Autocal Digital Multimeter

- **7½ Digit Resolution**
- **90 Day DCV Specifications to ±9ppm**
- **Comprehensive Ratio**
- **Autocal and Temperature Measurement**
- **IEEE-488 Programmable**

Designed for Standards Laboratories and specialist applications, the 7½ digit 1081 offers the most comprehensive measurement capability of the entire AUTOCAL range of DMMs.

High Performance

The 1081's key features are high precision, stability and low noise performance. Its wide functional capability includes 90 day DCV from 10 nV to 1000V with total uncertainty specifications to ±9ppm, True RMS ACV from 100 nV to 1000V over frequencies ranging from 0.1 Hz to 1 MHz to ±250ppm, and Resistance from 1μΩ to 20MΩ to ±11ppm.

Ratio

Ratio measurement is a particularly versatile and powerful feature of the 1081. Inputs of up to 350 volts peak are accepted via two isolated and floating channels to provide readings of ratio, difference, and percentage deviation. Coupled with autoranging, highly accurate ratio measurements of widely differing inputs can be made automatically. Apart from DC/DC, AC/AC and Ω/Ω comparisons, ratio can be used very effectively to compare AC sources to known DC values—a rapid technique for AC-DC transfer.

Temperature

Using a Datron supplied Platinum Resistance Thermometer, the 1081 can also make temperature measurements from −100°C to +200°C to 90 day accuracies of ±0.06°C. A special 100Ω range with 1mA energization current is used to keep thermometer self-heating effects to a minimum and to provide a measurement displayed in °C.

Autocal

As with all Datron DMMs, the 1081 incorporates AUTOCAL—a rapid covers-on calibration technique activated either from the front panel or via the IEEE-488 interface.

For ultimate precision, the numeric keyboard can be used to enable direct calibration to non-cardinal point sources such as standard cells, thus eliminating the uncertainties of additional transfer equipment.

In the 1081, AUTOCAL has been extended to include a standardize operation. This enables the user with one keystroke to simultaneously re-standardize all ranges and functions by correcting for any change in the 1081 internal reference circuitry or the Standards Laboratory prime reference.

Calibration Systems

In addition to its impressive measurement features, the 1081 has a comprehensive IEEE-488 interface capability and excellent series mode and common mode rejection, making the instrument ideal for calibration systems or precision A.T.E. applications.

Computation

The 1081 is supplied with math functions which include offset and scaling for simple linear calculations, Max, Min, and Max-Min stores for capturing the largest excursions of a signal over a period of time, and Hi and Lo limits for checking signals against predetermined tolerances.

In addition, the 1081 has Datron's patented spec readout capability, where the entire accuracy specifications are stored in the instrument's memory. This permits the worst case uncertainty for any particular measurement to be recalled at the press of a key.

SPECIFICATIONS

DC Voltage

Ranges: 100 mV to 1000V in decades.
FS: 2 x Full Range. 100% Overrange. (Except 1kV range).
Resolution: 10 nV, 7½ digits.
Total Uncertainty: (90 Day, 23° ±1°C, ±(ppmR+ppmFS)).
100 mV Range: 13+2.
1V Range: 8+1.5.
10V Range: 8+1.
100V Range: 13+1.5.
1000V Range: 13+1.5.
Temperature Coefficient: (13° 18°C and 28° 33°C, ±ppmR/°C).
100 mV Range: 1.5.
1V and 10V Ranges: 1.0.
100V and 1000V Ranges: 1.5.
CMRR: (1kΩ unbalance) >140 dB at DC, >(80 dB+NMRR) at 1 Hz-60 Hz.
NMRR: 66 dB at 50/60 Hz ±0.15% (Filter out), 120 dB at 50/60 Hz (Filter in).
Input Impedance: >10,000MΩ from 100 mV to 10V ranges, 10MΩ ±0.1% on 100V and 1000V ranges.
Input Protection: Withstands 1kV RMS on any range.
Input Current: <50pA.
Settling Time: (To 10ppm step size) <50 ms (Filter out), <1 s (Filter in).
Read Rate: 2 s.

True RMS AC Voltage

Ranges: 100 mV to 1000V in decades.
FS: 2 x Full Range. 100% Overrange. (Except 1kV range).
Resolution: 100 nV, 6½ digits.
Total Uncertainty: (90 Day, 23° ±1°C, Signal >1%FS, DC coupled below 100 Hz, ±(%R+%FS)).
100mV and 1000V Ranges:
10 Hz to 2 kHz: 0.035+0.007.
2 kHz to 20 kHz: 0.07+0.012.
20 kHz to 100 kHz: 0.14+0.022.
Add 0.01% per 100V above 500V.
1V to 100V Ranges:
10 Hz to 2 kHz: 0.02+0.005.
2 kHz to 20 kHz: 0.035+0.01.
20 kHz to 100 kHz: 0.08+0.02.
Lf Accuracy: (Add to main accuracy specifications)
DC: ±(0.01%R+0.0015%FS+10μV).
0.1 Hz: As DC coupled ±0.05%FS.
1 Hz: As DC coupled ±0.01%FS.
Hf Accuracy: (1V and 10V ranges)
100 kHz to 1 MHz: ±(2%R+1%FS).
Temperature Coefficient: (13° 18°C and 28° 33°C, ±ppmR/°C).
10 Hz to 2 kHz: 15.
2 kHz to 20 kHz: 25.
20 kHz to 100 kHz: 100.
CMRR: (1kΩ unbalance) >90 dB at DC −60 Hz.
Input Impedance: >1MΩ shunted by 150 pF.
Input Protection: Withstand 1kV RMS on any range.
Crest factor: 5:1 at full range.
Max Volt-Hertz: 2 x 10^7
Settling Time: (To 0.1% step size) <500 ms (100 Hz), <2.5s (10 Hz), <15s (1 Hz), <150s (0.1 Hz).
Read Rate: 2s.

Resistance

Ranges: 10Ω to 10MΩ in decades.
FS: 2 x Full Range, 100% Overrange.
Resolution: 1μΩ, 7½ digits.
Total Uncertainty: (90 Day, 23° ±1°C, ±(ppmR+ppmFS)).
10Ω Range: 12+3.
100Ω Range: 10+1.5.
1kΩ Range: 10+1.5.
10kΩ Range: 10+1.5.
100kΩ Range: 16+1.5.
1MΩ Range: 30+1.5.
10MΩ Range: 50+1.5.
Temperature Coefficient: (13° to 18°C and 28° to 33°C, ±ppmR/°C).
10Ω: 1.5.
100Ω: 1.0.
1kΩ: 1.0.
10kΩ: 1.0.
100kΩ: 1.0.
1MΩ: 2.0.
10MΩ: 2.5.
Open Circuit Voltage: <20V.
Lead Resistance: Up to 100Ω.
Current Through Unknown
10Ω: 10mA.
100Ω: 10 mA (1 mA-PRT).
1kΩ: 1 mA.
10kΩ: 100μA.
100kΩ: 10μA.
1MΩ: 5μA.
10MΩ: 500 nA.
Input Protection: Withstands 250V RMS on any range.
Settling Time: Up to 10kΩ generally the same as DCV.
Read Rate: 2s.

Temperature Accuracy

Total Uncertainty: (90 Day, 23° ±5°C, ±°C).
−100° to −55°C: 0.25.
−55° to 0°C: 0.1.
0° to +100°C: 0.06.
+100° to +200°C: 0.1.

Ratio Accuracy

±(net signal accuracy+net reference accuracy).

GENERAL

Calibration: Autocal from front panel or via IEEE interface.
Remote Programming: IEEE-488.
Environmental:
Operating Temp: 0° to +50°C.
Storage Temp: −40° to +70°C.
Dimensions: 88 mm (3.5 in.) high, 455 mm (17.9 in.) wide, 420 mm (16.5 in.) deep.
Weight: 10 kg (22 lb) net.
Power: 105-127V or 205-255V, 50 Hz, 60 Hz, or 400 Hz. 20 Watts approx.

CONFIGURATIONS

Model 1081: 7½ Digit AUTOCAL Standards Digital Multimeter (includes DCV, 5 Year Warranty).

OPTIONS

10: True RMS AC Converter.
20: 2-wire and 4-wire Resistance Converter.
40: Comprehensive Ratio and Rear Input.
50: IEEE-488 (1978) Standard Digital Interface.
52: Remote Trigger. (Included in Option 50.)
70: Analog Output.
80: 115V 60 Hz Line Operation.
81: 115V 50 Hz Line Operation.
82: 115V 400 Hz Line Operation.
90: Rack Mounting Kit.

ACCESSORIES

PRT 100: Platinum Resistance Thermometer Probe (100Ω). (Needs Option 40.)
1501: DMM Lead Kit.

FACTORY/FOB

Indianapolis, IN
Norwich, England