



Optional ▲ Ratcheting Mounting Side Clips

**3 1/2 DIGIT with 0.3" LCD**

# PM-35U

**Standard Range 2V  
4 Optional DC Input Ranges  
from 200mV to 1200V**

**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 100µV 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.

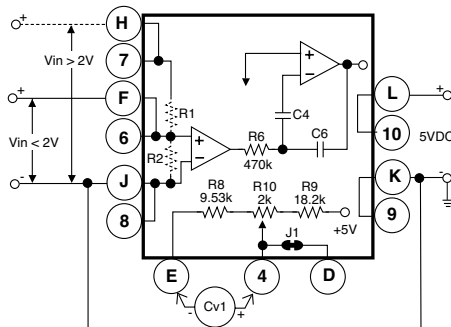
Because of its high noise immunity, it is also ideal for measuring various balanced transducers and bridge inputs. When measuring bridge circuits, long term drift of the excitation voltage can be compensated for by using the ratiometric voltmeter mode of operation.

## Typical Application Connections

**SINGLE-ENDED METER- 200mV Range, >2V Range 200mV Range:**

1) Change R6 from 470k to 47k, ±5%; 2) Change R9 from 18.2k to 26.7k, ±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.**

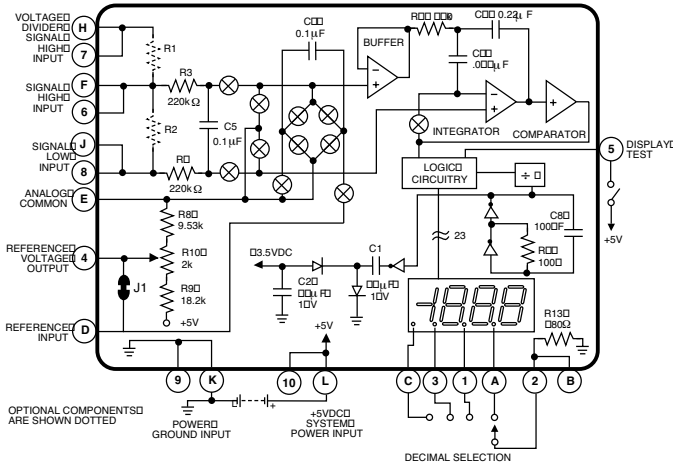
## Specifications

- Input Configuration:**.....True differential and single-ended
- Full Scale Ranges:** .....±199.9mVDC  
 ±1.999VDC (standard)  
 ±19.99VDC  
 ±199.9VDC  
 ±1200VDC
- Input Impedance:**.....Exceeds 1000MΩ on 200mV and 2V ranges; 10MΩ on all other ranges
- Input Protection:**.....±250VDC or 175VAC maximum on 200mV and 2V ranges; ±1200VDC or 850VAC on all other ranges
- Accuracy:** .....±(0.1% of reading + 1 digit)
- Temperature Coefficient:** ..5PPM/°C in ratiometric operation; 80 to 100PPM/°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° to +60°C
- Storage Temperature:** ....-20° to +70°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

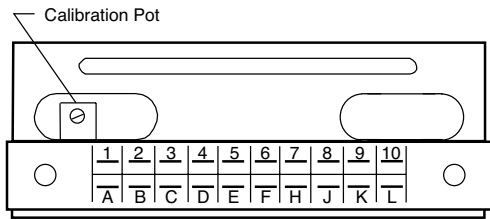
PM-35A.....	3.5 digit Red LED, Precision Preference, 2VDC, 5VDC Power	PM-45L.....	4.5 digit Red LED, Precision Meter w/Differential Input
PM-35U.....	3.5 digit Red LED, Low Cost, 2VDC, 5VDC Power	PM-45LU.....	4.5 digit Red LED, Low Cost Meter w/Differential Input
PM-35X.....	Replaced by SM-35X 3.5 digit LCD, Low Power Consumption 2VDC, 5VDC Power	PM-45X.....	4.5 digit LCD, Precision Meter w/Differential Input
		PM-45XU.....	3.5 digit LCD, Low Cost Meter w/Differential Input

## 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 resistors 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.

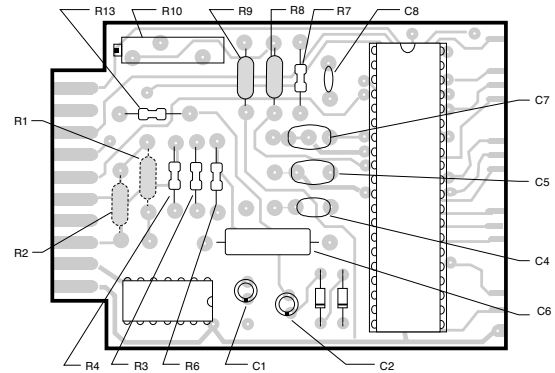
**Pins K and 9- Power Ground Input:** Negative terminal of +5VDC power should be connected to Pin 9. All digital signals, decimal points, display test, and overrange should be returned to this ground point.

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

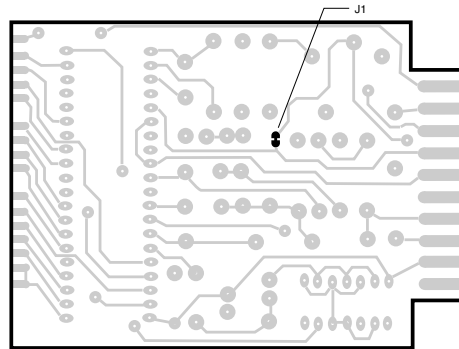
**Pin 4- Reference Voltage Output:** Internal precision voltage reference. Standard output is 1.000V, adjustable to  $\pm 5\%$  by R10 potentiometer. Usable voltages from .05V to 2.8V for special high impedance scaling can be obtained by changing the value of internal dividing resistors R8 and R9.

**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** **SPAN Potentiometer (Pot)**

To the Right Front Turn Clockwise to Increase Reading

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




## Calibration Procedure

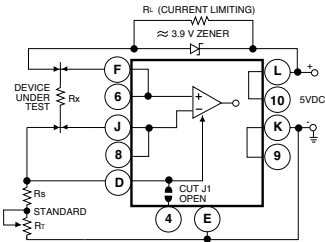
Apply power to the meter. Then with a precision DC reference source, apply +1.900VDC between the Signal High Input Pin F and the Signal Low Input Pin J. Adjust R10 potentiometer (on left side as viewed from rear) until the display reads +1.9900V. **Note:** The voltage applied in this case is for a  $\pm 1.999V$  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

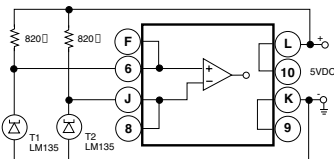
described in the text.

**NOTE:** Use of these application circuits is entirely at the risk and responsibility of the user and any user modification of the meter may be 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 



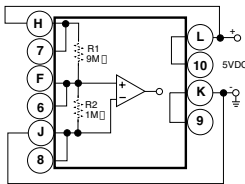
### DIFFERENTIAL RATIOMETRIC OHMMETER

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  $J_1$ .



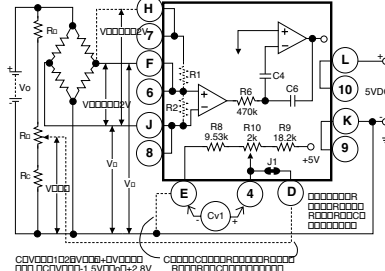
### MEASURE TEMPERATURE DIFFERENCE

Meter Reading =  $199.9^{\circ}\text{C}$  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.

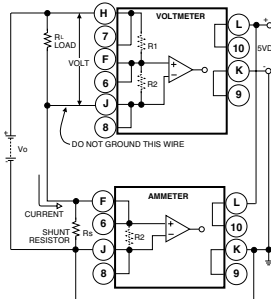


### DIFFERENTIAL METER - 200mV RANGE, >2V Range, or EXTERNAL REFERENCE

**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  $CV_1 = 100\text{mV}$ .

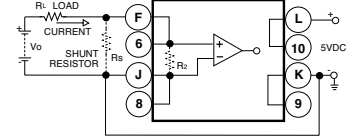
**>2V Range:** Install  $R_1$  and  $R_2$  as specified under section titled Useful Tables.

**External Reference:** 1) Cut open solder junction  $J_1$ ; 2) Connect Pin E to Pin K; 3) Connect moving arm of  $R_B$  to Pin D.



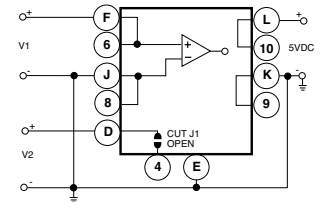
### SIMULTANEOUS VOLTAGE AND CURRENT MEASUREMENT

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.



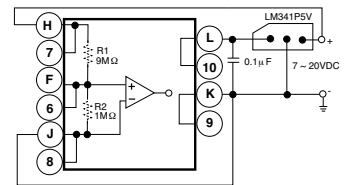
### SINGLE-ENDED CURRENT METER

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 VOLTMETER

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  $J_1$ .



### 7VDC TO 20VDC POWER SUPPLY MONITOR

Install  $R_1$  and  $R_2$  with values shown.

## Useful Tables

### VOLTAGE RANGE CHANGE

F.S. In	R1	R2	Resolution
200mV	omit	omit	100 $\mu\text{V}$
2V	omit	omit	1mV
20V	9M	1M	10mV
200V	10M	100k	100mV
1200V	10M	10k	1V

### CURRENT RANGE CHANGE (\*)

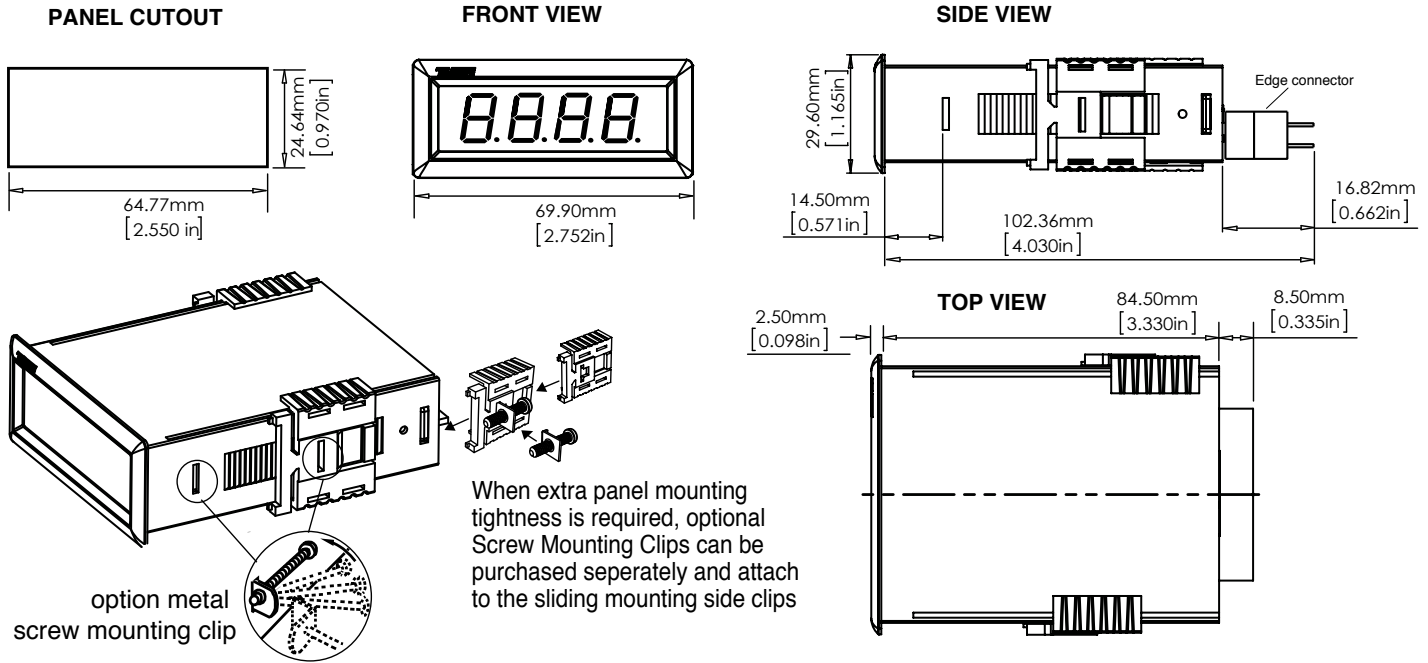
Use 200mV F.S. meter for minimum voltage drop.

F.S. In	$R_S$ External	Resolution
20A	0.01	10mA
2A	0.1	1mA
F.S. In	$R_S$ Internal	Resolution
200mA	1	100 $\mu\text{A}$
20mA	10	10 $\mu\text{A}$
2mA	100	1 $\mu\text{A}$
200 $\mu\text{A}$	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

# PM Case Dimensions and Panel Cutouts



## Ordering Information

### Standard Options for this Model Number

Part Number Description

#### ► BASIC MODEL NUMBER

**PM-35U** . . . . . 3.5 digit Red LED, Low Cost, 2VDC, 5VDC pwr

**Note:** For operation, the PM-35U requires a CN-L10 Dual Row 10 Pin PCB edge connector 0.156" center or equivalent (see accessories).

### Special Options and Accessories

Part Number Description

#### ► SPECIAL OPTIONS (Specify Inputs & Req. Reading)

- ZS . . . . . Custom display scaling within standard ranges
- ZR-1200V . . . . . 1200 VDC Range Change.
- ZR-200V . . . . . 200 VDC Range Change.
- ZR-20V . . . . . 20 VDC Range Change.
- ZRS-200MV . . . . . 200 mVDC range change.
- ZRS-PMRP . . . . . Non-standard range and scale.

#### ► ACCESSORIES

CN-L10 . . . . . Dual Row 10 Pin Connector, Solder Type



### WARRANTY

Texmate warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from date of shipment. Texmate's obligations under this warranty are limited to replacement or repair, at its option, at its factory, of any of the products which shall, within the applicable period after shipment, be returned to Texmate's facility, transportation charges pre-paid, and which are, after examination, disclosed to the satisfaction of Texmate to be thus defective. The warranty shall not apply to any equipment which shall have been repaired or altered, except by Texmate, or which shall have been subjected to misuse, negligence, or accident. In no case shall Texmate's liability exceed the original purchase price. The aforementioned provisions do not extend the original warranty period of any product which has been either repaired or replaced by Texmate.

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