BadgerWare

*Digital Panel Instruments*

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# POWER FACTOR AND PHASE ANGLE TRANSDUCER

**TPF** system Power Factor (COSθ)
**TPA** system Phase Angle

These transducers measure the power factor or phase angle between current and voltage of a single-phase or three-phase system with balanced loads. The output signals are isolated load-independent DC current or DC voltage.

## FEATURES

- Accuracy 0.5% FS ±0.3°
- High immunity to external noise
- Wide selection of input and output range
- Quick and easy mounting

## SPECIFICATION

**Accuracy:** 0.5% FS ±0.3°
**Temp. coefficient:** 100ppm at 23°C ±3°C (Option 60ppm at 23°C ±3°C)
**Temp. range:** -20 to 60 °C Operating 0~50°C
**Humidity range:** Up to 95% RH
**Isolation:** Input/output/power/case
**Dielectric test:** DIN-IEC 688. 2K Vrms 50/60 Hz, 1 min. Between terminal to terminal. 2.8K Vrms/1min. Between terminal to case.
**Surge test:** DIN-IEC 255-4, ANSI C37. 90a/1974. 5KV (1.2 x 50µs)
**Insulation resistance:** 100MΩ or more, DC 500V
**Housing material:** Steel sheet
**Mounting:** Wall mounting
**Power supply:** AC 115/230V ±15%, 50/60 Hz, 3VA

## INPUT

**Measuring range:** Power Factor: Lead (cap) 0.5 ~ 1 ~ Lag (ind) 0.5 Phase Angle: Lead (cap) 60° ~ 0 ~ Lag (ind) 60°
**Voltage:** AC 30V ~ 600V
**Current:** AC 0 ~ 5A (0.3 ~ 7.5A)
**Frequency:** 50Hz or 60Hz ±3Hz
**Burden:** ≤0.1VA per voltage circuit ≤0.2VA per current circuit
**Overload capacity:** Voltage … 600Vrms continuous
1.25 x rated continuous
2 x rated for 10 sec
4 x rated for 5 sec
Current … 3 x rated continuous
10 x rated for 10 sec
50 x rated for 1 sec
80 x rated for 0.5 sec


## OUTPUT

**Output variables:** DC voltage or current
**Ripple:** <0.5% p-p max.
**Response time:** < 0.4 sec. or less
**Zero adjustment:** ±5% minimum
**Span adjustment:** ±10% minimum
**DC current:** 0~20mA (max.)

| Output | Load resistance |
|---|---|
| 4~20mA | ≤ 600Ω |
| 0~20mA | ≤ 600Ω |
| 0~10mA | ≤ 1200Ω |
| 0~1mA | ≤ 12KΩ |
| -1~0~+1mA | ≤ 12KΩ |
| -10~0~+10mA | ≤ 1200Ω |

Load voltage 12V

$$R = \frac{12V}{\text{Output current}}$$

(R = load resistance)

**DC voltage:** 0~12V (max.)

| Output | Load resistance |
|---|---|
| 0~10V | ≥ 1000Ω |
| 0~5V | ≥ 500Ω |
| 1~5V | ≥ 500Ω |
| 0~1V | ≥ 100Ω |
| -1~0~+1V | ≥ 100Ω |
| -10~0~+10V | ≥ 1000Ω |

Load voltage 10mA

$$R = \frac{\text{Output voltage}}{10mA}$$

(R = load resistance)

# POWER FACTOR AND PHASE ANGLE TRANSDUCER

## ORDERING INFORMATION

TPF — □□ — □ □ □ □
TPA — □□ — □ □ □ □

**MODEL**
**TPF:** Power Factor
**TPA:** Phase Angle

**CONNECTION**
**12:** 1 phase 2 wires
**33:** 3 phase 3 wires
**34:** 3 phase 4 wires

**INPUT**
**1:** AC 120V, 5A
**2:** AC 240V, 5A
**Y:** Option (600V, 10A max.)

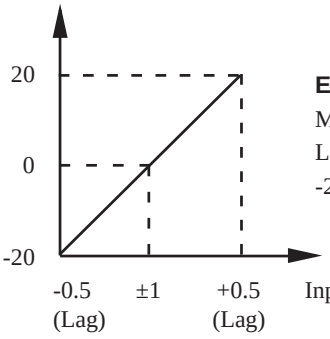
**INPUT FREQUENCY**
**1:** 50 Hz ±3 Hz
**2:** 60 Hz ±3 Hz

**DC OUTPUT**
**1:** 4~12~20mA
**2:** -10~0~+10mA
**3:** -1~0~+1mA
**A:** 0~5~10V
**B:** -10~0~+10V
**C:** -5~0~+5V
**D:** 1~3~5V
**Y:** Option (±20mA, ±12V max.)

**POWER SUPPLY**
**1:** AC 115/230V ±15%, 50/60 Hz
**Y:** Option

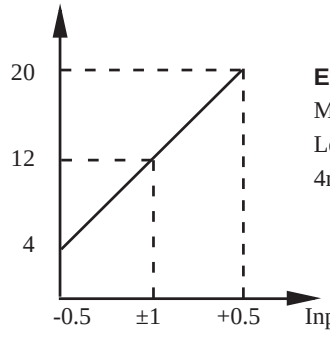
### DC output characteristic

A: Output (mA)




**Example:**
Measuring range Lead Output:
Lead 0.5~±1~Lag 0.5,
-20mA~0~+20mA

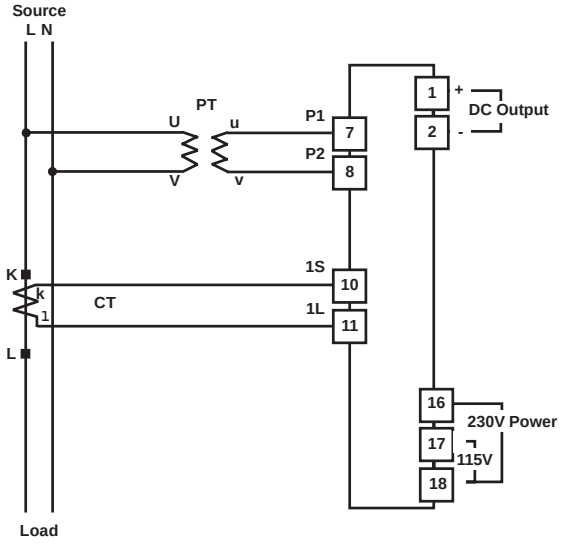
B: Output (mA)



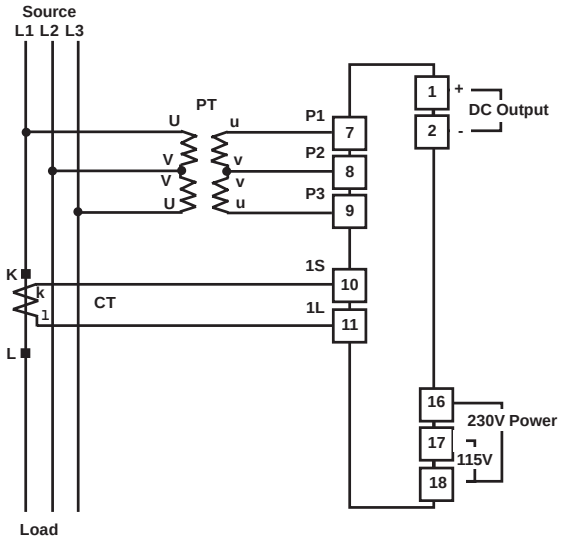

**Example:**
Measuring range Lead Output:
Lead 0.5~±1~Lag 0.5,
4mA~12~20mA

## CONNECTION DIAGRAMS

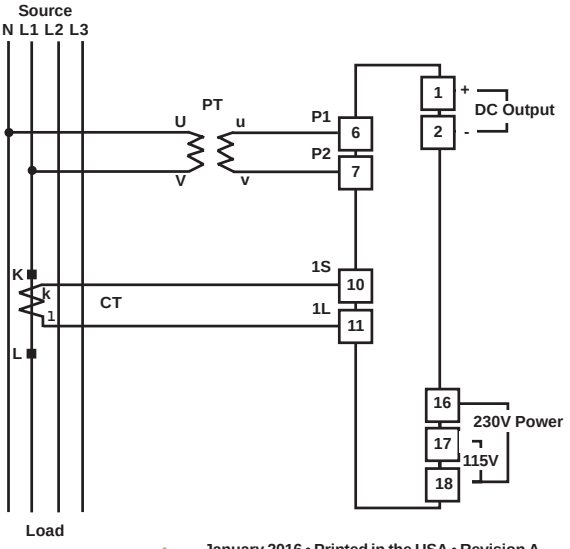
■ **TPF-12, TPA-12 (CASE B)** 1 phase 2 wires




■ **TPF-33, TPA-33 (CASE B)** 3 phase 3 wires




■ **TPF-34, TPA-34 (CASE B)** 3 phase 4 wires



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