



Application Notes

E-MAX Types RAW-1, RAW-1D, CM and CMD

The E-MAX Types RAW-1, RAW-1D, CM, and CMD are panel mounted relays with LED indication for monitoring breaker and auxiliary relay coils. The RAW-1D is identical to the RAW-1, except that the RAW-1D includes a 200 mS delay on dropout; the CM and CMD are similar (CMD has delay), but the LED indicator is connected and operates differently, as shown in Figure 1.

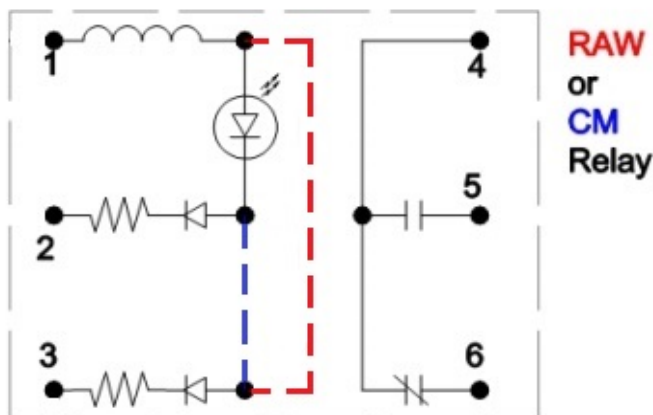


Figure 1 - RAW-1/CM Schematic

The functional difference is that for the RAW-1/RAW-1D the LED will be lit when the relay is energized through Terminals 1 & 2, but not when energized through Terminals 1 & 3. In the CM/CMD relays, the LED will be lit when the relay is energized through either path. These relays are powered by the trip bus and are energized by a very low (mA) current.

These relays can be applied in a number of ways to monitor a trip coil or auxiliary relay coil.

Indicate Breaker Position – Monitor Coil Only When Breaker Closed (RAW-1/RAW-1D only)

The RAW-1/RAW-1D can be connected to indicate breaker position.

This is the application shown in the E-MAX Trip Circuit Monitor catalog page. In this configuration, when the breaker is closed, the RAW relay is energized through Terminals 1 & 2, through the breaker coil. The Raw relay contacts are in their energized state (opposite the state shown in the diagram), and the LED is lit. If the breaker trips, the 52a contact opens, and the RAW relay is no longer energized through the breaker coil. However, the RAW relay is then energized through Terminals 1 & 3 by the 52b contact, so the RAW contacts do not change state, but the LED is dark. During this transition, the RAW coil is not energized during the brief time when the 52a contact is open but the 52b contact is not yet closed. The RAW-1D includes a 200 mS delay on dropout to allow the RAW-1D to ride through this transition without a momentary alarm.

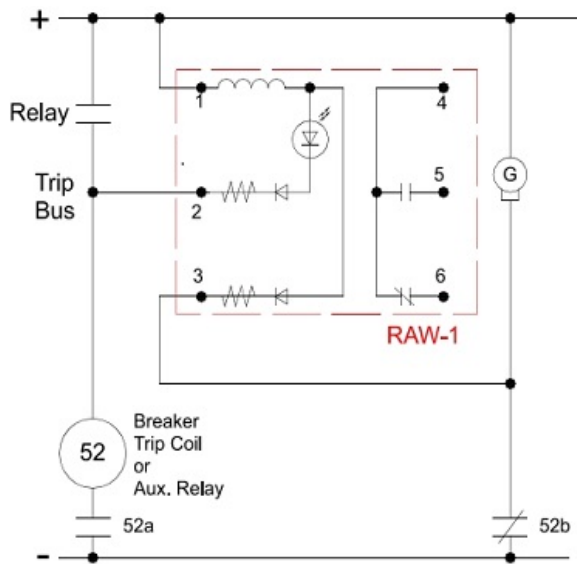


Figure 2 – Monitor Coil , Breaker Closed

Always Monitor Breaker Coil – Breaker Position Not Indicated

An RAW/CM relay can be connected to monitor the breaker coil regardless of breaker status. This can be accomplished in more than one way. If monitoring of breaker position is not required, the simplest connection that will monitor the breaker coil is shown in Figure 3.

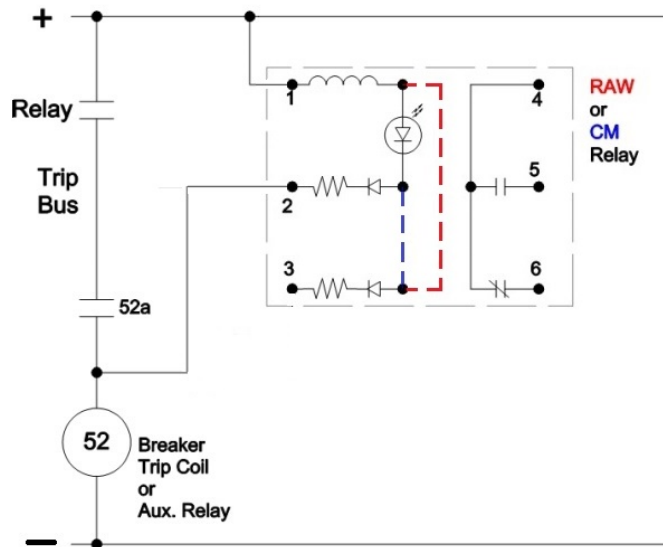


Figure 3 – Monitor Coil Only

Because the function of Terminal 2 is identical for both the RAW and CM relays, and Terminal 3 is not used, the RAW and CM will operate identically in this connection. The delay on dropout of the RAW-1D or CMD is not needed here because there is no momentary transition to ride through.

Always Monitor Breaker Coil – Breaker Position Indicated

The monitoring circuit can also be arranged such that the RAW/CM relay can monitor the coil at all times, and also indicate breaker position (Figure 4). Here the RAW and CM relay types operate differently. The RAW-1/RAW-1D relays will indicate breaker position (LED lit when breaker closed, LED dark when breaker open, contacts picked up as long as the breaker coil is intact), while in the CM/CMD relays the LED will remain lit as long as the breaker coil is intact. In fact, in this arrangement, the CM/CMD relay will operate exactly the same as in Figure 3. In this application, the RAW-1D/CMD with internal delay may be preferred; the delay on dropout would keep the relay contacts from momentarily changing state during the transition between the opening of the 52a contact and the closing of the 52b contact.

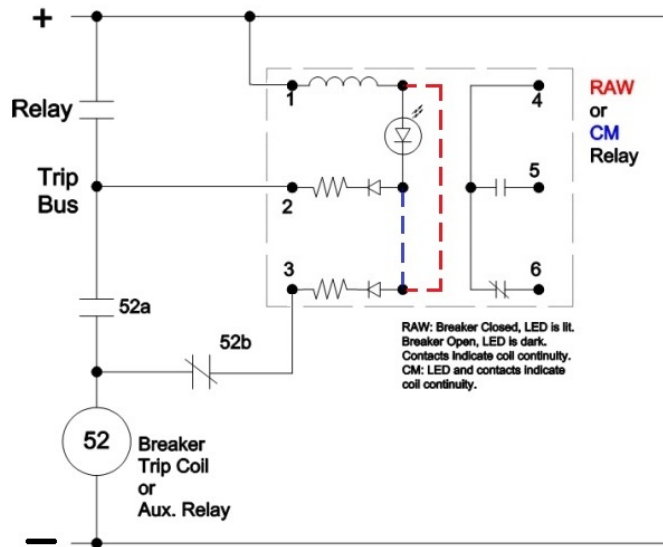


Figure 4 – Breaker coil always monitored, RAW indicates breaker position

Monitoring Breakers on a Negative Trip Bus

Monitoring breakers or auxiliary relays on a negative trip bus presents challenges when using standard trip circuit monitors because of the inherent polarity of the trip circuit monitors. One method for monitoring a breaker on a negative trip bus is shown in Figure 5.

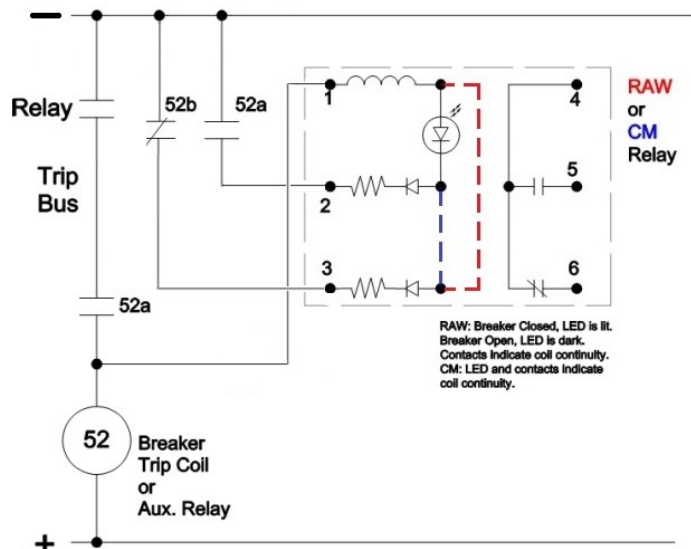


Figure 5 – Standard RAW/CM on Negative Trip Bus

This connection will monitor the breaker coil and indicate breaker position. But it requires an additional 52a contact and is more complex than when monitoring a positive bus. However, the E-MAX Type RAW-1/RAW-1D and CM/CMD are available in reverse polarity versions. This allows a breaker on a negative bus to be monitored using the same circuit as a standard RAW/CM relay on a positive bus, as shown in Figure 6.

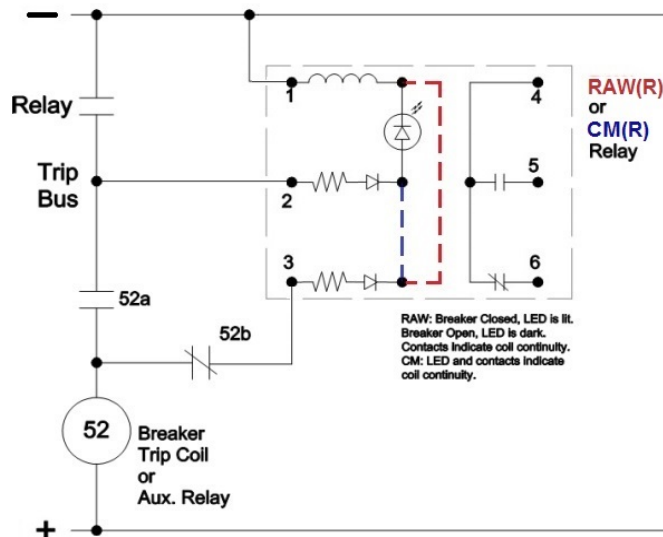


Figure 6 – Monitoring Breaker Coil on Negative Bus with Reverse Polarity RAW/CM