

Level Measurement

Point level measurement - Vibrating switches

SITRANS LVS200

Overview



SITRANS LVS200 is a vibrating point level switch for high, low or demand level detection of bulk solids.

Benefits

- High resistance to mechanical forces
- Strong vibration resistance to high bulk material loads
- Rotatable enclosure
- Suitable for low density material: standard version, 20 g/l (1.3 lb/ft³); liquid/solid interface version, 50 g/l (3 lb/ft³), and low density option min. 5 g/l (0.3 lb/ft³)
- Customer desired extensions up to 20000 mm (787")
- Optional detection of solids within liquid
- Durable short fork option with 165 mm (6.5") insertion length

Application

The standard LVS200 detects high, low, or demand levels of dry bulk solids in bins, silos or hoppers. The liquid/solid interface version can also detect settled solids within liquids or solids within confined spaces such as feed pipes. It is designed to ignore liquids in order to detect the interface between a solid and a liquid.

A pipe extension version is available with either the standard or liquid/solid interface electronics and fork, separated by a customer supplied 1" pipe.

SITRANS LVS200 has an optional 4 to 20 mA output for monitoring buildup on the fork to determine when preventative maintenance should be performed in sticky applications.

The LVS200 has a compact design and can be top, side or angle mounted. The vibrating fork design ensures the tines are kept clean. The unique design of the fork and crystal assembly eliminates false high level readings even if tines become damaged.

A signal from the electronic circuit excites a crystal in the probe causing the fork to vibrate. If the fork is covered by material, the change in vibration is detected by the electronic circuitry which causes the relay to change state after a one second delay. When the fork is free from material pressure, full vibration resumes and the relay reverts to its normal condition.

- Key Applications: dry bulk solids in bins, silos, hoppers or settled solids within liquids (interface version)

Technical specifications

Mode of operation	
Measuring principle	Vibrating point level switch
Input	
Measured variable	High, low and demand
Measuring frequency	<ul style="list-style-type: none"> • Standard 125 Hz • Liquid/solid interface and short fork version 350 Hz
Output	
PNP	Open collector: Permanent load max. 0.4 A, short-circuit and overload protected Turn-on voltage: max. 50 V (reverse protection)
2-wire without contact	Load current: <ul style="list-style-type: none"> • min. 10 mA • max. 500 mA permanent • max. 2A < 200 ms • max. 5A < 50 ms Voltage drop on the electronic module: max. 7 V with closed electric circuit Cutoff current with open electric circuit: max. 5 mA
Relays	SPDT relay DPDT relay
<ul style="list-style-type: none"> • Version with 1 relay • Version with 2 relays 	<ul style="list-style-type: none"> • From loss of vibration: approximately 1 second • From resumption of vibration: approximately 1 ... 2 seconds • Probe uncovered to covered: approximately 1 second • Probe covered to uncovered: approximately 1 to 2 seconds
Relay delay	
Signal delay	
Relay fail-safe	High or low, switch selectable
Alarm output	<ul style="list-style-type: none"> • Relay 8 A at 250 V AC, non-inductive • Relay 5 A at 30 V DC, non-inductive
mA output	8/16 mA or 4 ... 20 mA
<ul style="list-style-type: none"> • Resolution 4 ... 20 mA ± 0.1 mA 	
Sensitivity	High or low, switch selectable
Rated operating conditions	
Installation conditions	
<ul style="list-style-type: none"> • Location 	Indoor/outdoor
Ambient conditions	
<ul style="list-style-type: none"> • Ambient temperature • Installation category • Pollution degree 	-40 ... +60 °C (-40 ... +140 °F) III 2

Level Measurement

Point level measurement - Vibrating switches

SITRANS LVS200

		Selection and Ordering data	Order No.
Medium conditions		SITRANS LVS200, standard SITRANS LVS200 is a vibrating point level switch for high, low or demand level detection of bulk solids.	7ML5731- - - - - - A0
• Process temperature	<ul style="list-style-type: none"> All except CSA Class II, Group G: -40 ... +150 °C (-40 ... +302 °F) CSA Class II, Group G: -40 ... +140 °C (-40 ... +284 °F), CSA temperature code T3B 	Power supply	
• Max. threaded bushing temperature	+80 °C (+176 °F)	19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)	1
• Max. enclosure surface temperature (Category 2D)	+90 °C (+194 °F)	19 ... 230 V AC, 19 ... 55 V DC, two relay outputs (DPDT)	2
• Max. extension surface temperature (Category 1D)	+150 °C (+302 °F)	18 ... 50 V DC PNP	3
• Pressure (vessel)	Max. 10 bar g (145 psi g) European Pressure Directive 97/23/EC: Category 1	19 ... 230 V AC/DC without contact, 2-wire loop powered ¹⁾	4
• Minimum material density	<ul style="list-style-type: none"> Standard version: approx. 20 g/l (1.2 lb/ft³) liquid/solid interface version: approx. 50 g/l (3 lb/ft³) optional low density version: approx. 5 g/l (0.3 lb/ft³) 	7 ... 9 V DC (requires NAMUR switch amplifier) NAMUR IEC 60947-5-6, 2-wire ²⁾	5
		8/16 mA or 4 ... 20 mA; 12.5 ... 35 V DC, 2-wire	6
		19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT) basic version ³⁾⁴⁾	▶ 7
Design		Process temperature	
Material		Without temperature isolator	▶ A
• Enclosure	Epoxy coated aluminum	With temperature isolator	B
Process connection	<ul style="list-style-type: none"> Thread 1½" NPT [(Taper), ANSI/ASME B1.20.1], R ½" [(BSPT), EN 10226] and flange options Optional sliding bushing with 2" NPT [(Taper), ANSI/ASME B1.20.1] or BSP thread Thread material: stainless steel 303 (1.4301) 	Separated enclosure - cable length 1.5 m (4.92 ft) [max. temperature process +180 °C (+356 °F)/ max. temperature electronics +80 °C (+176 °F)]	C
Tine material	Stainless steel 316Ti (1.4571), PTFE-coated tines are available upon special request	Separated enclosure - cable length 4.0 m (13.12 ft) [max. temperature process +180 °C (+356 °F)/ max. temperature electronics +80 °C (+176 °F)]	D
Degree of protection	IP65/Type 4/NEMA 4	Process connection	
Conduit entry	2 x M20x1.5 or 2 x ½" NPT	<u>Threaded</u>	
Weight	<ul style="list-style-type: none"> Standard version, no extensions: approx. 2.0 kg (4.4 lbs) Solids/liquids version, no extensions: approx. 1.9 kg (4.2 lbs) 	R 1½" [(BSPT), EN 10226]	▶ A
		1½" NPT [(Taper), ANSI/ASME B1.20.1]	▶ B
		G 2" [(BSPP), EN ISO 228-1], sliding sleeve [min. length 500 mm (19.69")] ⁵⁾	C
		2" NPT [(Taper), ANSI/ASME B1.20.1], sliding sleeve [min. length 500 mm (19.69")] ⁵⁾	D
		<u>Flanged</u>	
		DN 100 PN 6, EN1092-1 (1.4541/321)	E
		DN 100 PN 16, EN1092-1 (1.4541/321)	F
		2" ASME 150 lbs B16.5 (1.4541/321)	G
		3" ASME 150 lbs B16.5 (1.4541/321)	H
		4" ASME 150 lbs B16.5 (1.4541/321)	J
		Tri-clamp 2" Stainless steel 304 (1.4301)	K
Power supply	<ul style="list-style-type: none"> 19 ... 230 V AC, +10 %, 50 ... 60 Hz, 8 VA 19 ... 55 V DC, +10 %, 1.5 W 	Extension length	
Certificates and approvals	<ul style="list-style-type: none"> CSA/FM General Purpose CE CSA/FM Dust Ignition Proof C-TICK ATEX II 1/2 D CSA/FM IS Class I, II, III Div. 1, Groups A, B, C, D, E, F, G, FM Class 1, Aex ia IIC, CSA Class 1, Ex ia IIC, available only with power supply option 5 and 6 ATEX II 1G and 1/2 G Eex ia IIC; ATEX II 1D and 1/2 D, available only with power supply option 5 	<u>Stainless steel 304 (1.4301)</u>	
		Standard length, 235 mm (9.25") ⁶⁾	▶ 11
		<u>Add order code Y01 and plain text:</u>	
		<u>"Insertion length ... mm"</u>	
		• 300 ... 500 mm (11.81 ... 19.69") ⁶⁾	12
		• 501 ... 750 mm (19.72 ... 29.53") ⁶⁾	13
		• 751 ... 1000 mm (29.57 ... 39.37") ⁶⁾	14
		• 1001 ... 1250 mm (39.41 ... 49.21") ⁶⁾	15
		• 1251 ... 1500 mm (49.25 ... 59.06") ⁶⁾	16
		• 1501 ... 1750 mm (59.09 ... 68.90") ⁶⁾	17
		• 1751 ... 2000 mm (68.94 ... 78.74") ⁶⁾	18
		• 2001 ... 2250 mm (78.78 ... 88.58") ⁶⁾	21
		• 2251 ... 2500 mm (88.62 ... 98.43") ⁶⁾	22
		• 2501 ... 2750 mm (98.46 ... 108.27") ⁶⁾	23
		• 2751 ... 3000 mm (108.31 ... 118.11") ⁶⁾	24
		• 3001 ... 3250 mm (118.15 ... 127.95") ⁶⁾	25
		• 3251 ... 3500 mm (127.99 ... 137.80") ⁶⁾	26
		• 3501 ... 3750 mm (137.83 ... 147.64") ⁶⁾	27
		• 3751 ... 4000 mm (147.68 ... 157.48") ⁶⁾	28

5

Level Measurement

Point level measurement - Vibrating switches

SITRANS LVS200

Selection and Ordering data	Order No.
SITRANS LVS200, short fork for liquids/solids interface Vibrating point level switch for solids or solids within liquid interface applications, and high load applications with short insertion requirements	7 ML 5 7 3 2 - A 0
Power supply 19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)	1
19 ... 230 V AC, 19 ... 55 V DC, two relay outputs (DPDT)	2
18 ... 50 V DC PNP	3
19 ... 230 V AC/DC without contact, 2-wire loop powered ¹⁾	4
8/16 mA or 4 ... 20 mA; 12.5 ... 35 V DC, 2-wire ²⁾	5
Process temperature Without temperature isolator	A
With temperature isolator	B
Separated enclosure - cable length 1.5 m (4.92 ft) [max. temperature process +180 °C (+356 °F)/max. temperature electronics +80 °C (+176 °F)]	C
Separated enclosure - cable length 4.0 m (13.12 ft) [max. temperature process +180 °C (+356 °F)/max. temperature electronics +80 °C (+176 °F)]	D
Process connection <u>Threaded</u> R 1½" [(BSPT), EN 10226]	A
1½" NPT [(Taper), ANSI/ASME B1.20.1]	B
G 2" [(BSPP), EN ISO 228-1], sliding sleeve [min. length 500 mm (19.69")]	C
2" NPT [(Taper), ANSI/ASME B1.20.1], sliding sleeve [min. length 500 mm (19.69")]	D
<u>Flanged</u> DN 100 PN 6, EN1092-1 (1.4541/321)	E
DN 100 PN 16, EN1092-1 (1.4541/321)	F
2" ASME 150 lbs B16.5 (1.4541/321)	G
3" ASME 150 lbs B16.5 (1.4541/321)	H
4" ASME 150 lbs B16.5 (1.4541/321)	J
Extension length <u>Stainless steel 304 (1.4301)³⁾</u> Standard length, 165 mm (6.50") ³⁾	1 1
<u>Add order code Y01 and plain text: "Insertion length ... mm"</u> 200 ... 500 mm (7.87 ... 19.69") ³⁾	1 2
501 ... 750 mm (19.72 ... 29.53") ³⁾	1 3
751 ... 1000 mm (29.57 ... 39.37") ³⁾	1 4
1001 ... 1250 mm (39.41 ... 49.21") ³⁾	1 5
1251 ... 1500 mm (49.25 ... 59.06") ³⁾	1 6
1501 ... 1750 mm (59.09 ... 68.90") ³⁾	1 7
1751 ... 2000 mm (68.94 ... 78.74") ³⁾	1 8
2001 ... 2250 mm (78.78 ... 88.58") ³⁾	2 1
2251 ... 2500 mm (88.62 ... 98.43") ³⁾	2 2
2501 ... 2750 mm (98.46 ... 108.27") ³⁾	2 3
2751 ... 3000 mm (108.31 ... 118.11") ³⁾	2 4
3001 ... 3250 mm (118.15 ... 127.95") ³⁾	2 5
3251 ... 3500 mm (127.99 ... 137.80") ³⁾	2 6
3501 ... 3750 mm (137.83 ... 147.64") ³⁾	2 7
3751 ... 4000 mm (147.68 ... 157.48") ³⁾	2 8
<u>Stainless Steel 316TI (1.4571)</u> Standard length, 165 mm (6.50") ⁴⁾	3 1
<u>Add order code Y01 and plain text: "Insertion length ... mm"</u> 200 ... 500 mm (7.87 ... 19.69") ⁴⁾	3 2
501 ... 750 mm (19.72 ... 29.53") ⁴⁾	3 3
751 ... 1000 mm (29.57 ... 39.37") ⁴⁾	3 4

Selection and Ordering data	Order No.
SITRANS LVS200, short fork for liquids/solids interface Vibrating point level switch for solids or solids within liquid interface applications, and high load applications with short insertion requirements	7 ML 5 7 3 2 - A 0
1001 ... 1250 mm (39.41 ... 49.21") ⁴⁾	3 5
1251 ... 1500 mm (49.25 ... 59.06") ⁴⁾	3 6
1501 ... 1750 mm (59.09 ... 68.90") ⁴⁾	3 7
1751 ... 2000 mm (68.94 ... 78.74") ⁴⁾	3 8
2001 ... 2250 mm (78.78 ... 88.58") ⁴⁾	4 1
2251 ... 2500 mm (88.62 ... 98.43") ⁴⁾	4 2
2501 ... 2750 mm (98.46 ... 108.27") ⁴⁾	4 3
2751 ... 3000 mm (108.31 ... 118.11") ⁴⁾	4 4
3001 ... 3250 mm (118.15 ... 127.95") ⁴⁾	4 5
3251 ... 3500 mm (127.99 ... 137.80") ⁴⁾	4 6
3501 ... 3750 mm (137.83 ... 147.64") ⁴⁾	4 7
3751 ... 4000 mm (147.68 ... 157.48") ⁴⁾	4 8
Material process connection/extension Stainless steel 304 (1.4301)	1
Stainless steel 316 TI (1.4571)	2
Approvals CSA/FM Dust Ignition Proof, C-TICK	A
ATEX II 1/2 D, C-TICK	B
CSA/FM General Purpose, C-TICK	C
CE, C-TICK	D
1) Available with approval options B, C, D only	
2) Available with approval option D only	
3) Available with material process connection/extension option 1 only	
4) Available with material process connection/extension option 2 only	

Selection and Ordering data	Order code
Further Designs Please add "-Z" to Order No. and specify Order code(s).	
Total insertion length: Enter the total insertion length in plain text description, max. 4000 mm (157.48")	Y01
Signal bulb inserted in M20 cable gland ¹⁾	A20
Operating Instructions Multi-language This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	Order No. 7ML1998-5FT62
Spare Parts Replacement Electronics Module (350 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)]	7ML1830-1KM
Sliding sleeve, 2" BSP (ISO 228)	7ML1830-1JM
Sliding sleeve, 2" NPT [(Taper), ANSI/ASME B1.20.1]	7ML1830-1JN
1) Available with approval options C, D only	

5

Level Measurement

Point level measurement - Vibrating switches

SITRANS LVS200

Selection and Ordering data	Order No.
SITRANS LVS200, cable extended Vibrating point level switch for high or low level detection of bulk solids materials	7 ML 5 7 3 4 - - - - - - A 0
Power supply	
19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)	1
19 ... 230 V AC, 19 ... 55 V DC, two relay outputs (DPDT)	2
18 ... 50 V DC PNP	3
19 ... 230 V AC/DC without contact, 2-wire loop powered ¹⁾	4
7 ... 9 V DC (requires NAMUR switch amplifier)	5
NAMUR IEC 60947-5-6, 2-wire ^{2) 3)}	6
8/16 mA or 4 ... 20 mA; 12.5 ... 35 V DC, 2-wire ⁴⁾	6
Process temperature	
Up to +80 °C (+176 °F)	A
Process connection	
<u>Threaded</u>	
R 1½" [(BSPT), EN 10226]	A
1½" NPT [(Taper), ANSI/ASME B1.20.1]	B
<u>Flanged</u>	
DN 100 PN 6, EN1092-1 (1.4541/321)	C
DN 100 PN 16, EN1092-1 (1.4541/321)	D
2" ASME 150 lbs B16.5 (1.4541/321)	E
3" ASME 150 lbs B16.5 (1.4541/321)	F
4" ASME 150 lbs B16.5 (1.4541/321)	G
Extension length	
700 ... 1000 mm (19.7 ... 39.4") [max. length 20000 mm (787.4"), not with Power supply option 5 (max. 10000 mm, 393.7")]	1 0
<u>Add order code Y01 and plain text: "Insertion length ... mm"</u>	
1001 ... 2000 mm (39.41 ... 78.74")	1 1
2001 ... 3000 mm (78.78 ... 118.11")	1 2
3001 ... 4000 mm (118.15 ... 157.48")	1 3
4001 ... 5000 mm (157.52 ... 196.85")	1 4
5001 ... 6000 mm (196.89 ... 236.22")	1 5
6001 ... 7000 mm (236.26 ... 275.59")	1 6
7001 ... 8000 mm (275.63 ... 314.96")	1 7
8001 ... 9000 mm (315 ... 354.33")	1 8
9001 ... 10000 mm (354.37 ... 393.70")	2 0
10001 ... 11000 mm (393.74 ... 433.07")	2 1
11001 ... 12000 mm (433.11 ... 472.44")	2 2
12001 ... 13000 mm (472.48 ... 511.81")	2 3
13001 ... 14000 mm (511.85 ... 551.18")	2 4
14001 ... 15000 mm (551.22 ... 590.55")	2 5
15001 ... 16000 mm (590.59 ... 629.92")	2 6
16001 ... 17000 mm (629.96 ... 669.29")	2 7
17001 ... 18000 mm (669.33 ... 708.66")	2 8
18001 ... 19000 mm (708.70 ... 748.03")	3 0
19001 ... 20000 mm (748.07 ... 787.40")	3 1
Application type	
Dry bulk solids (125 Hz)	1
Liquid/solids interface (350 Hz) ⁵⁾	2

Selection and Ordering data	Order No.
SITRANS LVS200, cable extended Vibrating point level switch for high or low level detection of bulk solids materials	7 ML 5 7 3 4 - - - - - - A 0
Approvals	
CSA/FM Dust Ignition Proof, C-TICK	A
ATEX II 1/2 D, C-TICK	B
CSA/FM General Purpose, C-TICK	C
CE, C-TICK	D
CSA/FM IS Class I, II, III Div. 1, Groups A, B, C, D, E, F, G, FM Class 1, Aex ia IIC, CSA Class 1, Ex ia IIC, C-TICK ⁶⁾	E
ATEX II 1G and 1/2G Exe ia IIC; ATEX II 1D and 1/2D, C-TICK ⁶⁾	F
1) Available with approval options A to D only	
2) Available with approval options C to F only	
3) Cable length is limited to 10000 mm (393.70")	
4) Available with approval options C, D only	
5) Cable length is limited to 7000 mm (275.59")	
6) Available with power supply option 5 and application type 1 only	

Selection and Ordering data	Order code
Further Designs	
Please add "-Z" to Order No. and specify Order code(s).	
Total insertion length: Enter the total insertion length in plain text description, max. 4000 mm (157.48")	Y01
Enhanced sensitivity > 5 g/l via electronics and increased fork length to 195 mm (7.68")	K05
Signal bulb inserted in M20 cable gland ¹⁾	A20
NAMUR 8/16 mA switch amplifiers	A15
Operating Instructions	Order No. 7ML1998-5FT62
Multi-language This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	
Spare Parts	
Replacement Electronics Module (125 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)]	7ML1830-1KL
Replacement Electronics Module (350 Hz) [19 ... 230 V AC, 19 ... 55 V DC, one relay output (SPDT)]	7ML1830-1KM
1) Available with approval options C, D only	

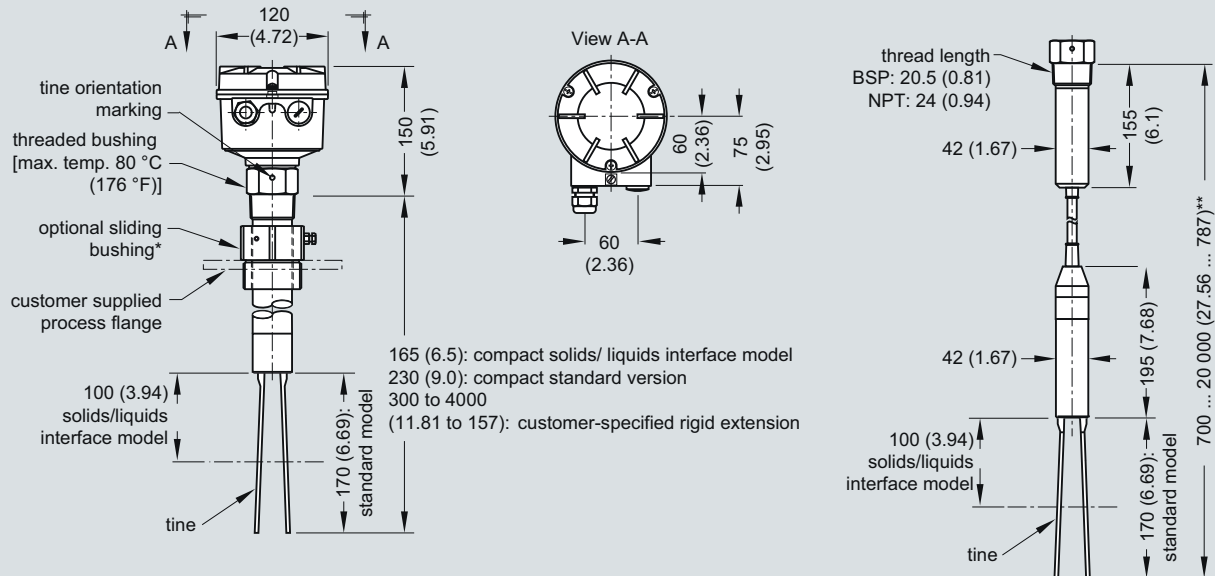
5

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Dimensional drawings



Notes:

- * The clamping screws of the sliding bushing must be tightened to 10 Nm.
- ** Cable version with Liquids/solids interface model option length to 7000 mm (275.59")
Cable version with NAMUR electronics length to 10 000 mm (393.7") tightened to 10 Nm.
See drawing 23650563 for pipe extended version details. (Pipe is customer supplied.)

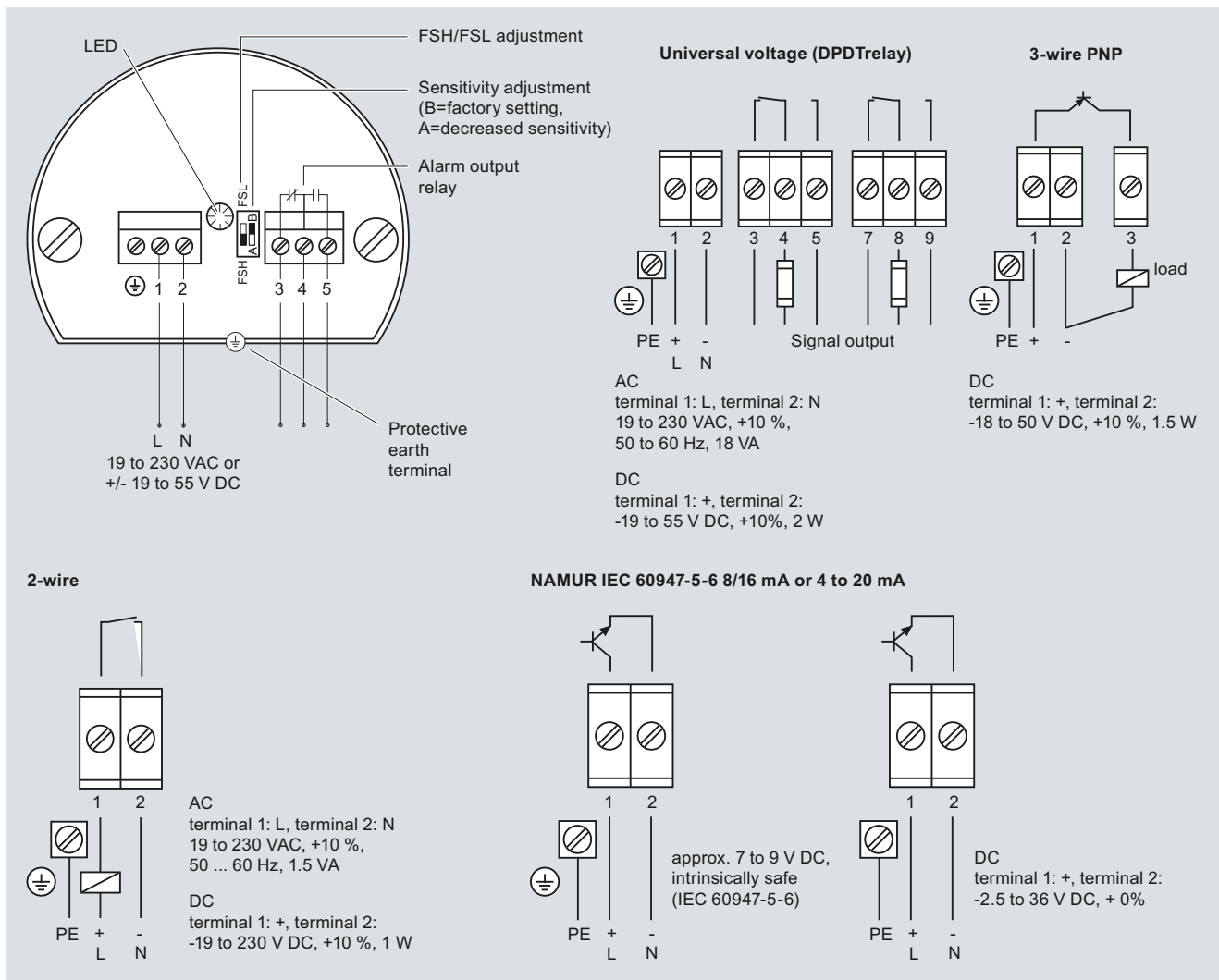
SITRANS LVS200, dimensions in mm (inch)

Level Measurement

Point level measurement - Vibrating switches

SITRANS LVS200

Schematics



SITRANS LVS200 connections

FINE CONTROLS (UK) LTD



Fine Controls have been supplying process controls & instrumentation equipment since 1994, & now serves an ever expanding customer base, both in the UK & globally.

We offer a full range of valve & instrumentation products & services, with our product range representing leading technologies & brands:

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Temperature: Temperature Probes & Thermowells, Temperature transmitters, Temperature Regulators & Temperature Displays

Level: Level Transmitters & Switches

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Fine Controls (UK) LTD, Bassendale Road, Croft Business Park,
Bromborough, Wirral, CH62 3QL UK
Tel: 0151 343 9966
Email: sales@finecontrols.com