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Tech Tips

The useful, but oft-overlooked KMC Relay Module (REE-5501)

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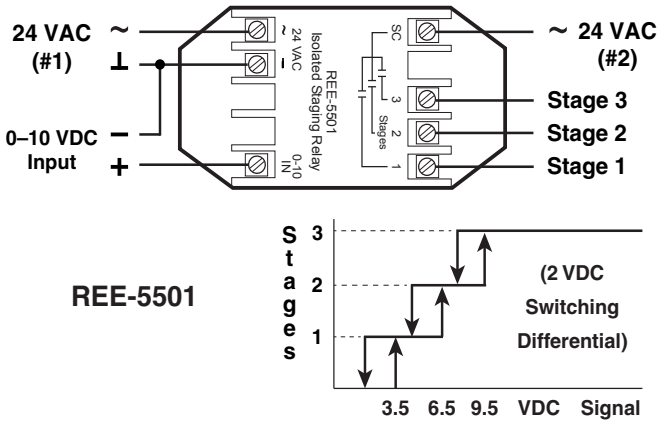
The REE-5501 Three-Stage Triac Relay Module is a hidden gem that you may never have noticed or known how useful it is. The module is designed to receive a variable 0–10 VDC signal and stage up and down three stages of triac relays. There are several reasons why you might want to use it in the right situation.

1. To control staging from only one output. With an REE-5501, you can control up to three stages from one controller output. This might allow you to use, for example, a four-output controller instead of a more expensive eight-output controller.

2. To save accessories costs. Three HPO-6701 Triac Relay Boards used in a Building Controller or a BAC/KMD-5800 series controller would cost approximately 60% more than using a single REE-5501. (Plus, an HPO-6802 Relay Board Cover is unnecessary.)

3. To simplify staging control. Since the REE-5501 has a built in start/stop differential of 2 VDC in the signal, you could control 3 stages directly from a PID Loop signal

without writing complicated staging programming. When configuring the controller's staging relay output for 0-100% and controlling it from a PID loop, a 20% differential (2 out of 10 VDC) exists. For example, if your PID Loop was set up for 3° F proportional band, the three stages of relay would be energized at about 1°, 2°, and 3° from setpoint and de-energized at 0.6° below the starting points or approximately 0.4°, 1.4°, and 2.4°.



The following BACnet examples show only the raw programming. Allowances for locking out the staging for such things as fan status or occupancy would need to be added.

AO1 is an Analog output configured for 0–10 VDC equaling 0–100%. LOOP1 is a PID loop producing a 0–100% value based on the setpoint and controlled point entered. (For KMDigital equivalents, replace AO# with OUT#, LOOP# with CON#, and AV# with VAR# below.)

Example 1:

AO1 = LOOP1

Disadvantages of this simple example are the inability to easily determine how many stages are on and the lack of stage delays other than the delays caused by the 20% differential control.

Example 2:

Here, LOOP1 is the PID loop calculating the controlled error such as room temperature. A, B, C are local variables use to calculate the stage. (Be sure to select local variables that do not conflict with any other local variable already in use.) AV10 shows the number of stages being commanded. AO1 is the controller's stage analog output, configured for 0–10 VDC, controlling the REE-5501.

10 IF LOOP1 < 1 THEN STOP A

20 IF LOOP1 > 33 THEN START A

30 IF LOOP1 < 33 THEN STOP B

40 IF LOOP1 > 66 THEN START B

50 IF LOOP1 < 66 THEN STOP C

60 IF LOOP1 > 99 THEN START C

70 AV10 = A + B + C : REM ---- Calculated number of stages ------

80 IF AV10 > 2.8 THEN AO1 = 10

90 IF AV10 > 1.8 AND AV10 < 2.5 THEN AO1 = 7

100 IF AV10 > 0.8 AND AV10 < 1.5 THEN AO1 = 4

120 IF AV10 < .5 THEN AO10 = 0

Example 3:

Here, the second and third stages have a delay of five minutes. Replace lines 10–60 in Example 2 above with the following code:

10 IF LOOP1 < 1 THEN STOP A

20 IF LOOP1 > 33 THEN START A

30 IF LOOP1 < 33 THEN STOP B

40 IF LOOP1 > 66 AND TIMEON(A) > 0:05:00 THEN START B

50 IF LOOP1 < 66 THEN STOP C

60 IF LOOP1 > 99 AND TIMEON(B) > 0:05:00 THEN START C

"Marry an orphan: you'll never have to spend boring holidays with the in-laws."

—George Carlin