Rosemount™ 2535 Solids Level Switch

Vibrating Rod

- Compact level switch with threaded process connections from 1-in.

- Sensitivity is adjustable with four settings

- High surface quality for excellent resistance

- Robust design, suitable for process pressures up to 232 psi (16 bar)

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

ROSEMOUNT™

EMERSON™

Introduction

Measurement principles

The Rosemount™ 2535 uses the principle of a tuning fork and a piezo-electric crystal to oscillate the rod at its natural frequency. Changes to the oscillation frequency are continuously monitored by electronics as it varies depending on the rod being covered or uncovered.

When the solids medium in the vessel (silo) falls away from the rod, 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 rod, 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

- Reliable level detection for all bulk materials

- Particularly suitable for use in fine-grained and powdery materials, and materials with strong "caking" properties and coarse-grained granulate

- Ideal for use for full-silo, on-demand, or empty-silo detection

- Very compact design for installation in vessels with very limited space

- Standard shaft lengths are available from 6.3 in. (160 mm)

- Tube-extension versions available with shaft lengths up to 157 in. (4000 mm)

- Robust aluminum die-cast housing with IP67 protection

- Easy installation and commissioning, and maintenance-free

- Approvals for hazardous locations (gas and dust)

- RoHS compliance

- Adjustable sensitivity levels for light bulk solids from 1.2 lb/ft^3 (20 g/l)

Contents

Applications

- Materials with very light product density
- Overfill detection in pipes and shafts
- Low level detection
- Silos/vessels with limited space
- Vibration within the vessel
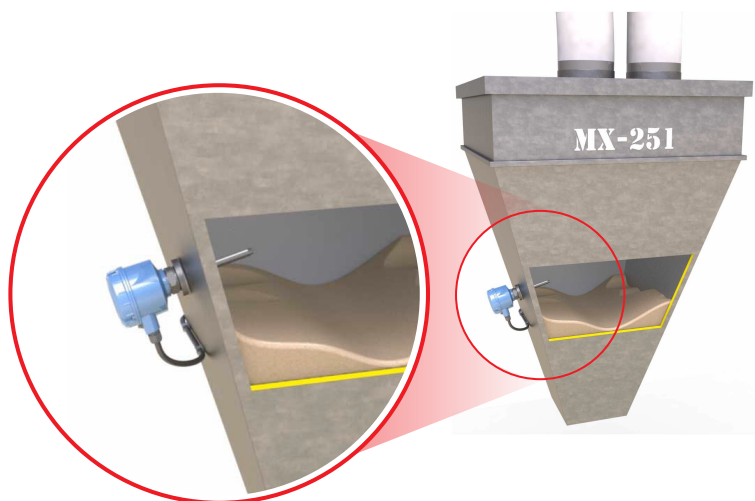
Ordering information

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.

Table 1: Rosemount 2535 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		
2535	Rosemount Solids Switch - Vibrating Rod		★
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	316L Stainless steel (1.4404)		★
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]	½-in. NPT tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)		★
5[5]	¾-in. NPT tapered ANSI B1.20.1 (1 off conduit + 1 off Ex-d blind plug)		★
Process connection size			
1	1 in./25 mm (DN25)/25A		★
A	1.25 in./32 mm		★
5	1.5 in./40 mm (DN40)/40A		★
2[6]	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	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	1, A, 5, and 2	★
Process connection type		**Ratings**	
F	Flat-face flange	DZ and DA	★
R	Raised-face flange	AA	★
G[7]	BSPP (G) thread	NN	★
N	NPT thread	NN	★
C	Tri Clamp	NN	★

Table 1: Rosemount 2535 Ordering Information *(continued)*

Electronic type			
G	PNP, 20 to 40 Vdc		
V	Relay DPDT, 21 to 230 Vac, 22 to 45 Vdc		★
Rod length			
A	Standard length 6.3 in. (160 mm)		★
E[8]	Extended, customer-specified length in tenths of inches		★
M[8]	Extended, customer-specified length in millimeters		★
Specific extended rod length			
0000	Factory default length (only if rod length A is selected)		★
XXXX	Specific customer-specified length in tenths of inches or millimeters (XXX.X inches or XXXX mm)		★
Product certifications		**Conduit entries**	
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[9]		**Certifications**	
S1	Sliding sleeve, without overpressure, maximum 302 °F (150 °C)	NA, GM, and KZ	★
S2	Sliding sleeve, with overpressure, maximum 232 psi (16 bar), maximum 302 °F (150 °C)	All	★
Extended product warranty			
WR5	5-year limited warranty		★
Typical model number: 2535 M S 1 5 NN G 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) *Available when Process connection type code R or C is selected.*

(7)   *Available when Process connection size 1, A, or 5 is selected.*

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

(9)   *Sliding sleeves require an extended length fork from 11.8 to 157-in. (300 to 4000 mm) with a threaded or flanged process connection. Tri Clamp,*
       1-in and 1¼-in. threaded process connections are not available.

Spare 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	
02500-1000-0127	Electronics board: Relay DPDT 21 to 230 Vac, 22 to 45 Vdc	★
02500-1000-0128	Electronics board: Relay PNP, 20 to 40 Vdc	★

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 M16 nuts 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 washers 1 off seal (non-food grade) for up to 256 °F (125 °C)	★

Specifications

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.

Electrical data

Connection terminals	0.14 - 2.5 mm^2 (AWG 26-14)
Cable entry	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 status switchover.
	1 to 2 seconds for covered-to-uncovered status 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	330 Hz
Overvoltage category	II
Pollution degree	2 (inside housing)

Electronics

	Universal voltage Relay DPDT	3-wire PNP
Power supply	21 to 230 Vac 50/60 Hz ±10%[*]	20 to 40 Vdc ±10%[*]
	22 to 45 Vdc ±10%[*]	[*]including ±10% from EN 61010
	[*]including ±10% from EN 61010	
Maximum ripple of power supply	7 V_{ss} at dc	7 V_{ss}
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 permanent load is 0.4 A
	Maximum 30 Vdc, 5 A (non-inductive)	Short-circuit, overload, and reverse polarity protections

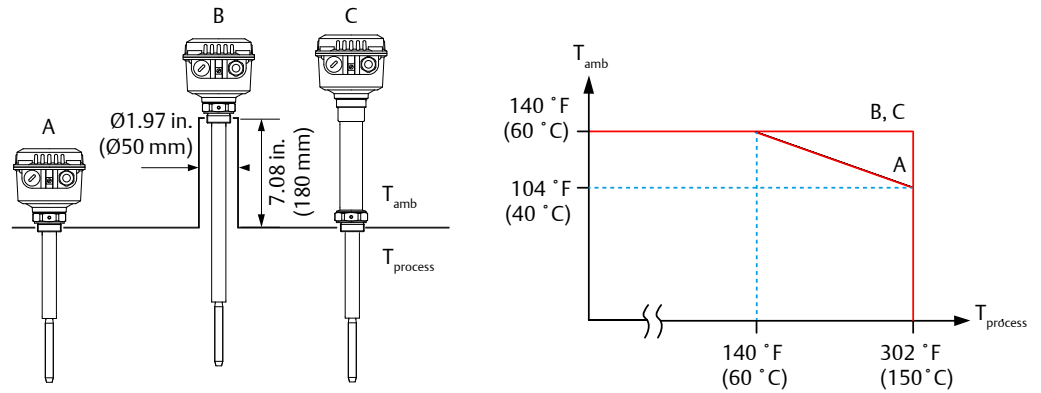|		$V_{OUT} = V_{IN}$, drop < 2.5 V
Status of signal output	Indicated by a built-in LED	Indicated by a built-in LED
Isolation	Power supply to signal output: 2225 Vrms	N/A
	Signal output to signal output: 2225 Vrms	
Protection class	I	III

Mechanical data

Housing	Aluminum housing, powder coated
	Seal between housing and lid: NBR
	Seal between housing and process connection: NBR
	Nameplate: polyester film
Ingress protection	IP67 (EN 60529), NEMA® Type 4X
Process connection	Materials:
	Standard length: Stainless steel 304/321 (1.4301/1.4541) or 316L (1.4404)
	Extended length: Stainless steel 304/321 (1.4301/1.4541) or 316L (1.4404)
	Thread: G 1-in., G 1¼-in., G 1½-in. DIN 228; NPT 1-in., NPT 1¼-in., NPT 1½-in. ANSI B 1.20.1
	Flanges: 321 (1.4541) or 316L (1.4404) according to selection
	Tri Clamp: Stainless steel 304 (1.4301) or 316L (1.4404), 2-in. (DN50) ISO 2852
	All materials are food grade.
Rod	Material: Stainless steel 316L (1.4404) (food grade)
Maximum noise level	50 dBA
Overall weight (approximated)	Standard length versions: 2.9 lbs (1.3 kg)
	Extended length versions: 2.9 lbs + 2.9 lbs per 39.3 in. (1.3 kg + 1.3 kg/m) extension

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 requirements	Setting	Minimum powder density
	I	1.25 lb/ft^3 (20 g/l)
	II	5 lb/ft^3 (80 g/l)
	III	9.4 lb/ft^3 (150 g/l)
	IV	18.7 lb/ft^3 (300 g/l)

Bulk material restriction	No strong tendency to cake or deposit.
Maximum mechanical load	400 N laterally on vibrating rod (at 104 °F, 40 °C)
	Fit a protective angled (reverse-V shaped) shield above the level switch when mechanical loads are high.
Maximum mechanical torque	180 Nm (at 104 °F, 40 °C) for extended lengths
Maximum process pressure	-14.5 to 232 psi (-1 to +16 bar)
	Must be an unpressurized tank when a sliding sleeve without overpressure option is used.
	The maximum process pressure may be reduced when flanges are used. Refer to the flange standards for pressure ratings and pressure de-ratings with higher temperatures.
	The Ex-approved Rosemount 2535 supports process over-pressures up to 232 psi (16 bar) for test purposes. In hazardous areas (classified locations), the over-pressure is restricted to between -2.9 to +1.45 psi (-0.2 to +0.1 bar).
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 vibrations, and 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 2535 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	FM20CA0038
Standards	ANSI/ISA 61010-1:2012
	ANSI/NEMA® 250:2003
	ANSI/IEC 60529:2004
Markings	Type 4X and IP67

U.S.A. Dust certification

KB

Summary of product certification:

Protection	Dust ignition-proof
Certificate	FM20CA0038
Standards	FM Class 3600:2018
	FM Class 3616:2011
	ANSI/ISA 61010-1:2012
	ANSI/NEMA® 250:2003
	ANSI/IEC 60529:2004
Markings	Class II, Division 1, Groups E, F, G
	Class III, Division 1
	T4A Ta = -40 °C to +60 °C
	Type 4X, IP67
Safety instructions	See Rosemount 2535 Product Certifications document

Canada

Canada Ordinary Location certification

KZ

Summary of product certification

Protection	Ordinary location (unclassified, safe area)
Certificate	FM20CA0038
Standards	CSA-C22.2 No. 0-10:R2015
	CSA-C22.2 No. 0.4:R2013
	CSA-C22.2 No. 0.5:R2012
	CSA-C22.2 No. 94:R2011
	CSA-C22.2 No. 60529:R2010
	CAN/CSA-C22.2 No. 61010-1:2012
Markings	Type 4X and IP67

Canada Dust certification

KB

Summary of product certification

Protection	Dust-ignition proof
Certificate	FM20CA0038
Standards	CSA-C22.2 No. 0-10:R2015
	CSA-C22.2 No. 0.4:R2013
	CSA-C22.2 No. 0.5:R2012
	CSA-C22.2 No. 25:R2014
	CSA-C22.2 No. 94:R2011
	CSA-C22.2 No. 60529:R2010
	CAN/CSA-C22.2 No. 61010-1:2012
Markings	Class II, Division 1, Groups E, F, and G
	Class III, Division 1
	T4A Ta = -40 °C to +60 °C
	Type 4X, IP67
Safety instructions	See Rosemount 2535 Product Certifications document

Europe

ATEX Dust certification

ND

Summary of product certification:

Protection	By enclosure
Certificate	BVS 19 ATEX E 075
Standards	EN60079-0:2012+A11:2013
	EN 60079-31:2014
Markings	⬡ II 1/2 D Ex ta/tb IIIC T* °C Da/Db
Temperature*	See Table 4
Safety instructions	See Rosemount 2535 Product Certifications document

Table 4: Thermal data

Permitted ambient temperature[1]	Maximum process temperature (Zone 20)	Maximum surface temperature
-40 °C...+60 °C	<= 120 °C	120 °C
	<= 130 °C	130 °C
	<= 140 °C	140 °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 120 °C.

Permitted temperature at sensor extension, process connection is -40 to 150 °C.

International

IECEx Dust certification

NK

Summary of product certification:

Protection	By enclosure
Certificate	IECEx BVS 19.0071
Standards	IEC 60079-0:2011
	IEC 60079-31:2013
Markings	Ex ta/tb IIIC T* °C Da/Db
Temperature*	See Table 5
Safety instructions	See Rosemount 2535 Product Certifications document

Table 5: Thermal data

Permitted ambient temperature[1]	Maximum process temperature (Zone 20)	Maximum surface temperature
-40 to 60 °C	<= 120 °C	120 °C
	<= 130 °C	130 °C
	<= 140 °C	140 °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 limited to 120 °C.

Permitted temperature at sensor extension, process connection is -40 to 150 °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 2535 Vibrating Rod Level Switch (Standard Length)
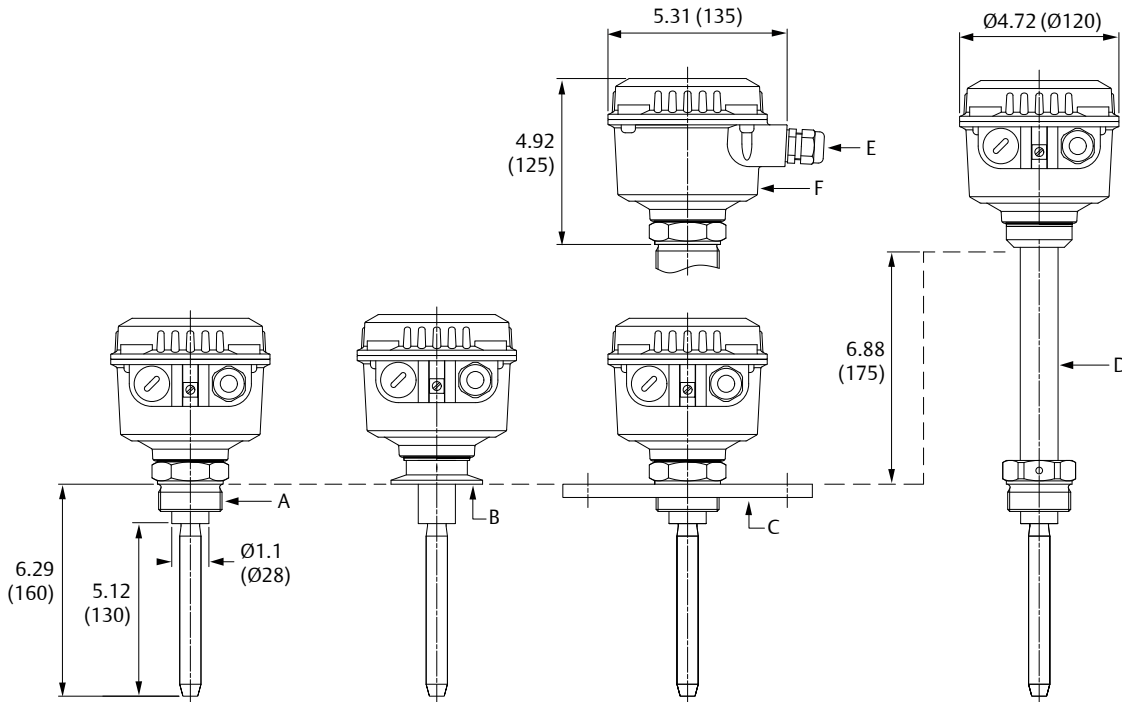
A. Thread
B. Tri Clamp
C. Flange
D. Thermal extension tube (temperature extension shaft)
E. Conduit/cable entries
F. Aluminum housing

Dimensions are in inches (millimeters).

**Figure 2: Rosemount 2535 Vibrating Rod Level Switch (Extended Length)**
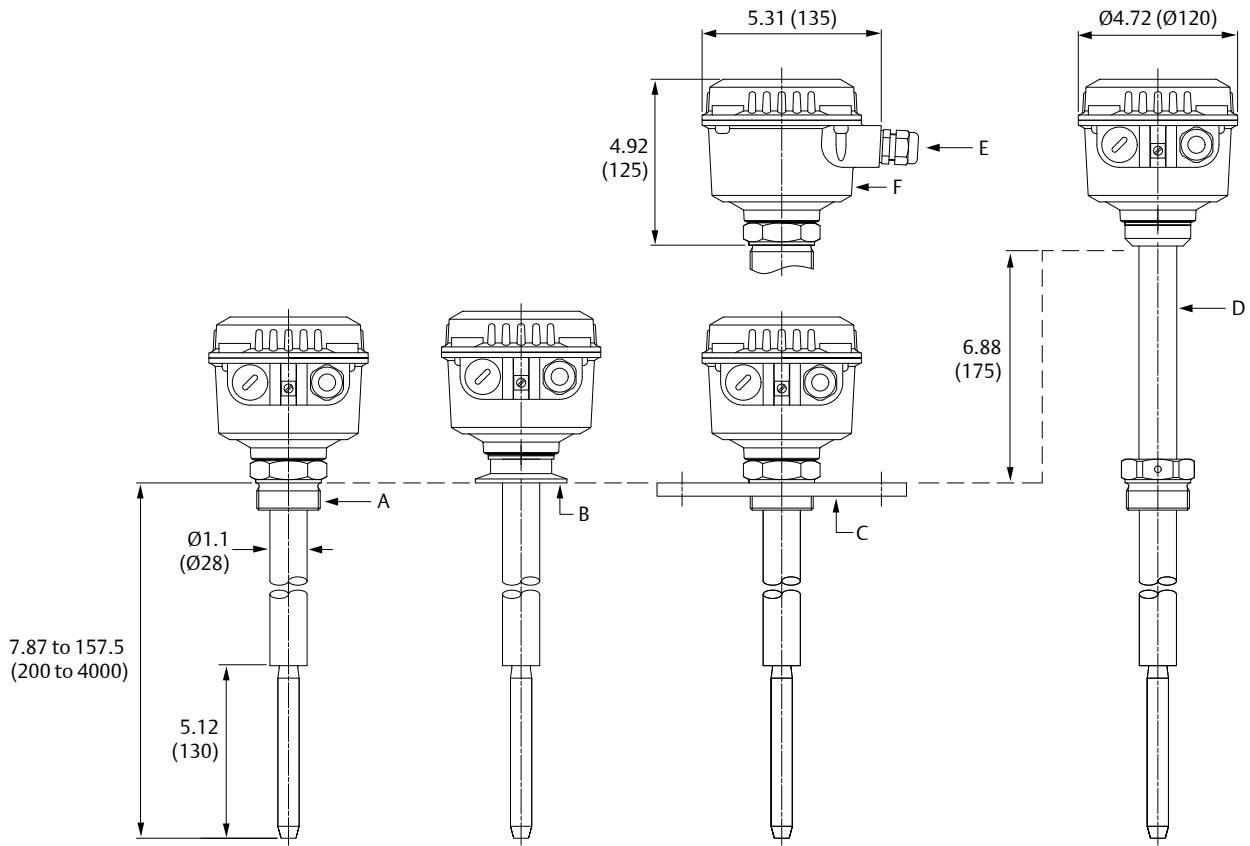
A. Thread
B. Tri Clamp
C. Flange
D. Thermal extension tube (temperature extension shaft)
E. Conduit/cable entries
F. Aluminum housing

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
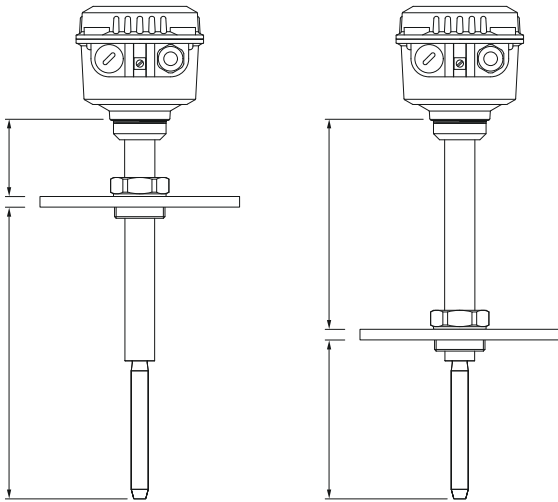
Emerson Automation Solutions

6021 Innovation Blvd.
Shakopee, MN 55379, USA
📱 +1 800 999 9307 or +1 952 906 8888
🖨 +1 952 949 7001
✉ RFQ.RMD-RCC@Emerson.com

North America Regional Office

Emerson Automation Solutions
8200 Market Blvd.
Chanhassen, MN 55317, USA
📱 +1 800 999 9307 or +1 952 906 8888
🖨 +1 952 949 7001
✉ RMT-NA.RCCRFQ@Emerson.com

Latin America Regional Office

Emerson Automation Solutions
1300 Concord Terrace, Suite 400
Sunrise, FL 33323, USA
📱 +1 954 846 5030
🖨 +1 954 846 5121
✉ RFQ.RMD-RCC@Emerson.com

Europe Regional Office

Emerson Automation Solutions Europe
GmbH
Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland
📱 +41 (0) 41 768 6111
🖨 +41 (0) 41 768 6300
✉ RFQ.RMD-RCC@Emerson.com

Asia Pacific Regional Office

Emerson Automation Solutions
1 Pandan Crescent
Singapore 128461
📱 +65 6777 8211
🖨 +65 6777 0947
✉ Enquiries@AP.Emerson.com

Middle East and Africa Regional Office

Emerson Automation Solutions
Emerson FZE P.O. Box 17033
Jebel Ali Free Zone - South 2
Dubai, United Arab Emirates
📱 +971 4 8118100
🖨 +971 4 8865465
✉ RFQ.RMTMEA@Emerson.com

in Linkedin.com/company/Emerson-Automation-Solutions
t Twitter.com/Rosemount_News
f Facebook.com/Rosemount
▶ Youtube.com/user/RosemountMeasurement

ROSEMOUNT™

EMERSON™