

## Power Transducer Series

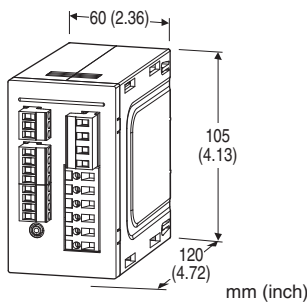
### MULTI POWER TRANSDUCER

#### 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, setting data are stored in the non-volatile memory at the power off.
- Conversion factors, system configuration, interval times are programmable.
- Open collector output for alarm or energy count.

#### Typical Applications

- Multi-functional power measurement in electric device or in switching boards.



### MODEL: L53U-1[1][2][3]-[4][5]

#### ORDERING INFORMATION

- Code number: L53U-1[1][2][3]-[4][5]
- Specify a code from below for each of [1] through [5].  
(e.g. L53U-1211-AD4/H/A/Q)
- Specify the specification for option code /Q  
(e.g. /C01/SET)

#### CONFIGURATION

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

#### [1] INPUT

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

#### [2] DISCRETE INPUT

- 0: None  
( 'External Interface' codes 1, 4 and 5 Not selectable.)  
1: 24 V DC  
( 'External Interface' codes 2, 3, 6 and 7 Not selectable.)

- 2: 110 V DC

( 'External Interface' codes 2, 3, 6 and 7 Not selectable.)

#### [3] EXTERNAL INTERFACE

- 1: Modbus, Do × 1, Di × 1  
2: 4 - 20 mA DC × 4  
3: 1 - 5 V DC × 4  
4: 4 - 20 mA DC × 2, Do × 1, Di × 1  
5: 1 - 5 V DC × 2, Do × 1, Di × 1  
6: 4 - 20 mA DC × 2, Do × 2  
7: 1 - 5 V DC × 2, Do × 2

#### [4] AUXILIARY POWER SUPPLY

AD4: universal

100 - 240 V AC (Operational range 85 - 264 V, 47 - 66 Hz) /  
110 - 240 V DC (Operational range 99 - 264 V,  
ripple 10 %p-p max)

R: DC Power

24 V DC (Operational range 19 - 29 V, ripple 10 %p-p max)  
( 'External interface' codes 1, 4, 5, 6 and 7 Not selectable.)

#### [5] OPTIONS (multiple selections)

Performance

blank: Standard

/H: High accuracy (voltage/current: ±0.2 %, energy: ±0.5 %)

Configurator Software Switch

/A: Without switch (must specify)

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.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

EX-FACTORY SETTING

/SET: Preset according to the Ordering Information Sheet  
(No. ESU-1958)

#### RELATED PRODUCTS

- PC configurator software (model: PMCFG)
- PC Recorder Light software for the 53U (model: MSR128LUx)

Downloadable at M-System's web site.

A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

**GENERAL SPECIFICATIONS****Connection**

**Voltage input:** Connector type terminal block  
(applicable wire size:  $\leq 2.5$  dia,  $0.5 - 3.5$  mm<sup>2</sup>, stripped length 7 - 8 mm)

**Current input:** Screw terminal block  
(applicable wire size:  $\leq 2.4$  dia,  $0.5 - 3.5$  mm<sup>2</sup>, stripped length 13 - 15 mm)

**Discrete input, discrete output, analog output, Modbus, auxiliary power supply:** Connector type terminal block  
(applicable wire size:  $\leq 2.4$  dia,  $0.5 - 2.5$  mm<sup>2</sup>, stripped length 7 - 8 mm)

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

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

**Isolation:** Voltage input to current input to discrete input to discrete output to Modbus or configurator jack or analog output to auxiliary power

**■ Measured variables**

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

**Current:** 1, 2, 3, N

**Active / reactive / apparent power:** 1, 2, 3,  $\Sigma$

**Power factor:** 1, 2, 3,  $\Sigma$

**Frequency**

**Voltage phase angle:** 1 - 2, 2 - 3, 3 - 1

**Active energy:** Incoming / outgoing / high tariff (peak) / low tariff (off-peak)

**Reactive energy:** Incoming / outgoing / lag / lead / high tariff (peak) / low tariff (off-peak)

**Apparent energy**

**Active / reactive / apparent average power (demand)**

**Average current:** 1, 2, 3, N

**Harmonic contents:**  $\Sigma$ , 2nd to 31st

**Count time:** High tariff / low tariff

**Max. and min. values**

**Demand history:** 1 to 4

**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 (single phase / 2-wire and 3-wire)

**Consumption VA:**  $\leq U_{LN}^2 / 300$  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

**Selectable primary power range:**  $\leq 2$  G VA

**Operational range**

**Voltage, current, apparent power:**  $\leq 120$  % 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 $\Omega$ )

**Detecting voltage:** External 24 V DC  $\pm 10$  % or 110 V DC  $\pm 10$  %

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

**OFF current:**  $\leq 0.1$  mA ( $\geq 240$  k $\Omega$  @ 24 V,  $\geq 1.1$  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, average current (demand), neutral current, frequency, power, average power (demand)

(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

## INSTALLATION

### Power consumption

•AC: < 10 VA

•DC: < 3 W

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

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

**Mounting:** DIN rail

**Weight:** 320 g (0.71 lb)

## PERFORMANCE

**Accuracy** (at 23°C ±10°C or 73.4°F ±18°F, 45 - 65 Hz)

**Voltage:** ±0.3 % (±0.2 % for Option /H)<sup>\*1</sup>

**Current:** ±0.3 % (±0.2 % for Option /H)<sup>\*1</sup>

**Power:** ±0.5 %<sup>\*1</sup>

**Power factor:** ±0.5 %

**Frequency:** ±0.1 %<sup>\*1</sup>

**Energy:** ±1 % (±0.5 % for Option /H<sup>\*2</sup>)

**Harmonic contents:** ±1 %<sup>\*1</sup>

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

\*1. Percentage of the spans:

480 V for voltage;

1 A or 5 A for current; and

4155 W (5 A) or 831 W (1 A) for active power

The described accuracy levels are ensured at the input 1 % or more for phase 2 current with 3-phase/3-wire unbalanced load, for neutral current with 3-phase/4-wire unbalanced load, and neutral current with 1-phase/3-wire.

\*2. Accuracy level:

Active energy class 0.5S according to IEC 62053-22

(Reactive energy class 2 according to IEC 62053-23)

**Sampling rate:** 64 samples per cycle

**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 MΩ with 500 V DC

**Dielectric strength:**

4000 V AC @1 minute

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

2500 V AC @1 minute

(voltage input to current input to discrete input to discrete output to Modbus or configurator jack or analog output)

## STANDARDS & APPROVALS

**EU conformity:**

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

Low Voltage Directive

EN 61010-1

Measurement Category III (input) (Measurement Category II if the auxiliary power supply code is R)

Measurement Category II (output)

Installation Category II (auxiliary power)

Pollution Degree 2

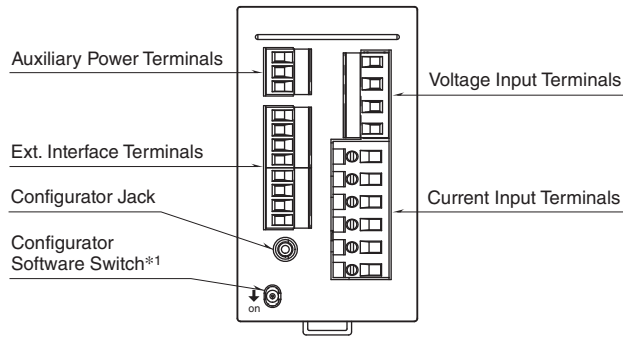
Input to auxiliary power: Reinforced insulation (550 V)

Output to auxiliary power: Reinforced insulation (300 V)

Input to output: Basic insulation (550 V)

RoHS Directive

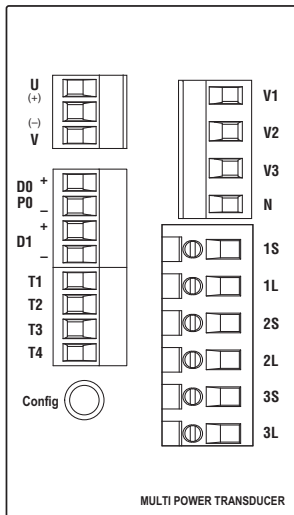
**EXTERNAL VIEW**



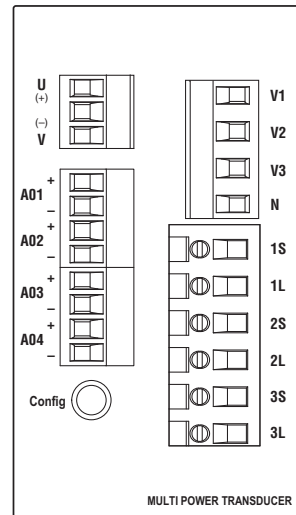
\*1 Only for the unit without option /A. Select ON (down) to use configurator software. For the unit with option /A, the switch is not available and this operation is not required.

**TERMINAL CONNECTIONS**

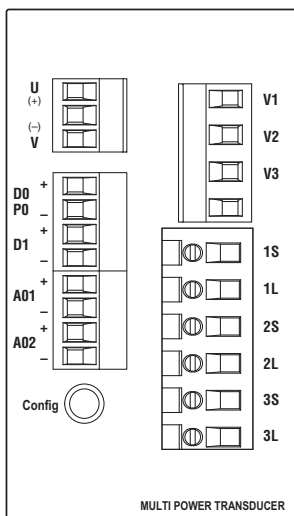
■ EXTERNAL INTERFACE CODE: 1



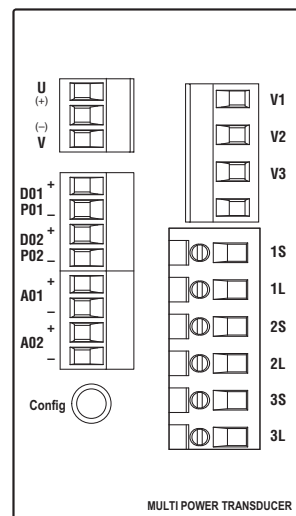
■ EXTERNAL INTERFACE CODE: 2, 3

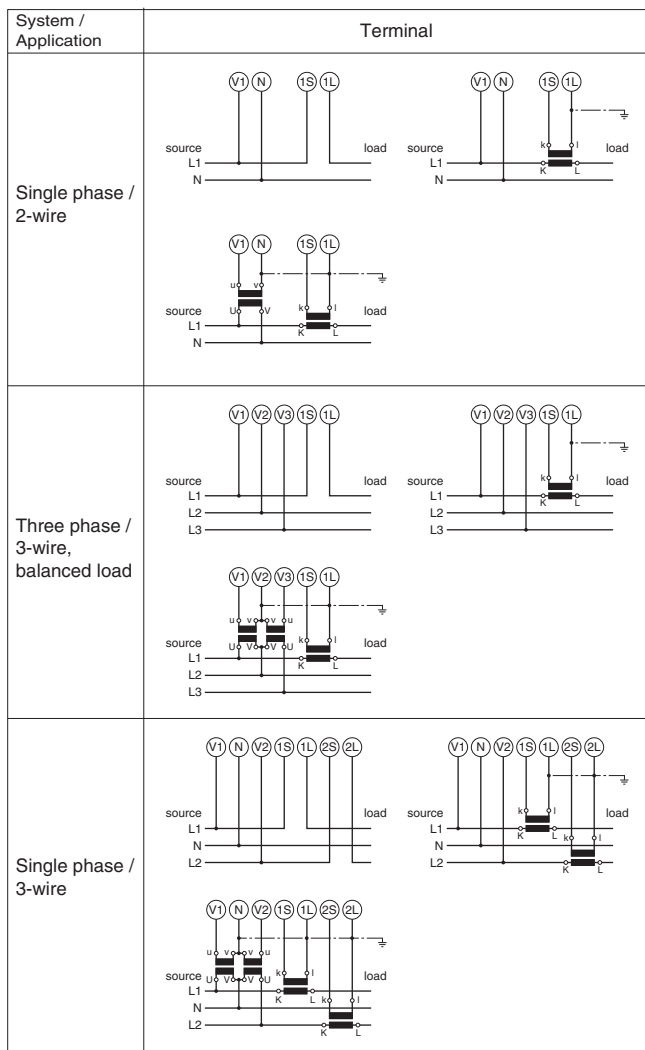


■ EXTERNAL INTERFACE CODE: 4, 5

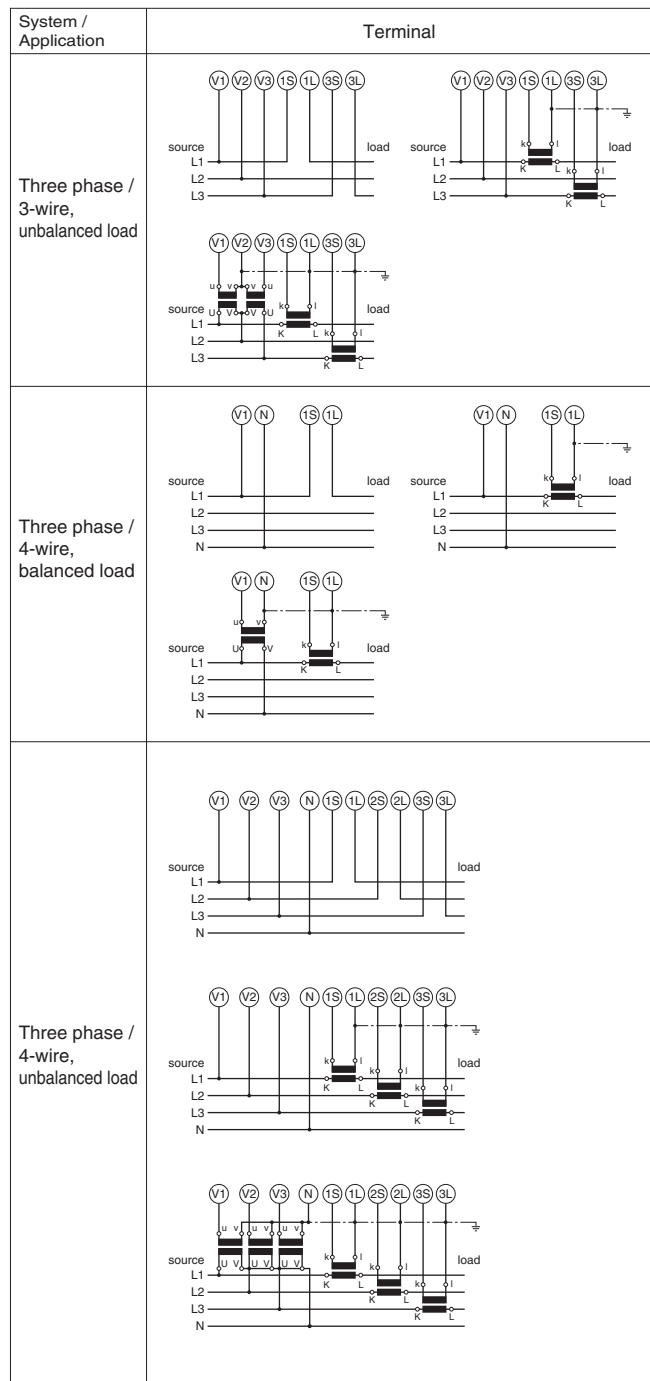


■ EXTERNAL INTERFACE CODE: 6, 7

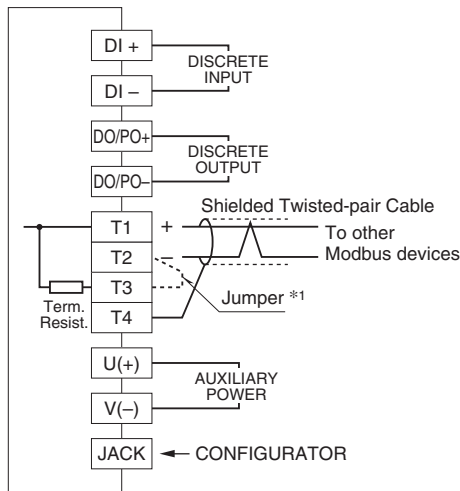




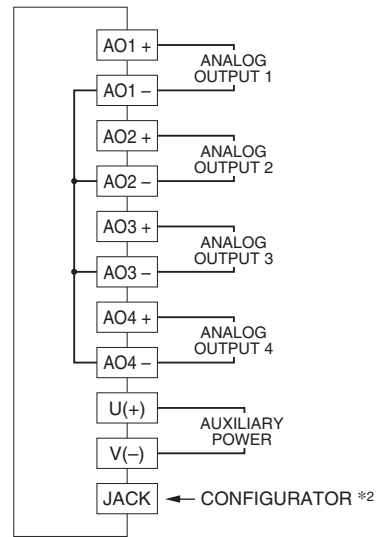
Note: For low voltage circuit, grounding is not required.



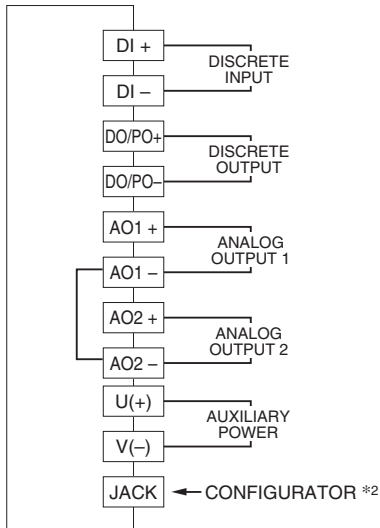
## EXTERNAL INTERFACE CODE: 1



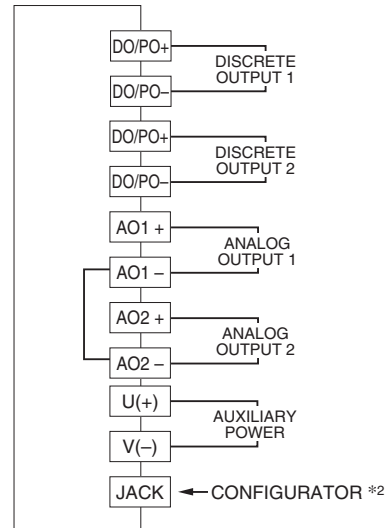
## EXTERNAL INTERFACE CODE: 2, 3



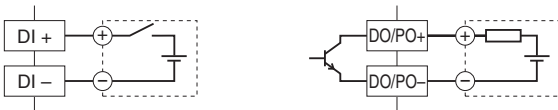
## EXTERNAL INTERFACE CODE: 4, 5



## EXTERNAL INTERFACE CODE: 6, 7

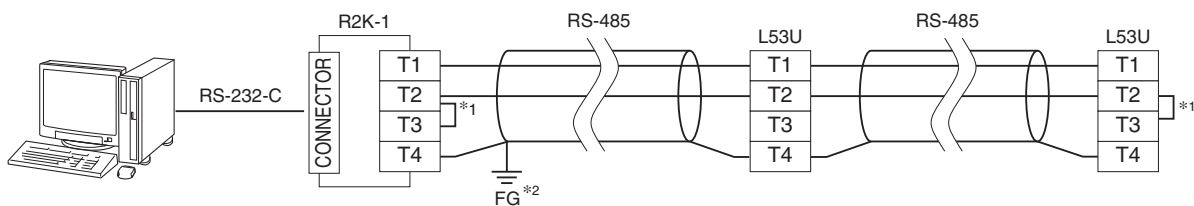


### Discrete Input Connection E.g. • Discrete Output Connection E.g.



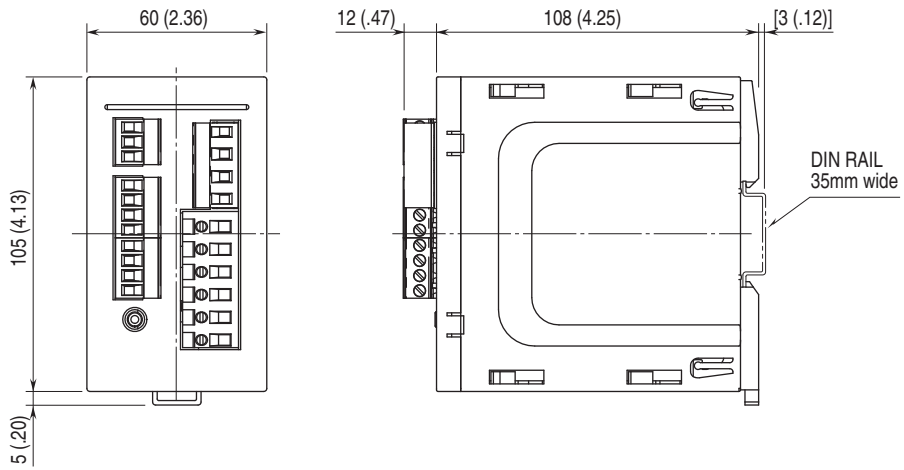
- \*1. When the device is located at the end of a transmission line via twisted-pair cable, (when there is no cross-wiring), close across the terminal T2 – T3 with a leadwire. When the device is not at the end, no shortcircuit wire is required.
- \*2. Analog output may momentarily fluctuate while the configurator cable is left connected.

## MODBUS WIRING CONNECTION



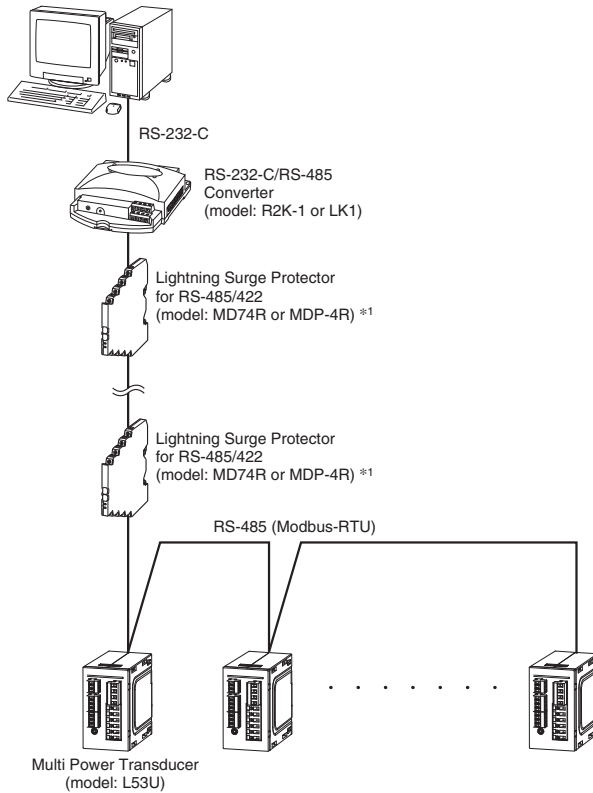
- \*1. Internal terminating resistor is used when the device is at the end of a transmission line.
- \*2. Install shield cables to all sections and ground them at single point.

**EXTERNAL DIMENSIONS** unit: mm [inch]

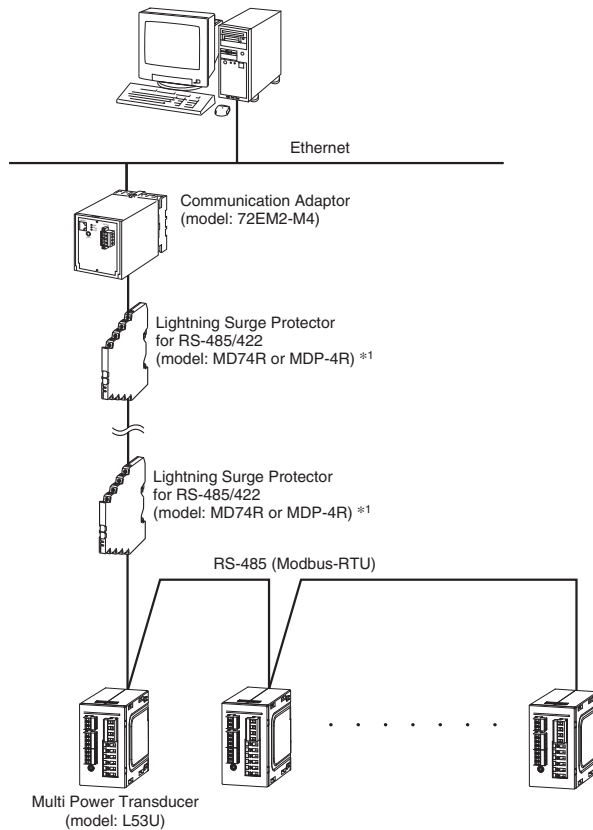


**SYSTEM CONFIGURATION EXAMPLES**

■ 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.