1756-RMS-SC-Wiring

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Access Level: Everyone

Question

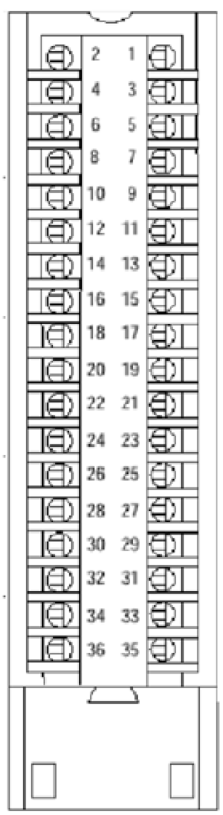
How do you wire a 1756-RMS-SC?

Answer

The following figure shows the general terminal block layout. The input signal type will determine which pins are used.

Figure 1. General Terminal Block Layout

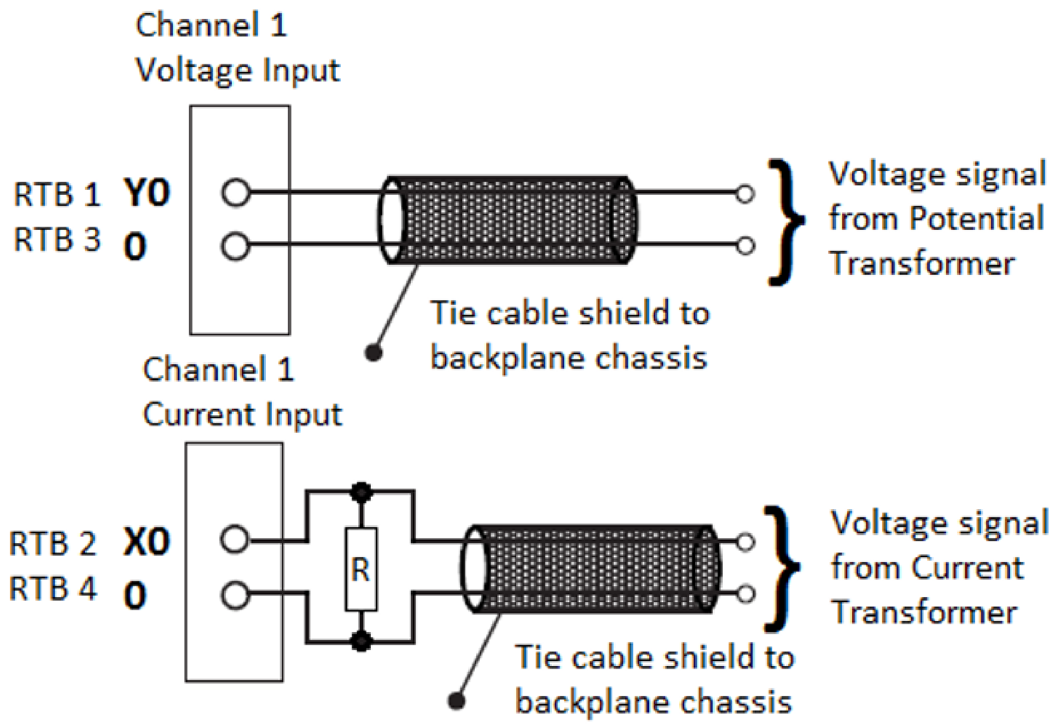
RTB Pin#	Name
2	X0
4	0
6	X1
8	1
10	X2
12	2
14	X3
16	3
18	X4
20	4
22	X5
24	5
26	X6
28	6
30	X7
32	7
34	NC
36	NC



Name	RTB Pin#
Y0	1
0	3
Y1	5
1	7
Y2	9
2	11
Y3	13
3	15
Y4	17
4	19
Y5	21
5	23
Y6	25
6	27
Y7	29
7	31
NC	33
NC	35

Voltage inputs start at the terminal block pins labeled Y0 and 0 (RTB pins 1 and 3). Current inputs start at the terminal block pins labeled X0 and 0 (RTB pins 2 and 4). Channel pairs are single-ended. For the first channel, pins 3 and 4 are connected internally as the reference terminals and should be connected to the low side of the inputs.

If the input signals are DC, the 0 terminals would be the DC common. The first channel DC voltage (positive signal) would be connected to Y0 (RTB pin 1).

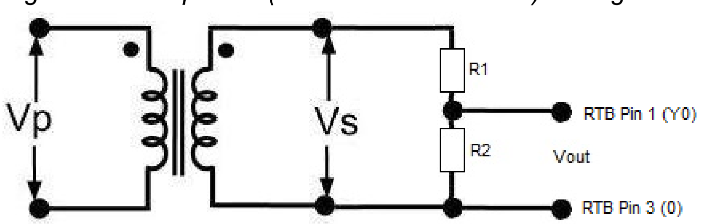


The 1756-RMS-SC module supports eight voltage/current input pairs connected individually to the module. Calculate the value of the load resistor (R=V/I) required for each current input by gathering up the following information:

- The voltage range input (V) of the current channel.
- The maximum amps output (I) of the current transformer.

A PT example using an Allen-Bradley 1497-A-CXJX-0-N, a 600 V:24 V control circuit transformer:

Figure 2. Example PT (Potential Transformer) Configuration:



Let's say this is to be used on a 480 V system. Since Vp=480 VAC and Vs=24 VAC, the nominal secondary output at a primary input of 480 V would be (480/600)*24=19.2 VAC.

The aim is to get Vout to be 5 VAC when the primary input Vp is at 480 V.

Let's say R2=5000 ohms. 5 V/5000 ohms = 1 milliamp, so R1 should be (19.2-5)/0.001=14200 ohms. A 15 Kohm resistor is easy to find.

This total resistance value – in this case 20 Kohms, keeps the current down since it is not needed on the PT.

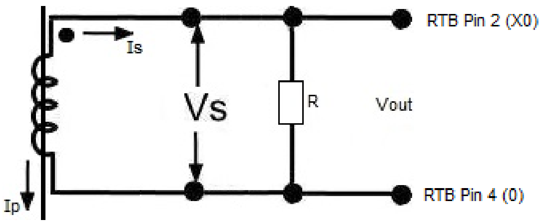
This ratio can be adjusted to trim the signal to the input as long as the total resistance R1+R2 stays high.

Vout would be 5 VAC when Vp=480 VAC which would be ideal for use with Range 1 on the RMS module.

A CT example using an Allen-Bradley 1411-615-201-1, a 200:1, ±1%, 1.5 VA burden current transformer.

The 615 is a metering grade rectangular split core transformer which means it provides enough resolution to enable accurate analysis of energy use and can be installed and removed without removing the power conductors.

Figure 3. Example CT (Current Transformer) Configuration:



Since this CT has a ratio of 200:1, when the primary input is 200 amps, the secondary output will be 1 amp.

The aim is to get Vout to be 5 VAC when the secondary current Is is at 1 amp. R=V/A so 5 Volts/1 Amp means R should be 5 ohms. In the case of the CT, we need to take into account the wattage of the resistor, so W=I2*R = 1*1*5 = 5 Watts. Therefore, this application needs a 5 Watt, 5 ohm power resistor.

That's the *theory* for the CT and burden resistor. In *practice*, it is the responsibility of the electrical engineer to measure normal full current flow through the primary of the CT with a calibrated device like an RMS clamp on ammeter and adjust the scaling factor in the 1756-RMS-SC module channel properties so the input data resembles as closely as possible what the ammeter is reading. Do not only use the theory to set the scaling or the input data will be off of the actual current.

CT Best Practices:

Pay attention to the polarity of the voltage connections from the potential and current transformers. Transformer polarity uses a 'dot' convention where the dot indicates the H1 terminals on the high side of the transformer. It might also be labeled H1 and X1, where X1 is the low side which should be connected to the reference terminal (RTB terminals 3 and 4 for channel 1).

The secondary of a current transformer should either be connected to a load resistor, or shorted if there is any chance there will be current through the primary of the current transformer.

WARNING ⚠	**Hazard to personnel due to the very high voltage and electrocution can occur.** If there is any current in the primary and the secondary is disconnected, there will be a very high voltage developed and the CT will fail due to voltage breakdown. For instance, when the leads to the burden resistor under power, the voltage rises quickly enough to maintain an arc. The easiest path to ground may be through the person opening the leads. See below for use of shorting leads to ensure a safe environment before any work is done on changing load resistor wiring.

The best practice is to use two shorting type terminals where the load resistors wiring is located, and near to the sensing input so it is easy to short the two leads together if the load resistor needs to be removed. Short the two leads together first, then work on changing the load resistors wiring. Once the load resistors wiring is finished, remove the shorting device.

- Example Jumper: 1492-CJLJ5-2 (2-Pole, Yellow plastic handle, Screwless Center Jumper).
- Example Terminal block: 1492-LM3 or 1492-JP3 (Single-circuit feed-through terminal block, 20 A).