OBSOLETE PRODUCT

Contact Factory for Replacement Model

DM-350

3-1/2 Digit Miniature Digital Panel Meter

Murata Power Solutions

Large 0.43" (11 mm) LED Display
Very Low Cost, $69.
Choice of Unipolar or Bipolar 1.999V Ranges
Choice of AC or 5VDC Power Supply
Very Low Power Consumption for Portable Instruments, 5VDC @ 300 mA max.

Datel's model DM-350 Digital Panel Meter features very low cost but high performance in a miniature case for display-only applications. The instrument uses advanced CMOS LSI circuits for a very low overall parts count, high reliability and low internal heat rise. The large red high-efficiency LED displays measure 0.43 inches (11 mm) high for easy, no-parallax viewing from comfortable working distances.

The DM-350 employs a high impedance (100 Megohms min.) single-ended input with a choice of 0 to +1.999 Volt or −1.999 Volt to +1.999 Volt input ranges.

The optional AC powered models are transformer-isolated, allowing operation in differential circuits not exceeding ±300 Volts to the AC line. AC power voltages are user-selected by jumpers on the rear connector for 115 or 230 VAC, 47 to 440 Hz input. The +5VDC models require only 300 mA max. current, making them ideal for battery-operated instruments.

Additional application features include an automatic polarity sign for bipolar models and user-selected decimal points on the rear connector for scaling inputs. The sampling rate of 2 per second may be varied by using external resistors, and the display may be held using a rear connector input. Overscale inputs are automatically indicated with horizontal bars on the display.

The DM-350 is housed in an impact-resistant, solvent-proof polycarbonate plastic case with four screwholes for front-panel mounting. The operating temperature range is 0 to +50°C

Rear Connector Wiring

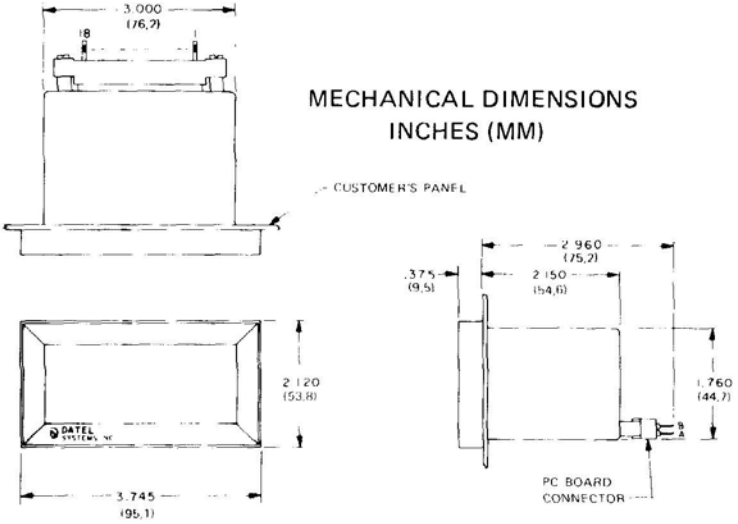
LEFT

1	ANALOG HI INPUT	
2	NO INTERNAL CONNECTION	
3	ANALOG GROUND	INTERNALLY CONNECTED
4	POWER COMMON	INTERNALLY CONNECTED
5	DECIMAL POINT	000 ← KEYWAY
6	DECIMAL POINT	00
7	DECIMAL POINT	0
8		
9	LAMP TEST	
10	HOLD DISPLAY	
11	SAMPLE RATE ADJUST	
12		
13	+5VDC POWER	
14		
15	AC POWER WINDING A HI	
16	AC POWER WINDING B HI	
17	AC POWER WINDING A LO	
18	AC POWER WINDING B LO	

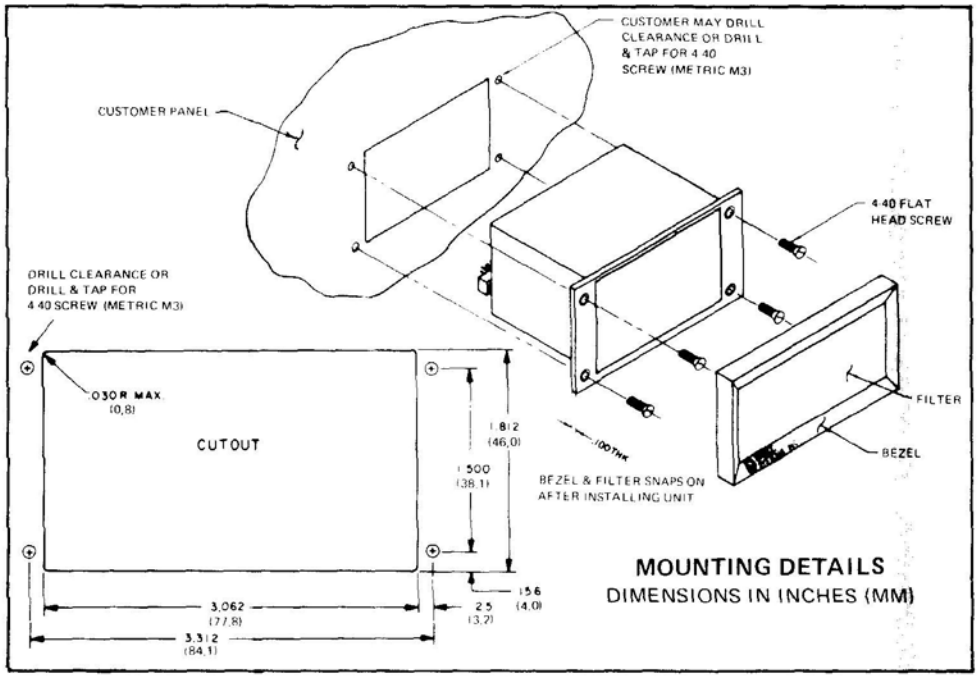
RIGHT

Pins A and B (Bottom and Top) are wired in parallel

$69 (1-9)



MECHANICAL DIMENSIONS
INCHES (MM)



MOUNTING DETAILS
DIMENSIONS IN INCHES (MM)

SPECIFICATIONS (typical @ +25°C unless noted)

DISPLAY

Number of Digits	3-½ digits with sign and 3 decimal points (+1.9.9.9)
Display Type	Red, Light Emitting Diode (LED)
Display Size	0.43 inches (11 mm) high
Overscale	Inputs greater than 1.999V indicated by steady horizontal bars and a "one"
Polarity	Plus and minus sign automatically displayed on bipolar models. No sign on unipolar models.
Lamp Test	All display segments may be tested (using 888) by grounding pin 9.
Sampling Rate	2 samples per second, may be varied using ext. resistors
Underscale	Reads all zero's

ANALOG INPUT

Configuration	Single-ended referenced to ground and common or single-ended transformer isolated (AC models)
Full Scale Input Ranges	0 to +1.999 Volts (unipolar) or −1.999 Volts to +1.999 Volts (bipolar)
Input Bias Current	45nA, typical, 500nA, maximum
Displayed Accuracy	Within 2mV of correct reading after calibration at steady operating temperature. (±0.05% of F.S. ±1 count)
Temp. Drift	Within 10mV between 0 and +50°C (±100ppm of F.S./°C)
Operating Temp. Range	0 to +50°C
Storage Temp. Range	−25°C to +85°C
Input Overvoltage	±50V continuous maximum for no damage
Input Impedance	100 Megohms minimum
Common Mode Voltage	±300VDC to AC pwr gnd (AC models only)
Common Mode Rejection	70dB @ DC (AC models only)
Warm Up Time	Essentially None

DIGITAL INPUTS **(Disregard These Inputs If Not Required)**

LAMP TEST	(Pin 9) Ground this pin to illuminate the three '8's" in the display. 1 TTL load (Sink 1.6mA)
Hold Display	(Pin 10) Switch this input to +5VDC to freeze the last displayed reading. 10 Kilohm load to ground.
Sample Rate Adjust	(Pin 11) Sampling rate is 2 samples per second with no connection on pin 11. Connect a 680 Kohms resistor to +5V for 4 samples/second. Connect a 1µF, 10V capacitor to ground for 1 sample/second. (Plus lead of cap to pin 11).
Decimal Points	(Pins 5, 6, and 7) Ground each pin to illuminate corresponding decimal points. Sink 20mA.

ADJUSTMENTS

Zero, Full Scale, Balance	Screwdriver trim pots for calibration adjustable by removing front panel bezel and filter.

POWER SUPPLY

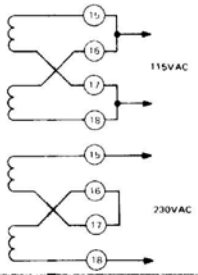
+5VDC	(Pin 13) +5VDC power ±.25VDC @ 300 mA max. Noise and spikes must be less than 50mV. Approximately 50mA may be used from pin 13 for external circuitry on AC models. Avoid errors by using a regulated supply.
AC	(Pins 15 thru 18) 115 to 230 VAC, ±10%, 47 to 440 Hz 5W max. required at these pins. Externally pin-strapped by the user as shown below.

PHYSICAL

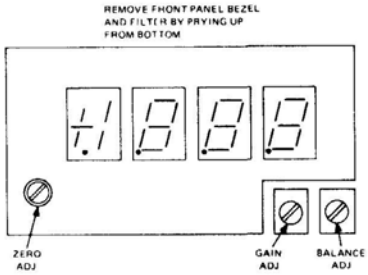
Case Size	3"W X 1.75"H X 2.25"D
Case Material	Black polycarbonate plastic
Weight	Approx. 10 oz. (280 g) AC Models Approx. 5 oz. (140 g) DC Models
Mounting	Panel mounted through a 1.812" X 3.062" cutout with 4-40 flathead screws.
Connector	Dual 18-pin, PC edgeboard type 0.1" centers, Datel #2335-1. (Viking 3VH18/IJN-5)

CALIBRATION PROCEDURE

AC POWER CONNECTIONS



LOCATION OF TRIM POTS



Calibration Procedure (perform at a steady operating temperature)

1. The instrument will have factory calibrated accuracy of 0.1% at +25°C when power is first applied, but a full 15 minutes is required for warm-up before recalibration.
2. **BIPOLAR** Models
   Connect pins 1 and 3 (i.e., short the analog input or apply a known zero DC input). Adjust the BALANCE pot until the sign flickers equally between + and − (ignore the numerical content of the display).
   Apply +0.0005 Volts from a precision reference source to pin 1 and adjust the ZERO potentiometer until the display flickers between +000 and +001. Rotating the ZERO control below the 000 reading will produce readings of 999, 998, --- etc. If the instrument is calibrated infrequently or operated over a wide temperature range, we recommend that the +000 to +001 change be calibrated with an input of +0.0005 volts. This will produce a slightly "wide" zero but will preclude false 999, 998 --- displays at zero.
   UNIPOLAR Models
   Apply any negative input between −0.1 and −2V. and adjust the ZERO pot to display 000. Apply +0.0005V. and adjust the BALANCE pot so the display flickers between 000 and 001.
3. Apply +1.900 Volts and adjust the GAIN pot to display +1.900. Bipolar models will automatically read within ·1 count of −1.900 if the polarity is reversed to −1.900 Volts input.

RECALIBRATION IS SUGGESTED EVERY 90 DAYS OR MORE OFTEN FOR VARIABLE CONDITIONS.

APPLICATION NOTES

If you are new to digital panel meters, you'll find them easy to use if you observe some simple precautions. Digital Panel Meters differ from mechanical meters in important ways. These include:

1. Input Characteristics — DPM's have very high input impedance and present a negligible load to most circuits. Because of input bias current error, an external buffer amplifier is recommended for input source resistance of 10KΩ or greater. Always connect the signal source between ANALOG HI and ANALOG COMMON. Do not use the POWER COMMON as an analog return in order to prevent a ground loop.

2. AC and noise on the input terminals and power supply can cause variations in the display and possible loss of readings around zero. If this occurs, try to reduce input source noise and hum. An input filter consisting of 10KΩ from ANALOG HI to the source and 10µF from ANALOG HI to ANALOG COMMON can be tried. Increase the capacitor for more filtering or use an external multi-pole active filter. Note that input filters give delayed response time. DPM's are sampling devices and measure DC or slowly-varying signals and require special external circuits to measure AC or complex waveforms. If in doubt, make sure the input is truly noiseless, slow DC by checking with a direct-coupled oscilloscope connected right at the DPM's input terminals.

Always use a regulated power supply for 5V-powered DPM's. A filtered 7805 or LM309K 3-terminal regulator can be used or Datel's UPM-5/1000B supply. Current varies rapidly as digits turn off and on so that unregulated supplies cannot be used.

The DM-350 includes a hold display input to freeze the last reading. Instrument manufacturers typically connect this input to a front panel pushbutton to allow an operator long enough to copy down a momentarily-stabilized reading. Contact Datel if you need assistance.

ORDERING GUIDE

Model Number

DM-350 — POWER SUPPLY — INPUT RANGE

POWER SUPPLY	INPUT RANGE
D = +5VDC	1 = Unipolar 0 to +1.999V
A = 115 or 230 VAC (User-selected on rear connector)	2 = Bipolar −1.999V to +1.999V

Prices (1-9)	*Covered by GSA Contract No. GS-OOS-[illegible]959*
DM-350D1 (5V, unipolar)	$69
DM-350D2 (5V, bipolar)	$75
DM-350A1 (AC, unipolar)	$79
DM-350A2 (AC, bipolar)	$89
	Connector: Datel #2335-1, Solder Tab [illegible]4.95 (Viking 3VH18/1JN-5)

Murata Power Solutions

Murata Power Solutions, Inc.
11 Cabot Boulevard, Mansfield, MA 02048-1151 U.S.A.
Tel: (508) 339-3000 (800) 233-2765 Fax: (508) 339-6356
www.murata-ps.com email: sales@murata-ps.com ISO 9001 and 14001 REGISTERED

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USA:	Mansfield (MA), Tel: (508) 339-3000, email: sales@murata-ps.com
Canada:	Toronto, Tel: (866) 740-1232, email: toronto@murata-ps.com
UK:	Milton Keynes, Tel: +44 (0)1908 615232, email: mk@murata-ps.com
France:	Montigny Le Bretonneux, Tel: +33 (0)1 34 60 01 01, email: france@murata-ps.com
Germany:	München, Tel: +49 (0)89-544334-0, email: munich@murata-ps.com
Japan:	Tokyo, Tel: 3-3779-1031, email: sales_tokyo@murata-ps.com Osaka, Tel: 6-6354-2025, email: sales_osaka@murata-ps.com
China:	Shanghai, Tel: +86 215 027 3678, email: shanghai@murata-ps.com Guangzhou, Tel: +86 208 221 8066, email: guangzhou@murata-ps.com
Singapore:	Parkway Centre, Tel: +65 6348 9096, email: singapore@murata-ps.com