

Rosemount™ 2521 Solids Level Switch

Vibrating Fork



- Very high sensitivity (<5 g/l)
- High quality 316 stainless steel material for the process
- 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™ 2521 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

- Enhanced version of the vibrating fork with extra sensitivity options
- Available as a standard fork length and tube/cable extended fork lengths
- Ideal for use on bulk solids - particularly suitable for use in fine-grained and powdered materials
- Suitable for hygienic applications - polished forks and wetted parts made from stainless steel
- 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
- Modular and simple design
- Available with separate electronic housing
- Reliable, simple, and maintenance-free measurement principle
- Robust aluminum die-cast housing with IP66 protection
- Adjustable signal output time delay

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Applications

- Applications with high mechanical loading
- Materials with very light product density
- Applications requiring pneumatic filling
- Silos/vessels with limited space
- Vibration within the vessel
- High reliability requirements



Ordering information

Table 1: Rosemount 2521 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		
2521	Level Switch - Enhanced Vibrating Fork		★
Fork profile ⁽¹⁾			
S	Standard sensitivity, 3 lb/ft ³ (50 g/l), dry and wet applications		★
H	High sensitivity, 1.2 lb/ft ³ (20 g/l)		★
Thermal profile			
M	Without extension tube (up to T _{proc} = 302 °F (150 °C) at T _{amb} ≤ 104 °F (40 °C))		★
E ⁽²⁾	With extension tube (up to T _{proc} = 302 °F (150 °C) at T _{amb} > 104 °F (40 °C))		★
R ⁽²⁾	With remote housing cable 59-in. (1500 mm) long (up to T _{proc} = 302 °F (150 °C))		★
S ⁽²⁾	With remote housing cable 157-in. (4000 mm) long (up to T _{proc} = 302 °F (150 °C))		★
C	With cable extension (T _{proc} : -13 to 176 °F (-25 to 80 °C), T _{amb} : -13 to 140 °F (-25 to 60 °C))		★
Materials of construction: process connection/process extension tube			
D	304/321 Stainless steel (1.4301/1.4541)		★
S ⁽³⁾	316L Stainless steel (1.4404)		★
Conduit entry/cable threads			
1	M20 x 1.5, 1 off screwed cable gland for CE, ATEX, and IECEx		★
2	M20 x 1.5, 2 off screwed cable glands		★
4	½-in. NPT tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)		★
Process connection size			
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		★
Process connection rating		Sizes	
AA	ASME B16.5 Class 150 flange	All except 5	★
DZ	EN 1092-1 PN6 flange	4	★
DA	EN 1092-1 PN16 flange	4	★
NN	For use with non-flange process connection type	2 and 5	★
Process connection type		Ratings	
F	Flat-face flange	DZ and DA	★
R	Raised-face flange	AA	★
B	BSPT (R) thread	NN	★

Table 1: Rosemount 2521 Ordering Information (continued)

G	BSPP (G) thread	NN	★
N	NPT thread	NN	★
C ⁽³⁾	Tri Clamp	NN	★
Electronic type			
E	Relay SPDT 19 to 230 Vac / 19 to 55 Vdc		★
Fork length		Fork profiles	
A ⁽³⁾	Standard length 6.47 in. (165 mm)	S	★
B ⁽³⁾	Standard length 9.25 in. (235 mm), or 10.24-in (260 mm) for Fork Sensitivity V1/V2/V3	H	★
E ⁽³⁾	Extended tube, customer-specified length in tenths of inches	All	★
M ⁽³⁾	Extended tube, customer-specified length in millimeters	All	★
F ⁽⁴⁾	Extended cable, customer-specified length in tenths of inches	All	★
N ⁽⁴⁾	Extended cable, customer-specified length in millimeters	All	★
Specific extended fork length			
00000	Factory default length (only if fork length A or B is selected)		★
XXXXX	Specific customer-specified tube/cable length in tenths of inches (XXXX.X inches) or millimeters (XXXXX mm)		★
Product certifications		Conduit entry	
NA	No hazardous locations certifications	All	★
ND ⁽⁵⁾	ATEX, dust certification	All	
NK ⁽⁵⁾	IECEX, dust certification	All	
E2 ⁽⁵⁾	INMETRO Flameproof	4	
E7 ⁽⁵⁾	IECEX Flameproof/Dust certification	4	
E8 ⁽⁵⁾	ATEX Flameproof/Dust certification	4	
EM ⁽⁵⁾	Technical Regulations Customs Union (EAC), dust certification	All	
I1 ⁽⁵⁾	ATEX Intrinsic Safety and Dust certification	All	
I2 ⁽⁵⁾	INMETRO Intrinsic Safety	All	
I7 ⁽⁵⁾	IECEX Intrinsic Safety and Dust certification	All	
IM ⁽⁵⁾	Technical Regulations Customs Union (EAC), Intrinsic Safety	All	
K1 ⁽⁵⁾	ATEX Flameproof/Increased Safety/Dust certification	All	
K2 ⁽⁵⁾	INMETRO Intrinsic Safety, Flameproof	All	
K5 ⁽⁵⁾	American Intrinsically Safe and Explosion-proof	4	
K7 ⁽⁵⁾	IECEX Flameproof/Increased Safety/Dust certification	All	
KB ⁽⁵⁾	American and Canadian, DIP	4	
KM ⁽⁵⁾	Technical Regulations Customs Union (EAC), Flameproof/Increased Safety/Dust	All	
KY ⁽⁵⁾	American and Canadian Flameproof/Dust certification	4	
KZ ⁽⁵⁾	American and Canadian Ordinary Location (Unclassified, safe area) certification	4	

Table 1: Rosemount 2521 Ordering Information (*continued*)

Options (include with selected model number)			
Calibration data certification			
Q4	Certificate of functional test		★
Weather protection			
P2	Weather protection cover		★
Fork sensitivity		Thermal profiles	
V1 ⁽⁶⁾	Enhanced (> 0.3 lb/ft ³ (5 g/l))	M, E, and C	★
V2 ⁽⁶⁾⁽⁷⁾	Enhanced (< 0.3 lb/ft ³ (5 g/l)) with increased vibrating surface (aluminum)	M, E, and C	★
V3 ⁽⁶⁾	Enhanced (< 0.3 lb/ft ³ (5 g/l))	M, E, and C	★
V4 ⁽⁸⁾	Adjustable sensitivity for interface applications	M, E, and C	★
Sliding sleeve			
S2 ⁽⁹⁾	Sliding sleeve, maximum 232 psi (16 bar), maximum 302 °F (150 °C)		★
Extended product warranty			
WR5	5-year limited warranty		★
Typical model number: 2521 S M D 1 5 N N B E A 00000 NA			

- (1) There are two adjustable settings, A and B on the electronics board. See [Operating conditions](#) for how the minimum density requirements are affected by the Fork Profile option codes.
- (2) A thermal extension cable or 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.
- (3) Not available when Thermal Profile code C is selected.
- (4) Available only when Thermal Profile code C is selected.
- (5) Please contact your local Emerson representative for the availability of this option.
- (6) Available only when Fork Profile code H is selected (for high sensitivity).
- (7) This option requires a 4-in. flanged process connection to be selected.
- (8) Available only when Fork Profile code S is selected (for standard sensitivity in wet and dry applications) and Product Certification code NA is selected. The potentiometer on the electronics board may then be used to fine-tune the sensitivity.
- (9) The sliding sleeve option requires an extended fork length.

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	
02500-1000-0069	Electronics board: Relay SPDT 19 to 230 Vac, 19 to 55 Vdc, Fork Profile code S	★
02500-1000-0080	Electronics board: Relay SPDT 19 to 230 Vac, 19 to 55 Vdc, Fork Profile code H	★
02500-1000-0081	Electronics board: Relay SPDT 19 to 230 Vac, 19 to 55 Vdc, Fork Sensitivity code V1	★
02500-1000-0082	Electronics board: Relay SPDT 19 to 230 Vac, 19 to 55 Vdc, Fork Sensitivity code V3	★
02500-1000-0083	Electronics board: Relay SPDT 19 to 230 Vac, 19 to 55 Vdc, Fork Sensitivity code V2	★

Table 3: Accessories

Part number	Description	
02500-7500-0002	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 464 °F (240 °C)	★
02500-7500-0005	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 464 °F (240 °C)	★
02500-7500-0008	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 M16 nuts 8 off washers 1 off seal (non-food grade) for up to 464 °F (240 °C)	★
02500-7500-0011	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 washers 1 off seal (non-food grade) for up to 464 °F (240 °C)	★

Specifications

Electrical data

Connection terminals	4 mm ² (AWG 12), maximum
Cable entry options	M20 × 1.5 screwed cable gland ½-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,FSH)	Configurable switches for each signal output. Select Fail Safe High (FSH) or Fail Safe Low (FSL) depending on application.
Sensitivity	Adjustable, two settings (A or B)
Vibration frequency	Rosemount 2521S: 350 Hz Rosemount 2521H: 125 Hz (standard) or 90 Hz (enhanced sensitive options V1 to V3)
Installation category	II
Pollution degree	2 (inside housing)

Electronics

	Universal voltage SPDT relay
Power supply	19 to 230 Vac 50/60 Hz ±10% 19 to 55 Vdc ±10%
Maximum ripple of power supply	7 V _{ss} at dc
Maximum installed load	8 VA, 1.5 W
Signal output	Floating relay SPDT Maximum 250 Vac, 8 A (non-inductive) Maximum 30 Vdc, 5 A (non-inductive)
Intrinsically Safe (IS) ratings	The Rosemount 2521 must only be installed in non-hazardous areas (unclassified locations).
Status of signal output	Indicated by a built-in LED
Isolation	Power supply to signal output: 2225 Vrms
Protection class	I

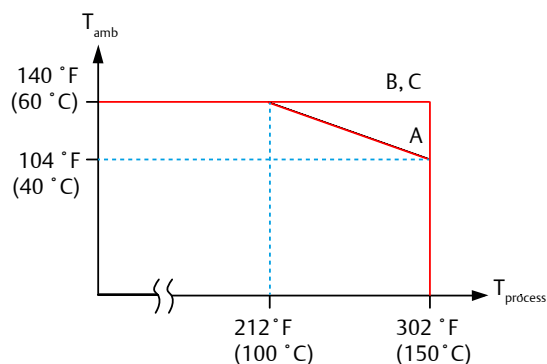
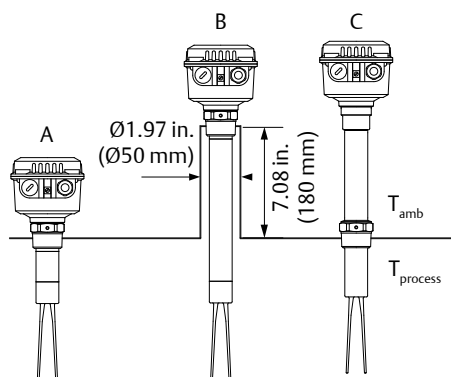
Mechanical data

Housing	Aluminum housing, powder coated Seal between housing and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film
Cable of separate housing	Silicone elastomer, $\varnothing 10$ mm ($\varnothing 0.39$ in.), surface resistance $< 10^9$ Ohm, UV-resistant, minimum bend radius of 1.97 in. (50 mm)
Degree of protection	NEMA® Type 4X, IP66 (IEC/EN 60529)
Process connection and extension	Materials: 1.4301/1.4404 stainless steel (304/316L) Flanges: 1.4541 stainless steel (321) Extension cable: PUR with black carbon (not food grade) Thread: R 1½-in. tapered (EN 10226) or 1½-in. NPT tapered (ANSI B 1.20.1) Tri Clamp: 1.4301/1.4404 stainless steel (304/316L), 2-in. (DN50) ISO 2852
Fork	1.4581 stainless steel, food grade Surface finish: polished, $R_a < 0.75$ μm ; PTFE (on request)
Maximum noise level	50 dBA
Overall weight (approximated)	Standard length version: 4.6 lbs (2.1 kg) Tube/shaft extended length version: 4.6 lbs + 5.5 lbs per 39.3 in. (2.1 kg + 2.5 kg per m) Cable extended length version: 9.9 lbs + 1.1 lbs per 39.3 in. (4.5 kg + 0.5 kg per m)

Operating conditions

Ambient temperature (housing)	-40 to +140 °F (-40 to +60 °C)	All except cable-extended versions
	-13 to +140 °F (-25 to +60 °C)	Cable-extended versions
Process temperature	-40 to +302 °F (-40 to +150 °C)	All except cable-extended versions
	-13 to +176 °F (-25 to +80 °C)	Cable-extended versions

Mounting for process temperature up to 150 °C (302 °F): see graph



Ventilation	Ventilation is not required.		
Minimum powder density requirements		Setting B:	Setting A:
	Rosemount 2521S	3 lb/ft ³ (50 g/l)	9 lb/ft ³ (150 g/l)
	Rosemount 2521H	1.2 lb/ft ³ (20 g/l) 0.3 lb/ft ³ (5 g/l)	4.5 lb/ft ³ (75 g/l) for standard sensitivity 1.2 lb/ft ³ (20 g/l) for enhanced sensitivity
Bulk material requirements	No strong tendency to cake or deposit. Maximum 0.39 in. (10 mm) grain size.		
Maximum mechanical load	600 N laterally (on the forks)		
	Fit a protective angled (reverse-V shaped) shield to the vessel, directly above the level switch, when mechanical loads are high.		
Maximum mechanical torque	300 Nm	Tube/shaft-extended versions	
Maximum tractive force	2 kN	Cable-extended versions	
Maximum process pressure	232 psi (16 bar)	Standard length and tube/shaft extended versions	
	87 psi (6 bar)	Cable-extended versions	
	The maximum overall process pressure may be reduced, depending on the selected flange. Refer to the flange standards for pressure ratings and pressure de-ratings at higher temperatures.		
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	6562 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 vibration, and a high flow rate of abrasive bulk material.		

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%

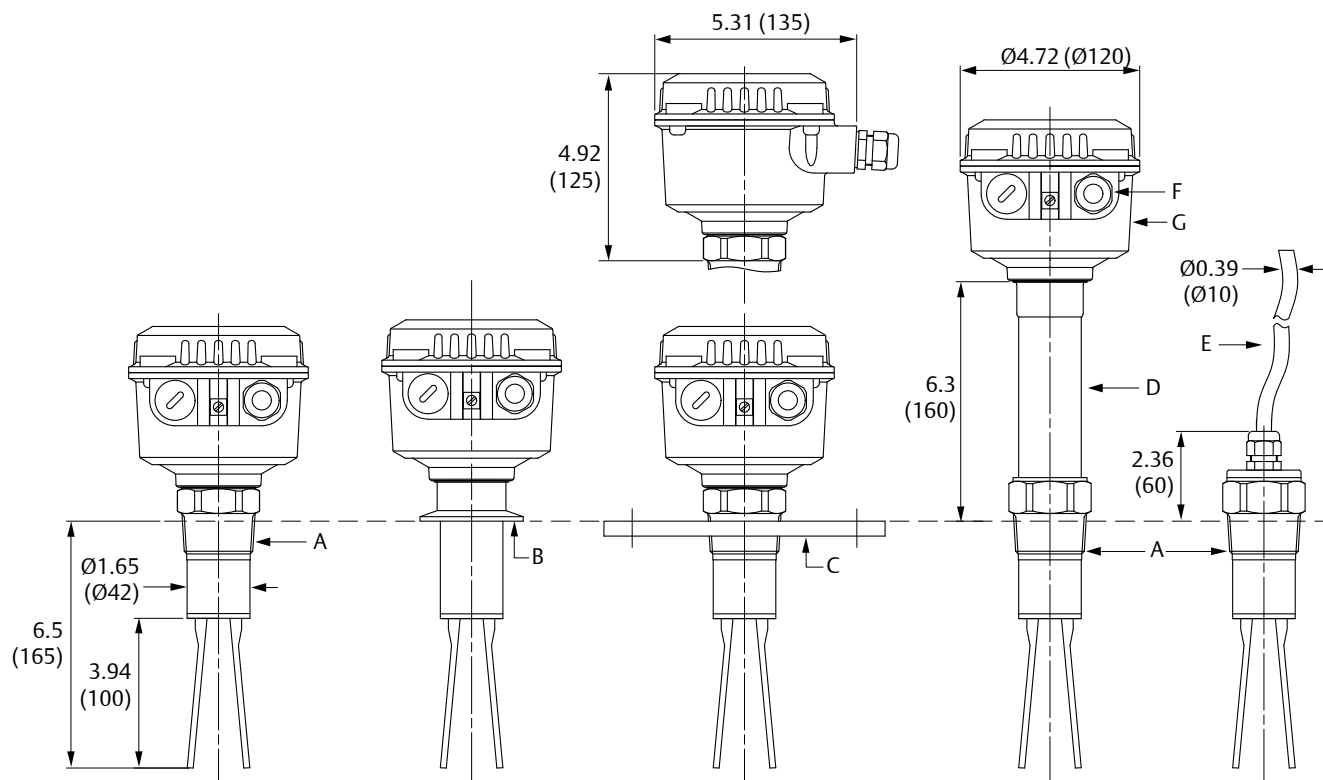
Product certifications

European Union directive information

A copy of the EU Declaration of Conformity can be found at the end of the Rosemount 2521 [Quick Start Guide](#). The most recent revision of the EU Declaration of Conformity can be found at [Emerson.com/Rosemount](https://emerson.com/Rosemount).

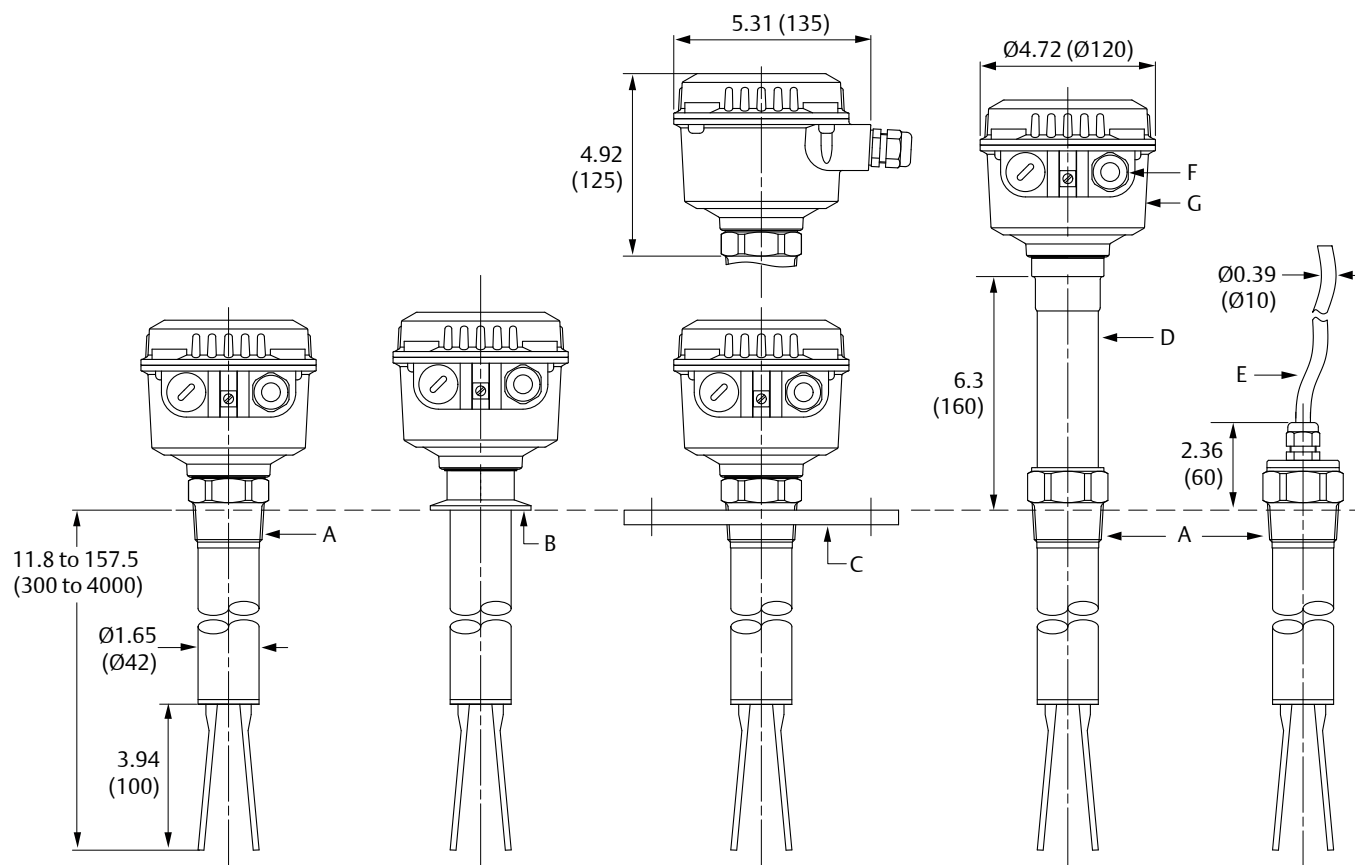
Dimensional drawings

Figure 1: Rosemount 2521S Vibrating Fork Level Switch (Standard Length, Standard Fork Sensitivity)



Dimensions are in inches (millimeters).

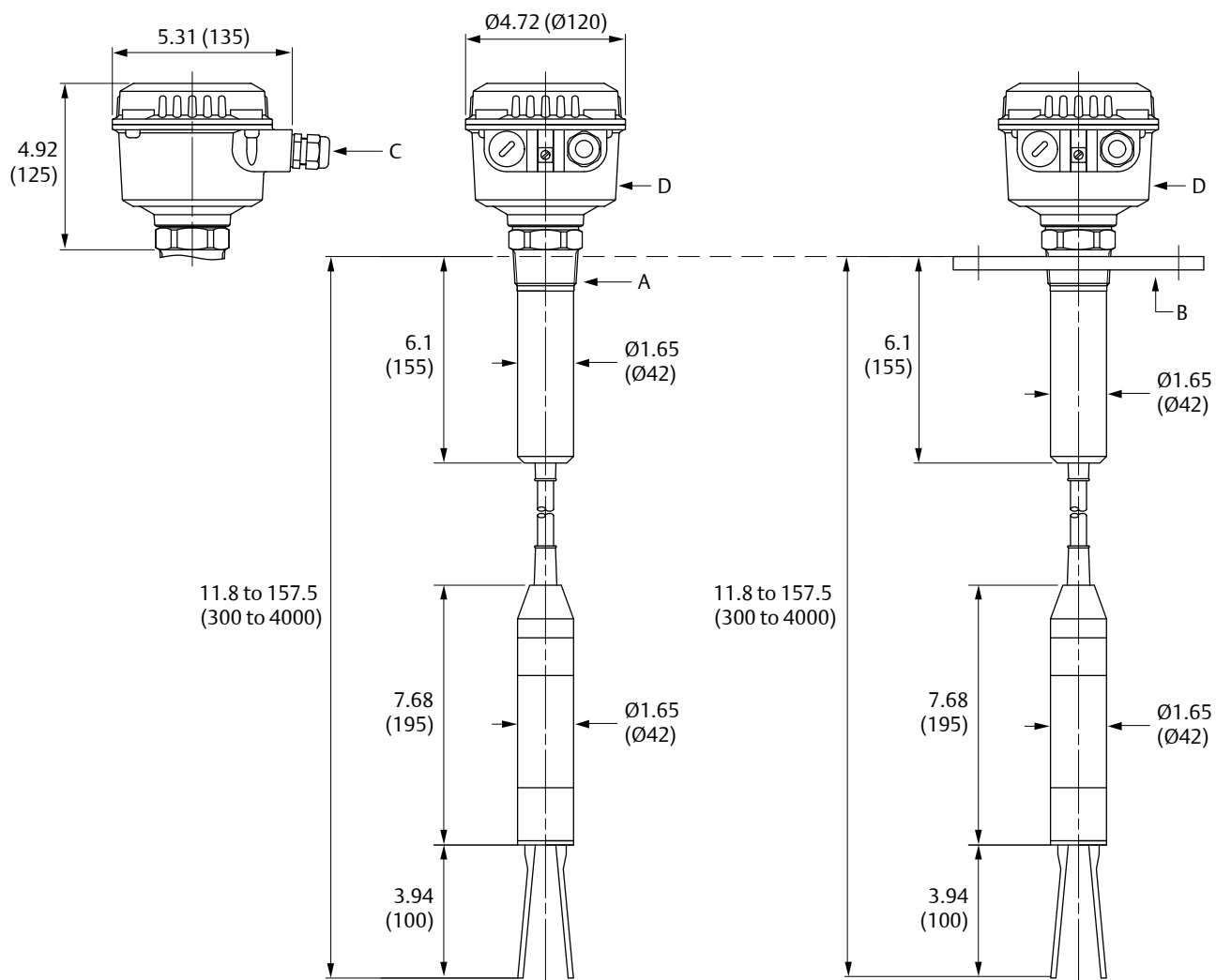
Figure 2: Rosemount 2521S Vibrating Fork Level Switch (Tube-extended Length, Standard Fork Sensitivity)



- A. Thread
- B. Flange
- C. Tri Clamp
- D. Thermal extension tube (temperature-extended shaft)
- E. Separate housing option
- F. Conduit/cable entries
- G. Aluminum housing

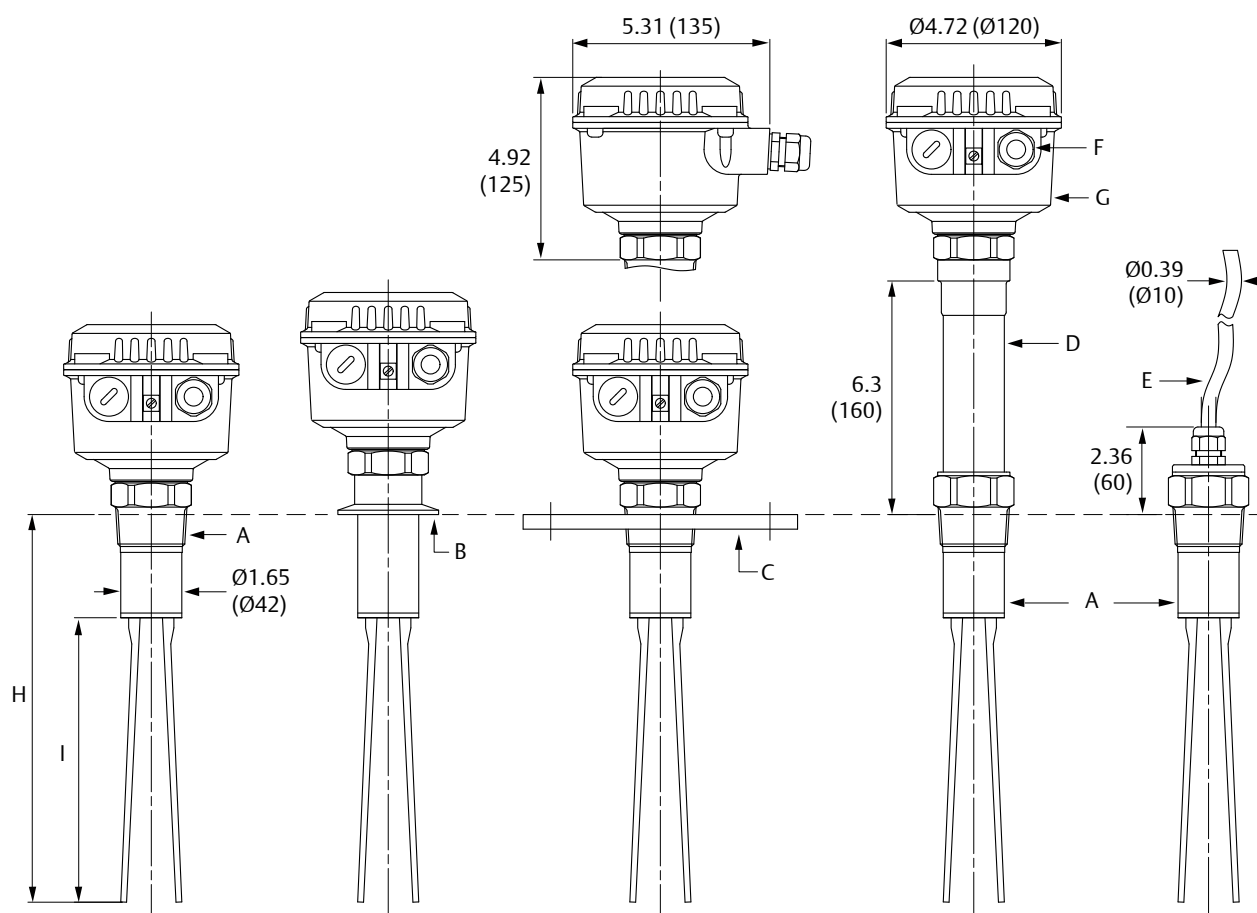
Dimensions are in inches (millimeters).

Figure 3: Rosemount 2521S Vibrating Fork Level Switch (Cable Extension, Standard Fork Sensitivity)



- A. Thread
- B. Flange
- C. Conduit/cable entries
- D. Aluminum housing

Dimensions are in inches (millimeters).

Figure 4: Rosemount 2521H Vibrating Fork Level Switch (Standard Length, Enhanced Fork Sensitivity)

- A. Thread
- B. Flange
- C. Tri Clamp
- D. Thermal extension tube (temperature-extended shaft)
- E. Separate housing option
- F. Conduit/cable entries
- G. Aluminum housing
- H. Dimension L (see Table 4)
- I. Dimension X (see Table 4)

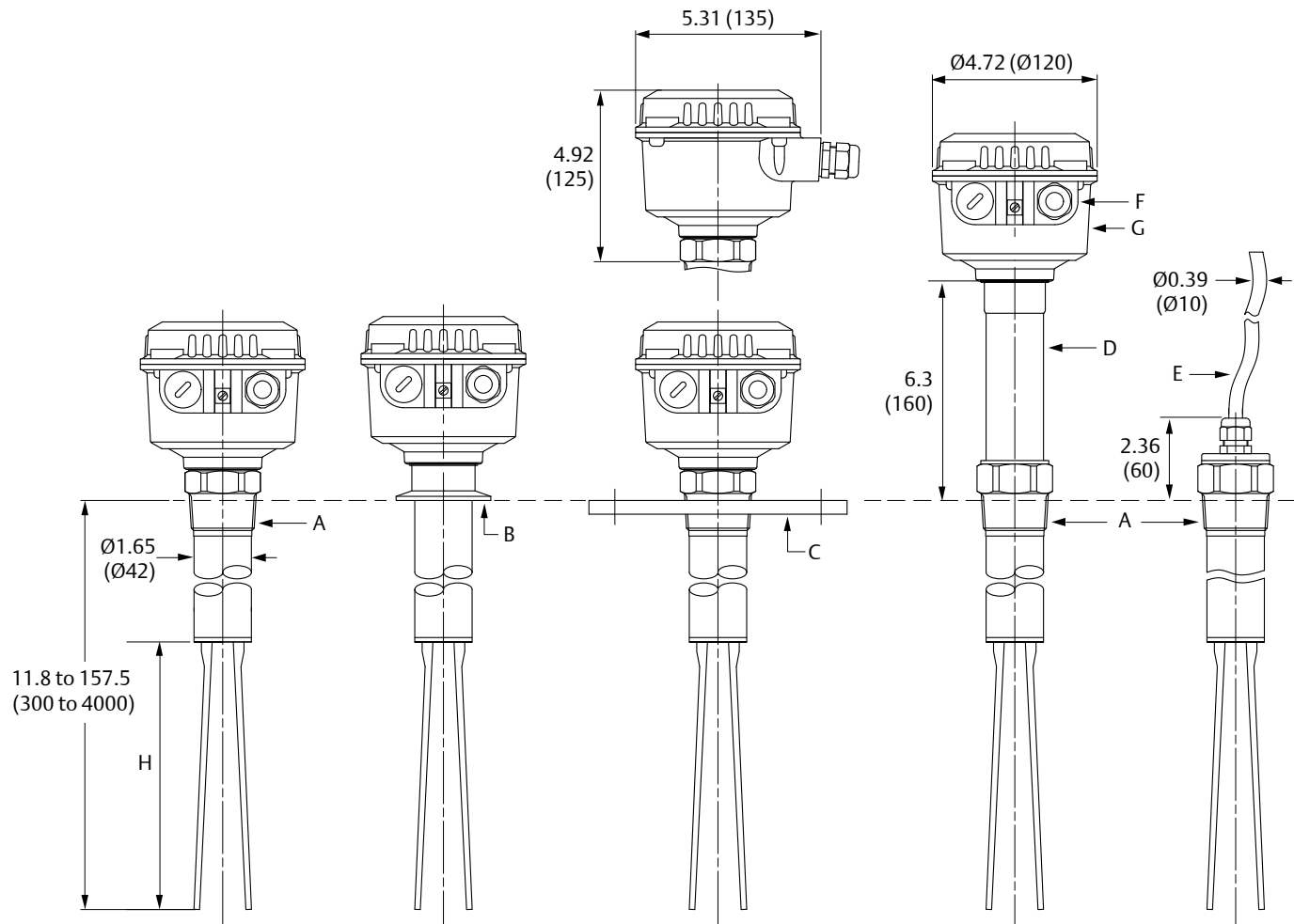
Dimensions are in inches (millimeters).

Table 4: Dimensions L and X

Dimension	Fork sensitivity options	
	Without option	Options (V1, V2 ⁽¹⁾ and V3)
L	9.25 in. (235 mm)	10.24 in. (260 mm)
X	6.69 in. (170 mm)	7.68 in. (195 mm)

(1) Option V2 is only available on a Rosemount 2521 with a 4-in. DN100 flanged process connection.

Figure 5: Rosemount 2521H Vibrating Fork Level Switch (Tube-extended Length, Enhanced Fork Sensitivity)



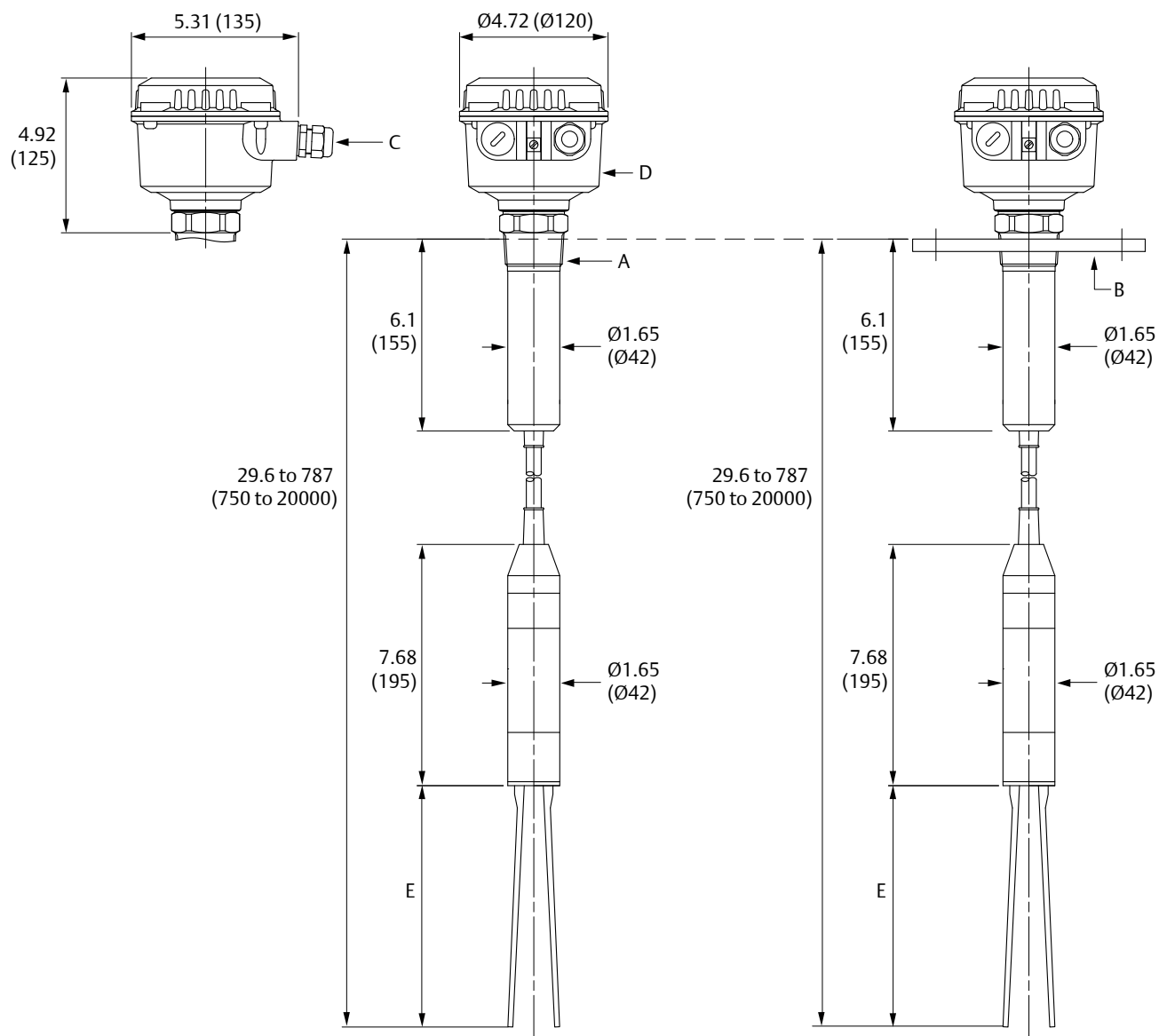
- A. Thread
- B. Flange
- C. Tri Clamp
- D. Thermal extension tube (temperature-extended shaft)
- E. Separate housing option
- F. Conduit/cable entries
- G. Aluminum housing
- H. Dimension X (see Table 5)

Dimensions are in inches (millimeters).

Table 5: Dimension X

Dimension	Fork sensitivity options	
	Without option	Options V1, V2 ⁽¹⁾ and V3
X	6.69 in. (170 mm)	7.68 in. (195 mm)

(1) Option V2 is only available on a Rosemount 2521 with a 4-in. DN100 flanged process connection.

Figure 6: Rosemount 2521H Vibrating Fork Level Switch (Cable Extension, Enhanced Fork Sensitivity)

- A. Thread
- B. Flange
- C. Conduit/cable entries
- D. Aluminum housing
- E. Dimension X (see Table 5)

Dimensions are in inches (millimeters).

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