

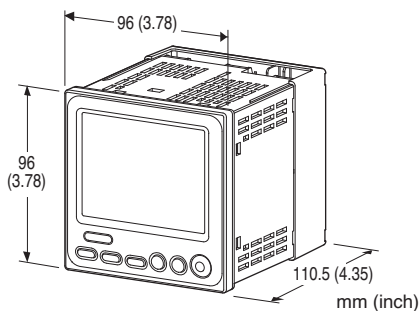
## Paperless Recording System

### PAPERLESS RECORDER

(color LCD display)

#### Functions & Features

- 96 mm square size
- Records, displays and sets alarms for 8 analog and 8 contact inputs and 8 contact outputs
- Maps the remote I/O data to logical channels
- Built-in I/O: 2 analog, 3 universal and 2 contact inputs and 2 contact outputs
- Trigger function: Records only necessary part of the data
- Recorded data can be transferred to a PC with memory cards or COP-IRDA and converted to CSV format with 71VRCFG
- TFT color LCD
- IP65 front panel
- Separable two pieces terminal block
- Safety terminal cover tethered to the device with a strap



### MODEL: 71VR1-[1][2]1-[3]

#### ORDERING INFORMATION

- Code number: 71VR1-[1][2]1-[3]
- Specify a code from below for each [1] through [3].  
(e.g. 71VR1-N101-M2)

#### [1] LANGUAGE

N: Japanese

E: English

(Language (Japanese or English) can be chosen by front panel setting.)

#### [2] ANALOG INPUT

00: None

10: DC input, 2-points

50: DC input, 2-points,

Universal input, 3-points (V, mA, T/C, RTD)

#### EXTERNAL INTERFACE

1: Modbus

#### [3] POWER INPUT

##### AC Power

M2: 100 - 240 V AC (Operational voltage range 85 - 264 V, 50/60 Hz)

##### DC Power

R: 24 V DC

(Operational voltage range 24 V  $\pm$ 10 %, ripple 10 %p-p max.)

P: 110 V DC

(Operational voltage range 85 - 150 V, ripple 10 %p-p max.)

#### RELATED PRODUCTS

- Precision Resistor Module (model: REM2-50)

Use for mA universal input

- Infrared communication adaptor (model: COP-IRDA)

- PC configurator software (model: 71VRCFG)

Downloadable at M-System's web site.

- Remote I/O R3 series

Modbus interface module (model: R3-NM1)

- Remote I/O R5 series

Modbus interface module (model: R5-NM1)

- Modbus I/O module (model: R7M)

R7 Configurator Software (Model: R7CON)

Modbus communication parameters of the R7M must be configured by using R7CON and the dedicated cable.

- Devices equipped with Modbus communication. For detailed information, visit the M-System's web site.

- Memory card

A memory card is required to store data in the unit.

Use the specified model number of memory card.

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

- Hagiwara Solutions NSD6-004GH

(NSD6-002GT and NSDA-004GT, NSDA-004GL ...

discontinued)

- Apacer Technology AP-ISD04GIS4B-3T

(AP-ISD04GIS4B-T ... discontinued)

#### GENERAL SPECIFICATIONS

**Construction:** 96-mm square (1/4 DIN size) panel flush mounted

**Degree of protection:** IP65; applicable to the front panel of the recorder with single mounting according to the specified panel cutout

**Connection:** M3 separable screw terminal (torque 0.5 N·m)

**Screw terminal:** Nickel-plated steel

**Housing material:** Flame-resistant resin (black)

**Isolation:** Analog input each other to contact input to contact output 1 to contact output 2 to Modbus interface to power input to FE (Functional Earth)

**Number of assignable logical channels**

**Analog input:** 8 points max.  
**Contact input:** 8 points max.  
**Contact output:** 8 points max.  
**Data storage:** Stores Trend and Alarm history in memory card.  
**Trend:** Stored in files named time and date.  
 60000 samples in one file  
 Storage capacity: 200 files max.  
 Storage time:  
 Approx. 13 days at storing rate 0.1 sec.,  
 approx. 138 days at 1 sec.,  
 approx. 1388 days at 10 sec.,  
 approx. 8333 days at 1min.,  
 approx. 250000 days at 30 min.,  
 approx. 500000 days at 1 hour.

**Alarm history:** Stored in alarm history file, 200 items max.

## ■ DISPLAY

**Display device:** 3.5-inch TFT LCD

**Display colors:** 256

**Resolution:** 320 × 240 pixels

**Backlight:** LED

**Display update interval:** 500 msec.

**Sample rate:**

NUMBER OF MODBUS LOGICAL CHANNELS	SAMPLE RATE (sec.)								
	0.1	0.2	0.5	1	2	5	10	20	30
0	Y*	Y*	Y	Y	Y	Y	Y	Y	Y
1 to 2	---	Y*	Y	Y	Y	Y	Y	Y	Y
3 to 5	---	---	Y	Y	Y	Y	Y	Y	Y
6 to 10	---	---	---	Y	Y	Y	Y	Y	Y
11 to 20	---	---	---	---	Y	Y	Y	Y	Y
21 to 24	---	---	---	---	---	Y	Y	Y	Y

NUMBER OF MODBUS LOGICAL CHANNELS	SAMPLE RATE (min)				SAMPLE RATE (hour)	
	1	5	10	20	30	1
0	Y	Y	Y	Y	Y	Y
1 to 2	Y	Y	Y	Y	Y	Y
3 to 5	Y	Y	Y	Y	Y	Y
6 to 10	Y	Y	Y	Y	Y	Y
11 to 20	Y	Y	Y	Y	Y	Y
21 to 24	Y	Y	Y	Y	Y	Y

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

\*Selectable when without thermal input settings

20 sec. or longer sampling rate is available with firmware of major version 1, minor version 4.01 or higher.

## INPUT SPECIFICATIONS

### ■ Universal Input (Ai3, Ai4, Ai5)

#### • DC current input

(Range: Input resistance)

-20 - +20 mA: 50 Ω (separately provided REM2)

#### • DC voltage input

(Range: Input resistance)

-1 - +1 V: ≥ 1 MΩ

-5 - +5 V: ≥ 1 MΩ

-10 - +10 V: ≥ 1 MΩ

• **Thermocouple input:** K, E, J, T, B, R, S, C, N, U, L, P, PR (See Table 1.)

**Input resistance:** ≥ 30 kΩ

**Burnout sensing:** ≤ 0.1 μA

**Burnout indication:** Maximum value (upscale burnout) of the usable range

• **RTD input:** Pt 100 (JIS '97, IEC), Pt 100 (JIS '89), JPt 100 (JIS '89), Pt 50Ω (JIS '81), Ni 100, Cu 10, Cu 50 (See Table 2.)

**Input resistance:** ≥ 1 MΩ

**Maximum leadwire resistance:** 100 Ω per wire

**Burnout indication:** Maximum value (upscale burnout) of the usable range

**Sensing current:** ≤ 1 mA

### ■ DC Current Input (Ai1, Ai2)

(Range: Input resistance)

-20 - +20 mA: 100 Ω (incorporated)

### ■ DC Voltage Input (Ai1, Ai2)

(Range: Input resistance)

-1 - +1V: ≥ 1MΩ

-5 - +5V: ≥ 1MΩ

-10 - +10V: ≥ 1MΩ

### ■ Contact Input (Di1, Di2): Dry contact, 2 points

**Input resistance:** Approx. 1.8 kΩ

**Common:** Negative

**Sensing:** 12 V DC

**ON current/resistance:** ≥ 1.5 mA, ≤ 1.5 kΩ

**OFF current/resistance:** ≤ 0.75 mA, ≥ 15 kΩ

### [Table 1 (Thermocouple input)]

T/C	USABLE RANGE (°C)	CONFORMANCE RANGE (°C)
K (CA)	-272 to +1472	-150 to +1370
E (CRC)	-272 to +1100	-170 to +1000
J (IC)	-260 to +1300	-180 to +1200
T (CC)	-272 to +500	-170 to +400
B (RH)	24 to 1920	1000 to 1760
R	-100 to +1860	380 to 1760
S	-100 to +1860	400 to 1760
C (WRe 5-26)	-52 to +2416	100 to 2315
N	-272 to +1400	-130 to +1300
U	-252 to +700	-200 to +600
L	-252 to +1000	-200 to +900
P (Platinel II)	-52 to +1496	0 to 1395
(PR)	-52 to +1860	300 to 1760

Overrange input (out of the usable range) is handled as burnout.

### [Table 2 (RTD input)]

RTD	USABLE RANGE (°C)	CONFORMANCE RANGE (°C)
Pt 100 (JIS '97, IEC)	-240 to +900	-200 to +850
Pt 100 (JIS '89)	-240 to +900	-200 to +660
JPt 100 (JIS '89)	-236 to +560	-200 to +510
Pt 50 (JIS '81)	-236 to +700	-200 to +649
Ni 100	-100 to +252	-80 to +250
Cu 10 (25°C)	-212 to +312	-50 to +250
Cu 50	-100 to +200	-50 to +150

Overrange input (out of the usable range) is handled as burnout.

## OUTPUT SPECIFICATIONS

### ■ Network Interface

• **Modbus-RTU:** Retrievable analog data is Int data (signed 16 bits) only.

**Transmission:** Half-duplex, asynchronous, no procedure

**Interface:** Conforms to EIA RS-485

**Max. transmission distance:** 500 meters

**Baud rate:** 4800, 9600, 19200, 38400 bps

**Data bit:** 8 bits

**Parity:** Odd

**Stop bit:** 1 bit

**Max. number of nodes:** 15 (except the master)

**Media:** Shielded twisted-pair cable (CPEV-S 0.9 dia.)

### • Infrared Interface

**Interface:** IrDA

**Max. transmission distance:** ≤ 0.2 m (with COP-IRDA and 71VRCFG)

### ■ Contact Output (Do1, Do2)

#### • Relay Output

**Relay rating:**

250 V AC @5 A (cos  $\phi$  = 1)

30 V DC @5 A (resistive load)

**Maximum switching voltage:** 250 V AC or 30 V DC

**Maximum switching power:** 1250 VA or 150 W

**Minimum load:** 5 V DC @10 mA

**Mechanical life:**  $2 \times 10^7$  cycles

## INSTALLATION

### Power consumption

#### •AC:

Approx. 7 VA at 100 V

Approx. 10 VA at 240 V

#### •DC: Approx. 6 W

**Operating temperature:** -5 to +55°C (23 to 131°F)

**Operating humidity:** 30 to 90 %RH (non-condensing)

**Atmosphere:** No corrosive gas or heavy dust

**Mounting:** Panel flush mounting

**Weight:** 550 g (1.21 lb)

## PERFORMANCE

### Conversion accuracy

**DC input:**  $\pm 0.1\% \pm 1$  digit

**Thermocouple input:**  $\pm 1^\circ\text{C}$  ( $\pm 2^\circ\text{C}$  for B, R, S, C, PR)

**RTD input:**  $\pm 1^\circ\text{C}$  ( $\pm 3^\circ\text{C}$  for Cu 10)

**CJC error:**  $\pm 2^\circ\text{C}$  max. at  $25^\circ\text{C} \pm 10^\circ\text{C}$

$\pm 4^\circ\text{C}$  max. for R, S, PR

**Temp. coefficient:**  $\pm 0.015 \%/^\circ\text{C}$  ( $\pm 0.008 \%/^\circ\text{F}$ )

( $\pm 0.05 \%/^\circ\text{C}$  ( $\pm 0.03 \%/^\circ\text{F}$ ) for Cu 10) of max. span

**Response time:** ≤ 0.5 sec. for DC input with the sample rate set to 100 msec.

≤ 2.5 sec. for T/C, RTD input with the sample

rate set to 500 msec.

Response time of alarm output, 0 - 100 % at 90 % setpoint.

**Line voltage effect:**  $\pm 0.1 \%$  over voltage range

**Calendar clock accuracy:** Monthly deviation 2 minutes at  $25^\circ\text{C}$

**Battery backup:** Approx. one month

**Insulation resistance:**  $\geq 100 \text{ M}\Omega$  with 500 V DC

**Dielectric strength:** 2000 V AC @1 minute

(Analog input each other to contact input to contact output 1 to contact output 2 to Modbus interface to power input to FE)

## STANDARDS & APPROVALS

### EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

Low Voltage Directive

EN 61010-1

Measurement Category II (contact output)

Installation Category II (power)

Pollution degree 2

Analog input or contact input or contact output or network interface to power to FG: Reinforced insulation (300 V)

Analog input each other to contact input to contact output each other to network interface: Basic insulation (300 V)

RoHS Directive

EN 50581

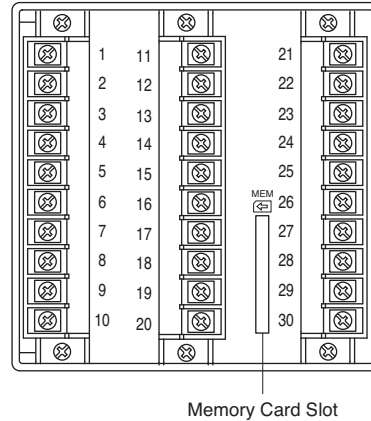
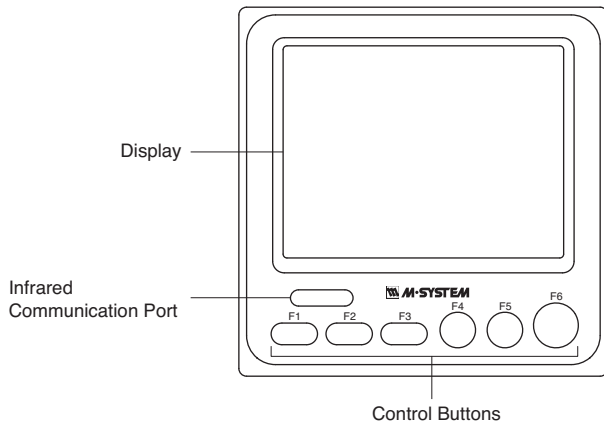
### Protection against access to the terminal blocks:

Finger protection (VDE 0660-514)

## EXTERNAL VIEW

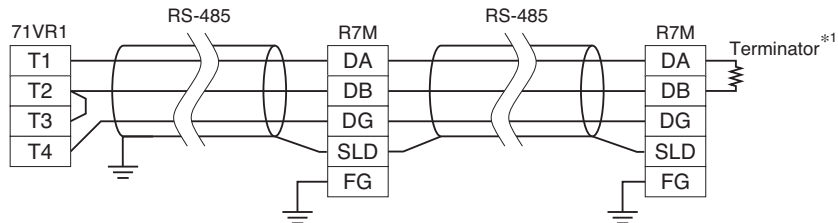
■ FRONT VIEW

■ REAR VIEW



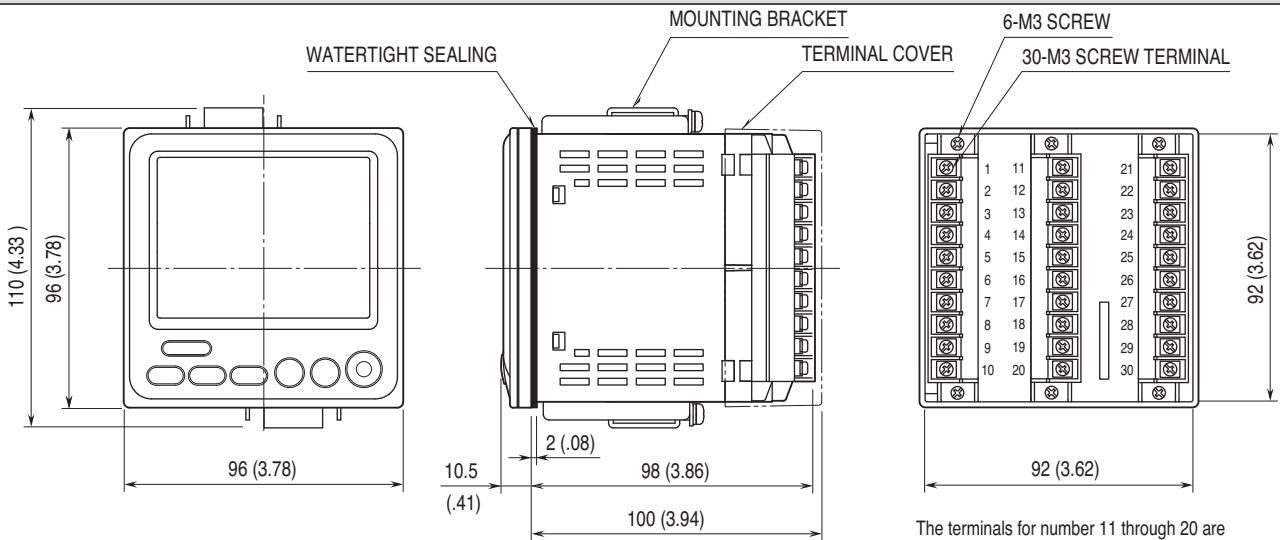
The terminals for number 11 through 20 are only with 5-points input.

## MODBUS WIRING CONNECTION



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

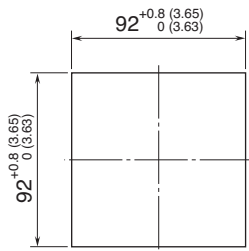
## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)



The terminals for number 11 through 20 are only with 5-points input.

**MOUNTING REQUIREMENTS unit: mm (inch)**

■ **PANEL CUTOUT**

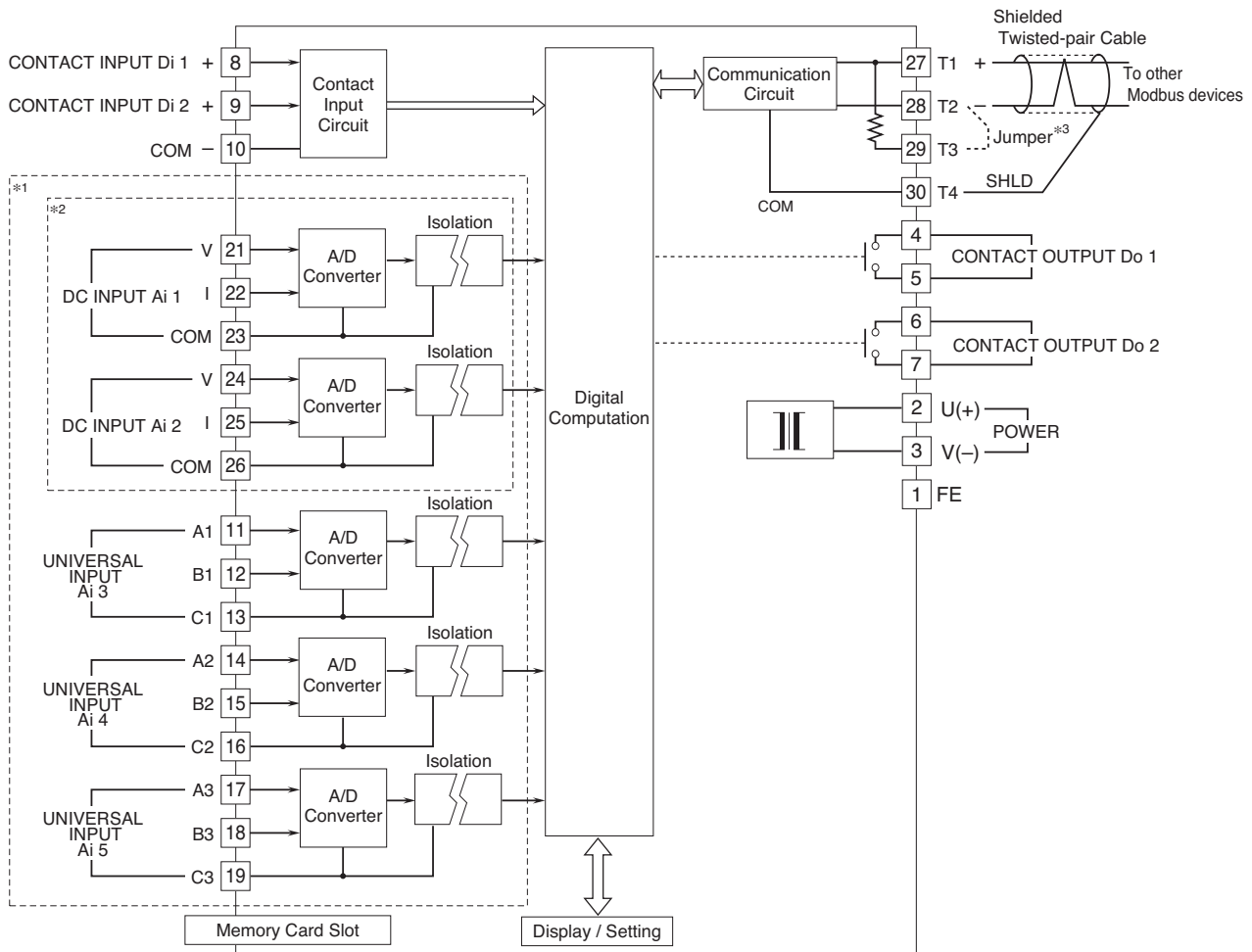


Usable panel thickness: 0.5 – 10 mm (0.02 to 0.39 inch)

## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.



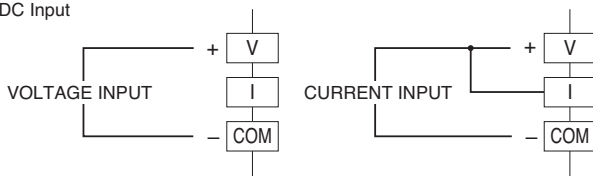
\*1. Only with 5-point inputs

\*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.

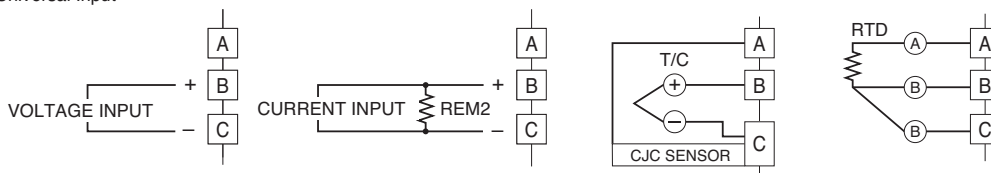
### INPUT CONNECTION E.G.

• DC Input



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

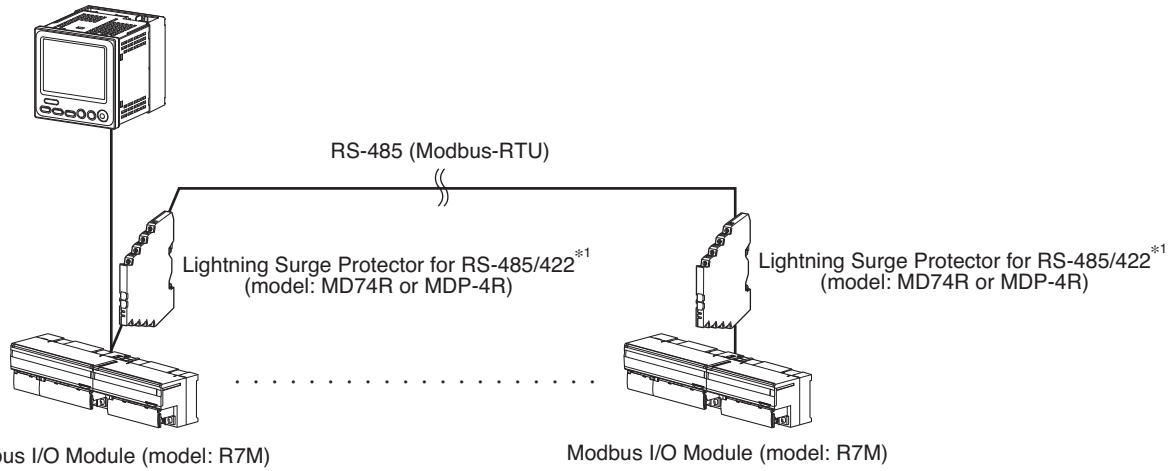
• Universal Input




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.

 Specifications are subject to change without notice.