

## Power Transducer Series LT-UNIT

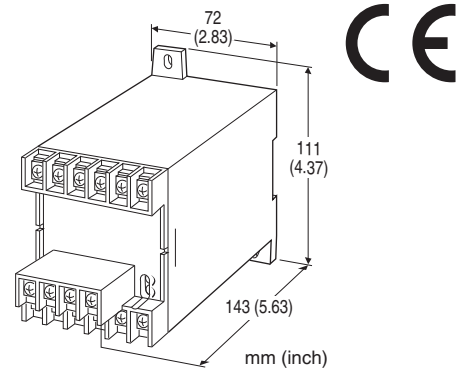
### VAR TRANSDUCER

#### Functions & Features

- Providing a DC output signal in proportion to AC reactive power
- DC output containing little ripple is ideal for computer input
- "Time division multiplication" method accepts distorted waveforms
- Isolation up to 2000 V AC
- High-density mounting
- Conforms to IEC 60688

#### Typical Applications

- Centralized monitoring and control of power management system in a manufacturing facility or building



## MODEL: LTRP-[1][2][3][4][5]-[6][7]

### ORDERING INFORMATION

- Code number: LTRP-[1][2][3][4][5]-[6][7]  
Specify a code from below for each of [1] through [7].  
(e.g. LTRP-115PA-R/T/Q)
- Special output range (For codes Z & 0)
- Specify the specification for option code /Q  
(e.g. /C01)
- Use Ordering Information Sheet (No. ESU-3355).

### [1] CONFIGURATION

- 1: 3-phase / 3-wire
- 4: 3-phase / 4-wire

### [2] VT INPUT (balanced load)

For 3-phase / 4-wire, phase voltages (e.g. 110 V /  $\sqrt{3}$ ) are used.

- 1: 100, 110, 115, 120 V AC
- 2: 190, 200, 210, 220, 230, 240 V AC
- 4: 380, 400, 415, 430, 440, 480 V AC

### [3] CT INPUT (unbalanced load)

#### Current

- 1: 1 A AC
- 2: 2 A AC
- 5: 5 A AC

### [4] OUTPUT SIGNAL POLARITY

P: Negative in lag, positive in lead

M: Negative in lead, positive in lag

### [5] OUTPUT

#### Current

A: 4 - 20 mA DC (Load resistance 500  $\Omega$  max.)

FW: -10 - +10 mA DC (Load resistance 1000  $\Omega$  max.)

GW: -1 - +1 mA DC (Load resistance 10 k $\Omega$  max.)

JW: -5 - +5 mA DC (Load resistance 2000  $\Omega$  max.)

Z: Specify current (See OUTPUT SPECIFICATIONS)

#### Voltage

6: 1 - 5 V DC (Load resistance 5000  $\Omega$  min.)

1W: -10 - +10 mV DC (Load resistance 10 k $\Omega$  min.)

2W: -100 - +100 mV DC (Load resistance 100 k $\Omega$  min.)

3W: -1 - +1 V DC (Load resistance 1000  $\Omega$  min.)

4W: -10 - +10 V DC (Load resistance 10 k $\Omega$  min.)

5W: -5 - +5 V DC (Load resistance 5000  $\Omega$  min.)

0: Specify voltage (See OUTPUT SPECIFICATIONS)

### [6] AUXILIARY POWER SUPPLY

#### AC Power

K3: 100 - 120V AC

(Operational voltage range 85 - 132 V, 47 - 66 Hz)

L3: 200 - 240V AC

(Operational voltage range 170 - 264 V, 47 - 66 Hz)

#### DC Power

R: 24 V DC

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

V: 48 V DC

(Operational voltage range 48 V  $\pm$  10 %, ripple 10 % p-p max.)

P: 110 V DC

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

(CE not available)

### [7] OPTIONS (multiple selections)

#### Terminal Cover

blank: Without

/T: With

#### Custom specification

(Refer to the custom specification list for difference of specification and combination of code numbers.)

blank: none

/X1: Input range

/X2: Input span

**Other Options**

blank: none

/Q: Option other than the above (specify the specification)

**SPECIFICATIONS OF OPTION: Q****COATING (For the detail, refer to M-System's web site.)**

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

**GENERAL SPECIFICATIONS****Connection:** M4 screw terminals (torque 1.2 N·m)**Screw terminal:** Chrome-plated steel**Housing material:** Flame-resistant resin (black)**Isolation:** Voltage input to current input to output to auxiliary power**Computation:** Time division multiplication**Overrange output:** Approx. -10 to +120 % at 1 - 5 V**Zero adjustment:** -5 to +5 % (front)**Span adjustment:** 95 to 105 % (front)**INPUT SPECIFICATIONS****Frequency:** 50 or 60 Hz• **Voltage input****Operational range:** 0 - 120 % of rating**Overload capacity:** 200 % of rating for 10 sec., 120 % continuous• **Current input****Operational range:** 0 - 120 % of rating**Overload capacity:** 4000 % of rating for 1 sec., 2000 % for 4 sec., 120 % continuous■ **How To Determine Var Range**

Calibration Range [var] = (Measuring Range) ÷ ((VT Ratio) × (CT Ratio))

Check that the required calibration range is within the available range in the table.

[example]

3-phase / 3-wire, measuring range 75 kvar,

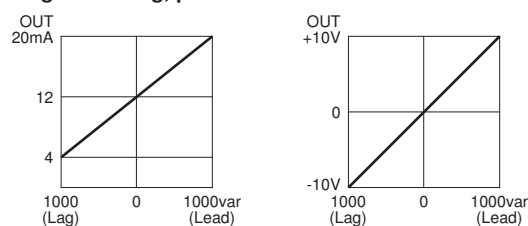
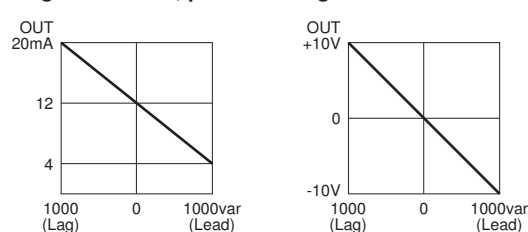
VT 220 / 110 V, CT 250 / 5 A

 $(75 \times 10^3 \text{ [var]}) \div ((220 \div 110) \times (250 \div 5)) = 750 \text{ [var]}$ • **3-phase / 3-wire**

| INPUT        |           | USABLE RANGE    | BURDEN (VA) |        |
|--------------|-----------|-----------------|-------------|--------|
| VT / CT CODE | STD.RANGE |                 | VT          | CT     |
| 1 / 1        | 200 var   | 100 - 240 var   | 0.2 /phase  | 0.1/ph |
| 1 / 2        | 400 var   | 200 - 480 var   |             | 0.2/ph |
| 1 / 5        | 1000 var  | 500 - 1200 var  |             | 0.5/ph |
| 2 / 1        | 400 var   | 200 - 480 var   | 0.4 /phase  | 0.1/ph |
| 2 / 2        | 800 var   | 400 - 960 var   |             | 0.2/ph |
| 2 / 5        | 2000 var  | 1000 - 2400 var |             | 0.5/ph |
| 4 / 1        | 800 var   | 400 - 960 var   | 0.6 /phase  | 0.1/ph |
| 4 / 2        | 1600 var  | 800 - 1920 var  |             | 0.2/ph |
| 4 / 5        | 4000 var  | 2000 - 4800 var |             | 0.5/ph |

• **3-phase / 4-wire**

| INPUT        |           | USABLE RANGE    | BURDEN (VA) |        |
|--------------|-----------|-----------------|-------------|--------|
| VT / CT CODE | STD.RANGE |                 | VT          | CT     |
| 1 / 1        | 200 var   | 100 - 240 var   | 0.1 /phase  | 0.1/ph |
| 1 / 2        | 400 var   | 200 - 480 var   |             | 0.2/ph |
| 1 / 5        | 1000 var  | 500 - 1200 var  |             | 0.5/ph |
| 2 / 1        | 400 var   | 200 - 480 var   | 0.3 /phase  | 0.1/ph |
| 2 / 2        | 800 var   | 400 - 960 var   |             | 0.2/ph |
| 2 / 5        | 2000 var  | 1000 - 2400 var |             | 0.5/ph |
| 4 / 1        | 800 var   | 400 - 960 var   | 0.4 /phase  | 0.1/ph |
| 4 / 2        | 1600 var  | 800 - 1920 var  |             | 0.2/ph |
| 4 / 5        | 4000 var  | 2000 - 4800 var |             | 0.5/ph |

**OUTPUT SPECIFICATIONS**■ **DC Current:** -10 - +20 mA DC**Span:** Min. 1 mA, max. 20 mA**Offset:** Max. 1.5 times span**Load resistance:** Output drive 10 V max.■ **DC Voltage:** -10 - +12 V DC**Minimum span:** 5 mV**Offset:** Max. 1.5 times span**Load resistance:** Output drive 1 mA max. at  $\geq 0.5 \text{ V}$ ■ **OPERATION DIAGRAM (example)**• **Negative in lag, positive in lead**• **Negative in lead, positive in lag**

**INSTALLATION****Power Consumption**

•AC: Approx. 2 VA

•DC: Approx. 2 W (18 mA at 110 V)

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

**Operating humidity:** 30 to 85 %RH (non-condensing)

**Mounting:** Surface or DIN rail

**Weight:** 450 g (0.99 lb)

**PERFORMANCE in percentage of span**

**Accuracy:**  $\pm 0.5\%$  (at 23°C  $\pm 10^\circ\text{C}$  or 73.4°F  $\pm 18^\circ\text{F}$ ,  
45 – 65 Hz)

**Magnetic field (ext. origin) effect:**  $\pm 0.5\%$  (400 A/m)

**Response time:**  $\leq 2$  sec. (0 – 100 %  $\pm 1\%$ )

**Ripple:** 0.5 %p-p max. (The output ripple may increase when there is great difference between the frequencies of input signal and power supply)

**Line voltage effect:**  $\pm 0.25\%$  over operational voltage range (Operational voltage range is [K3: 90 to 132 V AC], [L3: 180 to 264 V AC] when the output code is 4W or the specified voltage is  $\leq -9$  V)

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

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

(voltage input to current input to output to auxiliary power to ground)

**Impulse withstand voltage:** 1.2 / 50  $\mu\text{sec.}$ ,  $\pm 5$  kV  
(input to output or ground)

**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 (input)

Installation Category II (auxiliary power)

Pollution Degree 2

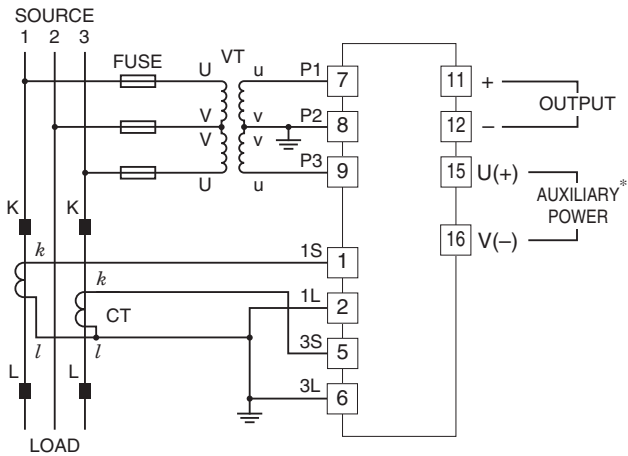
Input to output or auxiliary power: Reinforced insulation (550 V)

Output to auxiliary power: Reinforced insulation (300 V)

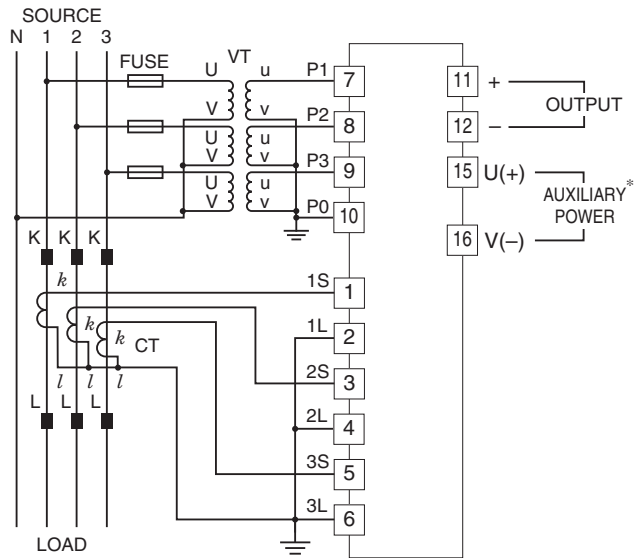
RoHS Directive

## CONNECTION DIAGRAM

### ■ 3-PHASE/3-WIRE

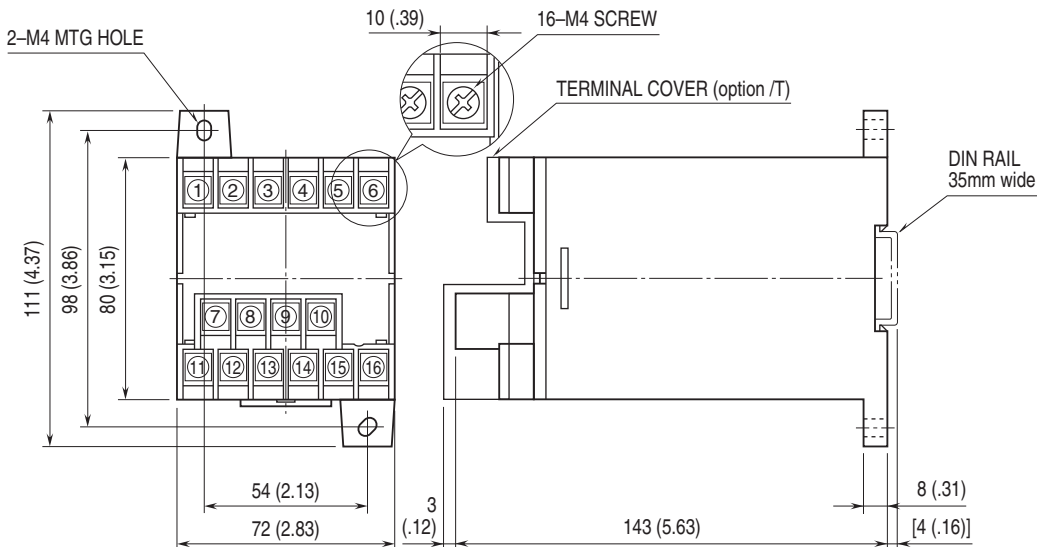


### ■ 3-PHASE/4-WIRE



\*The transducer can be powered from the input voltage when the voltage is sufficiently stable and meets within the range of auxiliary power supply of the unit specified in the data sheet/instruction manual.

## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



• When mounting, no extra space is needed between units.



Specifications are subject to change without notice.

## CUSTOM SPECIFICATION LIST

Refer to the following pages for each detailed custom specification.

**Custom specification:** Option /X1

■ Major specification changes

Input 0 % (LAG): 0 - 30 % of input 100 % (LEAD)

or

Input 0 % (LEAD): 0 - 30 % of input 100 % (LAG)

**Custom specification:** Option /X2

■ Major specification changes

Input span: 10 - 50 % for input span of standard input range

**CUSTOM SPECIFICATION : OPTION /X1****Major specification changes**

Input 0%: 30 - 0 % of input 100% (var)

**MODEL: LTRP-[1][2][3][4][5]-[6][7]/X1**

Same as standard specification (without customization)  
except followings.

Refer to standard specification pages.

**ORDERING INFORMATION**

- Code number: LTRP-[1][2][3][4][5]-[6][7]/X1

For each of [1] through [7] same code as standard  
specification is available.

Use Ordering Information Sheet (No. ESU-3355).

(e.g. LTRP-115PA-R/T/X1)

Refer to standard specification pages.

**SPECIFICATION CHANGES**

■ Input specifications

- Available input range

The value for 0 % (LAG) is within 0 - 30 % of input 100 %  
(LEAD).

or

The value for 0 % (LEAD) is within 0 - 30 % of input 100 %  
(LAG).

e.g. Input range: LAG 75 to LEAD 1000 [var]

$$75 [\text{var}] \div 1000 [\text{var}] \times 100 = -7.5 [\%]$$

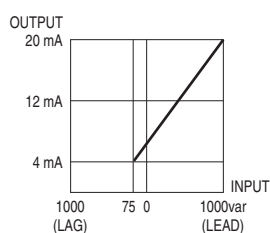
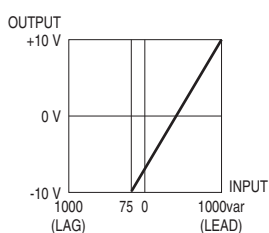
**Accuracy (including influence from temperature and  
frequency):  $\pm 0.75$  %**

■ Standards & approval

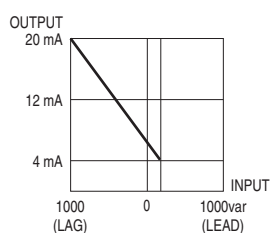
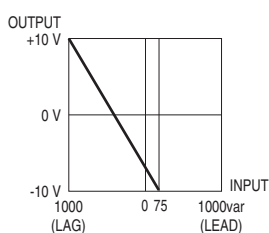
- CE not available

■ OPERATION DIAGRAM (example)

- Output Polarity Code P: Negative in lag, positive in lead



- Output Polarity Code M: Negative in lead, positive in lag



**CUSTOM SPECIFICATION : OPTION /X2****Major specification changes**

Input span: 10 - 50 % of input span of std. input range

**MODEL: LTRP-[1][2][3][4][5]-[6][7]/X2**

Same as standard specification (without customization) except followings.

Refer to standard specification pages.

**ORDERING INFORMATION**

- Code number: LTRP-[1][2][3][4][5]-[6][7]/X2

For each of [1] through [7] same code as standard specification is available.

Use Ordering Information Sheet (No. ESU-3355).

(e.g. LTRP-115PA-R/T/X2)

Refer to standard specification pages.

**SPECIFICATION CHANGES**

■ Input specifications

- Available input range: Refer to the table shown right.

■ PERFORMANCE

Accuracy (including influence from temperature and frequency): Refer to the table shown right.

e.g. 3-phase / 3-wire, 100 V, 5 A

Input range: LAG 350 - LEAD 350 var

As input span is 35 % for std. range (LAG 1000 - LEAD 1000 var), accuracy is  $\pm 0.8$  %.

■ Standards & approval

- CE not available

**• INPUT RANGE**

| VT/CT CODE | STD. RANGE  |          | USABLE RANGE |                |
|------------|-------------|----------|--------------|----------------|
| 1/1        | LAG<br>LEAD | 200 var  | LAG<br>LEAD  | 20 – 100 var   |
| 1/2        | LAG<br>LEAD | 400 var  | LAG<br>LEAD  | 40 – 200 var   |
| 1/5        | LAG<br>LEAD | 1000 var | LAG<br>LEAD  | 100 – 500 var  |
| 2/1        | LAG<br>LEAD | 400 var  | LAG<br>LEAD  | 40 – 200 var   |
| 2/2        | LAG<br>LEAD | 800 var  | LAG<br>LEAD  | 80 – 400 var   |
| 2/5        | LAG<br>LEAD | 2000 var | LAG<br>LEAD  | 200 – 1000 var |
| 4/1        | LAG<br>LEAD | 800 var  | LAG<br>LEAD  | 80 – 400 var   |
| 4/2        | LAG<br>LEAD | 1600 var | LAG<br>LEAD  | 160 – 800 var  |
| 4/5        | LAG<br>LEAD | 4000 var | LAG<br>LEAD  | 400 – 2000 var |

**• ACCURACY**

| INPUT SPAN                       | ACCURACY    |
|----------------------------------|-------------|
| $\geq 10 - < 25\%$ of std. range | $\pm 1.5\%$ |
| $\geq 25 - < 30\%$ of std. range | $\pm 1.0\%$ |
| $\geq 30 - < 35\%$ of std. range | $\pm 0.9\%$ |
| $\geq 35 - < 40\%$ of std. range | $\pm 0.8\%$ |
| $\geq 40 - < 45\%$ of std. range | $\pm 0.7\%$ |
| $\geq 45 - < 50\%$ of std. range | $\pm 0.6\%$ |