D8W3 Power Transducer

P/Ns 250-4020 and 250-4030

Overview

The D8W3 Power Transducer is an option for power monitoring. The D8W3 measures three-phase power and provides a single analog output. The D8W3 is normally used together with three current transformers. By combining several power transducers with a Copeland control system, the user is able to perform advanced power aggregation as well as load shedding.

Monitor Multiple Points: The D8W3 can prevent power draws by monitoring power consumption. A Copeland control system is designed so the user can network up to 16 individual power monitors. By using multiple monitoring points, load profiles of a site can be determined.

Hardware: The D8W3 uses screw terminals for all connections, and the D8W3 can be either rail mounted or mounted using standard screws. The D8W3's housing is made of self-extinguishing makrolon, is UL recognized, and meets CE requirements.

Models

There are three models for different line voltages: P/Ns 250-4020, and 250-4030.

P/N 250-4020 277/480 Volt 60 Hertz 3 Phase Watt Transducer, 120 V Transducer Power

Details:

- Line to Neutral voltages of 277 volts (222 to 333 volts)
- Line to Line voltages of 480 volts (384 to 576 volts)
- If using a 480 volt wye (277 volts Line to Neutral), the neutral should be connected to terminal 11; however, terminal 11 can be left disconnected if a neutral connection is not available. If connecting to a 480 volt delta, then terminal 11 should not be connected.
- Accurate with Power Factor 0.5 (leading or lagging) to 1.0
- Current transformer input currents of up to 5 amps each (0 to 6 amps)
- Current may lead or lag voltage by up to 60 degrees
- Auxiliary power (transducer power) of 120 VAC needs to be connected to terminals 20 and 21
- 60 Hertz
- Output of 0 to 5 volts DC at terminals 16 and 15
- Power Transducer Scale Factor of 4156.9 watts/5 volts

P/N 250-4030 277/480 Volt 60 Hertz 3 Phase Watt Transducer, 208 V Transducer Power

Details:

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- Line to Line voltages of 480 volts (384 to 576 volts)

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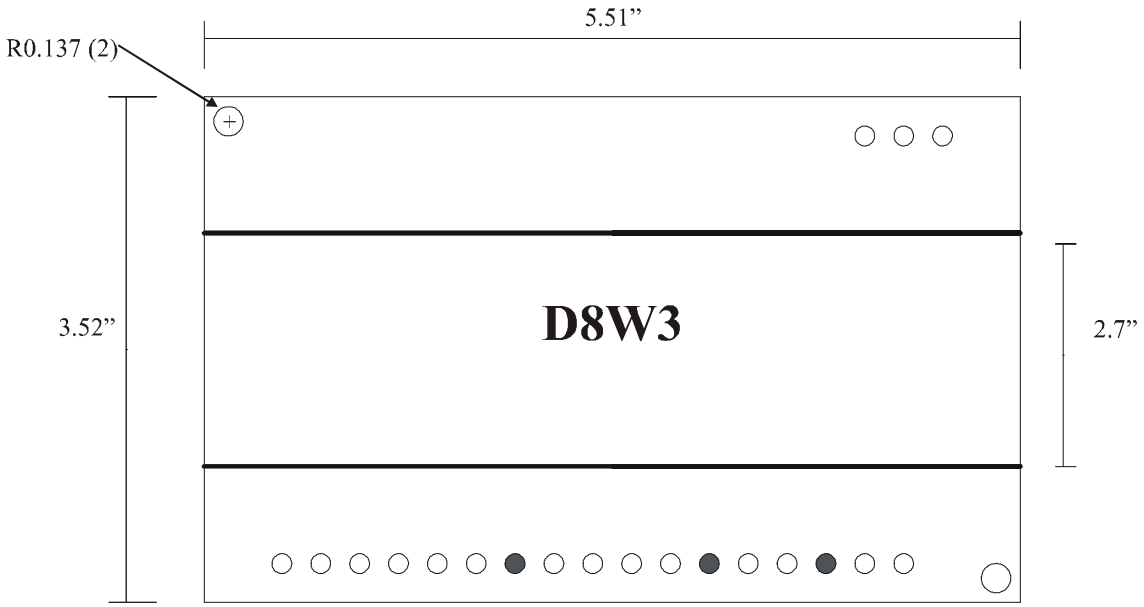
Associated Current Transformers

Part Numbers	CT Marking	CT Rating	For Measuring Current Up To	Wire Hole Diameter
251-4040	TAIBB, Kn 40/5A	40:5	40 Amps	0.82 inch
251-4050	TAIBB, Kn 50/5A	50:5	50 Amps	0.82 inch
251-4060	TAIBB, Kn 60/5A	60:5	60 Amps	0.82 inch
251-4070	TAIBB, Kn 70/5A	70:5	70 Amps	0.82 inch
251-4075	TAIBB, Kn 75/5A	75:5	75 Amps	0.82 inch
251-4080	TAIBB, Kn 80/5A	80:5	80 Amps	0.82 inch
251-4100	TAIBB, Kn 100/5A	100:5	100 Amps	0.82 inch
251-4120	TAIBB, Kn 120/5A	120:5	120 Amps	0.82 inch
251-4125	TAIBB, Kn 125/5A	125:5	125 Amps	0.82 inch
251-4150	TAIBB, Kn 150/5A	150:5	150 Amps	0.82 inch
251-4160	TAIBB, Kn 160/5A	160:5	160 Amps	0.82 inch
251-4200	TAIBB, Kn 200/5A	200:5	200 Amps	0.82 inch
251-4250	TAIBB, Kn 250/5A	250:5	250 Amps	0.82 inch
251-4300	TAIBB, Kn 300/5A	300:5	300 Amps	0.82 inch
251-4400	TA400, Ip(A) 400, Is(A) 5	400:5	400 Amps	1.37 inch
251-4500	TA400, Ip(A) 500, Is(A) 5	500:5	500 Amps	1.37 inch
251-4600	TA400, Ip(A) 600, Is(A) 5	600:5	600 Amps	1.37 inch
251-4700	TA400, Ip(A) 700, Is(A) 5	700:5	700 Amps	1.37 inch
251-4750	TA400, Ip(A) 750, Is(A) 5	750:5	750 Amps	1.37 inch
251-4800	TA400, Ip(A) 800, Is(A) 5	800:5	800 Amps	1.37 inch
251-5000	TA400, Ip(A) 1000, Is(A) 5	1000:5	1000 Amps	1.37 inch

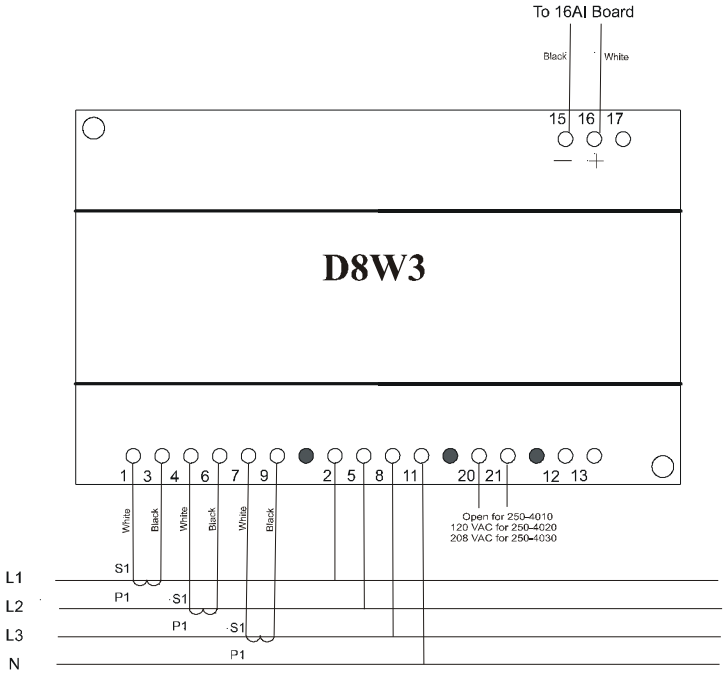
Other types of current transformers may also be used with the D8W3 if they have a 5 Amp secondary.
Two current transformers are required for each D8W3.

Mounting



The Transducer is designed to mount on standard DIN rail.

Power Transducer Wiring Diagram:



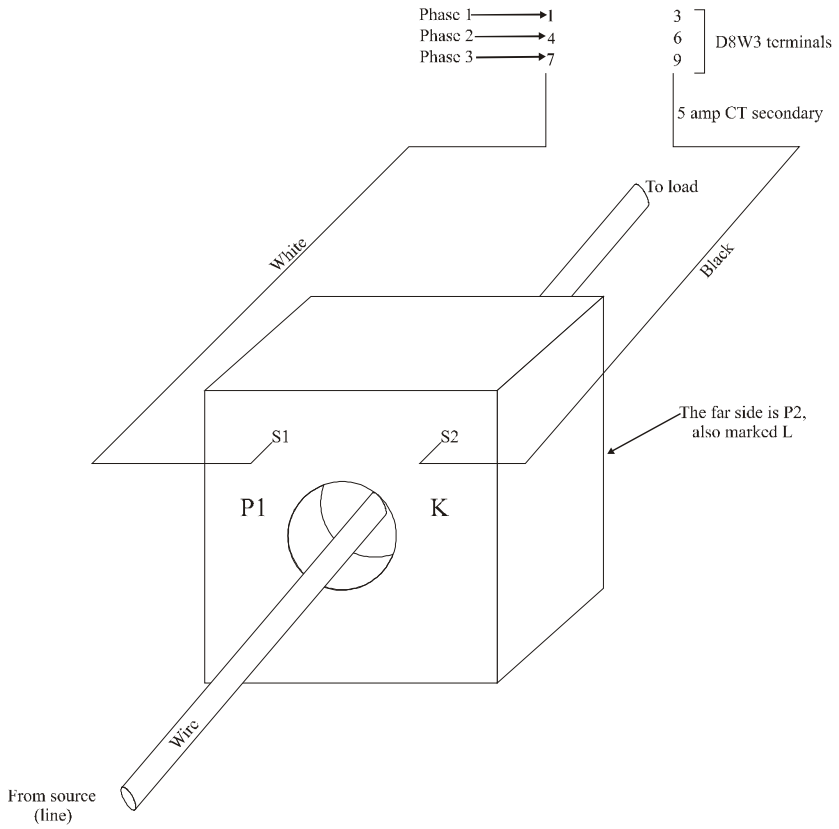
1. Use Belden #8761 #22 AWG, 2 conductor shielded wire to connect terminals 15 and 16 to an input point on the 16AI Board. Wire 15 to the odd-numbered terminal of the 16AI point with the black wire. Wire 16 to the even-numbered terminal with the white wire. Connect the shield to the odd-numbered terminal at the 16AI board, and clip off the shield wire at the D8W3 Power Transducer end of the cable.

2. Use 18 AWG or larger for wiring terminals 2, 5, 8, and 11 to L1, L2, L3, and neutral, respectively.

3. If wiring a 250-4020 or 250-4030, use 18 AWG or larger for wiring terminals 20 and 21 to 120 or 208 VAC power supply.

4. Voltage drops in the wiring of the current transformer secondaries are critical to the accuracy of power measurment. Use the following charts and formulas to determine the wire size needed for connecting current transformers to terminals 1 & 3, 4 & 6, and 7 & 9. A diagram of a current transformer appears below:

Current Transformer Orientation:



- P1 side should face the source of power, and the P2 side should face the load.
- P1 and P2 are primary, which is the wire inserted through the current transformer.
- S1 and S2 are secondary and are the terminals at the top of the current transformer.
- Typically, white wire is used for S1 and black wire is used for S2.
- P1 corresponds to H1 and P2 corresponds to H2 on other brands of current transformers.
- S1 corresponds to X1 or a white wire, and S2 corresponds to X2 or a black wire on other brands of current transformers.

Maximum Losses In Wiring For A Given Accuracy:

CT Marking	CT Rating	Max Burden for 0.5% Max Error	Max Burden for 1% Max Error	Max Burden for 3% Max Error
TAIBB-40	40:5			1.0 VA
TAIBB-50	50:5		1.25 VA	1.5 VA
TAIBB-60	60:5		1.25 VA	2.0 VA
TAIBB-70	70:5		1.5 VA	2.5 VA
TAIBB-75	75:5		1.5 VA	2.5 VA
TAIBB-80	80:5		1.5 VA	2.5 VA
TAIBB-100	100:5	2.0 VA	2.5 VA	3.5 VA
TAIBB-120	120:5	2.5 VA	3.5 VA	4.0 VA
TAIBB-125	125:5	2.5 VA	3.5 VA	4.0 VA
TAIBB-150	150:5	3.0 VA	4.0 VA	5.0 VA
TAIBB-160	160:5	3.0 VA	4.0 VA	5.0 VA
TAIBB-200	200:5	4.0 VA	5.5 VA	6.0 VA
TAIBB-250	250:5	5.0 VA	6.0 VA	7.0 VA
TAIBB-300	300:5	6.0 VA	7.5 VA	8.0 VA
TA400 400 5	400:5	8.0 VA	12.0 VA	15.0 VA
TA400 500 5	500:5	10.0 VA	12.0 VA	15.0 VA
TA400 600 5	600:5	12.0 VA	15.0 VA	15.0 VA
TA400 700 5	700:5	10.0 VA	12.0 VA	12.0 VA
TA400 750 5	750:5	10.0 VA	12.0 VA	15.0 VA
TA400 800 5	800:5	10.0 VA	12.0 VA	15.0 VA
TA400 1000 5	1000:5	10.0 VA	12.0 VA	15.0 VA

Wire Resistance:

Wire Gage	Resistance Per Length
18 AWG	0.00692 Ohm Per Foot
16 AWG	0.00435 Ohm Per Foot
14 AWG	0.00273 Ohm Per Foot
12 AWG	0.00171 Ohm Per Foot

$$\text{Maximum CT Secondary One-Way Wire Length} = \frac{(\text{CT Max Burden} - 0.5\ \text{Volt} \cdot \text{Amp})}{[(5\ \text{Amp})^2 \cdot 2 \cdot (\text{Wire's Resistance Per Length})]}$$

Einstein and RMCC Controller Settings:

Setting up power monitoring also involves setting up a controller with the correct constants. Below are the Einstein and RMCC settings, and a necessary calculation for Maximum Power.

EINSTEIN:

1. Log On
2. Press **F8** for ACTIONS
3. Press **Y** for System Setup
4. Press **6** for Input and Output Point Setup
5. Press **1** for Input Summary
6. At the Input Summary screen, select a new power monitoring point by highlighting it with the **DOWN ARROW** key
7. Press **F7** for **SETUP IN** to select the data type for the Input number you have selected
8. Press **1** for **Analog**. The Setup Echelon Analog Input screen displays
9. Name the power monitoring point KW Transducer for Point Name:
10. For **Sensor Type:** press **K** for **KW Transducer**
11. Set **Select Eng. Units**: to **KW**
12. Set **Default on Open**: to (**2x max power** - see below)
13. Set **Default** on Short: to **0**
14. Set **Default Other**: to **NONE**
15. Set **Change Delta**: to **0.0010**
16. Set **Multi. Factor**: to **1.0**
17. Set **Sensor Offset**: to **0**
18. Under **Modify Sensor Properties**, **Modify** should be set to **EndPoint**
19. Set **Low End Point**: to **0.000 V**
20. Set **HighEnd Point**: to **5.000 V**
21. Set **Low Eng. Units**: to **0.000**
22. Set **High Eng. Units**: to (**max power** - see below)
23. Set **Low End Limit**: to **-0.500 Volts**
24. Set **HighEnd Limit**: to **6.500 Volts**

RMCC

1. Log On
2. At the **MAIN MENU**, press **6 Power Monitor** to go to the **POWER MONITORING** screen
3. Select **2 Demand Setpoints** to go to the **DEMAND SETPOINTS** screen
4. Set **Minimum Voltage** to **00.000**
5. Set **Maximum Voltage** to **05.000**
6. Set **Power at Maximum** to max power (**XXXX.X** - see below)

Calculating Maximum Power:

Maximum Power is dependent upon the line voltage that the Watt Transducer is designed for (not upon the actual line voltage) and also upon the CT ratings.

CT ratio is the input current rating divided by the output current rating of 5 amps. For example, a 100:5 CT has a CT ratio of 100 amps/5 amps = 20.

Maximum Power Table:

Current Transformer Used	Ratio	Max Power for 250-4010	Max Power for 250-4020, 4030
251-4040	40:5	14.4 kW	33.25536 kW
251-4050	50:5	18 kW	41.5692 kW
251-4060	60:5	21.6 kW	49.88304 kW
251-4070	70:5	25.2 kW	58.19688 kW
251-4075	75:5	27 kW	62.3538 kW
251-4080	80:5	28.8 kW	66.51072 kW
251-4100	100:5	36 kW	83.1384 kW
251-4125	125:5	45 kW	103.923 kW
251-4150	150:5	54 kW	124.7076 kW
251-4160	160:5	57.6 kW	133.02144 kW
251-4200	200:5	72 kW	166.2768 kW
251-4250	250:5	90 kW	207.846 kW
251-4300	300:5	108 kW	249.4152 kW
251-4400	400:5	144 kW	332.5536 kW
251-4500	500:5	180 kW	415.692 kW
251-4600	600:5	216 kW	498.8304 kW
251-4700	700:5	252 kW	581.9688 kW
251-4750	750:5	270 kW	623.538 kW
251-4800	800:5	288 kW	665.1072 kW
251-5000	1000:5	360 kW	831.384 kW

Visit our website at copeland.com/en-us/products/controls-monitoring-systems for the latest technical documentation and updates.
For Technical Support call **833-409-7505** or email **ColdChain.TechnicalServices@Copeland.com**

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