# OEM33 3.5 digit LCD digital voltmeter

user guide /

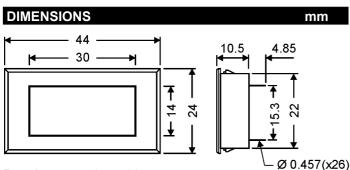


## features

- 3.5 Digit 10mm character height LCD
- 200mV Full Scale sensitivity
- Automatic zeroing and polarity indication
- 11 selectable annunciators
- Easy to use decimal point selection
- Built in snap fastener
- Display hold feature standard

## DESCRIPTION

The OEM33 is one of the world's smallest digital voltmeters. It is an ideal replacement for analogue meters with advantages of accuracy, size and easy mounting. The module includes an A/D converter, LCD display of 10mm character height, and plastic housing with standard dual in line pin terminals for easy insertion into sockets or PC Board.



Panel cut out 40.5 x 22.5 Fastening clips accept panel thickness 0.9 to 3.2mm

OPERATING SPECIFICATION					
Operating temperature	0 to 50 <sup>o</sup> C				
Storage temperature	-20 to 70 <sup>o</sup> C				
Operating relative humidity	80%				

## DISPLAY HOLD FACILITY

The OEM33 has a built in digital display hold facility. For normal, continuous operation connect the 'Hold 1' pin to the GD pin. To hold the present reading, connect 'Hold 1' to VDD. Do not leave this pin floating or it will drift in and out of hold mode.

ORDERING INFORMATION			
OEM33	3.5 digit, 200mV LCD Voltmeter		



ELECTRICAL CHARACTERISTICS T <sub>4</sub> =25°C							
CHARACTERISTIC	CONDITION	MIN	ΤΫ́Ρ	MAX	UNITS		
Supply voltage (VDD)	9 Volts 5 Volts	7 4.5	9 5	10 6	V V		
Supply Current (IDD)	9 Volts 5 Volts		500	900 5	μA mA		
Full scale				199.9	mV		
Input Impedance		100			MΩ		
Reference Voltage	9 Volts		100		mV		
Overload voltage				20	V		
Zero I/P Reading			0	<u>+</u> 1	Counts		
Accuracy at FSD	9 Volts 5 Volts		<u>+</u> 2 +2	<u>+</u> 4 <u>+</u> 4	Counts Counts		
Linearity	9 Volts 5 Volts		<u>+</u> 1 <u>+</u> 1	<u>+</u> 2 +2	Counts Counts		
Resolution			100		μV		
CMRR			70		dB		
Temp Coefficient			100	150	ppm/°C		

<b>PIN FUNCT</b>	IONS		
VDD	Positive supply terminal		
VSS	Negative supply terminal for 9 volts operation		
GD	Negative supply terminal for 5 volts operation		
IH	Input high terminal		
IL	Input low terminal		
RH	Reference high input terminal		
RL	Reference low input terminal		
HOLD1	Connect to VDD for hold and GD for continuous		
С	Analogue Common		
XBP	For driving annunciator		
BP	LCD back plane		
D1, D2, D3	Decimal point pins . D1 = .000, D2 = 0.00 D3 = 00.0 The decimal point will appear if the corresponding terminal is connected to XBP.		
BAT, °C, °F,~, m, μ, MΩ, KΩ, V, A, HOLD2	Annunciators		

All annunciators not in use must be connected to the BP pin for suppression purposes. To light up an annunciator, connect the corresponding pin to XBP.

#### USER INSTRUCTIONS

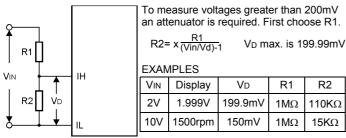
The OEM33 is designed for 5/9V supply. Incorrect supply polarity will destroy the module immediately. It is ready for general use when connected as in fig. 1 for 5V. For 9V supply the module may need calibrating before use as follows. Connect as in fig. 2, apply 100mV to the inputs from a calibrated source and adjust VR1 until the display reads 1000.The input range is 0-199.9mV.Over-range is indicated by displaying a "1" in the most significant digit. If the input voltage is reversed, a minus sign is displayed automatically.

The module has 3 decimal points. D1, D2, D3 and 11 selectable annnunciators.

For 5V operation, IL must be connected to GD for non-floating inputs (fig. 1) and to analogue common pin C for floating inputs. In both cases J1 should be closed).

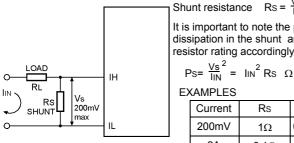
## **APPLICATION CIRCUITS**

#### DC VOLTAGE MEASUREMENT

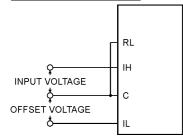


The input impedance becomes R1+R2. Choose accurate stable resistors. Typically, R1=1M $\Omega$ . 9M $\Omega$  is a practical upper limit.

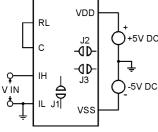
#### DC CURRENT MEASUREMENT



#### DC VOLTAGE OFFSET



#### **NON FLOATING INPUTS (a)**



Revision - 14 27/08/04

 $\frac{Vs}{IIN} \Omega$ 

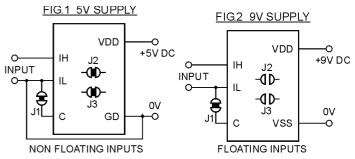
It is important to note the power dissipation in the shunt and choose resistor rating accordingly

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	Current	Rs	Ps				
	200mV	1Ω	0.04W				
	2A	0.1Ω	0.4W				

To achieve a zero display reading for a non-zero voltage input. apply the offset voltage between C and IL. For a positive offset apply a Positive signal to IL w.r.t. C. Apply the input signal between IH and C Note jumper J1 must be open

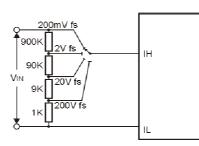
Where a single 5V supply is not suitable but you must connect your +5V DC input signal ground to the module supply ground then either of the two non-floating input circuits can be used. Note that the module is set in 9V supply mode BUT jumper J1 is left open.

## CONNECTION DIAGRAM BASIC CONFIGURATION



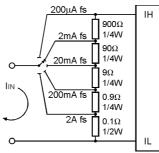
For 9V operation it is recommended to power from a 9V battery. The inputs are intended to float with respect to the supply but if they do not float they must be no closer than 1.5V from either VDD or VSS (VDD-1.5V and VSS+1.5V) see the circuits for non-floating inputs below.

#### DC MULTI-RANGE VOLTAGE MEASUREMENT



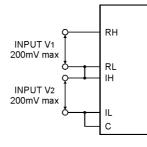
For multi-range, use a 2 pole, 4 way rotary switch. 1 pole for range select and the other to connect the appropriate decimal point to XBP.

#### DC MULTI-RANGE CURRENT MEASUREMENT



For multi-range, use, a 2 pole, 5 way rotary switch. 1 pole for range select and the other to connect the appropriate decimal point to XBP

## DC VOLTAGE RATIO MEASUREMENT

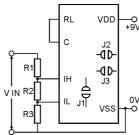


To determine the ratio between two voltages apply the inputs as shown. Displayed reading =  $\frac{V2}{V1}$  X 1000

Over range occurs when  $\frac{V2}{V1} \ge 2$ 

Note Jumper J1 must be closed and the track connecting RL to C must be cut

#### NON FLOATING INPUTS (b)



Using the formulae choose resistors to -O ensure the analogue inputs are no closer than 1.5V from either VDD or VSS (VDD-1.5V or VSS+1.5V)

> $\frac{VIN(Max)(R2)}{R1+R2+R3} \le 200 mV$  $VIN(Max)(R2+R3) \le VDD-1.5V$ R1+R2+R3  $VIN(Min)(R3) \ge VDD+1.5V$

R1+R2+R3

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### DETAILED LAYOUT AND DIMENSIONS

