



DC Ammeter Shunts

Temperature Rise

In many cases it is desirable to limit the temperature rise of a shunt for increased accuracy and stability or to protect other equipment near it. A satisfactory de-rating factor "K2" may be obtained from:

$$K2 = 1 - t / 125$$

where "t" is the difference between the rated and the newly imposed rise limit.

Example: Suppose it is necessary to limit the temperature rise of a shunt type LC800 Amp 50 mV to 75°C.

What is the maximum safe load?

$$t = 125 - 75 = 50 \quad K2 = 1 - 50 / 125 = 0.6$$

$$P_{\text{rated}} \times 0.66 = 26.4 \text{ watts} = P_{\text{max}} \text{ at } 25^\circ\text{C}$$

$$K2 \times P_{\text{max}} = 26.6 \times 0.6 = 15.84 \text{ watts};$$

therefore 510 Amps represents the maximum safe load.

Environment

1. Space requirement

Any shunt by definition is a resistor and hence will generate heat with passage of current. Shunts should be mounted in a location where there is free circulation of air to carry away the heat generated. Shunt blades should be mounted in a vertical position to promote free airflow. If there is not enough natural convection, forced air cooling should be applied.

2. Enclosures

Shunts are frequently mounted in enclosures for protection from the surroundings or to safeguard operators and personnel. If the unvented enclosure is large in proportion to the amount of energy to be dissipated, there is no need for concern. If the power density is greater than 1/4 watt per square inch of enclosure surface, provision must be made for cooling air using vents or fans.

Note: Call CSI Engineering Department for mathematical formulas and examples regarding Venting, Force air cooling, Grouping, Altitude and Combinations.

Conclusion

The foregoing discussions are intended as a guide to the design engineer in the selection of the correct shunt for application and should be adequate under normal circumstances. Since it is often difficult to determine what the shunt will actually "see" in service, it is wise to use a conservative approach in all cases.

If unusual conditions exist or if the engineer is unsure of the application, CSI Engineering Department is always ready to help in the selection of shunt for the case at hand.

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