



Providing Excellence in Science Education

IPC Irwin Joule & Watt Meter

Part Number IPC-1952-M

User Instructions



INTRODUCTION.

The IPC Irwin Joule & Watt Meter is designed for the direct measurement of the electrical energy or instantaneous power supplied to a load and is therefore a valuable tool for student-based work as well as simplifying many demonstrations. The direct readings mean that the need for voltmeters, ammeters, stop watches and calculators is eliminated and fast and accurate results can be obtained. Scientific understanding can therefore be gained from practical investigations rather than mathematical calculations and manipulation.

Its many uses include experiments with electrical heaters, determination of energy stored in a capacitor, calculating the power supplied by a DC source to a resistive load and measurement of the specific latent heat of steam.

DESCRIPTION.

The Joule & Watt Meter can measure energy (Joules) from 0.01mJ to 9999J or power (Watts) from 0.1mW to 200W in DC circuits and 0.1mW to 140W in AC circuits. The meter also provides two ranges of energy or power via a selector switch, these being mJ/mW and J/W, along with a 13mm, 4-digit LED display, providing fully auto-ranging when measuring Joules. Also included is a reset function to allow accurate timing when measuring energy (Joules). The maximum input current (both AC and DC) is 10A, while the maximum DC voltage is 20V and the AC voltage is 14V (rms). All electrical connections are via 4mm sockets, colour coded for DC measurements. The rear panel contains an illuminated (green) mains on/off switch and a mains input IEC socket containing an in-built protection fuse. Normally the unit is supplied with a separate UK plug to IEC plug 2.0m mains lead. The unit itself is manufactured in a robust metal case with a durable powder coat finish.

IPC Irwin

Holker School, Cark in Cartmel, Grange over Sands, Cumbria LA11 7PQ, United Kingdom

Call: 015395 58555 **Email:** sales@ipcirwin.com



Providing Excellence in Science Education

INSTRUCTIONS.

When setting up the meter the Input Supply Voltage should be connected to the pair of sockets on the front panel marked 'SUPPLY' and the Load should be connected to the pair of sockets marked 'LOAD'.

The input supply voltage may be AC or DC, in all cases the peak value should be no more than 20V, ie. when using an AC input voltage, the r.m.s. value should be limited to 14V. When using a DC input supply voltage, the polarity of the output voltage to the Load should be the same as the polarity of the input supply voltage (this is because the red positive sockets are connected together within the meter).

The connections to the Supply and the Load are not referenced to earth, ie. none of the front panel sockets are internally connected to the earth potential. When measuring energy or power in the milli-Joule or milli-Watt range, the range switch on the front panel should be set to the 'mJ/mW' position, for energy or power in the Joule or Watt range the switch should be set to the 'J/W' position. When measuring energy, the function switch on the front panel should be set to the 'J' position, at any time the switch can be set to the 'W' position to give a reading of instantaneous power supplied to the load. Momentarily moving the switch up to the 'RESET' position causes the display to reset to zero.

When using the meter on the mJ/mW range the maximum current that can be allowed to flow is 10mA, so with a maximum input voltage of 20V, the load should be a minimum of 2k Ω . Similarly, on the J/W range the maximum current that can be allowed to flow is 10A, so with a maximum input voltage of 20V, the load in this case should be a minimum of 2 Ω . **Note:** care should be taken to limit the current to these maximum values, failure to do so will result in inaccurate readings and possible damage to the meter.

Should the mains on/off switch or display fail to illuminate, then first check the 250mA (fast blow) fuse at the rear of the unit (located in the mains IEC socket), if this is found to be intact then check the 5A fuse in the mains plug (if UK plug).

SPECIFICATIONS.

Electrical Supply:	= 220-240VAC, 50-60Hz
Fuse Ratings:	= IEC Socket Inlet: F250mA, UK Mains Plug: 5A
Dimensions & Mass	= 180 x 190 x 85mm overall & 1.6kg
Maximum Input Voltages:	= 20VDC, 14VAC (rms).
Maximum Load Currents:	= 10A (J/W range), 10mA (mJ/mW range).
Maximum DC Wattages:	= 200W (Watt range), 200mW (milli-Watt range).
Maximum AC Wattages:	= 140W (Watt range), 140mW (milli-Watt range).
Joule (J) range:	= 0.01J to 9999J, auto-ranging.
milli-Joule (mJ) range:	= 0.01mJ to 9999mJ, auto-ranging.
Watt (W) range:	= 0.1W to 200.0W (maximum).
milli-Watt (mW) range:	= 0.1mW to 200.0mW (maximum).
Input Resistance/Accuracy:	= 2M Ω (No load) / $\pm$ 5% of full-scale reading (typically).

Please Note: This Equipment is for Education, Training, or research Purposes Only.

IPC Irwin

Holker School, Cark in Cartmel, Grange over Sands, Cumbria LA11 7PQ, United Kingdom

Call: 015395 58555 **Email:** sales@ipcirwin.com