



SCOPE

This test procedure covers the testing of the Basler BE1-81O/U under/over frequency relay. Refer to IM 9137300990 Rev. M (02/13) for testing support information and component level identification. See pages 4-21 through 4-22 for internal wiring and schematics and Section 5 for manufacturer test procedures.

SAFETY

The rated voltage range of this relay is 40 to 132Vac. Exceeding the upper limit for extended periods of time may damage the relay.

Ensure that DC power supply voltage is applied safely to terminals 3-4. Use caution during testing.

INTRODUCTION

The BE1-81O/U Digital Frequency Relay monitors the frequency of a single-phase, ac voltage and provides accurate frequency protection for a distribution system or generator operating at 50 or 60 hertz.

The BE1-81O/U can be specified with up to four independently adjustable frequency setpoints and time delays with associated output relays and target indicators.

TOOLS, EQUIPMENT, AND MATERIALS

- One variable ac voltage source with variable frequency and latch timer
- Variable dc voltage/current source

INSPECTION

1. Remove the cover from the relay, taking care to not shake or jar other relays around it.
2. Pull the relay-connecting plug(s) to disable the trip circuit and remove the voltage input.
3. Unlatch and remove the relay from the case.
4. Visually check the relay for any obvious problems.
5. Clean the relay thoroughly.

TEST PROCEDURE

This procedure will test the ranges of the underfrequency pickup, overfrequency pickup, and time delays.

1. Find the style number on the relay and check the style number identification chart in *Figure 1* to determine the appropriate voltage setting for the power supply.
2. Connect the appropriate power supply voltage source to Terminals 3 and 4, apply, and verify that the power LED illuminates.
3. Connect the variable frequency voltage source to Terminals 6 and 7.

UNDERVOLTAGE INHIBIT TESTING

1. Apply nominal sensing voltage (120Vac) at 60 Hz to terminals 6 and 7.
2. Adjust the front panel, setpoint 1 controls to the following settings.
Over/Under Selector Switch: Under (U) position
Frequency Selector Switch: 60.00
Time Delay Selector Switch: 25
3. Decrease the level of the sensing input voltage until it is less than the Undervoltage Inhibit control setting, indicated by the Undervoltage Inhibit indicator lighting.
NOTE: The range of the Undervoltage Inhibit setting is 40 to 120 Vac.
4. Decrease the frequency of the sensing input voltage to 59 Hz. The setpoint 1 Pickup indicator should not light and the setpoint 1 output relay should not operate.
5. Increase the level of the sensing input voltage until it exceeds the level of the undervoltage inhibit setting. The Undervoltage Inhibit indicator should turn off, the setpoint 1 Pickup indicator should light, and the setpoint 1 output relay should operate after the Time Delay Selector switch setting expires.

HIGH AND LOW FREQUENCY PICKUP TESTING

1. If applicable, adjust Selector Switch S7 for setpoint 1, located on the definite time circuit board controlling setpoint 1 (upper board), to obtain a time delay in cycles with a x1 multiplier
NOTE: Earlier BE1-81O/U relays with timing option E1 had a timing range of 3 to 99 cycles and did not include Selector Switch S7. Earlier relays with timing option

E2 had a timing range of 3 to 99 cycles.

2. Adjust the front panel, setpoint 1 controls to the following settings:
 - Over/Under Selector Switch: Over (O) position
 - Frequency Selector Switch: 70.00
 - Time Delay Selector Switch: 25
3. Apply nominal sensing voltage (120Vac) at 60 Hz to terminals 6 and 7.
NOTE: The level of voltage must exceed the setting of the adjustable, front panel Undervoltage Inhibit control.
4. Slowly increase the sensing voltage frequency until the setpoint 1 Pickup indicator lights. The sensing input frequency should be 70 Hz, ± 0.01 Hz.
5. Apply nominal sensing voltage (120Vac) at 60 Hz to terminals 6 and 7.
6. Adjust the front panel, setpoint 1 controls to the following settings:
 - Over/Under Selector Switch: Under (U) position
 - Frequency Selector Switch: 50.00
7. Slowly decrease the sensing input frequency until the setpoint 1 Pickup indicator just lights. The sensing input frequency should be 50 Hz, ± 0.01 Hz.
8. Additional overfrequency or underfrequency pickup up points may be tested by selecting the appropriate frequency setpoint with the frequency selector switch, applying nominal sensing voltage and frequency, and ramping the frequency to pickup indicated by the appropriate pickup indicator.
NOTE: The frequency pickup should be ± 0.01 Hz of the setpoint setting

FREQUENCY TIMING TESTING

1. Monitor the setpoint 1 output at terminals 1 and 10. (if the relay style includes an auxiliary frequency output, also test this function at terminals 2 and 5)
2. Adjust the front panel, setpoint 1 controls to the following settings:
 - Over/Under Selector Switch: Under (U) position
 - Frequency Selector Switch: 55.0
 - Time Delay Selector Switch: 11
3. Apply nominal sensing voltage (120Vac) at 60 Hz to terminals 6 and 7.
4. Reset all targets.
5. Step the frequency down to 53 Hz starting your pickup timer. Record the pickup time.
NOTE: The time delay should be 0.208 seconds (11 cycles x 1/53, ± 1.0 cycles).
6. Apply nominal sensing voltage (120Vac) at 60 Hz to terminals 6 and 7.
7. Adjust Selector Switch S7 for setpoint 1, located on the definite time circuit board controlling setpoint 1 (upper board), to obtain a time delay in seconds with a x1 multiplier.

NOTE: Earlier BE1-81O/U relays with timing option E1 had a timing range of 3 to 99 cycles and did not include Selector Switch S7. Earlier relays with timing option E2 had a timing range of 3 to 99 cycles.

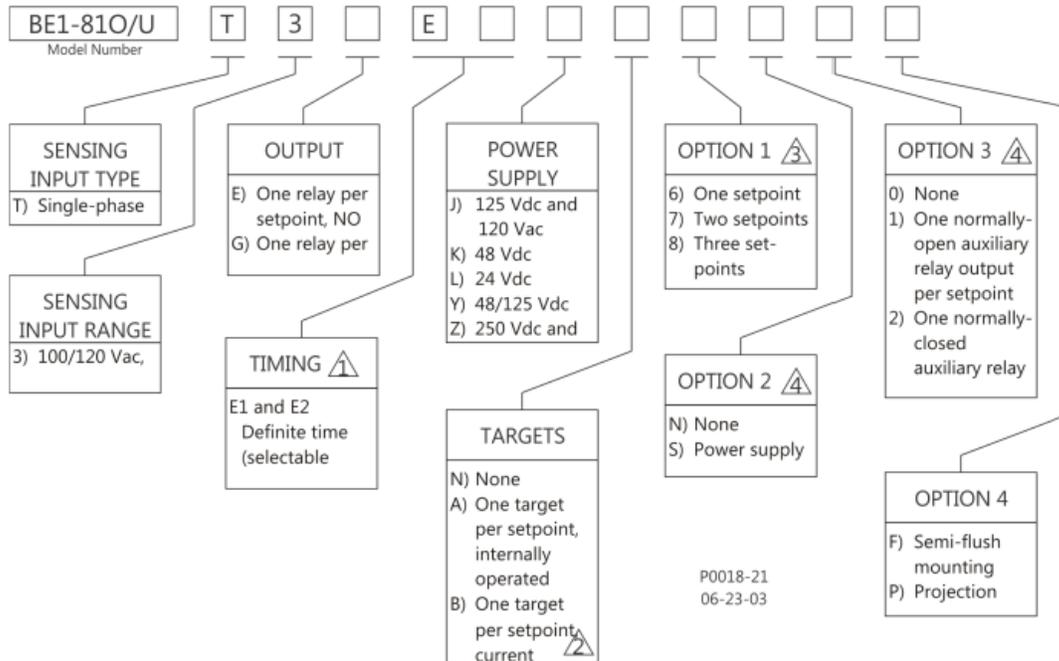
8. Adjust the front panel, setpoint 1 controls to the following settings.
Over/Under Selector Switch: Under (U) position
Frequency Selector Switch: 55.00
Time Delay Selector Switch: 25
9. Step the frequency down to 53 Hz starting your pickup timer. Record the pickup time.
NOTE: The time delay should be 2.5 seconds ± 0.05 seconds for relays with the S7 Selector Switch and 0.472 seconds (25 cycles $\times 1/53$, ± 1.0 cycles) for relays without the S7 Selector Switch.
10. Other overfrequency or underfrequency timing setpoints may be tested by selecting the appropriate function (U or O), time delay, applying nominal voltage and frequency, and stepping the frequency beyond the frequency pickup. (lower for underfrequency, higher for overfrequency).

OTHER SETPOINT TESTING

Repeat the test procedure for all subsequent setpoints using the following output contact terminals:

Setpoint 2 output:	Terminals 8 and 9
Setpoint 2 Aux output:	Terminals 11 and 12
Setpoint 3 output:	Terminals 13 and 14
Setpoint 3 Aux output:	Terminals 15 and 16
Setpoint 4 output:	Terminals 17 and 18
Setpoint 4 Aux output:	Terminals 19 and 20

FIGURE 1 Style Legend



NOTES

- ⚠ BE1-810/U relays with hardware version M and higher, with Timing Option E1 or E2, have an extended timing range. The new range for both timing options is identical at 3 cycles to 990 seconds (16.5 minutes).
Earlier relays with Timing Option E1 had a timing range of 3 cycles to 99 cycles and did not include range selection switches. Earlier relays with Timing Option E2 had a timing range of 3 to 99 seconds.
- To provide rearward compatibility for users of the BE1-810/U with Timing Option E1, new units are shipped with the timing range switches set in default positions to emulate the E1 timing range.
- ⚠ Target B should be selected only if Output E is specified.
- ⚠ If Option 1 is 6 or 7, an S1 case is required. If Option 1 is 8 or 9, an M1 case is required.

FIGURE 2 Internal Relay Connections

