

WATT/WATTHOUR TRANSDUCERS

AC WATT/WATT HOUR TRANSDUCER

MODELS W, W4

FEATURES

- Accurate regardless of variations in voltage, current, power factor, or load.
- Standard Analog outputs for Watts, relay contact or 5V pulse for Watthours.
- **Factory calibrated**, traceable to NIST.

APPLICATIONS

- Measurement of power consumption.
- Can be easily integrated into building management systems.
- Pulse outputs interface with electronic or mechanical counters for accumulation of Watt Hours.



(W) SINGLE PHASE, TWO WIRE 50/60 HERTZ (ONE ELEMENT)

(W4) SINGLE PHASE, TWO WIRE 400 HERTZ (ONE ELEMENT)

| INPUTS | | F.S. WATTS | F.S. COUNTS PER HR | STANDARD OUTPUTS MODEL W or W4- | | | | | | |
|--------|-------|------------|--------------------|---------------------------------|----------|-----------|----------|----------|---------|----------|
| VOLTS | AMPS | | | 0-±1mAdc* | 0-±1mAdc | 0-±10Vdc* | 0-±10Vdc | 0-±5Vdc* | 0-±5Vdc | 4-20mAdc |
| 0-150 | 0-1 | 100 | 100 | 103A | 103B | 103C | 103D | 103CX5 | 103X5 | 103E |
| | 0-2.5 | 250 | 250 | 106A | 106B | 106C | 106D | 106CX5 | 106X5 | 106E |
| | 0-5 | 500 | 5000 | 001A | 001B | 001C | 001D | 001CX5 | 001X5 | 001E |
| | 0-10 | 1000 | 1000 | 010A | 010B | 010C | 010D | 010CX5 | 010X5 | 010E |
| | 0-15 | 1500 | 1500 | 019A | 019B | 019C | 019D | 019CX5 | 019X5 | 019E |
| | 0-20 | 2000 | 2000 | 117A | 117B | 117C | 117D | 117CX5 | 117X5 | 117E |
| 0-300 | 0-2.5 | 250 | 250 | 106A | 106B | 106C | 106D | 106CX5 | 106X5 | 106E |
| | 0-5 | 500 | 5000 | 001A | 001B | 001C | 001D | 001CX5 | 001X5 | 001E |
| | 0-10 | 1000 | 1000 | 010A | 010B | 010C | 010D | 010CX5 | 010X5 | 010E |
| | 0-15 | 1500 | 1500 | 019A | 019B | 019C | 019D | 019CX5 | 019X5 | 019E |
| | 0-20 | 2000 | 2000 | 117A | 117B | 117C | 117D | 117CX5 | 117X5 | 117E |
| | 0-25 | 2500 | 2500 | 118A | 118B | 118C | 118D | 118CX5 | 118X5 | 118E |
| 0-600 | 0-1 | 100 | 100 | 103A | 103B | 103C | 103D | 103CX5 | 103X5 | 103E |
| | 0-2.5 | 250 | 250 | 106A | 106B | 106C | 106D | 106CX5 | 106X5 | 106E |
| | 0-5 | 500 | 5000 | 001A | 001B | 001C | 001D | 001CX5 | 001X5 | 001E |
| | 0-10 | 1000 | 1000 | 010A | 010B | 010C | 010D | 010CX5 | 010X5 | 010E |
| | 0-15 | 1500 | 1500 | 019A | 019B | 019C | 019D | 019CX5 | 019X5 | 019E |
| | 0-20 | 2000 | 2000 | 117A | 117B | 117C | 117D | 117CX5 | 117X5 | 117E |

Highlighted models, (5A), can be used with current transformers.

*Denotes self-powered unit, limiting input voltage ranges to:

103-135 for 150Vac models

215-280 for 300Vac models

395-550 for 600Vac models

All others require 103-135Vac instrument power, (50-400Hz), 5VA.

"E" MODELS ARE UNIDIRECTIONAL ONLY.

Optional 230Vac instrument power-Add suffix **"-22"** to part number.

Add suffix **"Y27"** for use on zero-crossing SCR controllers

NOTE: This option is not available for self-powered models

OPTION "V" - PROGRAMMABLE PULSES/HOURS

OPTION "T" - TTL OUTPUT FOR WATTHOURS. 5Vdc PULSE

CUSTOM COUNT RATES ARE AVAILABLE

400 HERTZ MODELS

To order for use on 400Hz application, substitute **"W4"** in part number.

ORDERING INFORMATION

Example: Self-Powered, Single-Phase, 120V, 5A Input with 0-5Vdc Output Proportional to 0-500 Watts, TTL Pulse Output for Watt Hours, each Pulse Proportional to 0.1 Watt Hours.

W-001CX5-T

FULL SCALE OUTPUT USING CURRENT TRANSFORMERS/MODEL W AND W4 WATT/WATTHOUR TRANSDUCERS

| MODEL NO. (EXAMPLE) W/W4 | F.S. WATTS FROM ABOVE | CURRENT TRANSFORMER RATIO (EXAMPLE) | FULL SCALE WATTS | COUNTS PER HR FROM ABOVE | WH PER COUNT |
|--------------------------|-----------------------|-------------------------------------|------------------|--------------------------|--------------|
| -001 | 500 | 500/5 (100:1) | 50,000 | 5000 | 10 |
| -002 | 1000 | 500/5 (100:1) | 100,000 | 1000 | 100 |
| -003 | 2000 | 500/5 (100:1) | 200,000 | 2000 | 100 |

FULL SCALE OUTPUT USING CURRENT AND POTENTIAL TRANSFORMERS/ MODEL W AND W4 WATT/WATTHOUR TRANSDUCERS

| F.S. WATTS FROM ABOVE | CURRENT TRANSFORMER RATIO (EXAMPLE) | POTENTIAL TRANSFORMER RATIO (EXAMPLE) | FULL SCALE WATTS | COUNTS PER HR FROM ABOVE | WH PER COUNT |
|-----------------------|-------------------------------------|---------------------------------------|------------------|--------------------------|--------------|
| 500 | 500/5 (100:1) | 2400/120 (20:1) | 1,000,000 | 5000 | 200 |

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MODELS W, W4



(W) THREE PHASE, THREE WIRE 50/60 HERTZ (TWO ELEMENT)

(W4) THREE PHASE, THREE WIRE 400 HERTZ (TWO ELEMENT)

| INPUTS | | F.S. WATTS | F.S. COUNTS PER HR | STANDARD OUTPUTS MODEL W or W4- | | | | | | |
|--------|------|------------|--------------------|---------------------------------|----------|-----------|----------|----------|---------|----------|
| VOLTS | AMPS | | | 0-±1mAdc* | 0-±1mAdc | 0-±10Vdc* | 0-±10Vdc | 0-±5Vdc* | 0-±5Vdc | 4-20mAdc |
| 0-150 | 0-1 | 200 | 200 | 120A | 120B | 120C | 120D | 120CX5 | 120X5 | 120E |
| | 0-5 | 1K | 1000 | 004A | 004B | 004C | 004D | 004CX5 | 004X5 | 004E |
| | 0-10 | 2K | 2000 | 013A | 013B | 013C | 013D | 013CX5 | 013X5 | 013E |
| | 0-15 | 3K | 3000 | 022A | 022B | 022C | 022D | 022CX5 | 022X5 | 022E |
| | 0-20 | 4K | 4000 | 112A | 112B | 112C | 112D | 112CX5 | 112X5 | 112E |
| 0-300 | 0-25 | 5K | 5000 | 123A | 123B | 123C | 123D | 123CX5 | 123X5 | 123E |
| | 0-1 | 400 | 400 | 121A | 121B | 121C | 121D | 121CX5 | 121X5 | 121E |
| | 0-5 | 2K | 2000 | 005A | 005B | 005C | 005D | 005CX5 | 005X5 | 005E |
| | 0-10 | 4K | 4000 | 014A | 014B | 014C | 014D | 014CX5 | 014X5 | 014E |
| | 0-15 | 6K | 6000 | 023A | 023B | 023C | 023D | 023CX5 | 023X5 | 023E |
| 0-600 | 0-20 | 8K | 8000 | 113A | 113B | 113C | 113D | 113CX5 | 113X5 | 113E |
| | 0-25 | 10K | 10000 | 124A | 124B | 124C | 124D | 124CX5 | 124X5 | 124E |
| | 0-1 | 800 | 800 | 122A | 122B | 122C | 122D | 122CX5 | 122X5 | 122E |
| | 0-5 | 4K | 4000 | 006A | 006B | 006C | 006D | 006CX5 | 006X5 | 006E |
| | 0-10 | 8K | 8000 | 015A | 015B | 015C | 015D | 015CX5 | 015X5 | 015E |
| 0-15 | 12K | 12000 | 024A | 024B | 024C | 024D | 024CX5 | 024X5 | 024E | |
| | 0-20 | 16K | 16000 | 114A | 114B | 114C | 114D | 114CX5 | 114X5 | 114E |

Highlighted models, (5A), can be used with current transformers.

*Denotes self-powered unit, limiting input voltage ranges to:

- 103-135 for 150V models
- 215-280 for 300V models
- 395-550 for 600V models

All others require 103-135Vac instrument power, (50-400Hz)

150V models may be used with single-phase, three wire, 120V/240V Edison systems.

Optional 230Vac instrument power-Add suffix "-22" to part number.

400 HERTZ MODELS
To order for use on 400Hz application, substitute "W4" in part number.

CUSTOM COUNT RATES, OPEN COLLECTOR WH OUTPUT AND TTL OUTPUTS AVAILABLE - CONSULT FACTORY

OPTION "V" - PROGRAMMABLE PULSES/HOUR

Add suffix "Y27" for use on zero-crossing SCR controllers
NOTE: This option is not available for self-powered models

FULL SCALE OUTPUT USING CURRENT TRANSFORMERS/MODEL W AND W4 WATT/WATTHOUR TRANSDUCERS

| MODEL NO. (EXAMPLE) W/W4 | F.S. WATTS FROM ABOVE | CURRENT TRANSFORMER RATIO (EXAMPLE) | FULL SCALE WATTS | COUNTS PER HR FROM ABOVE | WH PER COUNT |
|--------------------------|-----------------------|-------------------------------------|------------------|--------------------------|--------------|
| -004 | 1K | 500/5 (100:1) | 100K | 1000 | 100 |
| -005 | 2K | 500/5 (100:1) | 200K | 2000 | 100 |
| -006 | 4K | 500/5 (100:1) | 400K | 4000 | 100 |

FULL SCALE OUTPUT USING CURRENT AND POTENTIAL TRANSFORMERS/MODEL W AND W4 WATT/WATTHOUR TRANSDUCERS

| F.S. WATTS FROM ABOVE | CURRENT TRANSFORMER RATIO (EXAMPLE) | POTENTIAL TRANSFORMER RATIO (EXAMPLE) | FULL SCALE WATTS | COUNTS PER HR FROM ABOVE | WH PER COUNT |
|-----------------------|-------------------------------------|---------------------------------------|------------------|--------------------------|--------------|
| 1K | 500/5 (100:1) | 2400/120 (20:1) | 2000K | 1000 | 2000 |

SPECIFICATIONS

INPUT

Voltage..... See Tables
Current..... See Tables
Frequency Range W..... 48 to 70Hz
W4..... 400Hz
Power Factor..... Any
Response (Transient 90%) < 100µs
Burden
Voltage and Current..... 1.25VA/phase
Output Amplifier 2 Watts
Current Overload (Continuous) 1-10A..... 2 X F.S.
15A, 20A, 25A..... F.S.
Dielectric Test....(Input/Output/Case)..... 1500Vac (RMS)
Surge..... Withstands IEEE SWC test
Instrument Power..... 103-135Vac, 50-400 Hz, 5VA
"-22" Option..... 230Vac, 50/60Hz, ±10%
Self Powered Inst. Power Not Required

OUTPUT

ACCURACY ± 0.5% F.S.
Includes combined effects of power factor, linearity and repeatability.
WH Relay N/O SPST; 150Vac, 0.5A Rated
Contact Closure Period 200ms
Analog Output Ripple < 1% F.S.
Output Loading (Ω)
4 - 20mAdc..... 0-500
0 - ±1mAdc..... 0-10K
0 - ±10Vdc..... 2K min.
0 - ±5Vdc..... 2K min.
Response Time....(90%) 250ms
Suffix "Y27" (for use on zero-crossing SCR controllers) ...5s
Note: This option is not available on self-powered models.
Field Adjustable Cal. ± 10%
Temperature Range..... -10°C to +60°C
Temperature Effect ±1.0% of Rdg., ±0.1% F.S. Output
Optional 5V Pulse..... TTL output for watt hours, 5Vdc pulse
add suffix "-T" to part number.

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AC WATT/WATT HOUR TRANSDUCER

MODELS W, W4



(W) THREE PHASE, FOUR WIRE 50/60 HERTZ (THREE ELEMENT)

(W4) THREE PHASE, FOUR WIRE 400 HERTZ (THREE ELEMENT)

| INPUTS | | F.S. WATTS | F.S. COUNTS PER HR | STANDARD OUTPUTS MODEL W- or W4- | | | | | | |
|--------------|------|------------|--------------------|----------------------------------|----------|-----------|----------|----------|---------|----------|
| VOLTS | AMPS | | | 0-±1mAdc* | 0-±1mAdc | 0-±10Vdc* | 0-±10Vdc | 0-±5Vdc* | 0-±5Vdc | 4-20mAdc |
| 0-150 L-N | 0-1 | 300 | 300 | 125A | 125B | 125C | 125D | 125CX5 | 125X5 | 125E |
| | 0-5 | 1.5K | 1500 | 007A | 007B | 007C | 007D | 007CX5 | 007X5 | 007E |
| | 0-5 | 1.5K | 1500 | 7.5A | 7.5B | 7.5C | 7.5D | 7.5CX5 | 7.5X5 | 7.5E |
| | 0-10 | 3K | 3000 | 016A | 016B | 016C | 016D | 016CX5 | 016X5 | 016E |
| | 0-15 | 4.5K | 4500 | 025A | 025B | 025C | 025D | 025CX5 | 025X5 | 025E |
| | 0-20 | 6K | 6000 | 115A | 115B | 115C | 115D | 115CX5 | 115X5 | 115E |
| 0-300 L-N | 0-25 | 7.5K | 7500 | 127A | 127B | 127C | 127D | 127CX5 | 127X5 | 127E |
| | 0-1 | 600 | 600 | 126A | 126B | 126C | 126D | 126CX5 | 126X5 | 126E |
| | 0-5 | 3K | 3000 | 008A | 008B | 008C | 008D | 008CX5 | 008X5 | 008E |
| | 0-5 | 3K | 3000 | 8.5A | 8.5B | 8.5C | 8.5D | 8.5CX5 | 8.5X5 | 8.5E |
| | 0-10 | 6K | 6000 | 017A | 017B | 017C | 017D | 017CX5 | 017X5 | 017E |
| | 0-15 | 9K | 9000 | 026A | 026B | 026C | 026D | 026CX5 | 026X5 | 026E |
| | 0-20 | 12K | 12000 | 116A | 116B | 116C | 116D | 116CX5 | 116X5 | 116E |
| | 0-25 | 15K | 15000 | 128A | 128B | 128C | 128D | 128CX5 | 128X5 | 128E |

Highlighted models, (5A), can be used with current transformers.

*Denotes self-powered unit, limiting input voltage ranges to:

- 103-135 for 150V models
- 215-280 for 300V models
- 395-550 for 600V models

All others require 103-135Vac instrument power, (50-400Hz)

Optional 230Vac instrument power-Add suffix "-22" to part number.

Add suffix "Y27" for use on zero-crossing SCR controllers

NOTE: This option is not available for self-powered models

CUSTOM COUNT RATES,

OPEN COLLECTOR WH OUTPUT AND TTL OUTPUTS

AVAILABLE - CONSULT FACTORY

FULL SCALE OUTPUT USING CURRENT TRANSFORMERS/MODEL W AND W4 WATT/WATTHOUR TRANSDUCERS

| MODEL NO. (EXAMPLE) W | F.S. WATTS FROM ABOVE | CURRENT TRANSFORMER RATIO (EXAMPLE) | FULL SCALE WATTS | COUNTS PER HR FROM ABOVE | WH PER COUNT |
|-----------------------|-----------------------|-------------------------------------|------------------|--------------------------|--------------|
| -007 | 1500 | 500/5 (100:1) | 150,000 | 1500 | 100 |
| -008 | 3000 | 500/5 (100:1) | 300,000 | 3000 | 100 |

FULL SCALE OUTPUT USING CURRENT AND POTENTIAL TRANSFORMERS/MODEL W AND W4 WATT/WATTHOUR TRANSDUCERS

| F.S. WATTS FROM ABOVE | CURRENT TRANSFORMER RATIO (EXAMPLE) | POTENTIAL TRANSFORMER RATIO (EXAMPLE) | FULL SCALE WATTS | COUNTS PER HR FROM ABOVE | WH PER COUNT |
|-----------------------|-------------------------------------|---------------------------------------|------------------|--------------------------|--------------|
| 1500 | 500/5 (100:1) | 2400/120 (20:1) | 3,000,000 | 1500 | 2000 |

400 HERTZ MODELS

To order for use on 400Hz application, substitute "W4" in part number.

ORDERING INFORMATION

Example: Self-Powered,
Three Phase- Four Wire, 120V, 5A Input
with 0-5Vdc Output Proportional to 0-1500 Watts,
TTL Pulse Output for Watthours,
each Pulse Proportional to 1.0 Watthour.
W-007CX5-T

SPECIFICATIONS

INPUT

Voltage..... See Tables

Current..... See Tables

Frequency Range W..... 48 to 70Hz

W4..... 400Hz

Power Factor..... Any

Response (Transient 90%) < 100µs

Burden

Voltage and Current..... 1.25VA/phase

Output amplifier 2 Watts

Current Overload (Continuous) 2 X F.S.

15A, 20A, 25A..... F.S.

Dielectric Test....(Input/Output/Case)..... 1500Vac (RMS)

Surge Withstands IEEE SWC test

Instrument Power..... 103-135Vac, 50-400Hz, 5VA

"-22" Option..... 230Vac, 50/60Hz, ±10%

Self Powered Inst. Power Not Required

OUTPUT

ACCURACY ± 0.5% F.S.

Includes combined effects of power factor, linearity and repeatability .

WH Relay N/O SPST; 150Vac, 0.5A Rated

Contact Closure Period 200ms

Analog Output Ripple < 1% F.S.

Output Loading (Ω)

4 - 20mAdc..... 0-500

0 - ±1mAdc..... 0-10K

0 - ±10Vdc..... 2K min.

0 - ±5Vdc..... 2K min.

Response Time....(90%) 250ms

Suffix "Y27" (for use on zero-crossing SCR controllers) ...5s

Note: This option is not available on self-powered models.

Field Adjustable Cal. ± 10%

Temperature Range -10°C to +60°C

Temperature Effect ±1.0% of R_d, ±0.1% F.S. Output

Optional 5V Pulse..... TTL output for watthours 5Vdc pulse

add suffix "-T" to part number

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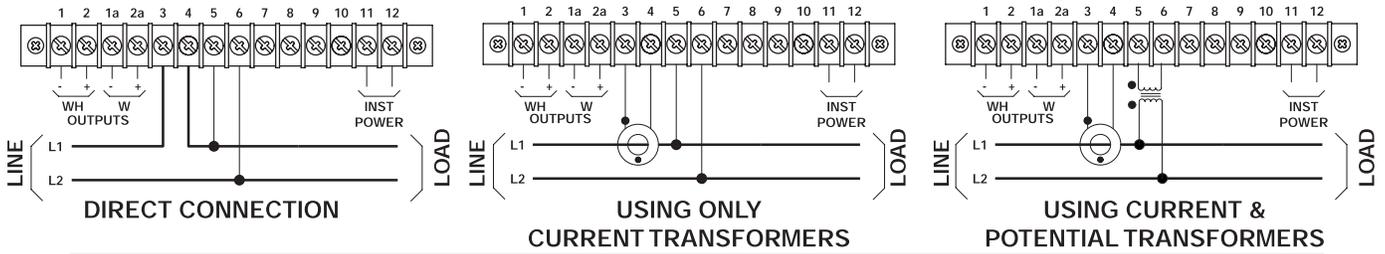
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WATT/WATTHOUR TRANSDUCERS

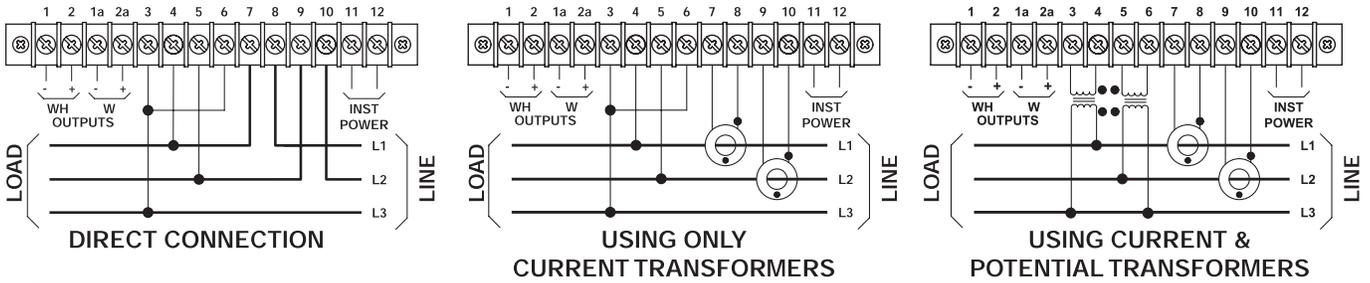
CONNECTION DIAGRAMS

MODELS W, W4

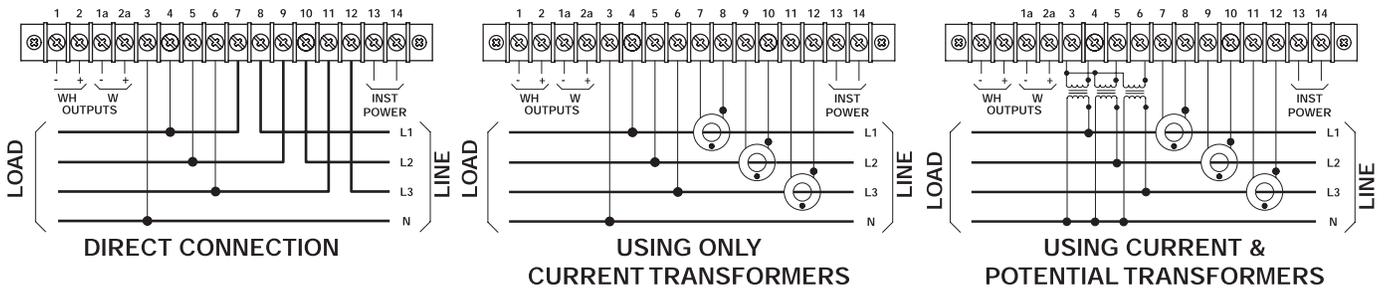
SINGLE PHASE CONNECTIONS



THREE-PHASE, THREE-WIRE CONNECTIONS

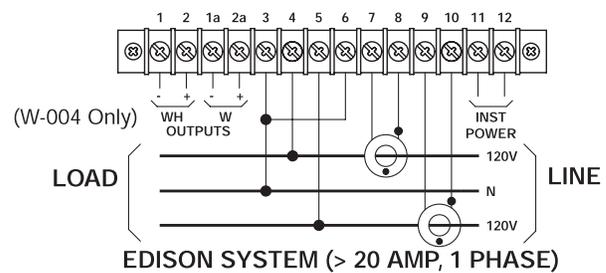
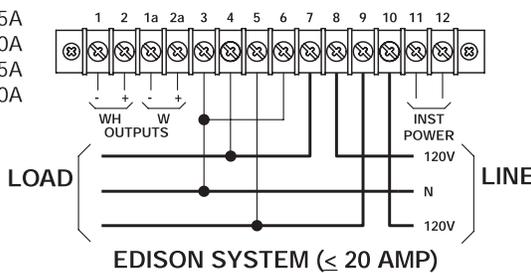


THREE-PHASE, FOUR-WIRE CONNECTIONS

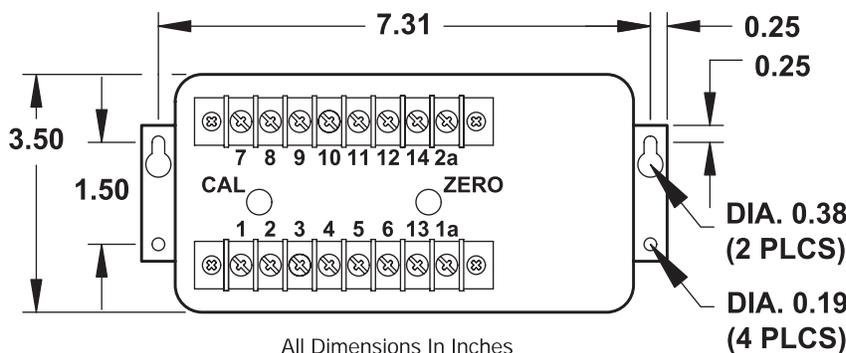


EDISON CIRCUIT 1 PHASE, 3-WIRE (120/240)

- (W-004) 5A
- (W-013) 10A
- (W-022) 15A
- (W-112) 20A



CASE DIMENSIONS



- CASE HEIGHT 5.50"
- 1PH 2W 3.0 Lbs.
- 3PH 3W 3.7 Lbs.
- 3PH 4W 4.5 Lbs.

All Dimensions In Inches

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