



# Low Cost 3 Digit AC Line or Logic Powered DPM

## AD2026

### FEATURES

- Third Generation I<sup>2</sup>L LSI Design
- Either Line Powered or Logic Powered
- Large 0.56" Red Orange LED's
- Balanced Differential Input/Floating
- 1000V, CMV
- Terminal Block Interface (ac Version)
- High Reliability: > 250,000 Hour MTBF
- Small Size and Weight
- Low Cost

### GENERAL DESCRIPTION

The AD2026 is specifically designed to provide a digital alternative to analog panel meters. The AD2026 is available either logic powered (+5V dc) or ac line powered. Most of the analog and digital circuitry is implemented on a single I<sup>2</sup>L LSI chip, the AD2020. Only 13 additional components are required to complete the AD2026 +5V dc version. The entire dc version is mounted on a single 3" X 1 5/8" PCB. AC line power is achieved with the addition of a second PCB containing the ac power transformer and power supply circuitry.

The AD2026, on both the ac line and logic powered versions, offers as a standard feature, 0.56" high LED Displays. Brightness is enhanced on both versions due to the Red Orange lens. In addition to the Red Orange lens, the AD2026 is also available with a dark red lens for applications where maximum brightness is not required and minimum backlighting is desired.

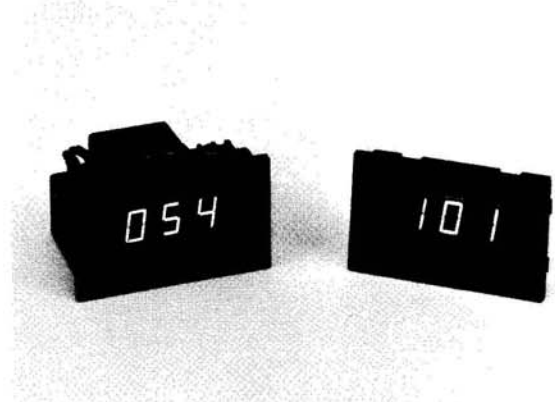
A unique patented case design utilizes molded-in fingers, both to capture the PCB in the case and to provide snap-in mounting of the DPM in a standard panel cutout. No mounting hardware of any kind is used. The dc version occupies less than 1" of space behind the panel. The line powered version offers the same mounting features but occupies 2 1/2" of behind-panel space.

### EXCELLENT PERFORMANCE

The AD2026 offers the instrument designer digital accuracy, resolution and use of readout while occupying less space than its analog counterpart. Other features of analog meters such as reliability and instantaneous response are retained in the AD2026.

The AD2026 measures and displays inputs from -99mV to +999mV, with an accuracy of 0.1% of reading  $\pm 1$  digit. Zero shift is less than one bit over the full operating temperature range, resulting in the same performance as a DPM with auto zero. The balanced differential input of the dc powered AD2026 rejects common mode voltages up to 200mV, enough to eliminate most ground loop problems. The floating differential input inherent in the ac line powered version offers 1000V of common mode voltage rejection.

\*Covered by patent numbers: 4,092,698; 29,992; 3,872,466; and 3,887,863.



Optional 10.0V full scale (F.S.) range is available on the ac line version that will accept inputs from -0.99V to 9.99V.

### WIRING CONNECTIONS

For Balanced Differential operation with the AD2026 dc version, connect input as shown in Figure 1. The common mode loop must provide a return path for the bias currents internal to the AD2026. The resistance of this path must be less than 100k $\Omega$  and total common mode voltages must not exceed 200mV.

For applications where attenuation is required, scaling resistors can be connected between pins 6 and 7 and between pins F and H. Pin 5 must be used as the High Analog Input when scaling resistors are used and pin 4 when they are not. Pin E is the Analog Low Input.

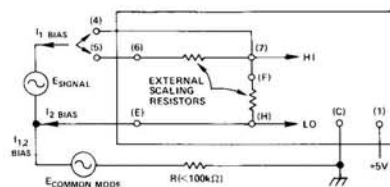


Figure 1.

Connection to the ac line powered AD2026 is via the terminal strip on the rear. AC line power is connected to terminals 4 and 5 and the signal input is connected to terminal 1 (Analog HI) and 2 (Analog Ground).

# SPECIFICATIONS (typical at +25°C and nominal supply voltage unless otherwise noted)

## DISPLAY OUTPUT

- Light emitting diode, planar seven segment display readouts, 0.56" (14.6mm) high (orange)
- Overload Indication: EEE
- Negative Indication: -XX
- Negative Overload Indication: ---
- Decimal Points: three (3) selectable at input connector (dc version); internally on ac version

## ANALOG INPUT

- Configuration: balanced differential input (dc version) single ended isolated (ac version)
- Full Scale Range: -99mV to +999mV  
-0.99V to +9.99V (10V option on ac version)
- Automatic Polarity
- Input Impedance: 100MΩ; 100kΩ (10V option)
- Bias Current: 100nA
- Overvoltage Production: ±15V dc, sustained

## ACCURACY

- ±0.1% ±1 digit<sup>1</sup>
- Resolution: 1mV or 10mV
- Temperature Range<sup>2</sup>: -10°C to +60°C operating; -25°C to +80°C storage
- Temperature Coefficient: Gain: 50ppm/°C  
Zero: 10μV/°C (essentially auto zero)
- Warm-Up Time to Rated Accuracy: Instantaneous
- Settling Time to Rated Accuracy: 0.3 second for full input voltage swing (dc version); 0.75 second for full input voltage swing (ac version)

## COMMON MODE REJECTION (1kΩ source imbalance, dc to 1kHz)

- 50dB, ±200mV common mode voltage (dc version)
- 116dB (96dB on 10V range); 1000V rms max CMV (ac version)

## NORMAL MODE REJECTION

- 30dB at 50-60Hz (ac version)

## CONVERSION RATE

- 4 conversions per second
- Hold and read on command (dc version only)

## CONTROL INPUTS

**Display Blanking/Display Power Input, (dc version only):** The display of the AD2026 can be blanked by removal of power to the display power input, with no effect on conversion circuitry. If external logic switching is used, the display requires 110mA peak (85mA average) when illuminated.

**Hold (dc version only):** When the Hold input is at Logic "0", grounded or open circuit, the AD2026 will convert at 4 conversions per second. If a voltage of 0.6V to 2.4V is applied to this input, the DPM will stop converting and hold the last reading. A 12kΩ resistor in series with this input to +5V will provide the proper voltage input. (Consult factory for "HOLD" on ac version.)

## DECIMAL POINT

- To illuminate decimal points on dc version, ground appropriate pin (A, B or 3).
- To illuminate decimal points on ac version, remove shroud and bridge appropriate solder pad (A, B or 3).

## POWER INPUT LOGIC POWER<sup>3</sup>

- Converter: +5V ±5%, 0.2 watts typ; 0.33 watts max
- Display: +5V ±40%, 0.45 watts typ; 0.75 watts max

## POWER INPUT AC LINE POWER

- AC line, 50-60Hz, 1.5 watts

## CALIBRATION ADJUSTMENTS

- Gain
- Zero
- Recommended recalibration interval: six months

## SIZE<sup>4</sup>

- 3.43"W X 2.0"H X 0.85"D (87 X 52 X 22mm)
- 0.88" (22mm) overall depth to rear of connector
- Panel cutout required: 3.175 ±0.015" X 1.810 ±0.015" (80.65 ±0.38 X 45.97 ±0.38mm)

## WEIGHT

- 1.8 ounces (53 grams) (dc version)
- 7 ounces (198 grams) (ac version)

## CONNECTIONS

A 10 pin T&B/Ansley 609-1000M with two feet of 10 conductor ribbon cable is available.

Conductor to pin A is color coded. Sequence of ribbon connections is A, 1, B, 2, C, 3, etc.

The AD2026 ac version is complete with terminal strip for easy interface.

## ORDERING GUIDE

### AD2026

#### Power Input

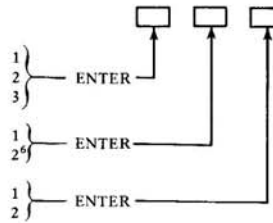
- +5V dc
- 90-129V ac
- 198-264V ac

#### Full Scale Input<sup>5</sup>

- 1V dc Full Scale
- 10V dc Full Scale

#### Lens<sup>5</sup>

- Red Lens
- Red Orange Lens



## NOTES:

<sup>1</sup> Guaranteed at +25°C and nominal supply voltage.

<sup>2</sup> Guaranteed.

<sup>3</sup> When the same power supply is used to power both display and converter, +5V, ±5%, 0.65 watts typical, 0.9 watts max is required.

<sup>4</sup> Dimensions for ac line powered version: 3.43"W X 2.0"H X 2.44"D (87mm X 52mm X 63mm)

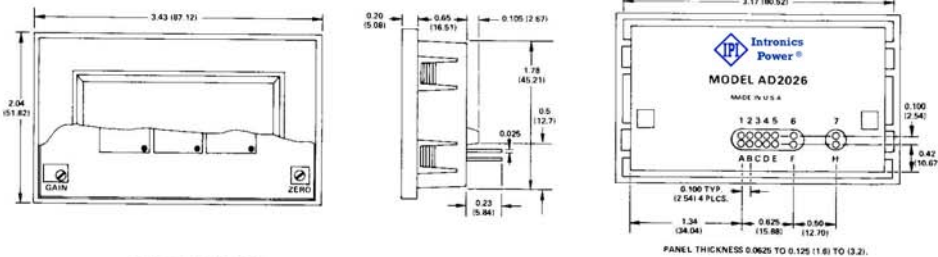
<sup>5</sup> No Charge Options

<sup>6</sup> 10V dc full scale option is available on ac power only

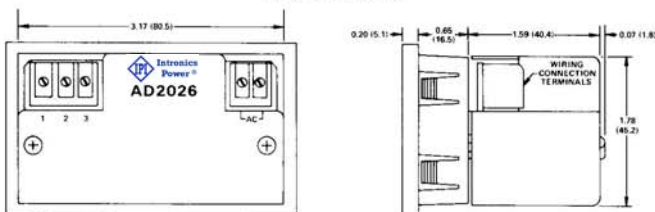
Specifications subject to change without notice.

## OUTLINE DIMENSIONS

Dimensions shown in inches and (mm)



## AC VERSION



## PIN CONNECTIONS

### AC VERSION

PIN	FUNCTION
1	Input
2	+5V Display Power
3	Analog Ground
4	AC HI
5	AC LO

### DC VERSION

PIN	FUNCTION
1	+5V Power
2	+5V Display Power
3	Decimal Point X.XX
4	Input (When Scaling Resistors Not Used)
5*	Input (When Scaling Resistors Are Used)
6*	Series Arm of Scaling Resistor Divider
7*	Series Arm of Scaling Resistor Divider

PIN	FUNCTION
A	Decimal Point XX.X
B	Decimal Point XXX.
C	Power Ground
D	Hold
E	Analog Ground
F*	Shunt Arm of Scaling Resistor Divider
H*	Shunt Arm of Scaling Resistor Divider

\*NOT NORMALLY USED. ALLOWS CONVENIENT MOUNTING OF SCALING RESISTORS.

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