

# INSTRUCTIONS

FOR

## DC MILLIVOLT SENSING RELAYS BE3-74SH, BE3-74SL, and BE3-74SD

Basler Electric  
Phone 618 654-2341  
Route 143 Box 269  
Highland IL 62249 USA

Power Systems Group  
Fax 618 654-2351  
<http://www.basler.com>  
[info@basler.com](mailto:info@basler.com)

### INTRODUCTION

BE3 dc millivolt sensing relays provide voltage monitoring and protection for any application where dc voltage levels are critical. A common application is overcurrent protection for dc charging systems. Millivolt input signals from shunts, sensors or transducers can provide the input signals. Undervoltage, overvoltage and combined over/undervoltage units are available. An external time delay control provides an adjustment of 0 to 10 seconds (operating time is typically 200 milliseconds). This time delay may be used to prevent false tripping when there are slight variations in the input signal. BE3 dc millivolt relays operate when the externally adjustable trip point is reached. On overvoltage units, the output relay energizes when the input signal exceeds the trip point. On undervoltage units, the output relay de-energizes when the input signal goes below the trip point. A red LED indicates the state of the relay. A green LED indicates the condition of the power supply.

### ELECTRICAL SPECIFICATIONS

U.L. Listed, CSA Certified, C.E. Compliant

#### INPUT

Nominal sensing input voltages are 50 mVdc, 100 mVdc, and 10 to 999 mVdc (specify nominal range). All units require external operating power. Nominal external operating power 45 to 65 hertz - 120 Vac, 240 Vac, 380 Vac, 480 Vac, ( $\pm 25\%$ ) and 24 Vdc ( $\pm 20\%$ , galvanically isolated).

#### Impedance

Input 50 kohms  
Source 100 ohms maximum

#### Burden

Voltage input burden is 2 VA for relays with ac external power and less than 3 W for relays with 24 Vdc external power.

#### Overload

10 times nominal continuously.

#### SETPOINT

Range Undervoltage Adjustable 0% to 80% of nominal  
Range Overvoltage Adjustable 40% to 120% of nominal  
Time Delay Adjustable 0 to 10 sec  
Repeatability Better than 0.5% of full span  
Differential Fixed 5% of nominal  
Operating Time 200 ms typical

#### OUTPUT

Relay Type D.P.D.T.  
AC Rating 250 V, 5 A, non-resistive, 1200 VA  
DC Rating 125 V, 1 A, resistive, 120 W  
Mechanical Life 5 million operations

### PHYSICAL SPECIFICATIONS

Operating Temperature 0° C (+32° F) to +60° C (+140° F)  
Functional Temperature -25° C (-13° F) to +70° C (158° F)  
Storage Temperature -40° C (-40° F) to +70° C (+158° F)  
Temperature Coefficient 0.03% per °C (200 ppm/°C)  
Relative Humidity 95% noncondensing  
Mounting DIN rail 1.38" by 0.29" (35 mm by 7.5 mm)  
Complies with IEC 529, DIN 40050, BS 5490  
Case Weight  
Single Unit 0.88 lbs. (0.4 kg)  
Combined Unit 1.32 lbs. (0.6 kg)  
Size  
Single Unit 2.17" wide (55 mm)  
Combined Unit 3.93" wide (100 mm)  
Case Material Complies with UL 94VO

### OPERATION

BE3-74SH and BE3-74SL dc millivolt sensing relays have two external, user adjustable controls marked SET and DELAY. The BE3-74SD has four controls: UNDER SET, UNDER DELAY, OVER SET, and OVER DELAY. The SET control adjusts the relay trip point. An overvoltage trip causes the relay output to energize when the voltage rises above the SET threshold. The overvoltage SET level is adjustable from 40% to 120% of nominal input ( $V_{nom}$ ). An undervoltage trip causes the relay output to de-energize when the voltage decreases below the SET threshold. The undervoltage SET level is adjustable from 0% to 80% of nominal input. Time delay is the amount of time that elapses after the trip point is reached and when the output relay operates.

#### Setting Example

A BE3-74SH relay with a nominal input rating of 100 mVdc has the following settings:

SET - 80%  
DELAY - 4 sec

A trip occurs when the sensing voltage rises above 80 mVdc and 4 seconds elapse. Reset occurs when the voltage decreases below 75 mVdc (5% of nominal below the set point).

### INSTALLATION

BE3 dc millivolt sensing relays are designed for mounting on standard DIN rails that comply to DIN-EN 50022. Mounting involves hooking the top edge of the cutout on the base of the case over one edge of the DIN rail. The opposite side of the cutout containing the release clip is then pushed over the opposite side of the DIN rail. To remove or reposition the relay, lever

the release clip and move the relay as required. BE3 relays should be installed in a dry, vibration free location where the ambient temperature does not exceed the operating temperature range. Connections to the relay should be made using wire that meets applicable codes and is properly sized for the application. Figure 1 shows the input connections for the BE3-74SH, BE3-74SL, and BE3-74SD relays.

### CALIBRATION

The calibration marks on the face plate have a maximum error of 10% and are provided only as guides. Proper calibration requires using an accurate millivolt meter in parallel with the input signal. Use the following procedure to calibrate your relay.

### OVERVOLTAGE

1. Adjust the SET control fully clockwise (CW) and the DELAY control fully counter-clockwise (CCW).
2. Apply the desired trip voltage to the relay.
3. Slowly (allow for the 200 ms operating time) adjust the SET control CCW until the relay trips.
4. Remove the applied voltage (do not change the voltage level) and set the DELAY control to the desired time delay.
5. Apply the trip voltage to the relay and measure the time to trip.
6. Adjust the DELAY and repeat steps 4 and 5 until you have the desired time delay.

### UNDervOLTAGE

1. Adjust the SET and DELAY controls fully CCW.
2. Decrease the applied sensing voltage from the nominal value until the desired tripping voltage is reached.
3. Slowly (allow for the 200 ms operating time) adjust the SET control CW until relay trips.
4. Set the DELAY control to the desired time delay and apply nominal voltage to the relay.
5. Step down the applied voltage from nominal to a level just below the trip level set in Step 3 and measure the time delay.
6. Adjust the DELAY and repeat steps 4 and 5 until the desired time delay is achieved.

### MAINTENANCE

BE3 relays are solid-state devices that require no maintenance. In the event that your relay requires repair, contact Basler Electric, Highland, IL, USA for return authorization.

### BE3 DC MILLIVOLT RELAYS

Figure 2 shows the BE3 style number identification chart.

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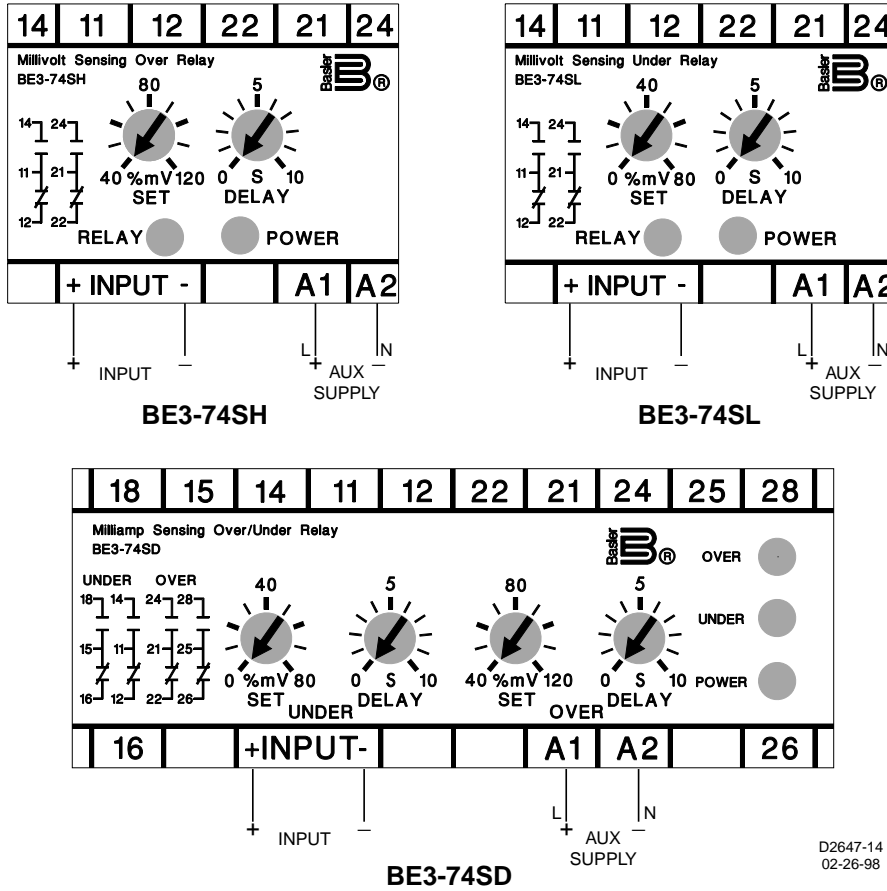


Figure 1. BE3-74SH, BE3-74SL, And BE3-74SD Input Connections

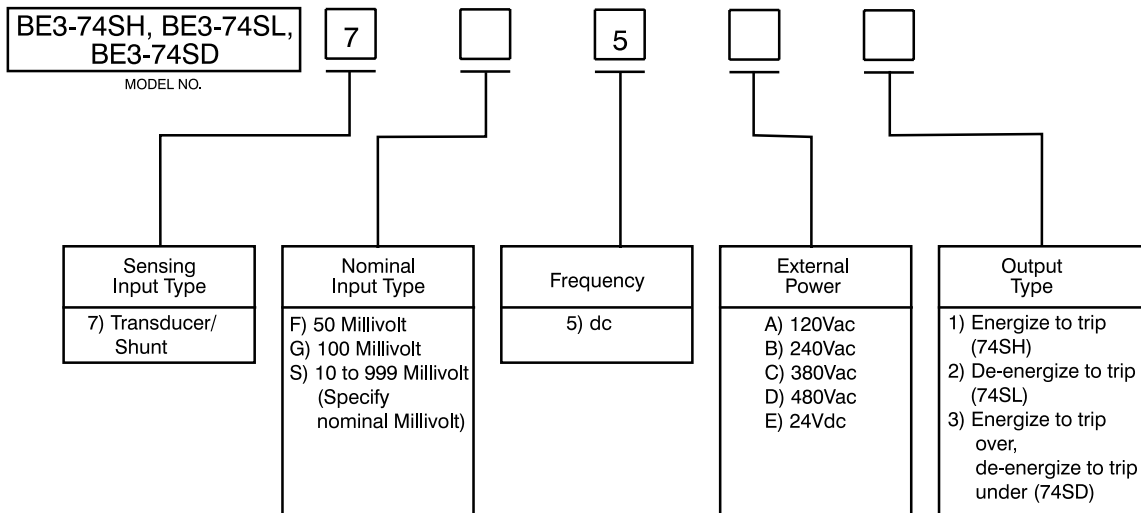


Figure 2. BE3-74SH, BE3-74SL, And BE3-74SD Style Number Identification Chart