Rosemount™ 2511 Solids Level Switch

Vibrating Fork

- Best price/performance value

- Sensitivity from 30 g/l

- Suitable for process pressures up to 232 psi (16 bar)

- Temperature range from -40 to 302 °F (-40 to 150 °C)

- Extremely robust short-fork versions

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Introduction

Measurement principles

The Rosemount 2511 uses the principle of a tuning fork and a piezo-electric crystal to oscillate the forks at their natural frequency. Changes to the oscillation frequency are continuously monitored by electronics which varies depending on whether the fork is covered or uncovered by a solids medium.

When the solids medium in the vessel (silo) falls away from the fork, it causes a change of oscillation frequency that is detected by the electronics and the output switches to indicate an 'uncovered' state.

When the solids medium in the vessel (silo) rises and covers the fork, it causes a change of oscillation frequency that is detected by the electronics and the output switches to indicate a 'covered' state.

The electrical output will vary depending on the electronics selected.

Key Features and Benefits

- Ideal for use with fine-grained and powdered materials

- Suitable for hygienic applications - forks are made from stainless steel

- Available as a standard fork length and tube/cable extended fork lengths

- Short extension lengths are able to withstand high mechanical loads such as low level indication in very large or tall silos

- Short fork design allows mounting in small pipes or process vessels with very limited space

- Versatile installation, may be installed in vertical, horizontal, or angled positions

- Reliable, simple, and maintenance-free measurement principle

- Compact design - ideal for installation in silos with very limited space

- Robust aluminum die-cast housing with IP67 protection

- Adjustable signal output time delay

- Adjustable high/low sensitivity

- Approvals for hazardous locations (gas and dust)

Contents

Applications

- Full, demand, or empty detection in bulk goods silos
- Widely used in storage silos and process vessels
- Materials with light product density
- Applications requiring pneumatic filling
- Silos/vessels with limited space
- Vibration within the vessel
- High reliability requirements
- Explosive environments

Ordering information

Online product configurator

Many products are configurable online using our product configurator.

Select the **Configure** button or visit Emerson.com/global to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.

Specifications and options

The purchaser of the equipment must specify and select the product materials, options, or components.

Model codes

Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in Figure 1.

Figure 1: Model Code Example

2511 M S 1 5 NN B V A 0000 NA   Q4
‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾   ‾‾
                1   2

1. Required model components (choices available on most)

2. Additional options (variety of features and functions that may be added to products)

Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

Rosemount 2511 Solids Level Switch ordering information

The Rosemount 2511 is suitable for fine-grained and powdered medias, in storage and process vessels. It is a cost effective and robust technology, with high sensitivity and that is easy to operate.

CONFIGURE >	VIEW PRODUCT >

Required model components

Model

Code	Description	
2511	Rosemount Solids Level Switch - Vibrating Fork	★

Thermal profile

A thermal extension tube (temperature-extended shaft) moves the electronics further away from high process temperatures. Select this extension when ambient temperatures are greater than 104 °F (40 °C).

Code	Description	
M	Without extension tube (up to $T_{process}$ = 302 °F (150 °C) at T_{amb} < 104 °F (40 °C))	★
E	With extension tube (up to $T_{process}$ = 302 °F (150 °C) at T_{amb} > 104 °F (40 °C))	★

Related information

Operating conditions
Dimensional drawings

Materials of construction: process connection/thermal extension tube

Code	Description	
D	304/321 stainless steel (1.4301/1.4541)	
S	Fitting and tube 316/316L/316TI stainless steel (1.4581/1.4404/1.4571), fork tines 1.4581 stainless steel	★

Conduit entry/cable threads

Code	Description	
1[1]	M20 x 1.5, 1 off screwed cable gland + 1 off blind plug for CE, ATEX, and IECEx	★
2[2]	M20 x 1.5, 2 off screwed cable glands	★
4[3]	NPT ½-in. tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)	★
5[4]	NPT ¾-in. tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)	

[1]   *Code 1 is for selecting a solid switch with M20 x 1.5-in threaded conduit/cable entries. The switch will be provided with 1 screwed cable gland and 1 blind plug. This option is valid with the following product certifications: CE, ATEX and IECEx, except flameproof versions.*

[2]   *Code 2 is for selecting a solid switch with two screwed M20 x 1.5-in cable glands. Available for all product certification options, expect flameproof versions.*

[3]   *Code 4 is for selecting a solid switch with NPT 1/5-in threaded conduit/cable entries. The switch will be provided with 1 conduit entry adaptor and one Ex-d rated blind plug. It is available for ordering with all product certifications.*

[4]   *Code 5 is for selecting a solid switch with NPT 3/4-in threaded conduit/cable entries. The switch will be provided with 1 conduit entry adaptor and one Ex-d rated blank plug. It is available for ordering with all product certifications.*

Process connection size

Code	Description	Types	
A	1¼ in./32 mm	N	★
5	1½ in./40 mm (DN40)/40A	B and N	★
2	2 in./50 mm (DN50)/50A	R and C	★
3	3 in./80 mm (DN80)/80A	R	★
4	4 in./100 mm (DN100)/100A	F and R	★

Process connection rating

Code	Description	Sizes	
AA	ASME B16.5 Class 150 flange	2, 3, and 4	★
DZ	EN 1092-1 PN6 flange	4	★
DA	EN 1092-1 PN16 flange	4	★
NN	For use with non-flange process connection type	A, 5, and 2	★

Process connection type

Code	Description	Ratings	
F	Flat-face flange	DZ and DA	★
R	Raised-face flange	AA	★
B	BSPT (R) thread	NN	★
N	NPT thread	NN	★
C	Tri Clamp	NN	★

Electronic type

Code	Description	
G	PNP 18 to 50 Vdc	
V	Relay DPDT 19 to 230 Vac, 19 to 40 Vdc	★

Fork length

Code	Description	
A	Standard length 6.68 in. (170 mm)	★
E[1]	Extended, customer-specified length in tenths of inches	★
M[1]	Extended, customer-specified length in millimeters	★

(1)   *Please refer to Dimensional drawings for minimum and maximum length.*

Specific extended fork length

Code	Description	
0000	Factory default length (only if fork length A is selected)	★
XXXX	Specific customer-specified length in tenths of inches or millimeters (XXX.X inches or XXXX mm)	★

Product certifications

Code	Description	Conduit entry	
NA	No hazardous locations certifications	All	★
ND	ATEX, Dust Certification (DIP)	All	★
NK	IECEx, Dust Certification (DIP)	All	★
NR	INMETRO, Dust Certification (DIP)	All	★
NS	China, Dust Certification (DIP)	All	★
KZ	American and Canadian Ordinary Location (unclassified, safe area)	4 and 5	★
KB	American and Canadian, DIP	4 and 5	★

Additional options

Calibration data certification

Code	Description	
Q4	Certificate of functional test	★

Weather protection

Code	Description	
P2	Weather protection cover	★

Sliding sleeve

The Sliding sleeve option requires an extended fork length.

Not available when Materials of construction code S, or Process connection size code A, or Process connection type C are selected.

Code	Description	Certifications	
S1	Sliding sleeve, without overpressure, maximum 302 °F (150 °C)	NA and KZ	★
S2	Sliding sleeve, with overpressure, maximum 232 psi (16 bar), maximum 302 °F (150 °C)	All	★

Extended product warranty

Code	Description	
WR5	5-year limited warranty	★

Tag plate

Code	Description	
WT	Wired tag plate	★

Spares and accessories

The specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See Material selection for more information.

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Table 1: Spares

Part number	Description	
02500-1000-0129[1]	Electronics board: Relay DPDT 19 to 230 Vac, 9 to 40 Vdc	★
02500-1000-0130[1]	Electronics board: PNP 18 to 50 Vdc	★

[1] *An adapting plate is included.*

Table 2: Accessories

Part number	Description	
02500-7500-0001	Mounting kit 1 for DN100 PN6 and EN1092-1 flange with ø18 mm holes, containing: 4 off M16 x 60 mm screws (A2-grade stainless steel) 4 off M16 nuts 4 off washers 1 off seal (non-food grade) for up to 256 °F (125 °C)	★
02500-7500-0004	Mounting kit 2 for DN100 PN6 and EN1092-1 flange with M16 threaded holes, containing: 4 off M16 x 40 mm screws (A2-grade stainless steel) 4 off washers 1 off seal (non-food grade) for up to 256 °F (125 °C)	★
02500-7500-0007	Mounting kit 3 for DN100 PN16 and EN1092-1 flange with ø18 mm holes, containing: 8 off M16 x 60 mm screws (A2-grade stainless steel) 8 off washers 1 off seal (non-food grade) for up to 256 °F (125 °C)	★
02500-7500-0010	Mounting kit 4 for DN100 PN16 and EN1092-1 flange with M16 threaded holes, containing: 8 off M16 x 40 mm screws (A2-grade stainless steel) 8 off M16 nuts 8 off washers 1 off seal (non-food grade) for up to 256 °F (125 °C)	★

Specifications

Electrical data

Connection terminals	0.14 - 2.5 mm² (AWG 26-14)
Cable entry options	M20 × 1.5 screwed cable gland
	½-in. NPT conduit connection
	¾-in. NPT conduit connection
	Clamping range (diameter) of the factory provided cable glands: 0.24 to 0.47 in. (6 to 12 mm) for M20 × 1.5
Signal output delay	1 second for uncovered-to-covered switchover
	1 to 2 seconds for covered-to-uncovered switchover
Safety operation (FSL or FSH)	Configurable switches for each signal output. Select Fail Safe High (FSH) or Fail Safe Low (FSL) depending on application.
Vibration frequency	200 Hz
Overvoltage category	II
Pollution degree	2 (inside housing)

Electronics

|	**DPDT relay**	**3-wire PNP**
Power supply	19 to 230 Vac 50/60 Hz ±10%*	18 to 50 Vdc ±10%*
	19 to 40 Vdc ±10%*	*includes ±10% from EN 61010
	*includes ±10% from EN 61010	
Maximum ripple of power supply	7 V_{ss} at dc	7 V_{ss} at dc
Maximum installed load, input current	22 VA, 2 W	0.5 A
Signal output	Relay DPDT:	Open collector:
	Maximum 250 Vac, 8 A (non-inductive)	Maximum 0.4 A (permanent load)
	Maximum 30 Vdc, 5 A (non-inductive)	Short-circuit, overload, and reverse polarity protections
		$V_{OUT} = V_{IN}$, drop < 2.5 V
Status of signal output	Indicated by built-in LED	Indicated by built-in LED
Isolation	Power supply to signal output: 2225 Vrms	Not applicable
	Signal output to signal output: 2225 Vrms	
Protection class	I	III

Mechanical data

Housing	Aluminum housing, powder coated
	Seal between housing and lid: NBR
	Seal between housing and process connection: NBR
	Nameplate: polyester film
Degree of protection	IP67 (EN 60529), NEMA® Type 4X
Process connection	Connections: Thread: R 1½-in. tapered (EN 10226), or 1½-in. NPT or 1¼-in. NPT tapered ANSI B 1.20.1 Flanges: 1.4541 (321) or 1.4404 (316L) stainless steel Tri Clamp: 2-in. (DN50) ISO 2852 Materials: Standard length: 1.4581 stainless steel Extended length: 1.4305/1.4571 stainless steel (303 or 316TI) Tri Clamp: 1.4301/1.4404 stainless steel (304/316L) All materials are food grade.
Fork	Material: 1.4581 stainless steel, food grade
Maximum noise level	50 dBA
Overall weight (approximated)	Rosemount 2511 (standard length): 3.7 lbs (1.7 kg)
	Rosemount 2511 (extended length): 3.7 lbs + 4.2 lbs per 39.3 in. (1.7 kg + 1.9 kg per m)

Material selection

Emerson provides a variety of Rosemount products with various product options and configurations, including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options, and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration, or materials of construction selected.

Operating conditions

Ambient temperature (housing)	-40 to +140 °F (-40 to +60 °C)
Process temperature	-40 to +302 °F (-40 to +150 °C)
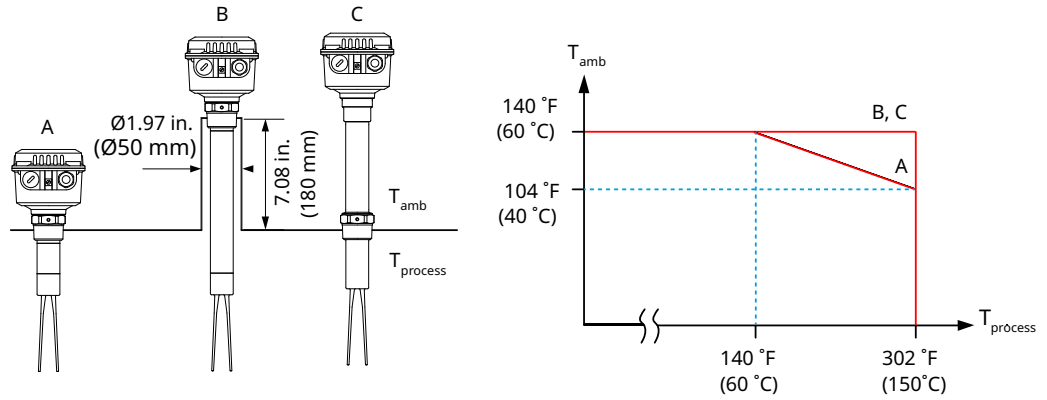
For versions with hazardous area approvals, see Product certifications.

Ventilation	Ventilation is not required.

Minimum powder density	Setting A:		Setting B:
	9.5 lb/ft^3 (150 g/l)		1.9 lb/ft^3 (30 g/l)

Bulk material requirements	No strong tendency to cake or deposit. Maximum grain size is 0.31-in. (8 mm).
Maximum mechanical load	500 N laterally (on the forks)
	Fit a protective angled (reverse-V shaped) shield above the level switch when mechanical loads are high.
Maximum mechanical torque	250 Nm for a Rosemount 2511 with an extended length fork
Maximum process pressure	-14.5 to 232 psi (-1 to +16 bar) for all versions of the Rosemount 2511, including when Sliding Sleeve option S2 (with over-pressure) is selected. The silo must not be pressurized (0 bar) when Sliding Sleeve option S1 (without over-pressure) is selected.

Note
Sliding sleeve option S1 (without over-pressure) must not be used in hazardous (classified) locations.

Vibration	1.5 (m/s^2)^2/Hz according to EN 60068-2-64
Relative humidity	0 to 100%, suitable for outdoor use
Maximum altitude	6,562 ft. (2000 m)
Expected product lifetime	The following parameters have a negative influence on the expected product lifetime:
	High ambient- and process temperatures, corrosive environments, high plant vibrations, high flow rate of abrasive bulk materials.

Transport and storage

Transport	Refer to the instructions as stated on the transport packaging, otherwise the products may get damaged.
	Transport temperature: -40 to +176 °F (-40 to +80 °C) Transport humidity: 20 to 85%
	Always inspect the received goods for any damage occurred during shipment from the factory. Notify Emerson of damaged goods as soon as possible.
Storage	Products must be stored at a dry and clean place. They must be protected from influence of corrosive environments, vibrations, and exposure to direct sunlight.
	Storage temperature: -40 to +176 °F (-40 to +80 °C) Storage humidity: 20 to 85%

Product certifications

See the Rosemount 2511 Product Certifications document for detailed information on the existing approvals and certifications.

Dimensional drawings

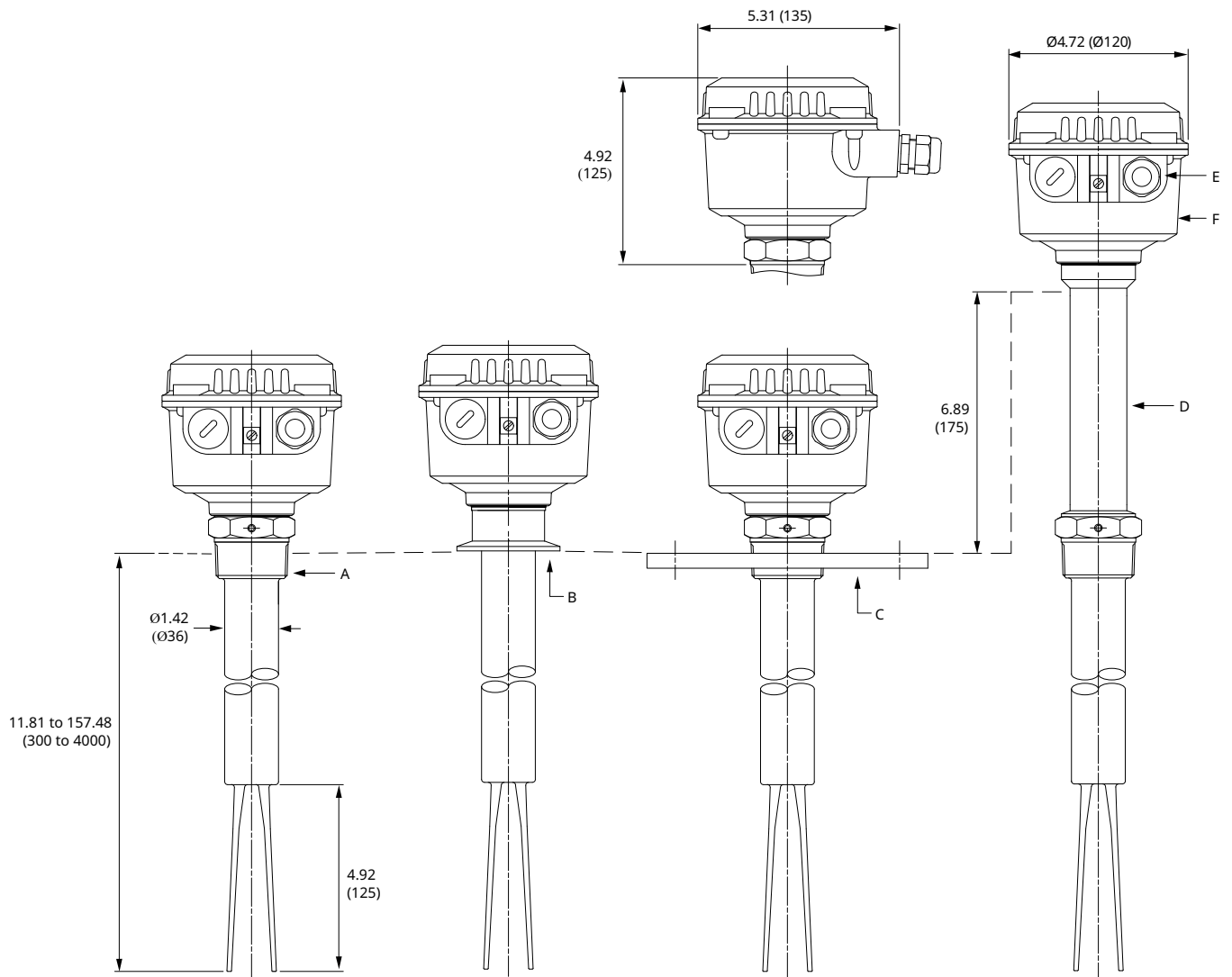**Figure 2: Rosemount 2511 Vibrating Fork Solids Level Switch (Standard Length)**
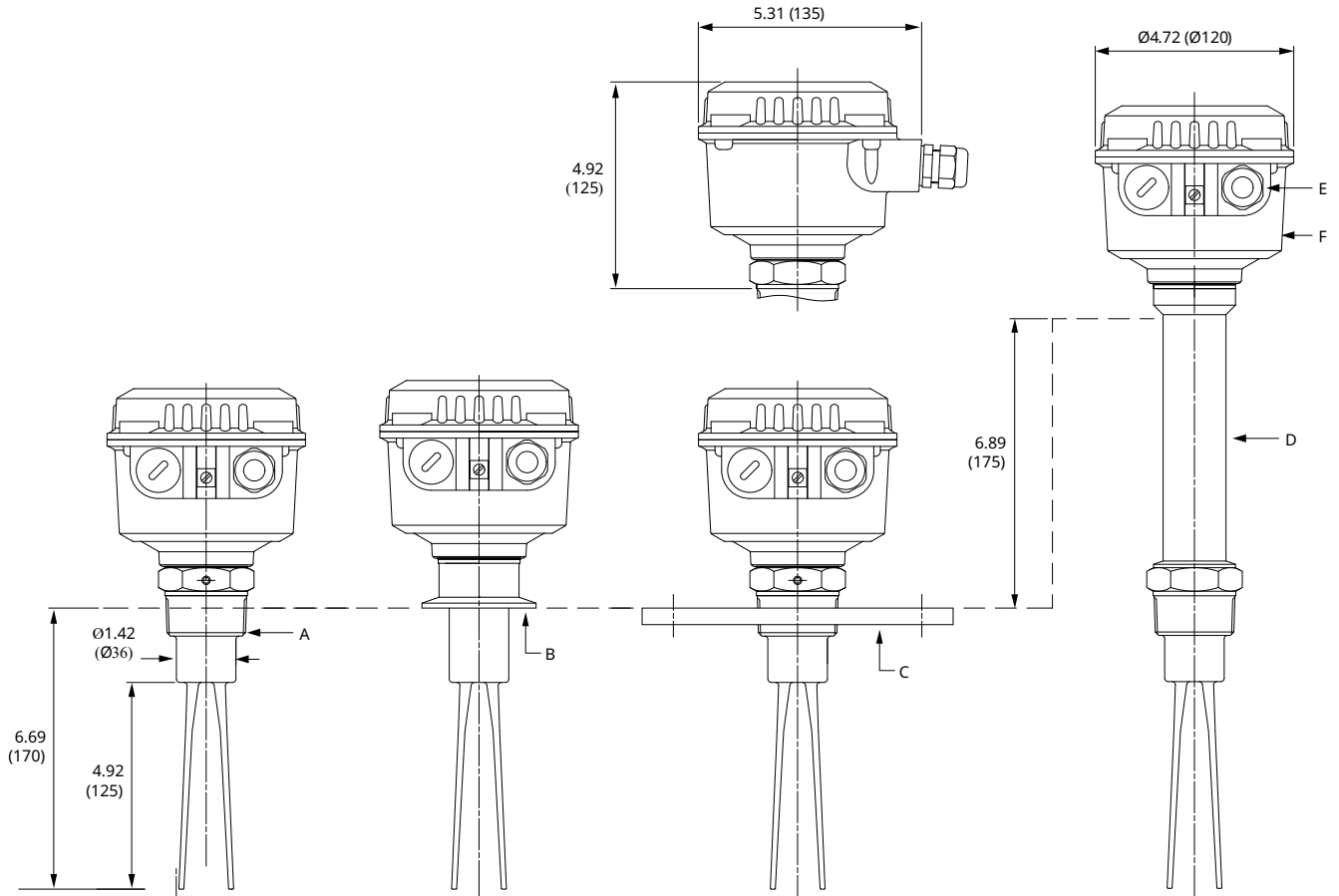
A. Thread
B. Tri Clamp
C. Flange
D. Thermal extension tube (temperature-extended shaft)
E. M20 or ½-in. NPT cable entry
F. Aluminum housing

Dimensions are in inches (millimeters).

**Figure 3: Rosemount 2511 Vibrating Fork Solids Level Switch (Extended Length)**

A. Thread
B. Tri Clamp
C. Flange
D. Thermal extension tube (temperature-extended shaft)
E. M20 or ½-in. NPT cable entry
F. Aluminum housing

Dimensions are in inches (millimeters).

Sliding sleeve

Sliding sleeve can be used to adjust the position of the paddle. When using the sliding sleeve the total length of the level switch remains unchanged, make sure that there is sufficient space to allow for these adjustments.

Figure 4: Sliding Sleeve
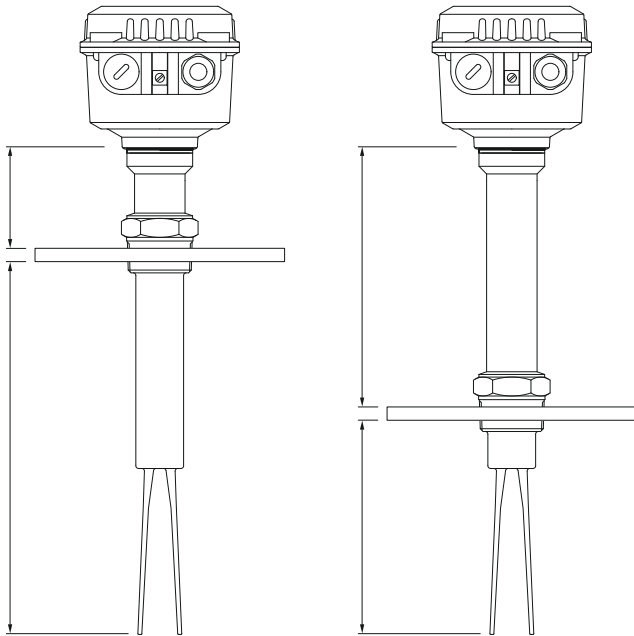
For more information: **Emerson.com/global**

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