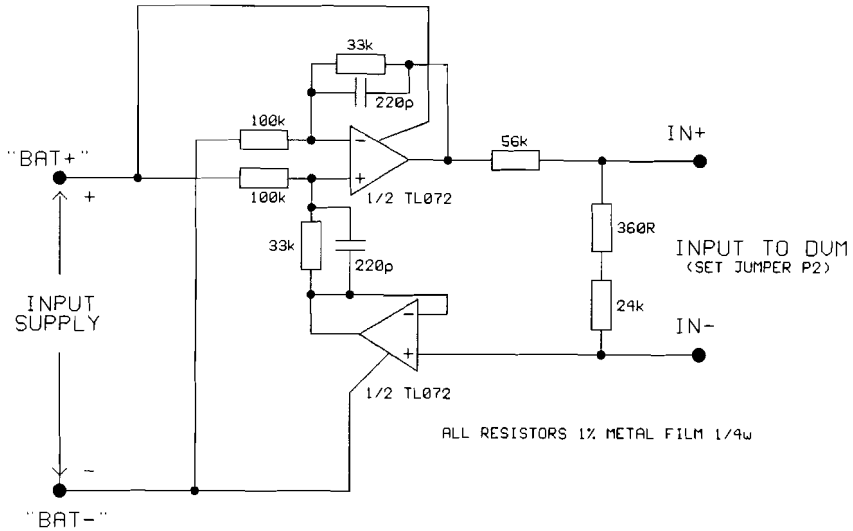
Circuit to enable the panel meter to measure its own supply voltage



CIRCUIT TO READ INPUT SUPPLY ON PM-438

Circuit Function

The DVM cannot measure its own supply by direct connection of the supply to the measurement input terminals, because both IN+ and IN- inputs sit at approximately 6.3V above the supply 0V.

There are several ways to scale and level-shift the monitored supply voltage. The solution given above, using the *Howland* current source is probably the most economical in components.

The accuracy obtained with typical op-amp offsets and 1% resistors is approximately ± 2%. For improved accuracy, trim R5 to give the correct reading for a known power supply input.

LCD Panel Meter
PM438

Product Code:
375-102

Distributed by:

JPR electronics

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Introduction

This DVM is a 3½ digit panel meter with FSD ±199.9 mV, automatic polarity indication, with accuracy ± 0.5 % ± 1digit.

Technical Data

Input impedance	>100MΩ
Accuracy	± 0.5% ± 1digit
Measurement range	199.9mV
Indication method	LCD display
Measurement method	Dual-slope integration A/D
Power supply	8 — 12V DC (9V battery)
Supply current	≈1mA
Operating temperature range	23°C ± 5°C
Size	68mm x 44mm

DCSupply

The input required is 8 — 12V DC @ 1mA from battery or power supply. Connections are labelled V+ and V-.
Check the polarity "+" and "-" before connection.

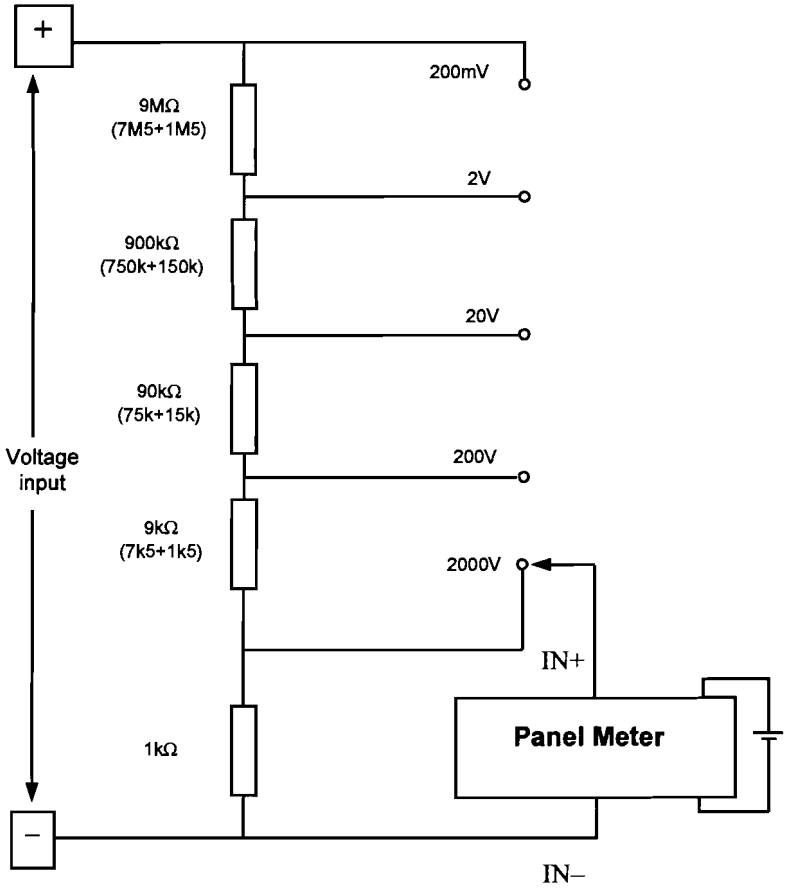
General Description

Analogue-to-digital Converter
This panel meter uses a low power CMOS 3½ digit analogue-to-digital converter.
The DC voltage at the input measurement connection (IN-) is approximately +6.3V relative to the negative terminal (V-) of the power supply or battery).

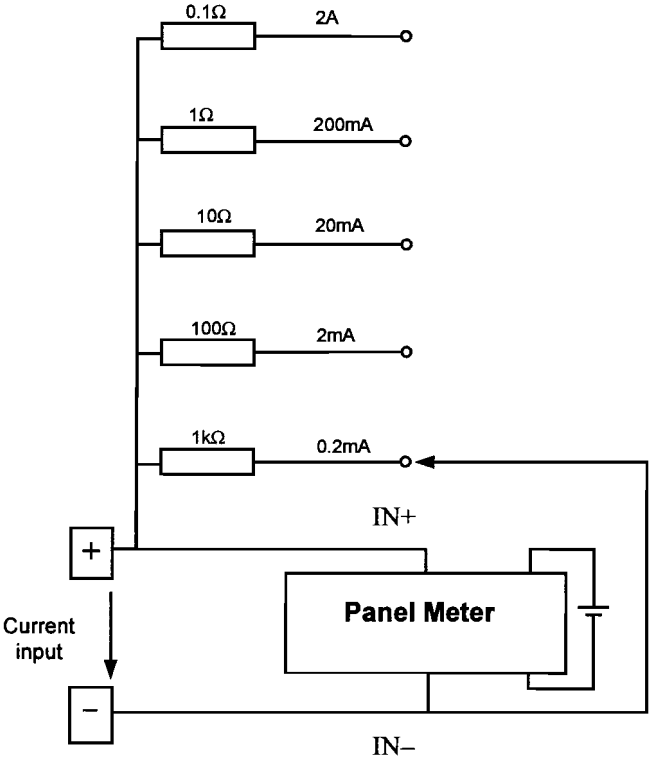
Reference Adjustment
The internal reference is factory-set to give the correct reading for a known voltage applied to the input terminals.

Decimal Point
The decimal point is set by jumpers P1, P2 and P3 (*see* "How to expand").

Multirange Voltmeter Expansion

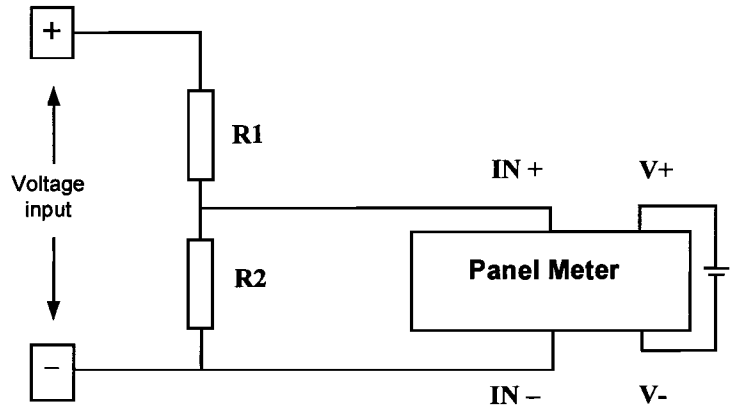


Multirange Current Meter Expansion



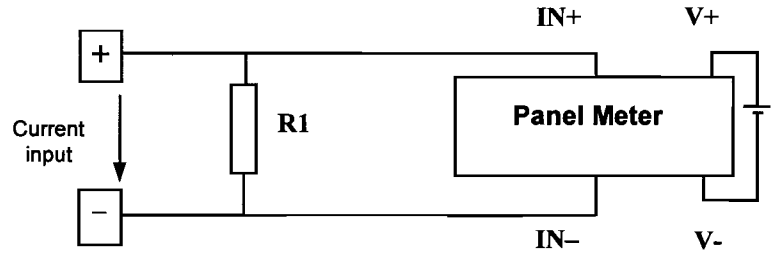
How to Expand

To expand the range of voltage to be measured, remove RA (10MΩ) and RB (s/c link) from meter PCB and connect external resistors as follows:



Range	R1 (Theoretical value)	R1 (Practical combination)	R2	Fit Jumper link
20V	9.9MΩ	7.5MΩ + series 2.4MΩ	100kΩ	P2
200V	9.99MΩ	10MΩ	10kΩ	P3
2000V	9.999MΩ	10MΩ	1kΩ	*no jumper*

To expand the range of current to be measured, use the correct value of shunt resistor R1 as shown below:



Range	R1
0.2mA	1kΩ
2mA	100Ω
20mA	10Ω
200mA	1Ω
2A	0.1Ω