



Shunt Selection Guide

Definition: Instrument Shunt is a particular type of resistor designed to be connected in parallel with the measuring device to extend the current range beyond some particular value for which the instrument is already complete.

Any shunt by definition is a resistor and will generate heat with the passage of current. Shunt ratings are established by finding the power required to achieve a specified manganin temperature rise in free air at certain predetermined conditions.

When operating conditions are significantly different from the rating conditions, the shunt should be de-rated or up-rated accordingly to keep the manganin temperature within reasonable limits in order to prevent premature failure, reduced reliability, reduced rated accuracy or causing permanent change in resistance.

CSI's standard shunts are rated to meet IEEE Standard Requirements for Direct Current Instrument Shunt. IEEE 6.2 Current Ratings:

Selection of ratings should be based on operation at a normal current of 2/3 the rated value.

Ratings are based on mountings in accordance with Reference Test Conditions:

- **Reference Temperature:** 25°C ($\pm 2^\circ\text{C}$)
- **Position:** Current terminals and resistance blades, vertical, allowing free air circulation
- **Connections:** Tightly bolted to current bus using all terminal slots and specified depth of blade insertion – or tightly bolted to lugs with cables or proper cross-section

Since a shunt is essentially part of a bus-bar assembly, it depends on the structure to conduct away a major portion of the heat generated within the shunt and then to radiate this heat. It is important, therefore, that these connecting buses be of ample size and properly attached to the shunt.

Design Considerations

When trying to find the correct shunt rating to specify for a given application, there are four things to take into account:

- A) Duty – continuous, intermittent or surge
- B) Ambient – elevated temperature or high altitudes
- C) Temperature rise – normal or limited
- D) Environment – grouped, enclosed, forced air
- E) Combinations of A through D

Although each of these conditions will be considered separately, any combination of them may exist in a specific case. When this happens it will be necessary to use more than one of the following sections to arrive at the correct rating.