PC-45

4 1/2 DIGIT EVENT COUNTER

A VERSATILE EVENT COUNTER/TOTALIZER FEATURING 19999 COUNTS WITH OVERRANGE INDICATION, OR 9999 COUNTS WITH CASCADE OUTPUT, CONTACT CLOSURE OR LOGIC SIGNAL INPUT, HIGH BRIGHTNESS 0.4" LED DISPLAY, +5VDC POWERED, WITH OUTPUTS FOR USER SUPPLIED NI-CAD BATTERY BACK-UP

DESCRIPTION

Texmate's model PC-45 event counter/totalizer is a versatile, low cost +5VDC powered LED meter which features three user programmable count-inputs and count rates. All count-inputs are compatible with open collector sensing devices. The standard low range SPST or SPDT dry contact closure rate is 0~6000 CPM (0~100 CPS). The SPST switch input mode utilizes a low pass filter and a Schmitt Trigger with 15% hysteresis for debouncing. The SPDT switch input mode which utilizes an Rs Flip-Flop for debouncing can accept high speed dry contact closure rates of 0~600,000 CPM (0~10,000 CPS) if the low pass filter is reduced or eliminated. The PC-45 also accepts 3-30VDC positive going pulses or AC signal inputs up to 15MHz. A 500mV hysteresis aids the accurate counting of slow changing waveforms.

Other features include logic controls such as inhibit, reset, display hold, carry output, overrange output, and outputs to continuously trickle charge, an external user supplied Ni-Cad battery back-up which will prevent loss of data in case of intermittent or power-out situations. There are four programmable decimal points, and unlimited cascading to achieve multiples of four digits using two or more PC-45 units. In this type of operation only the left most meter will display a fifth digit.

The display hold feature enables the user to latch the display while the counter continues counting. Without affecting the latched display, the counter may be reset to zero by the reset control or the counting function may be stopped and started by the inhibit control. When the Display Hold is released, the data present in the counter at that time is instantly displayed.

With external logic control, the PC-45 may be used as a frequency counter, RPM indicator or period counter. The large 0.4" LED display has excellent readability in both high and low ambient light conditions.

A 3.6V Ni-Cad battery can be used as the meter's power supply. When using this option, the press-to-read mode should be used to conserve power and battery life.

SPECIFICATIONS

COUNT INPUTS

SPST Contact Closure:	0~6000 CPM (100Hz) with 500Hz Low Pass filter and Schmitt Trigger set at 15% Hysteresis
SPDT Contact Closure:	0~6000 CPM (100Hz) with 500Hz Low Pass filter and Rs Flip-Flop. 0~600,000 CPM (10kHz) with filter removed
3-30V AC or DC Pulse:	0~500kHz with Schmitt Trigger threshold of 2V and 500mV Hysteresis. If the internal 100kΩ overvoltage protection resistor is removed the max count is 0~15MHz
Open Collector Sensing:	All inputs are compatible with open collector sensing devices
Over Voltage Protection:	Pins 6, E & F are protected up to ±100V peak overload with internal 100kΩ resistors. **Caution:** All other input or control pins are NOT PROTECTED against High Voltage

CONTROLS & OUTPUTS

Reset:	Dry Switch closure to ground or Logic Low "0" input for min. 3µS resets counter to zero. (50µA pull-up current is provided).
Inhibit Count:	Dry Switch closure to ground or Logic Low "0" input will prevent the D flip-flop on the count input from operating (10µA pull-up current is provided)
Display Hold:	An Open input or Logic High "1" input on this pin "freezes" the display while the counter continues to operate independently. A Dry Switch closure to ground or Logic low "0" input for min. 3µS updates the display (10µA pull up current is provided.) For continuous display of the counter input the display hold function should be connected to ground
Carry Output:	Pin 10 provides a logic signal output that occurs each 10,000 counts for cascading the count in 4 digit numbers
Overrange Output:	Internal solder pad SP1 goes to Logic High "1" when the count exceeds 20,000 counts
Display:	0.4" LED Max. 19999
Decimal:	User programmable to 4 positions
Overload Indications:	All digits blank except decimal points
Back-Up Battery:	0.5mA output is provided to trickle charge a user supplied 3.6V Ni-Cad battery
Power Requirements:	Regulated 4.5VDC to 6.5VDC at 250mA with display turned on, 4.5VDC to 6.5VDC at at 3mA when display is turned off.
Operating Temperature:	0˚C to +60˚C

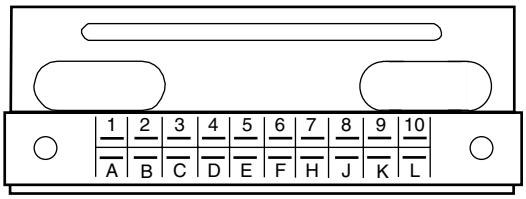
ORDERING INFORMATION

	Order Part No.
STANDARD 3½ DIGIT PANEL METER (2V Range)	PC-45
ACCESSORIES: Edge Connector (20 pin solder tabs)	CN-L10

OPTIONAL CASES: (see back page for details)	Order Part No.
End Mount Case (for twin mounting)	EM-CASERED
Center Mount Case (for multiple array mounting)	CM-CASERED
Slim Bezel Case (supplied as standard)	SL-CASERED

CONNECTOR PINOUTS

The Texmate Model PC-45 interconnects by means of a standard PC board edge connector having two rows of 10 pins, spaced on 0.156" centers. Connectors are available from Texmate, or from almost any connector manufacturer.



REAR VIEW OF METER CASE

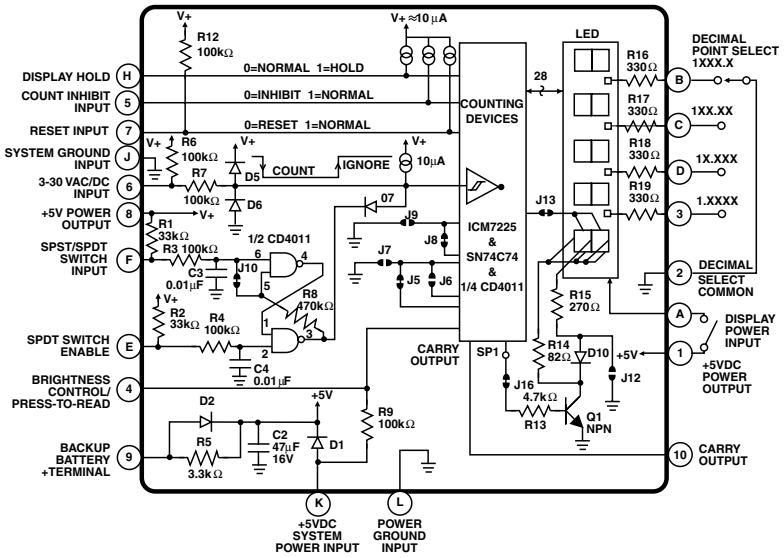
A - Display Power Input
B - Decimal Select (1XXX.X)
C - Decimal Select (1XX.XX)
D - Decimal Select (1X.XXX)
E - SPDT Switch Input Enable
F - SPST/SPDT Switch Input
H - Display Hold
J - System Ground Input
K - +5VDC System Power Input
L - Power Ground Input

1 - +5VDC Power Output
2 - Decimal Select Common
3 - Decimal Select (1.XXXX)
4 - Brightness Control/Press-To-Read
5 - Inhibit Input
6 - 3-30 AC/DC Pulse Input
7 - Reset Input
8 - +5VDC Power Output
9 - Back-up Battery Positive Terminal
10 - Carry Output

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.

FUNCTIONAL DIAGRAM

The diagram below depicts the Model PC-45 in its standard 2V F.S. form with all component values indicated for this mode of operation. Variations from the standard for use in special applications will be found under the heading Typical Application Circuits & Connection Instructions.



PIN DESCRIPTIONS

Pin A- Display Power Input: Pin A is connected to Power Output Pin 1 to obtain +5VDC for the LED display. The display can be operated at lower voltages (3.6V min.) to reduce power consumption.

Pin B, C, D & 3 - Decimal Selects: Decimal points may be displayed as required by connecting the appropriate pin to Decimal Select Common Pin 2. Any number of decimal points can be turned on at the same time. An open circuit will turn off the decimal points.

Pin E- SPDT Switch Input Enable: To use Pin E, J10 must be opened. This creates an Rs Flip-Flop for fail-safe switch closure counting. After an input is received on Pin F, no further count inputs will be accepted until Pin E is enabled by a contact to System Ground Pin J. When using a SPDT switch, connect the normally closed terminal to Pin E, the normally open terminal to Pin F, and the common terminal to System Ground Pin J. A low pass filter is provided to reject high frequency noise for operation within the range of 0~6000 COM (100Hz). For High Speed contact closure operation up to 10,000 counts per second max., C3 and C4 must each be reduced to 100pF or removed entirely.

Pin F- SPST/SPDT Switch Input: Connect a dry contact switch between Pin F and System Ground Pin J for a count on contact closure rate of 0~6000 CPM (100Hz). Contact debouncing is provided by a low pass filter and a Schmitt Trigger factory set at 15% hysteresis. This standard contact closure input mode of operation is designed for up to 100 counts per second or 6000 CPM. Faster counting rates can be implemented by proportionally reducing the low pass filters time constant. For example, 0~200 counters per second can be counted if C3 is changed to 5000pF. For High Speed contact closure operation, a SPDT switch must be used (see Pin E).

Pin H- Display Hold: Pin H controls a latch between the display driver circuit and the counter circuit. For normal continuous display of the count function, Pin H must be connected to System Ground Pin J or have Logic Low "0" applied. If Pin H is left open (a10µA pull-up current is provided), or if Logic High "1" is applied, the display register will latch up and hold the count displayed. The counter section will continue independent operation and may be reset or inhibited without affecting the display hold function. To refresh or update and hold the display, as would be required for RPM or frequency measurement applications, Pin H must be connected to System Ground Pin J or have Logic Low "0" applied for a minimum of 3µS.

Pins J - System Ground: All input signals and the negative terminal of the backup battery should be returned to System Ground Pin J. **Caution:** Damage may occur to the CMOS devices in this counter if voltage inputs from external sources are applied to the control and signal input pins before the counter's own power supply is established.

Pin K- +5VDC System Power Input: The positive terminal of the regulated (±10%) %VDC power supply is connected to Pin K.

Pin L- Power Ground Input: The negative terminal of +%VDC power supply is connected to Pin L.

Pin 1- +5VDC Power Output: Pin 1 is connected to display power input Pin A to obtain +5VDC for the LED display.

Pin 2- Decimal Select Common: Pin 2 serves as a common for the decimal select Pins B, C, D, and 3. To turn on any required decimal point, connect the appropriate Decimal Select Pin to Decimal Select Common Pin 2.

Pin 4 - Brightness Control/Press-To-Read: The drive current of the LED display is voltage controlled by Pin 4. When Pin 4 is at V+, the display is fully on and when Pin 4 is at 0V, the display is fully off. In normal operation, Pin 4 is maintained at V+ by R9 and the display operates at maximum brightness. A brightness control can be implemented by connecting a 100kΩ to 1MΩ potentiometer between Pin 4 and Power Ground Pin L. At zero resistance, the display will be fully off. At maximum resistance, the display will be at maximum brightness. When a battery backup is used and the +5V system power input is removed, the voltage on Pin 4 will drop to 0V because of the reverse bias effect of D1, and the display will be driven fully off. To conserve backup battery power, press-to-read function can be enabled by momentarily connecting Pin 4 to V+ which will present on Pin 1 or Pin 8.

Pin 5 - Inhibit Input: For normal operation Pin 5 is left open or applied to Logic High "1" (10µA) pull-up current is provided. If Pin 5 is connected to System Ground Pin J or has Logic Low "0" applied, the count input section of the counter circuit is disabled and will not accept input signals until Pin 5 is released from Pin J or has Logic High "1" applied.

Pin 6 - 3-30 AC/DC Pulse Input: Pin 6 provides a direct input to the counter for externally generated input signals. The input circuit incorporates a Schmitt Trigger with a 2.0V threshold and 0.5V of hysteresis. A 100kΩ pull-up resister R6 and a 100kΩ overvoltage protection resistor R7 are also incorporated into the circuit. The count occurs on the negative going edge of a positive input signal. Logic Low "0" = 0 to +5V. Logic High "1" = +2.5 to +30V. The 100kΩ overvoltage protection resistor R7 will protect the counter from overvoltages up to a peak of ±100V. **Caution:** See Pin J for precautions necessary to avoid damage to the counter from externally generated signals. The overvoltage protection resistor limits the maximum count speed to 0~500kHz. If the input signal is limited externally to 0~5VDC Logic Levels and the overvoltage protection resistor R7 is replaced with a jumper, the counter can typically operate up to 15MHz.

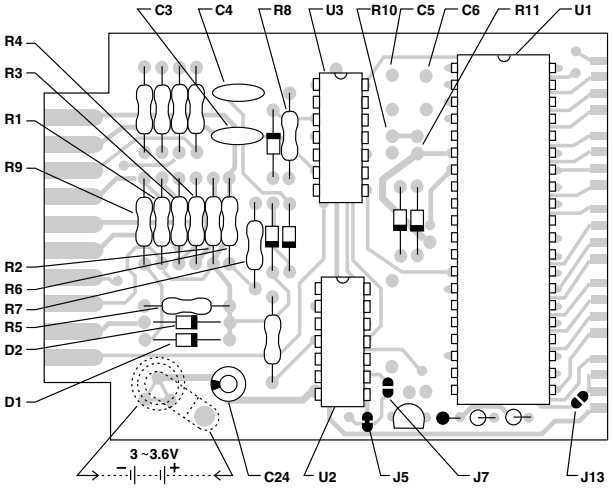
Pin 7 - Reset Input: For normal accumulative counting Pin 7 is left open or applied to Logic High "1" (50µA pull-up current is provided). When Pin 7 is connected to System Ground Pin J or has Logic Low "0" applied, the counter will reset to zero.

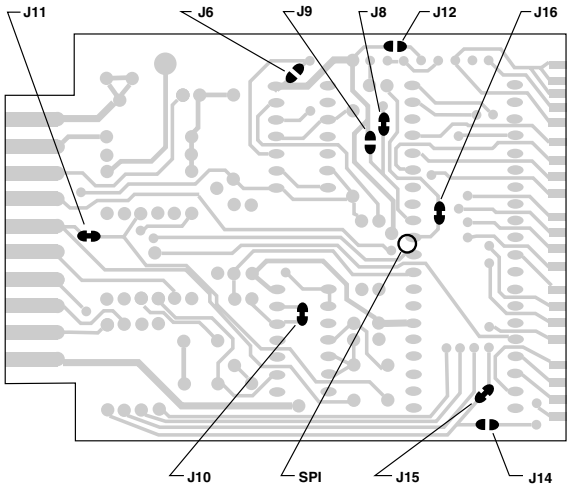
Pin 8 - +5VDC System Power Output: Pin 8 provides an auxiliary output of +5VDC referred to System Ground for external use up to 5mA maximum. **Caution**: Pin 8 is not overload protected and care should be exercised to avoid damage to the counter's power supply.

Pin 9 - Backup Battery Positive Terminal: When the unit is operated from a regulated (±10%) 5VDC power supply, a standard 3.6V Ni-Cad battery can be used as a backup battery by connecting the positive terminal of the battery to Pin 9 and the negative terminal to System Ground Pin J. The charging current is provided by the supply voltage, limited by a 3.3kΩ resistor R5. R5 can be changed to meet the trickle charge specifications of other types of batteries.

Pin 10 - Carry Output: Pin 10 is used when the user wishes to Cascade the units. To achieve multiples of four digits using 2 or more PC-45 units, Pin 10 of the first counter is connected to Pin 6 of the Cascading counter to provide a total of 19999~9999 counts maximum.

COMPONENT LAYOUT

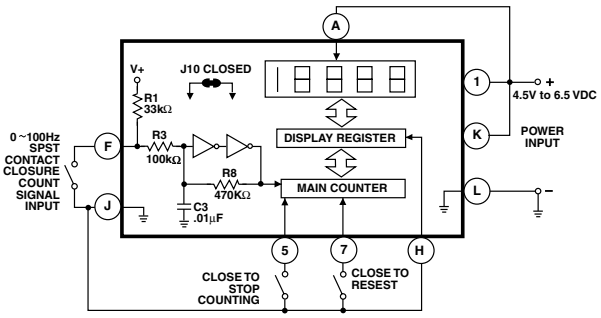




COMPONENT SIDE **SOLDER SIDE**

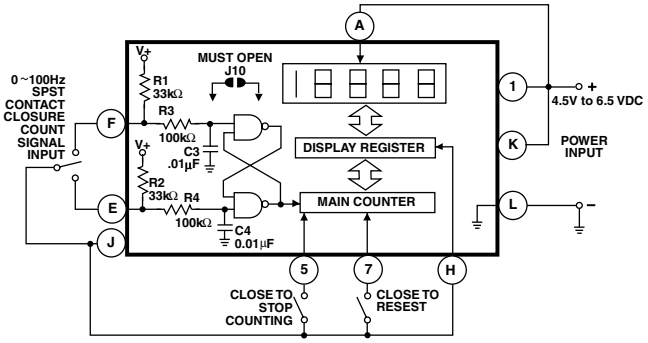
TYPICAL APPLICATION CIRCUITS & CONNECTION INSTRUCTIONS

The PC-45 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 warrany. (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) a mechanical switch is shown by ○—○ .



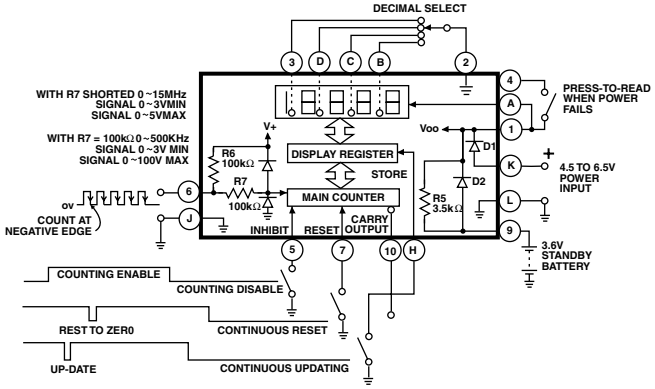
COUNT INPUT WITH SINGLE CONTACT SWITCH CLOSURE

A mechanically coupled single pole single throw contact closure can be used as a count input device for count rates up to 6000 CPM (100Hz). The contact noise debouncing circuit consists of a low-pass filter and a Schmitt Trigger with 15% Hysteresis. If required, a higher count rate of 0~400Hz can be achieved by reducing C3 to 2500pF.



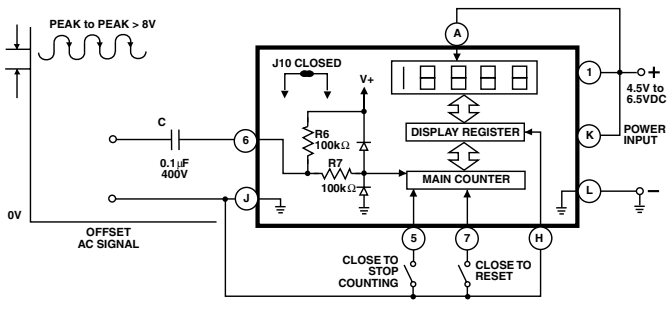
DOUBLE CONTACT CLOSURE COUNT INPUT

A mechanically coupled single pole double throw contact closure can be used as a count input device when J10 is opened. The contact noise debouncing circuit consists of a low-pass filter a Rs flip-flop. After a count input is created by making the connection between Pin F and Pin J, no further count inputs will be accepted until a contact is made between Pin E and Pin J. For higher count rates up to 0~600,000 CPM (10kHz) reduce C3 and C4 to 2500pF or remove entirely.



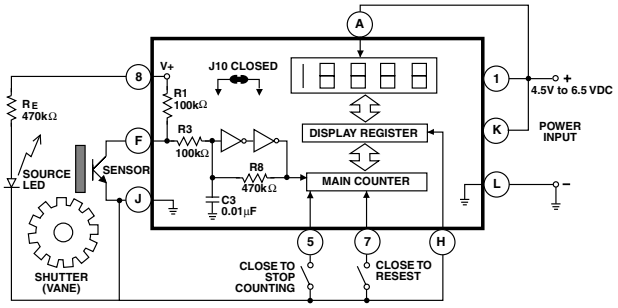
3-30V AC/DC PULSE INPUT AND HIGH FREQUENCY +5VDC LOGIC LEVEL INPUT

The input circuit incorporates a Schmitt Trigger with a 2.0V threshold and 0.5V of hysteresis. The count occurs on the negative going edge of an input signal. R6 acts as a pull-up resistor. R7 provides overvoltage protection to a peak of ±100V. For 0~15MHz operation from externally limited +5VDC logic level signals, replace R7 with a jumper.



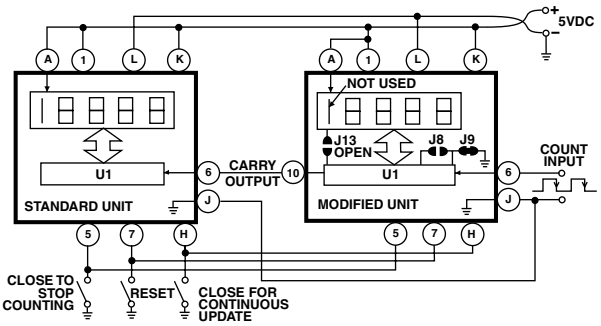
OFFSET AC-SIGNAL MODE

An isolation Capacitor C, is installed externally to isolate the offset voltage. The meter is then AC coupled so that the counter can be employed to measure an AC signal that is carried on an offset DC voltage.



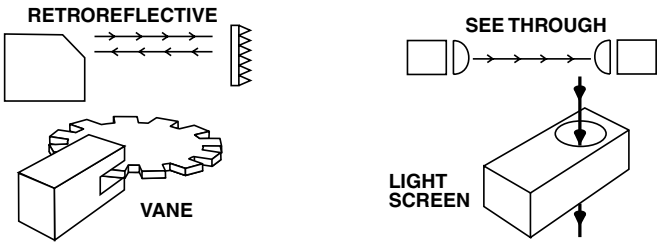
OPTO-ELECTRIC COUNT INPUT

A solid-state opto-electric NPN device can be interfaced directly to the event counter. External power may be required to power the LED section of the device if more than 5mA is required. **Note**: R1 can be changed to match the sensitivity of the photosensor.



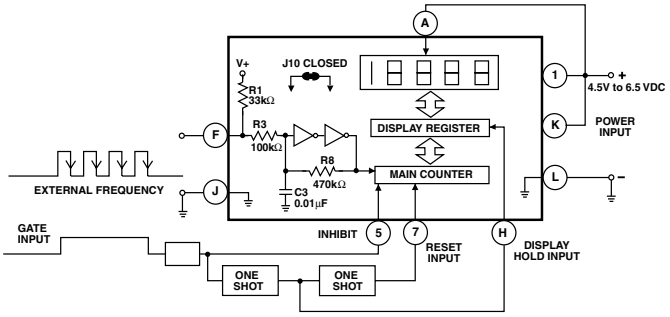
CASCADING THE UNIT

Open J5 and J8 and close J6 and J9 to disable overrange indication feature. Open J13 to disable the MSD 1's to convert the first counter to a meter 9999 count mode. Connect Pin 10 of the first counter to Pin 6 of the cascading counter to provide a total of 19999~9999 counts maximum.



MOST COUNT OUTPUT DEVICES CAN BE DIRECTLY INTERFACED

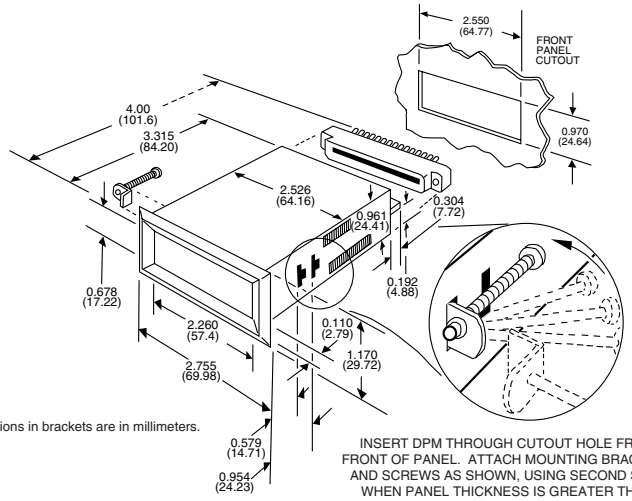
Photoelectric devices, contact closure, switches, NPN open collector translators, and voltages pulses up to 100V can be used directlly with Model PC-45 without expensive and complicated interfacing circuitry.



EXTERNAL LOGIC CONTROL PERMITS OPERATION AS A PERIOD COUNTER OR FREQUENCY/RPM METER

SLIM BEZEL CASE

The Slim Bezel Case is supplied as standard. If specified at time of ordering, any combination of Twin Mounting and Multiple Array Cases may be substituted at no additional cost. Extra cases may be ordered separately.



Dimensions in brackets are in millimeters.

INSERT DPM THROUGH CUTOUT HOLE FROM FRONT OF PANEL. ATTACH MOUNTING BRACKETS AND SCREWS AS SHOWN, USING SECOND SLOT WHEN PANEL THICKNESS IS GREATER THAN 1/4 INCH. TIGHTEN SCREWS AGAINST REAR OF PANEL.

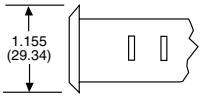
Dimensions in brackets are in millimeters. All other dimensions of these cases are the same as Slim Bezel Case shown at left.

STANDARD SLIM BEZEL CASE

SLIM BEZEL CASE

Standard Black ABS case with matte finish bezel for single unit mounting.

Part No. **SL-CASERED** for LED's
SL-CASECLR for LCD's

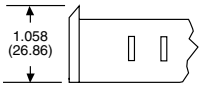


OPTIONAL TWIN MOUNTING OR MULTIPLE ARRAY CASES

END MOUNT CASE

Same styling as Slim Bezel case but with bottom edge of bezel removed. Two End Mount cases can be twin mounted in a single cutout.

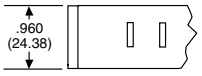
Part No. **EM-CASERED** for LED's
EM-CASECLR for LCD's



CENTER MOUNT CASE

Any number of Center Mount cases may be fitted between two End Mount cases for multiple arrays.

Part No. **CM-CASERED** for LED's
CM-CASECLR for LCD's



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.

USER'S RESPONSIBILITY

We are pleased to offer suggestions on the use of our various products either by way of printed matter or through direct contact with our sales/application engineering staff. However, since we have no control over the use of our products once they are shipped, NO WARRANTY WHETHER OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHERWISE is made beyond the repair, replacement, or refund of purchase price at the sole discretion of Texmate. Users shall determine the suitability of the product for the intended application before using, and the users assume all risk and liability whatsoever in connection therewith, regardless of any of our suggestions or statements as to application or construction. In no event shall Texmate's liability, in law or otherwise, be in excess of the purchase price of the product.

Texmate cannot assume responsibility for any circuitry described. No circuit patent licenses are implied. Texmate reserves the right to change circuitry, specifications, and prices without notice at any time.

TEXMATE INC
995 Park Center Drive • Vista, CA 92083-8397
Tel: (760) 598-9899 • Fax: (760) 598-9828
URL: http://www.texmate.com

Texmate has facilities in Japan, New Zealand, Taiwan, and Thailand. We also have authorized distributors throughout the USA and in 28 other countries.

Local Distributor Address