

**Power Transducer Series L-UNIT**

3: Lag 60° - 0 - lead 60° or  
Lead 60° - 0 - lag 60°

**PHASE ANGLE TRANSDUCER**

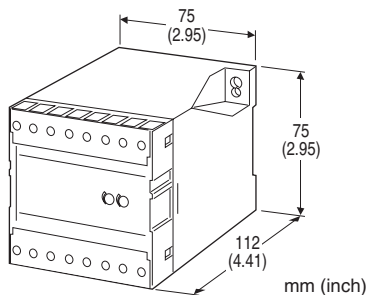
(between two voltages)

**Functions & Features**

- Providing a DC output signal in proportion to phase angle between two voltages
- Can accept both line voltages and phase voltages
- DC output containing little ripple is ideal for computer input
- Isolation up to 2000 V AC
- High-density mounting

**Typical Applications**

- Matching the phase of two power lines in order to turn on the circuit breaker



**MODEL: LPD-[1][2][3][4]-[5][6]**

**ORDERING INFORMATION**

- Code number: LPD-[1][2][3][4]-[5][6]
- Specify a code from below for each [1] through [6]. (e.g. LPD-11MA-C/Q)
- Special output range (For codes Z & 0)
- Specify the specification for option code /Q (e.g. /C01/S01)

**[1] INPUT VOLTAGE**

Phase voltage / line voltage

- 1: 63.5 V / 110 V AC
- 2: 127 V / 220 V AC
- 3: 110 V / 190 V AC
- 4: 220 V / 380 V AC

**[2] INPUT RANGE**

- 1: Lag 30° - 0 - lead 30° or  
Lead 30° - 0 - lag 30°
- 2: Lag 45° - 0 - lead 45° or  
Lead 45° - 0 - lag 45°

**[3] OUTPUT SIGNAL POLARITY**

- P: Negative in lag, positive in lead
- M: Negative in lead, positive in lag

**[4] OUTPUT**

**Current**

- A: 4 - 20 mA DC (Load resistance 550 Ω max.)
- B: 2 - 10 mA DC (Load resistance 1100 Ω max.)
- C: 1 - 5 mA DC (Load resistance 2200 Ω max.)
- D: 0 - 20 mA DC (Load resistance 550 Ω max.)
- E: 0 - 16 mA DC (Load resistance 650 Ω max.)
- F: 0 - 10 mA DC (Load resistance 1100 Ω max.)
- G: 0 - 1 mA DC (Load resistance 11 kΩ max.)
- J: 0 - 5 mA DC (Load resistance 2200 Ω max.)
- DW: -20 - +20 mA DC (Load resistance 550 Ω max.)
- FW: -10 - +10 mA DC (Load resistance 1100 Ω max.)
- GW: -1 - +1 mA DC (Load resistance 11 kΩ max.)
- JW: -5 - +5 mA DC (Load resistance 2200 Ω max.)
- Z: Specify current (See OUTPUT SPECIFICATIONS)

**Voltage**

- 1: 0 - 10 mV DC (Load resistance 10 kΩ min.)
- 2: 0 - 100 mV DC (Load resistance 100 kΩ min.)
- 3: 0 - 1 V DC (Load resistance 1000 Ω min.)
- 4: 0 - 10 V DC (Load resistance 10 kΩ min.)
- 5: 0 - 5 V DC (Load resistance 5000 Ω min.)
- 6: 1 - 5 V DC (Load resistance 5000 Ω min.)
- 1W: -10 - +10 mV DC (Load resistance 10 kΩ min.)
- 2W: -100 - +100 mV DC (Load resistance 100 kΩ min.)
- 3W: -1 - +1 V DC (Load resistance 1000 Ω min.)
- 4W: -10 - +10 V DC (Load resistance 10 kΩ min.)
- 5W: -5 - +5 V DC (Load resistance 5000 Ω min.)
- 0: Specify voltage (See OUTPUT SPECIFICATIONS)

**[5] AUXILIARY POWER SUPPLY**

**AC Power**

- B: 100 V AC
- C: 110 V AC
- D: 115 V AC
- F: 120 V AC
- G: 200 V AC
- H: 220 V AC
- J: 240 V AC

**DC Power**

- R: 24 V DC
- V: 48 V DC
- P: 110 V DC

## [6] OPTIONS

blank: none

/Q: With options (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

**TERMINAL SCREW MATERIAL**

/S01: Stainless steel

## GENERAL SPECIFICATIONS

**Construction:** Stand-alone; terminal access at the front

**Connection:** M3.5 screw terminals (torque 0.8 N·m)

**Screw terminal:** Nickel-plated steel (standard) or stainless steel

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

**Isolation:** Measured input to reference input to output to auxiliary power

**Computation:** Phase angle detection

**Input waveform:** Up to 5 % of 3rd harmonic content

**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

**Input burden:** 0.5 VA

**Operational range:** 85 - 110 % of rating

**Overload capacity:** 150 % of rating for 10 sec., 110 % continuous

## 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 max. 11 V

■ **DC Voltage:** -10 - +12 V DC

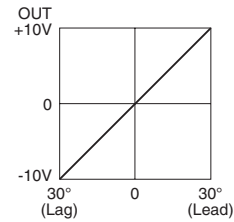
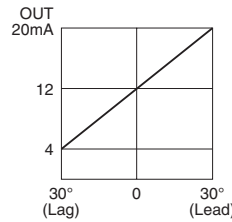
**Minimum span:** 5 mV

**Offset:** Max. 1.5 times span

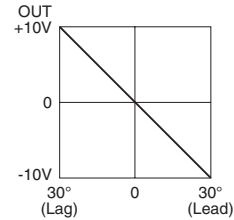
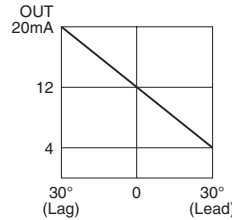
**Load resistance:** Output drive 1 mA max. at  $\geq 0.5$  V

## ■ OPERATION DIAGRAM (example)

• **Negative in lag, positive in lead**



• **Negative in lead, positive in lag**



Remark: When there is no input voltage, the transducer outputs as negative (-) overrange.

## INSTALLATION

**Auxiliary power supply**

• **AC:** Operational voltage range: rating -15/+10 %, 50/60 Hz, approx. 2 VA

• **DC:** Operational voltage range: rating  $\pm 10$  %, or 85 - 150 V for 110 V rating, ripple 10 %p-p max., 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:**  $\pm 2$  %

(at 23°C  $\pm 10$ °C or 73.4°F  $\pm 18$ °F, 45 - 65 Hz)

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

**Ripple:** 0.5 %p-p max.

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

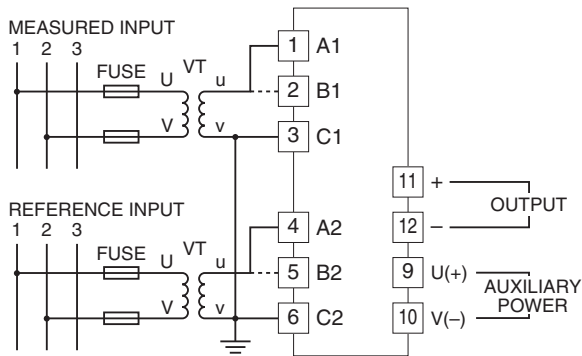
**Insulation resistance:**  $\geq 100$  M $\Omega$  with 500 V DC

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

(measured input to reference input to output to auxiliary power to ground)

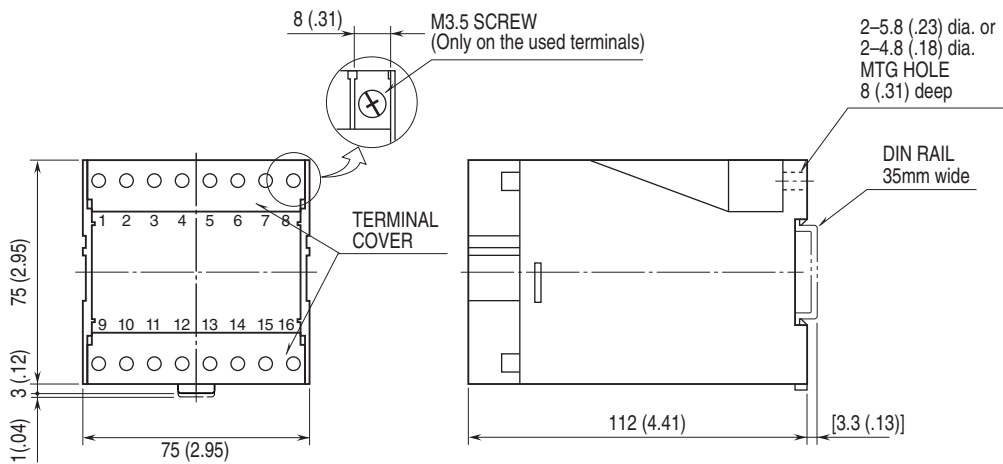
**Impulse withstand voltage:** 1.2 / 50  $\mu$ sec.,  $\pm 5$  kV (input to output or ground)

**CONNECTION DIAGRAM**



For measuring line voltages, use the terminals 1 and 4.  
 For measuring phase voltages, use the terminals 2 and 5.

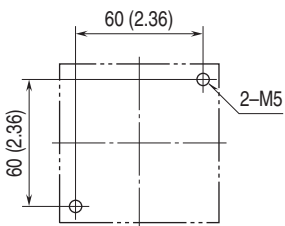
**EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)**



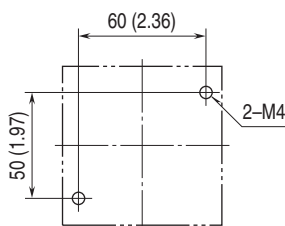
•When mounting, no extra space is needed between units.

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

■ M5 SCREWS



■ M4 SCREWS



Specifications are subject to change without notice.