

# Solid-state Level Sensors Installation Instructions

Catalog Numbers 840E-TB1B1A1-D4, 840E-TB1B2A1-D4, 840E-TB1B3A1-D4, 840E-TB2B1A1-E4, 840E-TB2B2A1-E4



**ATTENTION:** Read this document for information on installation, handling, mounting, general product specifications, and operation of this product.

## Introduction



**ATTENTION:** The Bulletin 840E is a level sensor for all kinds of liquid 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.

## Installation Considerations

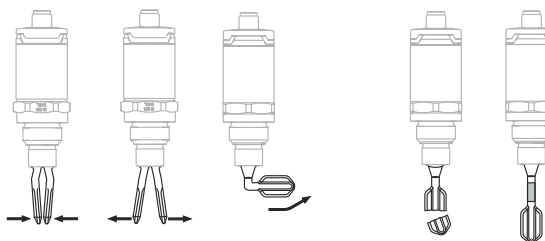
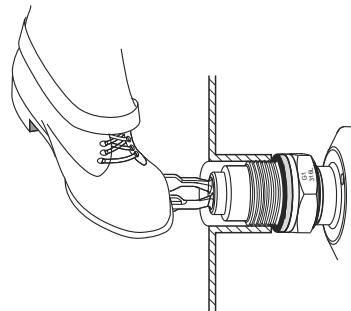
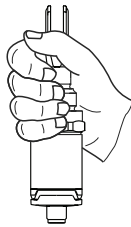
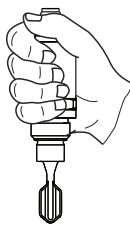


**ATTENTION:** Qualified individuals are required for installation and commissioning. Failure to comply will result in personal injury or equipment damage.

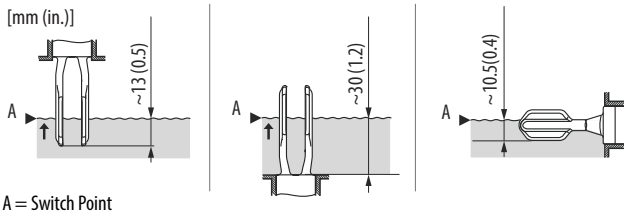
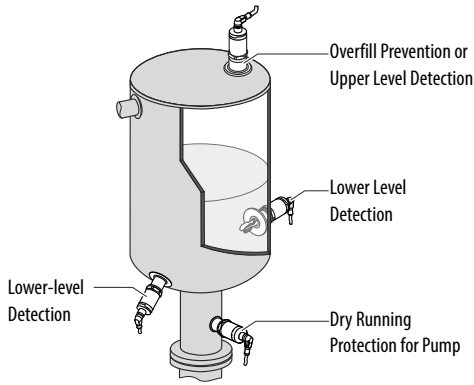
## Handling

Hold by the housing, not by the sensor fork.

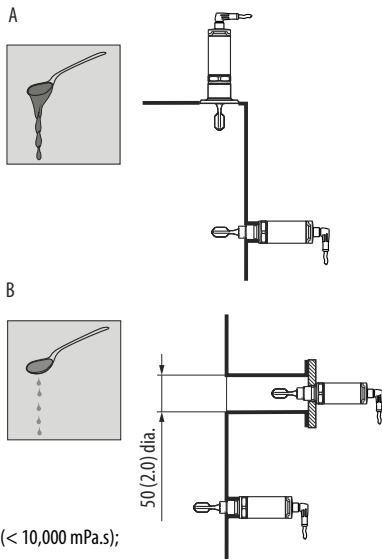
Do not bend, shorten, or lengthen.



## Mounting

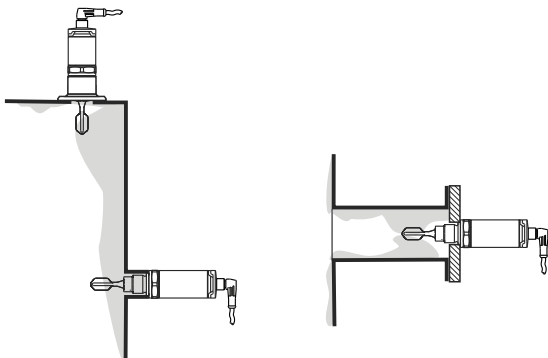


## Viscosity



A = High Viscosity (<math>< 10,000 \text{ mPa}\cdot\text{s}</math>);  
 B = Low Viscosity (<math>< 2,000 \text{ mPa}\cdot\text{s}</math>)

## Build-up



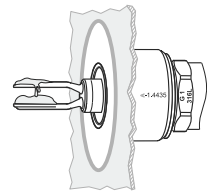
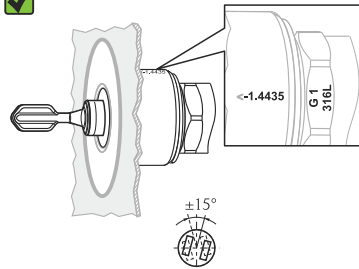
**ATTENTION:** Make sure that the installation socket does not exceed a certain length so that the tuning fork can project freely into the vessel.

## Installation

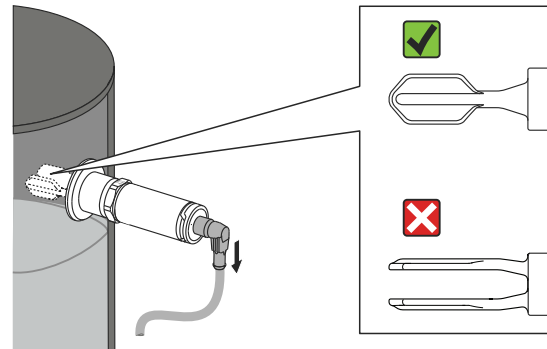
### Vessel

The marking indicates the position of the tuning fork. If installed horizontally in the vessels, the marking is face up.

### Orientation in a Vessel

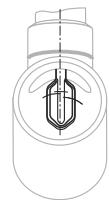
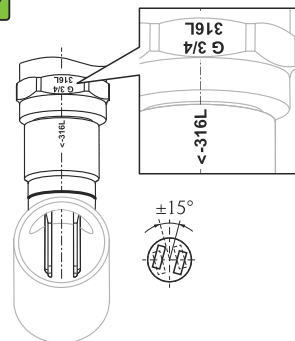


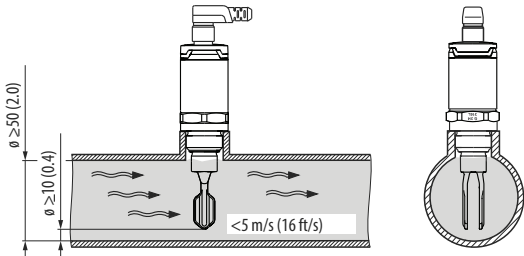
### Position of the Fork in a Horizontal Vessel



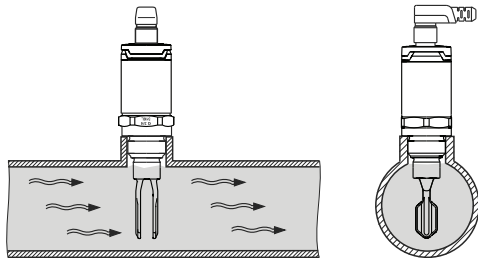
## Pipes

### Orientation in a Pipe

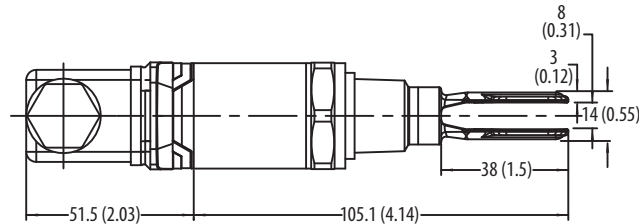
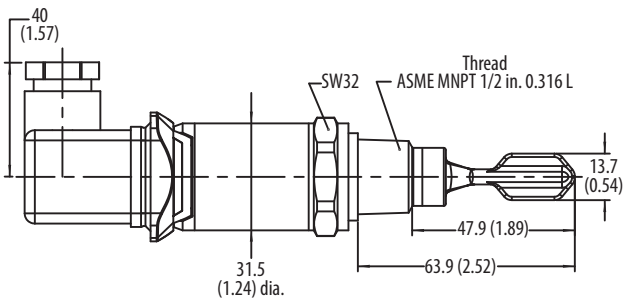




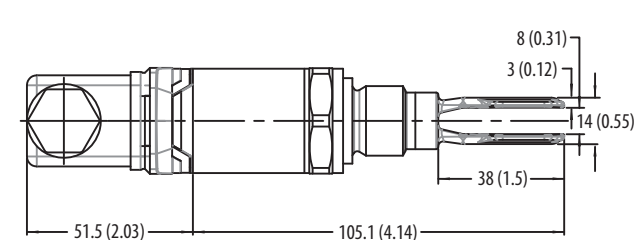
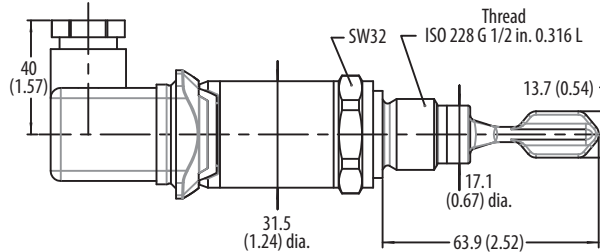
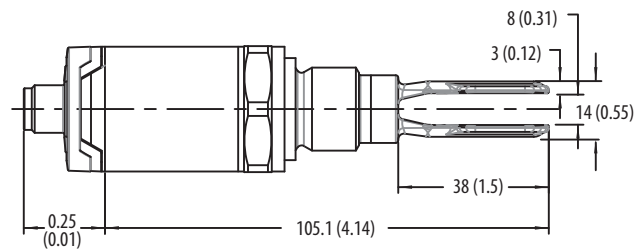
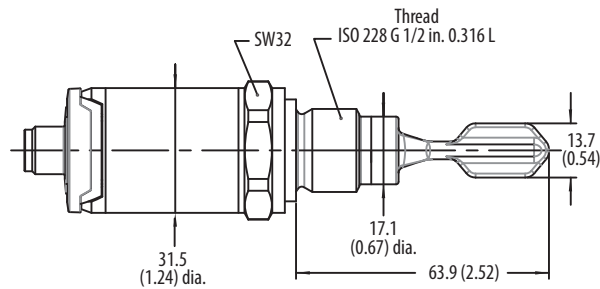
Pay attention to the position of the fork to minimize the turbulence in the pipe.



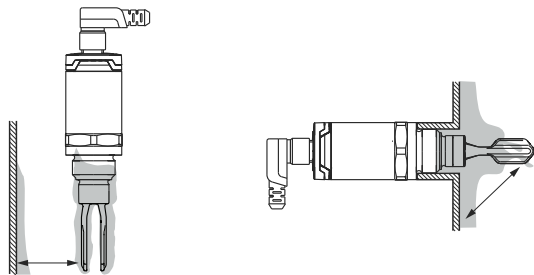
**1/2 in. NPT Valve Connector**



**G 1/2 in. Process Connection**



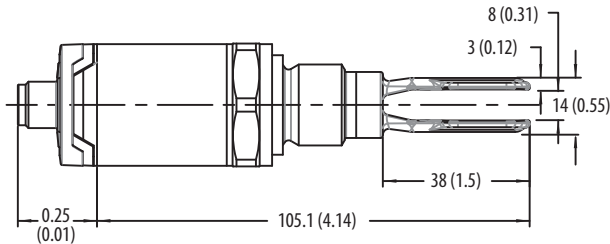
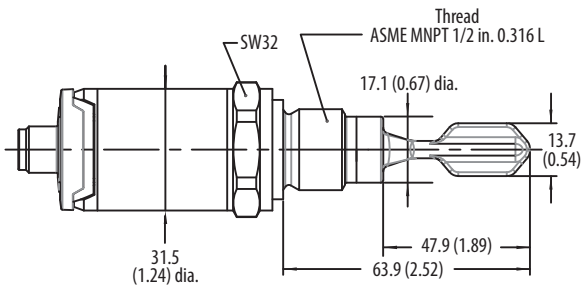
**Distance from Wall**



Recommended distance from wall  $\geq 10$  mm (0.39 in.)

**Dimensions [mm (in.)]**

**1/2 in. NPT and 3/4 in. NPT Process Connection**

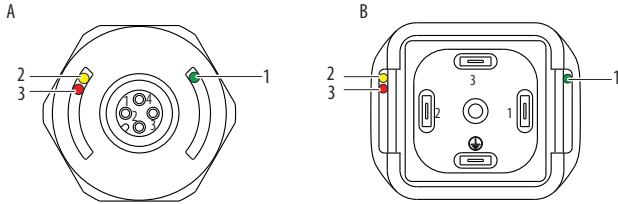


### Mating Cables

DC-PNP → 889D-F4AC-2 (M12x1 connector); 889D-R4AC-2 (M12x1) right angle connector. AC version → 889V-RZ3ABE-2 – 2 m (6.56 ft) DIN valve cable.

### Sensor Operation

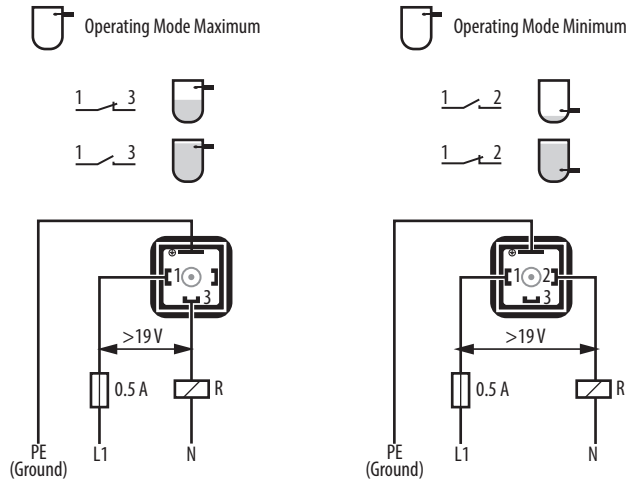
A ≥ 12 connector



B ≥ Valve plug

Item	Function	Description
1	Green LED (gn) lit	Device is operational
2	Yellow LED (ye) lit	M12 connector: indicates the sensor state: Tuning fork is covered by liquid Valve plug: indicates the switching state <ul style="list-style-type: none"> <li>Maximum operating mode (overflow prevention) sensor is not covered by liquid</li> <li>Minimum operating mode (dry running protection) the sensor is covered by liquid</li> </ul>
3	Red LED (rd) flashing lit	Warning/maintenance required: error can be rectified, for example, incorrect wiring Fault/device failure: error cannot be rectified, for example, electronic error

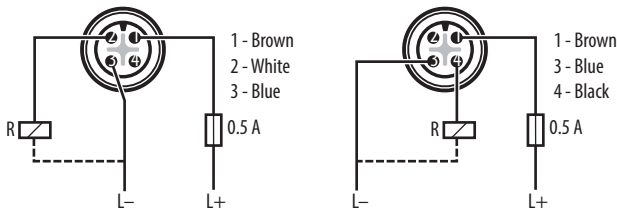
### AC Version with Valve Connector 1/2 in. NPT



R = External Load  
Current = 250 mA Maximum  
Voltage = 19...253V AC

### Wiring Diagrams

#### DC — PNP version with M12 Connector



R = External Load  
Current = 250 mA Maximum  
Voltage = 10...35V DC

## Specifications

Attribute	840E-TB1x	840E-TB2x
<b>Power Supply</b>		
Supply Voltage	10...30 V DC, 3-wire	2...253V AC, 2-wire
Power Consumption	< 975 mW	< 850 mW
Current Consumption	< 15 mA	< 3.8 mA
<b>Performance Characteristics</b>		
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	± 1 mm (0.04 in.)	
Hysteresis	3.0 ± 0.5 m (0.12 in. ± 0.02 in.)	
Setting Time	< 2 s	
<b>Reference Operation Conditions</b>		
Ambient Temperature [C (F)]	25° (77°)	
Process Pressure	1 Bar (14.5 psi)	
Fluid	Water (density: approx. 1 g/cm <sup>3</sup> , viscosity 1 mm <sup>2</sup> /s)	
Medium Temperature [C (F)]	25° (77°)	
Density Setting	> 0.7 g/cm <sup>3</sup>	
Switching Time Delay	Standard (0.5 s, 1 s)	
<b>Operating Conditions</b>		
Ambient Temperature Range [C (F)]	-40...+70° (-40...+158°)	
Storage Temperature [C (F)]	-40...+85° (-40...+185°)	
Process Temperature Range [C (F)]	-40...+100° (-40...+212°); -40...+150° (-40...+302°)	
Process Pressure Range	Maximum -1...+40 bar (-14.5...+580 psi)	
Degree of Protection	NEMA 4X (IP66/67) DC -M12 connector IP65 AC-Valve connector	
Shock Resistance	EN 60068-2-27:2007	
Vibration Resistance	EN 60068-2-64:2008	
Density	> 0.7 g/cm <sup>3</sup> (optionally available: > 0.5 g/cm <sup>3</sup> )	
Viscosity	1...10,000 mPa s, dynamic viscosity	
Media	Liquid	
Gas Content	Stagnant mineral water	
Solids Content	< 5 mm (0.20 in.) diameter	
<b>Materials</b>		
<i>Wetted Parts</i>		
Tuning Fork	Stainless steel 316L	
Process Adapter	Stainless steel 316L	
Seal for Weld-in Adapter	VMQ (vinyl-methyl-silicone)	
Flat Seal	FA (composite material based on aramid fibers combined with NBR)	
<i>Non-wetted Parts</i>		
Housing Cover with M12 Connector (IP65/IP67)	PPSU (polyphenylsulfone)	
Design Ring	PBT/PC (polybutylene terephthalate/polycarbonate)	
Housing	316L	
Cable Gland	PVDF (polyvinylidene fluoride)	
Name Plate	Plastic foil (attached to housing)	

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<b>Technical Support Center</b>	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	<a href="https://rockwellautomation.custhelp.com/">https://rockwellautomation.custhelp.com/</a>
<b>Local Technical Support Phone Numbers</b>	Locate the phone number for your country.	<a href="http://www.rockwellautomation.com/global/support/get-support-now.page">http://www.rockwellautomation.com/global/support/get-support-now.page</a>
<b>Direct Dial Codes</b>	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	<a href="http://www.rockwellautomation.com/global/support/direct-dial.page">http://www.rockwellautomation.com/global/support/direct-dial.page</a>
<b>Literature Library</b>	Installation Instructions, Manuals, Brochures, and Technical Data.	<a href="http://www.rockwellautomation.com/global/literature-library/overview.page">http://www.rockwellautomation.com/global/literature-library/overview.page</a>
<b>Product Compatibility and Download Center (PCDC)</b>	Get help determining how products interact, check features and capabilities, and find associated firmware.	<a href="http://www.rockwellautomation.com/global/support/pcdc.page">http://www.rockwellautomation.com/global/support/pcdc.page</a>

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