

MM4431 DC INPUT POWER FUNCTION EXPONENTIATOR TRANSMITTER $Y=X^m$



DESCRIPTION

The MM4431 raises its input to a power and provides an output voltage or current proportional to that power function ($Y = X^m$). The exponent M can be a value between 0.2 and 5. This range covers the most common requirements for measuring differential pressure in flow applications such as encountered in orifice plate or pitot tubes.

The range of M also includes the ranges used to provide flow data from Parshall flumes and V-notch weirs. In a Parshall flume, the flow is related to the height of the liquid level by the $3/2$ power of the height. In a V-notch weir, flow is related by the $5/2$ power to the liquid height.

The MM4431 uses a complex integrated circuit to find the exponent of the input signal. The exponent is chosen by the choice of two precision resistors and allows the unit to be factory-scaled for a wide selection of exponent values.

The following tables show the input/output relationship for square root, using 4-20 mA inputs and outputs.

OPTIONS

The following options are available of the MM4431:

U All circuit boards conformal coated for protection against moisture.

DC Power Inverter-isolated 12 V or 24 V DC power.

CONTROLS

Two controls, ZERO and SPAN, are available at the top of the module. The exponent, M, is not adjustable

CALIBRATION

The MM4431 is shipped precalibrated. If there is a need to recalibrate, proceed as follows:

Refer to the instrument's label to determine your instrument's supply voltage, exponent (M), and input and output ranges. Refer to the "Block Diagram and Pin Connections" for pin connections.

Connect a precision DC voltage or current source to the input. Connect a precision DC voltage or current meter to the output.

Set the input to the low end of the input range and adjust the ZERO control for the low-end output voltage or current. Increase the input to full scale and adjust the SPAN control for the full-scale output. Repeat until both readings are correct.

MOUNTING

The module is designed to plug into a standard 8-pin relay socket.

MP008 is a molded plastic socket suitable for mounting on a flat surface or in a 2 3/4 inch wide PVC snap track **TRK48**. Socket **DMP008** is a 8-pin DIN rail mounted socket.

Use **CLP1** hold-down clip if needed for vibration environment (**MP008** only). A Killark HK Series explosion-proof housing with dome and 8-pin socket is available **HKB-HK2D-8**.

WARRANTY

The Mighty Module Series of products carry a limited warranty of 10 + 5 years. In the event of a failure due to defective material or workmanship, during the 10 year period, the unit will be repaired or replaced at no charge. For a period of 5 years after the initial 10 year warranty, the unit will be repaired, if possible, for a cost of 10% of the original purchase price.

Relays are not covered by the warranty.

SPECIFICATIONS

Input Impedance

Voltage
100K

Current
1.25V drop std at 20 mA,
others available

Output Limits

Voltage
-10 to +15 V, 10 mA
Current
50 mA, 24V compliance

Accuracy

$0.4 \leq M \leq 4$
 $\pm 0.15\%$ of span

Isolation

Input/Output
greater than 500 megohms
1000 VAC rms

Temperature Stability

$\pm 0.04\%$ of span per °C

Common Mode Rejection

100 dB, DC to 60 Hz

Temperature, Operating

0 °C to 60 °C
32 °F to 140 °F

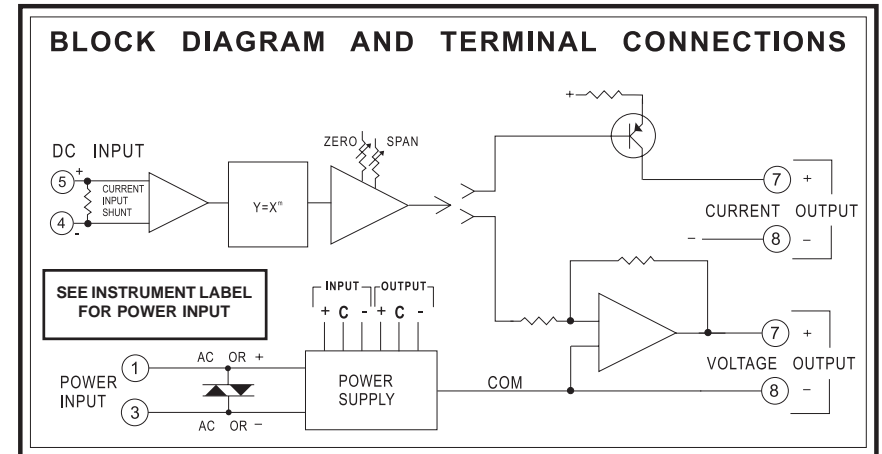
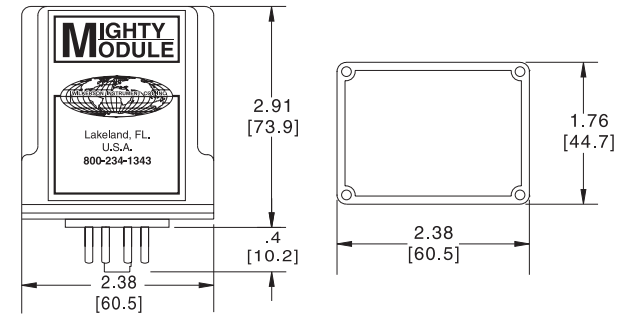
POWER (2.5 MAX)

115 VAC $\pm 10\%$, 50 or 60 Hz
230 VAC $\pm 10\%$, 50 or 60 Hz
(DC Power Option)
12 VDC (limits 10 VDC to 15 VDC)
24VDC (limits 21 VDC to 32 VDC)

OUT IN	VERSUS	IN OUT	FOR M=0.5	OUT IN	VERSUS	IN OUT	FOR M=2
4.000		4.000		4.000		4.000	
5.000		8.000		5.000		4.063	
6.000		9.657		6.000		4.250	
7.000		10.928		7.000		4.563	
8.000		12.000		8.000		5.000	
9.000		12.944		9.000		5.563	
10.000		13.798		10.000		6.250	
11.000		14.583		11.000		7.063	
12.000		15.314		12.000		8.000	
13.000		16.000		13.000		9.063	
14.000		16.649		14.000		10.250	
15.000		17.266		15.000		11.563	
16.000		17.856		16.000		13.000	
17.000		18.422		17.000		14.563	
18.000		18.967		18.000		16.250	
19.000		19.492		19.000		18.063	
20.000		20.000		20.000		20.000	

OUT IN	VERSUS	IN OUT	FOR M=1.5	OUT IN	VERSUS	IN OUT	FOR M=2.5
4.000		4.000		4.000		4.000	
5.000		4.250		5.000		4.016	
6.000		4.707		6.000		4.088	
7.000		5.299		7.000		4.244	
8.000		6.000		8.000		4.500	
9.000		6.795		9.000		4.873	
10.000		7.674		10.000		5.378	
11.000		8.630		11.000		6.026	
12.000		9.657		12.000		6.828	
13.000		10.750		13.000		7.797	
14.000		11.906		14.000		8.941	
15.000		13.121		15.000		10.270	
16.000		14.392		16.000		11.794	
17.000		15.718		17.000		13.521	
18.000		17.096		18.000		15.459	
19.000		18.524		19.000		17.616	
20.000		20.000		20.000		20.000	

CASE DIMENSIONS INCHES [mm]



Specifications are subject to change without notice. © 2008 Wilkerson Instrument Co., Inc. DWG#101065B 06/08



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