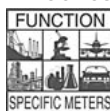




PM-Series



PM-35U

5 Optional DC Input Ranges
from 200mV to 1200V
3 1/2 DIGIT with 0.3" LEDs
In a Slim Bezel Case

A Low Cost Easy To Use General Purpose Meter.

General Features

The PM-35U Digital Panel Meter is an economical, high performance instrument incorporating a number of features usually found only on more expensive meters. Utilizing the dual slope method of integration, the unit measures differential and single-ended DC voltages over five user selectable ranges from 199.9mV to 1200V full scale.

Maximum resolution is 100 μ V over ± 1999 counts. Provision is made for user connections to provide various operating modes, including a ratiometric voltmeter, current meter, ratiometric ohmmeter, and a temperature difference meter.

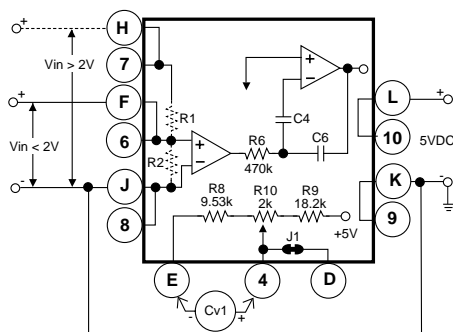
The true differential input capability of the Model PM-35U is particularly useful for making accurate measurements of very small signals in the presence of much larger common mode signals.

Because of its high noise immunity, it is also ideal for measuring various balanced transducers and bridge inputs. When measuring bridge circuits, long term drift of the excitation voltage can be compensated for by using the ratiometric voltmeter mode of operation.

Typical Application Connections

SINGLE-ENDED METER- 200mV Range, >2V Range 200mV Range:
1) Change R6 from 470k to 47k, $\pm 5\%$; 2) Change R9 from 18.2k to 26.7k, $\pm 1\%$; 3) Remove R8 (9.53k) and short with a jumper; 4) It is recommended that C4, C5 and C7 be changed to 0.22mF; 5) Adjust R10 until CV1=100mV.

>2V Range: Install R1 and R2 as specified under section titled Useful Tables.



View more application connections and connection instructions on page 3.

Compatibility

The PM-35U is shipped in a standard Slim Bezel case. The Slim Bezel case is compatible with the CM, SM, TM, & SP Series of meters. The PM-35U can be ordered in End Mount cases for twin mounting or combinations of multiple center mount cases and two end mount cases for stack mounting.

SLIM



BEZEL

Specifications

Input Configuration:.....True differential and single-ended

Full Scale Ranges:..... ± 199.9 mVDC
 ± 1.999 VDC (standard)
 ± 19.99 VDC
 ± 199.9 VDC
 ± 1200 VDC

Input Impedance:.....Exceeds 1000M Ω on 200mV and 2V ranges; 10M Ω on all other ranges

Input Protection:..... ± 250 VDC or 175VAC maximum on 200mV and 2V ranges; ± 1200 VDC or 850VAC on all other ranges

Accuracy:..... $\pm (0.1\%$ of reading + 1 digit)

Temperature Coefficient:.....5PPM/ $^{\circ}$ C in ratiometric operation; 80 to 100PPM/ $^{\circ}$ C using internal reference on 200mV and 2V ranges

Warm Up Time:.....2 minutes to specified accuracy

Conversion Rate:.....3 readings per second nominal

Display:.....0.3" LED

Decimal Selection:.....User programmable to 4 positions

Overrange Indication:.....When input exceeds full scale on any range being used, most significant "1" digit & polarity symbol are displayed with all other digits blank

Power Requirements:.....+4.5 to +5.5VDC at 200mA max.

Operating Temperature:.....0 $^{\circ}$ to +60 $^{\circ}$ C

Storage Temperature:.....-20 $^{\circ}$ to +70 $^{\circ}$ C

Relative Humidity:.....95% (non-condensing)

Case Dimensions:.....Bezel 2.76" x 1.17" (69.75 x 29.7mm)
Depth behind Bezel 3.32" (84mm) plus 0.68" (17.27mm) for connector.

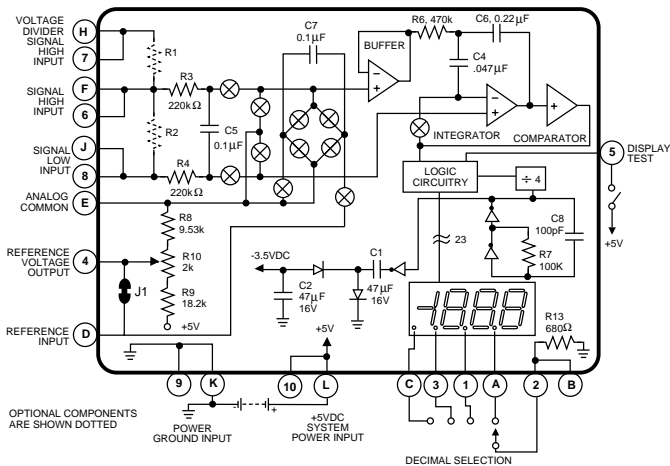
Weight:.....88 gms (3.1 oz)

PM-Series, high performance versatility for a wide range of applications

PM-35A.....3.5 digit Red LED, Precision Preference, 2VDC, 5VDC Power
PM-35AR.....3.5 digit Red LED, Autoranging, 200mV/2VDC, 5VDC Power
PM-35U.....3.5 digit Red LED, Low Cost, 2VDC, 5VDC Power
PM-35X.....3.5 digit LCD, Low Power Consumption 2VDC, 5VDC Power
PM-35XAR.....3.5 digit LCD, Low Power Autoranging
PM-35XAC110.....3.5 digit LCD, 2VDC, 120VAC Power
PM-35XACAR1.....3.5 digit LCD, Autoranging, 120VAC Power
PM-45L.....4.5 digit Red LED, Precision Meter w/Differential Input
PM-45LBCD.....PM-45L w/Tri-State Parallel BCD Output, 5VDC Power
PM-45LMUXBCD.....PM-45L w/Multiplexed BCD Output

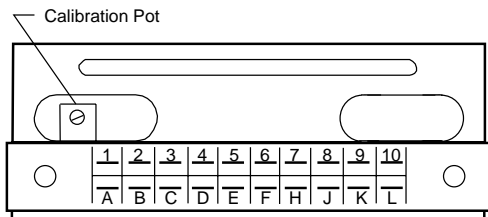
PM-45LU.....4.5 digit Red LED, Low Cost Meter w/Differential Input
PM-45LUBCD.....PM-45LU w/Tri-State Parallel BCD Output
PM-45LUMXBCD.....PM-45LU w/Multiplexed BCD Output
PM-45X.....4.5 digit LCD, Precision Meter w/Differential Input
PM-45XBCD.....PM-45X w/Tri-State Parallel BCD Output, 5VDC Power
PM-45XMUXBCD.....PM-45X w/Multiplexed BCD Output, 5VDC Power
PM-45XU.....3.5 digit LCD, Low Cost Meter w/Differential Input
PM-45XUBCD.....PM-45XU w/Tri-State Parallel BCD Output, 5VDC Power
PM-45XUMXBCD.....PM-45XU w/Multiplexed BCD Output, 5VDC Power

Functional Diagram



Connector Pinouts

The Texmate Model PM-35U interconnects by means of a standard PC board edge connector having two rows of 10 pins, spaced on 0.156" centers. Connector are available from Texmate, or from almost any connector manufacturer. Provision has also been made for direct solder termination to the PC board, thus eliminating the need for a connector. Please note that the warranty will be void if there is any damage due to soldering.



Component Side		Solder Side	
DECIMAL SELECT (1X.XX)	1	A	DECIMAL SELECT (1XX.X)
DECIMAL SELECT COMMON	2	B	DECIMAL DECIMAL SELECT COMMON
DECIMAL SELECT (1.XXX)	3	C	DECIMAL SELECT (1XXX)
REFERENCE VOLTAGE OUTPUT	4	D	REFERENCE INPUT
DISPLAY TEST	5	E	ANALOG COMMON
SIGNAL HIGH INPUT	6	F	SIGNAL HIGH INPUT
VOLTAGE DIVIDER SIGNAL HIGH INPUT	7	H	VOLTAGE DIVIDER SIGNAL HIGH INPUT
SIGNAL LOW INPUT	8	J	SIGNAL LOW INPUT
POWER GROUND INPUT	9	K	POWER GROUND INPUT
+5VDC SYSTEM POWER INPUT	10	L	+5VDC SYSTEM POWER INPUT

CAUTION: This meter employs high impedance CMOS inputs. Although internal protection has been provided for several hundred volt overloads, the meter will be destroyed if subjected to the high kilovolts of static discharge that can be produced in low humidity environments. Always handle the meter with ground protection.

Pins A, C, 1 and 3- Decimal Select: Decimal points may be displayed as required by connecting appropriate pin to Decimal Select Common Pins B or 2.

Pins B and 2- Decimal Select Common: Decimal points are displayed as required by connecting Pins B or 2 to the appropriate Decimal Select Pins A, C, 1, or 3.

Pin D- Reference Input: Reference voltage input for A to D converter. Normally supplied from Reference Voltage Output Pin 4 which is internally jumpered to Pin D by way of Junction J1. Pin D may be used as an input for ratiometric measurements. Minimum usable voltage is .05VDC with +4.0VDC being the maximum.

Pin E- Analog Common: 2.8V output referenced to +5V System Power Input L, approximately +2.2V output referenced to Power Ground Input Pin K.

Pins F and 6- Signal High Input: Signal high input of A to D converter. Maximum overvoltage protection is 250VDC or 175VAC.

Pins H and 7- Voltage Divider Signal High Input: Signal high input for voltages that require attenuation or scaling. Dividing resis-

tors R1 and R2 may be mounted internally for voltages up to 1200V max. Matched dividing resistors for 2V (1/10), 200V (1/100), and 1200V (1/1000) ranges are available from Texmate. Shunt resistors for current measurements up to 200mA may be internally mounted in the R2 position. The current loop is then applied to Signal High Input Pin F and returned through Pin J or Pin 8.

Pins J and 8- Signal Low Input: Signal low input of A to D converter. Maximum overvoltage protection is 250VDC or 175VAC.

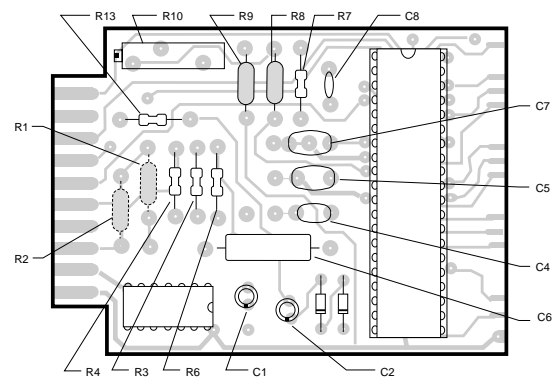
Pins K and 9- Power Ground Input: Negative terminal of + 5VDC power should be connected to Pin 9. All digital signals, decimal points, display test, and overrange should be returned to this ground point.

Pins L and 10- +5VDC System Power Input: Meter requires regulated ($\pm 10\%$) 5VDC power at approximately 200mA.

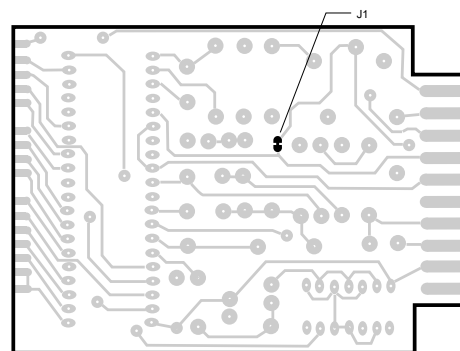
Pin 4- Reference Voltage Output: Internal precision voltage reference. Standard output is 1.000V, adjustable to $\pm 5\%$ by R10 potentiometer. Usable voltages from .05V to 2.8V for special high impedance scaling can be obtained by changing the value of internal dividing resistors R8 and R9.

Pin 5- Display Test: All segments will light up when Pin 5 is connected to +5VDC System Power Input Pin L or Pin 10.

Component Layout

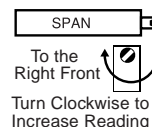


COMPONENT SIDE



SOLDER SIDE

Signal Conditioning Components



SPAN Potentiometer (Pot)

The SPAN pot is on the right side of the display. Typical adjustment is 20% of the input signal range.



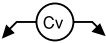
Calibration Procedure

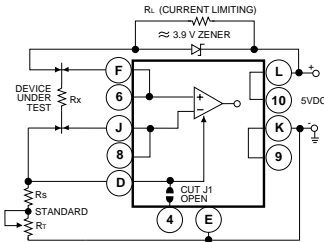
Apply power to the meter. Then with a precision DC reference source, apply +1.900VDC between the Signal High Input Pin F and the Signal Low Input Pin J. Adjust R10 potentiometer (on left side as viewed from rear) until the display reads +1.9900V. **Note:** The voltage applied in this case is for a ± 1.999 V F.S. meter. For other ranges, the voltage applied should be similarly proportionate to the particular full scale voltage.

Typical Application Connections

The PM-35U may be used in a wide variety of configurations. The following circuits illustrate some of the possibilities and demonstrate the exceptional versatility of Texmate products. Components called for in the applications which are not part of the standard meter may be supplied by the user or in some cases purchased from Texmate. The circuit diagrams explain the basic pinout connections required for each application. Unless otherwise specified, the diagrams will show the component values and solder junctions that would normally be installed on a standard 2V range meter. For those applications which have alternative ranges and/or input configurations, the required component values and any modifications are

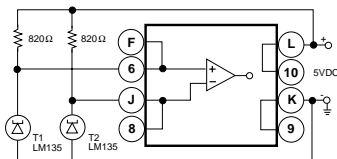
described in the text.

NOTE: Use of these application circuits is entirely at the risk and responsibility of the user and any user modification of the meter may at the discretion of Texmate, void the warranty. (See rear page for user's responsibility and warranty details) The following legend applies to all application circuits: 1) optional component positions are shown in dotted lines; 2) internal solder junctions are shown by  for a closed junction or  for an open junction; 3) calibration voltages as measured by an external user supplied voltmeter are shown by 



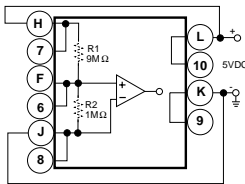
DIFFERENTIAL RATIOMETRIC OHMMETER

1) Select R_L so that the voltage drop across R_L is not less than 3V for that range in F.S., or use a 3.9V Zener diode instead of R_L ; 2) Install R_S and R_T as specified under section titled Useful Tables; 3) Cut open solder junction J1.



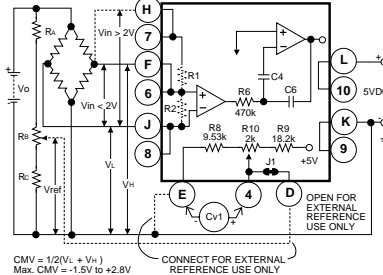
MEASURE TEMPERATURE DIFFERENCE

Meter Reading = 199.9°C Max. where $-50^{\circ}\text{C} \leq (T_1, T_2) < +150^{\circ}\text{C}$.



5VDC POWER SUPPLY MONITOR

Install R_1 and R_2 with component values shown.

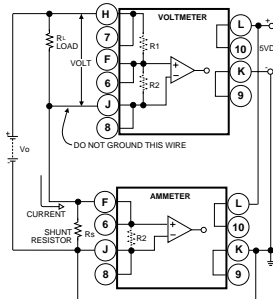


DIFFERENTIAL METER - 200mV RANGE, >2V Range, or EXTERNAL REFERENCE

200mV Range : 1) Change R_6 from 470k to 47k, $\pm 5\%$; 2) Change R_9 from 18.2k to 26.7k, $\pm 1\%$; 3) Remove R_8 (9.53k) and short with a jumper; 4) It is recommended that C_4 , C_5 and C_7 be changed to 0.22mF; 5) Adjust R_{10} until $CV_1 = 100\text{mV}$.

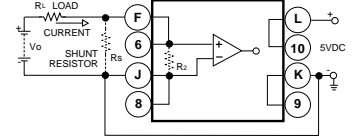
>2V Range: Install R_1 and R_2 as specified under section titled Useful Tables.

External Reference: 1) Cut open solder junction J1; 2) Connect Pin E to Pin K; 3) Connect moving arm of R_B to Pin D.



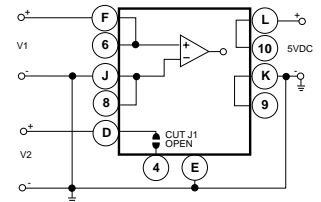
SIMULTANEOUS VOLTAGE AND CURRENT MEASUREMENT

1) Connect meter as for 200mV voltmeter for minimum drop on R_S or R_2 . Use R_S externally for currents greater than 200mA; 2) Install R_1 , R_2 , and R_S as specified under section titled Useful Tables. **NOTE:** R_S must be located in low side of the current loop and Signal Low Input Pin J of voltmeter must not be grounded. If it is necessary to install R_S on the high side of the current loop, the ammeter must be operated from an isolated power supply.



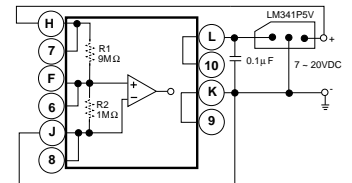
SINGLE-ENDED CURRENT METER

1) Connect meter as for 200mV voltmeter; 2) Install R_S . **NOTE:** R_S must be externally mounted when current is greater than 200mA. Standard values for R_S are specified under section titled Useful Tables. For all other ranges, R_S may be internally mounted in the R_2 position.



RATIOMETRIC VOLTMEETER

Reading = $(V_1 \div V_2) \times 1000$ where $-2\text{V} \leq V_1 \leq +2.8\text{V}$ and $+100\text{mV} \leq V_2 \leq +4\text{V}$ and $0000 < \text{Reading} < 1999$. Cut open solder junction J1.



7VDC TO 20VDC POWER SUPPLY MONITOR

Install R_1 and R_2 with values shown.

Useful Tables

VOLTAGE RANGE CHANGE

F.S. In	R_1	R_2	Resolution
200mV	omit	omit	100μV
2V	omit	omit	1mV
20V	9M	1M	10mV
200V	10M	100k	100mV
1200V	10M	10k	1V

CURRENT RANGE CHANGE (*)

Use 200mV F.S. meter for minimum voltage drop.

F.S. In	R_S External	Resolution
20A	0.01	10mA
2A	0.1	1mA
F.S. In	R_S Internal	Resolution
200mA	1	100μA
20mA	10	10μA
2mA	100	1μA
200μA	1k	100nA

OHMMETER RANGE CHANGE

F.S. In	$R_S + R_T$	Resolution
200	100	100m
2k	1k	1
20k	10k	10
200k	100k	100
2M	1M	1k
20M	10M	10k

