

*Innovative operator interface,
measurement, monitoring
and control solutions*



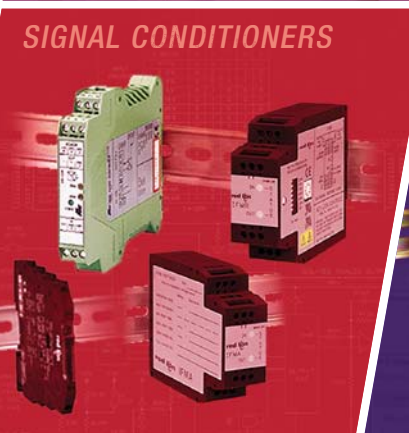
PROTOCOL CONVERSION
AND COMMUNICATIONS



OPERATOR INTERFACES



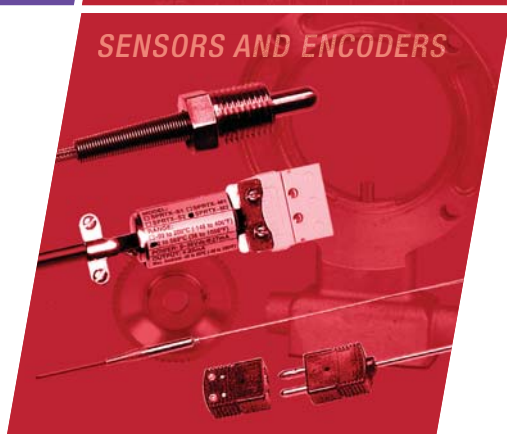
DIGITAL AND ANALOG
PANEL METERS



SIGNAL CONDITIONERS



MODULAR CONTROL AND
DATA ACQUISITION



SENSORS AND ENCODERS



PC BOARD MOUNT DISPLAYS

J



***The Trusted Source for
Innovative Control
Solutions***

1-717-767-6511

891

QUICK Specs

Counters

LCD DISPLAY

SUB-CUB 1 & 2



SUB-CUB 2-8A



SUB-CUB D



SUB-CUB T



Description

Count Indication

Count Indication

Count/Position Indication

Time/Count Indication

Dimensions (Height)x(Width)

26 mm (H) x 48 mm (W)
17 mm (H) x 27 mm (W)

26 mm (H) x 48 mm (W)

26 mm (H) x 48 mm (W)

26 mm (H) x 48 mm (W)

Display

6 Digit, .2" (5mm) LCD
6 Digit, .35" (9mm) LCD
Selectable Decimal Point

8 Digit, .3" (7mm) LCD
Selectable Decimal Point

6 Digit, .35" (9mm) LCD
Selectable Decimal Point

5 1/2 Digit, .35" (9mm) LCD

Max. Input Frequency

500,000 CPS

500,000 CPS

500,000 CPS

500,000 CPS

Input Modes

Uni-Directional
Latch

Uni-Directional
Inhibit
Latch

Uni-Directional
Up/Down
Quadrature
Inhibit
Latch

Uni-Directional
x1, ÷10, ÷100, ÷1000
Timer Ranges:
0.1 hr.
0.01 hr.
0.1 min.

Reset/ Features

Remote Reset

Remote Reset

Remote Reset

Remote Reset
Timer Running Indicator

Power Source/ Requirements

2.5-6 VDC
15 µA Typical

4.5-5 VDC
35 µA Typical

2.5-6 VDC
15 µA Typical

2.5-6 VDC
15 mA Typical

Construction

Plastic, PC Board
Snap-Mount
with Elastomeric
Connection

Plastic, PC Board
Snap-Mount
with Elastomeric
Connection

Plastic, PC Board
Snap-Mount
with Elastomeric
Connection

Plastic, PC Board
Snap-Mount
with Elastomeric
Connection

Page Number

Page 895

Page 896

Page 897

Page 898

QUICK Specs

Counters

LCD DISPLAY

MDMU



MDMV



Description	Counter/Time/Rate	D.C. Voltmeter
Dimensions (Height)x(Width)	23 mm (H) x 42 mm (W)	23 mm (H) x 42 mm (W)
Display	3 1/2 Digit, .4" (10mm) LCD Reflective, Yellow/Green or Red LCD Backlighting Selectable Decimal Point	3 1/2 Digit, .4" (10mm) LCD Reflective, Yellow/Green or Red LCD Backlighting Selectable Decimal Point
Max. Input Frequency	1,000,000 CPS	N/A
Input Modes	-0.5 to 7.0 VDC (Higher voltages can be applied with an external resistor limiting current to less than 450 μ A.)	0 to +/-199.9 mV DC +/- (0.1% + 1 Digit)
Reset/Features	Rate Multiplier/Prescaler from 0.0001 to 1.9999, 10 Timer Ranges, Selectable Decimal Point	Automatic Zeroing Circuit, Five Selectable Display Annunciators
Power Source/Requirements	5.0 VDC +/-10% (50 μ A max), 5.0 VDC +/-10% (25 mA max) Backlighting	4.8-6 VDC (5 mA max), 4.8-6 VDC (20 mA max) Backlighting
Construction	Plastic Case w/Solder Pin Connectors Panel or PC Board Versions	Plastic Case w/Solder Pin Connectors Panel or PC Board Versions
Page Number	Page 899	Page 900

J

This page intentionally left blank.

SUB-CUB 1 & 2 - COMPLETE 6-DIGIT COMPONENT COUNTERS

APPLICATIONS INCLUDE:

- VENDING MACHINES
- VIDEO GAMES
- COMPUTERS
- UTILITY METERS
- OFFICE COPIERS
- P.C.'S
- FLOW METERS
- TEST EQUIPMENT
- DISPENSING EQUIP.
- MACHINE CONTROLS
- MEDICAL EQUIPMENT
- PORTABLE INSTRUMENTS



- LSI COUNTER CHIP WITH LCD DISPLAY - SNAP MOUNTS DIRECTLY ON P.C. BOARD

- AVAILABLE IN TWO SIZES
SUB-CUB 1 - 0.2" (5 mm) HIGH DISPLAY
*SUB-CUB 2 - 0.35" (8.9 mm) HIGH DISPLAY
- SOLDERLESS, ELASTOMERIC INTERCONNECTS
- ULTRA-LOW POWER, 5 V AT 15 μ A TYPICAL
- LATCHABLE DISPLAY WITH LEADING ZERO BLANKING
- COUNT RATES TO 500 KHz
- IDEAL IN APPLICATIONS FOR:
REGISTER, STATUS & USAGE COUNTING
FREQUENCY, EPUT, & RPM INDICATION
TIMER, PULSE-WIDTH & PERIOD READOUT
- * ACCESSORY HARDWARE AVAILABLE FOR PANEL MOUNTING SUB-CUB 2



DESCRIPTION

As a completely self-contained counter/display module, SUB-CUB's can be treated as a component just like any other I.C. The modules contain a custom monolithic counter/driver chip that performs all the counting functions together with a 6-digit LCD readout. The latchable display with the separate reset function permits these modules to be used as frequency or rate meters, timers, phase-angle or pulse width indicators and for other complex readout requirements in addition to simple high speed counting.

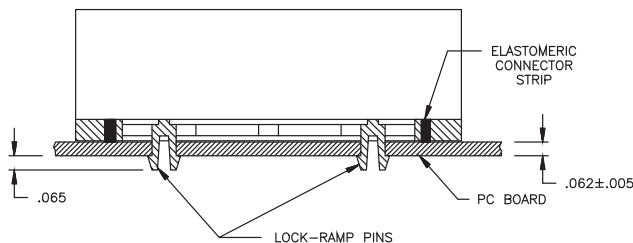
These modules are ideal for internal "on-board" applications where a readout of count, frequency, time, etc. is needed within a circuit enclosure for

maintenance, diagnostic, tune-up, or other data readout requirements. The SUB-CUB 2, with its larger display, can also be mounted with a convenient bezel kit to provide a very flexible and economical panel instrument.

SUB-CUB's snap-mount directly on any 1/16" P.C. Board that has been etched to provide a mating interconnect pad pattern with two mounting holes and a polarizing "key" hole. Interconnections to the P.C. Board as well as internal connections are made with elastomeric connectors that provide corrosion-proof, gas tight, interface contacts for high reliability.

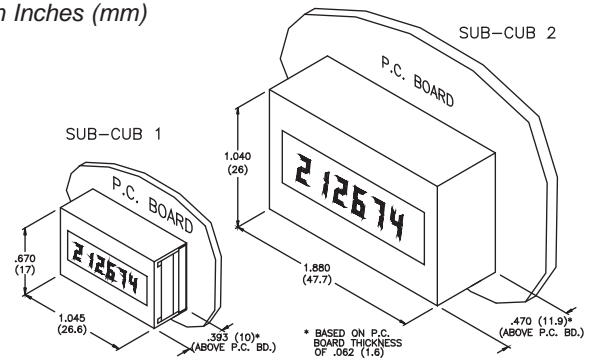
MOUNTING & DIMENSIONS

Snap in mounting on the P.C. Board is facilitated by two, split, lock-ramp pins which engage mounting holes drilled in the P.C. Board. The silicone rubber elastomeric connectors compress to accommodate P.C. Board thickness variation of ± 0.005 " (0.13 mm).



DIMENSIONS

In Inches (mm)



P.C. BOARD LAYOUT

P.C. Board pads may be gold or tin-lead plated. Pad surface must be flat without excessive tin-lead build-up. (Layout views are from SUB-CUB-D mounting side of board.)

Note: All hole size tolerances ± 0.003 " (0.08mm)
All other tolerances ± 0.005 " (0.13 mm)

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
SCUB1	SUB-CUB 1 Display/Counter Module	SCUB1000
SCUB2	SUB-CUB 2 Display/Counter Module	SCUB2000
HWK 4	*SUB-CUB 2 Panel Bezel Kit with P.C. Board & Cable	HWK40000
HWK 3	*SUB-CUB 2 Panel Bezel Kit w/o P.C. Board & Cable	HWK30000
-	Complete Evaluation Kit With Batteries	DMOSCB01
-	SUB-CUB Mounting P.C. Board	DMOSCB02

* SUB-CUB Evaluation Kits Do Not Include SUB-CUB Display/Counter Module.
Order SUB-CUB 1 or 2 Module Separately.

SUB-CUB2-8A - 8-DIGIT COMPONENT COUNTER



- SUB-CUB2-8A - 8-DIGIT COMPONENT COUNTER
- LSI COUNTER CHIP AND 0.30" (7.62 mm) HIGH LCD DISPLAY
- SOLDERLESS, ELASTOMERIC INTERCONNECTS (Snap Mounts Directly Onto P.C. Board)
- LATCHABLE DISPLAY WITH SELECTABLE LEADING ZERO BLANKING
- COUNT RATES TO 500 KHz
- LOW POWER, 30 μ A AT 5 V (Typical)

* ACCESSORY HARDWARE AVAILABLE FOR PANEL MOUNTING SUB-CUB2-8A

DESCRIPTION

The SUB-CUB2-8A is a completely self-contained 8-digit LCD counter/display module. The module can be treated as a component just like any other I.C. The SUB-CUB2-8A can be used in simple high speed counting applications as well as more complex applications such as frequency meters, pulse width meters, etc.

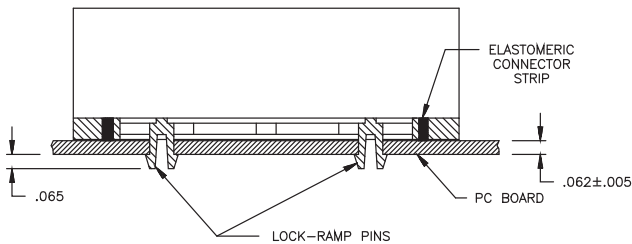
Since it is a P.C. Board mounted component, the SUB-CUB2-8A is easily integrated into applications where a readout of count, frequency, or time is needed within a circuit enclosure. The SUB-CUB2-8A bezel and interface

board can be used to provide a convenient and economical panel mounted display.

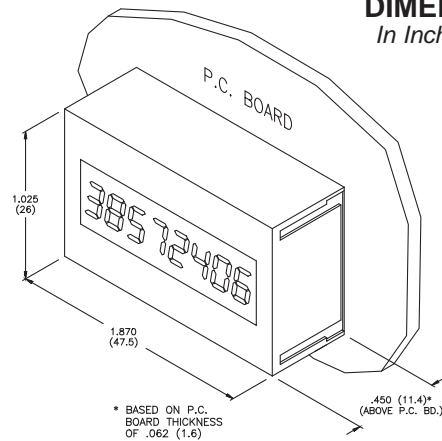
The SUB-CUB2-8A snap-mounts directly onto any 1/16" P.C. Board that has been etched to provide a mating interconnect pad pattern and drilled for two mounting holes and a polarizing "key" hole. Interconnections to the P.C. Board as well as internal connections are made with elastomeric connectors that provide an easy, corrosion-proof, and gas-tight interface for high reliability.

MOUNTING & DIMENSIONS

Snap in mounting on the P.C. Board is facilitated by two, split, lock-ramp pins which engage mounting holes drilled in the P.C. Board. The silicone rubber elastomeric connectors compress to accommodate P.C. Board thickness variations of ± 0.005 " (0.13 mm).



DIMENSIONS In Inches (mm)



P.C. BOARD LAYOUT

P.C. Board pads may be gold or tin-lead plated. Pad surface must be flat without excessive tin-lead build-up. (Layout view is from the SUB-CUB2-8A mounting side of the board.)

Pad area must be clean and free of contaminants so that proper electrical contact can be made.

Note: All hole size ± 0.003 " (0.08 mm)
All other tolerances ± 0.005 " (0.13 mm)

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
SCUB28A	SUB-CUB2-8A Display/Counter Module	SCUB28A0
HWK 28	*Panel Bezel Kit with P.C. Board & Cable	HWK28000
HWK 3	*Panel Bezel Kit w/o P.C. Board & Cable	HWK30000

* - Does not include SUB-CUB2-8A Display/Counter Module (Order SUB-CUB2-8A Separately).

SUB CUB D - 8-DIGIT COMPONENT COUNTER WITH 6-DIGIT LCD DISPLAY

U.S. PATENT NO. 4599600

- TRUE QUADRATURE WITH RESOLUTIONS UP TO 4 TIMES THE ENCODED INPUT
- BI-DIRECTIONAL COUNTING WITH UP/DOWN CONTROL
- POLARITY INDICATION
- 3 POSITION DECIMAL POINT WITH SELECTABLE LEADING ZERO BLANKING
- SOLDERLESS, ELASTOMERIC INTERCONNECTS (Snap mounts directly onto P.C. board)
- ULTRA LOW POWER, 15 μ A AT 5.0 V (Typical)



J

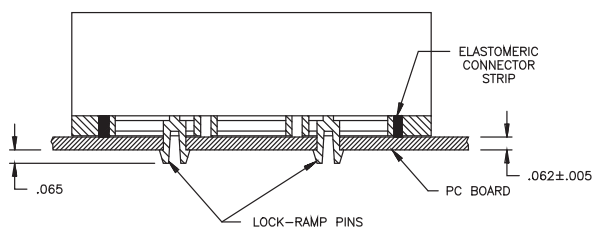
DESCRIPTION

A completely self-contained counter/display module, the new SUB CUB D can be treated as a component just like any other I.C. The SUB CUB D provides all of the capabilities of the SUB CUB 2 with two additional modes of operation. These are: Bi-directional counting with UP/DOWN control ... ideal for length measurement, where a change in direction can occur; and Quadrature counting (*two pulse trains, shifted from one another by 90°*) ... commonly used for positioning applications. The SUB CUB D has the additional capability of inhibiting counts on both inputs, used under certain conditions to prevent false counts.

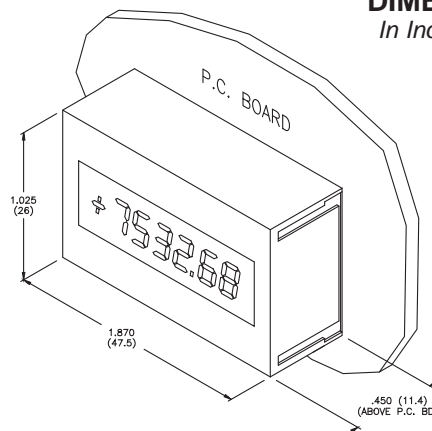
The SUB CUB D snap mounts directly onto a 1/16" thick P.C. Board which has been etched with the proper mating pattern (*shown below*). Four elastomeric connectors provide corrosion-proof, gas-tight contacts which afford high reliability. In addition, the SUB CUB D is available with a bezel mounting kit, which will allow the unit to be mounted as a panel instrument.

MOUNTING & DIMENSIONS

Snap-in mounting onto P.C. Board is facilitated by two, split, lock-ramp pins which engage mounting holes drilled into the P.C. Board. The silicone rubber elastomeric connectors compress to accommodate P.C. Board thickness variation of ± 0.005 ".



DIMENSIONS In Inches (mm)



P.C. BOARD LAYOUT

P.C. Board pads may be gold or tin-lead plated. Pad surface must be flat without excessive tin-lead build-up. (*Layout view is from SUB CUB D mounting side of board.*)

Pad area must be clean and free of contaminants so that proper electrical contact can be made.

Note: All hole size tolerances ± 0.003 " (0.08 mm)
All other tolerances ± 0.005 " (0.13 mm)

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
SCUBD	SUB CUB Display/Counter Module	SCUBD200
HWK 3	*Panel Bezel Kit w/o P.C. Board & Cable	HWK30000
HWK 6	*Panel Bezel Kit w/ P.C. Board & Cable	HWK60000
-	Prototype P.C. Board	DMOSCB04
* Does not include SUB CUB D Display/Counter Module. Order SUB CUB D separately.		

SUB-CUB-T - COMPLETE 5 1/2-DIGIT COMPONENT TIMER/COUNTER

- LSI TIMER/COUNTER CHIP WITH CRYSTAL CONTROLLED OSCILLATOR AND 0.35" (9 mm) HIGH LCD DISPLAY
- SNAP MOUNTS DIRECTLY ONTO P.C. BOARD
- SOLDERLESS, ELASTOMERIC INTERCONNECTS
- ULTRA LOW POWER, 15 μ A @ 5.0 VDC TYPICAL
- TIMES IN HOURS, 0.1 HOURS, 0.01 HOURS, AND 0.1 MINUTES
- COUNTS IN X1, \div 10, \div 100, AND \div 1000
- DEBOUNCE SELECTABLE IN COUNTER MODES
- COUNT RATES UP TO 500 KHz
- ANNUNCIATOR TO INDICATE TIMER RUNNING
- ACCEPTS AC VOLTAGE ON SIGNAL INPUT DIRECTLY THROUGH INPUT RESISTOR



DESCRIPTION

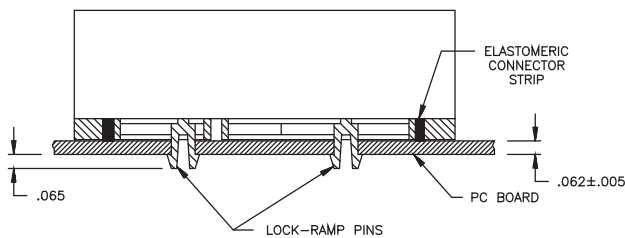
As a completely self-contained timer/counter/display module, the SUB-CUB-T can be treated as a component, just like any other I.C. The module contains a low power integrated circuit (that performs all of the timing and counting functions), a 32.768 KHz quartz crystal (which provides a stable time reference) and a 5 1/2-digit LCD readout. The SUB-CUB-T has 4 Control inputs which when set either high or low, determine the mode of operation. The BP and WINK outputs can be used to select either no decimal point, or a decimal point in the first or second position. The SIGNAL input is used to activate the timer (when in the timing modes) or to increment the counter (when in the counting modes).

The SUB-CUB-T is ideal for internal "on board" applications where a readout of elapsed time or count is needed within a circuit enclosure for maintenance, diagnostic, or other data readout requirements. It can also be mounted with a convenient bezel kit to provide a very flexible and economical panel instrument.

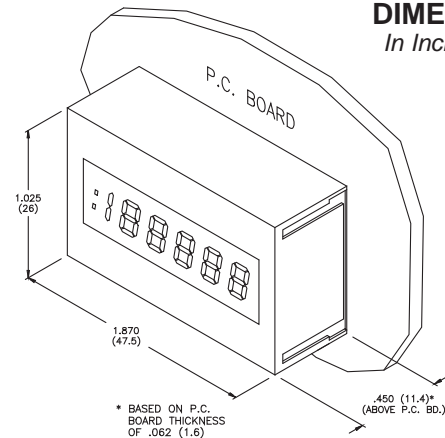
The SUB-CUB-T snap-mounts directly onto any 1/16" P.C. Board that has been etched to provide a mating interconnect pad pattern with two mounting holes and a polarizing "key" hole. Interconnections to the P.C. Board, as well as the internal connections, are made with elastomeric connectors that provide a corrosion-proof, gas-tight, interface contact for high reliability.

MOUNTING & DIMENSIONS

Snap-in mounting onto P.C. Board is facilitated by two, split, lock-ramp pins which engage mounting holes drilled into the P.C. Board. The silicone rubber elastomeric connectors compress to accommodate P.C. Board thickness variation of ± 0.005 ".



DIMENSIONS In Inches (mm)



P.C. BOARD LAYOUT

P.C. Board pads may be gold or tin-lead plated. Pad surface must be flat without excessive tin-lead build-up. (Layout view is from SUB-CUB-T mounting side of board.)

Pad area must be clean and free of contaminants so that proper electrical contact can be made.

Note: All hole size tolerances ± 0.003 " (0.08 mm)
All other tolerances ± 0.005 " (0.13mm)

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
SCUBT	SUB-CUB Timer/Counter Module	SCUBT200
HWK 3	*Panel Bezel Kit w/o P.C. Board & Cable	HWK30000
HWK 6	*Panel Bezel Kit w/ P.C. Board & Cable	HWK60000
-	Prototype P.C. Board	DMOSCB04
* Does not include SUB-CUB-T Display/Timer Module. Order SUB-CUB-T separately.		

MODEL MDMU - MINIATURE DISPLAY MODULE COUNTER/TIMER/TACH



- LCD, POSITIVE REFLECTIVE OR NEGATIVE TRANSMISSIVE WITH YELLOW/GREEN OR RED BACKLIGHTING
- COUNTER, TIMER, & TACH ALL IN A SINGLE UNIT
- RATE MULTIPLIER/PRESCALER FROM 0.0001 TO 1.9999 IN COUNT AND TACH MODES
- 9 RANGES IN TIMER MODE
- SELECTABLE DECIMAL POINTS
- 5 VDC POWERED
- PANEL MOUNT OR PC BOARD MOUNT

J

DESCRIPTION

The MDMU is a complete 6 digit Counter/Timer/Tach in a small panel or printed circuit board mounted package. It is designed to operate from a 5 VDC power supply. It has a 6 digit LCD, with 0.35" high digits, and 5 selectable decimal points. In the timer modes, a flashing annunciator is supplied to indicate that the signal input of the MDMU is active. The displays are available in positive image reflective (black digits, reflective background) or negative image transmissive (illuminated digits, dark background) with red or yellow/green backlighting.

The MDMU has four Mode Select and three Decimal Point Select inputs available for determining the basic operation. Certain functions can also be selected through programming. In most applications, the MS and DP inputs are hard wired to select the appropriate function (counter, timer and tach) and decimal point position (counter and tach only). If changes to the MDMU configuration are required, or if a rate multiplier/prescale is desired, the PROGRAM input must be used to enter the appropriate information.

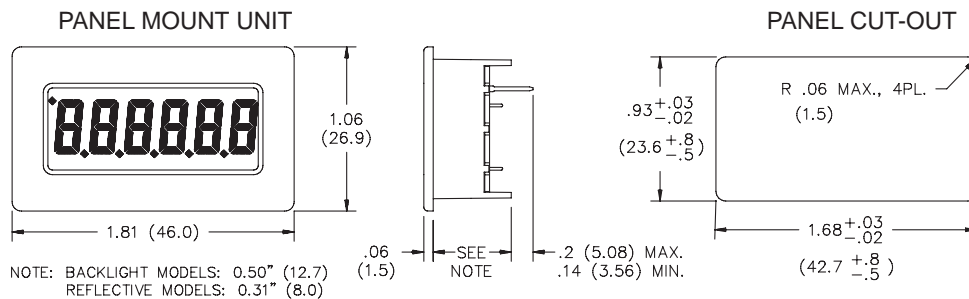
The integrated circuit is bonded directly to the printed circuit board and is mechanically protected. Internal electrical interface connections use elastomeric connectors to provide a corrosion resistant connection. This reliable construction also reduces the space requirements.

ORDERING INFORMATION

MODEL NO	DESCRIPTION	PART NUMBER
MDMU	Panel Mount W/Reflective Display	MDMU0000
	Panel Mount W/Yel-Grn Backlighting	MDMU0010
	Panel Mount W/Red Backlighting	MDMU0020
	PC Board Mount W/Reflective Display	MDMU0100
	PC Board Mount W/Yel-Grn Backlighting	MDMU0110
	PC Board Mount W/Red Backlighting	MDMU0120
HWK7	MDM Cable Assembly	HWK70000

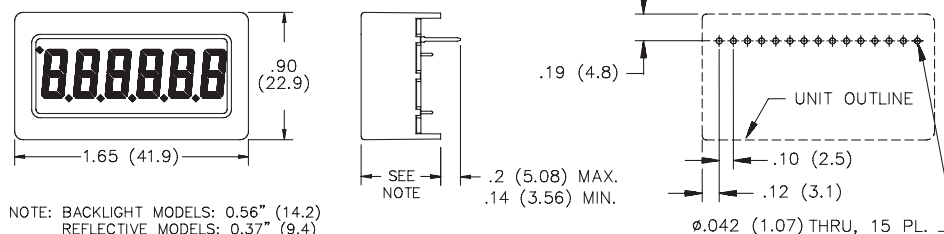
DIMENSIONS In inches (mm)

Note: Recommended minimum clearance behind the panel for mounting clip installation is 2.25" (57.2)W x 1.5" (38.1)H



PRINTED CIRCUIT BOARD MOUNT UNIT

RECOMMENDED PCB LAYOUT



MODEL MDMV - MINIATURE DISPLAY MODULE D.C. VOLTMETER



- LCD, POSITIVE REFLECTIVE OR NEGATIVE TRANSMISSIVE WITH YELLOW/GREEN OR RED BACKLIGHTING
- 1 pA INPUT LEAKAGE CURRENT TYPICAL
- 200 mV FULL SCALE
- AUTOMATIC ZEROING CIRCUIT
- SELECTABLE DECIMAL POINTS
- POLARITY INDICATION
- 5 VDC POWERED
- FIVE SELECTABLE DISPLAY ANNUNCIATORS
- PANEL MOUNT OR PC BOARD MOUNT

DESCRIPTION

The MDMV is a small panel or printed circuit board mount digital voltmeter. With advantages of accuracy, size, and ease of installation, it is an ideal replacement for analog meters. The unit has a 3½-digit LCD display with 0.4" (10.2 mm) high digits. The displays are available in positive image reflective (black digits, reflective background) or negative image transmissive (illuminated digits, dark background) with red or yellow/green backlighting.

The integrated circuit is bonded directly to the printed circuit board and is mechanically protected. Internal electrical interface connections use elastomeric connectors to provide a corrosion resistant connection. This reliable construction also reduces the space requirements.

The MDMV module is designed to operate from a +5 VDC supply. The module measures input voltages from 0 to ±199.9 mV DC relative to the supply common.

Auto-zeroing is provided by the module, therefore no zero adjustment is required. If the input signal exceeds the input range, the unit display will indicate an overrange condition.

The module has three selectable decimal point positions and five selectable annunciators (BAT,V,A,m,µ). The BAT (Battery) annunciator is used to indicate a low battery condition, while the others are used to indicate Volts and Amperes.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
MDMV	Panel Mount W/Reflective Display	MDMV0000
	PC Board Mount W/Reflective Display	MDMV0100
	Panel Mount W/Yel-Grn Backlighting	MDMV0010
	Panel Mount W/Red Backlighting	MDMV0020
	PC Board Mount W/Yel-Grn Backlighting	MDMV0110
	PC Board Mount W/Red Backlighting	MDMV0120
HWK7	MDM Cable Assembly	HWK70000

DIMENSIONS

In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.25" (57.2)W x 1.5" (38.1)H.

PANEL MOUNT UNIT

NOTE: BACKLIGHT MODELS: 0.50" (12.7)
REFLECTIVE MODELS: 0.31" (8.0)

PANEL CUT-OUT

R .06 MAX., 4PL. (1.5)

PRINTED CIRCUIT BOARD MOUNT UNIT

NOTE: BACKLIGHT MODELS: 0.56" (14.2)
REFLECTIVE MODELS: 0.37" (9.4)

RECOMMENDED PCB LAYOUT

UNIT OUTLINE

φ.042 (1.07) THRU, 15 PL.