

Power Transducer Series

MULTI POWER MONITOR

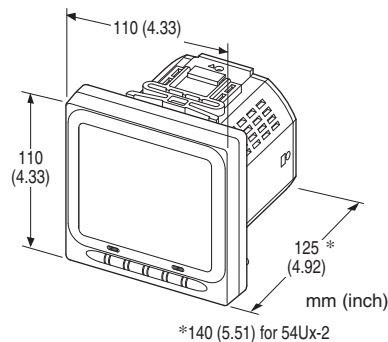
(4 digital displays)

Functions & Features

- Measures simultaneously several variables of a heavy-current power system: current, voltage, active, reactive and apparent power, active and reactive energy, power factor, frequency, etc.
- All measured values, counter values, display mode, setting data are stored in the non-volatile memory at the power off
- Parameters are programmable using the front buttons or the PC via infrared interface
- Mounted using M5 screws or mounting brackets
- 60-segment bargraph
- Displayed measurands are freely selectable
- Open collector output for alarm or energy count
- Loop test output

Typical Applications

- Multi-functional power monitor incorporated in an electric device: saves space, wiring works, and cost



MODEL: 54U-[1][2][3][4]-AD4[5]

ORDERING INFORMATION

- Code number: 54U-[1][2][3][4]-AD4[5]
Specify a code from below for each of [1] through [5].
(e.g. 54U-1211-AD4/Q)
- Specify the specification for option code /Q
(e.g. /C01/S01/SET)

[1] CONFIGURATION

- 1: Single phase / 2-wire and 3-wire, 3-phase / 3-wire
- 2: Single phase / 2-wire and 3-wire,
3-phase / 3-wire and 4-wire

[2] INPUT

- 1: 480 V / 1 A AC
- 2: 480 V / 5 A AC

[3] DISCRETE INPUT

- 0: None
(‘External Interface’ codes 1, 2, 3, 7 and 8 Not selectable.)
- 1: 24V DC
(‘External Interface’ codes 4, 5, 6, 9 and A Not selectable.)
- 2: 110V DC
(‘External Interface’ codes 4, 5, 6, 9 and A Not selectable.)

[4] EXTERNAL INTERFACE

- 1: Modbus, Do × 1, Di × 1
- 2: 4 – 20 mA DC × 4, Do × 1, Di × 1
- 3: 1 – 5 V DC × 4, Do × 1, Di × 1
- 4: Modbus, Do × 2
- 5: 4 – 20 mA DC × 4, Do × 2
- 6: 1 – 5 V DC × 4, Do × 2
- 7: 4 – 20 mA DC × 4 (isolated), Do × 1, Di × 1
- 8: 1 – 5 V DC × 4 (isolated), Do × 1, Di × 1
- 9: 4 – 20 mA DC × 4 (isolated), Do × 2
- A: 1 – 5 V DC × 4 (isolated), Do × 2

AUXILIARY POWER SUPPLY

- AD4: universal
100 – 240 V AC (Operational range 85 – 264 V, 50 / 60 Hz) /
110 – 240 V DC (Operational range 99 – 264 V,
ripple 10 %p-p max)

[5] OPTIONS (multiple selections)

Language

- blank: Japanese
- /E: English

Other Options

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

SPECIFICATIONS OF OPTION: Q (multiple selections)

COATING (For the detail, refer to M-System's web site.)

Moving parts and indicators are not coated.

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

TERMINAL SCREW MATERIAL

- /S01: Stainless steel

EX-FACTORY SETTING

- /SET: Preset according to the Ordering Information Sheet
(No. ESU-6487)

RELATED PRODUCTS

- Infrared Communication Adaptor (model: COP-IRU)
 - PC configurator software (model: PMCFG)
- Downloadable at M-System's web site.

GENERAL SPECIFICATIONS

Construction: 110-mm square panel flush mounted

Degree of protection

Front panel: IP 50

Terminal block, housing: IP 30

Connection

Voltage input: M4 screw terminals (torque 1.4 N·m)

Current input: M4 screw terminals (torque 1.4 N·m)

Discrete input, discrete output, analog output, Modbus, auxiliary power supply: M3 screw terminals (torque 0.6 N·m)

Configuration

Code 1: Single phase/2-wire and 3-wire, 3-phase/3- wire balanced/unbalanced load

Code 2: Single phase/2-wire and 3-wire, 3-phase/3- wire balanced/unbalanced load, 3-phase/4- wire balanced/unbalanced load

Screw terminal

- **M3 screw:** Nickel-plated steel (standard) or stainless steel
- **M4 screw:** Nickel-plated brass (standard) or stainless steel

Housing material: Flame-resistant resin (black)

Isolation: Voltage input to current input to discrete input to Modbus or analog output to discrete output to power

Note: Isolated between each analog output for 'External interface' codes 7, 8, 9 and A

■ **Measured variables**

Voltage: 1 - 2, 2 - 3, 3 - 1, 1 - N, 2 - N, 3 - N

Current: 1, 2, 3, N

Active / reactive / apparent power: 1, 2, 3, Σ

Power factor: 1, 2, 3, Σ

Frequency

Phase angle between voltages: 1 - 2, 2 - 3, 3 - 1

Active energy incoming / outgoing: Σ

Reactive energy inductive / capacitive: Σ

Apparent energy: Σ

Active / reactive / apparent power intervals (demand)

Current intervals (demand): 1, 2, 3, N

Harmonic contents: Σ , 2nd to 31st

Voltage: 1 - 2, 2 - 3, 3 - 1, 1 - N, 2 - N, 3 - N

Current: 1, 2, 3, N

Max. and min. values: 1 = R, 2 = S, 3 = T

Infrared communication: Transmission distance max. 1 meter (for use with the COP-IRU and PMCFG)

■ **DISPLAY:** LCD with LED backlight (LED OFF timer available)

Signed: 4 digits, 2 lines

Energy: 9 digits, 1 line

Bargraph: 1 point (60 segments)

INPUT SPECIFICATIONS

Frequency: 50 / 60 Hz (45 - 65 Hz)

• **Voltage Input**

Rated voltage

Line-to-line (delta voltage): 480 V

Line-neutral (phase voltage): 277 V

Consumption VA: $\leq U_{LN}^2 / 300 \text{ k}\Omega$ / phase

Overload capacity: 200 % of rating for 10 sec., 120 % continuous

Selectable primary voltage range: 50 - 400 000 V

• **Current Input**

Rated current: 1 A or 5 A

Consumption VA: $\leq I^2 \cdot 0.01 \Omega$ / phase

Overload capacity: 4000 % of rating for 1 sec., 2000 % for 4 sec., 120 % continuous

Selectable primary current range: 1 - 20 000 A

Operational range

Voltage, current, apparent power: ≤ 120 % of the rating

Active / reactive power: -120 to +120 % of the rating

Frequency: 45 - 65 Hz

Power factor: -1 to +1

■ **Discrete Input:** 24 V DC or 110 V DC

(input resistance 6 k Ω)

Detecting voltage: External 24 V DC ± 10 % or 110 V DC ± 10 %

ON current: $\geq 1 \text{ mA}$ ($\leq 24 \text{ k}\Omega$ @ 24 V, $\leq 110 \text{ k}\Omega$ @ 110 V)

OFF current: $\leq 0.1 \text{ mA}$ ($\geq 240 \text{ k}\Omega$ @ 24 V, $\geq 1.1 \text{ M}\Omega$ @ 110 V)

Detecting time: 10 - 1000 msec.

The status can be monitored on the Modbus; usable to reset energy count or to update average (demand) value.

OUTPUT SPECIFICATIONS

■ **Modbus**

Communication: Half-duplex, asynchronous, no procedure

Interface: Conforms to TIA/EIA-485-A

Max. transmission distance: 500 meters

Baud rate: 1.2 - 38.4 kbps

Max. number of nodes: 31 (except the master)

Protocol: Modbus RTU

Node address: 1 - 247 (factory default setting: 1)

Parity: none, even or odd (factory default setting: odd)

Stop bit: 1 or 2 (factory default setting: 1)

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

■ **DC Current:** 4 - 20 mA DC

Load resistance: $\leq 270 \Omega$

Measurands converted into analog output: Voltage, Current, Active / reactive / apparent power, Power factor, Frequency, Harmonic contents

■ **DC Voltage:** 1 - 5 V DC

Load resistance: $\geq 5000 \Omega$

Measurands converted into analog output: Voltage, Current,

Active / reactive / apparent power, Power factor, Frequency, Harmonic contents

■ Open Collector

Programmable for either alarm or energy count.

Max. rated load: 130 V DC @50 mA

Continuous rated load: 130 V DC @30 mA

Saturation voltage: 1.5 V DC

Measurands applicable to alarm: Voltage, current, current intervals, neutral current, frequency, energy, energy intervals

(ON delay, deadband and other parameters are selectable)

Measurands applicable to count: Energy;

Pulse rate selectable within

0.1 - 10 000.0 kWh/p, kvarh/p, kVAh/p

Data update period:

Harmonic contents and frequency: ≤ 1.1 sec.

Other: ≤ 600 msec.

Response time: ≤ 2 sec. (0 - 99 %),

≤ 3 sec. for frequency and harmonic contents

Insulation resistance: ≥ 100 M Ω with 500 V DC

Dielectric strength: 2000 V AC @ 1 minute

(voltage input to current input to discrete input to Modbus or analog output to discrete output to power)

500 V AC @1 minute for 'External interface' code 7, 8, 9 and A (between each analog output)

2000 V AC @1 minute (circuits to housing)

INSTALLATION

Power consumption

•**AC:** < 8 VA; Less than 13 VA for 'External interface' code 7 and 9

•**DC:** < 4 W; Less than 6 W for 'External interface' code 7 and 9

Operating temperature: -10 to +55°C (14 to 131°F)

Storage temperature: -20 to +80°C (-4 to +176°F)

Operating humidity: 0 to 90 %RH (non-condensing)

Mounting: Panel flush mounting (M5 screws (torque 2 N·m) or mounting brackets)

Weight

Configuration Code 1: 500 g (1.1 lb)

Configuration Code 2: 525 g (1.16 lb)

PERFORMANCE

Accuracy

(at 23°C $\pm 10^\circ\text{C}$ or 73.4°F $\pm 18^\circ\text{F}$, 45 - 65 Hz)

Voltage: (accur. ± 0.3 %)

Rated voltage at ≥ 100 V

100 V at < 100 V

Current: (accur. ± 0.3 %) of Span 1 A or 5 A

Power: (accur. ± 0.5 %)

Rated voltage/current at ≥ 100 V

Wattage as listed below at < 100 V:

173.2 W (1 A) or 866 W (5 A) for 3 ph/3 w

100 W (1 A) or 500 W (5 A) for 1 ph/2 w

200 W (1 A) or 1000 W (5 A) for 1 ph/3 w

300 W (1 A) or 1500 W (5 A) for 3 ph/4 w

PF: (accur. ± 0.5 %)

Frequency: (accur. ± 0.1 %) of span

Energy: (accur. ± 1 %)

Harmonic: (accur. ± 1 %) of span

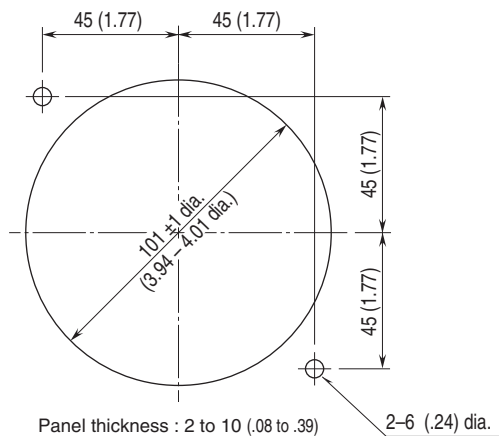
Analog output: Accuracy of assigned measurand or ± 0.2 %, whichever is greater.

Sampling rate: 64 samples per cycle

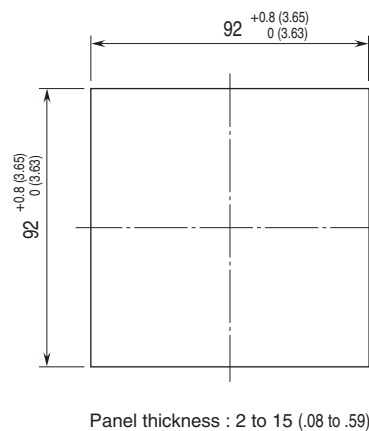
MOUNTING REQUIREMENTS

■ PANEL CUTOUT unit: mm (inch)

- USING MOUNTING SCREWS
Remove the mounting brackets.

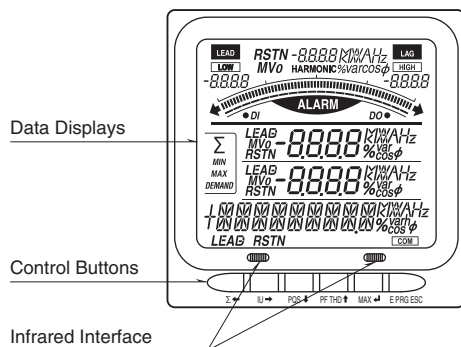


- USING MOUNTING BRACKETS
Remove the mounting screws.



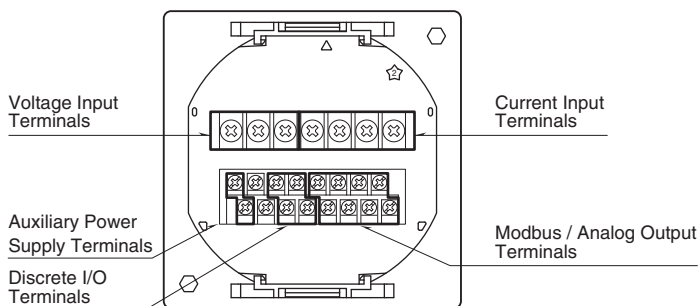
EXTERNAL VIEW

■ FRONT VIEW

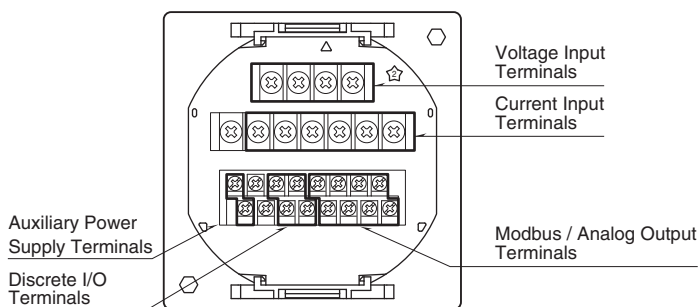


■ REAR VIEW

• CONFIGURATION CODE: 1



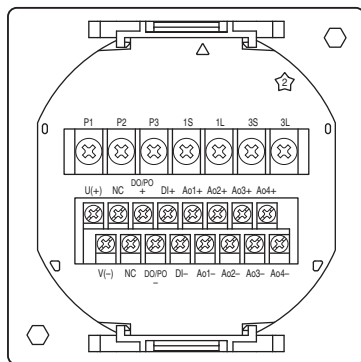
• CONFIGURATION CODE: 2



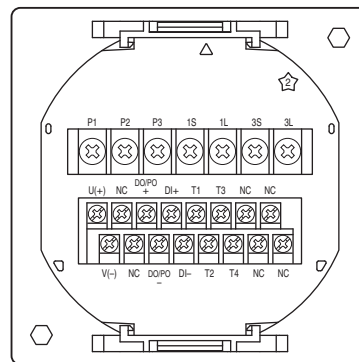
TERMINAL CONNECTIONS

■ CONFIGURATION CODE: 1

• Analog Output



• Modbus



System / Application	Terminal
Single-phase / 2-wire	
Three-phase / 3-wire, balanced load	

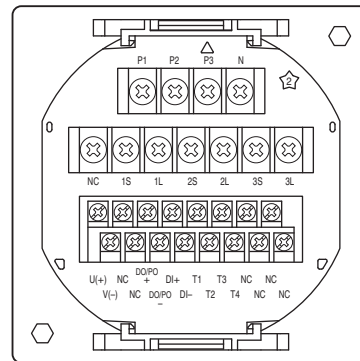
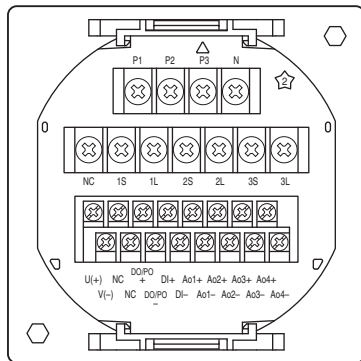
System / Application	Terminal
Single-phase / 3-wire	
Three-phase / 3-wire, unbalanced load (2CT)	

Note: For low voltage circuit, grounding is not required.

■ CONFIGURATION CODE: 2

• Analog Output

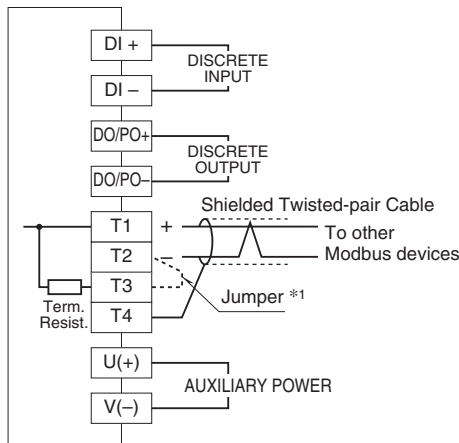
• Modbus



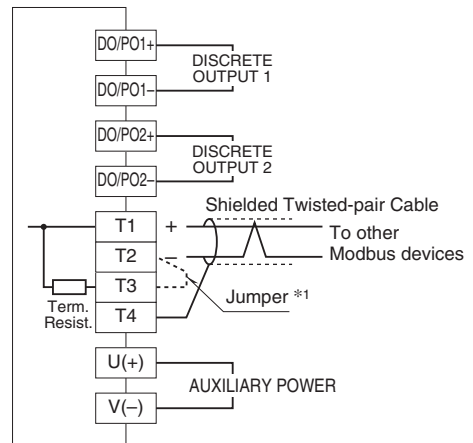
System / Application	Terminal	System / Application	Terminal
Single-phase / 2-wire		Single-phase / 3-wire	
Three-phase / 3-wire, balanced load		Three-phase / 3-wire, unbalanced load (2CT)	
Three-phase / 4-wire, balanced load		Three-phase / 4-wire, balanced load	
Three-phase / 3-wire, unbalanced load (3CT)		Three-phase / 4-wire, unbalanced load	

Note: For low voltage circuit, grounding is not required.

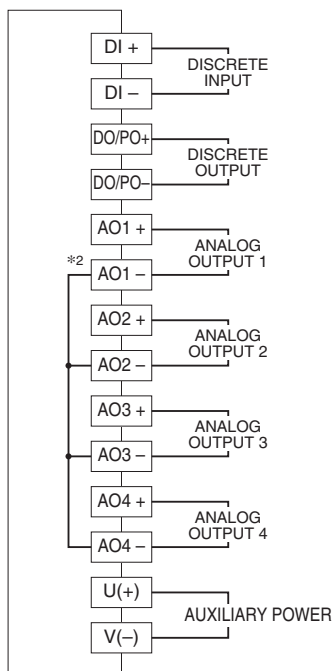
EXTERNAL INTERFACE CODE: 1



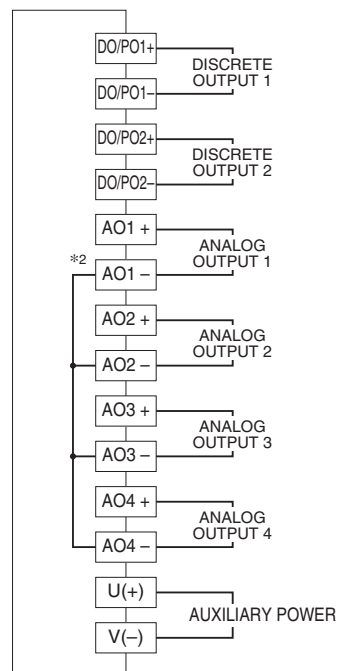
EXTERNAL INTERFACE CODE: 4



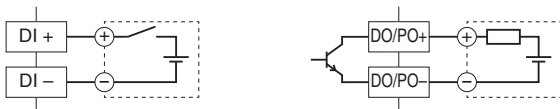
EXTERNAL INTERFACE CODE: 2, 3, 7, 8



EXTERNAL INTERFACE CODE: 5, 6, 9, A



Discrete Input Connection E.g. Discrete Output Connection E.g.

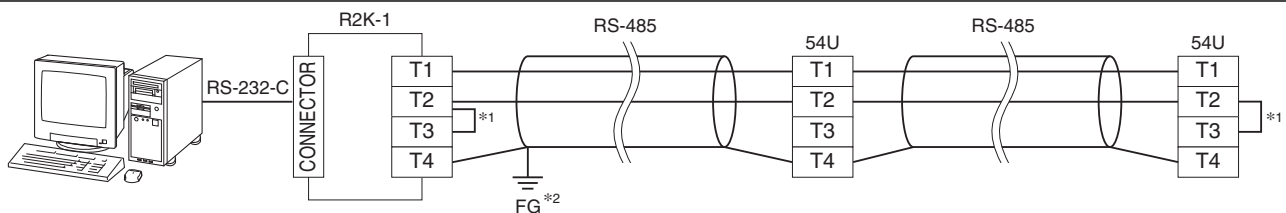


*1. When the device is located at the end of a transmission line via twisted-pair cable, (when there is no cross-wiring), close across the terminal T2 – T3 with a leadwire.

When the device is not at the end, no shortcircuit wire is required.

*2. For 'External interface' code 7, 8, 9 and A, the analog outputs are isolated between each other.

MODBUS WIRING CONNECTION

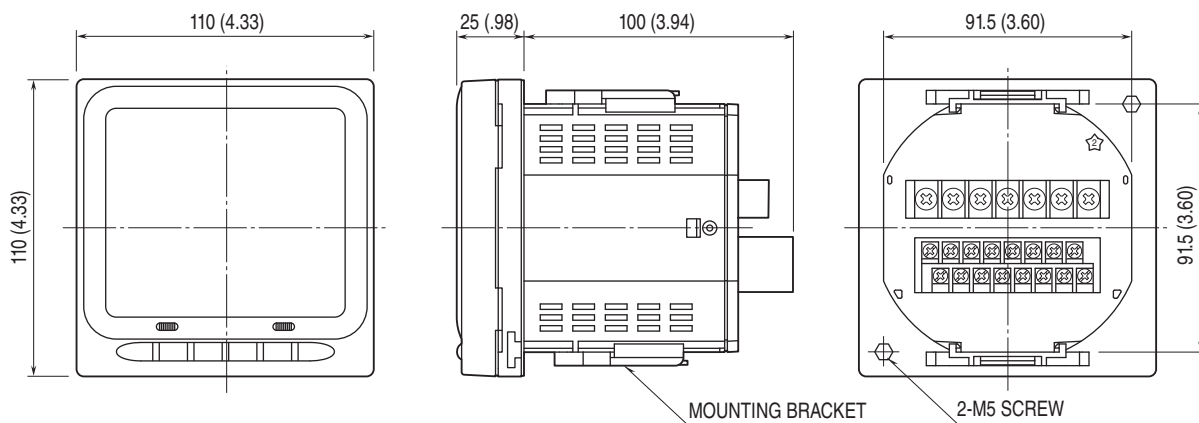


*1. Internal terminating resistor is used when the device is at the end of a transmission line.

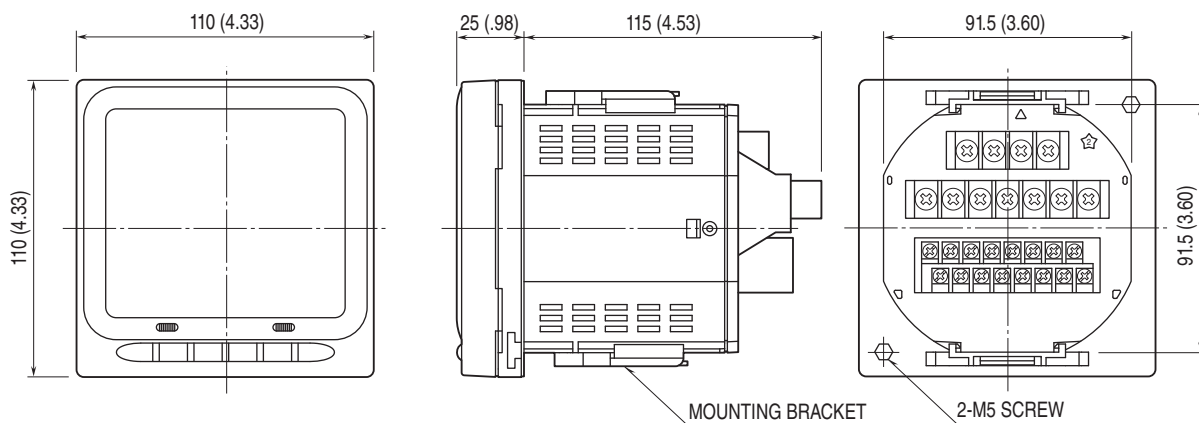
*2. Install shield cables to all sections and ground them at single point.

EXTERNAL DIMENSIONS unit: mm (inch)

■ CONFIGURATION CODE: 1

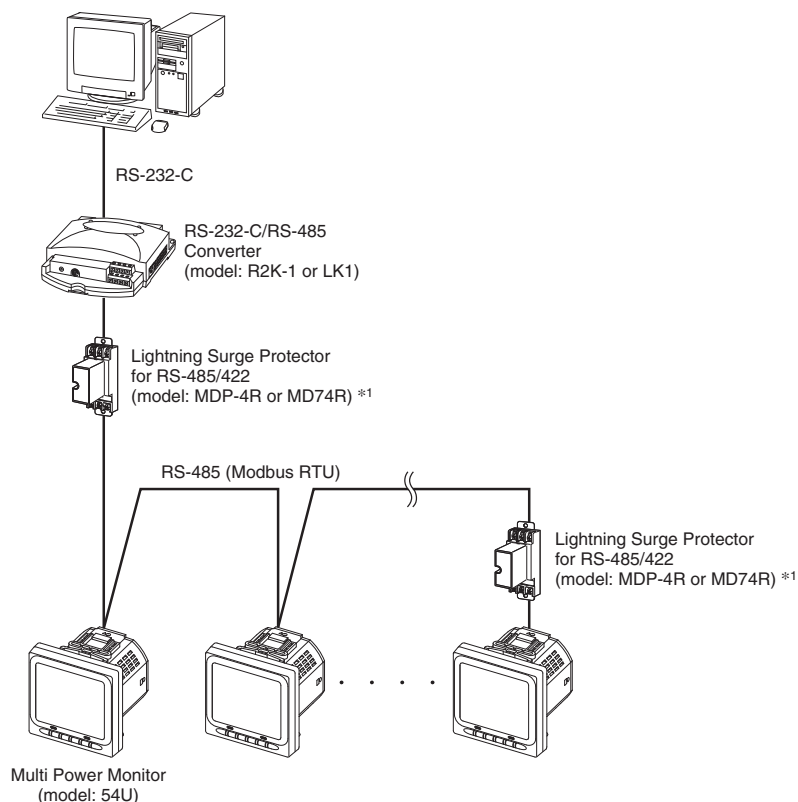


■ CONFIGURATION CODE: 2

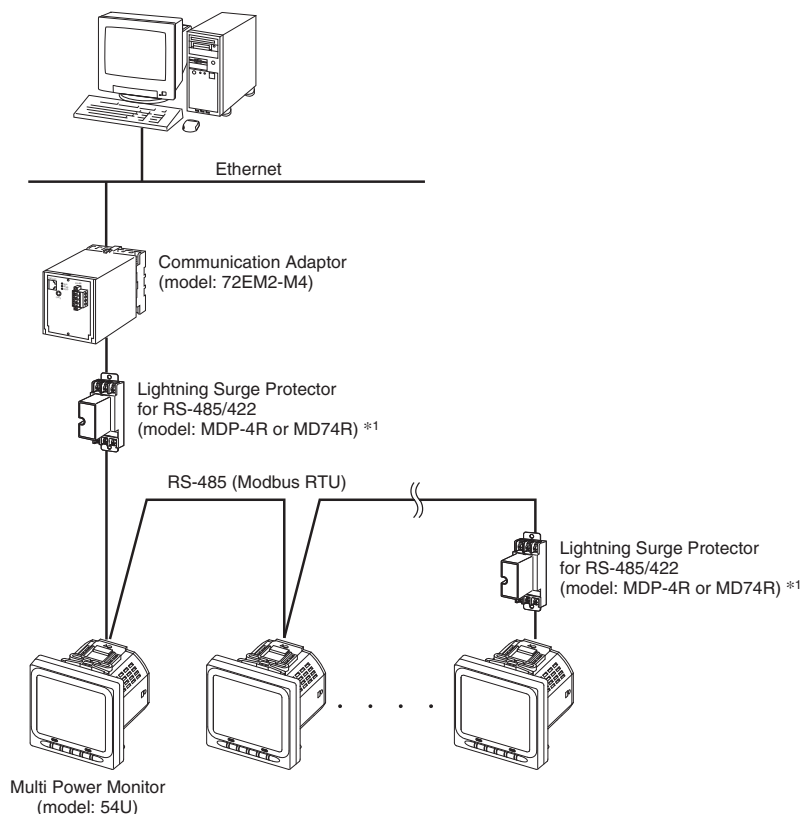


SYSTEM CONFIGURATION EXAMPLES

■ RS-485 / RS-232-C



■ RS-485 / ETHERNET



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



Specifications are subject to change without notice.