

POWER TRANSDUCERS



ABS DIN Rail Mount Case

High Accuracy
0.2% R.O. (standard)
0.1% R.O. (special Option)



Screw Mount Metal Case

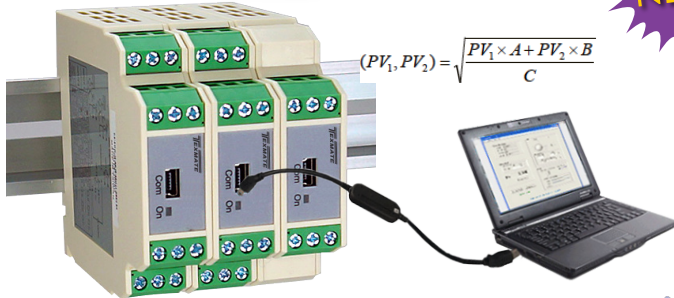


HIGH ACCURACY
LEGENDARY RELIABILITY
FAST DELIVERY
FRIENDLY APPLICATION SUPPORT



Texmate DIN Rail Mount Transmitters

TT SERIES



$$(PV_1, PV_2) = \sqrt{\frac{PV_1 \times A + PV_2 \times B}{C}}$$

NEW

Transmitters can be configured using TT Configurator software without connecting to a power source.



LEOPARD TL SERIES



- ▶ Active, isolated analog output. (No need of external 24V to power output)
- ▶ Plug n Play. Order unit setup to your exact requirements.
- ▶ Dual 9A Form C relays with NO and NC connections available.
- ▶ 24 VDC Excitation to power 4-20 mA loops and selectable 5 or 10 VDC to power Strain gauge, and Pressure / Load cell.
- ▶ Auto sensing AC/DC power supply 85-265 VAC / 95-370 VDC or optional 18-36 VAC / 9-60 VDC.
- ▶ Remote programmer may be used as a remote display.

- TT-1S1M** Single Channel input and Single 4-20mA output
- TTM-2S2MM** Dual same signal Inputs; Single 4-20mA output and Single 4-20mA output with Math Function
- TTM-2S2MC** Dual same signal Inputs; Single 4-20mA output with math function & Single RS-485 output
- TT-2D2MM** Dual Inputs; Dual 4-20mA output
- TT-2D2MC** Dual Inputs; Single 4-20mA & Single RS-485 output

Model#	Input signal	Maximum Range	Accu-
TT-1S1M TTM-2S2MM TTM-2S2MC TT-2D2MM TT-2D2MC	Thermocouple J	-50 to 1000°C (-58 to 1832°F)	±1°C
	Thermocouple K	-50 to 1370°C (-58 to 2498°F)	±1°C
	Thermocouple T	-270 to 400°C (-454 to 752°F)	±1°C
	Thermocouple E	-50 to 700°C (-58 to 1292°F)	±1°C
	Thermocouple B	0 to 1750°C (32 to 3182°F)	±2°C *
	Thermocouple R	-50 to 1750°C (-58 to 3182°F)	±2°C
	Thermocouple S	-50 to 1750°C (-58 to 3182°F)	±2°C
	Thermocouple N	-50 to 1300°C (-58 to 2372°F)	±2°C
	Thermocouple C	-50 to 1800°C (-58 to 3272°F)	±2°C
	Pt100	-200 to 600°C (-328 to 1112°F)	±0.2°C
	MV	-60mV to 60mV	
	Voltage	-10 to 10Vdc	±1mV
	Current	0 to 24mAdc	±10µA

*Accuracy is not guaranteed between 0 and 400°C (0 and 752°F) for type B, R and S.

- Output signal :** DC 4/0~20mA or DC 0~10V
- Output resolution :** 0.6uA.
- Output response time :** <200mS.
- Communication :** Modbus RS-485 RTU protocol, 4800~38400 bps
- Power supply :** 18~36 Vdc, internal protection against polarity inversion

Leopard Transmitter



Isolated Analog Output

Available Inputs:

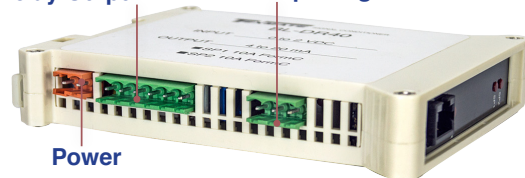
- ▶ DC - Volts, Amps, mV, mA
- ▶ AC - Volts, Amps, mV, mA, Line Frequency
- ▶ Load Cell, Pressure, Strain Gauge
- ▶ 3 wire Potentiometer - Position, Resistance
- ▶ Temperature - Thermocouple, RTD Pt-100
- ▶ Proximity switch - RPM or Frequency



Remote Display Programmer



Relay Output Input Signal



Power

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AC CURRENT TRANSDUCER



SCREW MOUNT METAL CASE **A**



ABS DIN RAIL MOUNT CASE **C**



ABS DIN RAIL MOUNT CASE **D**



SCREW MOUNT METAL CASE **B**

MODELS OFFERED

- TA-1:** 1 Phase, Average sensing Amps
- TA-1T:** 1 Phase, True rms sensing Amps
- TA-3:** 3 Phase, Average sensing Amps
- TA-3T:** 3 Phase, True rms sensing Amps

- True RMS sensing is recommended for input signals with distortion.
- Direct connect to the transducer for inputs \leq 5A AC.
- Connect using a current Transformer (C.T.) for inputs greater than 5A AC.

FEATURES

- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277)
- Many input and output signal combinations

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

AC CURRENT TRANSDUCERS

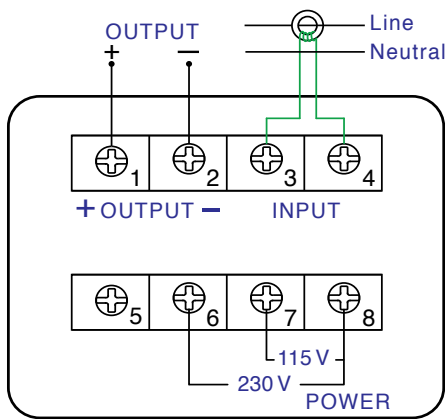
INPUT SPECIFICATIONS

- AC Input 0 to 5A AC, 0 to 1A AC or custom input
- Frequency..... 45Hz to 65Hz or 400Hz
- Burden $\leq 0.2VA$
- Response Sensitivity $\leq 0.5\%$ of measuring range to maximum input range
- Input Overload Capacity 3 times the rated input current continuously.
 10 times the rated current for 10 seconds.
 50 times the rated input current for 1 second.
 80 times the rated input current for 0.5 second.

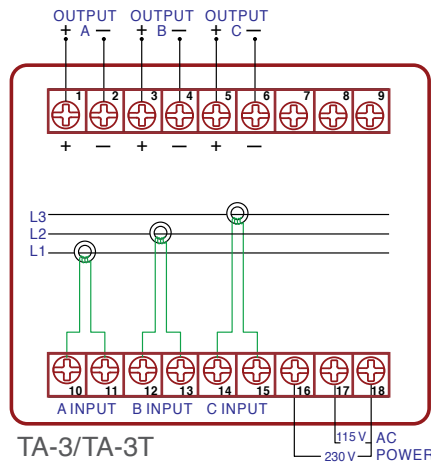
OUTPUT SPECIFICATIONS

- Output Variables DC mA or DC Volts
- Ripple..... $< 0.5\%$ of rated output. Peak to Peak (maximum)
- Response Time < 400 milliseconds to go from 0 to 99% of output
- Zero Adjustment..... $\pm 5\%$ of rated output (minimum)
- Span Adjustment..... $\pm 10\%$ of rated output (minimum)
- Load Resistance..... 10K Ω maximum for 0 to 1mA output
 500 Ω maximum for 4 to 20mA output
 500 Ω minimum for 0 to 10V output

CONNECTION DIAGRAM



TA-1/TA-1T



TA-3/TA-3T

Base Model	Accuracy	Input Signal	Input Frequency	Output Signal	Auxiliary Power	Case
TA-1	RO1 $\pm 0.2\%$	SA1 0 to 5 A AC	HZ1 45Hz to 65Hz	OA1 0 to 1 mA DC	P0 Single Powered	CM Metal
TA-1T	RO3 $\pm 0.1\%$	SA2 0 to 1 A AC	HZ4 400Hz	OA2 4 to 20mA DC	P1 0-1 mA Output Only	CP Plastic
TA-3		SAY Custom Input		OA3 0 to 10 V DC	P2 115/230V AC $\pm 15\%$	
TA-3T				OAY Custom Output	P3 24V DC $\pm 15\%$	
					PY Custom Power $\pm 15\%$	

AC VOLTAGE TRANSDUCERS



MODELS OFFERED

- TV-1:** 1 Phase, Average sensing
- TV-1T:** 1 Phase, True rms sensing
- TV-3:** 3 Phase, Average sensing
- TV-3T:** 3 Phase, True rms sensing

- True RMS sensing is recommended for input signals with distortion.
- Direct connect to the transducer for inputs $\leq 600V$ AC.
- Connect using a Potential Transformer (P.T.) for inputs $> 600V$ AC.

FEATURES

- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277)
- Many input and output signal combinations

GENERAL SPECIFICATIONS

Accuracy	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient	≤ 100 ppm/ $^{\circ}C$ of span ≤ 60 ppm/ $^{\circ}C$ for ambient temperature of $25^{\circ}C \pm 10^{\circ}C$
Temp. range	Storage temperature range $-20^{\circ}C$ to $60^{\circ}C$ ($-4^{\circ}F$ to $140^{\circ}F$) Operating temperature range $0^{\circ}C$ to $50^{\circ}C$ ($32^{\circ}F$ to $122^{\circ}F$)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting	Screw mount on metal case or Plastic case DIN Rail 35mm
Auxiliary Power	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

AC VOLTAGE TRANSDUCERS

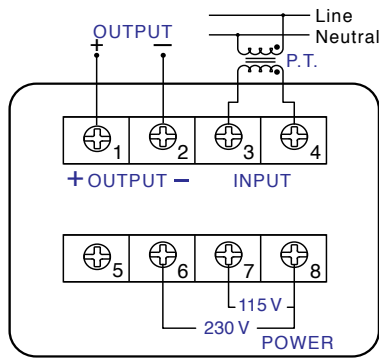
INPUT SPECIFICATIONS

AC Input..... 0 to 150V AC, 0 to 300V AC, 0 to 600V AC or custom input
 Frequency 45Hz to 65Hz or 400Hz
 Burden $\leq 0.1VA$
 Response Sensitivity $\leq 0.5\%$ of measuring range to maximum input range
 Input Overload Capacity 1.25 times the rated input voltage continuously.
 2 times the rated voltage for 10 seconds.
 4 times the rated input voltage for 5 seconds.
 Or 600V AC rms continuous.(absolute maximum)

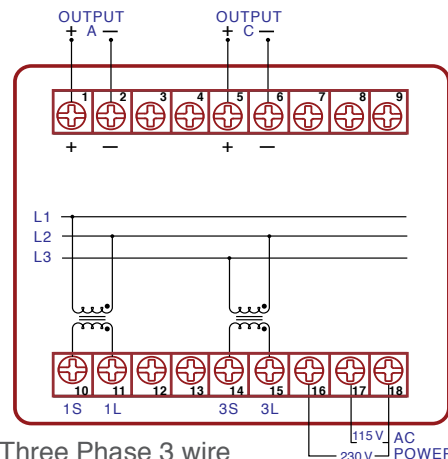
OUTPUT SPECIFICATIONS

Output Variables..... DC mA or DC Volts
 Ripple..... < 0.5% of rated output. Peak to Peak (maximum)
 Response Time..... < 400 milliseconds to go from 0 to 99% of output
 Zero Adjustment..... $\pm 5\%$ of rated output minimum
 Span Adjustment..... $\pm 10\%$ of rated output minimum
 Load Resistance..... 10K Ω maximum for 0 to 1mA output
 500 Ω maximum for 4 to 20mA output
 500 Ω minimum for 0 to 10V output

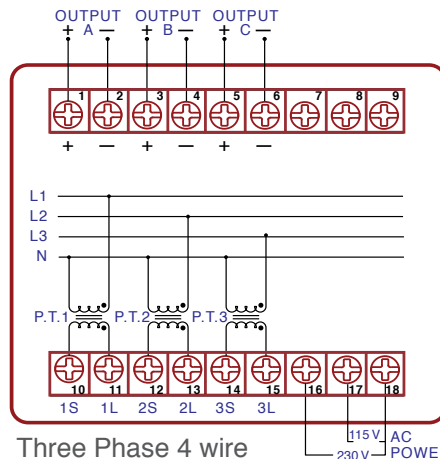
CONNECTION DIAGRAM



TV-1/TV-1T



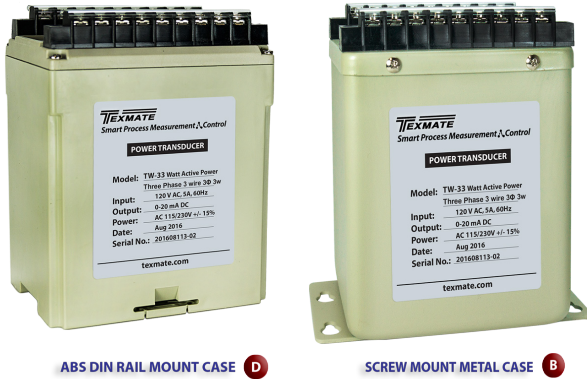
Three Phase 3 wire



Three Phase 4 wire

Base Model	Input Signal	Input Frequency	Output Signal	Auxiliary Power	Case
TV-1	SV1 0 to 150V AC	HZ1 45Hz to 65Hz	OV1 0 to 1 mA DC	P0 Single Powered	CM Metal
TV-1T	SV2 0 to 300V AC	HZ4 400Hz	OV2 4 to 20mA DC	P1 115/230V AC $\pm 15\%$	CP Plastic
TV-3	SV3 0 to 600V AC		OV3 0 to 10 V DC	P2 24V DC $\pm 15\%$	
TV-3T	SVY Custom Input		OVY Custom Output	P3 125V DC $\pm 15\%$	
RO1	$\pm 0.2\%$ Accuracy			PY Custom Power $\pm 15\%$	
RO3	$\pm 0.1\%$ Accuracy				

MODELS OFFERED



- TW-12:** Single Phase, 2 Wire – 1 Element
- TW-13:** Single Phase, 3 Wire – 2 Element
- TW-33:** 3 Phase, 3 Wire – 2 Element
- TW-34:** 3 Phase, 4 Wire – 3 Element

- Accurate measurement of the active power Watts for balanced or unbalanced loads.
- The output signals are isolated load independent DC mA or DC Volts, representing the measured value of the active power Watts.

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

Watts TRANSDUCERS

INPUT SPECIFICATIONS

AC Input 120V/5A AC, 240V/5A AC for 1Ø/2 wire, 240V/120V, 5A AC for 1Ø/3 Wire
 120V/5A AC, 240V/5A AC for 3Ø/3 Wire & 3Ø / 4 Wire
 custom input (600V max /10A AC max)

Frequency..... 60Hz ±3Hz, 50Hz ±3Hz, 400Hz ±3Hz

Burden ≤0.2VA per current circuit, ≤0.1VA per voltage circuit.

Response Sensitivity ≤0.5% of measuring range to maximum input range

Input Voltage 600V AC rms continuous (absolute maximum)

Overload Capacity 1.25 times the rated input Voltage continuously.
 2 times the rated input Voltage for 10 secs.
 4 times the rated input Voltage for 5 secs.

Input Current..... 3 times the rated input current continuously.

Overload Capacity 10 times the rated input current for 10 secs.
 50 times the rated input current for 1 sec.
 80 times the rated input current for 0.5 secs

OUTPUT SPECIFICATIONS

Output Variables..... DC mA or DC Volts

Ripple..... < 0.5% of rated output. Peak to Peak (maximum)

Response Time..... < 400 milliseconds to go from 0 to 99% of output

Zero Adjustment..... ± 5% of rated output (minimum)

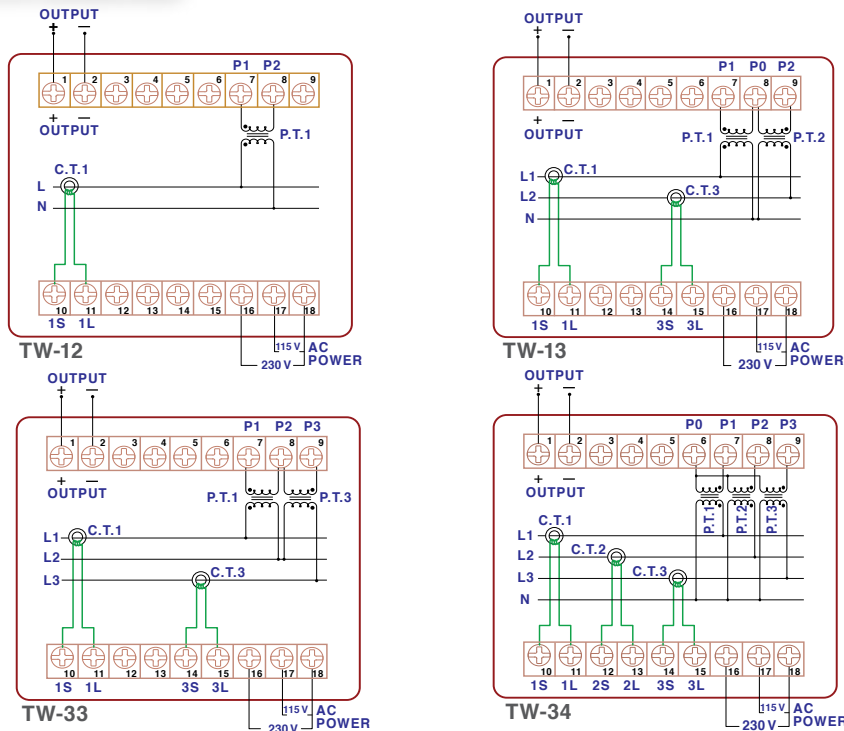
Span Adjustment..... ± 10% of rated output (minimum)

Load Resistance..... 10 kΩ maximum for 0 to 1mA output
 500 Ω maximum for 4 to 20mA output
 500 Ω minimum for 0 to 10V output

Maximum Input range value = (CT Ratio) X (PT Ratio) X (Nominal Watts)

If CT = 200A:5A PT is 3300V:110V Nominal Watts = 500
 then CT Ratio = 40 then PT Ratio = 30 and Maximum input range value = 40 x 30 x 500 = 600KW

CONNECTION DIAGRAM



Case	CM	Metal
	CP	Plastic
Auxiliary Power	P0	Single Powered
	P1	115/230V AC ±15%
	P2	24V DC ±15%
	P3	125V DC ±15%
PY	Custom Power ±15%	
Output Signal	OW1	0 to 1 mA DC
	OW2	4 to 20mA DC
	OW3	0 to 10 V DC
	OWY	Custom Output
Input Frequency	HZ6	60Hz
	HZ5	50Hz
	HZ4	400Hz
Input Signal	SW1	120V/5A AC
	SW2	240V/5A AC
	SWY	Custom Input, MAX 10A
Accuracy	RO1	±0.2%
	RO3	±0.1%
Base Model	TW-12	1 Phase, 1P/2W, 1E, Watts
	TW-13	1 Phase, 1P/3W, 2E, Watts
	TW-33	3 Phase, 3P/3W, 2E, Watts
	TW-34	3 Phase, 3P/4W, 3E, Watts

MODELS OFFERED

- TQ-12:** Single Phase, 2 Wire – 1 Element
- TQ-13:** Single Phase, 3 Wire – 2 Element
- TQ-33:** 3 Phase, 3 Wire – 2 Element
- TQ-34:** 3 Phase, 4 Wire – 3 Element

- Accurate measurement of the active power Watts for balanced or unbalanced loads.
- The output signals are isolated load independent DC mA or DC Volts, representing the measured value of the active power Watts.



ABS DIN RAIL MOUNT CASE **D**



SCREW MOUNT METAL CASE **B**

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

INPUT SPECIFICATIONS

AC Input 120V/5A AC, 240V/5A AC for 1Ø/2 wire, 240V/120V, 5A AC for 1Ø/3 Wire
 120V/5A AC, 240V/5A AC for 3Ø/3 Wire & 3Ø / 4 Wire
 custom input (600V max /10A AC max)

Frequency.....60Hz ±3Hz, 50Hz ±3Hz, 400Hz ±3Hz

Burden≤0.2VA per current circuit, ≤0.1VA per voltage circuit.

Response Sensitivity≤0.5% of measuring range to maximum input range

Input Voltage600V AC rms continuous (absolute maximum)

Overload Capacity 1.25 times the rated input Voltage continuously.
 2 times the rated input Voltage for 10 secs.
 4 times the rated input Voltage for 5 secs.

Input Current.....3 times the rated input current continuously.

Overload Capacity 10 times the rated input current for 10 secs.
 50 times the rated input current for 1 sec.
 80 times the rated input current for 0.5 secs

OUTPUT SPECIFICATIONS

Output Variables.....DC mA or DC Volts

Ripple.....< 0.5% of rated output. Peak to Peak (maximum)

Response Time.....< 400 milliseconds to go from 0 to 99% of output

Zero Adjustment.....± 5% of rated output (minimum)

Span Adjustment.....± 10% of rated output (minimum)

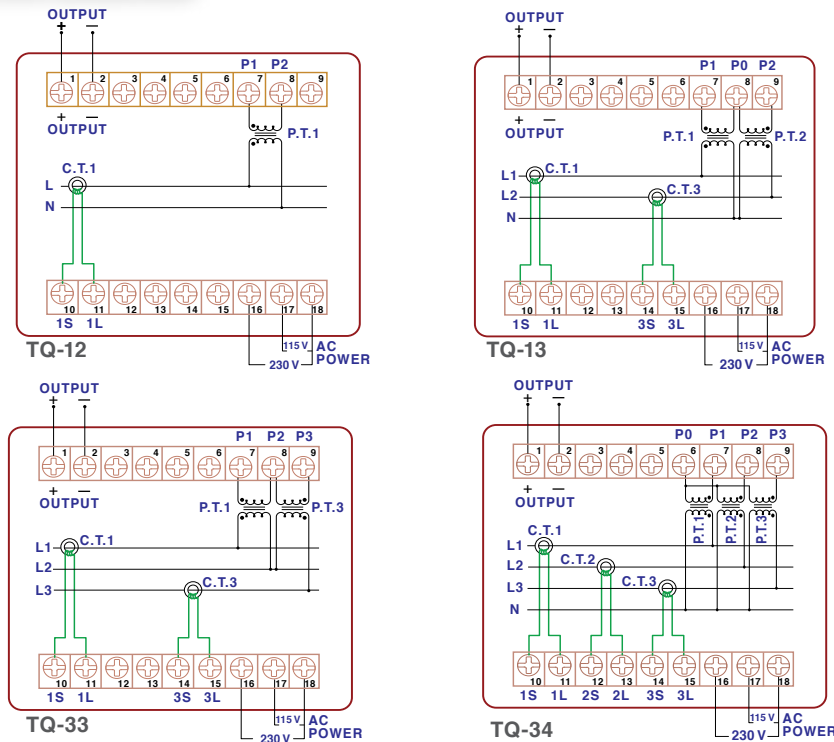
Load Resistance.....10 kΩ maximum for 0 to 1mA output
 500 Ω maximum for 4 to 20mA output
 500 Ω minimum for 0 to 10V output

Maximum Input range value = (CT Ratio) X (PT Ratio) X (Nominal VARs)

If CT = 200A:5A PT is 3300V:110V Nominal VARs = 500

CT Ratio = 40 PT Ratio = 30 and Maximum input range value = 40 x 30 x 500 = 600KVAR

CONNECTION DIAGRAM



Case	CM	Metal
	CP	Plastic
Input/Output Relationship	LG	LAG = + Polarity
	LD	LEAD = + Polarity
Auxiliary Power	P0	Single Powered
	P1	115/230V AC ±15%
	P2	24V DC ±15%
	P3	125V DC ±15%
	PY	Custom Power ±15%
Output Signal	OQ4	±1 mA DC
	OQ5	12 ± 8mA DC
	OQ6	±10 V DC
	OQY	Custom Output
Input Frequency	HZ6	60Hz
	HZ5	50Hz
	HZ4	400Hz
	Input Signal	SW1
SW2		240V/5A AC
SWY		Custom Input
Accuracy	RO1	±0.2%
	RO3	±0.1%
Base Model	TQ-12	1 Phase, 1P/2W, 1E, VARs
	TQ-13	1 Phase, 1P/3W, 2E, VARs
	TQ-33	3 Phase, 3P/3W, 2E, VARs
	TQ-34	3 Phase, 3P/4W, 3E, VARs



ABS DIN RAIL MOUNT CASE **D**



SCREW MOUNT METAL CASE **B**

MODELS OFFERED

- TWQ-12:** 1 Phase, 2 Wire – 1 Element
- TWQ-13:** 1 Phase, 3 Wire – 2 Element
- TWQ-33:** 3 Phase, 3 Wire – 2 Element
- TWQ-34:** 3 Phase, 4 Wire – 3 Element

- Accurate measurement of the active power and reactive power (Watts and VARs) of a single/ three phase system with balanced or unbalanced loads.
- The output signals are isolated load independent DC mA or DC Volts, representing the measured value of the active and reactive power (Watts and VARs).

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation.....	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional), 125V DC $\pm 20\%$ (optional)

INPUT SPECIFICATIONS

AC Input.....	120V/5A AC, 240V/5A AC for 1 ϕ /2 wire, 240V/120V, 5A AC for 1 ϕ / 3 Wire 120V/5A AC, 240V/5A AC for 3 ϕ /3 Wire & 3 ϕ / 4 Wire custom input (600V max /10A AC max)
Frequency.....	60Hz ± 3 Hz, 50Hz ± 3 Hz, 400Hz ± 3 Hz
Burden	≤ 0.2 VA per current circuit, ≤ 0.1 VA per voltage circuit.
Response Sensitivity	$\leq 0.5\%$ of measuring range to maximum input range
Input Voltage	600V AC rms continuous (absolute maximum)
Overload Capacity	1.25 times the rated input Voltage continuously. 2 times the rated input Voltage for 10 secs. 4 times the rated input Voltage for 5 secs.
Input Current.....	3 times the rated input current continuously. 10 times the rated input current for 10 secs.
Overload Capacity	50 times the rated input current for 1 sec. 80 times the rated input current for 0.5 secs

OUTPUT SPECIFICATIONS

- Output Variables..... DC mA or DC Volts
- Ripple..... < 0.5% of rated output. Peak to Peak (maximum)
- Response Time..... < 400 milliseconds to go from 0 to 99% of output
- Zero Adjustment..... ± 5% of rated output (minimum)
- Span Adjustment..... ± 10% of rated output (minimum)
- Load Resistance..... 10 kΩ maximum for 0 to 1mA output
500 Ω maximum for 4 to 20mA output
500 Ω minimum for 0 to 10V output

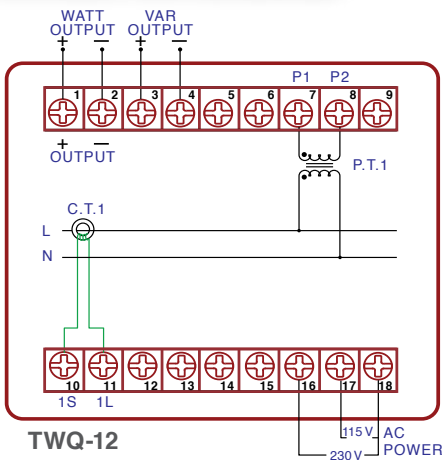
To calculate the actual Watts and VARs Maximum Input range value, the CT and PT ratios have to be factored in

Maximum input Range for Watts = (CT Ratio) X (PT Ratio) X (Nominal Watts)
 Maximum Input range value for VARs = (CT Ratio) X (PT Ratio) X (Nominal VARs)

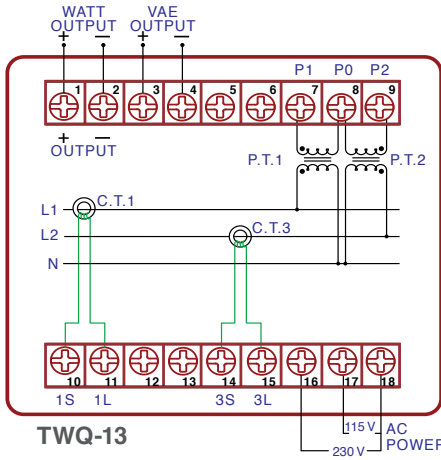
For example:

If CT = 200A:5A PT is 3300V:110V Nominal Watts = 1000 Nominal VARs = 1000
 then CT Ratio = 40 then PT Ratio = 30 and
 Maximum input range value for Watts = 40 x 30 x 1000 = 1200KWatts
 Maximum input range value for VARs = 40 x 30 x 1000 = 1200KVARs

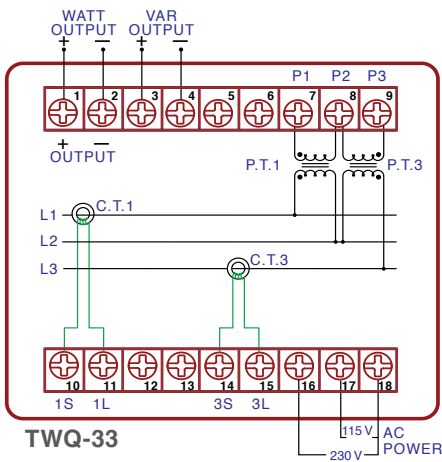
CONNECTION DIAGRAM



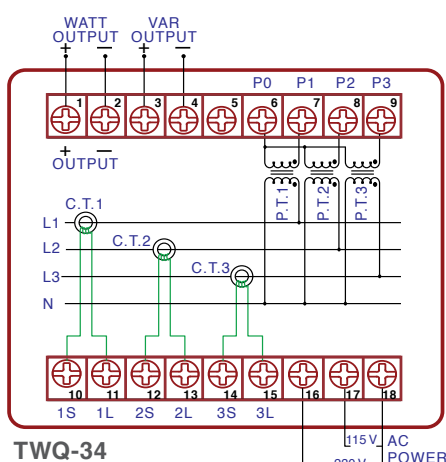
TWQ-12



TWQ-13



TWQ-33



TWQ-34

Base Model	Accuracy	Input Signal	Input Frequency	Output Signal	Auxiliary Power	Input/Output Relationship	Case
TWQ-12 1 Phase, 1P/2W, 1E, Watt + VARs	RO1 ±0.2%	SW1 120V/5A AC	HZ6 60Hz	OWV1 Watts 0 to 1 mA DC VARs ±1mA DC	P0 Single Powered 0 +/- 1mA Output Only	LG LAG = + Polarity	CM Metal
TWQ-13 1 Phase, 1P/3W, 2E, Watt + VARs	RO3 ±0.1%	SW2 240V/5A AC	HZ5 50Hz	OWV2 Watts 4 to 20mA DC VARs 12 ± 8mA DC	P1 115/230V AC ±15%	LD LEAD = + Polarity	CP Plastic
TWQ-33 3 Phase, 3P/3W, 2E, Watt + VARs		SWY Custom Input	HZ4 400Hz	OWV5 Watts 12 ± 8mA DC VARs 12 ± 8mA DC	P2 24V DC ±15%		
TWQ-34 3 Phase, 3P/4W, 3E, Watt + VARs				OWV6 Watts 0 to 10V DC VARs ±10V DC	P3 125V DC ±15%		
					PY Custom Power ±15%		

Watt Hours TRANSDUCERS



ABS DIN RAIL MOUNT CASE **D**



SCREW MOUNT METAL CASE **B**

MODELS OFFERED

- TWH-12:** 1 Phase, 2 Wire – 1 Element
- TWH-13:** 1 Phase, 3 Wire – 2 Element
- TWH-33:** 3 Phase, 3 Wire – 2 Element
- TWH-34:** 3 Phase, 4 Wire – 3 Element

- Accurate measurement of the active energy (Watt Hours) of a single phase system with balanced or unbalanced loads.
- The output signals are isolated load independent pulses, representing the measured value of the active energy (WattHours, forward and reverse).

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations.

GENERAL SPECIFICATIONS

Accuracy	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional), 125V DC $\pm 20\%$ (optional)

INPUT SPECIFICATIONS

AC Input	120V/5A AC, 240V/5A AC for 1 ϕ /2 wire, 240V/120V, 5A AC for 1 ϕ / 3 Wire 120V/5A AC, 240V/5A AC for 3 ϕ /3 Wire & 3 ϕ / 4 Wire custom input (600V max /10A AC max)
Frequency.....	60Hz ± 3 Hz, 50Hz ± 3 Hz, 400Hz ± 3 Hz
Burden	≤ 0.2 VA per current circuit, ≤ 0.1 VA per voltage circuit.
Response Sensitivity	$\leq 0.5\%$ of measuring range to maximum input range
Input Voltage	600V AC rms continuous (absolute maximum)
Overload Capacity	1.25 times the rated input Voltage continuously. 2 times the rated input Voltage for 10 secs. 4 times the rated input Voltage for 5 secs.
Input Current	3 times the rated input current continuously. 10 times the rated input current for 10 secs.
Overload Capacity	50 times the rated input current for 1 sec. 80 times the rated input current for 0.5 secs

Watt Hours TRANSDUCERS

OUTPUT SPECIFICATIONS

- Output Variables..... Pulses
- Ripple..... < 0.5% of rated output. Peak to Peak (maximum)
- Response Time..... < 400 milliseconds to go from 0 to 99% of output
- Zero Adjustment..... ± 5% of rated output (minimum)
- Span Adjustment..... ± 10% of rated output (minimum)

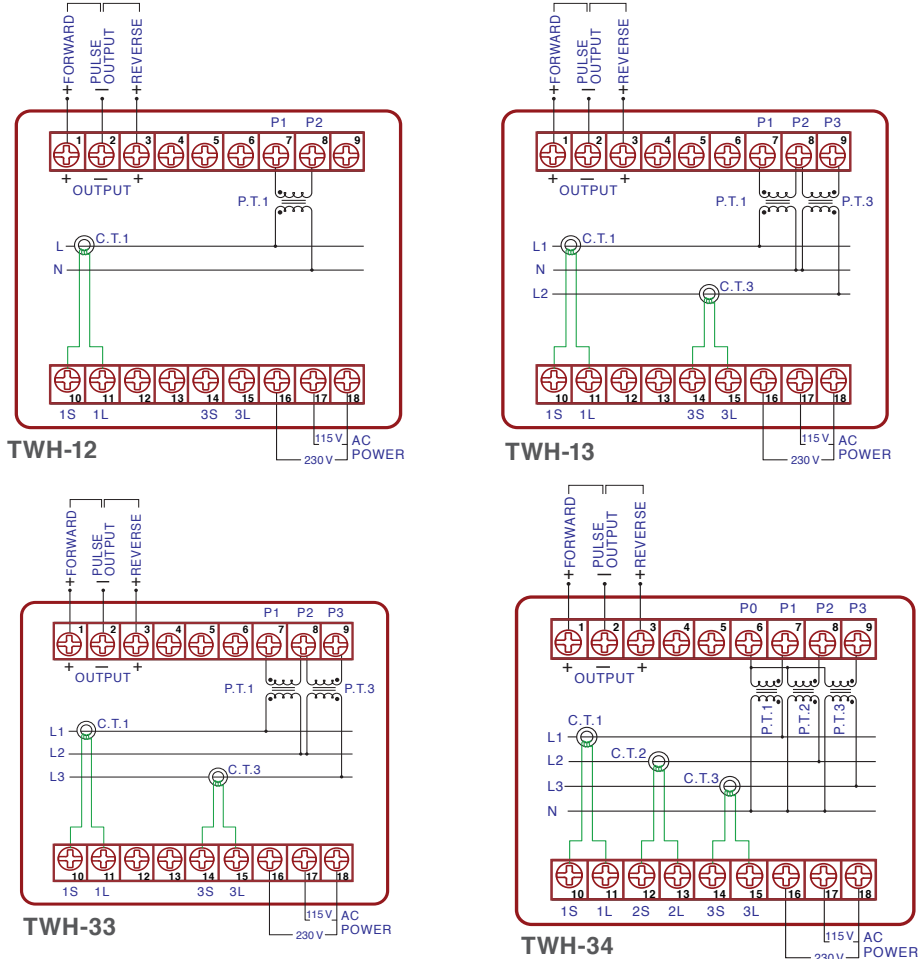
To calculate the actual WattHours for each output pulse, the CT and PT ratios have to be factored in

$$\text{WattHours per Output Pulse} = \frac{(\text{CT Ratio}) \times (\text{PT Ratio})}{\text{Nominal Pulses /WattHour}}$$

Calculation example: For Single phase 2 wire, TWH-12
 If CT = 200A:5A then CT Ratio = 40 PT is 3300V:110V then PT Ratio = 30

If 1 pulse per WattHour is selected, the output will actually be 1 pulse per 1200 WattHours
 If 10 pulse per WattHour is selected, the output will actually be 1 pulse per 120 WattHours
 If 100 pulse per WattHour is selected, the output will actually be 1 pulse per 12 WattHours

CONNECTION DIAGRAM



Case	Pulse per WattHour	Auxiliary Power	Output Signal	Input Frequency	Input Signal	Accuracy	Base Model
CM	1 pulse per WH	115/230 VAC ±15%	Reed Relay. Forward only	HZ6 60Hz	SW1 120V/5A AC	RO1 ±0.2%	TWH-12 1 Phase, 1P/2W, 1E, Watthours
CP	10 Pulses Per WH	24 VDC ±15%	Reed Relay. Forward + Reverse	HZ5 50Hz	SW2 240V/5A AC	RO3 ±0.1%	TWH-13 1 Phase, 1P/3W, 2E, Watthours
	100 pulses per WH	125 VDC ±15%	Open Collector. Forward only	HZ4 400Hz	SWY Custom Input		TWH-33 3 Phase, 3P/3W, 2E, Watthours
	1 pulse per 1000WH	Custom Power ±15%	Open Collector. Forward + Reverse				TWH-34 3 Phase, 3P/4W, 3E, Watthours



ABS DIN RAIL MOUNT CASE **D**

SCREW MOUNT METAL CASE **B**

MODELS OFFERED

- TWWH-12 base model** 1 Phase, 2 Wire – 1 Element
- TWWH-13 base model** 1 Phase, 3 Wire – 2 Element
- TWWH-33 base model** 3 Phase, 3 Wire – 2 Element
- TWWH-34 base model** 3 Phase, 4 Wire – 3 Element

- Accurate measurement of the active energy (WattHours) of a three phase system with balanced or unbalanced loads.
- The output signals are isolated load independent pulses, representing the measured value of the active energy (WattHours, forward and reverse) and DC mA or DC V for the active power (Watts).

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations.

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	$\leq 100\text{ppm}/^\circ\text{C}$ of span $\leq 60\text{ppm}/^\circ\text{C}$ for ambient temperature of $25^\circ\text{C} \pm 10^\circ\text{C}$
Temp. range.....	Storage temperature range -20°C to 60°C (-4°F to 140°F) Operating temperature range 0°C to 50°C (32°F to 122°F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV($1.2 \times 50 \mu\text{s}$)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case on DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

INPUT SPECIFICATIONS

AC Input.....	120V/5A AC, 240V/5A AC. Custom input (600V max /10A AC max)
Frequency.....	60Hz $\pm 3\text{Hz}$, 50Hz $\pm 3\text{Hz}$, 400Hz $\pm 3\text{Hz}$
Burden	$\leq 0.2\text{VA}$ per current circuit, $\leq 0.1\text{VA}$ per voltage circuit.
Response Sensitivity	$\leq 0.5\%$ of measuring range to maximum input range
Input Voltage	600V AC rms continuous (absolute maximum)
Overload Capacity	1.25 times the rated input Voltage continuously. 2 times the rated input Voltage for 10 secs. 4 times the rated input Voltage for 5 secs.
Input Current.....	3 times the rated input current continuously.
Overload Capacity	10 times the rated input current for 10 secs. 50 times the rated input current for 1 sec. 80 times the rated input current for 0.5 secs

Watt+Watt Hours TRANSDUCERS

OUTPUT SPECIFICATIONS

- Output Variables**..... Pulses (WattHours) and DC mA or DC V (Watts)
- Ripple**..... < 0.5% of rated output. Peak to Peak (maximum)
- Response Time**..... < 400 milliseconds to go from 0 to 99% of output
- Zero Adjustment**..... ± 5% of rated output (minimum)
- Span Adjustment**..... ± 10% of rated output (minimum)

To calculate the actual WattHours and Watts for each output pulse, the CT and PT ratios have to be factored in

$$\text{Watts} = (\text{CT Ratio}) \times (\text{PT Ratio}) \times \text{Nominal Watts}$$

$$\text{WattHours per Output Pulse} = \frac{(\text{CT Ratio}) \times (\text{PT Ratio})}{\text{Nominal Pulses /WattHour}}$$

Calculation example: For Single phase 2 wire, TWWH-12

If CT = 200A:5A then CT Ratio = 40 PT is 3300V:110V then PT Ratio = 30

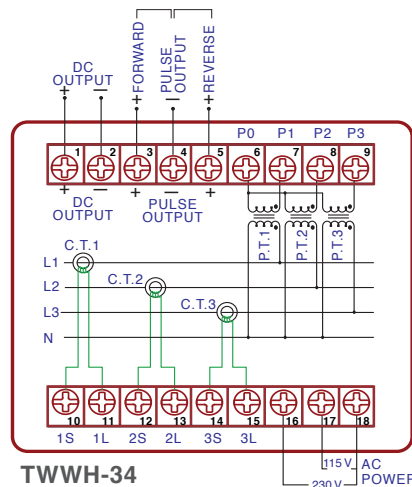
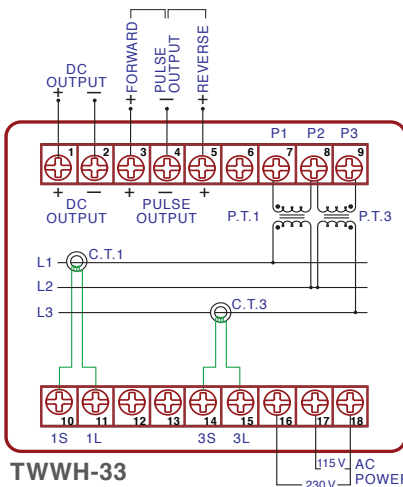
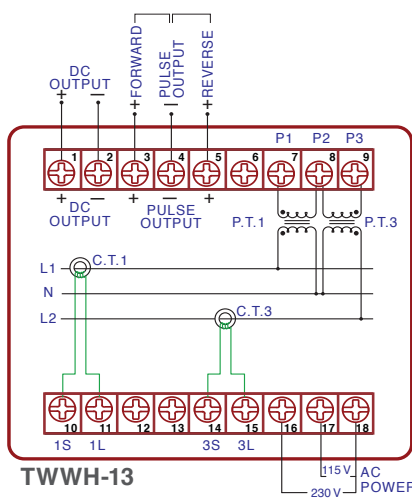
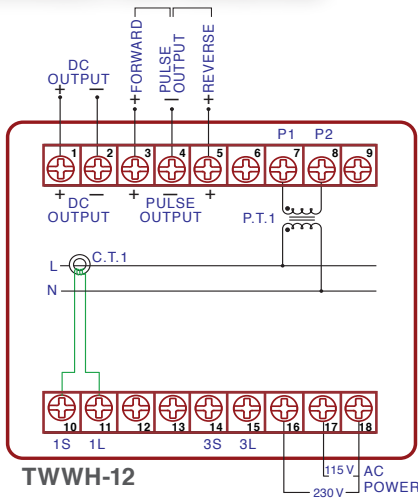
Watts = 30 x 40 x 500 = 600kW

If 1 pulse per WattHour is selected, the output will actually be 1 pulse per 1200 WattHours

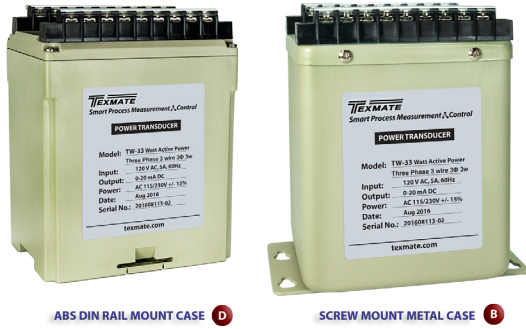
If 10 pulse per WattHour is selected, the output will actually be 1 pulse per 120 WattHours

If 100 pulse per WattHour is selected, the output will actually be 1 pulse per 12 WattHours

CONNECTION DIAGRAM



Base Model	Accuracy	Input Signal	Frequency	Output Signal	Auxiliary Power	Pulse per WattHour	Case
TWWH-12 1 Phase, 1P/2W, 1E, Watts+Watthours	RO1 ±0.2%	SW1 120V/5A AC	HZ6 60Hz	OWR1 Watts 0 to 1 mA DC WHR Reed Relay. Forward only	P1 115/230 VAC ±15%	PU1 1 pulse/WH	CM Metal
TWWH-13 1 Phase, 1P/3W, 2E, Watts+Watthours	RO3 ±0.1%	SW2 240V/5A AC	HZ5 50Hz	OWR2 Watts 4 to 20 mA DC WHR Reed Relay. Forward and Reverse	P2 24 VDC ±15%	PU2 10 Pulses/WH	CP Plastic
TWWH-33 3 Phase, 3P/3W, 2E, Watts+Watthours		SWY Custom Input	HZ4 400Hz	OWC1 Watts 0 to 1 mA DC WHR Open Collector. Forward only	P3 125 VDC ±15%	PU3 100 pulses/WH	
TWWH-34 3 Phase, 3P/4W, 3E, Watts+Watthours				OWC2 Watts 4 to 20 mA DC WHR Open Collector. Forward + Reverse	PY Custom Power ±15%	PU4 1 pulse/1000WH	



MODELS OFFERED

- TQH-12:** 1 Phase, 2 Wire – 1 Element
- TQH-13:** 1 Phase, 3 Wire – 2 Element
- TQH-33:** 3 Phase, 3 Wire – 2 Element
- TQH-34:** 3 Phase, 4 Wire – 3 Element

- Accurate measurement of the reactive energy (VAR Hours) of a single phase system with balanced or unbalanced loads.
- The output signals are isolated load independent DC mA or DC Volts, representing the measured value of the active energy (WattHours, forward and reverse).

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations.

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test.....	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case on DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

INPUT SPECIFICATIONS

AC Input.....	120V/5A AC, 240V/5A AC. Custom input (600V max /10A AC max)
Frequency.....	60Hz ± 3 Hz, 50Hz ± 3 Hz, 400Hz ± 3 Hz
Burden	≤ 0.2 VA per current circuit, ≤ 0.1 VA per voltage circuit.
Response Sensitivity	$\leq 0.5\%$ of measuring range to maximum input range
Input Voltage	600V AC rms continuous (absolute maximum)
Overload Capacity	1.25 times the rated input Voltage continuously. 2 times the rated input Voltage for 10 secs. 4 times the rated input Voltage for 5 secs.
Input Current.....	3 times the rated input current continuously.
Overload Capacity	10 times the rated input current for 10 secs. 50 times the rated input current for 1 sec. 80 times the rated input current for 0.5 secs

VAR Hours TRANSDUCERS

OUTPUT SPECIFICATIONS

- Output Variables..... Pulses
- Ripple..... < 0.5% of rated output. Peak to Peak (maximum)
- Response Time..... < 400 milliseconds to go from 0 to 99% of output
- Zero Adjustment..... ± 5% of rated output (minimum)
- Span Adjustment..... ± 10% of rated output (minimum)

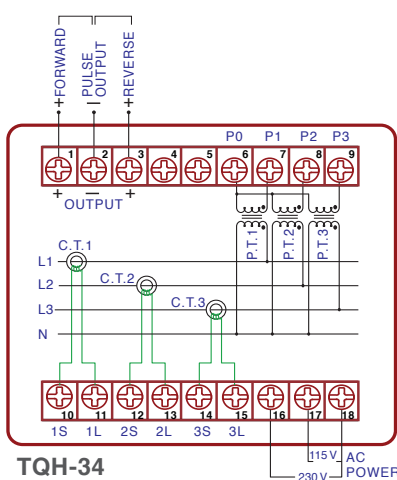
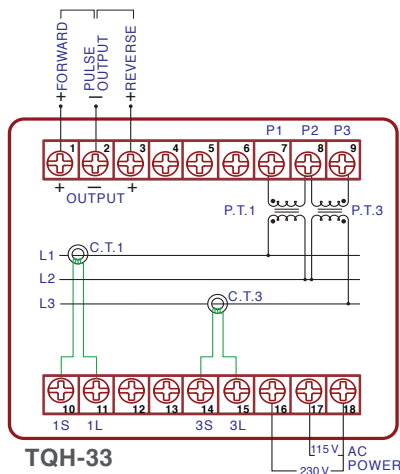
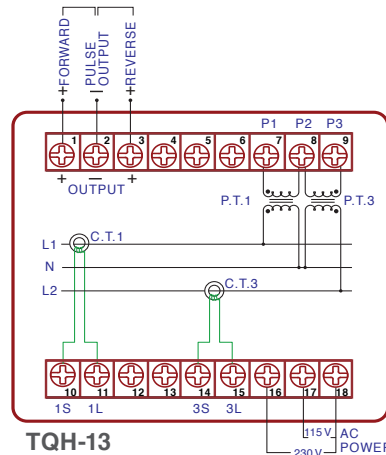
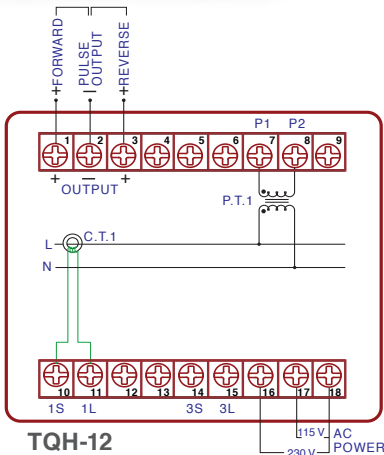
To calculate the actual VARHours for each output pulse, the CT and PT ratios have to be factored in

$$\text{VARHours per Output Pulse} = \frac{(\text{CT Ratio}) \times (\text{PT Ratio})}{\text{Nominal Pulses / VARHour}}$$

Calculation example: For Single phase 2 wire, TQH-12
 If CT = 200A:5A then CT Ratio = 40 PT is 3300V:110V then PT Ratio = 30

If 1 pulse per VARHour is selected, the output will actually be 1 pulse per 1200 VARHours
 If 10 pulse per VARHour is selected, the output will actually be 1 pulse per 120 VARHours
 If 100 pulse per VARHour is selected, the output will actually be 1 pulse per 12 VARHours

CONNECTION DIAGRAM



Base Model	Accuracy	Input Signal	Input Frequency	Output Signal	Auxiliary Power	Pulse per VARHour	Case
TQH-12 1 Phase, 1P/2W, 1E, VARhours	RO2 ±0.25%	SW1 120V/5A AC	HZ6 60Hz	OR1 Reed Relay. Forward only	P1 115/230 VAC ±15%	PU5 1 pulse per VARH	CM Metal
TQH-13 1 Phase, 1P/3W, 2E, VARhours	RO3 ±0.1%	SW2 240V/5A AC	HZ5 50Hz	OR2 Reed Relay. Forward + Reverse	P2 24 VDC ±15%	PU6 10 Pulses Per VARH	CP Plastic
TQH-33 3 Phase, 3P/3W, 2E, VARhours		SWY Custom Input	HZ4 400Hz	OC1 Open Collector. Forward only	P3 125 VDC ± 15%	PU7 100 pulses per VARH	
TQH-34 3 Phase, 3P/4W, 3E, VARhours				OC2 Open Collector. Forward + Reverse	PY Custom Power ± 15%	PU8 1 pulse per 1000VARH	

VARs+VAR Hours TRANSDUCERS

MODELS OFFERED

TQQH-12: 1 Phase, 2 Wire – 1 Element

TQQH-13: 1 Phase, 3 Wire – 2 Element

TQQH-33: 3 Phase, 3 Wire – 2 Element

TQQH-34: 3 Phase, 4 Wire – 3 Element



ABS DIN RAIL MOUNT CASE **D**



SCREW MOUNT METAL CASE **B**

- Accurate measurement of the reactive power and reactive energy (VARs and VARHours) of a three phase system with balanced or unbalanced loads.
- The output signals are isolated load independent pulses, representing the measured value of the reactive energy (VARHours, forward and reverse) and DC mA or DC mV for the reactive power (VAR).

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- Super high accuracy $\pm 0.1\%$ of Rated Output (R.O.) available as a special order.*
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations.

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case on DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

INPUT SPECIFICATIONS

AC Input.....	120V/5A AC, 240V/5A AC. Custom input (600V max /10A AC max)
Frequency.....	60Hz ± 3 Hz, 50Hz ± 3 Hz, 400Hz ± 3 Hz
Burden	≤ 0.2 VA per current circuit, ≤ 0.1 VA per voltage circuit.
Response Sensitivity	$\leq 0.5\%$ of measuring range to maximum input range
Input Voltage	600V AC rms continuous (absolute maximum)
Overload Capacity	1.25 times the rated input Voltage continuously. 2 times the rated input Voltage for 10 secs. 4 times the rated input Voltage for 5 secs.
Input Current.....	3 times the rated input current continuously.
Overload Capacity	10 times the rated input current for 10 secs. 50 times the rated input current for 1 sec. 80 times the rated input current for 0.5 secs

VARs+VAR Hours TRANSDUCERS

OUTPUT SPECIFICATIONS

- Output Variables**..... Pulses (VARHours) and DC mA or DC V (VARs)
- Ripple**..... < 0.5% of rated output. Peak to Peak (maximum)
- Response Time**..... < 400 milliseconds to go from 0 to 99% of output
- Zero Adjustment**..... ± 5% of rated output (minimum)
- Span Adjustment**..... ± 10% of rated output (minimum)

To calculate the actual VARHours and VARs for each output pulse, the CT and PT ratios have to be factored in

$$\text{VARs} = (\text{CT Ratio}) \times (\text{PT Ratio}) \times \text{Nominal Watts}$$

$$\text{VARHours per Output Pulse} = \frac{(\text{CT Ratio}) \times (\text{PT Ratio})}{\text{Nominal Pulses /VARHour}}$$

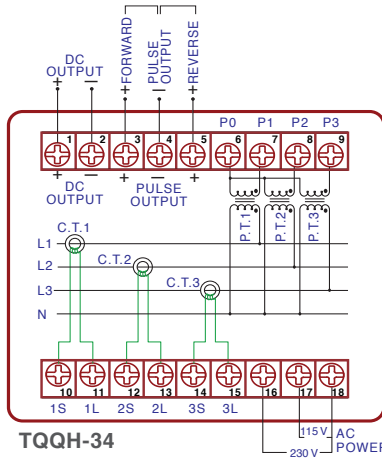
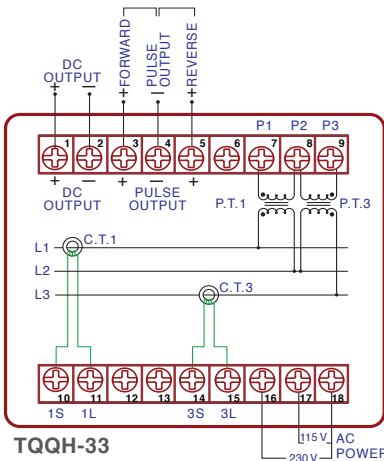
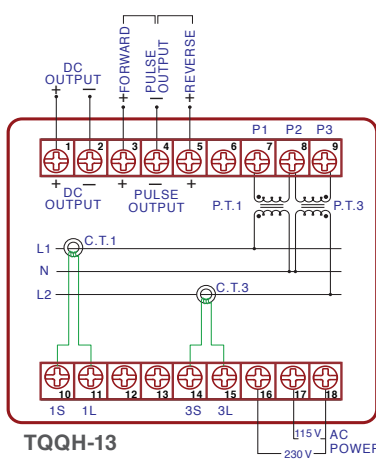
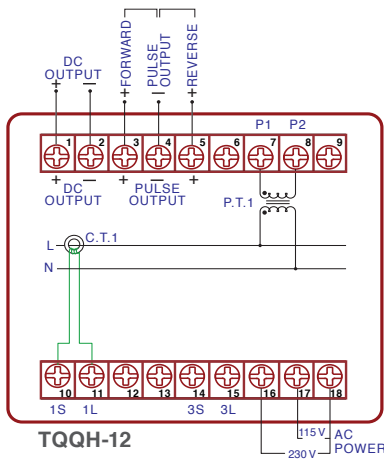
Calculation example: For Single phase 2 wire, TQQH-12

If CT = 200A:5A then CT Ratio = 40 PT is 3300V:110V then PT Ratio = 30

$$\text{VARs} = 30 \times 40 \times 500 = 600\text{kVAR}$$

If 1 pulse per VARHour is selected, the output will actually be 1 pulse per 1200 VARHours
 If 10 pulse per VARHour is selected, the output will actually be 1 pulse per 120 VARHours
 If 100 pulse per VARHour is selected, the output will actually be 1 pulse per 12 VARHours

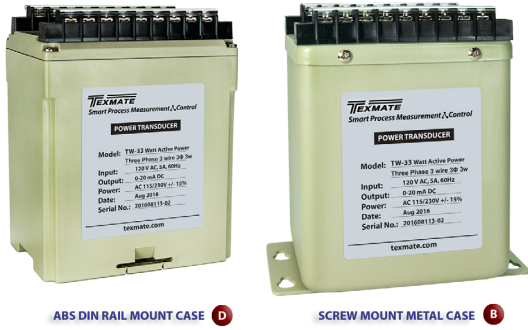
CONNECTION DIAGRAM



Base Model	Accuracy	Input Signal	Input Frequency	Output Signal	Auxiliary Power		Pulse per VARHour		Case	
					P1	P2	P3	P4	CM	CP
TQQH-12 1 Phase, 1P/2W, 1E, VAR+VARhours	RO2 ±0.25% RO3 ±0.1%	SW1 120V/5A AC SW2 240V/5A AC SWY Custom Input	HZ6 60Hz HZ5 50Hz HZ4 400Hz	VARs ±1 mA DC VARHr Reed Relay, Forward only VARs 12±8mA DC VARHr Reed Relay, Forward and Reverse VARs ±1 mA DC VARHr Open Collector, Forward only VARs 12 ± 8mA DC VARHr Open Collector, Forward + Reverse	PU5 1 pulse per VARH PU6 10 Pulses Per VARH PU7 100 pulses per VARH PU8 1 pulse per 1000VARH	P1 115/230 VAC ±15% P2 24 VDC ±15% P3 125 VDC ±15% P4 Custom Power ±15%	CM Metal CP Plastic			
TQQH-13 1 Phase, 1P/3W, 2E, VAR+VARhours										
TQQH-33 3 Phase, 3P/3W, 2E, VAR+VARhours										
TQQH-34 3 Phase, 3P/4W, 3E, VARs+VARhours										

AC Power Factor TRANSDUCERS

MODELS OFFERED



TPF-12: 1 Phase, 2 Wire – 1 Element

TPF-33: 3 Phase, 3 Wire – 2 Element

TPF-34: 3 Phase, 4 Wire – 3 Element

- Accurate measurement of the Power Factor (Cos ϕ) of a three phase system with balanced or unbalanced loads.
- The output signals are isolated load independent DC mA or DC V, representing the measured value of the Power Factor (Cos ϕ).

FEATURES

- Uses Time Division Multiplication (TDM) for precision measurement of even distorted signals.
- High accuracy $\pm 0.5\%$ of Rated Output (R.O.).
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations.

GENERAL SPECIFICATIONS

Accuracy.....	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range.....	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting.....	Screw mount on metal case or Plastic case on DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

INPUT SPECIFICATIONS

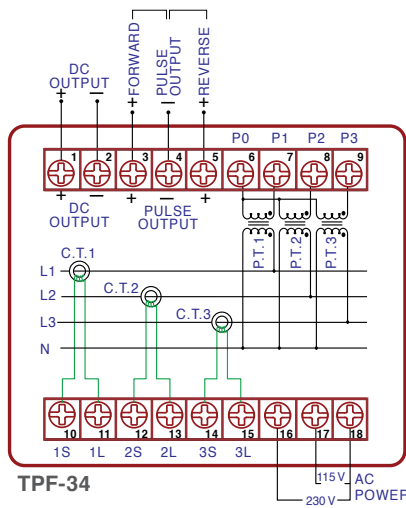
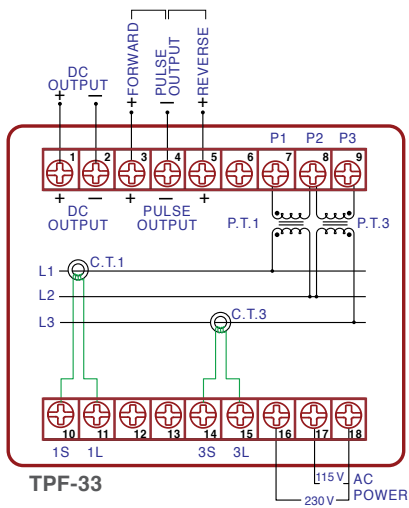
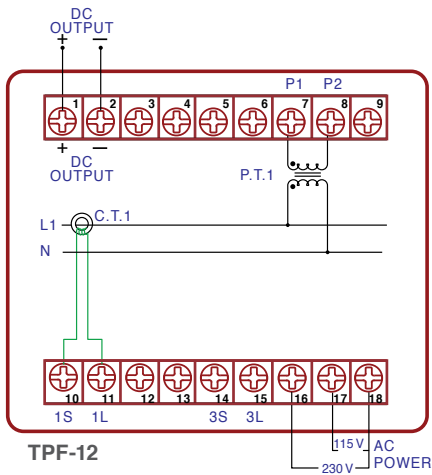
Measuring Range	Power Factor Lead (capacitive) 0.5 1 Lag (Inductive) 0.5
AC Voltage Input.....	30 to 600V
AC Current Input.....	0 to 5A AC
Frequency	60Hz ± 3 Hz, 50Hz ± 3 Hz, 400Hz ± 3 Hz
Burden.....	≤ 0.2 VVA per current circuit, ≤ 0.1 VVA per voltage circuit.
Response Sensitivity	$\leq 0.5\%$ of measuring range to maximum input range
Input Voltage	600V AC rms continuous (absolute maximum)
Overload Capacity	1.25 times the rated input Voltage continuously. 2 times the rated input Voltage for 10 secs. 4 times the rated input Voltage for 5 secs.
Input Current	3 times the rated input current continuously.
Overload Capacity	10 times the rated input current for 10 secs. 50 times the rated input current for 1 sec. 80 times the rated input current for 0.5 secs

AC Power Factor TRANSDUCERS

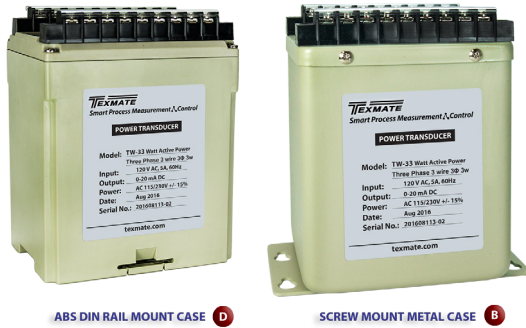
OUTPUT SPECIFICATIONS

- Output Variables..... DCmA or DCV (Power Factor, Cos ϕ)
- Ripple..... < 0.5% of rated output. Peak to Peak (maximum)
- Response Time..... < 400 milliseconds to go from 0 to 99% of output
- Zero Adjustment..... \pm 5% of rated output (minimum)
- Span Adjustment..... \pm 10% of rated output (minimum)

CONNECTION DIAGRAM



Base Model	Accuracy	Input Signal	Input Frequency	Output Signal	Auxiliary Power	Input/Output Relationship	Case
TPF-12 1 Phase, 1P/2W, 1E, Power Factor	RO6 $\pm 0.5\%$	SW1 120V/5A AC	HZ6 60Hz	OPF1 ± 1 mA DC, 0-1-0 PF	P0 Single Powered	LG LAG = + Polarity	CM Metal
TPF-33 3 Phase, 3P/3W, 2E, Power Factor	RO5 $\pm 0.3\%$	SW2 240V/5A AC	HZ5 50Hz	OPF2 4 to 20mA DC 0-1-0 PF	P1 115/230V AC $\pm 15\%$	LD LEAD = + Polarity	CP Plastic
TPF-34 3 Phase, 3P/4W, 3E, Power Factor		SWY Custom Input	HZ4 400Hz	OPFA ± 1 mA DC, 0.5 - 1 - 0.5 PF	P2 24V DC $\pm 15\%$		
				OPFB 4 to 20mA DC 0.5 - 1 - 0.5 PF	P3 125V DC $\pm 15\%$		
					PY Custom Power $\pm 15\%$		



MODELS OFFERED

TF-1: Frequency

- Accurate measurement of the Frequency of a single or three phase system with balanced or unbalanced loads.
- The output signals are isolated load independent DC mA or DC V, representing the measured value of the Frequency.

FEATURES

- High accuracy $\pm 0.05\%$ of Rated Output (R.O.).
- Frequency range from 45 Hz to 10KHz.
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277) or screw mounting.
- Many input and output signal combinations.

GENERAL SPECIFICATIONS

Accuracy	$\pm 0.2\%$ R.O. Standard for 10 to 100% of rated output $\pm 0.1\%$ R.O. (Special Option)
Temp. coefficient	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation	Between Input/Output/Power/Case
Dielectric test	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting	Screw mount on metal case or Plastic case on DIN Rail 35mm
Auxiliary Power	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

FREQUENCY TRANSDUCERS

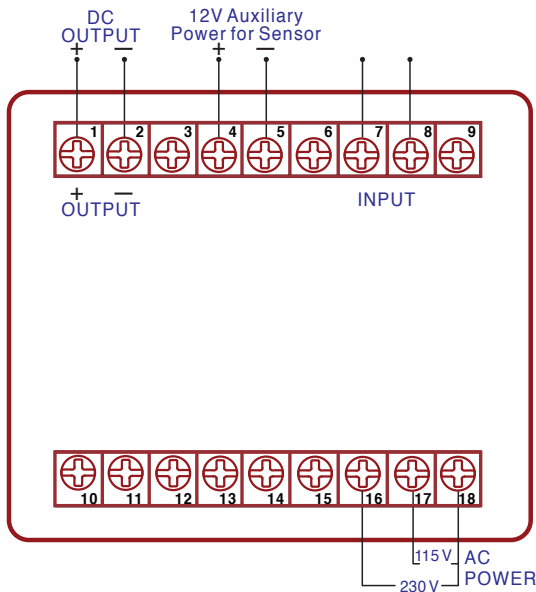
INPUT SPECIFICATIONS

AC Voltage Input range..... 2V to 200V AC or 30 to 600V AC
 Frequency 60Hz ±3Hz, 50Hz ±3Hz, 400Hz ±3Hz
 Burden..... ≤0.2VA per current circuit, ≤0.1VA per voltage circuit.
 Response Sensitivity ≤0.5% of measuring range to maximum input range
 Input Voltage..... 600V AC rms continuous (absolute maximum)
 Overload Capacity 1.25 times the rated input Voltage continuously.
 2 times the rated input Voltage for 10 secs.
 4 times the rated input Voltage for 5 secs.

OUTPUT SPECIFICATIONS

Output Variables..... DCmA or DCV
 Ripple..... < 0.5% of rated output. Peak to Peak (maximum)
 Response Time..... < 400 milliseconds to go from 0 to 99% of output
 Zero Adjustment..... ± 5% of rated output (minimum)
 Span Adjustment..... ± 10% of rated output (minimum)
 Load Resistance..... 10 kΩ maximum for 0 to 1mA output
 500 Ω maximum for 4 to 20mA output
 500 Ω minimum for 0 to 10V output

CONNECTION DIAGRAM



Case	CM Metal	CP Plastic		
Auxiliary Power	P1 115/230 VAC ±15%	P2 24 VDC ±15%	P3 125 VDC ±15%	PY Custom Power ±15%
Output Signal	OHZ1 0 to 1 mA DC	OHZ2 4 to 20mA DC	OHZ4 0±1 mA DC	OHZY Custom Output
Input Frequency	HZ2 45Hz to 55Hz	HZ3 55Hz to 65Hz	HZ1 45Hz to 65Hz	HZY Custom input Fq range
Input Signal	SF1 80V to 600V AC	SF2 2V to 30V AC/DC		
Accuracy	RO7 ±0.1%	RO4 ±0.05%		
Base Model	TF-1 1 Phase, 1P/2W, Frequency			

DC Volts or mA TRANSMITTER ISOLATOR



SCREW MOUNT METAL CASE **A**



ABS DIN RAIL MOUNT CASE **C**

MODELS OFFERED

TD-1: DC Volts or mA

- The DC to DC Isolation Transmitter can receive various DC Voltage or Current signals and can output desired voltage or current signals isolated from each other

FEATURES

- High accuracy $\pm 0.2\%$ of Rated Output (R.O.)
- High immunity to external noise.
- Quick and easy mounting to 35mm DIN Rail (DIN46277)
- Many input and output signal combinations

GENERAL SPECIFICATIONS

Accuracy	$\pm 0.1\%$ R.O.
Temp. coefficient.....	≤ 100 ppm/ $^{\circ}$ C of span ≤ 60 ppm/ $^{\circ}$ C for ambient temperature of 25° C $\pm 10^{\circ}$ C
Temp. range	Storage temperature range -20° C to 60° C (-4° F to 140° F) Operating temperature range 0° C to 50° C (32° F to 122° F)
Humidity range	Up to 95% RH non condensing
Isolation.....	Between Input/Output/Power/Case
Dielectric test.....	DIN-IEC 688 2K Vrms/1 min, Between terminal to terminal 2.8K Vrms/1 min, Between terminal to case
Surge test.....	DIN-IEC 255-4, ANSI C37 90a/1974 5KV(1.2x50 μ s)
Insulation Resistance	Greater than 100 M Ω at 500V DC
Housing material	ABS Resin(94V-0) or metal
Mounting	Screw mount on metal case or Plastic case on DIN Rail 35mm
Auxiliary Power.....	AC 115/230V $\pm 15\%$, 50/60Hz, 3VA DC 24V $\pm 20\%$ (optional) 125V DC $\pm 20\%$ (optional)

DC Volts or mA TRANSMITTER ISOLATOR

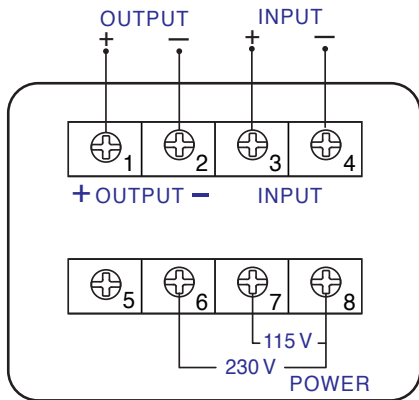
INPUT SPECIFICATIONS

DC Voltage 0 to 600V
 DC Current for current input can be obtained from shunt

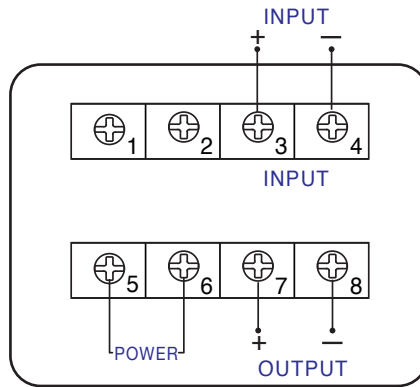
OUTPUT SPECIFICATIONS

Output Variables..... DC Voltage (0~10V)
 DC Current (0~20mA)
 Response Time..... < 400 milliseconds to go from 0 to 99% of output
 Zero Adjustment..... ± 5% of rated output (minimum)
 Span Adjustment..... ± 10% of rated output (minimum)

CONNECTION DIAGRAM



Metal Case



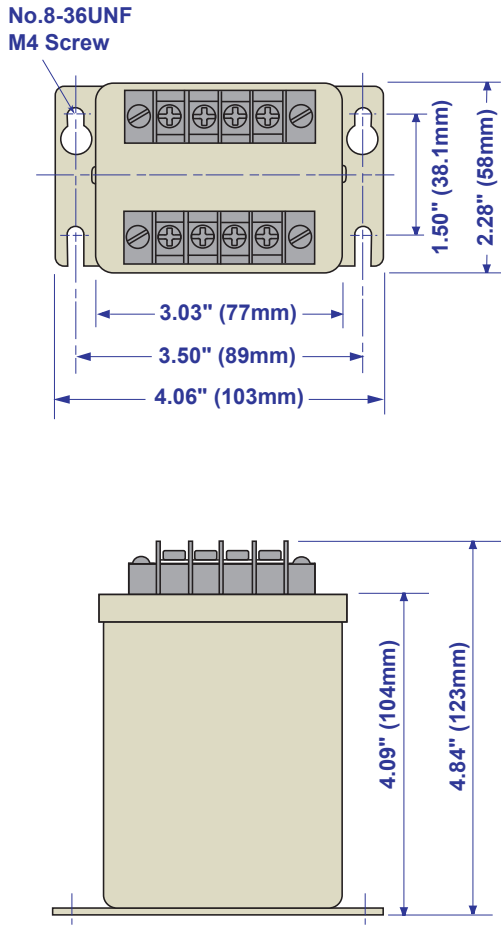
Plastic Din Rail

Case	CM Metal	CP Plastic
Auxiliary Power	P1 115/230 VAC ±15%	P2 24 VDC ±15%
	P3 125 VDC ±15%	PY Custom Power ±15%
Output Signal	OD1 0 to 1mA DC	OD2 4 to 20mA DC
	OD3 0 to 10VDC	ODY Custom Output
Input Signal	SD1 0 to 1mA DC	SD2 4 to 20mA DC
	SD3 0 to 1V DC	SD4 0 to 10V DC
	SDY Custom Input (600V max)	
Base Model	TD-1 DC Volts or mA	
Accuracy	RO7 ±0.1%	

CASE DIMENSIONS

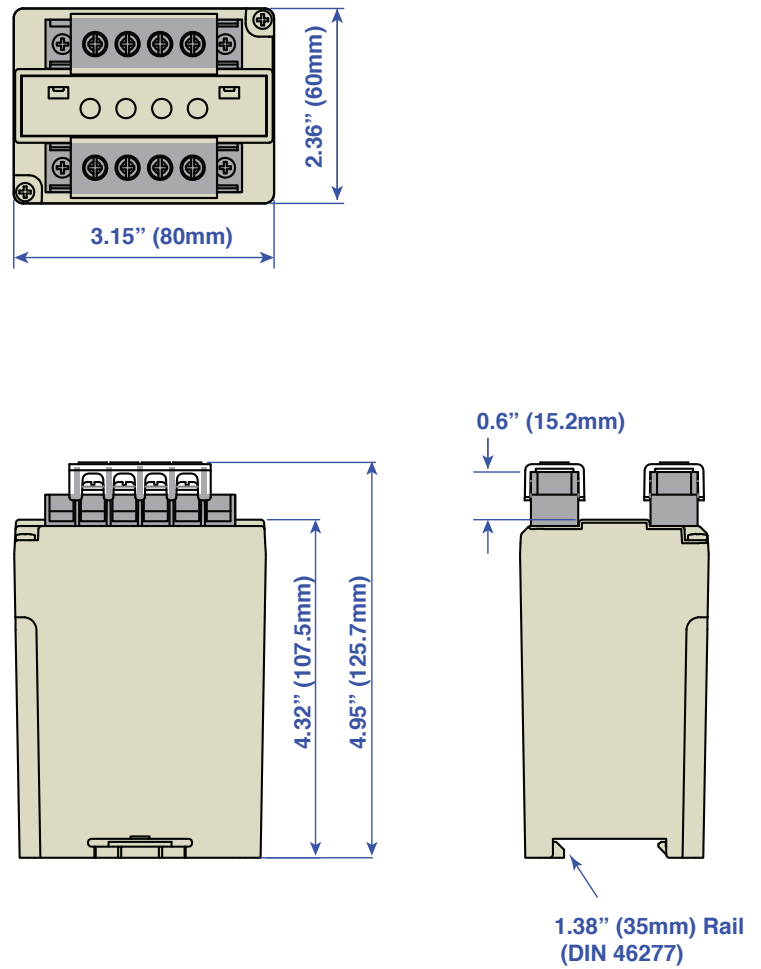
Case A

Metal Case, Screw Mounting



Case C

**Fire Retardant, ABS Case
DIN Rail Mounting**

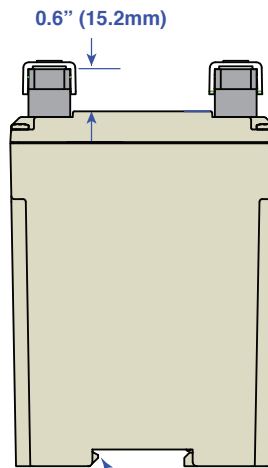
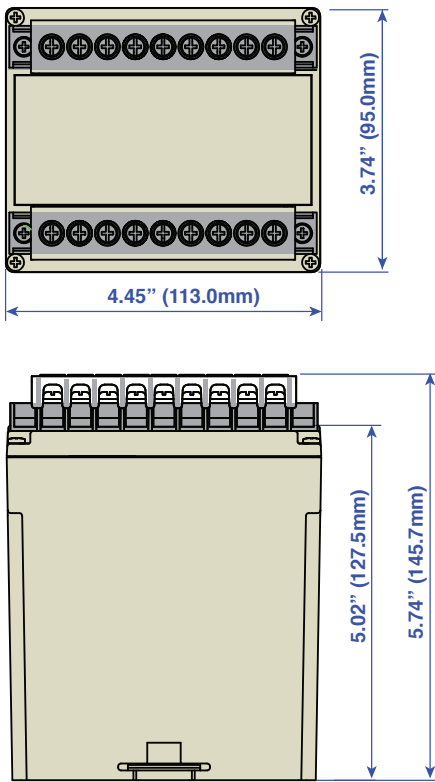


CASE DIMENSIONS - CASE B & D

CASE DIMENSIONS

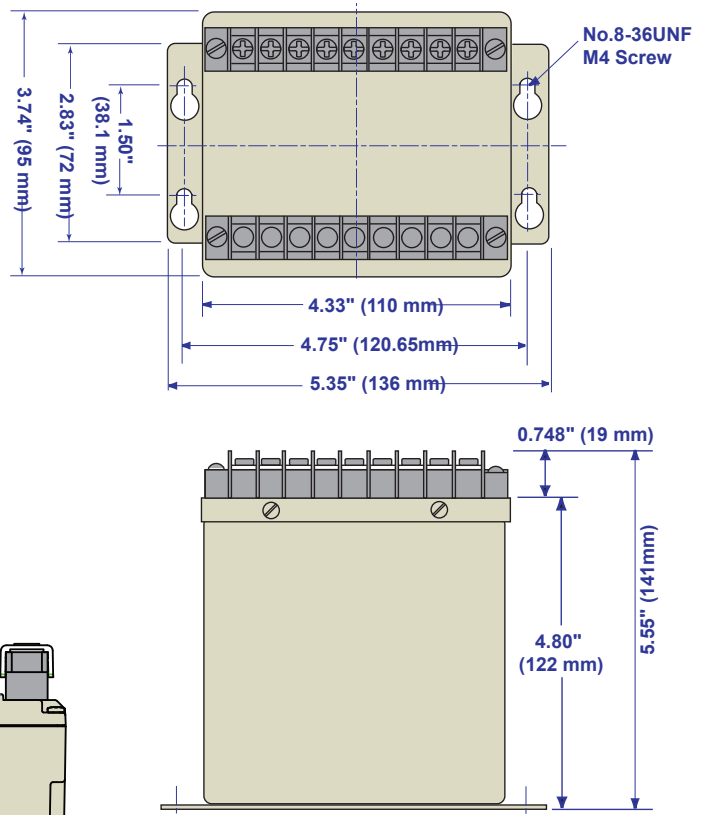
Case D

Fire Retardant, ABS Case
DIN Rail Mounting



Case B

Metal Case, Screw Mounting



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