DPM 160

4½ Digit LCD Module

A DPM offering levels of performance, low current consumption and compact size never previously available. Automatic low battery indication and 'continuity' flags are built into the display. Supplied complete with snap-in bezel, the DPM 160 will suit many applications calling for low cost, high accuracy measurements in portable instruments.

- **12.5mm (0.5“) Digit Height.**
- **Programmable Decimal Points**
- **Auto-zero**
- **Auto-polarity**
- **200mV d.c. or 2V d.c. Full Scale Reading (F.S.R.)**
- **Digital Hold**
- **Single Rail Version (DPM 160S)**
- **Autoranging Outputs**



SCALING

Two resistors Ra and Rb may be fitted in order to alter the full scale reading (F.S.R.) of the meter - see table.
The meter will need re-calibration.

Required F.S.R.	Range Input	Ra	Rb
200mV	LOW (o/c)	Link	(o/c)
2V	HIGH	Link	(o/c)
20V Note	HIGH	910k	100k
200V Note	HIGH	1M	10k
2kV Note	HIGH	1M	1k
200µA	LOW(o/c)	Link	1k
2mA	LOW(o/c)	Link	100R
20mA	LOW(o/c)	Link	10R
200mA	LOW(o/c)	Link	1R

NOTE
Ensure that Link La is open if fitting Ra.

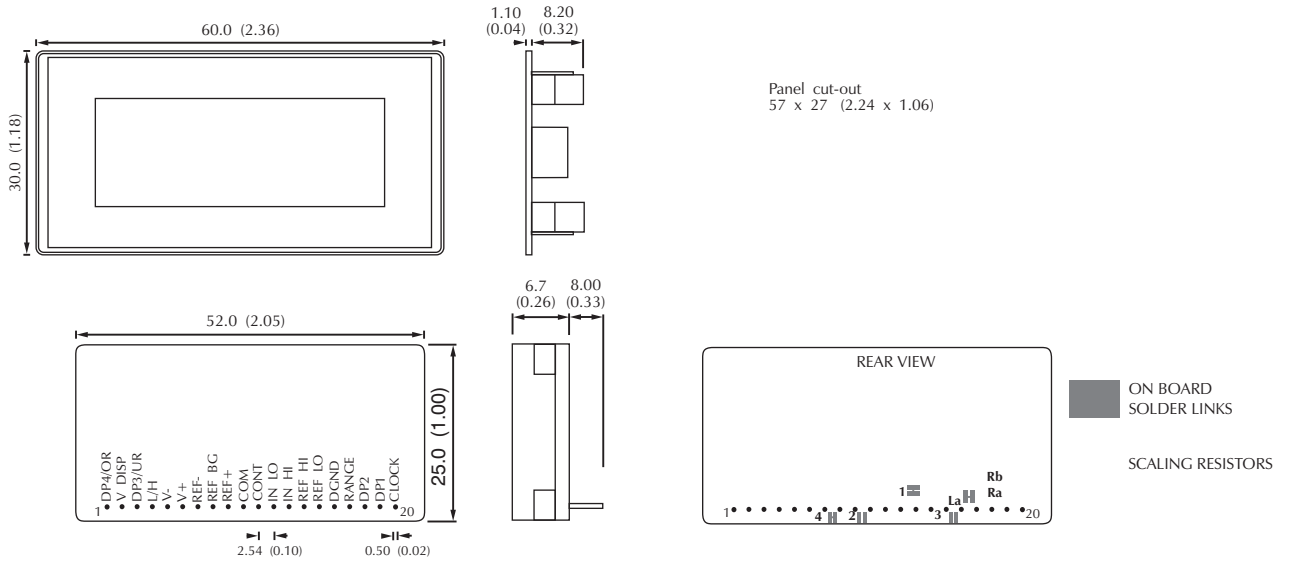
Standard Meter Single Rail Version		Min.	Typ.	Max.	Unit Stock Number DPM 160 DPM 160S
Accuracy (overall error) *			0.005	0.01	% (±1 count)
Linearity				±1	count
Sample rate			1.6		samples/sec
Operating temperature range		0		50**	°C
Temperature stability			30		ppm/°C
Supply voltage (V+ to V-)	DPM 160	6	9	14	V
	DPM 160S	3	5	7	
Supply current			1		mA
Input leakage current (Vin= 0V)			1	10	pA

* To ensure maximum accuracy, re-calibrate periodically.
** Above typically 35°C the display's viewing angle will progressively reduce, although contrast should remain acceptable when viewed head-on.

SAFETY

To comply with the Low Voltage Directive (LVD 93/68/EEC), input voltages to the module's pins must not exceed 60Vdc. If voltages to the measuring inputs do exceed 60Vdc, then fit scaling resistors externally to the module. The user must ensure that the incorporation of the DPM into the user's equipment conforms to the relevant sections of BS EN 61010 (Safety Requirements for Electrical Equipment for Measuring, Control and Laboratory Use).

DIMENSIONS All dimensions in mm (inches)



PANEL FITTING

Locate the meter by passing it through the front of the panel cut-out, and gently push until the rear of the bezel is flush with the panel (DO NOT PUSH ON THE LCD). The snap-in lugs will now automatically hold the meter firmly in position.

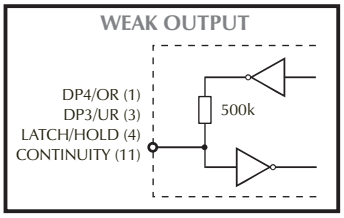
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PIN FUNCTIONS

Note that 'HI' means V+ (6) and 'LO' means DGND (16). Four of the pins are input/output ,featuring 'weak' outputs . To use it as an input, the output is easily over driven. In order to obtain the output data, the pin must be connected to a high impedance input.

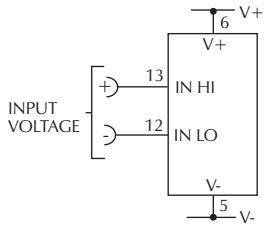


1. DP4/OR **Input:** When pulled HI, DP 1.9999 will be shown. If DP4 is not to be used, connect it LO.
   Output: The output will go HI if the result exceeds ±19999.
   Note: If DP4 is to be shown and the O/R signal is to be sensed at the same time, Pin 1 should be used as an input under normal conditions except during L/H output when the O/R flag should be sensed.
2. VDISP This input sets the drive voltage for the display. It is internally linked to DGND.
3. DP3/UR **Input:** When pulled HI, DP 19.999 will be shown. If DP3 is not to be used, connect it LO.
   Output: The output will go HI if the result is less than ±1000.
   Note: If DP3 is to be shown and the U/R signal is to be sensed at the same time, Pin 3 should be gated with the L/H as described below.
4. L/H **Input:** When floating, the converter operates in the free-run (normal) mode. When pulled HI, the last displayed reading is held.
   Output: A negative pulse occurs when the data in the display latches is updated.
5. V- Negative power supply.
6. V+ Positive power supply.
7. REF- Negative supply for the internal reference.
8. REF BG Output of the bandgap reference (1.22V nom).
9. REF+ Positive output from internal reference.
10. COM The ground for the analogue section of the A/D converter. Held actively at 3.2V (nom.) below V+.
11. CONT If the converter input voltage drops below a nominal 200mV, then the continuity annunciator will be shown and the output will be HI. To disable the continuity indicator, pin 11 should be held LO.
12. IN LO Negative differential measuring input.
13. IN HI Positive differential measuring input.
    } Inputs must be lower than 1.0V below V+, and higher than 1.5V above V-.
14. REF HI Positive input for reference voltage.
15. REF LO Negative input for reference voltage.
16. DGND DGND is held at between 4.6 and 6 voltage below V+. This is the supply voltage for the digital section. If CMOS logic is used to provide or decode DPM 160 signals, then it can be powered from V+ and DGND up to a maximum of 1mA.
17. RANGE This pin has an internal 3mA pull down and need not be connected for a 200mV full scale. For 2V full scale connect HI.
18. DP2 Input for DP 199.99
19. DP1 Input for DP 1999.9
    } These pins have an internal 3µA pull down and need not be connected if the decimal points are not to be shown. To show the points, connect to HI.
20. CLOCK This input can be used to override the internal clock in order to synchronise DPM 160 with external systems.

VARIOUS OPERATING MODES

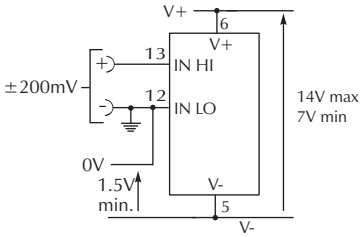
ON-BOARD LINKS: In order to quickly and easily change operating modes for different applications the meter has several on-board links. They are designed to be easily opened (cut) or shorted (soldered). Do not connect more than one meter to the same power supply if the meters cannot use the same signal ground. Taking any input beyond the power supply rails will damage the meter.





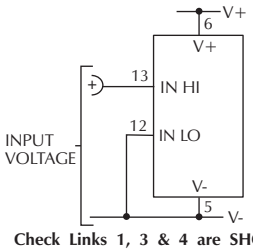
Check Links 1, 2, 3 & 4 are SHORTED

Measuring a floating voltage source of 200mV full scale.



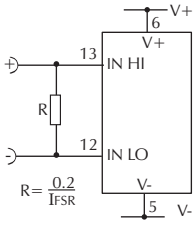
Check Links 1, 3 & 4 are SHORTED.

Split supply operation (DPM 160).



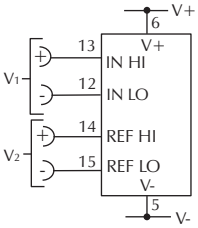
Check Links 1, 3 & 4 are SHORTED.

Measuring a single ended input referenced to supply (DPM 160S).

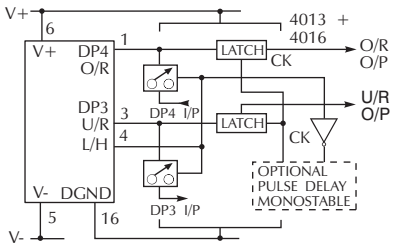


Check Links 1, 2, 3 & 4 are SHORTED

Measuring current.
Supply MUST be isolated.



Measuring the ratio of two voltages.
200mV F.S.R. reading = 10^5 V_1/V_2
2V F.S.R. reading = 10^4 V_1/V_2.



Check Link REF is SHORT.

Driving DP3 and DP4 inputs while monitoring under range and over range outputs.