the upper and lower input range values. This setting determines the momentary value unit displayed on the digital displays while recording. For a temperature input, this setting is greyed out.

Eng. range	Max. 6 digits including a decimal point and minus sign

MEMO

'e' key on the keypad is used to enter a very large number or a very small number. For example, for '6.2 x 10^6,' enter '6.2e6.' For '3.5 x 10^{-3},' enter '3.5e-3.'

Plot position

Determines the display range on the chart when 'Normal' is selected at 'Normal / Log.' Log's detailed setting including the display range is conducted in the Exp. scale. The plot position setting is effective on the Trend view, the Bargraph view and bargraphs on the Overview.

Set up the upper and lower display range values using the keypad. It is usually the same as the engineering unit range, but is set to a different range when you want to enlarge a part of the range to view details.

Plot position	Max. 6 digits including a decimal and minus sign

For example, if you have a temperature input:

	UNIT	LOWER LIMIT	UPPER LIMIT
Scaled Range	°C	-270	1370
Plotted Range	°C	-270	1370

This is the most common setting. Eng. Range and Plot Position values are the same. Scales are -270°C at the left edge, 1370°C at the right edge of the chart.

	UNIT	LOWER LIMIT	UPPER LIMIT
Scaled Range	°C	-270	1370
Plotted Range	°C	0	1000

This is used when you want to enlarge a particular section of the Eng. Range. The chart is used only for a narrower range of 1000°C, between 0°C at the left edge and 1000°C at the right edge, against the 1640°C full-scale.

The plot range of a particular channel can be reflected on the scale bar (engineering unit scale). For example, if you have a plot range of 0 (lower limit) to 1000 (upper limit), the scale bar shows 0, 100, 200 .... 900, 1000, the full-scale range (0 to 1000) divided by ten.

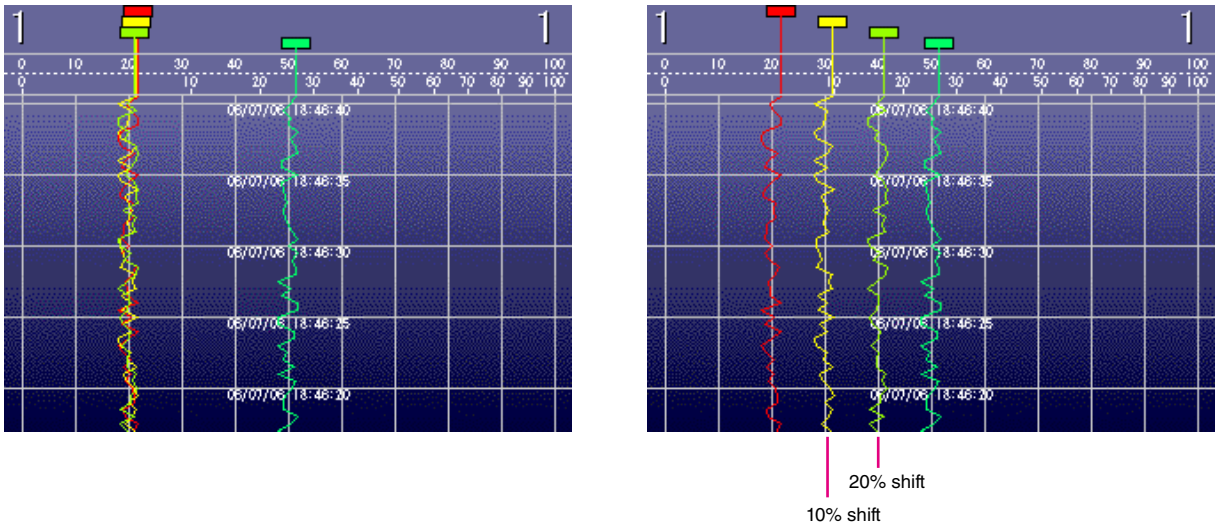
If you need fractions to be included, specify the both ranges with decimal point. For example, if you have a plot range of 0 (lower limit) to 0.20 (upper limit), the scale bar shows 0, 0.02, 0.04 .... 0.18, 0.20. If you need three decimal points, set the upper limit to 0.200. Max. three decimal places can be displayed with perpendicular chart, and max. one decimal place with horizontal chart. In the Bargraph view, only one decimal place can be displayed with perpendicular bars, and max. three decimal places can be displayed with horizontal bars.

MEMO

'e' key on the keypad is used to enter a very large number or a very small number. For example, for '6.2 x 10^6,' enter '6.2e6.' For '3.5 x 10^{-3},' enter '3.5e-3.'

Scale shift

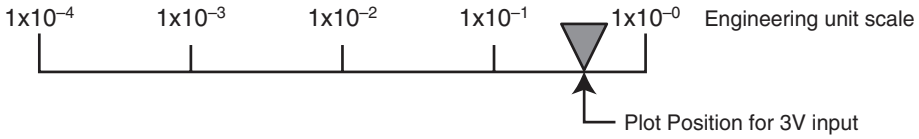
Plot positions can be shifted in parallel on the trend chart. This function is useful when multiple graphs are overlapping. You can separate the plot positions while no other data is changed.



Scale shift	Selectable within -100 to 100%

Normal / Log

When Normal plotting is selected, the plot area is divided equally.
For Logarithmic plotting, specify Logarithmic Exponential Scale and Plot Position Exponent.
Logarithmic 1
Input signal is converted and plotted in direct logarithmic representation. Specify the lower limit of exponent in 'Logarithmic Plot Position Exponent' field within -9 to 8, and how many divisions you wish to have in 'Exponential Scale' among 10, 5, 4, 2, and 1.
[Example]
Input range: 1 to 5V
Scale: $1x10^{-4}$ to $1x10^{-0}$ (0.0001 to 1)
Exponential scale: 4
Logarithmic plot position exponent: -4
With 3V input, the engineering unit value equals to $5.0x10^{-1}$ (0.49995).



The lower plot range value equals to $1x10^{-4}$, the upper value equals to $1x10^{0}$. 3V input, 0.5 in the engineering range equals to $5.0x10^{-1}$, which is plotted as shown above.

Logarithmic 2

Input signal is converted and only the exponential scale is plotted. Specify the lower limit of exponent in 'Logarithmic Plot Position Exponent' field within -9 to 8, and how many divisions you wish to have in 'Exponential Scale' among 10, 5, 4, 2, and 1.

[Example]

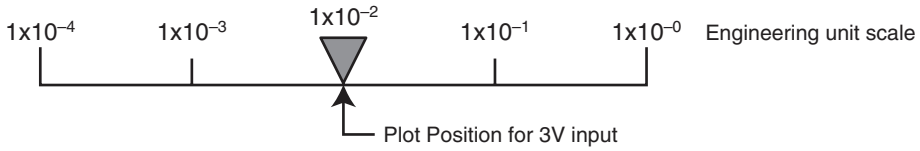
Input range: 1 to 5V

Scale: $1x10^{-4}$ to $1x10^{-0}$ (0.0001 to 1)

Exponential scale: 4

Logarithmic plot position exponent: -4

With 3V input, the engineering unit value equals to $1x10^{-2}$.



The lower plot range value, the same as in the case of Logarithmic 1, equals to $1x10^{-4}$, the upper value equals to $1x10^{0}$. Only the part of exponential scale (-2) of 3V input, $1x10^{-1}$, is plotted as shown above.

Square Root

Input data is square-root-extracted when this setting is enabled.

Overview Color

This option can be changed while recording.

Specify the bargraph color for the pen in the Overview. Use the color palette.

If you have specified alarm-specific colors in Pen (Alarm) Setting, these colors are applied instead of Overview Color.

■ DISCRETE SETTING

OFF Description, ON Description

Short description for ON (1) and OFF (0) status can be specified.

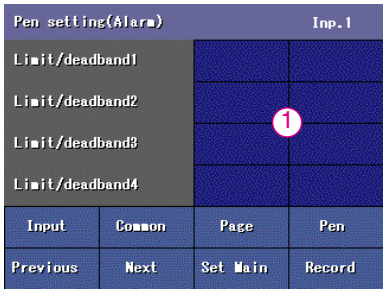
OFF description	Max. 5 characters
ON description	Max. 5 characters

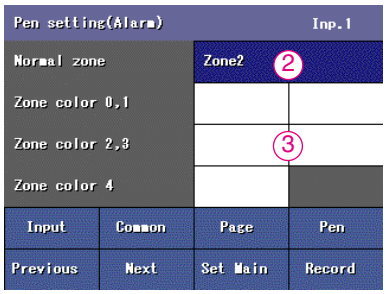
4.5.3 PEN SETTING (ALARM)

■ ANALOG ALARM

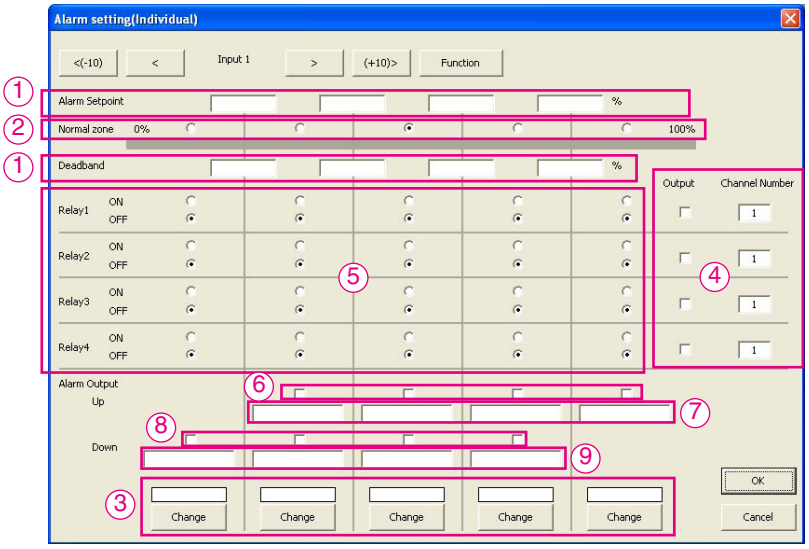
Touching Pen setting (Alarm) and choosing one of the pens specified as analog channel opens the Pen setting (Input) view for the selected. It consists of eight pages as shown below. The 73VR31BLD Alarm Setting Dialog Box is also shown in order to help you understand each parameter's functions. Corresponding parameters are marked with the same numbers.

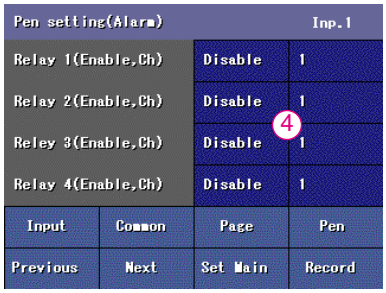
These options can be changed while recording.

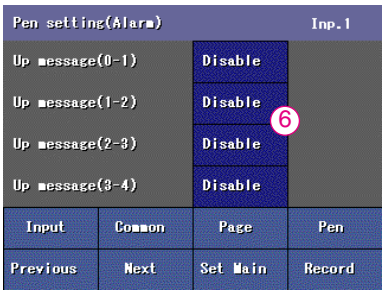


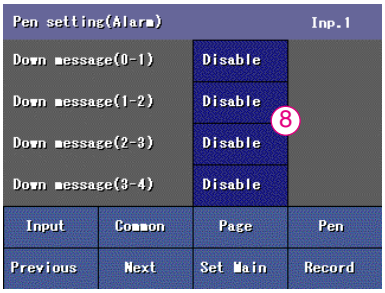


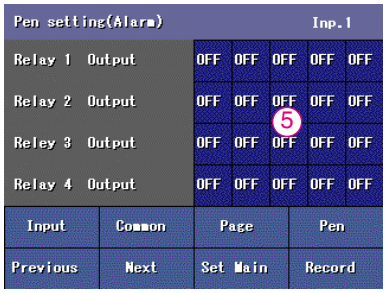
73VR31BLD Alarm Setting Dialog Box

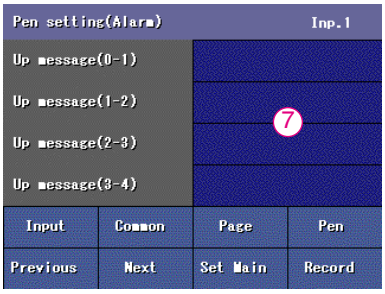


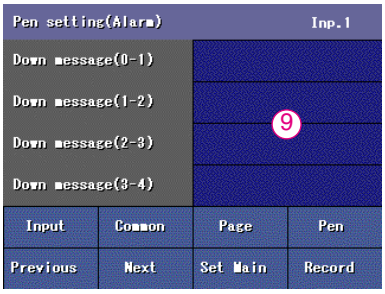












Limit (Alarm Setpoint), Deadband (1)

Specify up to 4 setpoints in engineering unit within the Input Range. Alarms are reset when the signal goes out of the alarm zone by the preset deadband values.

If you set only “High” and “Low” setpoints, they must be set immediately next to the “Normal” zone.

Deadband is used to avoid the alarm ON and OFF quickly and repeatedly around the setpoint when the input signal changes that way. The alarm, once triggered, does not reset until the signal passes the point by the preset deadband.

Limit / Deadband	Max. 6 digits including a decimal point and minus sign

Normal Zone (2)

Specify the zone of normal status. When the input signal is out of this zone, the alarm indicator of the pen flashes. Choose among Zone 0, 1, 2, 3 and 4.

Zone Color (3)

You can apply specific colors to represent each zone divided by the limits for use in the Display views. Touch the current selection and use the color palette.

Relay 1 to 4 (Enable, Ch.) (4)

Alarm contact outputs can be provided to the R3-DC16, R3-DC32A and R3-DAC16A.

Choose Enable to activate an relay output, and specify the channel No. of the R3-DC16, R3-DC32A and R3-DAC16A to the right field.

Channel No.	Selectable from 1 to 256

NOTE

This setting is not available for the storing intervals 20 msec. and 100 msec. because no discrete output modules can be mounted in these settings.

Relay 1 to 4 Output (5)

Specify the zone(s) in which you wish the contact to be turned on or off.

The keys are arranged from the left to right in the order of Zone numbers (Zone 0 for the leftmost key, Zone 4 for the rightmost key).

NOTE

This setting is not available for the storing intervals 20 msec. and 100 msec. because no discrete output modules can be mounted in these settings.

Alarm Message (6)...(9)

Set Enable to the thresholds where Messages are to be displayed on the Alarm History.

Up messages appear when the signal goes across an alarm setpoint upward. For example, Up message (0-1) is sent when the signal goes over the Limit 1. Down messages appear when the signal goes across an alarm setpoint downward. For example, Down message (0-1) is sent when the signal goes below the Limit 1. Message contents up to 10 characters respectively for Up and Down.

Caution !

Number of alarm event per 1 sampling

- When alarm event occurs per every sampling, be sure to set not more than 8 points for the number of alarm event per 1 sampling.

■ DISCRETE ALARM

OFF / ON Output, Delay

Alarm contact outputs can be provided to the R3-DC16, R3-DC32A and R3-DAC16A.
Choose Enable to activate an relay output for respective signal status (input ON and OFF).
In order to eliminate noise interference, you can specify the time (seconds) to wait to apply change in signal status.

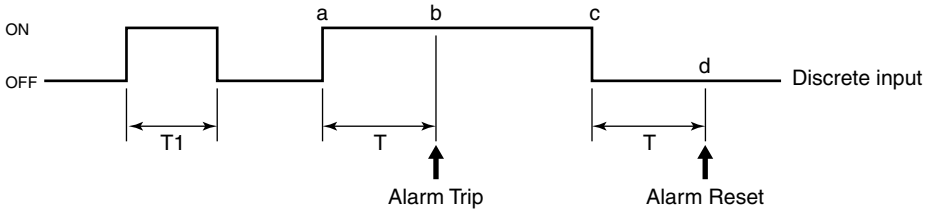
Delay	Selectable from 1 to 99 seconds

NOTE

This setting is not available for the storing intervals 20 msec. and 100 msec. because no discrete output modules can be mounted in these settings.

Caution !

Alarm is Not triggered if 'true' contact status lasts shorter than the delay time.
[Example] ON Alarm



- ON status for T1 time duration does not trigger alarm because the duration is shorter than the delay time.
- 'True' contact status starts at (a) point but an alarm is triggered only at (b) point, after the delay time T has been elapsed.
- 'False' contact status starts at (c) point but the alarm is reset only at (c) point, after the delay time T has been elapsed.

Normal State

You can specify which contact status from the trigger input terminal should be considered 'Normal.' For example, if you set 'OFF' to be normal, ON contact status triggers alarm, and it is indicated on the recorder view.

ON/OFF	Both ON and OFF are normal.
ON	ON is normal.
OFF	OFF is normal.

OFF Color, ON Color

You can apply specific colors to represent each ON and OFF status for use in the Display views. Touch the current selection and use the color palette.

OFF / ON Alarm, Message

Specify the channel No. of the R3-DC16, R3-DC32A and R3-DAC16A to the left field.

Channel No.	Selectable from 1 to 256

NOTE

This setting is not available for the storing intervals 20 msec. and 100 msec. because no discrete output modules can be mounted in these settings.

Set Enable to the status for which Messages are to be displayed on Alarm History.

OFF Message, ON Message

These messages are used for Overview and Alarm History. Message contents up to 10 characters respectively for Up and Down.

Caution !

Number of alarm event per 1 sampling

- When alarm event occurs per every sampling, be sure to set not more than 8 points for the number of alarm event per 1 sampling.

4.6 PENS ASSIGNED TO FUNCTIONS

4.6.1 PEN SETTING (COMMON)

Touching Pen setting (Common) and choosing one of the Function pens opens the Pen setting (Common) view for the selected. It consists of two pages as shown below.

Enable / Disable

Enable / Disable the recording. The pen's function data is stored when this selection is set to Enable.

Analog / Discrete

Analog / Discrete signal. Select the function's signal type. Select Analog for arithmetic functions and filters. Select Discrete for logic functions.

Channel No.

Channel No. setting is not available for Function pens.

Tag name

Touching the current selection of the Tag name opens an alphanumeric keypad.

Tag name	Max. 8 characters

Unit

Touching the current selection of the Unit opens an alphanumeric keypad.

Unit	Max. 4 characters

Color

Touching the current selection of the Color opens a color palette. Choose a desired color from the palette.

Line thickness

This setting is selectable even during recording.

Normal	Normal line
Thick	Thick line

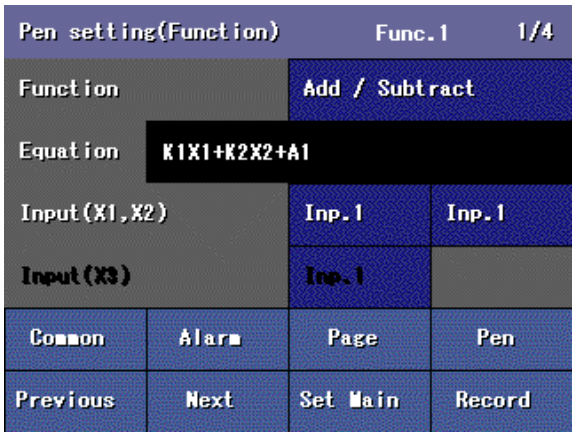
Decimal place

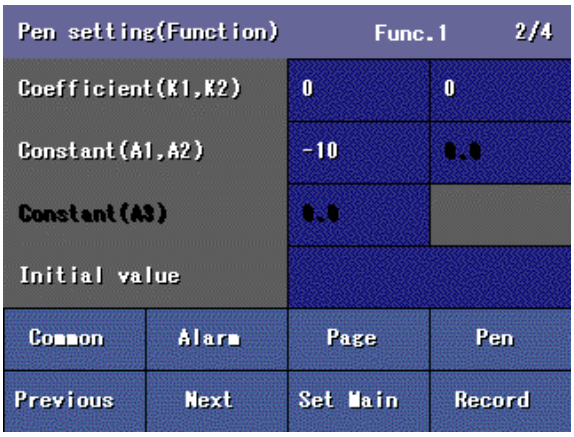
Decimal places for the digital indicator can be specified.

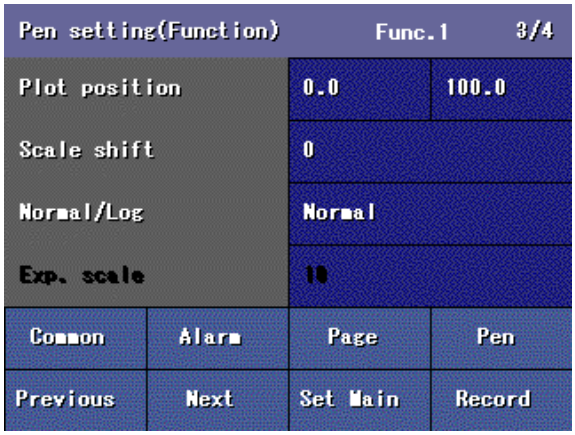
3	3 decimal places
2	2 decimal places
1	1 decimal place
0	No decimal point

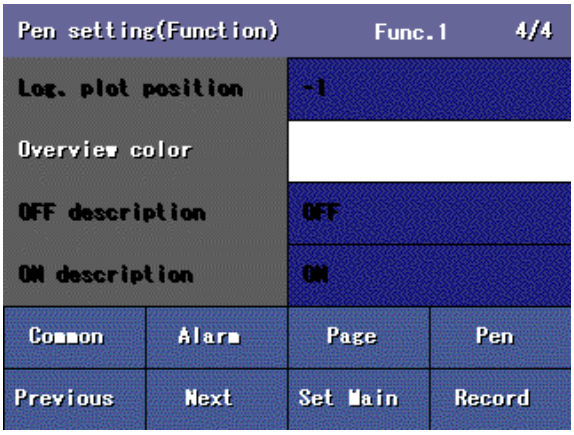
4.6.2 PEN SETTING (FUNCTION)

Touching Pen setting (Function) and choosing one of the Function pens opens the Pen setting (Function) view for the selected. It consists of multiple pages as shown below.









Function

Choosing one of the available functions will change the rest of the parameter list to match the selected function.

Add / Subtract	Addition / Subtraction
Multiplication	Multiplication
Division	Division
Moving average	Moving average filter
First order lag	First order lag filter
Square root	Square root extraction
Peak hold (max)	Maximum value hold
Peak hold (min)	Minimum value hold
Power	Power
Analog accumulation	Analog signal accumulation
Pulse accumulation	Pulse count (difference) accumulation
F value calculation	F value calculation
AND	Logical multiplication
OR	Logical addition (sum)
NOT	Logical negation
XOR	Exclusive disjunction
Anemoscope	Wind direction

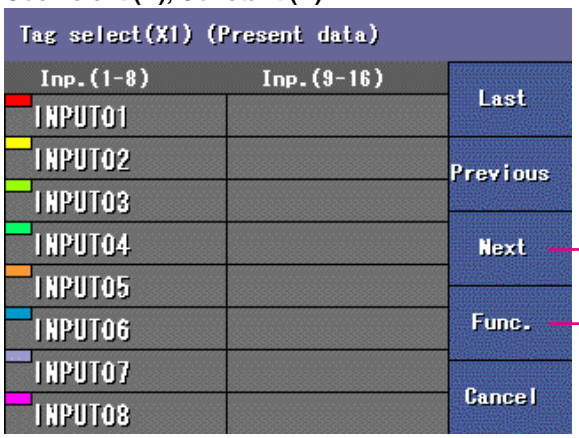
■ ARITHMETIC FUNCTIONS

Input (X)

Touching Inp.1 or Inp.2 opens the Tag name selector view. Select input signals used for the operating function.
If you want to use the previous data sample (last one) or one of the function pens, switch to the respective views and choose. Tag names for previous data samples are indicated with * (asterisk).
If you want to use the previous function pen data sample (last one), first switch to the Tag select (Function) view and then touch Last key.

> Caution !
> Be careful to choose a pen of Not Itself. For example, you cannot choose Function Pen 1 or the last data of Function Pen 1 to be used as X1, X2 or X3 in an equation for Function Pen 1.
> When assigning 'last' data sample to X1, X2 or X3, specify also the initial value. Otherwise no data is recorded for the first operating cycle.

Coefficient (K), Constant (A)



Touching the current selection of these parameters opens a numeric keypad. Enter appropriate values.

Coefficient, Constant	Max. 6 digits including a decimal point and minus sign

Initial value

Initial value is used in the function operation cycle as default data sample when 'last' data is specified in an equation. If you do not need, leave the field blank.

Initial value	Max. 6 digits including a decimal point and minus sign

Plot position

Determines the display range on the chart when 'Normal' is selected at 'Normal / Log.' Log's detailed setting including the display range is conducted in the Exp. scale. Refer to Section 4.5.2.

Scale shift

Plot positions can be shifted in parallel on the trend chart. This function is useful when multiple graphs are overlapping. You can separate the plot positions while no other data is changed. Refer to Section 4.5.2.

Normal / Log

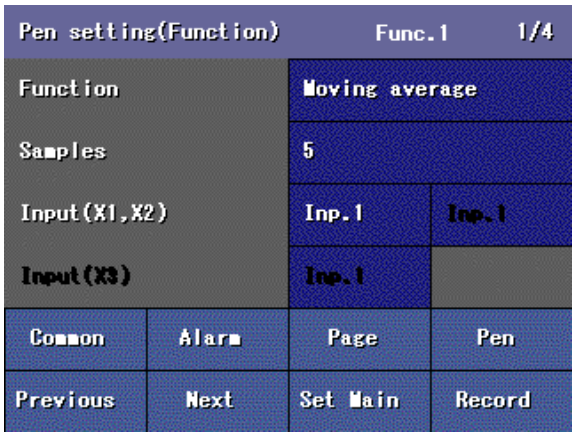
When Normal plotting is selected, the plot area is divided equally. When Logarithmic is selected, the plot area is divided in specified scale of exponents of 10.
For Logarithmic plotting, specify the lower limit of exponent in 'Logarithmic Plot Position Exponent' field within -9 to 8, and how many divisions you wish to have in 'Exponential Scale' among 10, 5, 4, 2, and 1. Refer to Section 4.5.2.

Overview Color

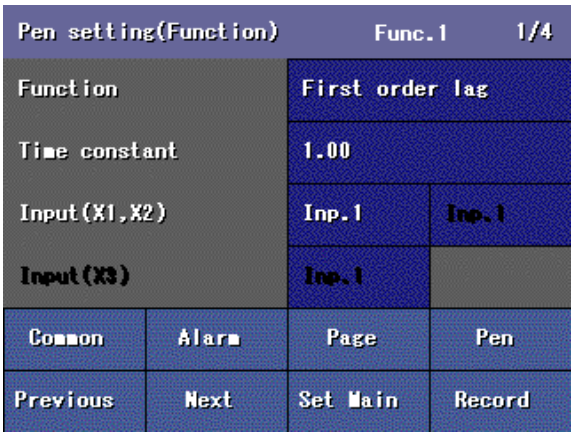
This option can be changed while recording.
Specify the bargraph color for the pen in the Overview. Use the color palette.

■ FILTER FUNCTIONS

Touching Pen setting (Func) and choosing one of the pens specified as analog channel opens the Pen setting (Func) view for the selected. Filter function views are as follows:



Moving average.



First order lag filter.

Moving Average

Specify number of samples used for the moving average operation and an input channel. Touching Inp.1 opens the Tag name selector view. Select an input signal used for the operating function.

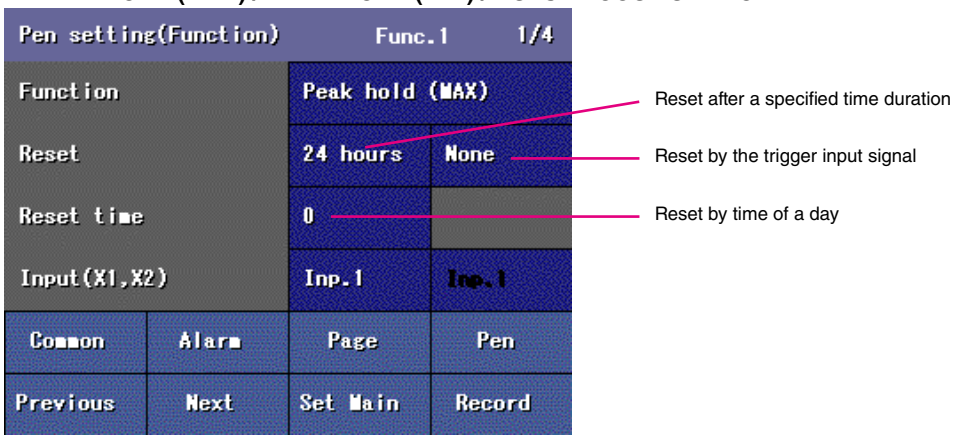
Samples	Specify between 2 and 16

First Order Lag Filter

Specify a time constant and an input channel. Touching Inp.1 opens the Tag name selector view. Select an input signal used for the operating function.

Time constant	Specify between 0.00 and 100.00 seconds. Max. 2 decimal places.

■ PEAK HOLD (MAX) / PEAK HOLD (MIN) / PULSE ACCUMULATION



Input (X1)

Touching Inp.1 opens the Tag name selector view. Select an input signal used for the operating function.

Caution !

Be careful to choose a pen of Not Itself. For example, you cannot choose Function Pen 1 or the last data of Function Pen 1 to be used in an equation for Function Pen 1.

Reset / Reset time

In order to reset the hold function, 'Time' or 'Trigger input' can be specified. Touch the left 'None' key for 'Time,' the right key for 'Trigger input' conditions. If you leave the setting to 'None,' the data is reset only when 'Start' key is touched. When '24 hours' is specified, the reset time must be specified. Touch the current time specification and a numeric keypad appears on the screen.

• 'Reset by time' selections

None	No resetting by time. Reset only when 'Start' key is touched.
30 min.	Reset at 0 minute and 30 minutes every hour
1 hour	Reset at 0 minute every hour
2 hours	Reset at 0 minute every even hours (0, 2, 4,...)
3 hours	Reset at 0 minute every three hours (0, 3, 6,...)
4 hours	Reset at 0 minute every four hours (0, 4, 8,...)
6 hours	Reset at 0 minute every six hours (0, 6, 12, 18)
12 hours	Reset at 0 minute every twelve hours (0, 12)
24 hours	Reset at a specified time of a day

• 'Reset by trigger input' selections

None	No resetting by trigger input. Reset only when 'Start' key is touched.
Rise	Reset when the trigger input turns from OFF to ON.
Sink	Reset when the trigger input turns from ON to OFF.
ON	Reset while the trigger input is ON.
OFF	Reset while the trigger input if OFF.

■ POWER FUNCTIONS

Input (X1)

Touching Inp.1 opens the Tag name selector view. Select input signal used for the operating function.

Caution !
Be careful to choose a pen of Not Itself. For example, you cannot choose Function Pen 1 or the last data of Function Pen 1 to be used in an equation for Function Pen 1.

Constant (A1)

Specify the exponent.

Constant	Exponent ±99.99

Caution !

(1) The power function results in error when:

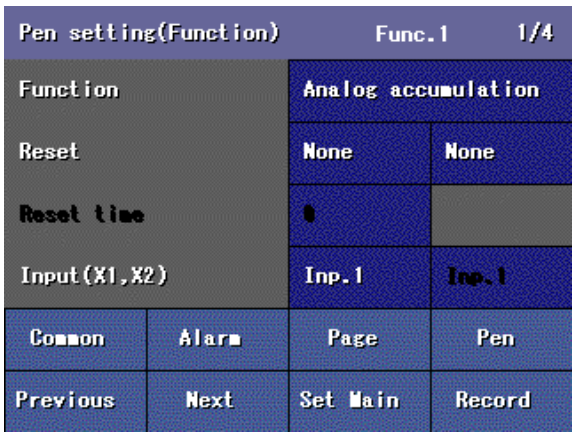
$X1 = 0, A1 < 0$ or

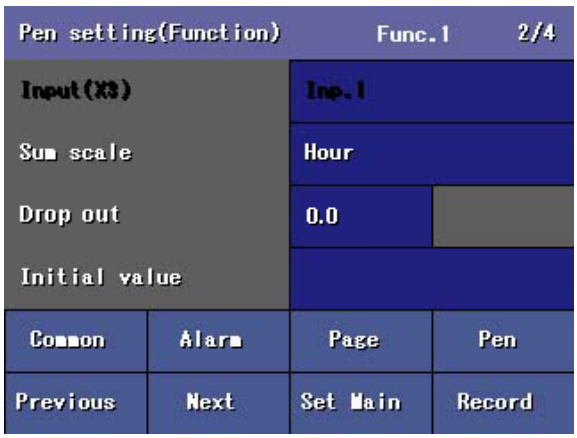
$X1 < 0, A1 \neq$ integer

'ERR' is indicated on the screen.

(2) The power function results in overrange when the results exceeds the range from '$-1x10^{10}$' to '$1x10^{10}$.' No data is displayed on the screen, and CSV data cells are blank.

■ **ANALOG ACCUMULATION**





Input (X1)

Touching Inp.1 opens the Tag name selector view. Select an input signal used for the operating function.

Caution !

Be careful to choose a pen of Not Itself. For example, you cannot choose Function Pen 1 or the last data of Function Pen 1 to be used in an equation for Function Pen 1.

Reset / Reset time

In order to reset the totalized value, 'Time' or 'Trigger input' can be specified. Touch the left 'None' key for 'Time,' the right key for 'Trigger input' conditions. If you leave the setting to 'None,' the data is reset only when 'Start' key is touched. When '24 hours' is specified, the reset time must be specified. Touch the current time specification and a numeric keypad appears on the screen.
Setting "succession", analog count is performed continuously. ("Succession" is available from Ver 6.03.09)
For details of the selections, please refer to 'Peak Hold' function.

Sum scale

Input X1, such as flow signals, could be values per time unit (/day, /hour, /min, /sec). In order to accurately totalize this type of signals, specify the time unit.

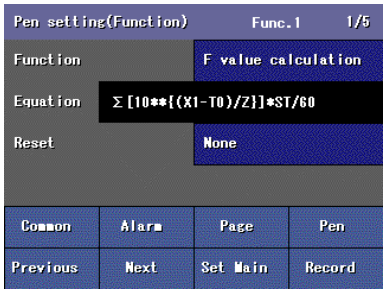
None	Simple accumulation of the input data
Sec	Per second
Min	Per minute
Hour	Per hour
Day	Per day

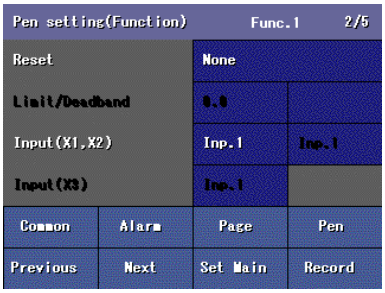
Drop out

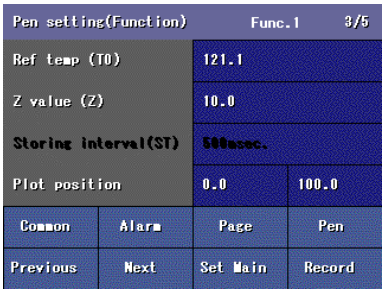
Touching the number next to Drop out opens a numeric keypad. Enter appropriate values.

Drop out	Max. 6 digits positive number including a decimal point.

■ F VALUE CALCULATION







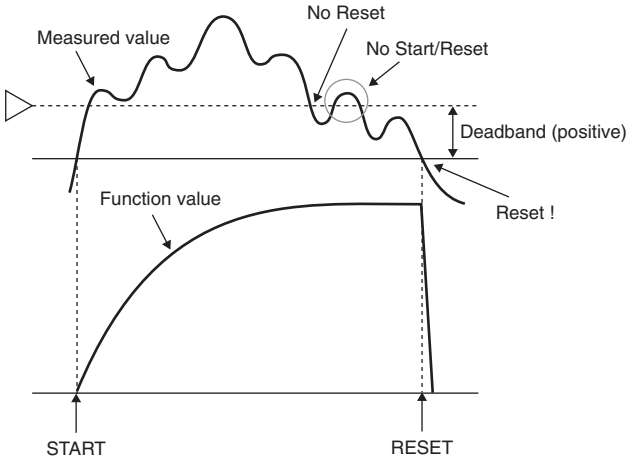
Reset

In order to reset the totalized value, 'Trigger input' and/or 'Analog input' can be specified. Touch the 'None' key in Page 1/5 for 'Trigger,' the one in Page 2/5 for 'Analog input' conditions. If you leave the setting to 'None,' the data is reset only when 'Start' key is touched.
For details of the trigger input selections, please refer to 'Peak Hold' function.
For the analog input resetting, choose one of the following conditions:

None	No resetting by analog input. Reset only when 'Start' key is touched.
Value < Limit	Reset when the measured value is lower than the limit value.
Value ≤ Limit	Reset when the measured value is equal to or lower than the limit value.

Limit / Deadband

Specify Limit value used to reset the function result. Deadband is used to prevent repeating of F value calculation execution and resetting when the measured value stays unstable close to the limit value.
A positive deadband is used to reset at 'Limit – Deadband,' while a negative deadband is used to reset at 'Limit + Deadband.'
By choosing an wide deadband, you can set different values for set and reset conditions.



Input (X1)

Touching Inp.1 opens the Tag name selector view. Select an input signal used for the operating function.

Input (X3)

Touching Inp.1 opens the Tag name selector view. Select an input signal used as resetting limit.

Ref. Temp (T0), Z value (Z)

Ref. Temp, Z value	Max. 6 digits including a decimal point and minus sign

Caution !
100 msec. storing interval is not usable with F value calculation.
Be careful to choose a pen of Not Itself. For example, you cannot choose Function Pen 1 or the X2 in an equation for Function Pen 1.
'e' can be used to input an exponential value such as '1e9.' Entering 'e' in any other way (e.g. '1ee') will not be recognized as a numeral.

■ LOGIC FUNCTIONS

Function

Choosing one of the available functions will change the rest of the parameter list to match the selected function.

Input (X1, X2)

Touching Inp.1 or Inp.2 opens the Tag name selector view. Select input signals used for the operating function.

> Caution !
>
> Be careful to choose a pen of Not Itself. For example, you cannot choose Function Pen 1 or the last data of Function Pen 1 to be used in an equation for Function Pen 1.

OFF Description, ON Description

Short description for ON (1) and OFF (0) status for the operation result can be specified.

OFF description	Max. 5 characters
ON description	Max. 5 characters

■ ANEMOSCOPE

Input (X1)

Touching Inp.1 opens the Tag name selector view. Select input signals used for the operating function.

> Caution !
>
> Be careful to choose a pen of Not Itself. For example, you cannot choose Function Pen 1 or the last data of Function Pen 1 to be used in an equation for Function Pen 1.

4.7 CONFIRMING CHANGES

New setting becomes valid when the display has gone back to one of the Display views by touching Record key If there was any change in the storing rate, the data storing form, and/or the number of enabled pens, the message as shown below appear on the screen.
Touching OK overwrites the previous data file, and touching Cancel return the screen to Display view.

4.8 SETTING UP WITH THE 73VR31BLD

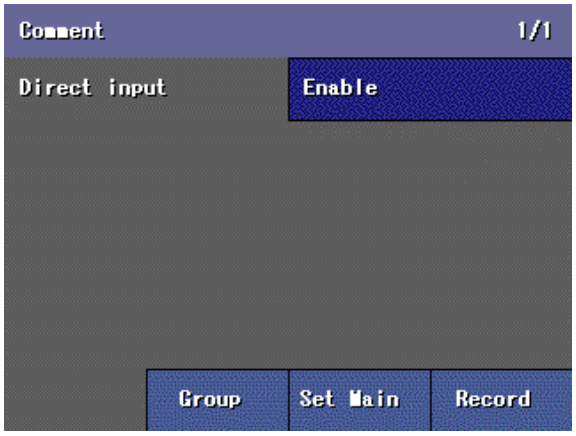
A software configuration created on the 73VR3100 Configuration Builder (model: 73VR31BLD) can be downloaded to the 73VR3100. The configuration set up on the 73VR3100 can be uploaded and displayed on the 73VR31BLD.
In order to apply a new setting stored in the CF Card using the 73VR31BLD, restart the 73VR3100. For detailed information about the 73VR31BLD, please refer to the users manual for the model.

5. ENTERING COMMENTS

You can either enter comments directly on the chart while recording, or preset a library of comments to be indicated on the Trend view.
The maximum of 56 comments categorized in 7 groups (8 comments per group) can be preset. The seventh group is used also for free comment entry during recording. The comments in this group can be modified while recording.

5.1 WRITING COMMENTS DIRECTLY

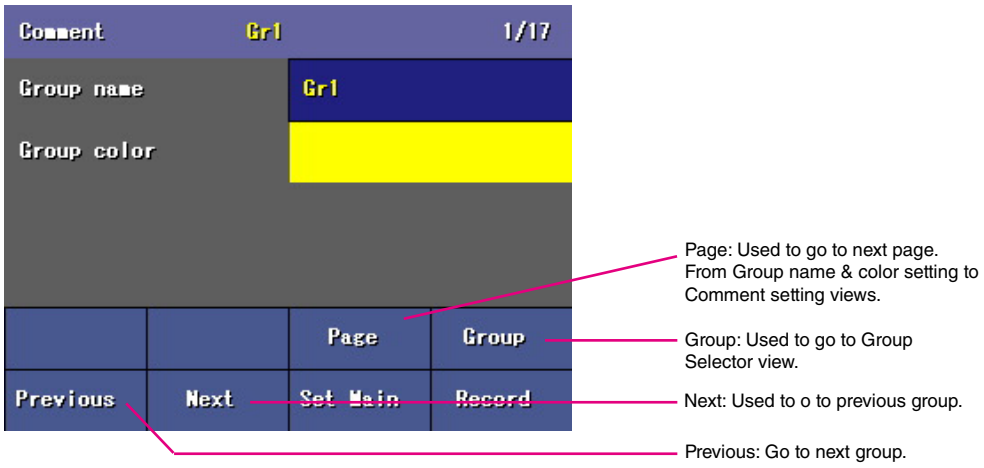
You can directly write comments on the screen while recording via an USB keyboard. These comments are stored in Group 7. When this mode is enabled, other preset comments in Groups 1 through 6 cannot be used.



1. Touch Comment Setting on the Main view.
2. Choose Enable.

5.2 SETTING COMMENT GROUPS

You can assign a specific color to each comment group which can be identified with a specific name. Comments are indicated on the Trend view in this color.



1. Touch Comment Setting on the Main view.
2. Touch Group key.
3. Choose a group.
4. Enter the group name and choose a color.

Group	Max. 10 characters

5.3 SETTING COMMENTS

1. Touch Page button at the bottom of the Group setting view. Turn pages until the screen shows the comment entry view you want to set up.
2. Touch the comment field and enter a comment. Character size is automatically adjusted according to the number of characters and character width (e.g. smaller size when 'w' or 'm' are used than when ' t ' or ' i ' are.)
3. Enable 'Auto Write In' if needed. More explanations are give in the following.
4. Touch Page button to go to another comment entry.

Auto write in

Comments can be automatically written on the chart according to preset conditions. Choose Enable to use this function.

Discrete/Analog

Specify the signal type (analog or discrete) that you want to use to trigger the automatic comment entry.

Threshold

Specify the threshold value for analog trigger signal.

Threshold	Max. 6 digits including a decimal point and minus sign

Condition

For analog trigger signal, the following conditions can be used to trigger the comment entry.

Value > Threshold	The comment is written in when the subject pen signal goes above the analog trigger signal value.
Value < Threshold	The comment is written in when the subject pen signal goes below the analog trigger signal value.
Value ≥ Threshold	The comment is written in when the subject pen signal is equal to or goes above the analog trigger signal value.
Value ≤ Threshold	The comment is written in when the subject pen signal is equal to or goes below the analog trigger signal value.

For discrete trigger signal, the following conditions can be used to trigger the comment entry.

Up	The comment is written in when the subject pen signal turns from OFF to ON.
Down	The comment is written in when the subject pen signal turns from ON to OFF.

Pen number

Choose the pen number for the trigger signal.

Caution !

Number of comment written per 1 sampling

- When writing comment occurs per every sampling, be sure to set not more than 5 points for writing comment per 1 sampling.

6. OPERATING FUNCTIONS

6.1 GENERAL DESCRIPTIONS

Arithmetic and logic functions are performed and stored at the Function pens. For setting up Function pens, please refer to Section 5.5.3.

■ AVAILABLE FUNCTION PENS v.s. STORING INTERVALS

STORING INTERVAL	FUNCTION PEN
20 millisec.	Function pen 1 through 16 (16 channels)
100 millisec.	Function pen 1 through 16 (16 channels)
≥500 millisec.	Function pen 1 through 64 (64 channels)

■ OPERATING FUNCTIONS

CATEGORY	FUNCTION PEN
Arithmetic functions	Addition/Subtraction, Multiplication, Division
Logic functions	AND, OR, XOR, NOT
Math functions	Square root extraction, Power
Accumulation	Analog accumulation (until reset), Pulse accumulation
Filter	Moving average, First order lag
Peak hold	Peak (maximum value) hold, Peak (minimum value) hold
Others	Anemoscope (16 directions)

■ PARAMETERS

- Measuring data: Specify input pens. With analog data, engineering unit data is used for computations. Data sampled in the last cycle can be also used.
- Function data: Specify pen numbers used to store operation function results.
- Coefficients (K1, K2)
- Constants (A1, A2, A3)
- Other parameters: Number of data sampled to be used for the moving average function, Time constant for the first order lag operation.

Caution 1

If 'Last' data is assigned to X1 and X2, the first function data will be missed.

Measuring data and function data are used as numbers without an engineering unit. No adjustment between different scales or engineering units are performed automatically.
The function operations are consecutively performed from the smallest Function Pen No. When you take one or more function data as parameters for another function, be sure of the orders of functions.
The effective number of digits for the calculation result is 6 digits. Function result values exceeding the effective number of digits may have intolerable deviations.

6.2 DETAILED PARAMETER SETTING

6.2.1 ARITHMETIC FUNCTIONS

Addition / Subtractions

K1X1 + K2X2 + A

Specify measured data or function data for X1 and X2 (analog signal only), gains (K1 and K2) and bias (A1).

Multiplication

(K1X1+A1) (K2X2+A2) + A3

Specify measured data or function data for X1 and X2 (analog signal only), gains (K1 and K2) and biases (A1, A2 and A3).

Division

(K1X1+A1) / (K2X2+A2) + A3

Specify measured data or function data for X1 and X2 (analog signal only), gains (K1 and K2) and biases (A1, A2 and A3).

6.2.2 LOGIC FUNCTIONS

AND

$X1 \wedge X2$

Specify two measured or function data (X1, X2: only discrete signals). When both samples equal '1,' '1' is output. '0' is output for all other combinations.

OR

$X1 \vee X2$

Specify two measured or function data (X1, X2: only discrete signals). When both samples equal '0,' '0' is output. '1' is output for all other combinations.

NOT

$\neg X1$

Specify one measured or function data (X1, only discrete signal). An output of opposite logic to an input is provided.

XOR

$X1 \wedge X2$

Specify two measured or function data (X1, X2: only discrete signals). When one sample's logic matches the other, '0' is output. When it does not, '1' is output.

6.2.3 MATH FUNCTIONS

Square root

$K1\sqrt{X1}$

Specify measured data or function data (X1), with a coefficient (gain K1).

Power

$X1^{A1}$

Specify measured data or function data (X1), with a constant (exponent A1).

6.2.4 ACCUMULATION

Analog accumulation

Specify measured data or function data (X1), with Reset condition.

The measured (function) data is accumulated until it is reset when the reset condition is true or when Start key is touched. In order to reset the hold function, 'Time' or 'Trigger input' can be specified.

When "succession" of "reset by time" is chosen, clicking on "start", new data is recorded on CF card succeeding to the last data stored in the card. When there is no data recorded in the CF card, reset is performed. When the recording method is "Remote trigger", "Event recording" or "stored at defined time", after clicking start button, event recording analog accumulation is "succession."

Notice that when the recording starts, it is recorded from the analog accumulation of that phase.

Reset	Time	30 min., 1 hour, 2 hours, 3 hours, 4 hours, 6 hours, 12 hours, 24 hours (selectable time of a day), succession (Ver 6.03.09 or later)
	Trigger input	Rise, Sink, ON, OFF.

Input X1, such as flow signals, could be values per time unit (/day, /hour, /min, /sec). In order to accurately totalize this type of signals, specify the time unit. For example, without the time unit setting, with 1-minute storing interval, 500 m^3/h data input, 500 is added every 1 minute, up to 30000 m^3/h. With the time unit setting, only one-sixtyth (1/60) of the input data is counted by every storing interval.

Sum scale	None	∑ (input or function data)
	Sec	∑ (input or function data) x (3600/GAIN)
	Min	∑ (input or function data) x (60/GAIN)
	Hour	∑ (input or function data) x (1/GAIN)
	Day	∑ (input or function data) x (0.04166/GAIN)

Values assigned to GAIN depend upon the storing interval.

Storing interval	GAIN
0.1 seconds	36000
0.5 seconds	7200
1 second	3600
2 seconds	1800
5 seconds	720
10 seconds	360
1 minute	60
10 minutes	6

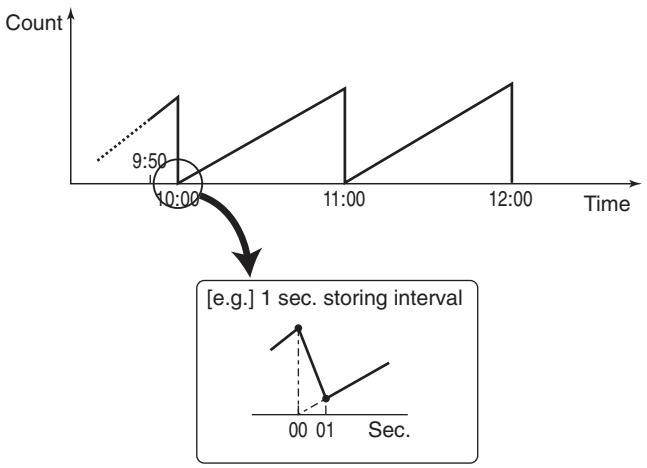
Drop out

Specify maximum 6 digits positive number including a decimal point.

The measured data or the function data is accumulated with every storing interval by drop out condition.

Drop out	Analog accumulation condition
0 or not specified	Accumulates regardless of the measured (or function) data.
More than 0	Accumulates when the measured (or function) data exceeds the drop out value.

At the timing of resetting, both the totalized count up to 00 second and '0' could exist at once. The 73VR3100 stores the totalized count at 00 second and a new count at 01 second after the resetting at 00 second.



Upper limit

Analog accumulation value upper limit is 1 x 10^{10}. If the accumulation upper limit is exceed, reset is performed. Interval data allocation significant digit number is 7. Reset integrated value according to the purpose of use.

Pulse accumulation

Specify measured data or function data (X1), with Reset condition.
The measured (function) data is accumulated until it is reset when the reset condition is true or when Start key is touched. In order to reset the hold function, 'Time' or 'Trigger input' can be specified.

Reset	Time	30 min., 1 hour, 2 hours, 3 hours, 4 hours, 6 hours, 12 hours, 24 hours (selectable time of a day)
	Trigger input	Rise, Sink, ON, OFF.

Plotting on the screen is performed in the same way as for the analog accumulation.

6.2.5 F VALUE CALCULATION

F value calculation

Specify measured data or function data (X1), with Reset condition.
The measured (function) data is accumulated until it is reset when the reset condition is true or when Start key is touched. In order to reset the hold function, 'Time' or 'Trigger input' can be specified.

Reset	Trigger input	Up, Down, ON, OFF.
	Analog input	Value < Threshold, Value ≤ Threshold

At the timing of resetting, both the totalized count up to 00 second and '0' could exist at once. The 73VR3100 stores the totalized count at 00 second and a new count at 01 second after the resetting at 00 second.
If the reset condition remains true for more than a moment, the function data remains 0.

Equation: $\sum 10^{(X1 - T0) / Z} ST/60$

where X1: Measured temperature (°C)
T0: Reference temperature (°C)
Z: Z value
ST: Storing interval (seconds)

If the result of the equation is out of the range: 0 to 1.0×10^{10}, it is given as an error.

6.2.6 FILTER

First order lag

Time constant is a response time for a step input (0 to 100%) to reach 63%. By setting the first order lag filter, noises and spikes contained in the input signal could be attenuated in the output signal. Specify measured data or function data, with a time constant.
With 1 sec. or longer storing rate, function results displayed on the screen maintain the last value periodically, because the function is executed the sampling rate and displayed on the screen.

Moving average

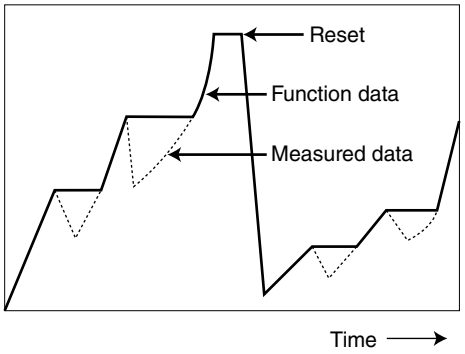
Multiple samples of input data are averaged. When the next sample is added, the oldest sample is discarded and the new set of samples are averaged. By setting the moving average filter, noises and spikes contained in the input signal could be attenuated in the output signal.
With 1 sec. or longer storing rate, function results displayed on the screen maintain the last value periodically, because the function is executed the sampling rate and displayed on the screen.

6.2.7 PEAK HOLD

Peak hold (max)

Specify measured data or function data (X1), with Reset condition.
Maximum value hold function is operated by sampling interval (100 msec. with 100 msec. storing interval, 500 msec. with 500 msec. or longer intervals). The measured (function) data is compared with the current hold value and the former is taken when it is greater than the latter, while the latter is taken when it is smaller than the latter.
The measured data is reset when the reset condition is true or when Start key is touched. In order to reset the hold function, 'Time' or 'Trigger input' can be specified.

Reset	Time	30 min., 1 hour, 2 hours, 3 hours, 4 hours, 6 hours, 12 hours, 24 hours (selectable time of a day)
	Trigger input	Rise, Sink, ON, OFF.



Equation

When $X1_{MAX} < X1$
$Y = X1$
$X1_{MAX} = X1$

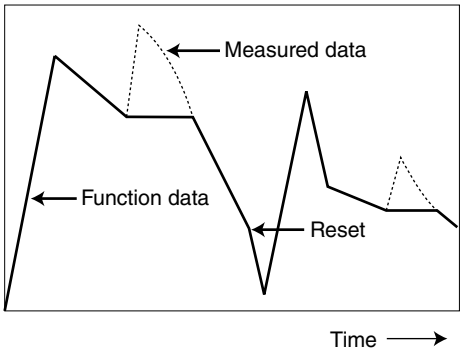
When $X1_{MAX} \geq X1$
$Y = X1_{MAX}$

When Reset condition is true: $Y = X1$
Y : Function data
X1 : Measured input data
$X1_{MAX}$: Hold value

Peak hold (min)

Specify measured data or function data (X1), with Reset condition.
Minimum value hold function is operated by sampling interval (100 msec. with 100 msec. storing interval, 500 msec. with 500 msec. or longer intervals). The measured (function) data is compared with the current hold value and the former is taken when it is smaller than the latter, while the latter is taken when it is greater than the latter.
The measured data is reset when the reset condition is true or when Start key is touched. In order to reset the hold function, 'Time' or 'Trigger input' can be specified.

Reset	Time	30 min., 1 hour, 2 hours, 3 hours, 4 hours, 6 hours, 12 hours, 24 hours (selectable time of a day)
	Trigger input	Rise, Sink, ON, OFF.



Equation

When $X1_{MIN} > X1$
$Y = X1$
$X1_{MIN} = X1$

When $X1_{MIN} \leq X1$
$Y = X1_{MIN}$

When Reset condition is true: $Y = X1$

Y : Function data
X1 : Measured input data
$X1_{MIN}$: Hold value

6.2.8 ANEMOSCOPE

Specify measured data or function data (X1).

Direction corresponding to measured data is displayed in the display view shown below.

1. Digital display of Trend view
2. Overview

Relation between input and direction

Input	Display
---	---
-3	WNW
-2	NW
-1	NNW
0	N
1	NNE
2	NE
3	ENE
4	E
5	ESE
6	SE
7	SSE
8	S
9	SSW
10	SW
11	WSW
12	W
13	WNW
14	NW
15	NNW
16	N
17	NNE
18	NE
---	---

When input is fractional value, closest direction is displayed.
Example: $1.5 \leq X1 < 2.5 \rightarrow$ NE

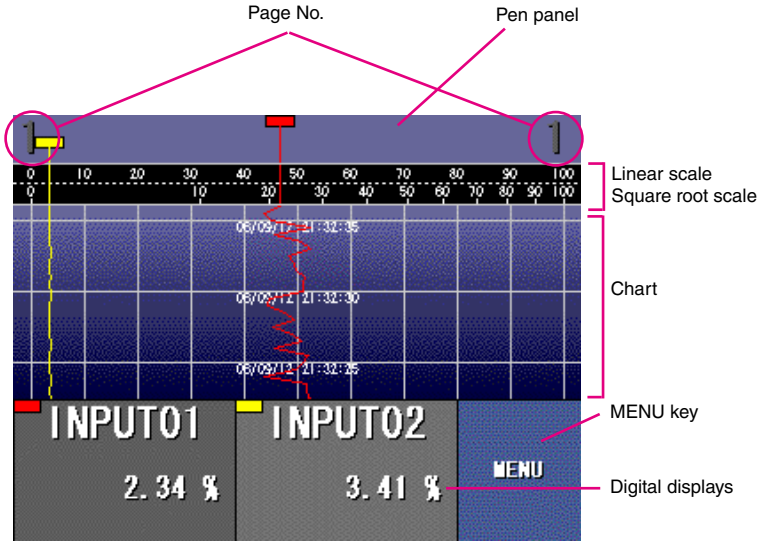
In the Retrieve view, input value is displayed, not direction.
Recorded data is input value, not direction. Display in the 73VR Data Viewer (73VRWV) and converted CSV data is not direction.

7. DISPLAY VIEWS

Five data display views are available for the 73VR3100: Data display (record) views (Trend, Overview and Bargraph), Retrieve view and Alarm History. You can switch between these five views at any time.

7.1 TREND VIEW

The Trend view shows currently recorded data on a trending chart. Four pages are available, and each page consists of Pen Panel, Chart, Digital Displays and Menu key.



Trend view.

7.1.1 PEN PANEL

Pen Pointers

Pens on the chart are specified by Pen Select control. Each view can show 8 pens at the maximum. Display rate is 1 second.

Pen pointers are vertically offset to each other so that each pointer can be recognized even when multiple pointers are positioned at the same input value.

The number 1, 2, 3 and 4 indicated at the left and right ends indicates the current page. Touching the number switches the pages in turn. Ones not assigned with pens are skipped.

Scale Bar

Two scales, linear and square root from 0 to 100%, are indicated on the scale bar. The scales apply to the plot range specified in Pen Setting.

Engineering scale for a specific pen can replace the standard scale by touching the tag name for the pen. In order to return the scale to 0 to 100%, touch the scale.

The engineering unit scale is indicated to three decimal places (one decimal place with horizontal chart).

While recording, the scale bar is turned to black color; display is gray while not recording after start (e.g. while waiting signal in trigger operation)

Caution !

When more than 5 characters (including sign and decimal point) are to be shown on the scale, only those at 0%, 50% and 100% are indicated.

7.1.2 CHART

Perpendicular and horizontal charts are selectable. On the perpendicular chart, data stream from top to bottom. On the horizontal chart, data stream from left to right. In order to switch the direction, select Display setting – Graph direction (Section 4.3.2).
Perpendicular rules are lined by 10% of the linear scale.
Horizontal rules are lined by time. One (1) division time depends upon the chart speed setting and the storing interval as shown in the table below. For the entire chart time spans, refer to Section 4.3.1.

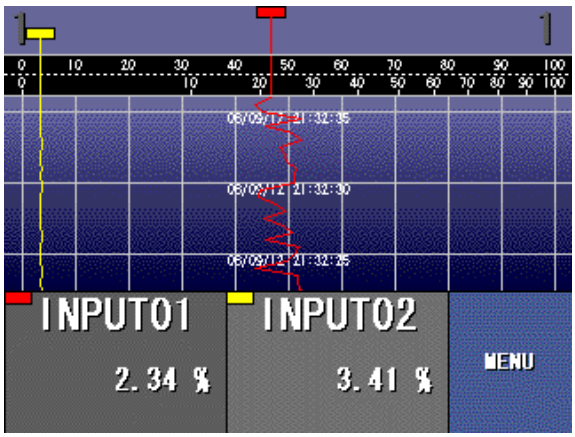
■ PERPENDICULAR CHART

Chart Speed	One Division Time		
	20 msec. storing interval	100 msec. storing interval	500 msec. storing interval
4	----	1 second	5 seconds
1	1 second	5 seconds	20 seconds
1/5	10 seconds	1 minute	1 minute
1/32	40 seconds	5 minutes	5 minutes
1/160	----	----	30 minutes
1/480	----	----	2 hours
1/960	----	----	4 hours

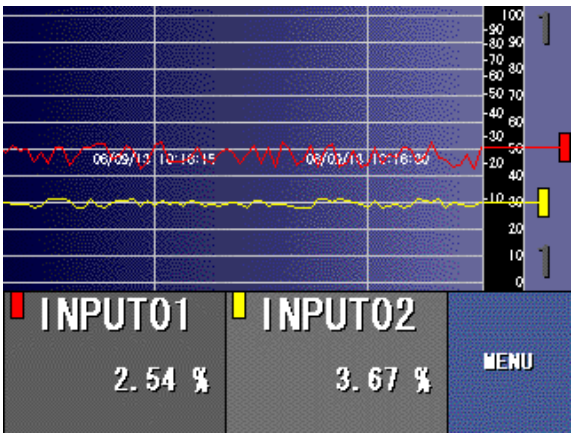
■ HORIZONTAL CHART

Chart Speed	One Division Time		
	20 msec. storing interval	100 msec. storing interval	500 msec. storing interval
4	----	2 seconds	15 seconds
1	2 seconds	10 seconds	1 minute
1/5	10 seconds	5 minutes	5 minutes
1/32	1 minute	30 minutes	30 minutes
1/160	----	----	3 hours
1/480	----	----	6 hours
1/960	----	----	12 hours

Time index is shown at the center of the chart, in 'YY/MM/DD HH:MM:SS' format.



Perpendicular chart.



Horizontal chart.

7.1.3 DIGITAL DISPLAY

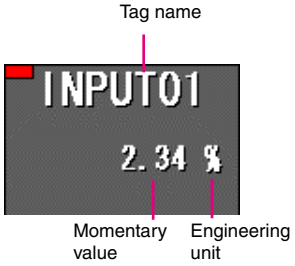
Digital displays include the tag name and/or instantaneous value or status as specified (Tag + Value, Tag, or Value) in Digital Display Type (See Section 4.3.3).

Engineering Unit Value or Discrete Status

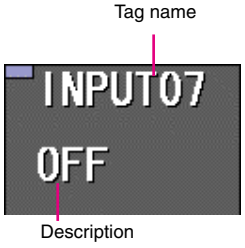
Analog instantaneous values indicated in engineering unit are renewed by the specified display rate.
Discrete status is indicated with the display description specified in the Pen setting.
The alarm status is also indicated. Display rate is 1 second.
If Auto Hide function is enabled (See 4.3.4), the digital display is automatically hidden when the screen is untouched for 30 seconds. The chart time span is longer without the digital display. In order to show the digital display, touch the bottom half area of the screen.

Alarm Status

Zone colors specified in Pen setting (alarm) (Section 4.5.3) are applied to the tag name and momentary value to indicate it is within respective zones. Indicator's background color turns to black color when the pen is in alarm status. Normal color is grey.
For discrete signals, ON and OFF status colors are applied to the tag name and description for respective states. Indicator's background color turns to black color in alarm, to grey in normal state.



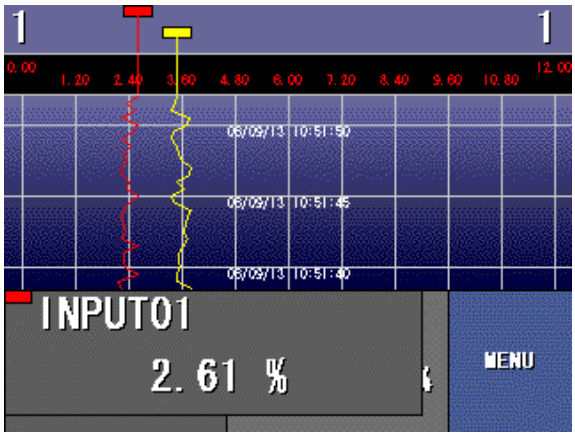
Digital display, analog signal.



Digital display, discrete signal.

Large digital display

Only one (1) digital display can be specified to appear in large size.



Large digital display.

Touch twice the digital display of the pen you want to enlarge. The scale changes to the engineering unit of the pen at the first touch, and then the large display appears at the second touch. In order to reduce the display size to the original state, touch the large display once again.

7.1.4 WRITING COMMENTS

Comments can be indicated on the screen in the Trend view. These comments are also saved in Comment History file to view on the Comment History view.

In order to write comments, three (3) methods are available:

1. Selecting from a preset list of comments
2. Writing a comment directly
3. Writing a selected comment automatically by preset conditions

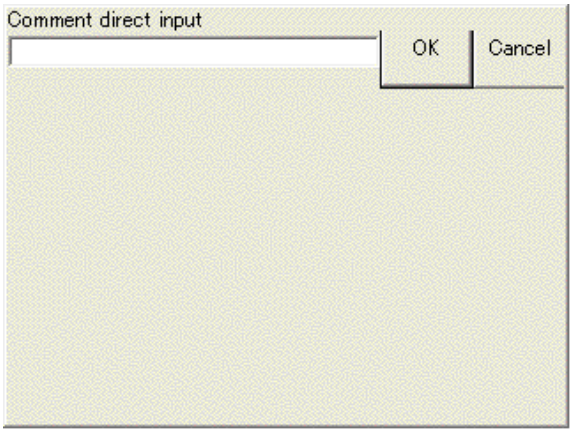
When 'direct comment input' is enabled, other methods are not available.

The maximum of 56 comments categorized in 7 groups (8 comments per group) can be preset. The seventh group is used also for free comment entry during recording. The comments in this group can be modified while recording.

NOTE
Comment function can be used only (1) when the trend graph is showing a perpendicular chart, and (2) when the 73VR3100 is recording in the CF Card. No comment can be written in while you are hot-swapping the CF Card.
While the automatic comment entry is on, DO NOT execute a FTP data transfer.

When the direct comment input is enabled:

1. Touch MENU button on the Trend view and then choose Comment write in.
2. Comment direct input view replaces it on the screen. Enter a comment using an USB keyboard and touch OK.



Comment direct input

3. The comment appears in the center of the chart, at 50% position.

When the direct comment input is disabled:

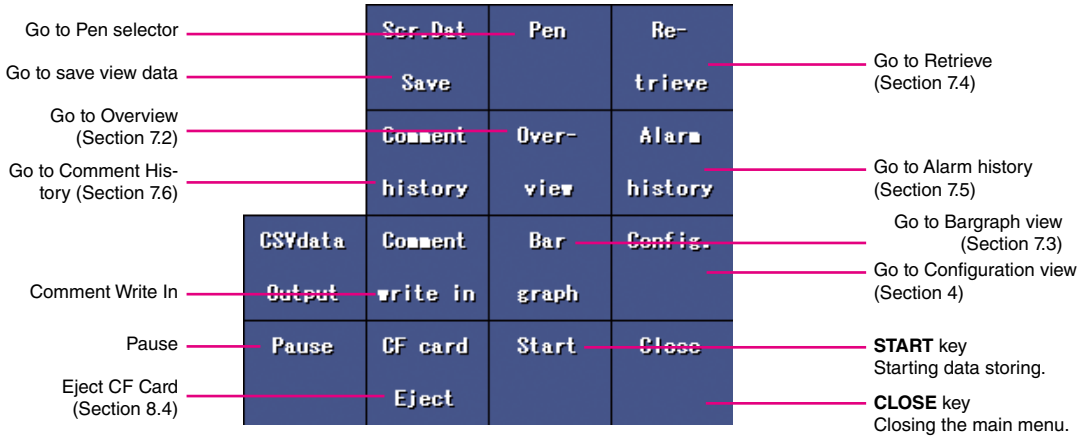
1. Touch MENU button on the Trend view and then choose Comment write in.
2. In order to choose a comment from the list, choose a group and then a comment from the list, and touch OK. The comment is written in the chart at the time index indicated on the list (the moment when the Comment write in key is touched).
   In order to enter a free comment, choose Gr7 (Group 7). Choose one of the comment fields and enter a new comment, and touch OK. You can also choose an existing comment, touch Change key and modify it to use.
3. The comment appears in the center of the chart, at 50% position.

NOTE

1. A comment is written in according to the storing interval. For example, with 10-minute interval, even when you touch the Comment write in key at 20:27:00, the comment is written in only at 20:30:00.
2. If multiple comments are specified during the same storing interval, only the last comment is valid.
3. If the data recording is cancelled or terminated while you are operating to write in a comment, the comment is invalid.
4. Only 'Hour:Minute:Second' is valid in comment writing even when 100-msec. or 500-msec. storing interval is specified.
5. Up to 20 comments can be added on the screen. After the 21st comment, the oldest comment will be automatically deleted while it will be stored in the comment history data.
6. Automatic comment writing is also executed according to the storing intervals. The trigger condition must be true at the moment of data storing. If the condition comes to be true and then untrue between data storing cycles, no comment writing is executed.

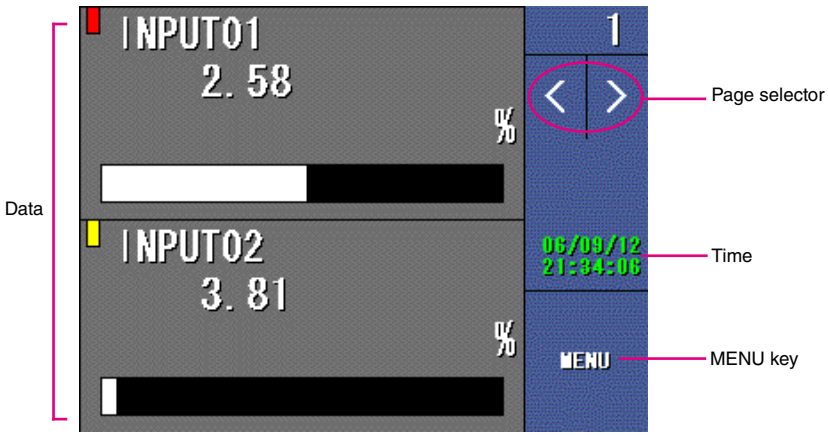
7.1.5 MENU CONTROL KEYS

Touching Menu key opens selectable menu items on the right half of the screen as shown below.



7.2 OVERVIEW

The Overview is used to monitor up to 16 channels at once. Four groups (pages) are available, and each page consists of Page & Time Indicator, Data Indicators and Menu key.



Overview.

7.2.1 PAGE & TIME INDICATOR

Page Number

The number 1, 2, 3 or 4 indicated at the left and end indicates the current group (page). The number 1, 2, 3 and 4 indicated at the right top indicates the current page.

Page Selector

[<] and [>] buttons are used to switch between pages for the different groups. Touch [>] to go to the next page and [<] to the previous page.
Pages not assigned with pens are skipped.

Data File Used Volume

Three bargraphs are indicated when Data File Used Volume is set to 'Show' in the basic setting.
The 73VR3100 creates files (data (D), alarm history (A) and comment history (C)) at the startup using all unused space and shows while recording how much space has been used in percentage (1 percent increments). The bargraph color changes according to the used volume: green below 50%, yellow up to 79% and red over 80%. Once the used space reaches 100%, the 73VR3100 overwrites the oldest data with a new one. There will be no update on this indicator after 100%.
While the CF card is hot-swapped or during the FTP while in recording, the indicator shows the used volume of the backup file in the internal memory. Percentage indication turns to green color.

Date / Time

Date and time is shown in black characters when the recorder is stopped, in green while recording.

7.2.2 DATA INDICATORS

Pen Assignment

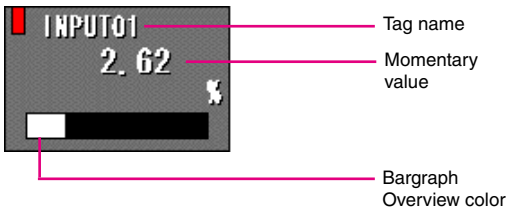
Up to 16 pens are indicated in the Overview. Numbers of pens as specified in Display pen number (Section 4.3.6).

Analog Data

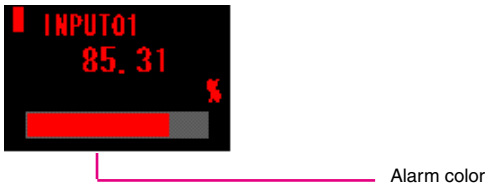
Analog data is indicated in bargraph with its tag name (no bargraph with 16-pen view). The bargraph color is set in Analog Pen Setting (Overview color). When the signal is in alarm status, the tag name, momentary value and bargraph color changes to the one specified in Analog Alarm Setting (Alarm color).

Discrete Data

Tag name and discrete data status is indicated. The status indicator tile at the bottom turns to the designated colors according to each status. When the signal is in alarm status, the background turns to black color.

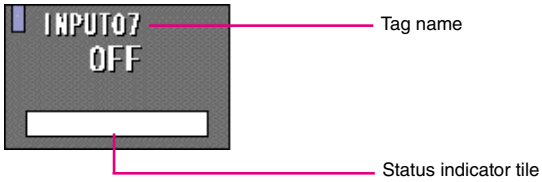


Analog data.



Analog data in alarm.

Analog data (16-pen view).

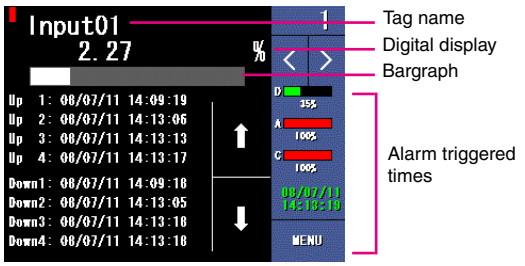


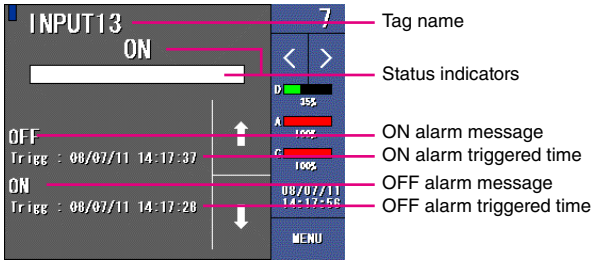
Discrete data.

Detail Monitor

More information can be displayed for a specific pen. Touch the data indicator you want to enlarge. Touch arrow keys to show other pens.

Touching the enlarged area closes the detailed information.





Detail monitor (analog and discrete).

Analog data is added with a momentary value in engineering unit. Alarm history is also indicated if the alarm setting has been enabled. When the alarm is disabled, time index shows --/--/-- --:--:--.

Discrete data is also added with ON/OFF history data.

Analog alarm history

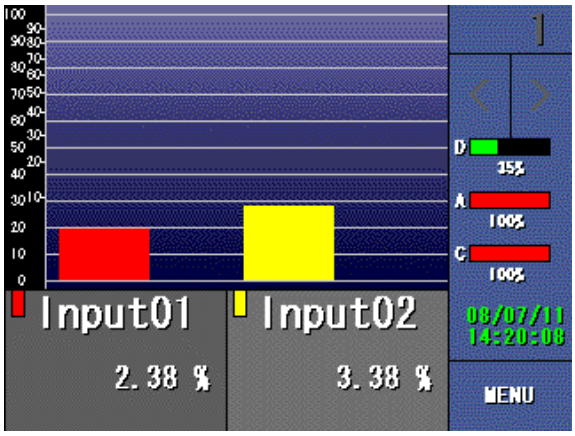
Up 1	Time when the measured value goes up from Zone 0 to Zone 1.
Up 2	Time when the measured value goes up from Zone 1 to Zone 2.
Up 3	Time when the measured value goes up from Zone 2 to Zone 3.
Up 4	Time when the measured value goes up from Zone 3 to Zone 4.
Down 1	Time when the measured value goes down from Zone 1 to Zone 0.
Down 2	Time when the measured value goes down from Zone 2 to Zone 1.
Down 3	Time when the measured value goes down from Zone 3 to Zone 2.
Down 4	Time when the measured value goes down from Zone 4 to Zone 3.

7.2.3 MENU CONTROL KEYS

Touching Menu key opens selectable menu items on the right half of the screen. Refer to Section 7.1.5.

7.3 BARGRAPH

The Bargraph view shows bargraphs with digital displays showing momentary values.



Bargraph view.

7.3.1 PAGE & TIME INDICATOR

Page Number

The number 1, 2, 3 and 4 indicated at the left and right ends indicates the current page. Touching the number switches the pages in turn. Ones not assigned with pens are skipped.

Data File Used Volume

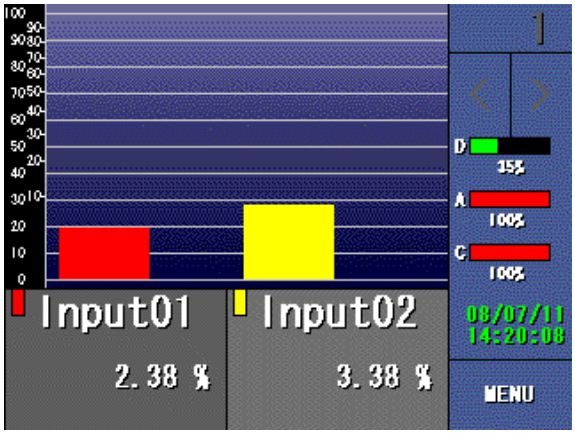
A bargraph is indicated when Data File Used Volume is set to 'Show' in the basic setting.
Refer to Section 8.2 for detailed explanations.

Date / Time

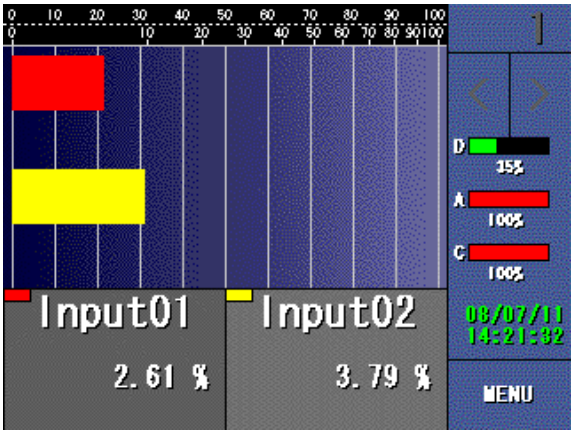
Date and time is shown in black characters when the recorder is stopped, in green while recording.

7.3.2 BARGRAPH

Perpendicular and horizontal bars are selectable.



Perpendicular bargraph.



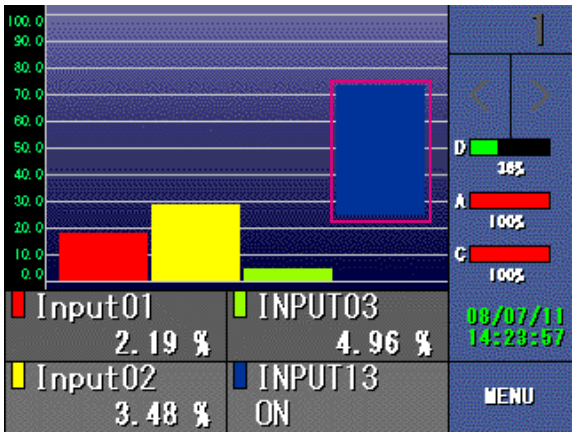
Horizontal bargraph.

Analog Data

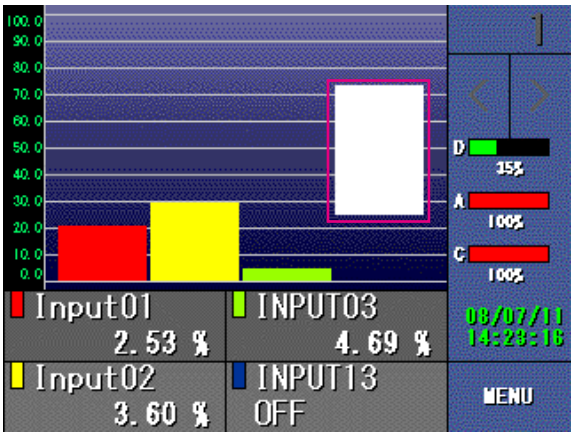
Analog data is indicated in bargraph within the range of 0 to 100%. 0% at the bottom (perpendicular bar) or at the left end (horizontal). The bargraph color is set in Pen Setting (input).

Discrete Data

Discrete data is indicated in boxes located between 25% and 75%. The box is filled in with the color specified in Common Pen Setting in ON (Logic 1) status. It is blank in OFF (Logic 0) status.



Discrete data in bargraph, ON.



Discrete data in bargraph, OFF.

Scale Bar

Two scales, linear and square root from 0 to 100%, are indicated on the scale bar. The scales apply to the plot range specified in Pen Setting.

Engineering scale for a specific pen can replace the standard scale by touching the tag name for the pen. In order to return the scale to 0 to 100%, touch the scale.

The engineering unit scale is indicated to three decimal places (one decimal place with horizontal chart).

While recording, the scale bar is turned to black color.

Caution !

When more than 5 characters (including sign and decimal point) are to be shown on the scale, only those at 0%, 50% and 100% are indicated.

7.3.3 DIGITAL DISPLAY

Digital displays include the tag name and/or instantaneous value or status as specified (Tag + Value, Tag, or Value) in Digital Display Type (See Section 4.3.3).

Engineering Unit Value or Discrete Status

Analog instantaneous values indicated in engineering unit are renewed by the specified display rate.

Discrete status is indicated with the display description specified in the Pen setting.

Display rate is 1 second.

Alarm Status

Zone colors specified in Pen setting (alarm) (Section 4.5.2) are applied to the tag name and momentary value to indicate it is within respective zones. Indicator's background color turns to black color when the pen is in alarm status. Normal color is grey.

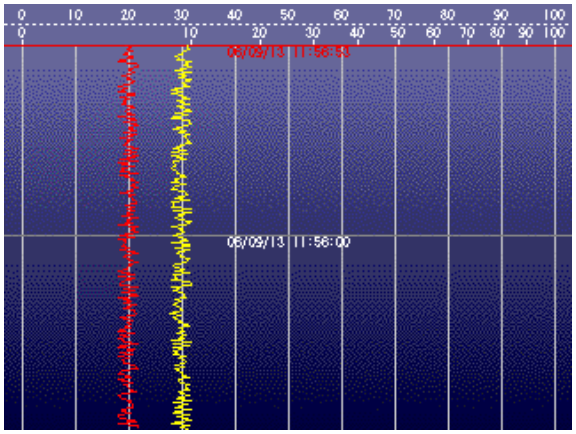
For discrete signals, ON and OFF status colors are applied to the tag name and description for respective states. Indicator's background color turns to black color in alarm, to grey in normal state.

7.3.4 MENU CONTROL KEYS

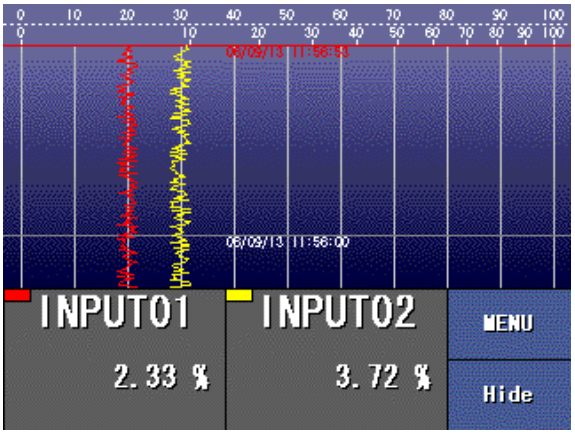
Touching Menu key opens selectable menu items on the right half of the screen. Refer to Section 7.1.5.

7.4 RETRIEVE

Data stored in the CF Card are searched and displayed on the Retrieve view. Retrieval is available even while recording. In order to show Menu key in the Retrieve view, touch on the screen. The digital display with Menu and Hide keys appear on the lower part of the screen.



Basic Retrieve view.



Retrieve view with digital display (Menu and Hide keys).

7.4.1 DATA DISPLAY

The Retrieve view can show 8 pens at the maximum. Four (4) pages (display groups) are available.
Last part of the stored data is indicated first. If you are using the 73VR3100 only for plotting on the screen without recording, naturally no retrieval is available.
The screen time frame in the Retrieve chart depends upon the storing rate. Table below shows the screen time frame by display types at various storing rate settings.

CHART TYPE / STORING INTERVAL	Perpendicular with digital display	Perpendicular without digital display	Horizontal
20 msec.	2.74 seconds	4.34 seconds	5.94 seconds
100 msec.	13.7 seconds	21.7 seconds	29.7 seconds
500 msec.	1 min., 8.5 seconds	1 min., 48.5 seconds	2 min., 28.5 seconds
1 second	2 min., 17 seconds	3 min., 37 seconds	4 min., 57 seconds
2 seconds	4 min., 34 seconds	7 min., 14 seconds	9 min., 54 seconds
5 seconds	11 min., 25 seconds	18 min., 5 seconds	24 min., 45 seconds
10 seconds	22 min., 50 seconds	36 min., 10 seconds	49 min., 30 seconds
1 minute	2 hours, 17 min.	3 hours, 37 min.	4 hours, 57 min.
10 minutes	22 hours, 50 min.	1 day, 12 hours, 10 min.	2 days, 1 hour, 30 min.

The chart can be scrolled using your finger. Touch the screen with your finger and move up and down. The chart area shifts accordingly.
The digital meters shows values at the time point indicated with the red line on the screen. The red line moves to where your finger touches. Touch Hide button to remove the digital display.

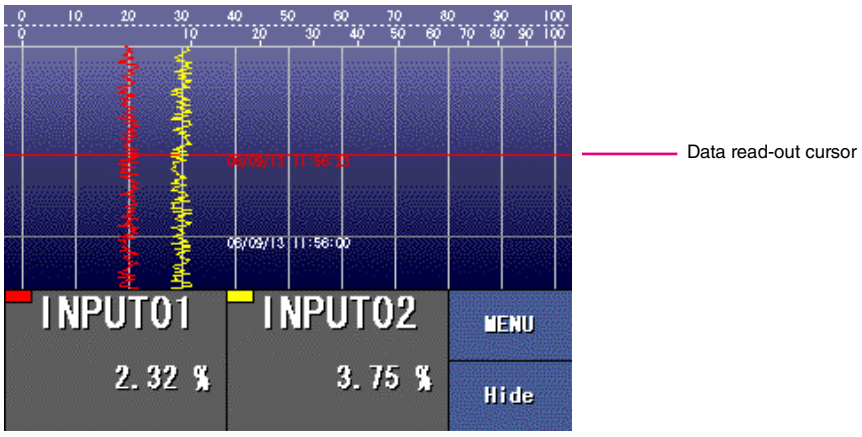


Figure: Data read-out.

Comments written in during recording is also indicated on the screen.
Comments may be overlapped on each other, showing the oldest at the top, if there are too many comments within a limited time span.

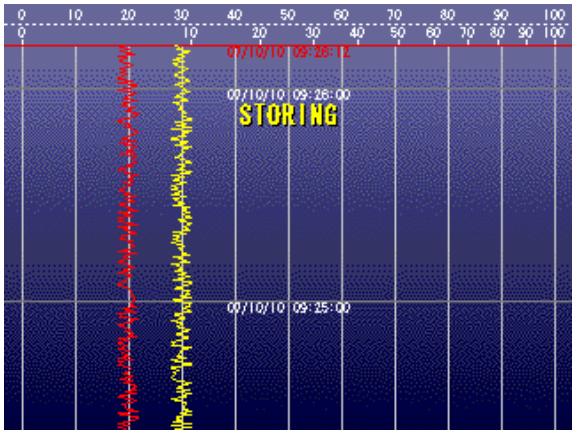
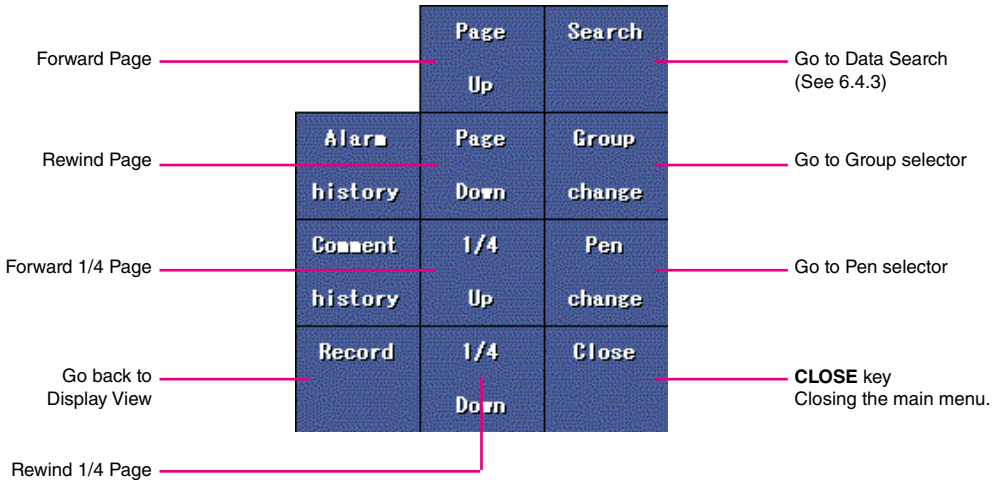


Figure: Comment written in the record.

7.4.2 MENU CONTROL KEYS



Page Up / Page Down
These keys are used to scroll the chart in forward (Up) and reverse (Down) time directions.

1/4 Up / 1/4 Down
These keys are used to scroll the chart by quarter page in forward (Up) and reverse (Down) time directions.

Group Change
Group change key is used to move between the four display groups. Groups are switched every time the key is pressed.

Pen Change
Pen Change is used to assign signal channels to be displayed on the screen.

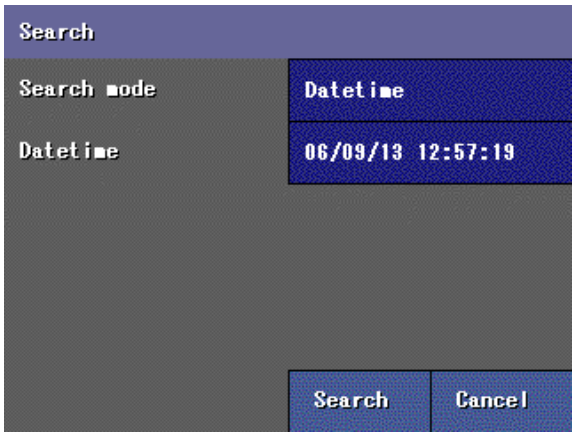
Alarm history
Touching Alarm history key switches the screen to the Alarm history view.

Comment history
Touching Comment history key switches the screen to the Comment history view.

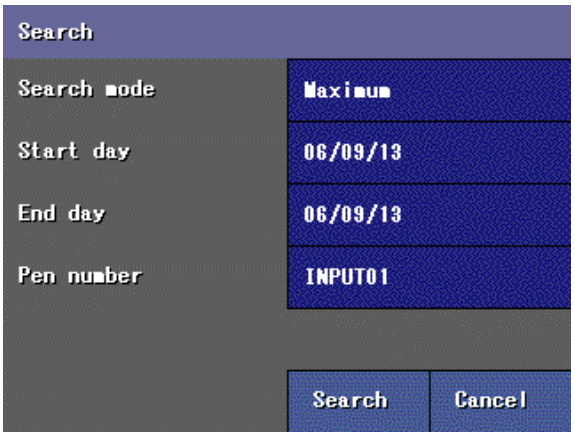
Record
Touching Record key switches the screen back to the Display view.

7.4.3 DATA SEARCH

Data search is available using three parameters: Date & time, Maximum value, and Minimum value.
Touching Search key in the main menu opens Search view as shown below.



Search view, Date & Time search mode.

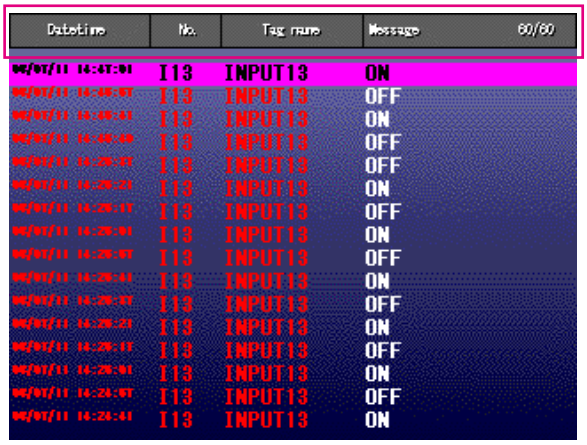


Search view, Max. or Min. value search mode.

Datetime	Date & time search	Data at a specific time index. is searched. Specify a date and time using the numeric input keypad. The searched data at the specified time is located at the top of the chart, and the previous data is shown below that.
Maximum	Maximum value search	Maximum data within a specified time span is searched. The searched data at the specified time is located at the top of the chart, and the previous data is shown below that. When you press Menu key at this moment, Next key is added to the menu, so that you can continue searching the second greatest value.
Minimum	Minimum value search	Minimum data within a specified time span is searched. The searched data at the specified time is located at the top of the chart, and the previous data is shown below that. When you press Menu key at this moment, Next key is added to the menu, so that you can continue searching the second smallest value.

7.5 ALARM HISTORY

Analog alarm events and discrete signal status changes are stored in the CF Card. This data can be searched and displayed on the Alarm History view. When you touch the top part of the screen (enclosed in the frame), control keys appears.



Alarm history.

Alarm history control keys.

7.5.1 DATA DISPLAY

The Alarm History view shows the date and time of the events, pen No. and its tag name, and the alarm message (comment) pre-described for the particular status.
Sixteen (16) events are listed on the view, and the maximum of 1000 events can be searched and displayed with the 512 MB and 1GB CF card. The capacity depends upon the CF card capacity (See Section 7).
Blinking message line means that the event is not acknowledged yet. Touch it to acknowledge, and it stops blinking.
In order to acknowledge all events on the screen, use ACK All button.
While Auto Update is enabled, other control buttons are unavailable.
Input pens are identified as Ixx (xx = pen number), and Function pens are identified as Fxx (xx = function pen number).

7.5.2 MENU CONTROL KEYS

Touching the top part of the screen on the Alarm History shows Menu on the right part.

Page Up / Page Down

These keys are used to scroll the list in forward (Up) and reverse (Down) time directions.

1/4 Up / 1/4 Down

These keys are used to scroll the list by quarter page in forward (Up) and reverse (Down) time directions.

Search

Data at a specific time index can be called up. Touching the Search button shows a numeric keypad. Specify a date and time.

ACK (acknowledge) All

Touch ACK All key when you want to acknowledge all events of the alarm history. Unacknowledged events' message lines blink. Once acknowledged, they stop blinking.

Auto Update

Touch Auto Update key to enable automatic update of the alarm history. While it is enabled, other control buttons are unavailable. Touch the key again to disable to use other controls.

Jump

Touching Jump key when a specific alarm event is selected switches the screen to the Retrieve view where the data at the moment of alarm event is indicated.

Oldest

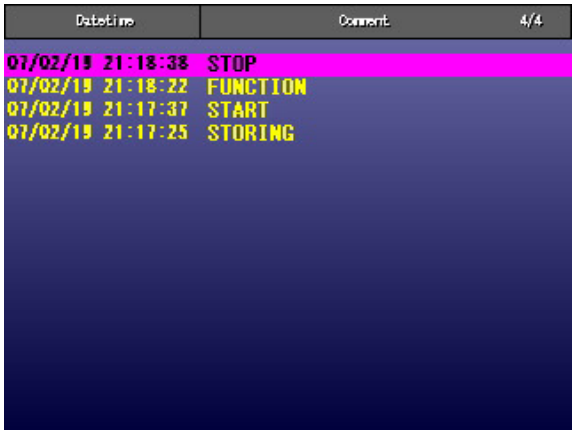
Touching Oldest key moves the screen to the oldest alarm event.

Newest

Touching Newest key moves the screen to the newest alarm event.

7.6 COMMENT HISTORY

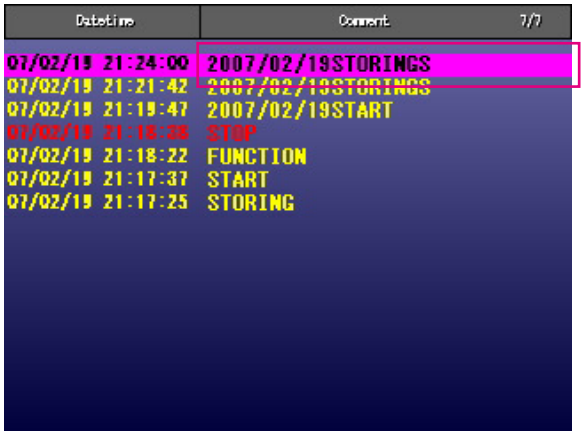
Comments entered on the Record view are stored in the CF Card. This data can be searched and displayed on the Comment History view. When you touch the top part of the screen (enclosed in the frame), control keys appears.

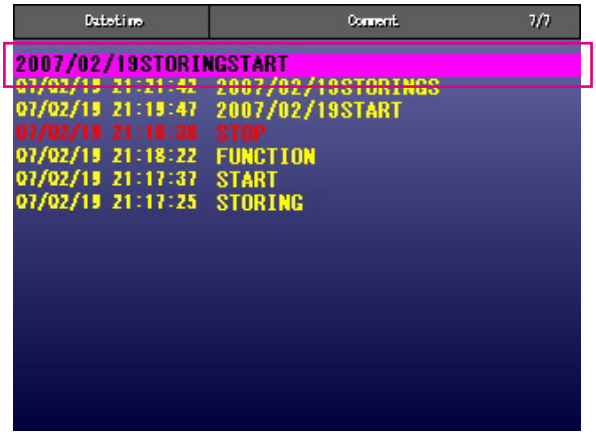


Comment history.

7.6.1 DATA DISPLAY

The Comment History view shows the date/time and the comments in the group specific color.
Sixteen (16) events are listed on the view, and the maximum of 1000 events can be searched and displayed.
To the right top of the screen, the position of the presently selected comment among the total number of comments is indicated.
Max. 18 characters are displayed on the list. When you want to read all characters of a comment longer than that, move the cursor to the comment row and touch the comment part.





7.6.2 DATA SEARCH BY COMMENT

Touching Jump key when a specific comment is selected switches the screen to the Retrieve view where the data at the moment of comment entry is indicated.

7.6.3 MENU CONTROL KEYS

Touching the top part of the screen on the Comment History shows Menu on the right part.

Page Up / Page Down

These keys are used to scroll the list in forward (Up) and reverse (Down) time directions.

1/4 Up / 1/4 Down

These keys are used to scroll the list by quarter page in forward (Up) and reverse (Down) time directions.

Search

Data at a specific time index can be called up. Touching the Search button shows a numeric keypad. Specify a date and time.

Auto Update

Touch Auto Update key to enable automatic update of the comment history. While it is enabled, other control buttons are unavailable. Touch the key again to disable to use other controls.

Jump

Touching Jump key when a specific comment row is selected switches the screen to the Retrieve view where the data at the moment of comment entry is indicated.

Oldest

Touching Oldest key moves the screen to the oldest comment row.

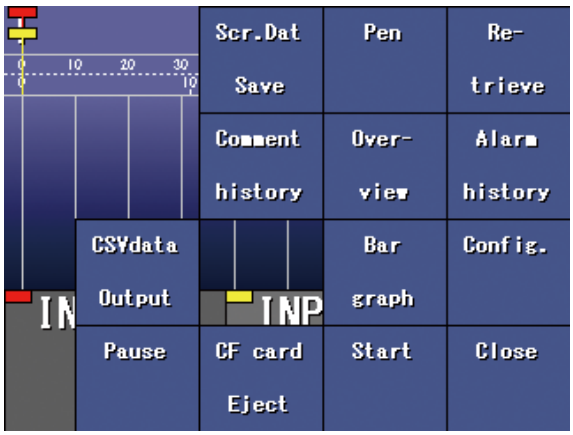
Newest

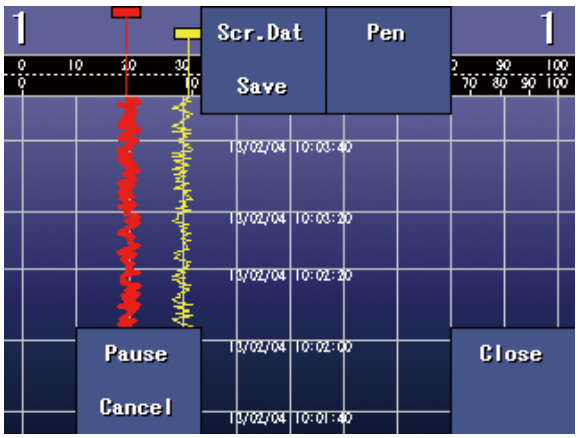
Touching Newest key moves the screen to the newest comment row.

7.7 TREND VIEW PAUSE AND SCROLL (Ver 6.03.09 or later)

7.7.1 TREND VIEW PAUSE.

Click on pause button to stop trend view.
View pause is available while running or stopped.
View pause is available when chart speed is 1 or 4. When chart speed is 1/5 through 1/960 is not available.
In pause, the pen moves depending on measured value.
In pause, handling of change view page, change pen, save view data (only in stopped) only are available.
Measurands data displayed in pause is recorded to memory of trend view display and new data is overwritten to the oldest data for every measurement. When all the display view data at the time of a pause is overwritten, pause is cancelled automatically.





7.7.2 TREND VIEW SCROLL

Drag the view in pause to scroll the view 2/3.

-In perpendicular chart

Drag from top to down... scroll to new data side

Drag from bottom to up...scroll to old data side

-In horizontal chart

Drag from right to left... scroll to new data side

Drag from left to right...scroll to old data side

CAUTION

Memory amount used for display data with chart speed 4 or 1 is 3000 record. When storing rate is slower than 0.5 sec., data is recorded in 0.5 sec. intervals. Therefore, maximum recording time of memory for display data is 1500 sec.
Reset is performed when memory used for display data with chart speed 4 or 1 in case of changing chart speed to 1/5 through 1/960, but reset is not performed in the opposite case. Changing chart speed from 1/5 through 1/960 to 1 or 4, pause is available.

8. DATA & FILES

8.1 73VR3100 FILES

Files required to store the 73VR3100 data are created automatically when the 73VR3100 gets started. Table below shows the types of files.

Type	Description	File Name	Extension
73VR3100 Data File	Data sampled by the 73VR3100	Fixed (73VR)	VRD31
73VR3100 Alarm History File	Alarm history data	Fixed (73VR)	VRA31
73VR3100 Comment History File	Comment history data	Fixed (73VR)	VRM31
73VR3100 Control File	Record pointer for 73VR.VRD31	Fixed (73VR)	VRC31
73VR3100 Parameter File	Parameter settings such operation mode, pen setting	Fixed (73VR)	VRP31

CAUTION !

When you delete the data file in a CF Card, delete also the control file. In any event do not modify the control file. A modified control file may destroy the data file.

WARNING !

Be sure to restart the 73VR3100 before using a data file created by the 73VR31BLD configurator software. If not, the data file will be destroyed.

DATA FILE

All 73VR3100 data are stored in binary in single data file named '73VR.VRD31.'
An empty data file is already created at the startup of the 73VR3100 using all available space. Once data recording starts, sampled data are stored in this file. It means that the data file size is fixed regardless of the data volume in it. In order to confirm data recording, open the file in Retrieve view.
All data are stored in a single file even if multiple sets of data are recorded within a day, or if single or multiple data are recorded over multiple days. Trigger data are stored also in the same principle. Therefore the user must be aware that some data may be overwritten by another of different configuration settings if you keep recording after setting new configuration.

ALARM HISTORY FILE

Alarm history is stored in binary in single data file named '73VR.VRA31.' Analog alarm events and discrete signal status changes (regardless of alarm setting) are recorded in this file.
Like the data file, an empty alarm history file is already created at the startup of the 73VR3100. The file size is fixed regardless of the data volume in it.
Number of events stored in this file depends upon the CF card capacity. Refer to Table below.

CF CARD CAPACITY	ALARM EVENT NUMBERS
128 MB	250
256 MB	500
512 MB, 1 GB	1000

The alarm history file is cyclic: data in the CF Card will be overwritten when the file is full.

COMMENT HISTORY FILE

Comment history is stored in binary in single data file named '73VR.VRM31.'
Like the data file, an empty comment history file is already created at the startup of the 73VR3100. The file size is fixed regardless of the data volume in it.
The comment history file is cyclic: data in the CF Card will be overwritten when the file is full.

CONTROL FILE

The control file contains the information to manage the data file. It is used to convert the file into compatible format for use on the 73VR Data Viewer program or into .CSV format.
If this file is deleted, the data file is initialized. When storing the data file in the PC's hard disk, store also the control file.

PARAMETER FILE

The parameter file contains information about the 73VR3100's system and pen configurations. The 73VR3100 reads this file at the startup to apply the parameters.

8.2 DATA STORAGE TIME

Data storage time for one CF Card depends upon the following:

1. Storing rate
2. Data storing form
3. Number of channels

There are also CF Cards of different capacities.
Data storage time of a CF Card is calculated as follows:

Record Size

[Date Information] (bytes) + [One Sample Data] (bytes) x [No. of Channels] (points) = [Record Size] (bytes)

Number of Records

[CF Card Memory Size]* (bytes) / [Record Size] (bytes) = [Number of Records]

Data Storable Time

[Number of Records] x [Storing Rate] (seconds) = [Data Storage Time] (seconds)
Date information takes 8 bytes and one bit of sampled data takes 4 bytes with the floating point form, 2 bytes with short integer form. No. of channels must include all channels set to 'Enable.'
*[CF Card Memory Size] means the volume of data file (73VR.VRD31) created in the CF Card.

[Example]

Storing rate: 5 sec.
Data storing form: Short integer
Number of channels: 6
CF Card memory size: 118 MB (for 128 MB CF Card)
A record size is calculated as:
8 (bytes) + 2 (bytes) x 6 (points) = 20 (bytes)
The number of records which can be stored in this CF card is calculated as:
(118 x 1024 x 1024**) (bytes) / 20 (bytes) = approx. 6186598 (records)
Time duration usable for the number of records is:
6186598 x 5 (sec.) = 30932990 (sec.) = approx. 8592 hours. = approx. 358 days
**1KB-CF card's memory size is calculated as 1024 bytes.
This calculated result is only for approximate estimation since the data file must be smaller than the full capacity of a CF Card.

8.3 WRITING/READING SETTING FILE IN AN USB FLASH-MEMORY

The 73VR3100's setting file can be read from or written in an USB flash-memory.
Connect the USB flash-memory at the USB connector at the front behind the front cover or at the rear side. See Section 2.2 for these connectors' locations.
The USB flash-memories listed below have been tested and confirmed adequate operations with the 73VR3100. Other memory sticks are not guaranteed.

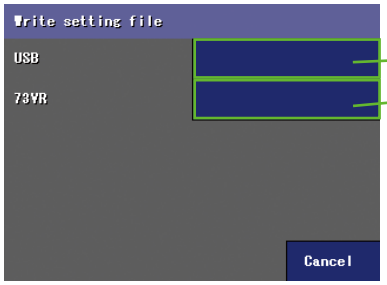
Manufacturer: Buffalo Technology
Models: RUS2-S Series (256 MB through 1 GB)
RUF-CL/U2 Series (256 MB)
Manufacturer: I-O Data Devices, Inc.
Models: TB-M2 Series (256 MB), TB-B series (256 MB), EasyDisk Platinum2 (256 MB)

CAUTION !

USB memory sticks may need certain time before it is detected by the PC. DO NO try to read or write setting files until it is detected and confirmed.
DO NOT insert USB memory sticks to the front and the rear connectors at once.
Buffalo RUF-CL/U2, 64 MB, is Not compatible with the 73VR3100.

8.3.1 HOW TO WRITE A CONFIGURATION FILE IN

(1) Call up the Main Menu and touch Write Setting File key.
(2) Writes to a USB memory, then moves to the file name setting view.



Load the configuration in the CF card in the 73VR3100.

Touching here loads the data, then returns to the setting view.

(Ver 6.03.09 or later)

The configuration loaded in the unit is used when the unit starts without CF card.
When configuration data is loaded in the unit, storing method will be "No Storing."

(3) Enter a file name you desire on the alphanumeric keypad (max. 8 characters).
(4) Touch OK. If you do not want to save a file, touch Cancel.

CAUTION !

A file extension is automatically added when the file is stored.

8.3.2 HOW TO READ A CONFIGURATION FILE OUT

(1) Call up the Main Menu and touch Read Setting File key.
(2) Touch the green panel to the right of File Name to show a list of setting files in the USB flash-memory. The list consists of two (2) pages, ten (10) files in each page.
(3) Choose a file and touch OK. If you do not want to save a file, touch Cancel.

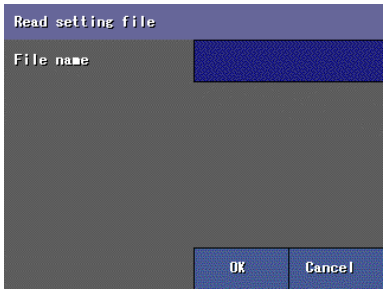


Figure: File read view.

Figure: File list.

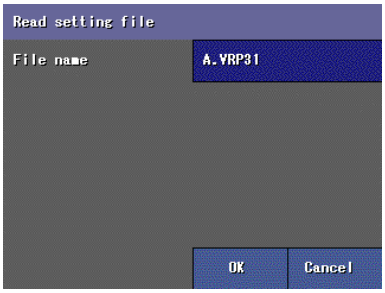


Figure: File selected.

CAUTION !

Touch Back to Record key to apply the new setting.

8.4 HOT SWAPPING THE CF CARD

The CF Card can be replaced while the 73VR3100 is running.
The data sampled while the card is not placed is stored in the 73VR3100's internal memory. Its capacity is enough approximately for 5 minutes without a card. Be sure to get ready with a CF Card for replacement. If the CF Card does not contain the files 73VR.VRD31, 73VR.VRP31, 73VR.VRC31, 73VR.VRM31 and 73VR.VRA31, they must be created beforehand using the 73VR31BLD Configurator software. If the CF Card already has these files with stored data, they will be overwritten.
Be sure to observe the following procedure. If not, CF Card and its data may be damaged or lost.

HOW TO REPLACE THE CF CARD

(1) Call up the Menu on the Display view and touch CF Card Eject key.
(2) Confirm that you want to remove the CF Card. If not touch Cancel.
(3) Confirm that the Menu now shows CF Card Insert key, and extract the card.

NOTE
No data retrieval or alarm history display is available while the card is removed.

(4) Insert a new CF Card, and touch CF Card Insert key.
(5) The 73VR3100 will ask you if you want to reset the data file if one exist. Confirm that and touch OK.

CAUTION !
The CF Card cannot be removed while data in the internal memory is transferred to the card, during the card replacement or after the recording is complete. It may take certain time.

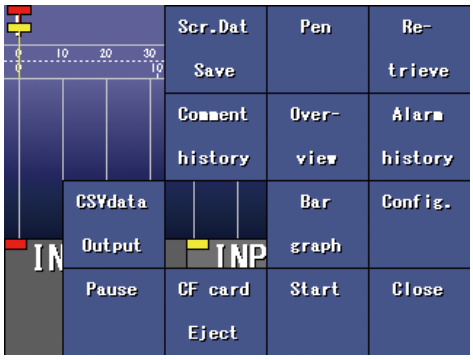
CAUTION !
The 73VRWV can perform FTP transfer while the 73VR3100 is recording. The 73VR3100 stores data in its internal memory while the FTP is in progress. When the internal memory is full, the file transfer is stopped, and the 73VR3100 starts transferring data from the memory to the CF Card. Then with the transfer to the CF Card completed, the file transfer to the 73VRWV is resumed. Due to this operating procedure, it usually takes longer time in a file transfer when the 73VR3100 is recording.

NOTE
Time elapsed (used file volume) since a card is removed can be confirmed on the Bargraph or the Overview. The Data File Used Volume bargraph will indicated 100% after 5 minutes has been passed. To use this function, choose Enable in the Display Setting.

8.5 TREND VIEW DISPLAY DATA SAVING (Ver 6.03.09 or later)

The Trend View Display data at Stopped can be recorded. When a graph you want to save is displayed, it is used.

- It is not available during Stopped. In case of Remote Trigger, Event Recording and Time Specified, also it is not available after touching Start and before saving condition establishment.
- It is available in chart speed setting 4 or 1. It is not available in any one of 1/5 through 1/960.
- Saved data
  - · The data is saved in "\DISDAT" folder in the CF card.
  - · Data of alarm and comment are not saved.
  - · Even in case of longer saving intervals than 0.5 sec., the display data is saved in 0.5 sec. intervals.
  - · The maximum number of recorded data is 2500.
  - · Data of all pens that are enabled is saved.
  - · The data can be treated with 73VR Data Viewer in 73VRPAC2 CD-ROM.
- Limitation
  - · The available button during saving is "Close" only.
  - · When saving is done, the CF card access indicator LED turns off.
  - · If the unit turns on without CF card, this function is not available.



HOW TO SAVE THE DATA

(1) Touch MENU in Trend View. Menu list will be displayed then touch Scr.Dat Save.

(2) The view that confirms saving data will appear. Touch OK, or touch Cancel if you do not want.

(3) The view returns to Trend View. During data saving, the view is not changed. When saving is done, the CF card access indicator LED turns off.

CAUTION

· The memory for Trend View Display used in chart speed setting "4" or "1" will be reset if the speed setting is changed to any one of "1/5" through "1/960." In case of opposite changes, the memory will not be reset.

· When chart speed setting is one of "1/5" through "1/960," changing the setting to "4" or "1" makes Saving available.

· The memory size for Trend View Display is 3000 records. However, the maximum number of recorded data is 2500.

8.6 STORED DATA WRITING TO USB MEMORY (Ver 6.03.09 or later)

Writes stored data in the CF card to USB memory with CSV format.

CSV file writing conditions

· The unit must be turned on with CF card and the card is mounted when writing.

· The USB memory is mounted.

· Data is stored in the CF card.

· Not during hot-swapping or FTP communication.

· Alarm histories or comment histories are not written.

· Data range

During not storing: All of stored data in the CF card

During storing: The oldest 1-hour data including empty records is not written to the USB memory. When the empty records is larger than 1-hour data, all of the stored data is written.

CAUTION

There is a USB connector each front and rear of the unit. Be sure that use 1 USB memory at once. If 2 USB memories are mounted, the unit may not recognize them.

8.6.1 WRITING

• Data range setting

2 formats of data range setting are available. “Date” and “Specified Time.”

Note: The format of date and time is YY/MM/DD hh;mm:ss in this unit.

· Date: Writes the data of between 0:00:00.000 and 23:59:59.999 of the specified date.

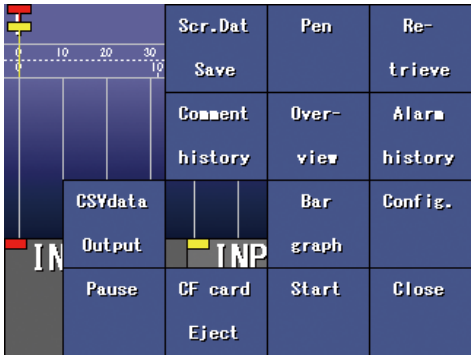
· Specified Time: Writes the data of between 0 msec. of the specified Start date & time and 999 msec. of the specified End date & time.

E.g. in case of Start at 9:10:00 on January 10th 2013, End at 10:00:00 on January 10th 2013, data of between 13/01/10 9:10:00.000 and 13/01/10 10:10:00.999.

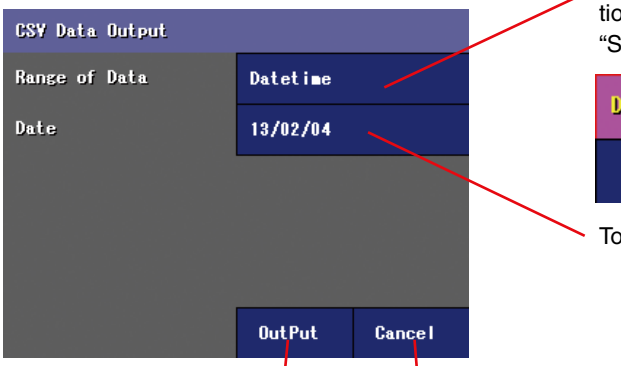
Touching Output and at least 1 record is stored, the data is written to the USB memory. If there is no data in the specified period, Error message will be shown.

HOW TO WRITE THE DATA

(1) Touch MENU in Trend View. Menu list will be displayed then touch CSVdata Output.



(2) CSV data output view (date)

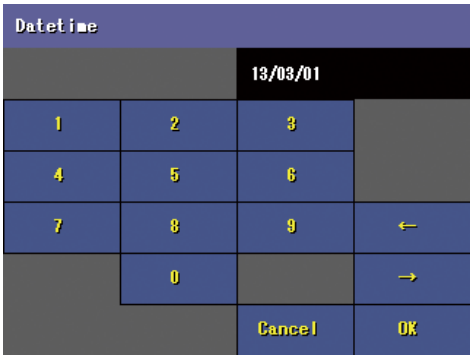


Touch here to change data range setting. Then the selection view for data range setting appears. Touch “Date” or “Specified Time” button.

Touch to specify the date.

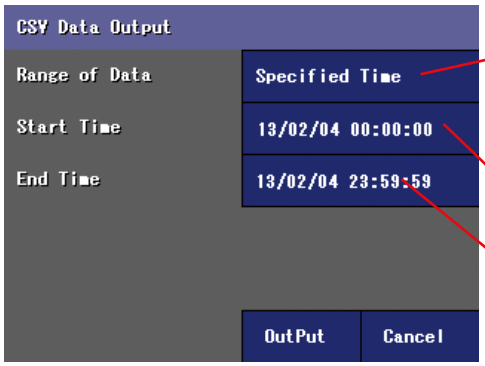
Starts writing to USB memory.

Return to Trend View.



Date Input View (Refer to “Tips for Key Operation” in Section 4.)

(3) CSV Writing View (Specified Time)



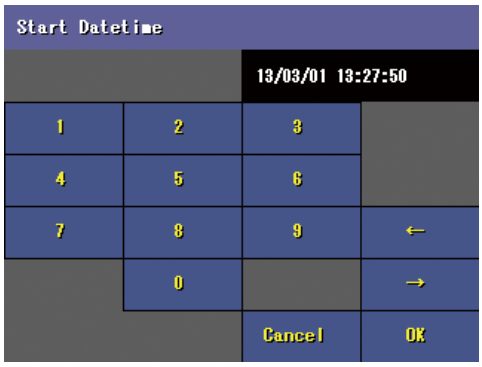
Touch here to change data range setting. Then the selection view for data range setting appears. Touch “Date” or “Specified Time” button.

Touch to specify Start Time (date and time).

Touch to specify End Time (date and time).

Starts writing to USB memory.

Return to Trend View.



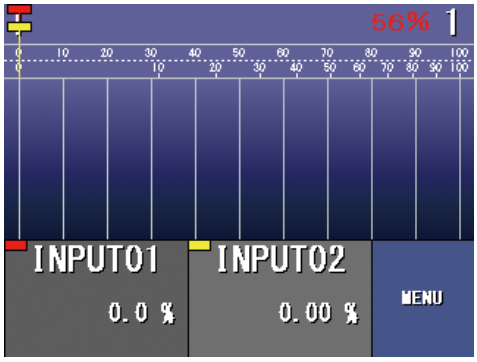
Start Time Input View (same as End Time; refer to “Tips for Key Operation” in Section 4.)

(4) View at writing

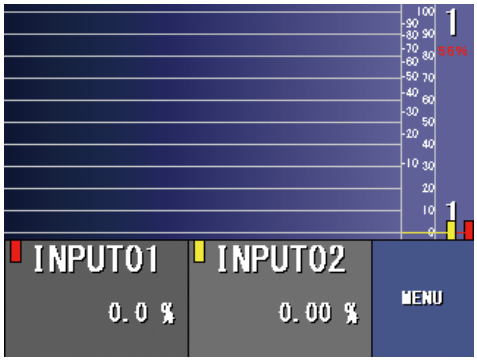
• Progress rate

During writing process, progress rate (%) is shown in red at top right of the screen. It is shown in also Overview and Bargraph.

Do not dismount the USB memory while progress rate is shown.



Progress rate (in a perpendicular chart)



Progress rate (in a horizontal chart)

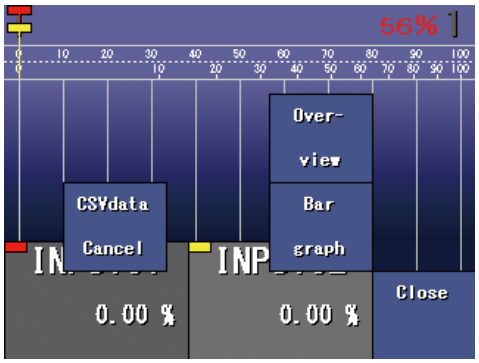
• Menu during writing

During writing, the following menus are available.

· CSV data Cancel Quit writing. Data written in USB memory remains.

· Change View Switch view between Trend View, Overview and Bargraph

· Close Close menu buttons



(5) Error

If settings or operation is incorrect, Error message will be shown when touching CSV data Output button.

· Not available to write to the USB memory

In case that USB memory is dismounted, write protected, etc.

· Date or time is incorrect.

In case that End Time is the same as Start Time or earlier.

· No data in the specified period.

At least 1 record is necessary.

8.6.2 CSV FILE

FILE SECTION

In the following case, the CSV file is sectioned.

· The time stamps of the records are not continuous.

· The time stamps of the records continue to the next day.

· Number of record exceeds the following.

60 000 (20 min.; storing interval: 20 msec.)

36 000 (1 hour; storing interval: 100 msec.)

57 600 (8 hours; storing interval: 500 msec.)

432 000 (12 hours or more; storing interval: 1sec. or more)

FOLDER AND FILE NAME

• Folder where the CSV file saved

CSV files are saved at root folder of the USB memory.

• Name of the CSV file

· No same name file in the USB memory: yymmdd-##.CSV

· Same name files exist in the USB memory: yymmdd-%%-##.CSV

yy: Last two digit of the year of the time stamp of the first record (00 to 99)

mm: Month of the time stamp of the first record (01 to 12)

dd: Day of the time stamp of the first record (01 to 31)

##: Serial number of sectioned files. (00 to 99)

%%: Serial number added when same name files exist (00 to 99)

Note: The maximum number of ## and %% is 99. When the numbers reach 99, the number is fixed to 99 and previous file is overwritten.

CSV FILE WRITING TIME

Writing time depends on the USB memory's performance. Use a fast USB memory.

Writing time example of 30 minutes records

Storing Interval	Input	USB Memory 1		USB Memory 2	
		Stopped	Recordingx	Stopped	Recording
20 msec.	AI: 8 ch, DI: 8 ch, FI: 8 ch	17 min. 36 sec.	18 min. 46 sec.	32 min. 53 sec.	36 min. 52 sec.
1 sec.	AI: 8 ch, FI: 8 ch	16 sec.	17 sec.	33 sec.	33 sec.
1 sec.	AI: 56 ch, DI: 8 ch, FI: 64 ch	1 min. 12 sec.	1 min. 14 sec.	2 min. 51 sec.	2 min. 59 sec.

AI: Analog input, DI: Discrete input, FI: Functions

APPENDIX – 1. BACKLIGHT FAILURE

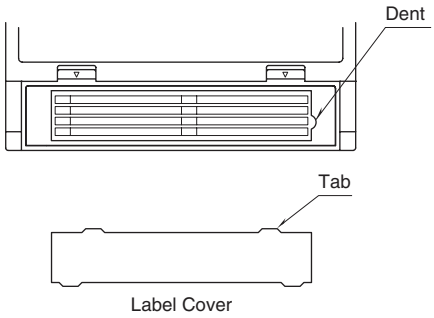
If the backlight is failed, the screen becomes dark in the following circumstances:

- The screen becomes dark even when no screen saver is activated.
- The screen becomes dark after the screen saver is activated, and then it does not recover even when the screen is touched.

The backlight can be replaced at our factory. Stop recording, turn off the power supply and consult us.
The 73VR3100 operation can be remotely stopped using the 73VR31BLD software. Refer to the 73VR31BLD users manual for detail.

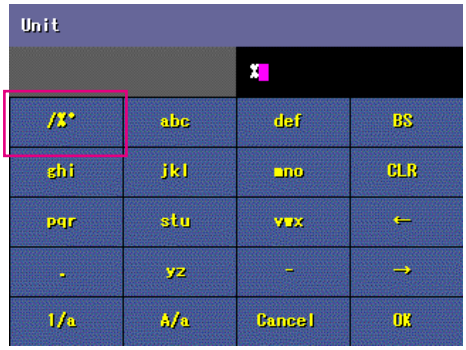
APPENDIX – 2. REPLACING TAG LABEL

(1) Insert a small screwdriver or a similar device under the label cover from the dent on the right side of the label, and pull up until the right tabs on the label cover is lifted out of the slots.
(2) Lift also the left tabs.
(3) Replace the label on the front and put the label cover back.



APPENDIX – 3. HOW TO SHOW TEMPERATURE UNIT ON THE 73VR3100 SCREEN

In order to enter '°C' or '°F' on the 73VR3100, please use the keypad as follows:
(1) Touch the current selection of Unit under Pen Setting (Common) to open the alphanumeric keypad.
(2) Touch three times [/%°] key to enter [°].



(3) Touch [A/a] key to switch to the capital letters mode.
(4) Touch [→] key to move to [ABC] key, and enter [C] by touching the key three times. To enter [F], move to [DEF] key.
(5) Touch OK.

NOTE
Max. 4 characters can be used for an engineering unit. '°C' or '°F' takes two characters.

APPENDIX – 4. UPDATE HISTORY

The history of the updates after firmware version 6 are detailed below.

Ver. 6. 00I	Remote mode available
Ver. 6. 01.xx	R3-US4 and anemoscope function available
Ver. 6.02.xx	SD card available
Ver. 6.03.xx	Revise of Trend View: updating during stopped, pause, display data saving, scrolling at pause are available. Succession of Analog accumulation is available. Writing stored data to USB memory is available.