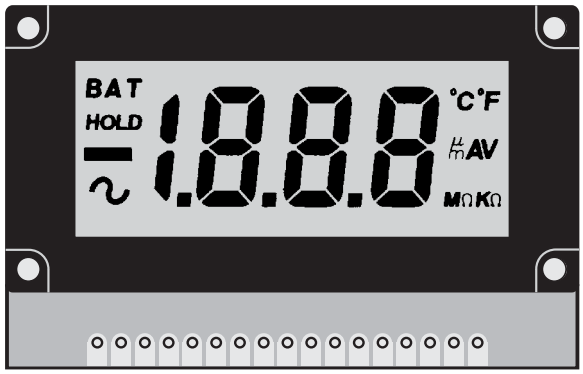
anders electronics

OEM22 and OEM24L (backlit) 3.5 digit LCD digital voltmeters

features

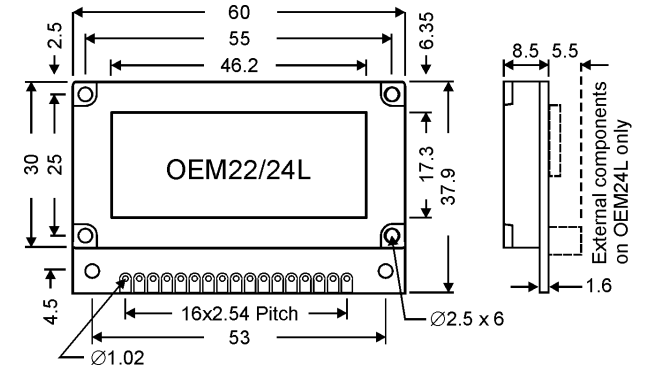
- 3.5 Digit 12.7mm character height LCD
- 200mV full scale sensitivity
- Automatic zeroing and polarity indication
- Low battery indication (For 9V option only)
- 10 selectable annunciators
- Easy to use decimal point selection
- Display Hold as standard

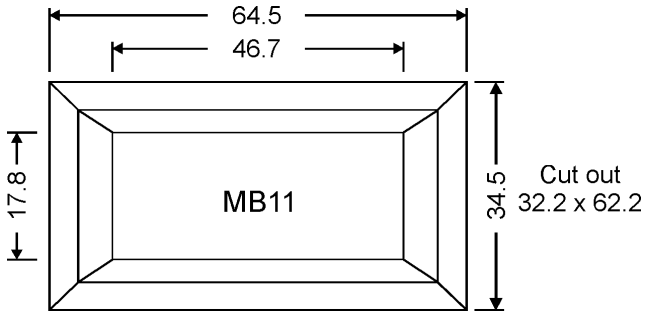


DESCRIPTION

The OEM22 is a neat "flat pack" voltmeter module that can either be sub-panel mounted or used with the optional MB11 fixing bezel. The module is set up for 9 volt operation but can be adjusted for 5V use. A low BAT annunciator is provided as standard (9Vonly). The OEM24L version comes complete with a green LED backlight. All versions now come with display hold feature.

DIMENSIONS mm





OPERATING SPECIFICATION

Operating temperature	0 to 50°C
Storage temperature	-20 to 70°C
Operating relative humidity	80%

ORDERING INFORMATION

OEM22	3.5 digit, 200mV LCD Voltmeter
OEM24L	3.5 digit, 200mV LCD Voltmeter with backlight
MB11	Optional mounting bezel

ELECTRICAL CHARACTERISTICS T_A=25°C

CHARACTERISTIC	CONDITION	MIN	TYP	MAX	UNITS
Supply voltage (VDD)	9 volts 5 volts	7 4.8	9 5	10 6	Volts Volts
Supply Current (IDD)	9 Volts 5 Volts		500 5	900	µA mA
Full scale				199.9	mV
Input impedance		100			MΩ
Ref voltage ROH	9 Volts		100		mV
Overload voltage				20	Volts
Zero I/P Reading			0	±1	Count
Accuracy at FSD	9 volts 5 volts		±1 ±1	±2 ±4	Counts Counts
Resolution			100		µV
CMRR			70		dB
Temp Coefficient			100	150	ppm/°C
Low Battery Ind.	9 Volts only	6.75	7.25	7.75	V
Backlight Volts	OEM24L		5		V
Backlight Current	at 5V	-	40	60	mA

PIN FUNCTIONS

PIN	DESCRIPTION
VDD	Positive supply terminal
VSS	Negative supply terminal for 9 Volt mode only
INHI INLO	Positive input terminal Negative input terminal
RFH RFL ROH ROL	Reference input high terminal Reference input low terminal Reference output high terminal Reference output low terminal
HOLD	Con. to VDD for display hold, to TST for normal.
COM	Analogue common
TST	Connect to VDD to test all segments (except annunciators), for a few seconds only. (9V mode) Also negative supply terminal for 5V supply.
XBP	For driving annunciators
BP	LCD back plane.
D1, D2, D3	Decimal point select. The decimal point will energize when these pins are tied to VDD.
AB,B3,E3,G3,	For use with external auto-ranging circuit.
BAT,°C,°F,~,m,µ,M, Ω,KΩ,V,A,HOLD	Annunciators. See user instructions. BAT is auto turn on. Turn it off in 5V mode by adjusting V2.
LMP +	Backlight positive terminal (+5V DC) OEM24L
LMP -	Backlight negative terminal (0V DC) OEM24L

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USER INSTRUCTIONS

The OEM22/24L is designed for 9/5V supply. Incorrect supply polarity will destroy the module immediately. It is ready for general use when connected as in figure 1, for 9V supply. For 5V supply, the module must be calibrated before use as follows. Connect as in figure 2, apply 100mV to the inputs, from a calibrated source and adjust VR1 until the display reads 1000.

The input range is 0-200mV. Over-range is indicated by blanking the three least significant digits and displaying a "1" in the most significant digit.

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.

The low BAT voltage can be set adjusting VR2 but it is not recommended to operate with a supply voltage below 7V.

CONNECTION DIAGRAM BASIC CONFIGURATION

FIG.1 9V SUPPLY

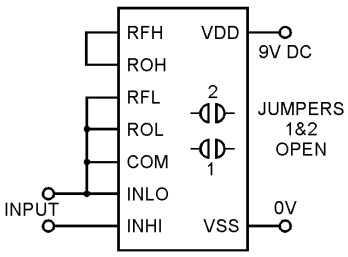
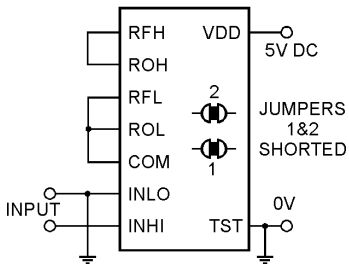


FIG.2 5V SUPPLY

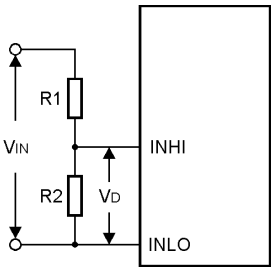


All annunciators are connected to BP for suppression purposes. To light up, cut the trace between the selected annunciator pad and BP track and then link with solder the annunciator pad to the XBP pad next to it.

For 5V operation, INLO must be connected to TST for non-floating inputs (as fig. 2) and to the analogue common pin COM for floating inputs. The low BAT annunciator needs to be turned of by adjusting VR2.

APPLICATION CIRCUITS

DC VOLTAGE MEASUREMENT



To measure voltages greater than 200mV an attenuator is required.

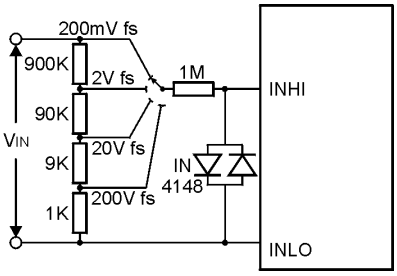
$V_{IN}=V_D \times \frac{R1+R2}{R2}$ V_D max. is 199.99mV

EXAMPLES

V_{IN}	Display	V_D	R1	R2
2V	1.999V	199.9mV	1MΩ	110KΩ
10V	1500rpm	150mV	1MΩ	15KΩ

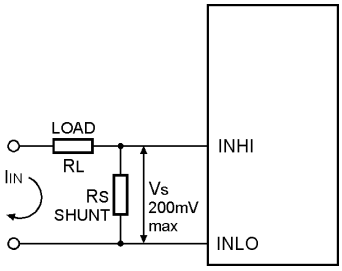
The input impedance becomes R1+R2. Choose accurate stable resistors. Typically, R1=1MΩ. 9MΩ is a practical upper limit.

MULTI-RANGE DC 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 CURRENT MEASUREMENT



Shunt resistance $R_S = \frac{Vs}{I_{IN}}$ Ω

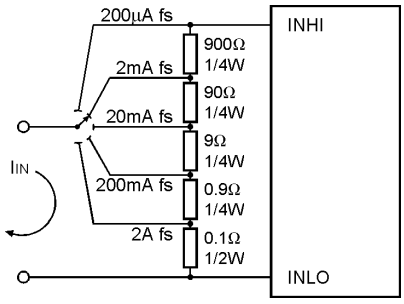
It is important to note the power dissipation in the shunt and choose resistor rating accordingly

$P_S = \frac{Vs^2}{I_{IN}} = I_{IN}^2 R_S$ Ω

EXAMPLES

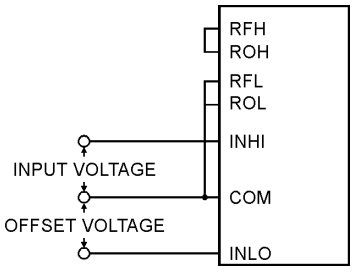
Current	R_S	P_S
200mA	1Ω	0.04W
2A	0.1Ω	0.4W

MULTI-RANGE DC 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 OFFSET

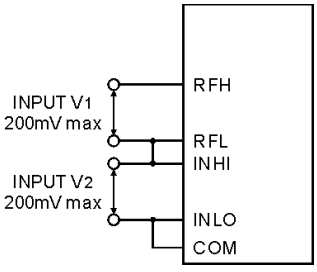


To achieve a zero display reading for a non-zero voltage input, apply the offset voltage between COM and INLO.

For a positive offset apply a Positive signal to INLO w.r.t. COM.

Apply the input signal between INHI and COM.

DC VOLTAGE RATIO MEASUREMENT

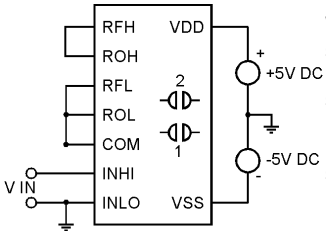


To determine the ratio between two voltages apply the inputs as shown.

Displayed reading = $\frac{V2}{V1}$ X 1000

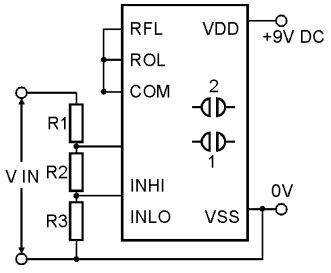
Over range occurs when $\frac{V2}{V1} \geq 2$

NON FLOATING INPUTS (a)



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

NON FLOATING INPUTS (b)



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

$\frac{VIN(Max)(R2)}{R1+R2+R3} \leq 200mV$

$\frac{VIN(Max)(R2+R3)}{R1+R2+R3} \leq VDD-1.5V$

$\frac{VIN(Min)(R3)}{R1+R2+R3} \geq VDD+1.5V$

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