

## Power Transducer Series L-UNIT

### WATT TRANSDUCER

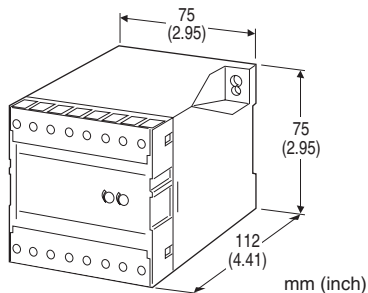
(self-powered, with pulse output)

#### Functions & Features

- Providing a DC output signal and pulse totalizer signal in proportion to AC active power
- Convenient pulse unit output (Wh×10<sup>n</sup>)
- Measuring bidirectional power flow
- 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

#### Typical Applications

- Centralized monitoring and control of power management system in a manufacturing facility or building
- SCR - Silicon Controlled Rectifier



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

#### ORDERING INFORMATION

- Code number: LWTN-[1][2][3][4][5]
- Specify a code from below for each [1] through [5].  
(e.g. LWTN-11A2/Q)
- Specify the specification for option code /Q  
(e.g. /C01/S01)
- Calibration range (e.g. -750 - +750 W)
- VT ratio, CT ratio (e.g. VT 3300/110 V, CT 250/5 A)
- Special DC output range (For codes Z & 0)
- Pulse output (e.g. 6.666 Wh/pulse)

#### How To Determine Pulse Unit

[example]

3-phase / 3-wire, VT 3300/110 V, CT 250/5 A, calibration range 750 W

- From Pulse Unit 10 [kWh/pulse]  
10 [kWh/pulse] / (3300/110) × (250/5)

$$= 6.666 \times 10^{-3} \text{ [kWh/pulse]}$$

$$= 6.666 \text{ [Wh/pulse]}$$

- From Pulse Rate 150 [pulses/kWh]

$$1 / 150 \text{ [pulses/kWh]}$$

$$= 6.666 \times 10^{-3} \text{ [kWh/pulse]}$$

$$= 6.666 \text{ [Wh/pulse]}$$

- From Frequency 0.03125 Hz (at 100 %)

$$750 \text{ [W]} / 0.03125 \text{ [H]} \times 3600 \text{ [s]}$$

$$= 6.666 \text{ [Wh/pulse]}$$

#### [1] CONFIGURATION

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

#### [2] INPUT (unbalanced load)

- 1: 110 V / 5 A AC
- 2: 110 V / 1 A AC
- 3: 220 V / 1 A AC
- 4: 220 V / 5 A AC
- 5: 220 V / 380 V / 1 A AC (3-phase / 4-wire)
- 6: 220 V / 380 V / 5 A AC (3-phase / 4-wire)
- 7: 110 V / 190 V / 1 A AC (3-phase / 4-wire)
- 8: 110 V / 190 V / 5 A AC (3-phase / 4-wire)
- A: 100 V / 200 V / 1 A AC (single-phase / 3-wire)
- B: 100 V / 200 V / 5 A AC (single-phase / 3-wire)

#### [3] DC OUTPUT

##### Current

- A: 4 - 20 mA DC (Load resistance 600 Ω max.)
- B: 2 - 10 mA DC (Load resistance 1200 Ω max.)
- C: 1 - 5 mA DC (Load resistance 2400 Ω max.)
- D: 0 - 20 mA DC (Load resistance 600 Ω max.)
- E: 0 - 16 mA DC (Load resistance 750 Ω max.)
- F: 0 - 10 mA DC (Load resistance 1200 Ω max.)
- G: 0 - 1 mA DC (Load resistance 12 kΩ max.)
- J: 0 - 5 mA DC (Load resistance 2400 Ω max.)
- FW: -10 - +10 mA DC (Load resistance 1000 Ω max.)
- GW: -1 - +1 mA DC (Load resistance 10 kΩ max.)
- JW: -5 - +5 mA DC (Load resistance 2000 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)

## [4] PULSE OUTPUT (open collector)

- 0:** None  
**1:** 2.777 Hz at 100 % input  
**2:** Specify pulse unit (within 0.006 - 3.12 Hz)

## [5] 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:** Voltage input to current input to DC output to pulse output  
**Computation:** Time division multiplication  
**Overrange output:** Approx. -10 - +120 % at 1 - 5 V  
**Zero adjustment(DC output):** -5 to + 5 % (front)  
**Span adjustment(DC output):** 95 to + 105 % (front)

### INPUT SPECIFICATIONS

- Frequency:** 50 or 60 Hz
- Voltage Input**  
**Operational range:** 85 - 110 % of rating  
**Overload capacity:** 150 % of rating for 10 sec., 110 % continuous
  - Current Input**  
**Operational range:** 0 - 120 % of rating  
**Overload capacity:** 1000 % of rating for 3 sec., 200 % for 10 sec., 120 % continuous
- **How To Determine Wattage Range**  
 Calibration Range [W] = (Measuring Wattage) / ((VT Ratio) × (CT Ratio))  
 Check that the required calibration range is within the available range in the table.

[example]  
 3-phase / 3-wire, measuring wattage 750 kW,  
 VT 3300 / 110 V, CT 250 / 5 A  
 $(750 \times 10^3 [W]) \div ((3300 / 110) \times (250 / 5)) = 0 - 500 [W]$

### ■ INPUT RANGE

#### • 3-phase / 3-wire

INPUT	STD.RANGE	AVAILABLE RANGE	BURDEN (VA)	
			VOLT.	CURR.
110V/1A	±200 W	±100 - ±240 W	P <sub>1</sub> : 2.5	0.1/ph
110V/5A	±1000 W	±500 - ±1200 W	P <sub>3</sub> : 0.2	0.5/ph
220V/1A	±400 W	±200 - ±480 W	P <sub>1</sub> : 2.5	0.1/ph
220V/5A	±2000 W	±1000 - ±2400 W	P <sub>3</sub> : 0.4	0.5/ph

#### • Single-phase / 2-wire

INPUT	STD.RANGE	AVAILABLE RANGE	BURDEN (VA)	
			VOLT.	CURR.
110V/1A	±100 W	±50 - ±120 W	2.5	0.1
110V/5A	±500 W	±250 - ±600 W		0.5
220V/1A	±200 W	±100 - ±240 W	2.5	0.1
220V/5A	±1000 W	±500 - ±1200 W		0.5

#### • Single-phase / 3-wire

INPUT	STD.RANGE	AVAILABLE RANGE	BURDEN (VA)	
			VOLT.	CURR.
200V/1A	±200 W	±100 - ±240 W	P <sub>1</sub> : 2.5	0.1/ph
200V/5A	±1000 W	±500 - ±1200 W	P <sub>2</sub> : 0.2	0.5/ph

### ■ INPUT RANGE

#### • 3-phase / 4-wire

INPUT	STD.RANGE	AVAILABLE RANGE	BURDEN (VA)	
			VOLT.	CURR.
$\frac{110V}{\sqrt{3}}/1A$	±200 W	±100 - ±240 W	P <sub>1</sub> - P <sub>2</sub> : 2.5	0.1 /phase
$\frac{110V}{\sqrt{3}}/5A$	±1000 W	±500 - ±1200 W	P <sub>3</sub> : 0.1	0.5 /phase
$\frac{190V}{\sqrt{3}}/1A$	±350 W	±175 - ±420 W	P <sub>1</sub> : 2.5	0.1 /phase
$\frac{190V}{\sqrt{3}}/5A$	±1750 W	±875 - ±2100 W	P <sub>2</sub> , P <sub>3</sub> : 0.2	0.5 /phase
$\frac{220V}{\sqrt{3}}/1A$	±400 W	±200 - ±480 W	P <sub>1</sub> - P <sub>2</sub> : 2.5	0.1 /phase
$\frac{220V}{\sqrt{3}}/5A$	±2000 W	±1000 - ±2400 W	P <sub>3</sub> : 0.3	0.5 /phase
$\frac{380V}{\sqrt{3}}/1A$	±700 W	±350 - ±840 W	P <sub>1</sub> : 2.5	0.1 /phase
$\frac{380V}{\sqrt{3}}/5A$	±3500 W	±1750 - ±4200 W	P <sub>2</sub> , P <sub>3</sub> : 0.4	0.5 /phase

### OUTPUT SPECIFICATIONS

#### ■ DC Output

- DC Current:** -10 - + 20 mA DC  
**Span:** Min. 1 mA, max. 20 mA  
**Offset:** Max. 1.5 times span  
**Load resistance:** Output drive 12 V maximum; 10 V for [±] output
- 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

■ **Pulse output:** Open collector; 0 Hz at 0 W  
(cutout at approx. 0.5 - 1.0 %)

**Rating:** 35 V DC @ 100 mA

**ON voltage:**  $\leq 1$  V at 100 mA

**ON duration:** Max. 0.5 sec., min. approx. 50 msec.

**Frequency range:**

0 - 2.777 Hz (0 - 100 %) standard; 0 - 0.006 Hz through 3.12 Hz is possible.

• **2.777 Hz at 100 % Input**

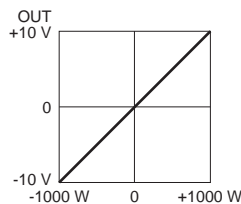
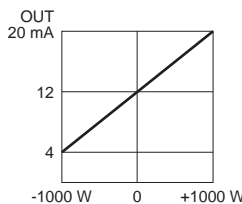
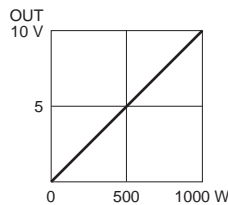
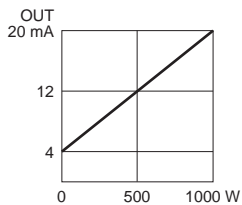
[example] 1000 W calibration range

$2.777 \text{ [Hz]} \times 3600 \text{ [s]} / 1 \text{ [kW]} = 10000 \text{ [pulses/kWh]}$

• **Specified Pulse Unit:** Refers to how much electrical energy (kWh) consumption at the primary of the VT and CT corresponds to the single output pulse per hour from the transducer.

Output Frequency [Hz] = Calibration Range [kW]  $\times$  VT Ratio  $\times$  CT Ratio / Pulse Unit [kWh/pulse]  $\times$  3600 [s]

■ **OPERATION DIAGRAM (example)**



## INSTALLATION

**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  $\pm 10$ °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.

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

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

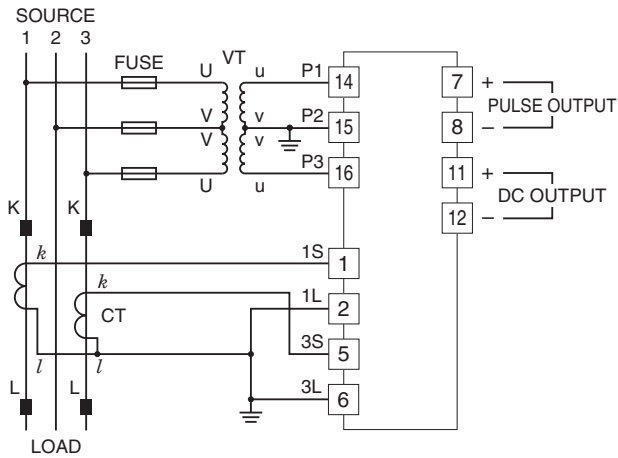
(voltage input to current input to DC output to pulse output to ground)

**Impulse withstand voltage:** 1.2 / 50  $\mu$ sec.,  $\pm 5$  kV

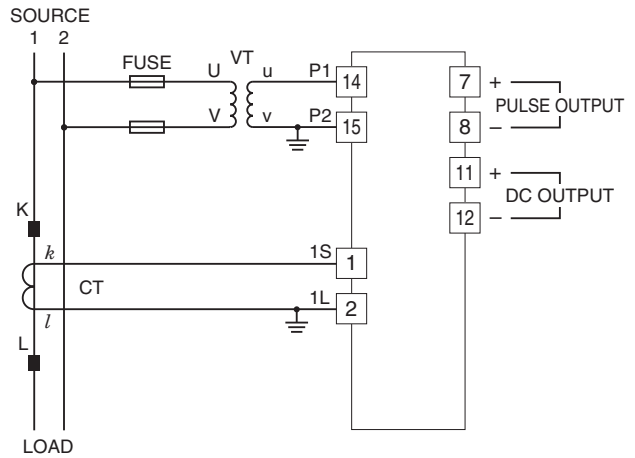
(input to output or ground)

## CONNECTION DIAGRAM

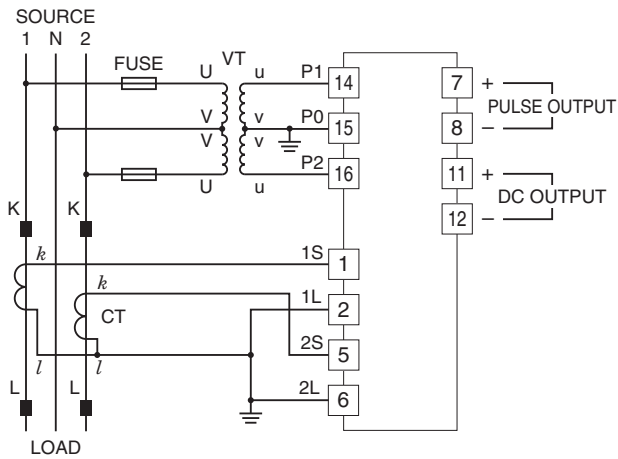
### 3-PHASE/3-WIRE



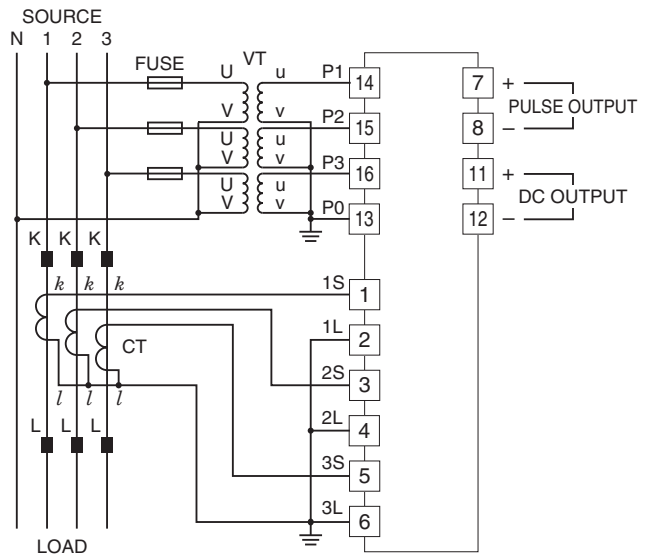
### SINGLE-PHASE/2-WIRE



### SINGLE-PHASE/3-WIRE

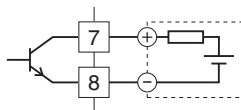


### 3-PHASE/4-WIRE

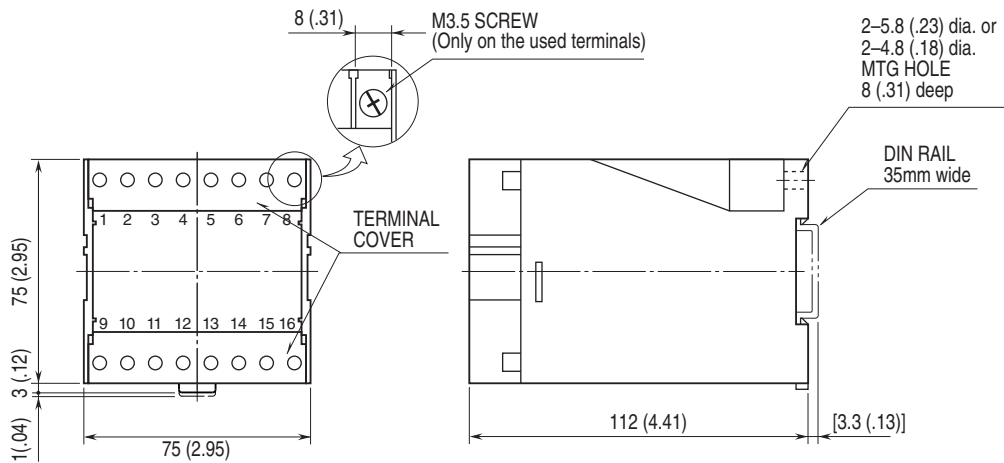


Pulse Output Connection Example

■ Open Collector



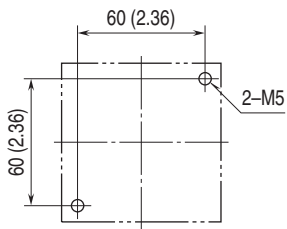
## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)



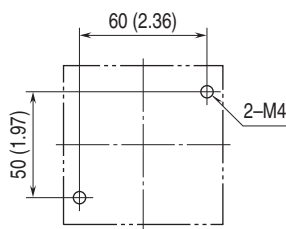
•When mounting, no extra space is needed between units.

## MOUNTING REQUIREMENTS unit: mm (inch)

### ■ M5 SCREWS



### ■ M4 SCREWS



Specifications are subject to change without notice.