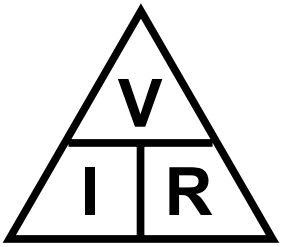
Pribusin Inc.

Section 1

Electronics Fundamentals

The Law of Mr. Georg Ohm - Ohm's Law

$$V = I \times R$$

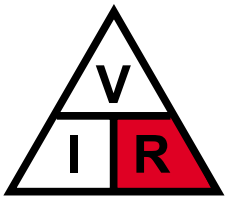


V=Voltage in Volts (V)
I=Current in Amps (A)
R=Resistance in Ohms (Ω)
(also called Load)

Mr. Ohm's Pyramid: To find any variable, cover it up and you have the right equation for that variable.

Example 1: Find the maximum allowable load in a 4-20mA loop.

Assume the loop is powered by a 24 VDC supply. Then,

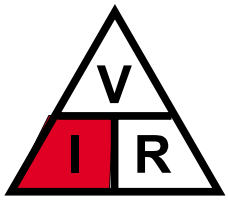


$$R = \frac{V}{I} = \frac{24}{0.020} = 1200 \text{ Ohms}$$

To allow for Power supply fluctuations a good idea is to use 20 VDC yielding a max. load of 1000 Ohms.

Example 2: Using a voltmeter to measure current in a 4-20mA loop.

Assume an instrument with a 250 ohm input impedance. Then,



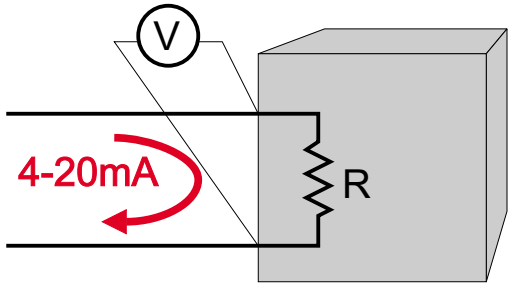
$$I = \frac{V}{R}$$

where, V=voltage measured across R
R=input impedance

If you measure a voltage of, say 3 volts accross R then,

$$I = \frac{V}{R} = \frac{3}{250}$$

= 0.012 Amps
= 12mA



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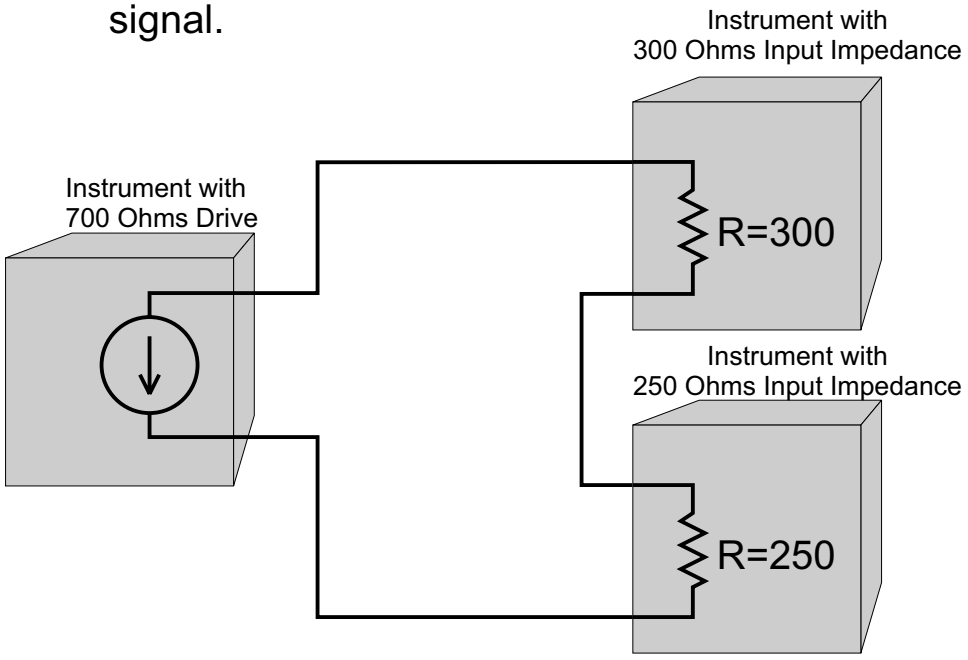
Drive vs. Impedance - Force vs. Resistance

Drive - The 'electric force' with which an output forces current into the loop

The output drive capability of an instrument is specified in ohms. This means that the total resistance of the 4-20mA loop connected to this output may not exceed this number.

Impedance - The resistance an input poses to this 'electric force'

The input impedance of an instrument is also specified in ohms. Adding together all input impedances of all units connected in the loop results in the total loop load. This figure cannot exceed the loop drive of the unit that provides the loop signal.



The total loop resistance in this loop is 300+250=550 ohms. The output drive of the left instrument is 700 ohms. This means that the output of the left instrument is almost loaded to capacity. No More instrument could be connected to this loop (except if its input impedance is less than or equal to 150 ohms).

Most of Pribusin's instruments have 1000 ohms output drive - some even have 1600 ohms drive. This allows you to connect many instruments to our outputs.

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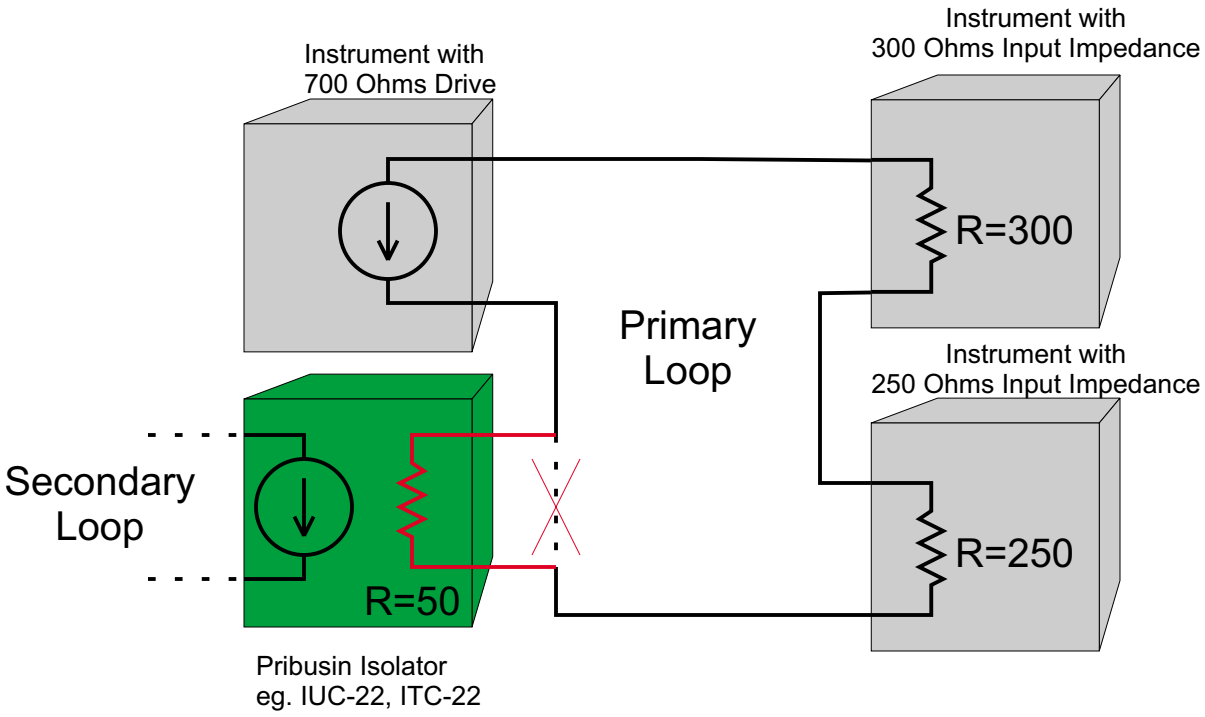
Increased Drive - A Simple Solution

If you need to connect an instrument into an already loaded loop you may find you're out of loop drive from the supplying instrument. Fortunately, Pribusin's ITC and IUC series can help increase your loop's drive by providing a secondary loop that is isolated from the primary and has its own loop drive characteristics.

The circuit below has a 550 ohm load on an output that can drive up to 700 ohms. This loop is almost loaded to capacity.



By adding a Pribusin Isolator into the Primary Loop the Primary Loop load increases by only 50 ohms to a total of 600 ohms. This is still well within the drive capability of the Primary Instrument.

BUT the Pribusin Isolator now provides a Secondary Loop with 1000 - 1600 ohms drive depending on the model used. In addition, this Secondary Loop is isolated from the Primary Loop to provide noise immunity and ground loop protection.

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