Model 456 The Millennium Range

Temperature controlled Fixed AC/DC Resistors

- Nominal Temperature Coefficient of Resistance: +0.02ppm/°C (with temperature control on)18 to 25°C
- Power Rating: 0.5 watt at +25°C
- Resistance Tolerance (Initial Resistance Accuracy): ±0.005%
- Resistance Range: 5 ohms to 3.3 megaohms
- Current Noise: <0.010µV (RMS) / Volt of Applied Voltage.
- Thermal EMF: 0.1µV/°C Max; 0.05µV/°C Typical
- The most precise and stable resistors available.
- Impervious to harmful environments - oil filled.

By temperature controlling an otherwise very stable resistor a performance close to the very best available World-wide can be achieved at a surprisingly low price. The resistor itself is oil filled and hermetically sealed.

The function of hermetic sealing is to eliminate the ingress of moisture and oxygen both of which play a role in the long term degradation of unsealed resistors. A further enhancement in both short and long term stability is achieved by oil filling. The oil also acts as a thermal conductor allowing the device to accept short periods of overload without degradation.

With accuracies of ±0.005% and a resistance range from 5 ohms to 3.3 megaohms and long term drift of less than 5ppm, these devices are virtually secondary standards that can be kept in a laboratory as references to calibrate other devices.

The Resistor is held in a temperature controlled environment heated to 30±0.1°C other temperatures are available to special order. The heater requires 2 watts at 5V which can be supplied by a battery or an unregulated DC supply. In an ambient of 20°C the Resistor's heater will warm up in typically 30 minutes, and a LED shows when the temperature has been reached. A test pocket is provided so that the resistors' temperature can be monitored if required.

0.1 ppm/month or better stability can be expected.

We can supply the value you choose ±0.1% between a minimum of 5 ohms and a maximum of 3.3 megaohms. However we bulk buy and keep in stock the following standard values: 10Ω, 25Ω, 100Ω, 1000Ω, 10,000Ω.

For the highest quality traceability we recommend that the 456 be UKAS Certified. We can offer the 2 Sigma Uncertainties shown in the table.

Measured Quantity Instrument or Gauge	Range/ Frequency	Best measurement Capability expressed as an Expanded Uncertainty (k=2)	Remarks
DC Resistance			**Resistors suitable** for oil immersion can be measured over the range 10°C to 30°C
0.1Ω to 10Ω		±0.3ppm+0.1µΩ	
10Ω to 250Ω		±0.3ppm+2.5µΩ	
250Ω to 1000Ω		±0.4ppm+10µΩ	
1KΩ to 1MΩ		±20ppm	
1MΩ to10MΩ		±55ppm	
AC Resistance			**The uncertainties can** only be realised for resistors of suitable AC characteristics
2.5Ω to 400Ω	75Hz	±15ppm	
400Ω to 1000Ω	75Hz	±100ppm	

Model No.	456 Standard value
Dimensions	144 x 110 x 96mm (in box)
Weight	1kg (including box) 550g (excluding box)
Rating	0.5 watt
Stability	Typically lppm per year at 1mA
Traceability	A Traceable Certificate accompanies your 456 to the 2 sigma uncertainties shown above.
Induction	0.08µH typical
Capacitance	0.5pf
How to Order	
	456 Temperature Controlled Fixed AC/DC Resistor
	Please specify ohmic value
	State with UKAS Calibration or without UKAS Calibration. Refer to Databook 5.
	Other Resistor ranges including the Model 836, SRA and SRB are available. Please consult Isotech.