

# LIGHTNING OHM'S LAW CALCULATOR

The LIGHTNING OHM'S LAW CALCULATOR is a device for obtaining direct-reading answers to problems involving RESISTANCE, VOLTAGE, CURRENT and POWER when any two of these values are known. The directions for use are listed in order of known values. In using this CALCULATOR, keep in mind as a general rule that similar colored scales MUST always be used together in reading or setting adjacent values. This will be understood from the following directions. Actual examples of each of the problem conditions are given separately. All answers are given directly, no additional calculations being necessary. Accuracy is within the tolerance of commercial resistors.

## Voltage and Current Known

Set ARROW (I) on YELLOW-CURRENT scale, adjacent to known current value.

Read resistance on GREEN-RESISTANCE scale, adjacent to known voltage value on GREEN-VOLTAGE scale.

Read power on RED-POWER scale, adjacent to known voltage value on RED-VOLTAGE scale.

**Example:** It is desired to operate a tube from a 250-volt power supply. The rated screen voltage is 100 and the screen current 1.2 milliamperes. What value of series dropping resistor should be used? **Solution:** The series resistor will have to take care of a 150-volt drop. (250 minus 100.) Therefore the known values are: Voltage=150 volts, Current=1.2 milliamperes. First set the value of 1.2 milliamperes on the YELLOW-CURRENT scale by turning the dial so that the ARROW (I) points to the value of 1.2 milliamperes. Then locate the value of 150 volts on the GREEN-VOLTAGE scale. Adjacent to this on the GREEN-RESISTANCE scale will be found the answer of 125 kilohms. To find the power dissipated, locate the known value of 150 volts on the RED-VOLTAGE scale. Adjacent to this, on the RED-POWER scale, will be found the answer of 180 milliwatts.

## Voltage and Power Known

Set known value on RED-VOLTAGE scale, adjacent to known value on RED-POWER scale.

Read resistance on GREEN-RESISTANCE scale, adjacent to known voltage value on GREEN-VOLTAGE scale.

Read current on YELLOW-CURRENT scale, adjacent to ARROW (I).

**Example:** A 110-volt lamp is rated at 40 watts. What current does it consume and what is its hot resistance at 110 volts? **Solution:** The known values here are: voltage=110 volts, power=40 watts. These values should be set adjacent to each other on the RED-VOLTAGE and RED-POWER scales. Read the answer directly on the YELLOW-CURRENT scale adjacent to the ARROW (I). The resistance value may be read directly on the GREEN-RESISTANCE scale and will be found adjacent to the known value of 110 volts on the GREEN-VOLTAGE scale. The answer is 300 ohms and 360 milliamperes.

## Voltage and Resistance Known

Set known value on GREEN-VOLTAGE scale, adjacent to known value on GREEN-RESISTANCE scale.

Read power on RED-POWER scale adjacent to known voltage value on RED-VOLTAGE scale.

Read current on YELLOW-CURRENT scale, adjacent to ARROW (I).

**Example:** A 17,000-ohm (17-kilohm) resistor is connected across a 250-volt power supply. What current flows and what power is being consumed? **Solution:** The known values here are: voltage=250 volts, resistance=17,000 ohms. These two values should be set adjacent to each other on the GREEN-VOLTAGE and the GREEN-RESISTANCE scales. The answer in current will be found on the YELLOW-CURRENT scale adjacent to ARROW (I) and is 15 milliamperes. The power dissipation answer will be found on the RED-POWER scale adjacent to the known value of 250 volts on the RED-VOLTAGE scale and is 3.7 watts.

## Current and Power Known

Set ARROW (I) adjacent to known value of current on YELLOW-CURRENT scale.

Read voltage on RED-VOLTAGE scale, adjacent to known power value on RED-POWER scale.

Read resistance on GREEN-RESISTANCE scale, adjacent to voltage value (found in preceding step) on GREEN-VOLTAGE scale.

**Example:** A 100-watt heating element is to be wound with wire which reaches its maximum rated temperature at a current of 1.5 amperes. What will be the resistance of the element, and what voltage must be applied? **Solution:** The known values are: Current=1.5 amperes, power=100 watts. Set ARROW (I) to 1.5 amperes on YELLOW-CURRENT scale. Adjacent to 100 watts on RED-POWER scale, read 67 volts on RED-VOLTAGE scale. Adjacent to 67 volts on GREEN-VOLTAGE scale, the resistance, 45 ohms, will be found on GREEN-RESISTANCE scale.

## Current and Resistance Known

Set ARROW (I) adjacent to known value on YELLOW-CURRENT scale.

Read voltage on GREEN-VOLTAGE scale, adjacent to known value of resistance on GREEN-RESISTANCE scale.

Read power on RED-POWER scale, adjacent to voltage value (found in preceding step) on RED-VOLTAGE scale.

**Example:** A meter-reading indicates that there is a current of 75 milliamperes flowing through a resistance of 6,000 ohms (6 kilohms). What is the voltage drop across the resistor and what is the wattage dissipation? **Solution:** The known values are: current=75 milliamperes, resistance=6 kilohms. Set the ARROW (I) adjacent to the value 75 milliamperes on the YELLOW-CURRENT scale. On the GREEN-VOLTAGE scale, adjacent to the value of 6 kilohms on the GREEN-RESISTANCE scale, will be found the answer, 450 volts. To find the power dissipation, locate the value of 450 volts on the RED-VOLTAGE scale and adjacent to this on the RED-POWER scale find the answer, 33 watts.

## Resistance and Power Known

Locate the known values of resistance and power on the GREEN-RESISTANCE and RED-POWER scales. Then rotate dial until the same value of voltage on both the GREEN-VOLTAGE scale and RED-VOLTAGE scale appears adjacent to the known values of resistance and power. This matched value of voltage is the required voltage. The current value will be found adjacent to the ARROW (I).

**Example:** A 2,000-ohm resistor is rated at 5 watts. What is the maximum current that should pass through this resistor? And what is the maximum voltage to which this resistor may be subjected without exceeding its rating? **Solution:** Known values are: resistance=2 kilohms, power=5 watts. Locate these two values on the GREEN-RESISTANCE scale and the RED-POWER scale. Turn the dial until the same voltage value on both the GREEN-VOLTAGE scale and the RED-POWER scale appears adjacent to the values of 2 kilohms and 5 watts. This will be found to give a value of 100 volts. With the same setting, the ARROW (I) will indicate 50 milliamperes.

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