

O Rngd PN # 082069

D-C RESISTANCE STANDARDS

4020-B	4030-B	4040-B
4025-B	4035-B	4045-B

TECHNICAL LIBRARY
DOCUMENT CONTROL ADMINISTRATOR



LEEDS & NORTHRUP

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1. GENERAL INFORMATION

These resistors are for use as standards in industrial and educational laboratories and are of the U. S. National Bureau of Standards type. Each resistor is made of selected manganin wire, wound bifilar on a large metal spool, stress relieved and aged to ensure permanency. The coil is immersed in moisture-free oil in a sealed metal container. The construction of the resistor permits immersion of the whole unit in oil for better temperature equalization and higher current rating. All leads are sufficiently heavy to permit connecting units in series or in parallel without departing from the computed value of the combination by more than the guaranteed limit of error. Intermediate values of resistance other than those listed can be provided.

2. SPECIFICATIONS

Terminals—Four, current/potential type.

Limits of Error—Limits of error for the nominal values listed in table below apply under conditions of normal use for one year after date of shipment. Each standard is supplied with an L&N® Certificate* giving (1) temperature coefficient data and (2) measured value at 25 C to 10 parts per million ($\pm 0.001\%$), is accurate to 50 parts per million ($\pm 0.005\%$).

The value of the resistance stated on the certificate is the value between the two amalgamated ends of the terminals at 25 C. When used as a 4-terminal resistor, the resistance value is 0.00004 ohm less than the certified value. This should be taken into consideration where it is significant.

The resistance value at any temperature other than 25 C can be calculated by using the formula on the L&N Certificate.

To maintain maximum stability, the unit should not be exposed to temperatures below 20 C or above 35 C.

Further details are given on the back of the L&N Certificate.

Current Rating—See Table I.

Size—4" x 7" x 1-7/8".

Weight—Approximately 1 pound.

* The value of resistance given is in terms of the absolute ohm and is based on reference standards maintained by L&N and certified at regular intervals by the N. B. S. Some of these reference standards have been recertified regularly by the N. B. S. for over 25 years.

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TABLE I—CURRENT RATINGS

Resistance Ohms	Current Rating Amperes		L&N No.
	For Certificate Limit of Error	For $\pm 0.02\%$ Limit of Error	
1	0.3	1.0	4020-B
10	0.1	0.3	4025-B
100	0.03	0.1	4030-B
1,000	0.01	0.03	4035-B
10,000	0.003	0.01	4040-B
100,000	0.001	0.003	4045-B

3. AMALGAMATE ENDS OF TERMINALS

To eliminate the possibility of having a high resistance contact surface at the ends of the terminals, they should have a clean bright amalgamated coating of chemically pure mercury.

To accomplish amalgamation, thoroughly clean the contact surfaces with fine grain sandpaper and carefully wipe each contact surface with a clean cloth. Fill a one-half fluid ounce bottle about one-half full with chemically pure mercury and add approximately 1/8-cubic inch of metallic sodium. Shake the bottle gently until the mercury flashes.

WARNING: Keep face away from the open end of bottle while shaking.

Turn the resistor up-side-down. Moisten the contact surfaces with a drop of water and using an eye-dropper, place a drop of sodium prepared mercury on each contact surface. When contact surfaces are thoroughly amalgamated, thoroughly wash with water; otherwise, the amalgam will turn green to form high resistance contact surfaces. To finish the process, empty the contents of the eye-dropper into the bottle containing the sodium prepared mercury. Wash out the dropper with water and refill with chemically pure mercury. Place a drop of chemically pure mercury on each contact surface. The mercury will now adhere to the ends of the terminals to form low resistance contact surfaces with high conductivity characteristics.

The procedure outlined above should be repeated as often as the ends of the terminals require it.

4. CONNECTIONS4A. Used as Two-Terminal Resistor

Under this condition the connections are made to the two amalgamated ends of the terminals (used with mercury cups).

4B. Used as Four-Terminal Resistor

Under this condition the current connections can be to either the amalgamated ends of the terminals (used with mercury-cups) or the two side thumbscrews. The potential connections are made to the two top thumbscrews.

5. USE OF THERMOMETER

The hole in the head of the resistor case is the opening of a well for inserting a suitable thermometer to check the temperature of the unit.

6. ACCESSORY COMPONENTS

L&N 127287 Adjustable Mercury-Cup Stand.

L&N 128436 Connecting Link. This link is used to short circuit the mercury-cups and permits the continuity of an electrical circuit from which a resistance standard has been removed.

