

Meter Shunt Fabrication - Parameters and Calculations



<http://www.casa.co.nz>

Meter-Shunt-Calculations.viz

Edition: 23/07/2023



Type: **RLM6-RLM6-10AWG-0Mx-xRx (shunt)**

DRAFT

General Data

Description:

This brief overview of current-shunt design for analogue meters illustrates the typical schematic and associated calculations to make a shunt to match the required measuring parameters to a specific meter.

Required Parameters:

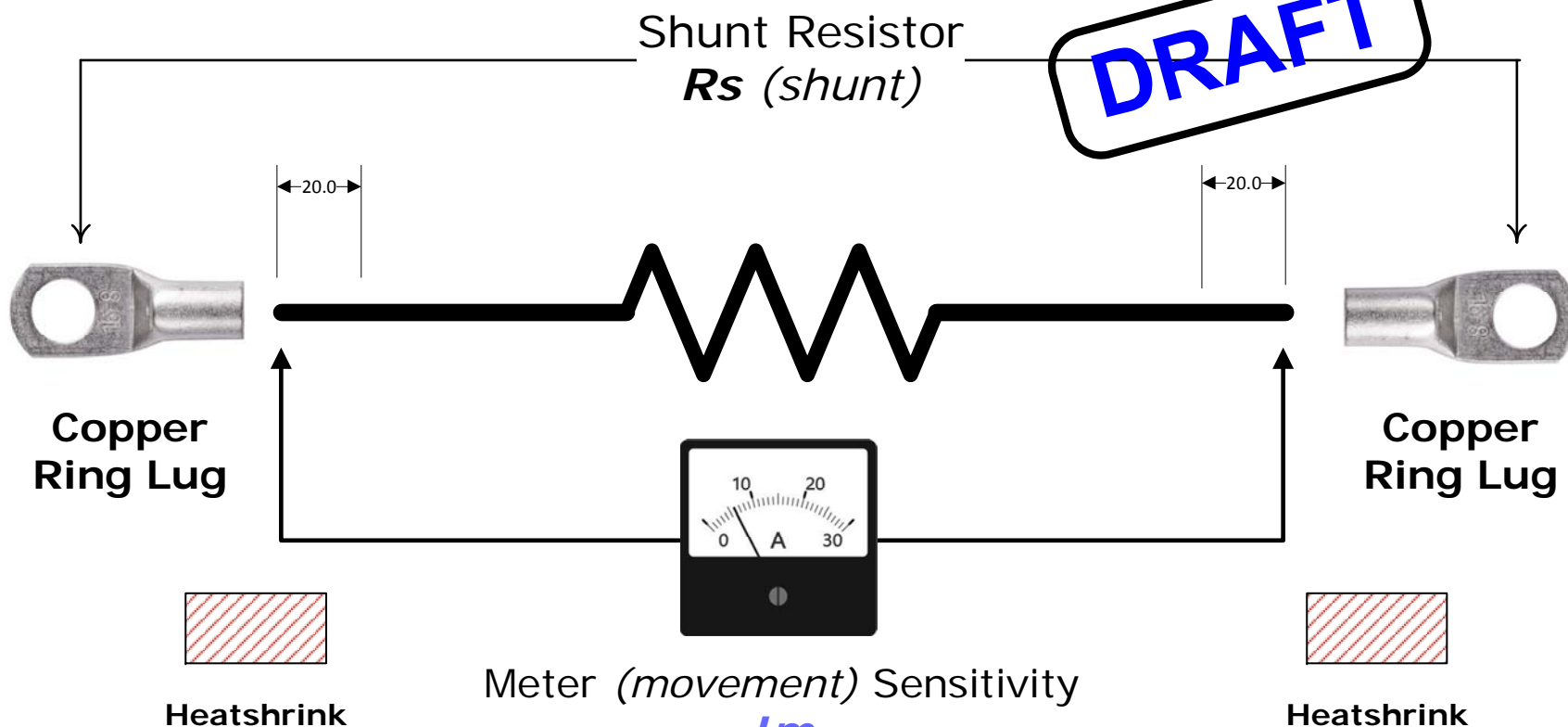
I_{fs} = The required full scale reading eg 30 Amps

I_m = Meter sensitivity = FSD eg 1 mili-Amp

R_m = Meter Internal Resistance eg 50 Ohms

Notes: There are practical considerations relating to the choice of meter, especially with regard to the manufacture, or supply, and power rating of the shunt resistor, and the native scale.

Leads from the shunt to the meter may contribute errors if not factored in.



Meter (*movement*) Sensitivity

I_m

Internal Resistance of meter

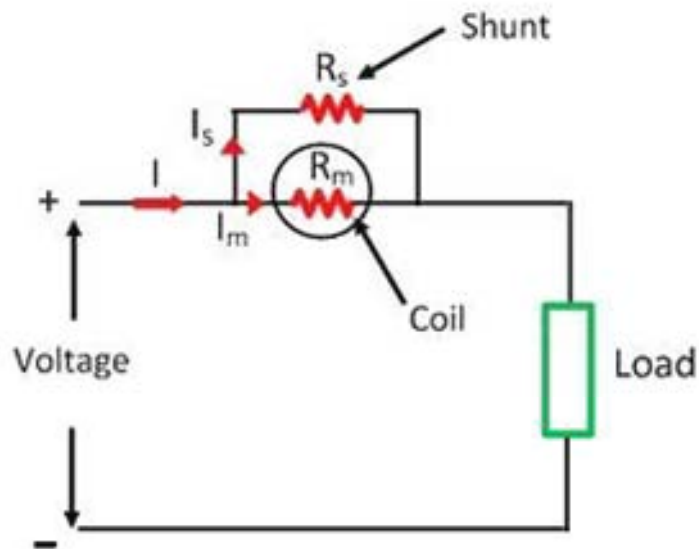
R_m

Required Full-Scale Reading

I_{fs}

See next page >

NOTICE – the information on this page is not guaranteed for accuracy – CASA accepts no responsibility (*neither expressed nor implied*) for any errors or the consequence therefrom.



The simple formula for calculating the required current-shunt resistance **Rs** (Ohms) to enable a meter with a full-scale sensitivity of **Im** (Amps) and internal resistance **Rm** (Ohms) to measure **Ifs** (Amps) is:

$$R_s = (I_m / R_m) * I_{fs}$$

Where:

Rs = Current shunt resistance (Ohms)

Im = Full-scale sensitivity of the meter (Amps)

Ifs = Current to be measured (Amps)

Rm = Internal resistance of the meter (Ohms)

Example – 1 (Shunt For 30Afs to suit a 100uA 50 Ohm meter)

Rs = Current shunt resistance (Ohms to be determined)

Im = **0.0001** (100uA) = Full-scale sensitivity of the meter (Amps)

Ifs = **30** (30 Amps) = Current to be measured (Amps)

Rm = **50** (50 Ohms) = internal resistance of the meter (Ohms)

Rs = $(0.0001 / 30) * 50 = \mathbf{0.00016666 \text{ Ohms}}$ (1.7 uOhms)

Example – 2 (Shunt For 50Afs to suit a 1mA 50 Ohm meter)

Rs = Current shunt resistance (Ohms to be determined)

Im = **0.001** (1mA) = Full-scale sensitivity of the meter (Amps)

Ifs = **50** (50 Amps) = Current to be measured (Amps)

Rm = **50** (50 Ohms) = Internal resistance of the meter (Ohms)

Rs = $(0.001 / 50) * 50 = \mathbf{0.001 \text{ Ohms}}$ (1 mOhms)

