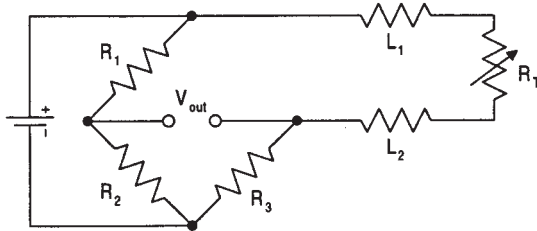
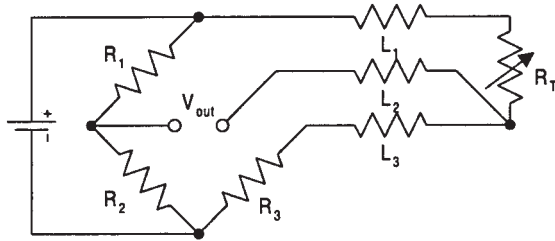


## TEMPERATURE CIRCUITS

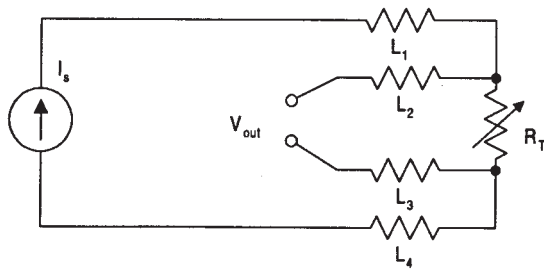
**2-WIRE CIRCUIT:** A Wheatstone bridge is the most common approach for measuring an RTD. As  $R_T$  increases or decreases with temperature,  $V_{out}$  also increases or decreases. Use an op-amp to observe  $V_{out}$ . Lead wire resistance,  $L_1$  and  $L_2$  directly adds to the RTD leg of the bridge.



**3-WIRE CIRCUIT:** In this approach,  $L_1$  and  $L_3$  carry the bridge current. When the bridge is in balance, no current flows through  $L_2$  so no  $L_2$  lead resistance is observed. The bridge becomes unbalanced as  $R_T$  changes. Use an op-amp to observe  $V_{out}$  and prevent current flow in  $L_2$ . The effects of  $L_1$  and  $L_3$  cancel when  $L_1 = L_3$  since they are in separate arms of the bridge.

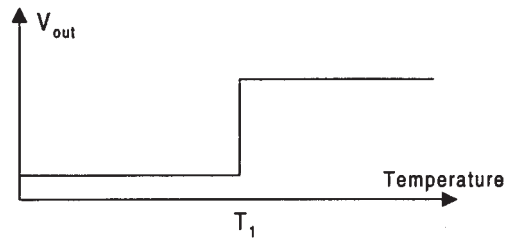
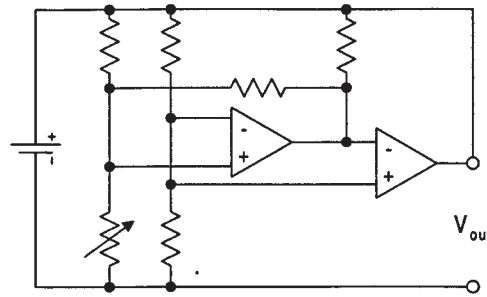


**4-WIRE CIRCUIT:** A 4-wire approach uses a constant current source to cancel lead wire effects even when  $L_1 \neq L_4$ . Use an op-amp to observe  $V_{out}$  and prevent current flow in  $L_2$  and  $L_3$ .



## TEMPERATURE SWITCH

The following circuit causes an output voltage to rail whenever the temperature of the RTD rises above a fixed value  $T_1$ . The open-collector output simplifies the interfacing of this circuit with additional electronics.



## TEMPERATURE SWITCH WITH HYSTERESIS

The following circuit uses positive feedback from the output to self heat the RTD enough to develop a hysteresis in the behavior of the switch. Once on, the temperature must drop low enough to offset the self heating before the switch will disable.

