Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid-State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or on-line at http://www.ab.com/manuals/gi) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary we use notes to make you aware of safety considerations.

<table>
<thead>
<tr>
<th>WARNING</th>
<th>Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPORTANT</td>
<td>Identifies information that is critical for successful application and understanding of the product.</td>
</tr>
</tbody>
</table>
| ATTENTION   | Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:  
  - identify a hazard  
  - avoid a hazard  
  - recognize the consequence |
| SHOCK HAZARD| Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that dangerous voltage may be present. |
| BURN HAZARD | Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that surfaces may be dangerous temperatures. |
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1 Safety Instructions

1.1 Designated Use
The Bulletin 840E is a level switch for all kinds of fluids and is used in tanks, containers and pipelines. The device has been safely built with state-of-the-art technology and meets the applicable requirements and EC Directives. It can, however, be a source of danger if used incorrectly or for anything other than the designated use.

1.2 Installation, Commissioning, and Operation
Only personnel familiar with these types of products and associated machinery should plan or implement the installation, start-up, configuration, and subsequent maintenance of the Bulletin 840E level switch.

ATTENTION: Installation and commissioning must be carried out by qualified individuals. Failure to comply may result in personal injury or equipment damage.

1.3 Operational Safety
  • Functional safety
    The Bulletin 840E level switches were developed according to the standards EN 60068 and EN 61326.
  • Hazardous areas
    The Bulletin 840E is not approved for use in intrinsic safety (hazardous area) applications.

1.4 Return
Before returning a device to Rockwell Automation, be sure to remove all fluid residue. This is particularly important if the fluid is a health hazard, e.g. flammable, toxic, caustic, carcinogenic, etc.

ATTENTION: Do not return a measuring device if you are not absolutely certain that all traces of hazardous substances have been removed, e.g. substances which have penetrated crevices or diffused through plastic.
2 Product Identification

Notes:

- Specifications and ratings may differ from those shown in Figure 1, depending on particular model. Refer to product nameplate or catalog for actual ratings and specifications.

- The series number indicates the version of the switch. A change in the series letter does not have any effect on the compatibility.
3 Installation

3.1 Dimensions

3.1.1 1/2 in. NPT and 3/4 NPT Process Connection [mm (in.)]

Figure 3.1: NPT Dimensions
3.1.2 G 1/2 Process Connection [mm (in.)]

![Diagram of G 1/2 Process Connection]

3.1.3 Product Selection

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Description</th>
<th>Description</th>
<th>Temperature</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>840E-T82B3A1E4</td>
<td>G 1/2</td>
<td>2-WIRE</td>
<td>19...235V AC, 100 °C</td>
<td>1/2 NPT Valve Connector</td>
</tr>
<tr>
<td>840E-T82B2A1E4</td>
<td>3/4 in. NPT</td>
<td>2-WIRE</td>
<td>19...235V AC, 100 °C</td>
<td>1/2 NPT Valve Connector</td>
</tr>
<tr>
<td>840E-T82B1A1E4</td>
<td>1/2 in. NPT</td>
<td>2-WIRE</td>
<td>19...235V AC, 100 °C</td>
<td>1/2 NPT Valve Connector</td>
</tr>
<tr>
<td>840E-T81B3A1D4</td>
<td>G 1/2</td>
<td>3-WIRE PNP</td>
<td>10...35V DC, 100 °C</td>
<td>M12 Connector</td>
</tr>
<tr>
<td>840E-T81B2A1D4</td>
<td>3/4 in. NPT</td>
<td>3-WIRE PNP</td>
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<td>10...35V DC, 100 °C</td>
<td>M12 Connector</td>
</tr>
</tbody>
</table>
3. 2 Installation Instructions

3.2.1 Handling

Figure 3.3: Hold by the housing, not by the sensor fork

$Ra < 3.2 \, \mu m$

Figure 3.4: Do not bend, shorten or lengthen.
3.2.2 Mounting Examples

Figure 3.5: A = Switchpoint, B = Switching Hysteresis
3.2.3 Viscosity and Build-up

Figure 3.6: Take into account viscosity and build-up.
3.2.4 Sensor Fork Alignment

$v = 0...10000 \text{ mm/s} \quad (0...15.50 \text{ in/s})$

$v = 0...2000 \text{ mm/s} \quad (0...3.10 \text{ in/s})$

Figure 3.7: Align Sensor Fork (note mark)
Wiring

4 Wiring

4.1 DC-PNP Version with M12 Connector

Operating Mode MAX (NC Contact)  Operating Mode MIN (NO Contact)

![Diagram of DC-PNP Wiring]

4.1.1 Mating Cables [mm (in.)]

2 m (6.5 ft) PVC Cable with 4-pin micro (M12x1) connector and ratcheted epoxy-coated zinc coupling nut.
Catalog number: **889D-F4AC-2**

2 m (6.5 ft) PVC Cable with 4-pin micro (M12x1) right-angle connector and ratcheted epoxy-coated zinc coupling nut.
Catalog number: **889D-R4AC-2**

**Note:** Other cable lengths are available and shielded cables may be required for some analog output applications – refer to the On-Machine Connectivity catalog (publication #M115-CA001A-EN-P) for additional information.
### 4.1.2 DC-PNP Operation

<table>
<thead>
<tr>
<th>Light Status</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
</table>
| **Green light ON:** | Sensor is connected to power supply and operational | - |}
| **Yellow light ON:** | Sensor is immersed in liquid | - |}
| **Red light ON:** | Overload or short-circuit in load circuit | - Rectify the short circuit  
- Reduce maximum load current to below 250 mA | |}
| **Green light OFF:** | Error: No power supply | - Check plug, cable and power supply | |}
| **Red light flashing:** | Internal sensor error or sensor corroded | - Replace device | |}

---

**Figure 4.2: DC-PNP Operation**

- Rectify the short circuit
- Reduce maximum load current to below 250 mA
- Replace device

---
4.2 AC Version with Valve Connector NPT 1/2

Operating Mode MAX

Operating Mode MIN

R = External Load
I = 250 mA Maximum
U = 19...253V AC

Figure 4.3: AC Wiring.

4.2.1 Mating Cables

Optional cordset 2 m (6.5 ft) DIN valve. Catalog number: **889V-RZ3ABE-2**

1 Brown
2 Blue
3 Black
GND Yellow/Green
### 4.2.2 AC Operation

<table>
<thead>
<tr>
<th>Status</th>
<th>MAX</th>
<th>MIN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Green light ON:</strong></td>
<td>Sensor is connected to power supply and operational</td>
<td></td>
</tr>
<tr>
<td><strong>Red light ON:</strong></td>
<td>Mode of operation MAX (overfill protection): sensor is immersed in liquid</td>
<td></td>
</tr>
<tr>
<td><strong>Green light OFF:</strong></td>
<td>Error: No power supply</td>
<td>Check plug, cable and power supply</td>
</tr>
<tr>
<td><strong>Red light flashing:</strong></td>
<td>Error: Overload or short-circuit in load circuit</td>
<td>Rectify the short circuit</td>
</tr>
<tr>
<td><strong>Error:</strong></td>
<td>Internal sensor error or sensor corroded</td>
<td>Replace device</td>
</tr>
</tbody>
</table>

**Figure 4.4: AC Operation**

- **Light On**
- **Light Off**

- **U ~ (AC)**: 50–60 Hz
- **L1**: V 1 ≤ U ≤ V 2
- **N**: I ≤ 4 mA
- **NL1**: U ~ (AC)
- **Red Light**: 1
- **Green Light**: 1
4.3 Functional Test

Use test magnet supplied with the sensor to test level switch functionality.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Step 1</th>
<th>Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>MIN</td>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>MAX</td>
<td><img src="image5" alt="Diagram" /></td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
</tbody>
</table>

*Figure 4.5: Functional Test*
5 Technical Data

5.1 Power Supply

DC-PNP with M12 connector
- 10...35 V DC Supply voltage
- < 825 mW Power consumption
- < 15 mA Current consumption

AC with NPT 1/2 valve connector
- 19...253 V AC Supply voltage
- < 810 mW Power consumption
- < 3.8 mA Current consumption

5.2 Performance characteristics

Switching delay
- 0.5 s when covering
- 1.0 s when free

Resolution
- < 0.5 mm (0.02 in.)

Maximum error
- 13.0 +/- 1 mm (0.51 in. +/- 0.04 in.)

Repeatability
- +/- 0.5 mm (+/- 0.02 in.)

Hysteresis
- 3.0 +/- 0.5 mm (0.12 in. +/- 0.02 in.)

Settling time
- < 2 s

Reference operating conditions
- Ambient temperature: 23 °C (73 °F)
- Process pressure: 14.5 psi
- Medium: Water
- Medium density: 1
- Medium temperature: 23 °C (73 °F)
- Installation from above
- Density setting: > 0.7 SGU
5.3 Operating Conditions

Ambient temperature range  
-40...+70 °C (-40...+158 °F)

Process temperature range  
-40...+100 °C (-40...+212 °F)

Storage temperature range  
-40...+85 °C (-40...+185 °F)

Shock resistance  
EN 60068-2-27 (30 g)

Vibration resistance  
EN 60068-2-64

Process pressure  
-14.5...580 psi

Degree of protection  
NEMA 4X (IP66/67)  DC - M12 connector

                     IP65  AC - Valve connector

Media  
Liquid

Density  
> 0.7 SGU

Viscosity  
1...10 000 cSt

Gas content  
Stagnant mineral water

Solids content  
< 5 mm(0.20 in.) diameter