

# JULIE TYPE CH-48T4HK

*Oil Filled Low-Ohm Precision  
Heat-Sink Resistors (Four Terminal)*

- **ABSOLUTE ACCURACY FROM 0.002%**
- **STABILITY PER YEAR FROM 0.002%**
- **SELF HEATING FROM 0.0025%/W**

The CH-48T4HK is designed for optimum performance in low resistance ranges - 1 to 100 ohms. It consists of an oil-filled, hermetically sealed resistor mounted on a specially-designed heat sink. Its four-terminal construction enables low resistance values to be obtained with the complete elimination of lead resistance uncertainties.

The specially designed, finned heat sink is composed of aluminum, and is attached to a rectangular bracket with holes for easy mounting. It is optimized for maximum heat dissipation, therefore keeping the internal temperature rise to a negligible value at currents up to 2 Amperes. The heat sink increases the dissipation power of the resistor and decreases the thermal time constant, which allows for a self-heating coefficient as low as 0.0025%/W. Please see the back of this sheet for mechanical specifications.

Rigorous selection of raw materials and rigid control at every step in the manufacturing process ensure a unit essentially immune to aging, drift, and environmental deterioration. Designers of critical military equipment will be particularly gratified by the unusually high stability of the CH-48T4HK over the ambient temperature range from -45°C to 85°C, and at high currents. All designers will appreciate the high absolute accuracies (up to 0.002%), as well as the outstanding ratio accuracies (up to 0.0015%). Glass-to-metal hermetic end seals make the resistor independent of external influences such as humidity, altitude, salt spray, fungus or dust, while its internal construction and fill ensure a high resistance to the effects of severe shock and vibration.

## SPECIFICATIONS

**Range:** Individual Resistors, 1 ohm to 100 ohms.

**Accuracy:** Standard accuracy of resistors, 0.005%. Accuracies from 0.002% to 1% are also available.

**Stability:** 0.003% per year for standard ranges.

**Load Life Stability:** 0.002% for 2000 hours.

**Accuracy Over Military Environmental Conditions:** 0.02% from -30 to +85°C.

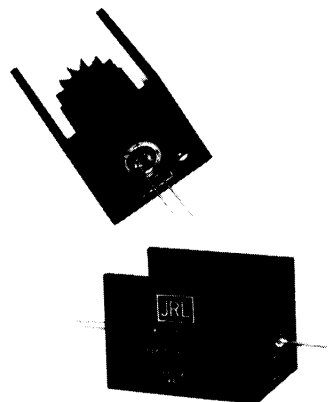
**Retrace Over Military Environmental Conditions:** 0.002%

**Temperature Coefficient:** Resistors, 5 ppm/°C standard, available as low as 1 ppm/°C. Note: Temperature Coefficient can be altered, in manufacture, over wide ranges.

**Thermal Transients:** All thermal-induced transient effects, e.g.: self-heating, Seebeck, and Peltier effects, are less than 0.0015% at rated power dissipation. Self-heating and time constants of thermal transients are reduced to 10% of normal values in air.

**Current Capability:** To 2 Amperes.

**Voltage:** Between terminals, PR volts maximum. Terminals to case, 500 volts maximum.



## 4-TERMINAL HEAT SINK APPLICATIONS

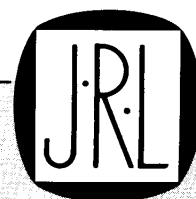
### PRODUCTION

- METER SHUNTS
- MILITARY COMPUTER NETWORKS
- OPERATIONAL AMPLIFIER SUMMING NETWORKS
- TRANSDUCER CALIBRATING NETWORKS

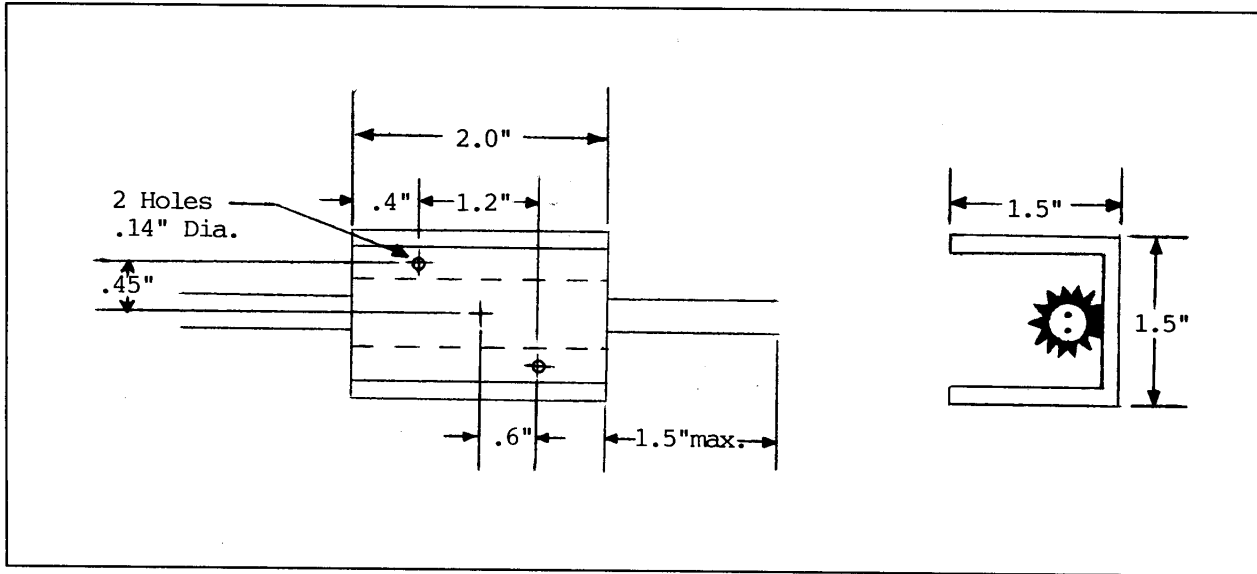
### INSTRUMENTATION

- METER SHUNTS
- OPERATIONAL AMPLIFIER SUMMING ELEMENTS
- GYRO TORQUE-CURRENT METERING
- TRANSDUCER CALIBRATION NETWORKS
- AC & DC PRECISION BRIDGE ELEMENTS
- LABORATORY SECONDARY STANDARDS OF RESISTANCE AND AC OR DC RATIO

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# STANDARD CONFIGURATION



## CONSTRUCTION

Oil-immersed in hermetically-sealed metal case, and surrounded by aluminum finned heat sink with mounting bracket. Casing provides electrostatic shielding and isolation from environmental effects other than temperature.

**Leads:** Axial, Wire

**Length:** 2"

**Width:** 1.5"

**Height:** 1.5"

**Maximum Resistance:** 100 Ohms

**Maximum Current:** 4 Amps

**Maximum Power:** 6 Watts

## ACCURACY

The CH-48T4HK resistor has been designed for use under the most extreme stresses, including field and Military environments, without requiring elaborate correction circuitry or calculations. This desirable feature has been achieved by:

1. Trimming the absolute resistance so that it is extremely close to the nominal value.
2. Designing for a low temperature coefficient.
3. Providing means for limiting the self-heating coefficient and thermal time constant, so that at the relatively low dissipations usually encountered in most precision measurements, corrections need not be made for the self-heating effect.

## CUSTOM DESIGNS

Individual resistors, groups of resistors, and resistance divider sets with two or more elements are available to higher accuracies, better temperature characteristics, and very close match. Please specify requirements fully in requesting quotations.

## REFERENCES

Information useful in the selection, specification, and application of JRL Precision Resistors will be found in the following publications (available on request from JRL):

JRL Resistor Catalog (pages B3, B4): "How to Specify and Select Precision Resistors"

JRL Brochure "Networks for Computers"

JRL Journal "PRECISION"

Volume I, No.1 - "Resistors of Very High Accuracy and Stability"

Volume II, No. 6 - "Applying the NB-1 to Computer Network Requirements"

Volume III, No. 1 - "Solving the Accuracy Attrition Problem with a Premium Grade Encapsulated Wirewound Precision Resistor"

Volume III, No. 2 - "Achieving Premium Accuracy and Exceptionally Low Reactance Over a Wide Range of Resistance Values"

Volume III, No. 3 - "Applying Low-Reactance Resistors to Quadrature Reduction in Precise AC Networks"

Volume III, No. 4 - "Ultra-Stable Time-Constant Networks for High-Accuracy Analog Integration"