Power Transducer Series

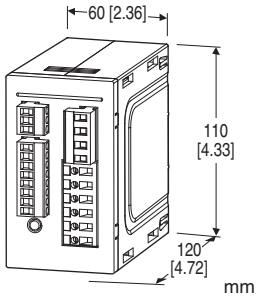
MULTI POWER TRANSDUCER

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



CE

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 our 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 cable (model: COP-US)
• PC configurator software (model: PMCFG)
• PC Recorder Light for the 53U Multi Power Monitor (model: MSR128LUx)
Software downloadable at our web site.

GENERAL SPECIFICATIONS

Connection
Voltage input: Connector type terminal block

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(applicable wire size: ≤ 2.5 dia., 0.5 – 3.5 mm^2, stripped length 7 - 8 mm)
Current input: Screw terminal block
(applicable wire size: ≤ 2.4 dia., 0.5 – 3.5 mm^2, stripped length 13 - 15 mm)
Discrete input, discrete output, analog output, Modbus, auxiliary power supply: Connector type terminal block
(applicable wire size: ≤ 2.4 dia., 0.5 – 2.5 mm^2, 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, Σ
Power factor: 1, 2, 3, Σ
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: Σ, 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: ≤ U_{LN}^2 / 300 kΩ / 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: ≤ $I^2 \cdot 0.01$ Ω / 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: ≤ 2 G VA
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 kΩ)
Detecting voltage: External 24 V DC ±10 % or 110 V DC ±10 %
ON current: ≥ 1 mA (≤ 24 kΩ @ 24 V, ≤ 110 kΩ @ 110 V)
OFF current: ≤ 0.1 mA (≥ 240 kΩ @ 24 V, ≥ 1.1 MΩ @ 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: ≤ 270 Ω
Measurands converted into analog output: Voltage, Current, Active / reactive / apparent power, Power factor, Frequency, Harmonic contents
■ **DC Voltage**: 1 – 5 V DC
Load resistance: ≥ 5000 Ω
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

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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)[*1]
Current: ±0.3 % (±0.2 % for Option /H)[*1]
Power: ±0.5 %[*1]
Power factor: ±0.5 %
Frequency: ±0.1 %[*1]
Energy: ±1 % (±0.5 % for Option /H[*2])
Harmonic contents: ±1 %[*1]
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

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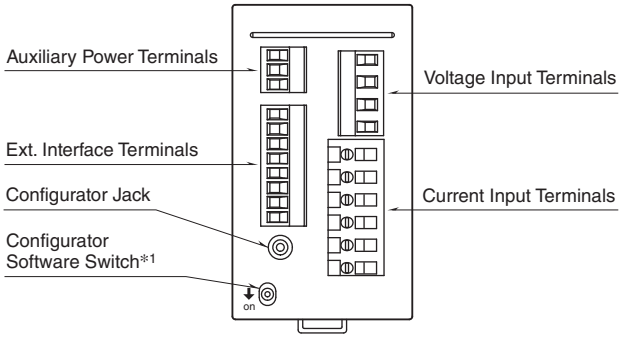
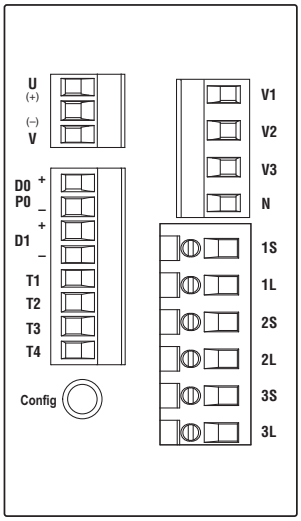
EXTERNAL VIEW



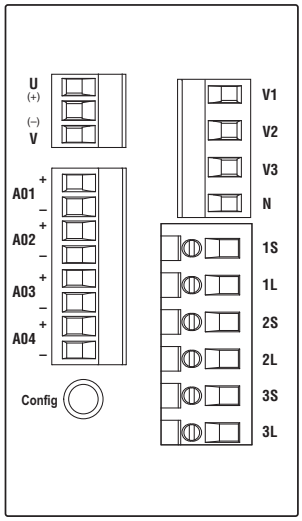
*1 Only for the unit without option /A. Select ON (down) to use configurator software.
For the unit with option /A, the switch is not available and this operation is not required.

TERMINAL CONNECTIONS

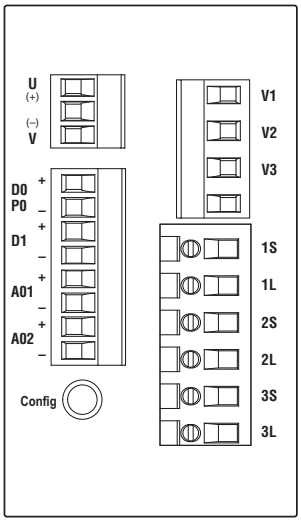
■ **EXTERNAL INTERFACE CODE: 1**



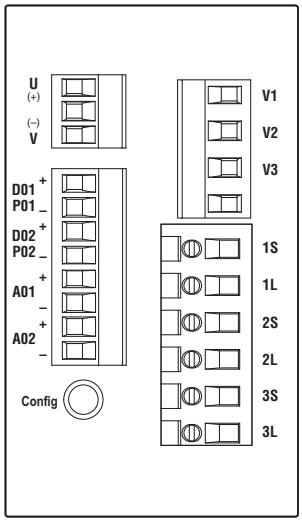
■ **EXTERNAL INTERFACE CODE: 2, 3**



■ **EXTERNAL INTERFACE CODE: 4, 5**



■ **EXTERNAL INTERFACE CODE: 6, 7**



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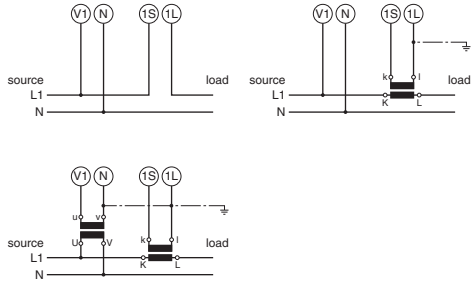
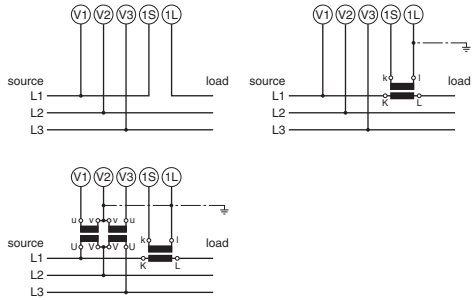
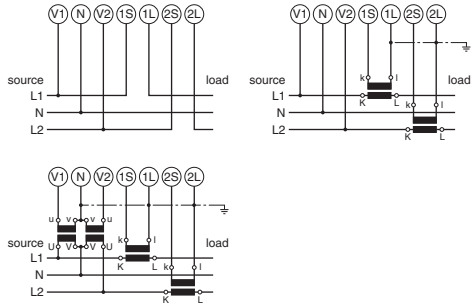
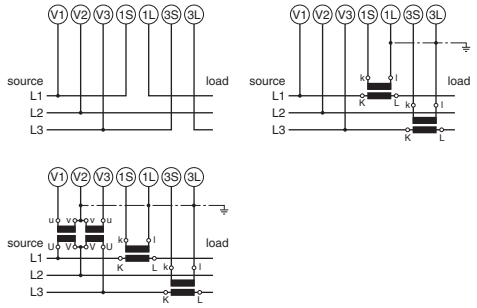
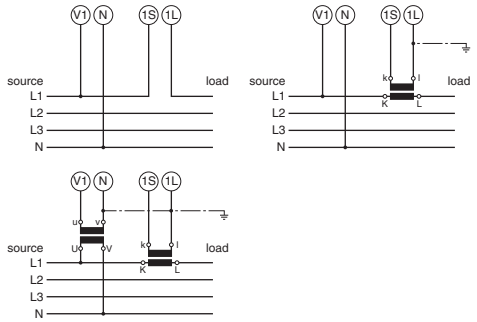
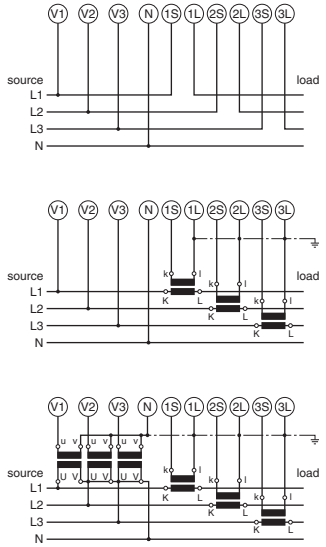
System / Application	Terminal
Single phase / 2-wire	
Three phase / 3-wire, balanced load	
Single phase / 3-wire	

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

System / Application	Terminal
Three phase / 3-wire, unbalanced load	
Three phase / 4-wire, balanced load	
Three phase / 4-wire, unbalanced load	

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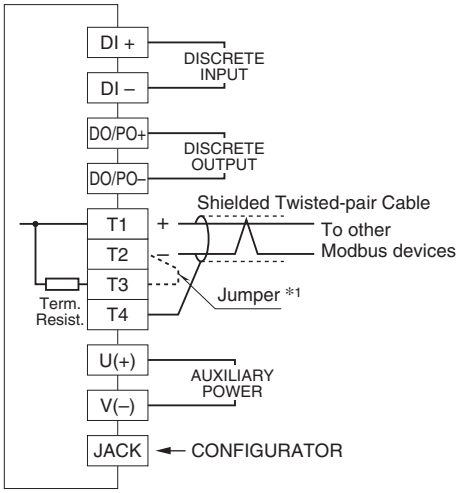
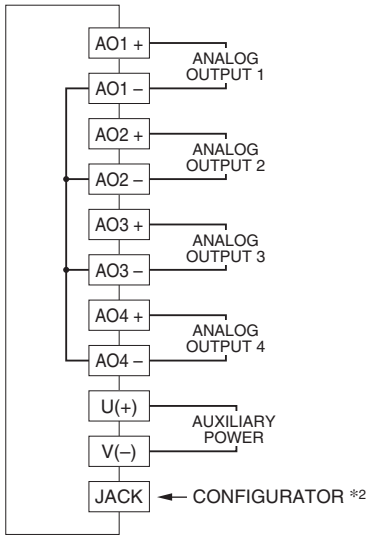
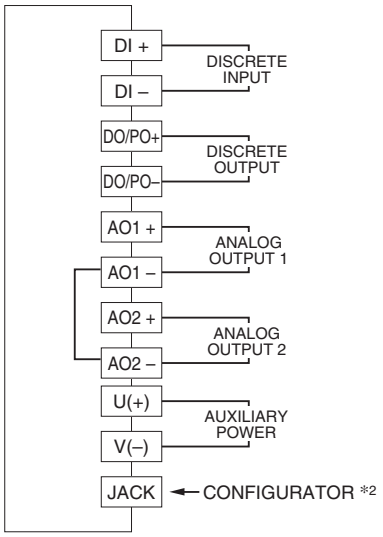
■ **EXTERNAL INTERFACE CODE: 1**



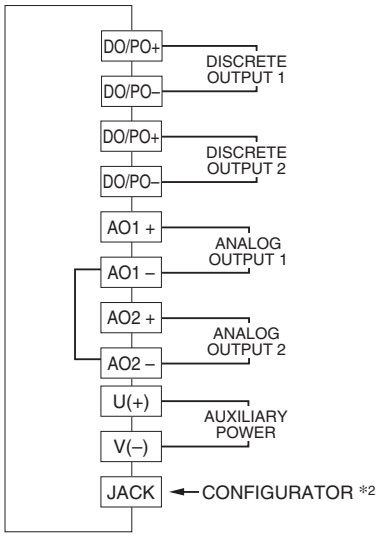
■ **EXTERNAL INTERFACE CODE: 2, 3**



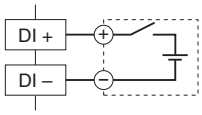
■ **EXTERNAL INTERFACE CODE: 4, 5**



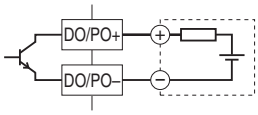
■ **EXTERNAL INTERFACE CODE: 6, 7**



• Discrete Input Connection E.g.

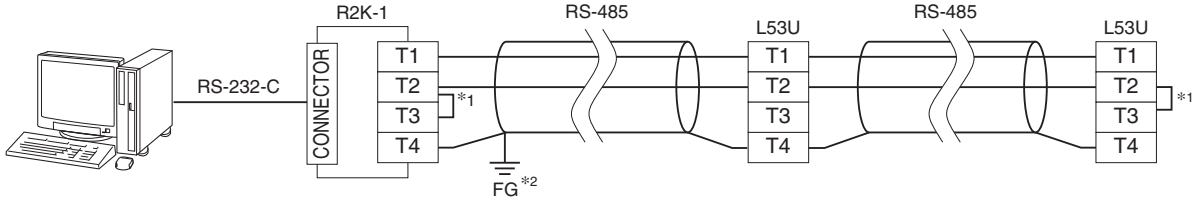


• Discrete Output Connection E.g.



*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.

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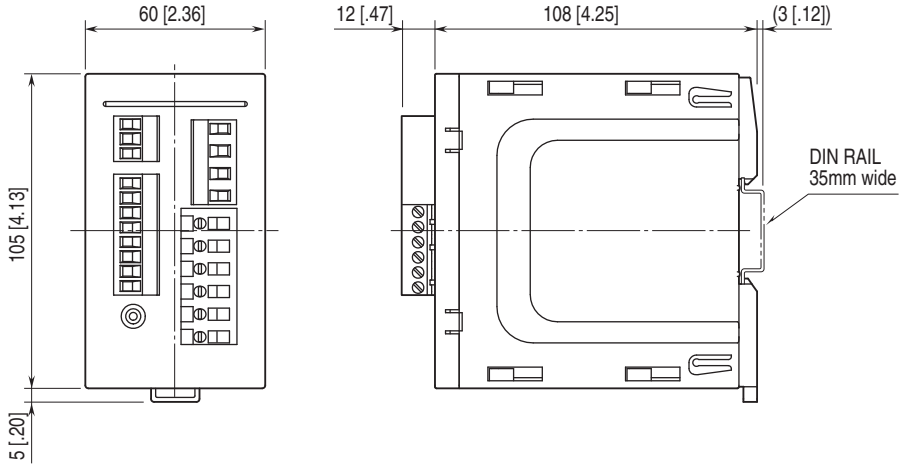
EXTERNAL DIMENSIONS unit: mm [inch]



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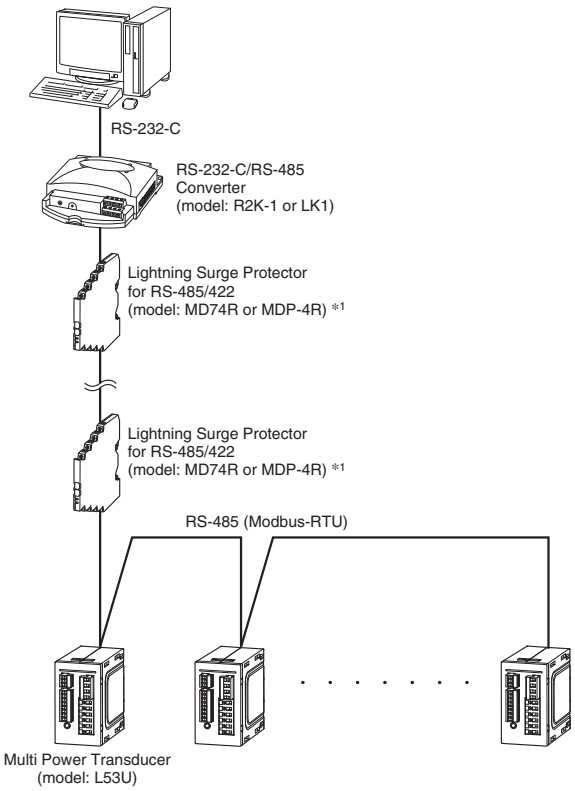
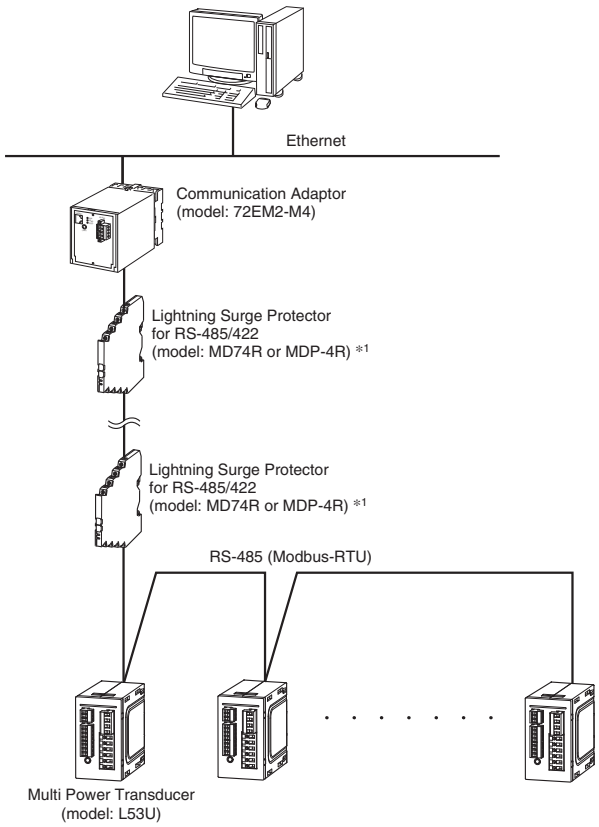
SYSTEM CONFIGURATION EXAMPLES

■ **RS-485 / RS-232-C**



■ **RS-485 / ETHERNET**



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

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⚠ Specifications are subject to change without notice.

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