

# PAPERLESS RECORDER

(color LCD display)

MODEL 71VR1

## BEFORE USE ....

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.

If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

This product 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).

Make sure for safety that only qualified personnel perform the wiring.

### ■ PACKAGE INCLUDES:

Paperless Recorder .....	(1)
Installation fastener.....	(1) pair
CSJ sensor (for 71VR1- E501-x) .....	(3)

### ■ MODEL NO.

Confirm that the model number described on the product is exactly what you ordered.

### ■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

For detailed explanations to operate this product, please refer to Model 71VR1 Operating Manual (EM-7403-B), downloadable at M-System's web site.

<http://www.m-system.co.jp>

### ■ MEMORY CARD

Prepare the following model numbers:

Available for purchase from M-System. Consult M-System

- Manufacturer: Hagiwara Solutions  
Model: NSD6-002GT (discontinued)  
Capacity: 2 GB
- Manufacturer: Hagiwara Solutions  
Model: NSDA-004GT (discontinued), NSDA-004GL  
Capacity: 4 GB
- Manufacturer: Apacer Technology  
Model: AP-ISD04GIS4B-T (discontinued), AP-ISD04GIS4B-3T  
Capacity: 4 GB

## POINTS OF CAUTION

### ■ CONFORMITY WITH EC DIRECTIVES

- This equipment is suitable for use in a Pollution Degree 2 environment and in Installation Category II, with the maximum operating voltage of 300V.

Reinforced insulation is maintained between analog input or contact input or contact output or network interface, power and FE (Functional Earth), Basic insulation is between analog input each other, contact input, contact output each other and network interface. Prior to installation, check that the insulation class of this unit satisfies the system requirements.

- Altitude up to 2000 meters.
- Do not share the grounding point of PE (Protective Earth) of other devices with FE (Functional Earth). Handle as signal ground.
- The equipment must be installed such that appropriate clearance and creepage distances are maintained to conform to CE requirements. Failure to observe these requirements may invalidate the CE conformance.
- In order to enable the operator to turn off the power input immediately, install a switch or a circuit breaker according to the relevant requirements in IEC 60947-1 and IEC 60947-3 and properly indicate it.

### ■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:  
Rating 100 – 240V AC: 85 – 264V, 50/60 Hz,  
approx. 7VA at 100V, approx. 10VA at 240V  
24V DC rating: 24V  $\pm$ 10%, approx. 6W  
110V DC rating: 85 – 150V, approx. 6W
- Supplying any level of power other than specified above will cause malfunctions.
- The power supply must have the startup characteristics such that output voltage rises within operational voltage range in 5 seconds.
- The power cables and the signal I/O cables must be located separately.
- The power cables, the signal I/O cables, and the communication 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.

### ■ SAFETY PRECAUTION

- Before you remove the unit, turn off the power supply and input signal for safety.
- Do not disassemble or modify the unit in any way. Doing so may result in a fire or an electrical shock.
- Do not block the unit's ventilation openings or use it in areas where heat accumulates. Additionally, do not store or use it under high-temperature conditions.
- Do not use the unit in an environment where flammable gases or corrosive gases are present.
- Do not store or use the unit in locations subject to direct sunlight, or where excessive dust or dirt is present.
- The unit is a precision instrument. Do not store or use it where large shocks or excessive vibration can occur.

- Do not store or use the unit 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 unit.
- Observe the environmental conditions when using the unit.
- Wait at least for 15 seconds before turning on the power supply after it has been turned off.

#### ■ ENVIRONMENT

- Indoor use
- The unit 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 -5 to +55°C (23 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

#### ■ GROUNDING

- Be sure to determine in advance the most stable grounding point in the environment and earth the unit's FE terminal and that of connected devices to it in order to protect the devices from dielectric breakdown.
- Grounding is also effective to eliminate noise that could cause errors in the unit's operation.

#### ■ MEMORY CARD

- Do not turn off the power supply to the unit or reset it during recording. The memory card may be destroyed.
- Observe the described procedure when you need to replace the memory card during recording.
- Confirm the sides and the connector position of the memory card when inserting one to the card slot.
- Do not touch the metal terminal with your hands or metallic tools.
- Memory cards have a life span. Back up your important data.

#### ■ 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.
  - The LCD screen pixels may contain minute black-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 unit and wait 15 seconds before restarting it.
- To prevent an afterimage plan to change the screen image periodically so that the same image does not remain for the long time period.

#### ■ MINIMIZING NOISE INTERFERENCE TO ANALOG SIGNAL CABLES

- Noise entering through the analog signal cables may cause irregular measurement values, degradation of overall accuracy, and malfunction of the product. We recommend that you would conduct wiring to the unit with the following points of caution.
- Do not install cables (power supply, input and output) close to noise sources (high frequency line, etc.).
- Do not bind the analog I/O cables together with those in which noises are present. Do not install them in the same duct.

#### ■ DO NOT APPLY OVERRANGE INPUT

- Do not apply voltages exceeding  $\pm 15V$  to terminals V – COM and AB – C to prevent damage. Do not apply currents exceeding  $\pm 30mA$  to terminals I – COM to prevent damage.

#### ■ INTERNAL CLOCK

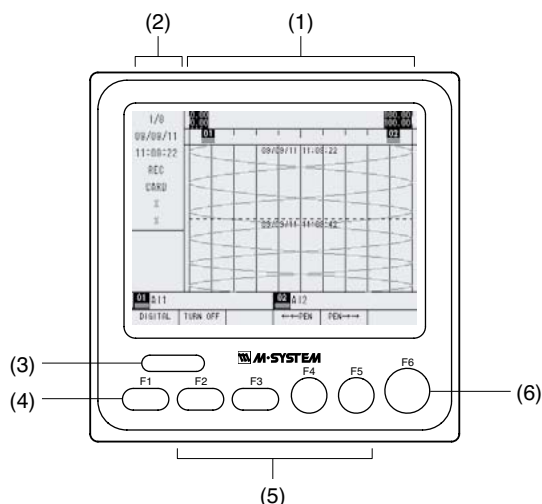
- The internal clock data is stored in memory powered by a backup battery while the unit is without external power supply.
- The data will be reset to its default status when the battery is used up while the unit is left without power supply for a long time period. The clock adjustment will be necessary once the power is restored.
- Once the power is restored, the unit starts recharging the battery. It will be full in approximately in 36 to 48 hours.
- Battery backup: approx. one month

#### ■ AND ....

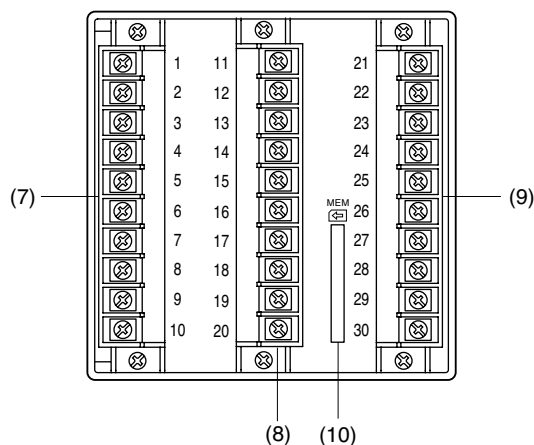
- We recommend use of an UPS to supply power backups.
- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

## COMPONENT IDENTIFICATION

### FRONT VIEW

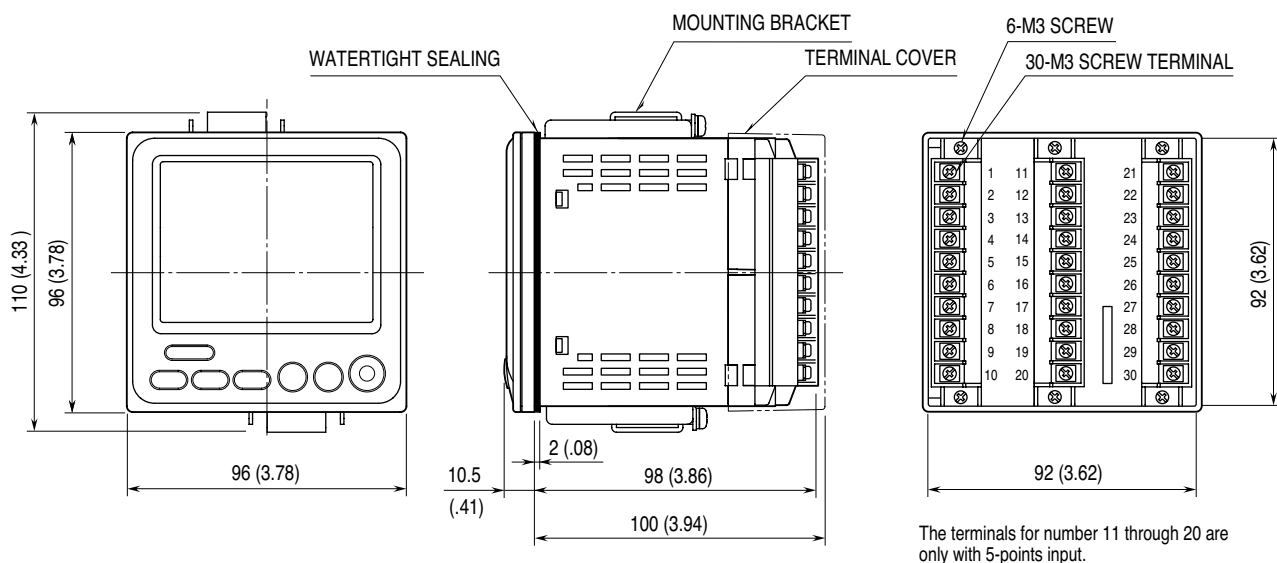


### REAR VIEW



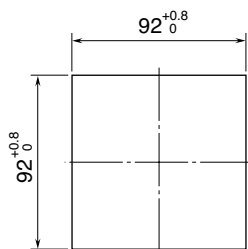
COMPONENT	FUNCTION
(1) Main display	Measured values and setting view are displayed. TREND display screen: Recorded data is displayed in trend graph. DIGITAL display screen: Display digital values and bar graph. CONTROL MENU: Change the settings. SETTING MENU: Change the detailed settings.
(2) Sub display	Date/time, memory card status and contact status are displayed.
(3) Infrared communication port	Recorded data and settings are transferred to a PC with the Infrared Communication Adaptor (model: COP-IRDA) and the PC configurator software (model: 71VRCFG).
(4) F1 button	Change measurement display, CONTROL MENU, and SETTING MENU, cancel the operation.
(5) F2 – F5 button	Change display pages, operation of menu or cursor, change setting values.
(6) F6 button	Mark to measured values, ENTER, execute commands.
(7) Terminal 1	Power supply terminals, contact output terminals, contact input terminals
(8) Terminal 2	Analog input terminals
(9) Terminal 3	Analog input terminals, external interface terminals
(10) Memory card slot	Insert a memory card.

## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENT unit: mm (inch)



## INSTALLATION

### ■ PANEL CUTOUT unit: mm



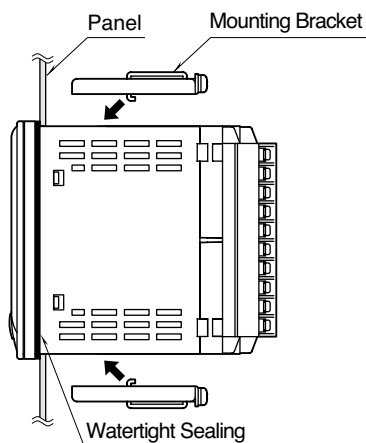
Usable panel thickness: 0.5 – 10

### ■ CAUTION

- Degree of protection, IP65 is applicable to the front panel of the unit with single mounting according to the specified panel cutout.
- Install the unit to vertical panel so that its function buttons are at the bottom side. Installing by other direction will cause degradation of life span or performance due to rise of the internal temperature.
- Ensure that there is sufficient space for ventilation inside a panel. Do not install above the devices that generate high heat such as heaters, transformers or resistors. Observe at the minimum of 30 mm (1.2") in all directions for maintenance purpose.

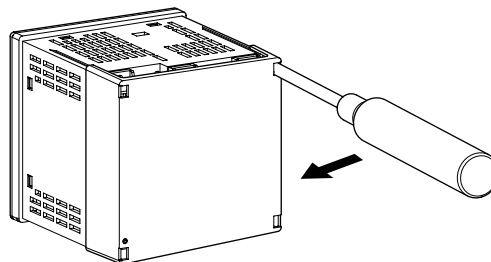
### ■ HOW TO MOUNT THE UNIT ON A PANEL

- 1) Remove the mounting brackets.
- 2) Remove the terminal cover and insert it into the panel cutout prior to insertion of the unit.
- 3) Insert the unit into the panel cutout. The watertight packing must be in place to hold the unit. Do not remove it.
- 4) Hang the hooks of the mounting brackets at the square holes on the upper and bottom side of the unit. Tighten screws of the brackets until the unit is fixed to the panel.



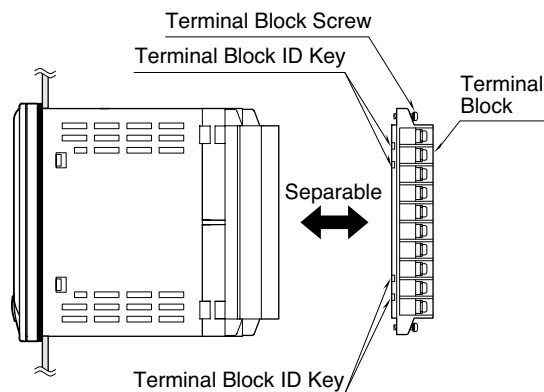
### ■ HOW TO REMOVE THE TERMINAL COVER

Insert the minus tip of a screwdriver into each hole at the four corners of the cover and pull it to the direction as indicated below to separate the terminal cover.

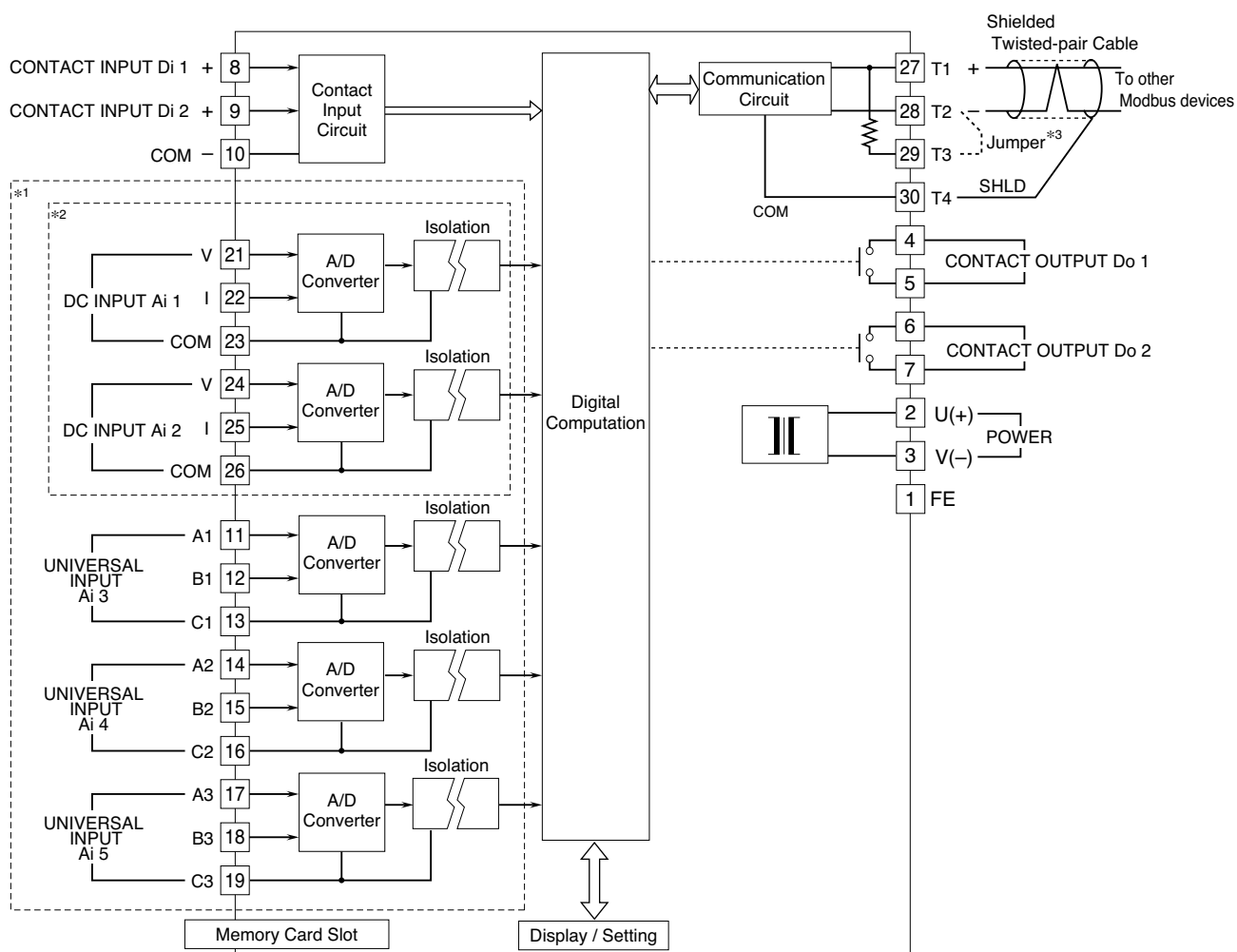


### ■ HOW TO REMOVE THE TERMINAL BLOCK

- The terminal block is separable in two pieces. Loosen two screws on top and bottom of the terminal block to separate.
- Be sure to turn off the power supply, input/output signal, communication signal and power supply to the output relays before separating the terminal block.
- Each terminal block has ID keys so that it can be inserted to applicable terminal socket only.



## CONNECTION DIAGRAM



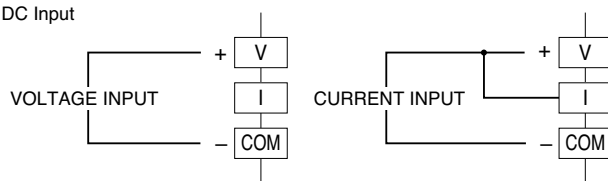
\*1. Only with 5-point inputs

\*2. Only with 2-point DC inputs

\*3. When the device is located at the end of a transmission line via twisted-pair cable (when there is no cross-wiring), close across the terminals T2 - T3 with a leadwire.

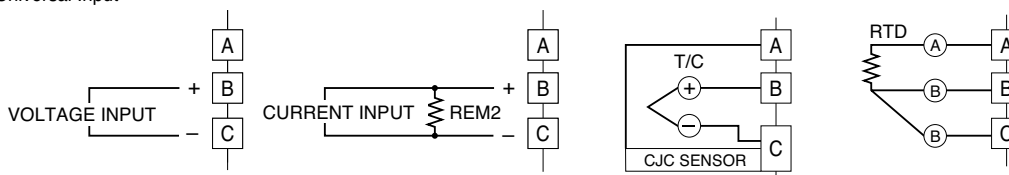
### ■ INPUT CONNECTION E.G.

• DC Input



NOTE: Short across the terminals V and I for Current Input.

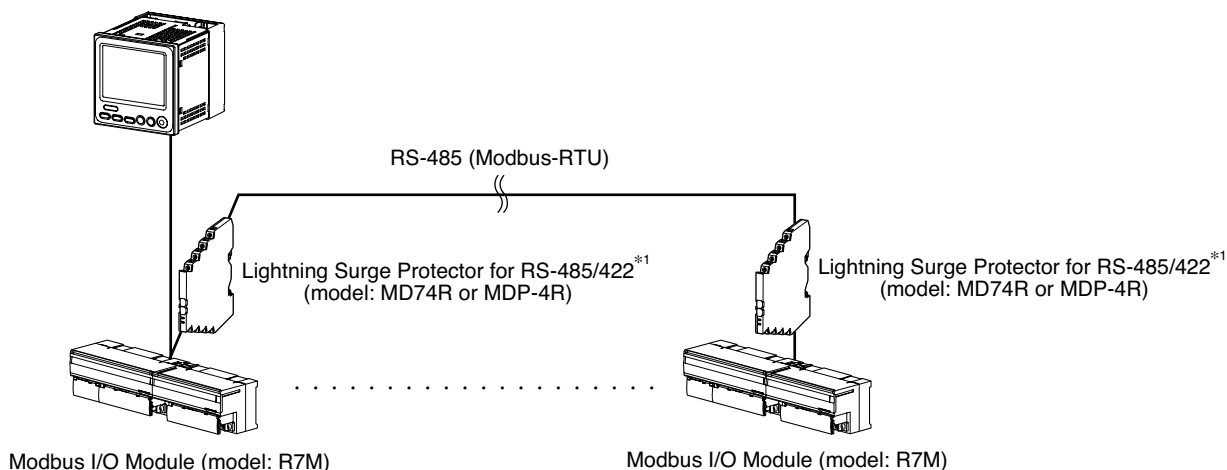
• Universal Input



NOTE: For mA input, the REM2 is required.

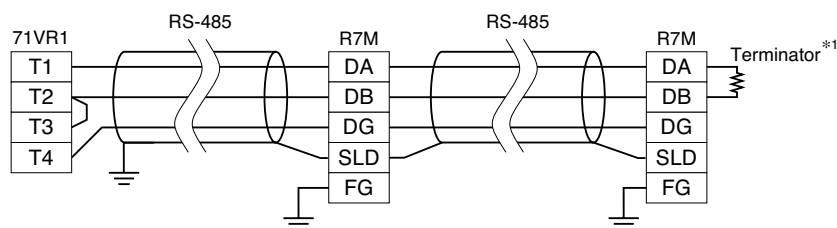
## SYSTEM CONFIGURATION EXAMPLES

Paperless Recorder (model: 71VR1)



\*1. Insert lightning surge protectors recommended in this example if necessary.

## MODBUS WIRING DIAGRAM



\*1. Use a terminating resistor when the device is at the extreme end of a transmission line.

## PREPARATION & WIRING TO THE UNIT

### ■ MEMORY CARD

#### • How to insert a memory card

- 1) Initialize a memory card
- 2) Make sure the Lock switch is slid up (unlock position) so that the memory card is writable.
- 3) Insert the memory card into the memory card slot completely.
- 4) CARD in the sub display turns to green.

#### • How to remove a memory card

- 1) When the unit is recording, press STOP RECORDING button in the CONTROL MENU to stop recording.
- 2) Press the REMOVE MEMORY CARD button in the CONTROL MENU.
- 3) Push the memory card to remove it.

### ■ WIRING

#### • Power supply

Confirm the power input rating marked on the product.

- 1) Remove the terminal cover.
- 2) Loosen three screws on the power supply terminals.
- 3) Connect the power cables and the earth cable to the power supply terminals.
- 4) Replace the terminal cover.

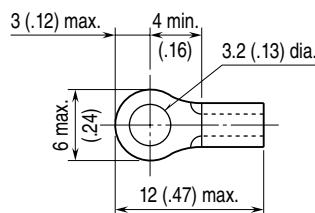
#### • Input/Output

Follow the procedure shown below when a DC signal is connected to DC Input Ai 1. For other input/output connections, similar procedure should be followed.

- 1) Turn the power off.
- 2) Remove the terminal cover.
- 3) Connect the (+) side of a signal source to V (21), connect the (-) side to COM (23).
- 4) Replace the terminal cover.

Please choose appropriate solderless terminals for the input/output terminals and the power terminals, referring to the figure shown below. Appropriate tightening torque is 0.5 N·m.

Input terminal block: M3 screw terminal connection  
Screw terminal material: Nickel plated steel  
Appropriate wire size: 0.3 to 0.75 mm<sup>2</sup>



## SETTING UP THE RECORDER

Basic setup procedure for 71VR1-E101-x is explained in this section, using an example of voltage input measurement at Input 1 displaying 0 to 100 % to store data in a memory card in 500 m sec. sample rate.

### ■ SYSTEM SETTING

- 1) Hold down F1 button on TREND display screen, DIGITAL display screen or CONTROL MENU until SETTING MENU is displayed.
- 2) SYSTEM is selected. Press [ENTER] (F6) button to display SYSTEM SETTING menu.
- 3) Confirm the settings such as DATE, TIME, NUMBER OF DECIMALS, and MODBUS. If you need to change them, press F1 or F2 button to move to the setting you need to change.
- 4) Press [EDIT] (F6) button to change color of the value to magenta, then change the value by pressing F2 through F5 button. After changing the value, press [ENTER] (F6) to set the value.
- 5) Press [RETURN] (F1) button to return to TREND display screen.

### ■ INPUT CHANNEL SETTING

- 1) Hold down F1 button on TREND display screen, DIGITAL display screen or CONTROL MENU until SETTING MENU is displayed.
- 2) Press F2 or F3 button to select CHANNEL in the menu list, then press [ENTER] (F6) button to display CHANNEL MENU.
- 3) OPERATING MODE is selected. Press [ENTER] (F6) button to display CHANNEL/OPERATING MODE menu.
- 4) SAMPLE RATE is selected. Press [EDIT] (F6) button. Press F2 or F3 button to select 500 ms of sample rate. Press [ENTER] (F6) button to set the sample rate.
- 5) NORMAL/DEMO is for selecting NORMAL mode or DEMO mode. Confirm it is NORMAL.
- 6) Press [RETURN] (F1) button to return to the CHANNEL MENU.

### ■ CHANNEL/ANALOG INPUT/CHANNEL SETTING

- CHANNEL/ANALOG INPUT menu 1/3
- 1) Press F2 or F3 button in CHANNEL MENU to select ANALOG INPUT, then press [ENTER] (F6) button to display CHANNEL/ANALOG INPUT menu.
  - 2) Press [EDIT → →] (F6) button to select "AI 1" for INPUT CHANNEL.
  - 3) Press F2 or F3 button to select FIELD CHANNEL, then press [EDIT → →] (F6) button to enable editing.
  - 4) Press F2 or F3 button to select Ai1, then press [ENTER] (F6) button to set the field channel to Ai1.
  - 5) Press F2 or F3 button to select TYPE, then press [EDIT → →] (F6) button to enable editing.
  - 6) Press F2 or F3 button to select "-10 - 10V", then press [ENTER] (F6) button to set the type to "-10 - 10V".
  - 7) Press F2 or F3 button to select MIN, then press [EDIT → →] (F6) button to enable editing.
  - 8) Press F2 through F5 button to change the value to 0.000, then press [ENTER] (F6) button. The number of decimal places displayed here is fixed by the setting in the SYSTEM SETTING menu.

- 9) Press F2 or F3 button to select MAX, then press [EDIT → →] (F6) button to enable editing.
- 10) Press F2 through F5 button to change the value to 10.000, then press [ENTER] (F6) button.

- CHANNEL/ANALOG INPUT menu 2/3

To change ENGINEERING UNIT and TAG NAME, the Configurator Software (model: 71VRCFG) is required.

- 1) Press F4 or F5 button to display CHANNEL/ANALOG INPUT menu 2/3.
- 2) Press F2 or F3 button to select SCALE MIN, then press [EDIT → →] (F6) button to enable editing.
- 3) Press F2 through F5 button to change the value to 0.000, then press [ENTER] (F6) button.
- 4) Press F2 or F3 button to select SCALE MAX, then press [EDIT → →] (F6) button to enable editing.
- 5) Press F2 through F5 button to change the value to 10.000, then press [ENTER] (F6) button.

- CHANNEL/ANALOG INPUT menu 3/3

- 1) Press F4 or F5 button to display CHANNEL/ANALOG INPUT menu 3/3.
- 2) PRESENT VALUE displays current measured value. Use ZERO/SPAN to adjust the measured value.
- 3) Press [RETURN] (F1) button twice to return to SETTING MENU.

### ■ PEN SETTING

- 1) Press F2 or F3 button to select PEN in the menu list, then press [ENTER] (F6) button to display PEN SETTING menu.
- 2) Confirm that P1 is displayed at PEN column.
- 3) Press F2 or F3 button to select INPUT, then press [EDIT → →] (F6) button to enable editing.
- 4) Press F2 or F3 button to select "AI 1", then press [ENTER] (F6) button.
- 5) Press [RETURN] (F1) button twice to return to TREND display screen.

Basic procedure is mostly the same as the above example.

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## LET'S START RECORDING

### ■ DISPLAY MEASURED VALUE

Press F1 to select TREND display screen or DIGITAL display screen and display measured value.

### ■ RECORD MEASURED VALUE

- 1) Press F1 button several times to display CONTROL MENU.
- 2) Press F2 or F3 button to select START CONTINUOUS RECORDING, then press [ENTER] (F6) button. The unit starts recording to memory card.
- 3) Press F1 button to confirm REC in the sub display of TREND display screen or DIGITAL display screen turns to red.

### ■ STOP RECORDING

- 1) Press F1 button several times to display CONTROL MENU.
- 2) Press F2 or F3 button to select STOP RECORDING, then press [ENTER] (F6) button. The unit stops recording.

Use the memory card, or the Infrared Communication Adaptor (model: COP-IRDA) and the PC configurator software (model: 71VRCFG) to transfer the recorded files to a Personal Computer.

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## LIGHTNING SURGE PROTECTION

M-System offers a series of lightning surge protector for protection against induced lightning surges. Please contact M-System to choose appropriate models.