Product Data Sheet
00813-0100-2511, Rev AC
November 2020

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

ROSEMOUNT™

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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

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		★
Thermal profile (1)			
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))		★
Materials of construction: process connection/thermal extension tube			
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			
1(2)	M20 x 1.5, 1 off screwed cable gland + 1 off blind plug for CE, ATEX, and IECEx		★
2(3)	M20 x 1.5, 2 off screwed cable glands		★
4(4)	NPT ½-in. tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)		★
5(5)	NPT ¾-in. tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)		
Process connection size		**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		**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		**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			
G	PNP 18 to 50 Vdc		

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

V	Relay DPDT 19 to 230 Vac, 19 to 40 Vdc		★
Fork length			
A	Standard length 6.68 in. (170 mm)		★
E(6)	Extended, customer-specified length in tenths of inches		★
M(6)	Extended, customer-specified length in millimeters		★
Specific extended fork length			
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		**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	★
GM	Technical Regulations Customs Union (EAC), Ordinary Locations	All	★
KZ	American and Canadian Ordinary Location (unclassified, safe area)	4 and 5	★
KB	American and Canadian, DIP	4 and 5	★
Options (include with selected model number)			
Calibration data certification			
Q4	Certificate of functional test		★
Weather protection			
P2	Weather protection cover		★
Sliding sleeve		**Certifications**	
S1(7)(8)	Sliding sleeve, without overpressure, maximum 302 °F (150 °C)	NA, GM, and KZ	★
S2(7)(8)	Sliding sleeve, with overpressure, maximum 232 psi (16 bar), maximum 302 °F (150 °C)	All	★
Extended product warranty			
WR5	5-year limited warranty		★
Tag plate			
WT	Wired tag plate		★
Typical model number: 2511 M S 1 5 NN B V A 0000 NA			

(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) *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.*

(3) *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.*

(4) *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.*

(5) *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.*

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

(7) *The Sliding sleeve option requires an extended fork length.*
(8) *Not available when Materials of construction code S, or Process connection size code A, or Process connection type C are selected.*

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 2: 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 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^2 (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_{ss} at dc	7 V_{ss} at dc
Maximum installed load, input current	22 VA, 2 W	0.5 A
Signal output	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 $V_{OUT} = V_{IN}$, 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 Signal output to signal output: 2225 Vrms	Not applicable
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)

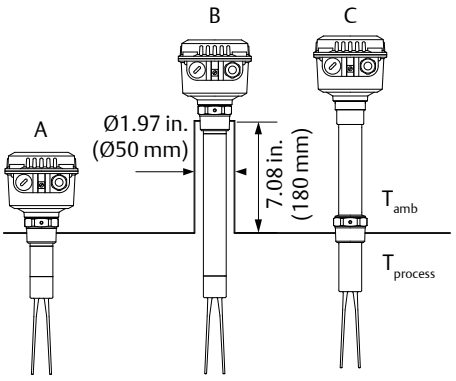
Material selection

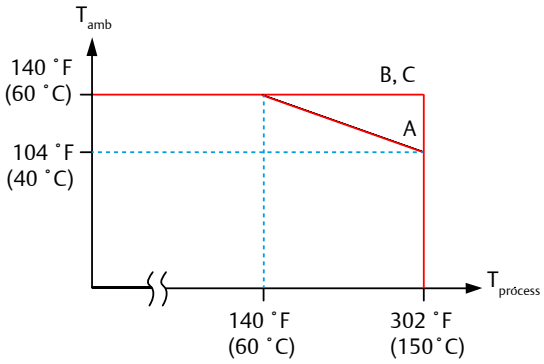
Emerson provides a variety of Rosemount products with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate 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

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.

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:	
Protection	Ordinary location (unclassified, safe area)
Certificate	FM20US0088X
Standards	FM Class 3810:2018
	ANSI/NEMA® 250:1991
	ANSI/IEC 60529:2004
Markings	Type 4X and IP67

U.S.A. Dust certification

KB

Summary of product certification:	
Protection	Dust ignition-proof
Certificate	FM20US0088X
Standards	FM Class 3600:2018
	FM Class 3616:2011
	FM Class 3810:2018
	ANSI/NEMA® 250:1991
	ANSI/IEC 60529:2004
Markings	Class II, Division 1, Groups E, F, G
	Class III, Division 1
	Ta=-40 °C to +60 °C
	Type 4X, IP67
Safety instructions	See Rosemount 2511 Product Certifications document

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)
Certificate	80055793
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® 4, IP67

Canada Dust certification

KB

Summary of product certification	
Protection	Dust-ignition proof
Certificate	80055790
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
Safety instructions	See Rosemount 2511 Product Certifications document

Europe

ATEX Dust certification

ND

Summary of product certification:	
Protection	By enclosure
Certificate	BVS 19 ATEX E 074
Standards	EN60079-0:2012+A11:2013 EN 60079-31:2014
Markings	Ex II 1/2 D Ex ta/tb IIIC T* °C Da/Db
Temperature*	See Table 5
Safety instructions	See Rosemount 2511 Product Certifications document

Table 5: Thermal data

Permitted ambient temperature(1)	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* °C Da/Db
Temperature*	See Table 6
Safety instructions	See Rosemount 2511 Product Certifications document

Table 6: Thermal data

Permitted ambient temperature(1)	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.

Technical Regulations Customs Union (TR-CU)

EAC

GM

TR CU 020/2011 “Electromagnetic Compatibility of Technical Products”

TR CU 004/2011 “On safety of low-voltage equipment”

Brazil

INMETRO Dust certification (DIP)

NR

Please contact manufacturer for further details.

China

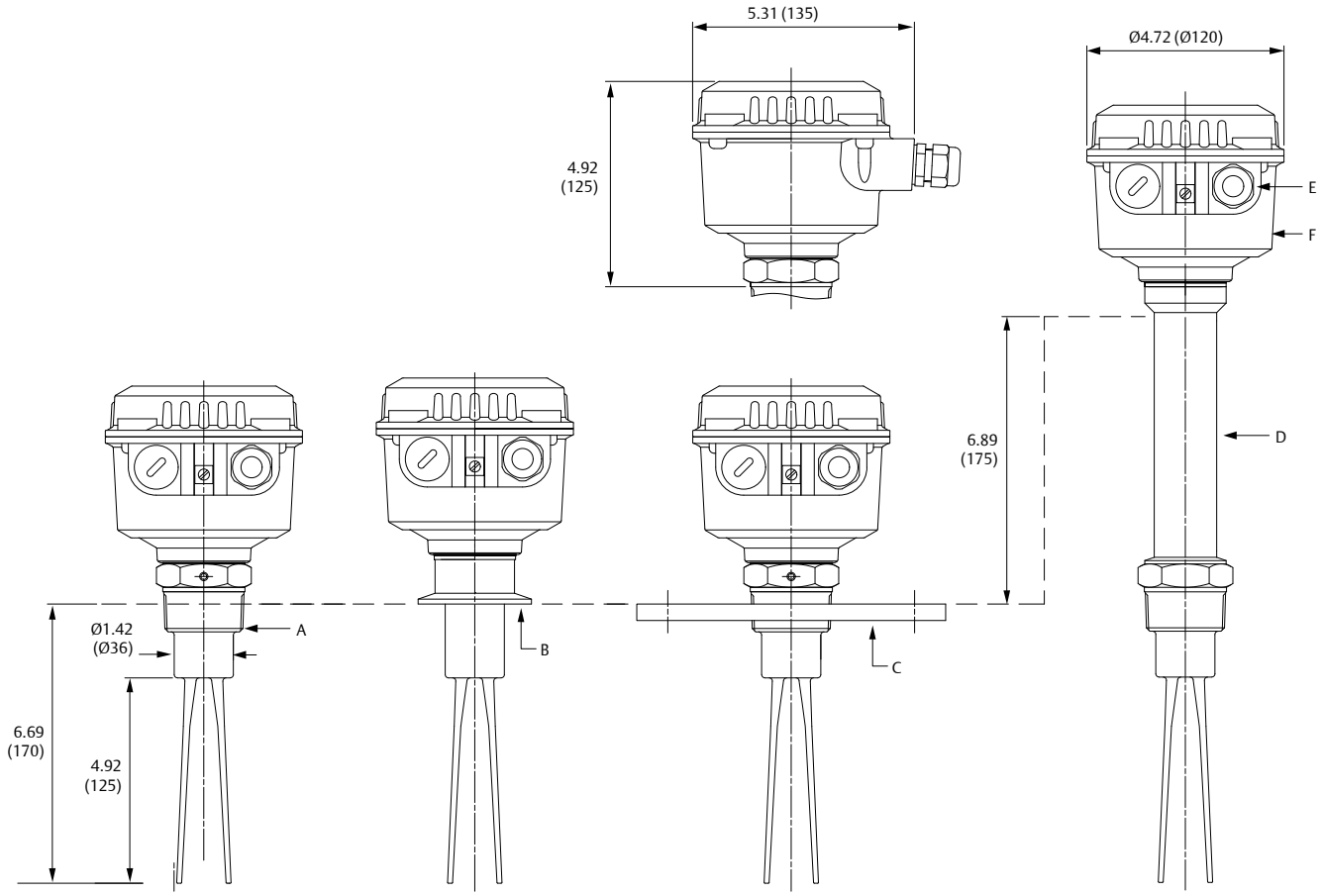
China Dust certification (DIP) NEPSI 粉尘

NS

Please contact manufacturer for further details.

Dimensional drawings

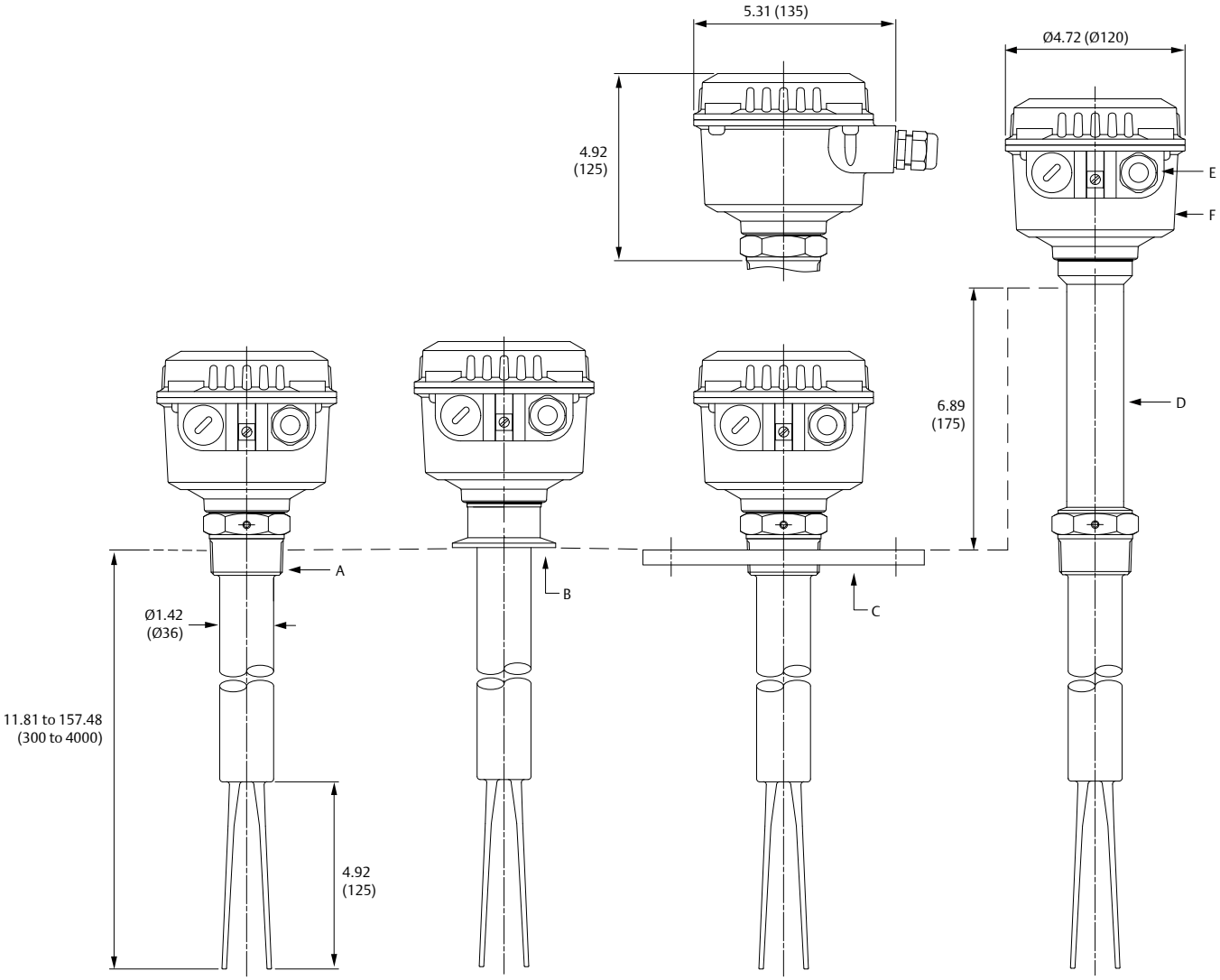
Figure 1: Rosemount 2511 Vibrating Fork Solids Level Switch (Standard Length)



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

Dimensions are in inches (millimeters).

Figure 2: Rosemount 2511 Vibrating Fork Solids Level Switch (Extended Length)



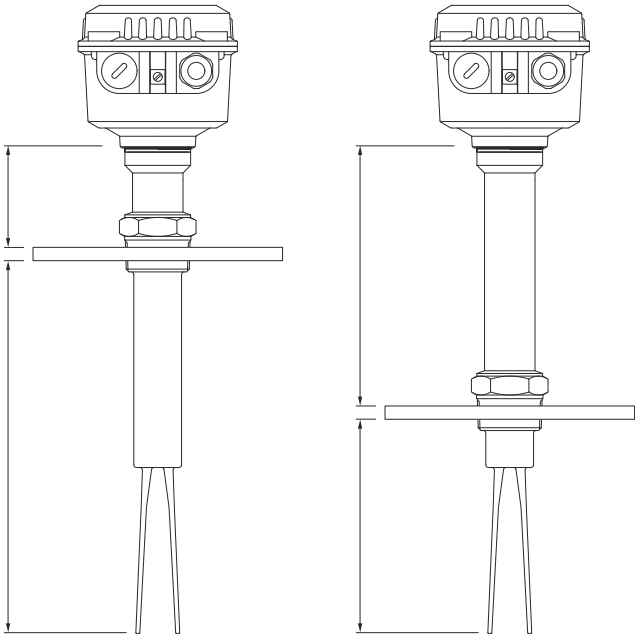
A. Thread
B. Tri Clamp
C. Flange
D. Thermal extension tube (temperature-extended shaft)
E. M20 or ½-in. NPT cable entry
F. Aluminum housing

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 3: Sliding Sleeve



00813-0100-2511
Rev. AC
November 2020

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