

# 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

# Introduction

## Measurement principles

The Rosemount™ 2511 Solids Level Switch 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

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## 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

**Table 1: Rosemount 2511 Ordering 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.

Model	Product description		
2511	Rosemount Solids Level Switch - Vibrating Fork		★
<b>Thermal profile <sup>(1)</sup></b>			
M	Without extension tube (up to T <sub>process</sub> = 302 °F (150 °C) at T <sub>amb</sub> < 104 °F (40 °C))		★
E	With extension tube (up to T <sub>process</sub> = 302 °F (150 °C) at T <sub>amb</sub> > 104 °F (40 °C))		★
<b>Materials of construction: process connection/thermal extension tube</b>			
D	304/321 stainless steel (1.4301/1.4541)		
S	Fitting and tube 316/316L/316TI stainless steel (1.4404/1.4571), fork tines 1.4581 stainless steel		★
<b>Conduit entry/cable threads</b>			
1	M20 x 1.5, 1 off screwed cable gland + 1 off blind plug for CE, ATEX, and IECEx		★
2	M20 x 1.5, 2 off screwed cable glands		★
3	M20 x 1.5, 1 off screwed cable gland + 1 off blind plug for FM and CSA		★
4	NPT ½-in. tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)		★
5	NPT ¾-in. tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)		
<b>Process connection size</b>			
A	1¼ in./32 mm		★
5	1½ in./40 mm (DN40)/40A		★
2	2 in./50 mm (DN50)/50A		★
3	3 in./80 mm (DN80)/80A		★
4	4 in./100 mm (DN100)/100A		★
<b>Process connection rating</b>			<b>Sizes</b>
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
<b>Process connection type</b>			<b>Ratings</b>
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

**Table 1: Rosemount 2511 Ordering Information (continued)**

<b>Electronic type</b>			
G	PNP 18 to 50 Vdc		
V	Relay DPDT 19 to 230 Vac, 19 to 40 Vdc		★
<b>Fork length</b>			
A	Standard length 6.68 in. (170 mm)		★
E	Extended, customer-specified length in tenths of inches		★
M	Extended, customer-specified length in millimeters		★
<b>Specific extended fork length</b>			
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)		★
<b>Product certifications</b>		<b>Conduit entry</b>	
NA	No hazardous locations certifications	All except 3	★
ND	ATEX, dust certification	All except 3	★
NK	IECEX, dust certification	All except 3	★
EM <sup>(2)</sup>	Technical Regulations Customs Union (EAC), dust certification	All except 3	
KZ	American and Canadian Ordinary Location (unclassified, safe area)	All except 1	★
KB	American and Canadian, DIP	4 and 5	★
<b>Options (include with selected model number)</b>			
<b>Calibration data certification</b>			
Q4	Certificate of functional test		★
<b>Weather protection</b>			
P2	Weather protection cover		★
<b>Sliding sleeve</b>		<b>Certifications</b>	
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	★
<b>Extended product warranty</b>			
WR5	5-year limited warranty		★
<b>Typical model number: 2511 M S 1 5 NN B V A 0000 NA</b>			

- (1) 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). See [Operating conditions](#) and [Dimensional drawings](#) for further information.
- (2) Please contact your local Emerson representative for the availability of this option.

## Spares and accessories

The specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See [Materials 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 2: Spares**

Part number	Description	
02500-1000-0129 <sup>(1)</sup>	Electronics board: Relay DPDT 19 to 230 Vac, 9 to 40 Vdc	★
02500-1000-0130 <sup>(1)</sup>	Electronics board: PNP 18 to 50 Vdc	★

(1) An adapting plate is included.

**Table 3: 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 mm <sup>2</sup> (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

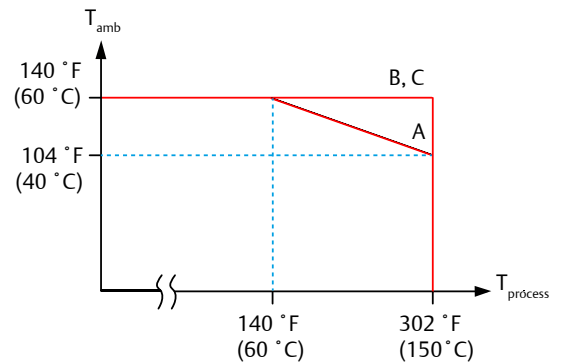
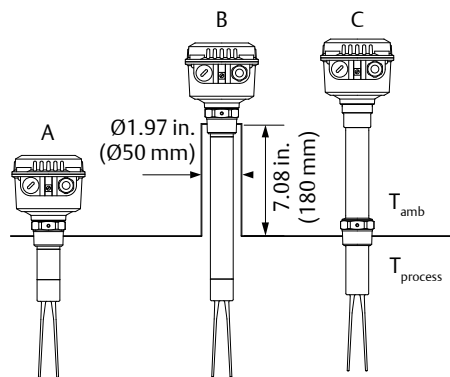
	DPDT relay	3-wire PNP
Power supply	19 to 230 Vac 50/60 Hz ±10%* 19 to 40 Vdc ±10%* *includes ±10% from EN 61010	18 to 50 Vdc ±10%* *includes ±10% from EN 61010
Maximum ripple of power supply	7 V <sub>SS</sub> at dc	7 V <sub>SS</sub> at dc
Maximum installed load, input current	22 VA, 2 W	0.5 A
Signal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

## Mechanical data

<b>Housing</b>	Aluminum housing, powder coated Seal between housing and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film
<b>Degree of protection</b>	IP67 (EN 60529), NEMA® Type 4X
<b>Process connection</b>	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.
<b>Fork</b>	Material: 1.4581 stainless steel, food grade
<b>Maximum noise level</b>	50 dBA
<b>Overall weight (approximated)</b>	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)

## Operating conditions

<b>Ambient temperature (housing)</b>	-40 to +140 °F (-40 to +60 °C)
<b>Process temperature</b>	-40 to +302 °F (-40 to +150 °C)



For versions with hazardous area approvals, see [Product Certifications](#).

<b>Ventilation</b>	Ventilation is not required.	
<b>Minimum powder density</b>	Setting A: 9.5 lb/ft <sup>3</sup> (150 g/l)	Setting B: 1.9 lb/ft <sup>3</sup> (30 g/l)



<b>Bulk material requirements</b>	No strong tendency to cake or deposit. Maximum grain size is 0.31-in. (8 mm).
<b>Maximum mechanical load</b>	500 N laterally (on the forks)  Fit a protective angled (reverse-V shaped) shield above the level switch when mechanical loads are high.
<b>Maximum mechanical torque</b>	250 Nm for a Rosemount 2511 with an extended length fork
<b>Maximum process pressure</b>	232 psi (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.
<hr/>	
<b>Note</b>	
Sliding sleeve option S1 (without over-pressure) must not be used in hazardous (classified) locations.	
<hr/>	
<b>Vibration</b>	1.5 (m/s <sup>2</sup> ) <sup>2</sup> /Hz according to EN 60068-2-64
<b>Relative humidity</b>	0 to 100%, suitable for outdoor use
<b>Maximum altitude</b>	6,562 ft. (2000 m)
<b>Expected product lifetime</b>	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

<b>Transport</b>	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.
<b>Storage</b>	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

## European Union directive information

A copy of the EU Declaration of Conformity can be found at the end of the Rosemount 2511 [Product Certifications document](#) . The most recent revision of the EU Declaration of Conformity can be found at [Emerson.com/Rosemount](http://Emerson.com/Rosemount).

## Ordinary location certification

As standard, the level switch has been examined and tested to determine that the design meets the basic electrical, mechanical, and fire protection requirements by a nationally recognized test laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

## Installing equipment in North America

The US National Electrical Code® (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

## U.S.A.

### U.S.A. Ordinary Location certification

#### KZ

**Summary of product certification:**

<b>Protection</b>	Ordinary location (unclassified, safe area)
<b>Project ID</b>	3027841
<b>Standards</b>	FM Class 3810:2005 ANSI/NEMA® 250:2003 ANSI/IEC 60529:2004
<b>Markings</b>	Type 4X and IP67

**U.S.A. Dust certification**

**KB**

Summary of product certification:

Protection	Dust ignition-proof
Project ID	3027841
Standards	FM Class 3600:2011 FM Class 3616:2011 FM Class 3810:2005 ANSI/NEMA® 250:2003 ANSI/IEC 60529:2004
Markings	DIP / II, III / 1 / EFG T** Ta=-40 °C to +60 °C Type 4X, IP67

**Special Condition for Safe Use (X)**

See [Table 4](#) for the T code temperature class.

**Table 4: Thermal data**

Maximum ambient temperature	Maximum process temperature	Maximum surface temperature	Temperature class (division system)
140 °F (60 °C)	230 °F (110 °C)	239 °F (115 °C)	T4A
	248 °F (120 °C)	248 °F (120 °C)	T4
	266 °F (130 °C)	266 °F (130 °C)	T4
	284 °F (140 °C)	284 °F (140 °C)	T3C
	302 °F (150 °C)	302 °F (150 °C)	T3C

## Canada

### Canada Ordinary Location certification

#### KZ

##### Summary of product certification

Protection	Ordinary location (unclassified, safe area)
Project ID	3027841
Standards	CAN/CSA-C22.2 No. 61010-1-12 CAN/CSA-C22.2 No. 14-13 CAN/CSA-C22.2 No. 94-1-07/94-2-07 UL Std. No. 61010-1 (3rd Edition) UL Std. No. 508 (17th Edition) UL Std. No. 50/50E
Markings	Type 4, NEMA <sup>®</sup> 4, IP67

### Canada Dust certification

#### KB

##### Summary of product certification

Protection	Dust-ignition proof
Project ID	3027841
Standards	CAN/CSA C22.2 No. 0-10 CAN/CSA C22-2 No. 61010-1-04 CAN/CSA C22-2 No. 25-1966 (R2009) CAN/CSA C22.2 No. 94-M91 (R2011) CAN/CSA E1241-1-1-02 (R2006) CAN/CSA C22.2 No. 60529:10 CAN/CSA-C22.2 No. 60079-31:12
Markings	Class II, Division 1, Groups E, F, and G Class III: Ex DIP A20/21 T150 °C Type 4X, IP66

## Europe

### ATEX Dust certification

#### ND

**Summary of product certification**

Protection	By enclosure
Certificate	BVS 19 ATEX E 074
Standards	EN60079-0:2012 + A11:2012 EN 60079-31:2014
Markings	⊕ II 1/2 D Ex ta/tb IIIC T* Da/Db
Temperature	See <a href="#">Table 5</a>

**Table 5: Thermal data**

Permitted ambient temperature <sup>(1)</sup>	Permitted process temperature	Maximum surface temperature
-40 °C... +60 °C	-40 °C... +110 °C	115 °C
	-40 °C... +120 °C	120 °C
	-40 °C... +130 °C	130 °C
	-40 °C... +140 °C	140 °C
	-40 °C... +150 °C	150 °C

(1) At the electronics enclosure (Zone 21).

The maximum surface temperature of the electronic enclosure with a thermal fuse is 117 °C.

Maximum permitted temperature at change over between extension and housing is +80 °C.

## International

### IECEX Dust certification

#### NK

**Summary of product certification**

Protection	By enclosure
Certificate	IECEX BVS 19.0070
Standards	IEC 60079-0:2011 IEC 60079-31:2013
Markings	Ex ta/tb IIIC T* Da/Db
Temperature	See <a href="#">Table 6</a>

Table 6: Thermal data

Permitted ambient temperature <sup>(1)</sup>	Permitted process temperature	Maximum surface temperature
-40 °C...+60 °C	-40 °C... +110 °C	115 °C
	-40 °C... +120 °C	120 °C
	-40 °C... +130 °C	130 °C
	-40 °C... +140 °C	140 °C
	-40 °C... +150 °C	150 °C

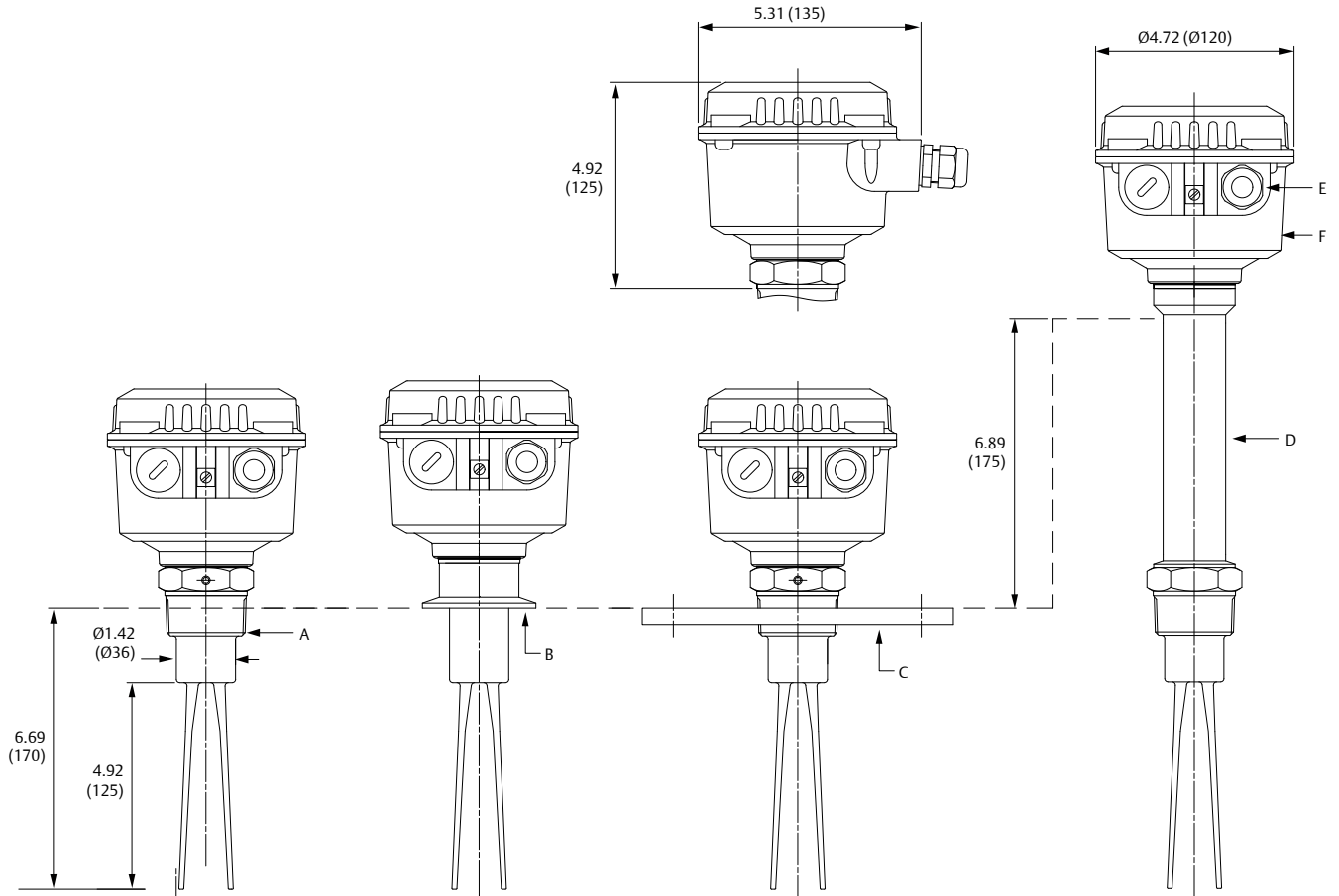
(1) At the electronics enclosure (Zone 21).

The maximum surface temperature of the electronic enclosure with a thermal fuse is 117 °C.

Maximum permitted temperature at change over between extension and housing is +80 °C.

# Dimensional drawings

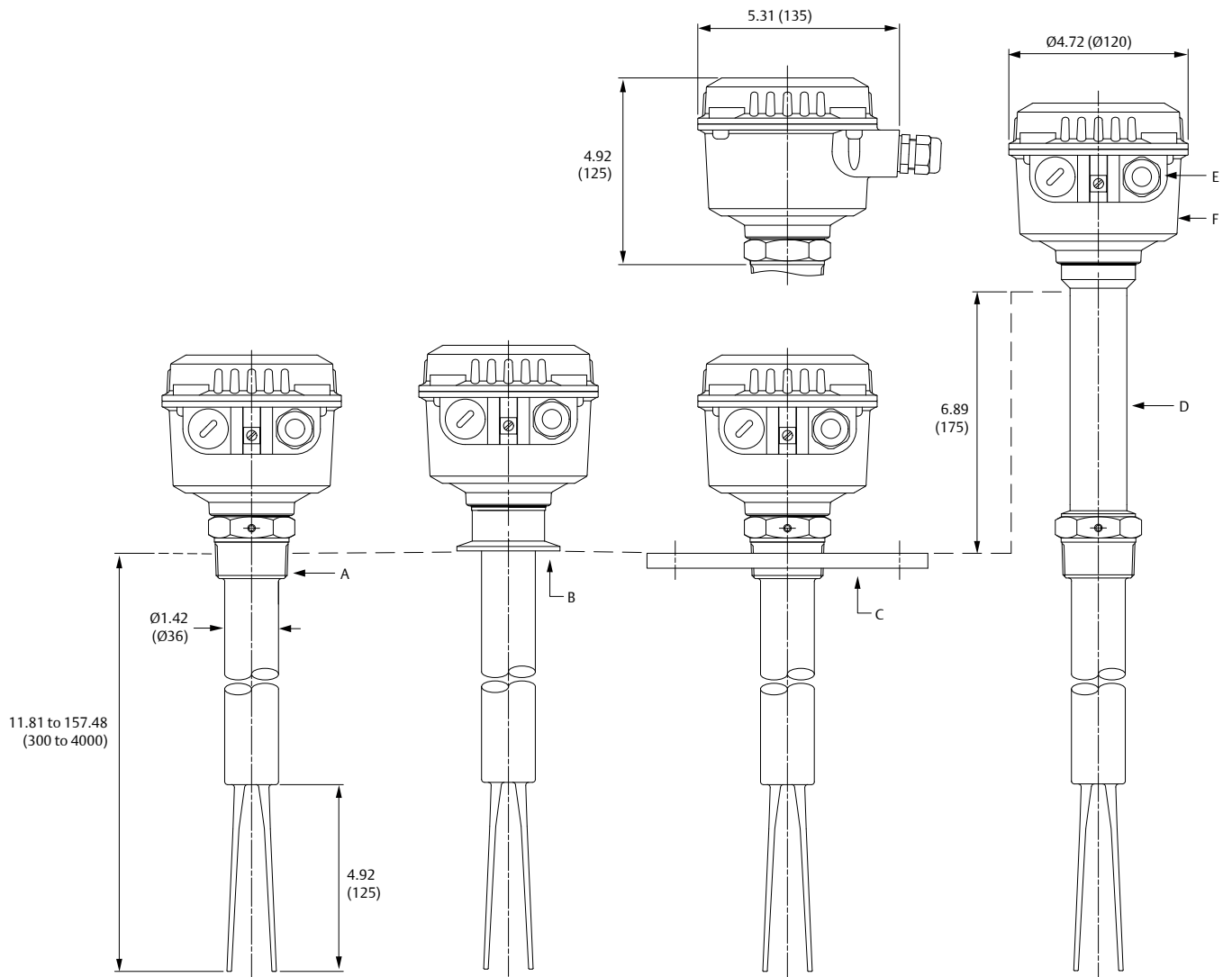
Figure 1: Rosemount 2511 Vibrating Fork Solids Level Switch (Standard Length)



- A. Thread
- B. Tri Clamp
- C. Flange
- D. Thermal extension tube (temperature-extended shaft)
- E. M20 or 1/2-in. NPT cable entry
- F. Aluminum housing

Dimensions are in inches (millimeters).

Figure 2: 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 1/2-in. NPT cable entry
- F. Aluminum housing

Dimensions are in inches (millimeters).









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