

Level measurement

Point level measurement

Vibrating switches

SITRANS LVL100

Overview



SITRANS LVL100 is a compact vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low and demand applications, as well as pump protection. It is ideal for use in confined spaces.

Benefits

- Proven vibrating level switch technology for liquids
- Compact insertion length of 40 mm (1.57 inch) for confined space applications
- Available starting at 1/2" threaded process connections
- Fault monitoring for corrosion, loss of vibration, or line break to the piezo drive
- Integrated test function to confirm correct operation

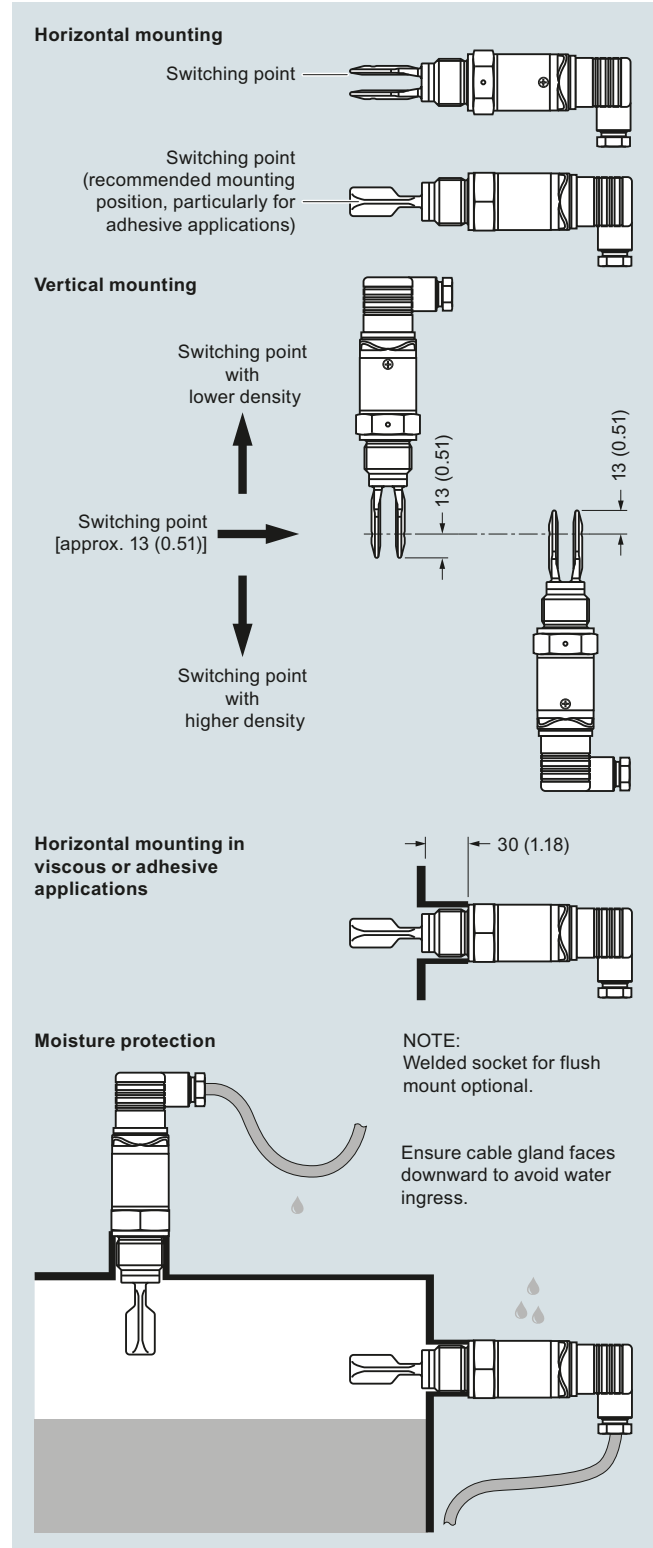
Application

SITRANS LVL100 is a compact level switch designed for industrial use in all areas of process technology and can be used for material detection with liquids and slurries. With an insertion length of only 40 mm (1.57 inch), SITRANS LVL100 can be mounted in small pipes and confined space applications. It is virtually unaffected by the chemical and physical properties of the liquid. The LVL100 can be used in difficult conditions including turbulence, air bubbles, foam generation, buildup, or external vibration.

The tuning fork is piezoelectrically energized and vibrates at a mechanical resonance frequency of approximately 1 200 Hz. The vibration frequency changes when the tuning fork is covered by the medium. This change is detected by the integrated oscillator and converted into a switching command. The integrated electronics evaluate the level signal and output a switching signal to connected devices.

- Key Applications: for use in liquids and slurries, for level measurement, overflow, and dry run protection

Configuration



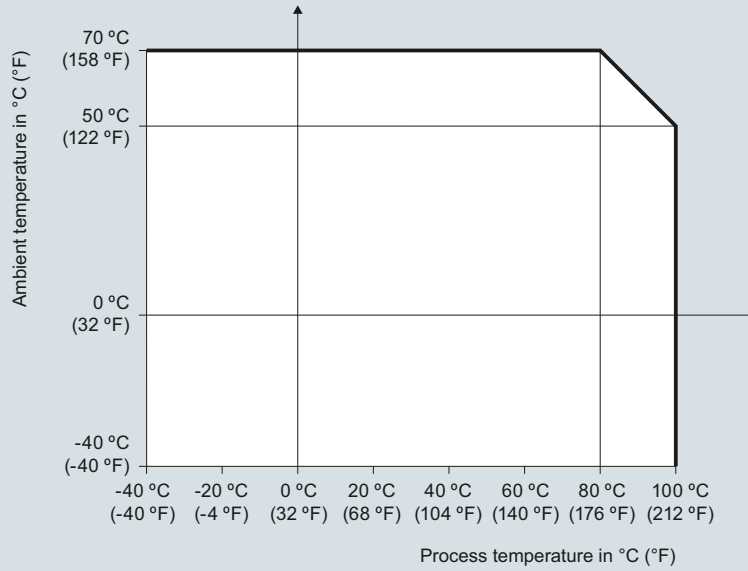
SITRANS LVL100 installation, dimensions in mm (inch)

Technical specifications

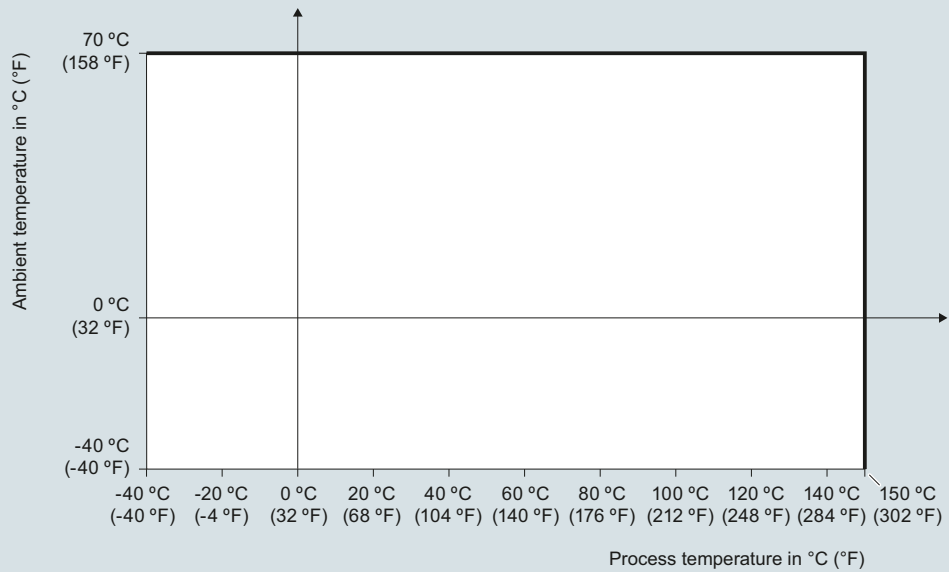
Mode of operation	
Measuring principle	Vibrating point level switch
Input	
Measured variable	High and low and demand
Output	
Output options	<ul style="list-style-type: none"> • Contactless electronic switch • Transistor output PNP
Measuring accuracy	
Hysteresis	Approx. 2 mm (0.08 inch) with vertical installation
Switching delay	Approx. 500 ms (on/off)
Frequency	Approx. 1 100 Hz
Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions	
• Ambient temperature	-40 ... +70 °C (-40 ... +158 °F)
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)
• Installation category	III
• Pollution degree	2
Medium conditions	
• Temperature	
- Standard	-40 ... +100 °C (-40 ... +212 °F)
- High temperature option	-40 ... +150 °C (-40 ... +302 °F)
• Pressure (vessel)	-1 ... 64 bar g (-14.5 ... 928 psi g)
• Density	0.7 ... 2.5 g/cm ³ (0.025 ... 0.09 lb/in ³)
Design	
Material	
• Enclosure	316L and Plastic PEI
• Tuning fork	316L (1.4404 or 1.4435)
• Process connection (threaded)	316L (1.4404 or 1.4435)
• Process seal	Klingersil C-4400
Process connection	
• Pipe thread, cylindrical (ISO 228 T1)	G ½" A, G ¾" A, or G 1" A
• Pipe thread, tapered	½" NPT, ¾" NPT, or 1" NPT
• Hygienic fittings	Bolting DN 40 PN 40 Tri-clamp 1", 1½", 2" PN 10
Degree of protection	IP65/Type 4/NEMA 4 (with DIN 43650 valve plug), IP66/67 or IP68 (with M12 connector)
Conduit entry	1 x M12 [IP66/IP67 or IP68 (0.2 bar)]
Weight (housing)	250 g (9 oz)
Power supply	
Supply voltage	20 ... 253 V AC, 50/60 Hz 20 ... 253 V DC
Power consumption	Max. 0.5 W
Certificates and approvals	
	<ul style="list-style-type: none"> • Overfill protection (WHG) • Shipping approvals

Characteristic curves

**Ambient temperature to process temperature dependency
(standard version)**



**Ambient temperature to process temperature dependency
(high temperature version)**



SITRANS LVL100 ambient temperature/process temperature derating curves

Level measurement

Point level measurement

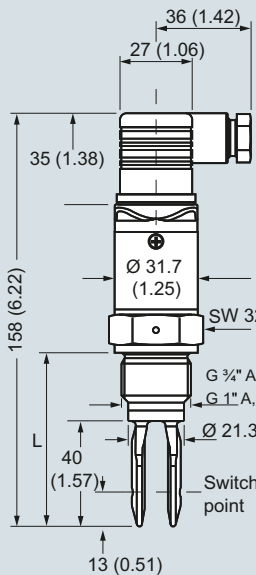
Vibrating switches

SITRANS LVL100

Dimensional drawings

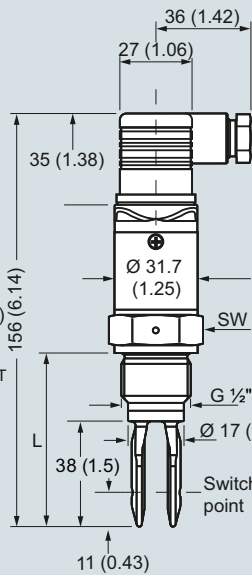
SITRANS LVL100 (standard)

Thread G 3/4" A, G 1" A
(DIN ISO 228/1),
3/4" NPT or 1" NPT
(valve plug ISO 4400)



L =
Length with G 3/4" A, 3/4" NPT: 66 (2.6)
Length with G 1" A, 1" NPT: 69 (2.7)

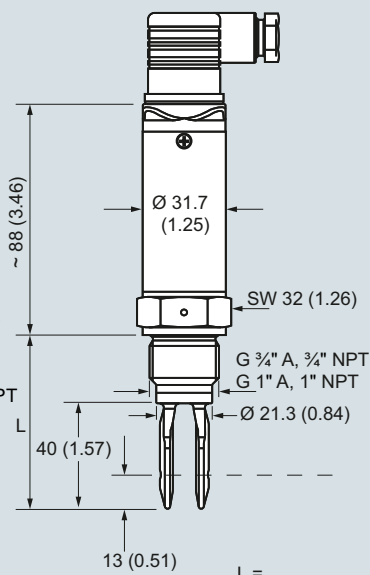
Thread G 1/2" A
(DIN ISO 228/1),
1/2" NPT
(valve plug ISO 4400)



L =
Length with G 1/2" A, 1/2" NPT: 62 (2.4)

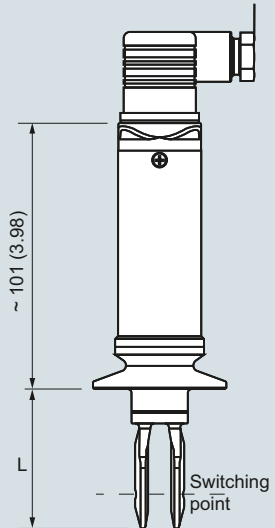
SITRANS LVL100 (extended high temperature)

Thread G 3/4" A, G 1" A
(DIN ISO 228/1),
3/4" NPT or 1" NPT
(valve plug DIN 43650)

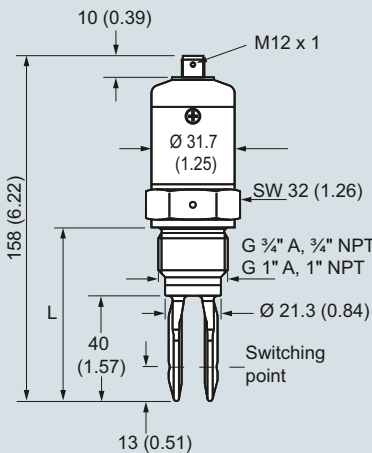


L =
Length with G 3/4" A, 3/4" NPT: 66 (2.6)
Length with G 1" A, 1" NPT: 69 (2.7)
Length with Tri-clamp: 53 (2.1)

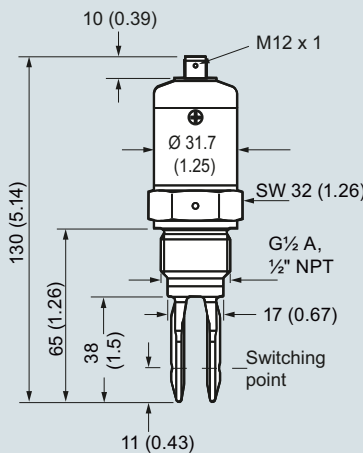
Tri-clamp (valve plug DIN 43650)



SITRANS LVL100 (standard with M12 connector)



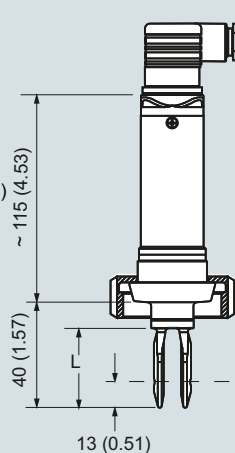
L =
Length with G 3/4" A, 3/4" NPT: 66 (2.6)
Length with G 1" A, 1" NPT: 69 (2.7)



L =
Length with G 1/2" A, 1/2" NPT: 62 (2.4)

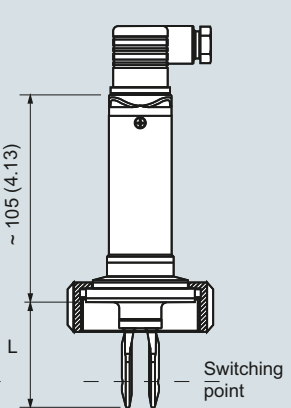
SITRANS LVL100 (extended, high temperature)

Bolting DIN 11851
(valve plug DIN 43650)

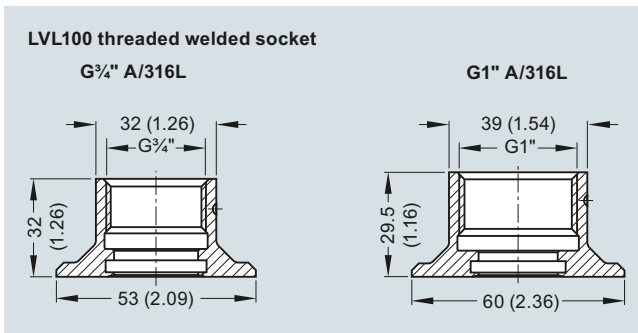


L =
Length with bolting: 53 (2.1)
Length with SMS 1145: 53 (2)

SMS 1145
(valve plug DIN 43650)



SITRANS LVL100, dimensions in mm (inch)

Options

SITRANS LVL100 welded socket, dimensions in mm (inch)

Level measurement

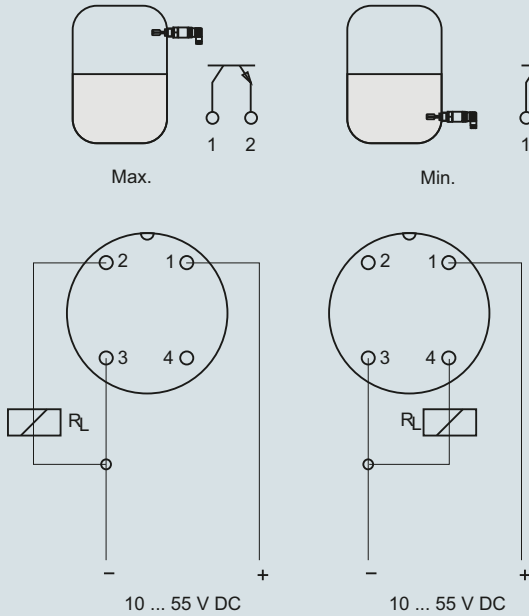
Point level measurement

Vibrating switches

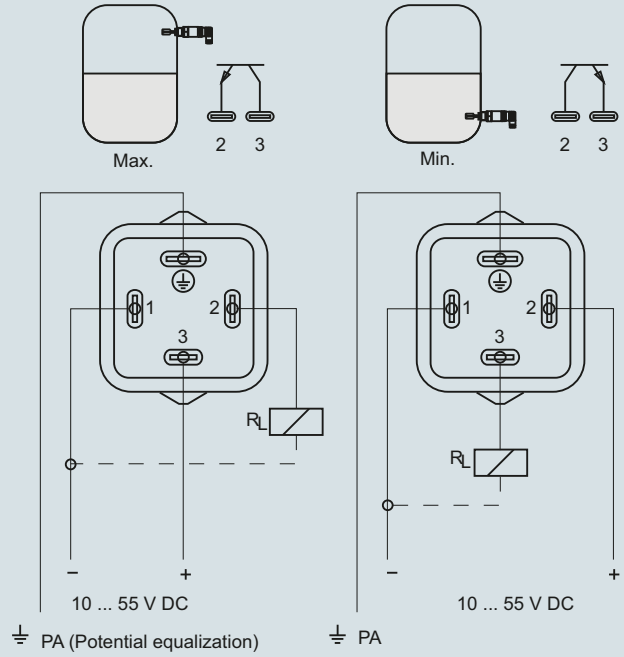
SITRANS LVL100

Circuit diagrams

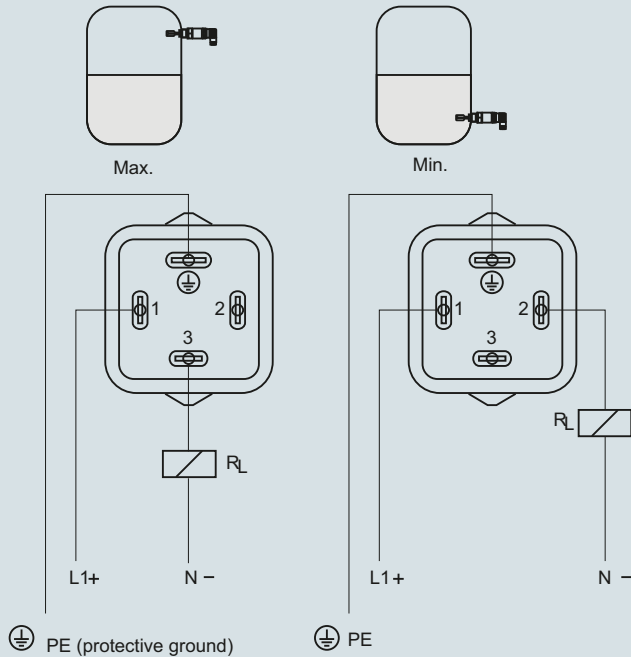
Transistor PNP (M12 x 1 plug connection)



Transistor PNP (with valve plug DIN 43650)



Contactless electronic switch (valve plug DIN 43650)



SITRANS LVL100 connections

Overview



SITRANS LVL200 is a standard vibrating level switch for material detection in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. For use in SIL-2 applications.

Benefits

- Proven vibrating level switch technology for liquids
- Compact insertion length of 40 mm (1.57 inch) for confined space applications
- Fault monitoring for corrosion, loss of vibration or line break to the piezo drive
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511
- Hygienic process connections
- Suitable for API 2350
- Optional remote test signal conditioner

Application

SITRANS LVL200 is a level switch designed for industrial use in all areas of process technology and can be used with liquids and slurries. With a tuning fork insertion length of only 40 mm (1.57 inch), SITRANS LVL200 can be mounted in small pipes and applications with confined space. The LVL200 can be used to measure products with a minimum density of $> 0.5 \text{ g/cm}^3$ (0.018 lb/in^3). The LVL200 can be used in difficult conditions including turbulence, air bubbles, foam generation, buildup, or external vibration.

SITRANS LVL200 continuously monitors faults via frequency evaluation, providing early detection of strong corrosion or damage on the tuning fork, loss of vibration, or a line break to the piezo drive.

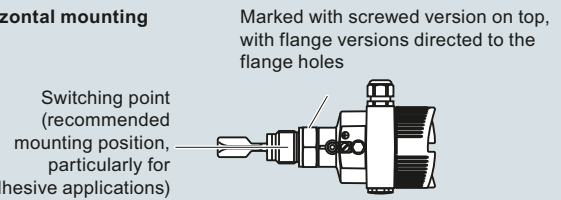
The tuning fork is piezoelectrically energized and vibrates at its mechanical resonance frequency of approximately 1 200 Hz. The vibration frequency changes when the tuning fork is covered by the medium. This change is detected by the integrated oscillator and converted into a switching command. The integrated electronics evaluate the level signal and output a switching signal, directly operating connected devices.

The optional signal conditioner provides a remote test feature to ensure continuous product reliability.

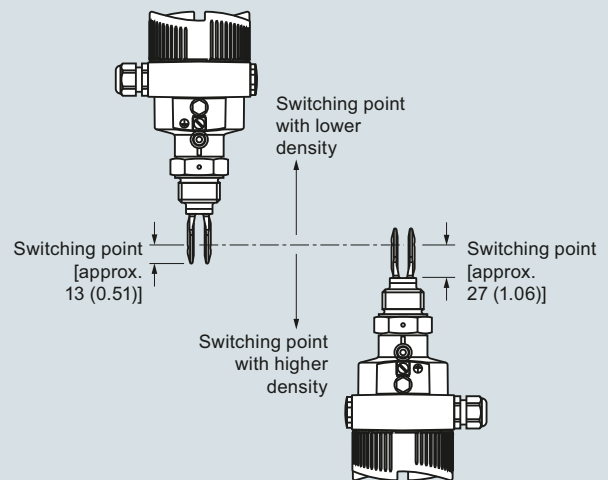
- Key Applications: for use in liquids and slurries, for level measurement, overflow, and dry run protection

Configuration

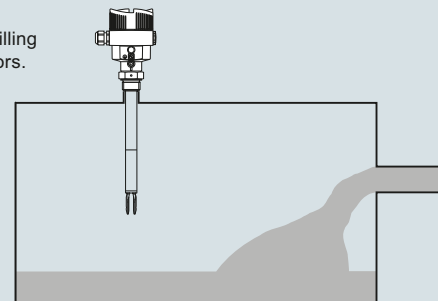
Horizontal mounting



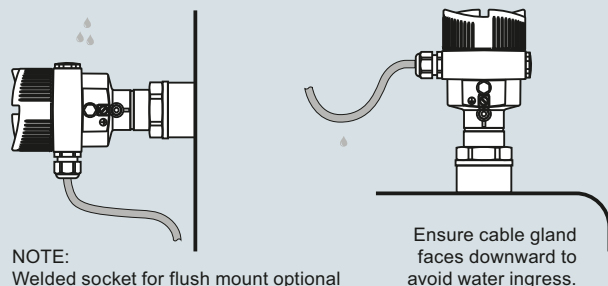
Vertical mounting



Mount away from filling openings or agitators.



Moisture protection



SITRANS LVL200 installation, dimensions in mm (inch)

Level measurement

Point level measurement

Vibrating switches

SITRANS LVL200

Technical specifications

Mode of operation		Design	
Measuring principle	Vibrating point level switch	Material	<ul style="list-style-type: none"> Aluminum die-cast AlSi10Mg, powder-coated, basis: Polyester Stainless steel housing, electropolished 316L Stainless steel housing, precision casting 316L Plastic housing, plastic PBT (Polyester)
Input		• Enclosure	
Measured variable	High and low and demand (via mode switch)	• Tuning fork	316L (1.4404 or 1.4435), Alloy C22
Output		• Extension tube [ø 21.3 mm (0.839 inch)]	316L (1.4404 or 1.4435), Alloy C22
Output options	<ul style="list-style-type: none"> Relay output (DPDT), 2 floating SPDTs Contactless electronic switch 2-wire Namur signal output Transistor (NPN/PNP) 10 ... 55 V DC 8/16 mA 	• Process connection: threaded	<ul style="list-style-type: none"> Standard, Extended: 316L (1.4404 or 1.4435), Alloy C22 High temperature: Inconel 718
Measuring accuracy		• Process connection: flange	<ul style="list-style-type: none"> Standard, Extended: 316L (1.4404 or 1.4435), Alloy C22 High temperature: Inconel 718
Repeatability	0.1 mm (0.004 inch)	• Process seal	Klingsil C-4400
Hysteresis	Approx. 2 mm (0.08 inch) with vertical installation	Process connection	
Switching delay	<ul style="list-style-type: none"> Standard, Extended: approx. 500 ms (on/off) High temperature: approx. 1 s (optionally adjustable at factory) 	• Pipe thread, cylindrical (ISO 228 T1)	G ¾" A, G 1" A
Frequency	<ul style="list-style-type: none"> Standard, Extended: Approx. 1 200 Hz High temperature: 1400 Hz 	• Pipe thread, tapered	¾" NPT, 1" NPT, 1½" NPT
Rated operating conditions		• Flanges	DIN from DN 25, ASME from 1"
Installation conditions		• Hygienic fittings	Bolting DN 40 PN 40, 1, 1½, 2, 2½" Tri-Clamp PN 10, conus DN 25 PN 40, Tukenhagen Varivent DN 50 PN 10, SMS
• Location	Indoor/outdoor	Degree of protection	Type 4X/NEMA 4X/IP66/IP67
Ambient conditions		Conduit entry	<ul style="list-style-type: none"> 1 x M20 x 1.5 (cable: ø 5 ... 9 mm), 1 x blind stopper M20 x 1.5; attached 1 x M20 x 1.5 cable entry 1 x ½" NPT cable entry, 1 x blind stopper ½" NPT, 1 x ½" NPT cable entry 1 x M12 x 1; 1 x blind stopper M20 x 1.5
• Ambient temperature	-40 ... +70 °C (-40 ... +158 °F)	Weight	
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)	• Device weight (dependent on process fitting)	Approx. 0.8 ... 4 kg (0.18 ... 8.82 lb)
• Installation category	III	• Tube extension (extended version)	Approx. 920 g/m (10 oz/ft)
• Pollution degree	2	Power supply	
Medium conditions		Supply voltage	
• Temperature		• Relay DPDT	20 ... 253 V AC, 50/60 Hz, 20 ... 72 V DC
- LVL200S Standard	-50 ... +150 °C (-58 ... +302 °F)	• Contactless	20 ... 253 V AC, 50/60 Hz, 20 ... 253 V DC
- LVL200S High temperature option	-50 ... +250 °C (-58 ... +482 °F)	• 2-wire NAMUR	
- LVL200E Standard: with 316L/Alloy C22	-50 ... +150 °C (-58 ... +302 °F)	Operating voltage (characteristics according to standard) for connection to an amplifier according to NAMUR	IEC 60947-5-6, approx. 8.2 V Off-load voltage U_0 approx. 8.2 V Short-circuit current I_U approx. 8.2 mA
- LVL200E High temperature option with 316L/Alloy C22	-50 ... +250 °C (-58 ... +482 °F)	Operating voltage 8/16 mA (via the signal conditioning instrument)	
- LVL200H High temperature	-196 ... +450 °C (-321 ... +842 °F)	• Non-Ex instrument	12 ... 36 V DC
Pressure (vessel)	<ul style="list-style-type: none"> Standard, Extended: -1 ... 64 bar g (-14.5 ... 928 psi g) High temperature: instrument version up to 160 bar (2 320 psi g): -1 ... 160 bar/-100 ... 16 000 kPa (-14.5 ... 2 320 psi g) <p>Note: The process pressure is dependent on configuration, including process fitting, e.g. flange</p>	• Ex-d instrument (ATEX, FM, CSA)	12 ... 36 V DC
Density	0.7 ... 2.5 g/cm ³ (0.025 ... 0.09 lb/in ³); 0.5 ... 2.5 g/cm ³ (0.018 ... 0.09 lb/in ³) by switching over Density optionally starts at 0.47 cm ³ (0.017 lb/in ³)	• Ex-ia instrument (ATEX)	12 ... 29 V DC
		• Ex-ia instrument (FM, CSA)	12 ... 31 V DC

Technical specifications (continued)

Power consumption	<ul style="list-style-type: none"> Standard, Extended: 1 ... 8 VA (AC), approx. 1.3 W (DC) High temperature: 3 VA (AC), 1 W (DC)
<ul style="list-style-type: none"> Relay DPDT Contactless 	<p>1 ... 8 VA (AC), approx. 1.3 W (DC) Domestic current requirement approx. 3 mA (via load circuit)</p> <p>Load current</p> <ul style="list-style-type: none"> Min. 10 mA Max. 400 mA [with I > 300 mA the ambient temperature can be max. 60 °C (140 °F)] Max. 4 A up to 40 ms (not WHG specified)
• 8/16 mA, two-wire output	<p>Output signal</p> <ul style="list-style-type: none"> Empty (uncovered) <ul style="list-style-type: none"> - 8 mA Full (covered) <ul style="list-style-type: none"> - 16 mA Fault message <ul style="list-style-type: none"> - < 1.8 mA <p>Possible signal conditioning instruments: SITRANS SCSC, SITRANS TCSC</p>
• 2-wire Namur	<p>Current consumption</p> <ul style="list-style-type: none"> Falling characteristics ≥ 2.6 mA uncovered/≤ 0.6 mA covered ≤ 0.6 mA uncovered/≥ 2.6 mA covered Failure message ≤ 0.6 mA
• Transistor (NPN/PNP) 10 ... 55 V DC	<p>Output</p> <ul style="list-style-type: none"> Floating transistor output, permanently shortcircuit-proof <p>Load current</p> <ul style="list-style-type: none"> < 400 mA <p>Voltage loss</p> <ul style="list-style-type: none"> < 1 V <p>Switching voltage</p> <ul style="list-style-type: none"> < 55 V DC <p>Blocking current</p> <ul style="list-style-type: none"> < 10 μA
Certificates and approvals	<ul style="list-style-type: none"> CE, CSA Overfill Protection WHG and VLAREM II FM (Non-Incendive) Class I, Div. 2, Groups A, B, C, D FM (Explosion-Proof) Class I, Div. 1, Groups A, B, C, D; (Dust Ignition-Proof) Class II, III, Div. 1, Groups E, F, G1 IECEx d IIC T6 ... T2 Ga/Gb EHEDG ATEX II 1/2G, 2G EEx d IIC T6 ATEX II 1G, 1/2G, 2G EEx ia IIC T6 Shipping approvals BR-Ex d IIC T6 ... T2 FDA, 3A, EHEDG SIL/IEC61508 Declaration of Conformity [SIL-2 (min/max detection)] <p>Please see configuration section below for full list of approvals.</p>

Level measurement

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Vibrating switches

SITRANS LVL200

Selection and ordering data

SITRANS TCSC, dual channel, signal conditioner

Provides power and relay output for two LVL200 vibrating switch, 8/16 mA electronics design. Provides remote test of any LVL200 device.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Approvals

For Ex-free area¹⁾

ATEX II (1) G/D [Ex ia Ga/Da] IIC/IIIC, I (M1) [Ex ia Ma]²⁾

ATEX II (1) G/D (Ex ia Ga/Da) IIC/IIIC, I (M1) (Ex ia Ma) I + WHG

IEC [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma]²⁾

IEC (Ex ia Ga) IIC, (Ex ia Da) IIIC, (Ex ia Ma) I + WHG

Ex-free area (incl. EAC approval)

SIL qualification

Without

With

Article No.

7ML5761-

	A	1	-				
1	A						
1	D						
1	E						
1	H						
1	J						
2	A						
		1					
		2					

SITRANS TCSC, dual channel, signal conditioner

Provides power and relay output for two LVL200 vibrating switch, 8/16 mA electronics design. Provides remote test of any LVL200 device.

Version

Double-channel (8/16 mA) for level detection

Housing/cable entry

Plastic/IP20

Terminal block connection

Detachable 2.5 mm²/ Ex sensor: 2 x blue; output and operating voltage: 2 x black
 Detachable 2.5 mm²/ sensor: 2 x black; output and operating voltage: 2 x black

Language

English

German

Operating Instructions

All literature is available to download for free, in a range of languages, at

<http://www.siemens.com/processinstrumentation/documentation>

¹⁾ Available only with terminal block connection option B.

²⁾ Available only with terminal block connection option A.

Article No.

7ML5761-

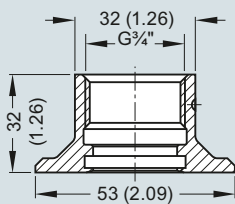
	A	1	-				
1							
	A						
	A						
	B						
		0					
		1					

4

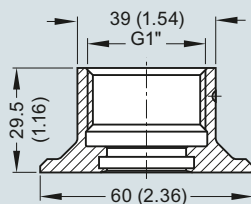
Options

LVL200 threaded welded socket

G^{3/4}" A/316L

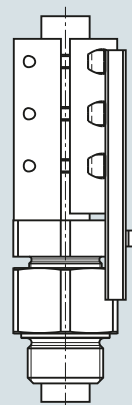


G1" A/316L

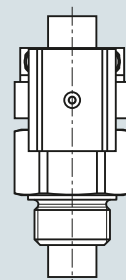


Lock fitting

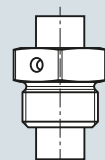
LVL200 extended 64 bar



LVL200 extended 16 bar



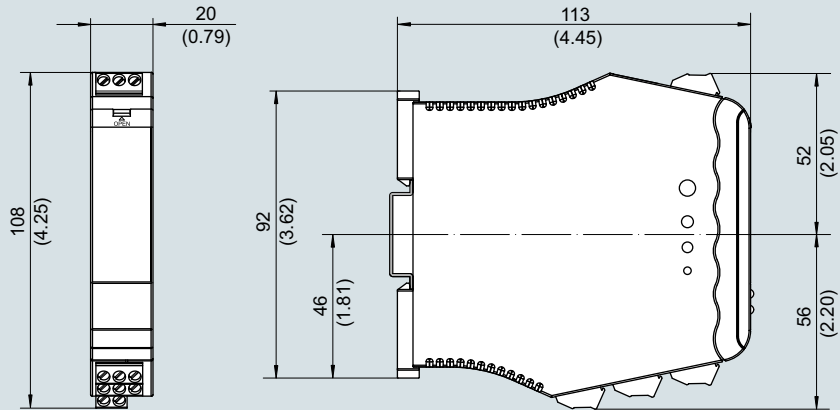
LVL200 extended unpressurized



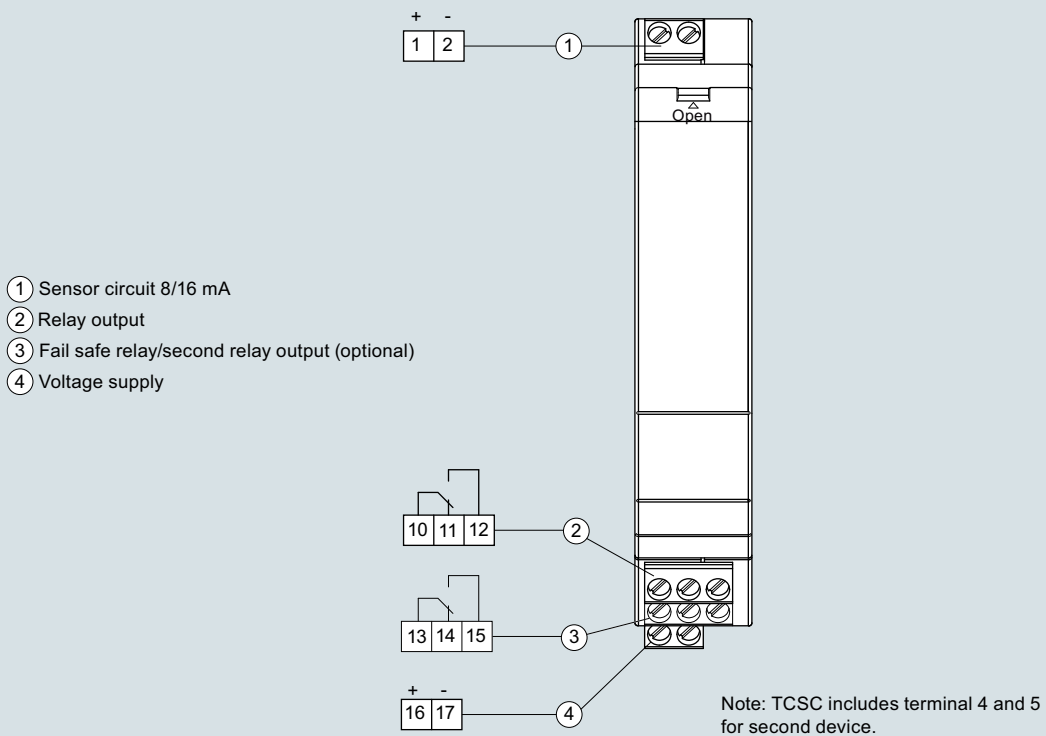
SITRANS LVL200 welded socket and lock fitting, dimensions in mm (inch)

Options (continued)

SITRANS SCSC and TCSC LVL test conditioner



SITRANS SCSC and SITRANS TCSC LVL Test Conditioners, dimensions in mm (inch)



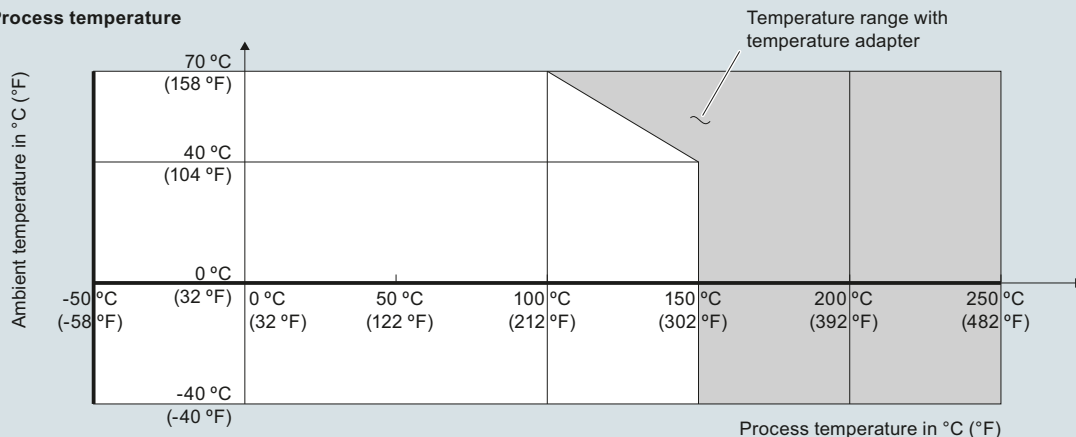
SITRANS SCSC and SITRANS TCSC LVL Test Conditioner connections

Level measurement
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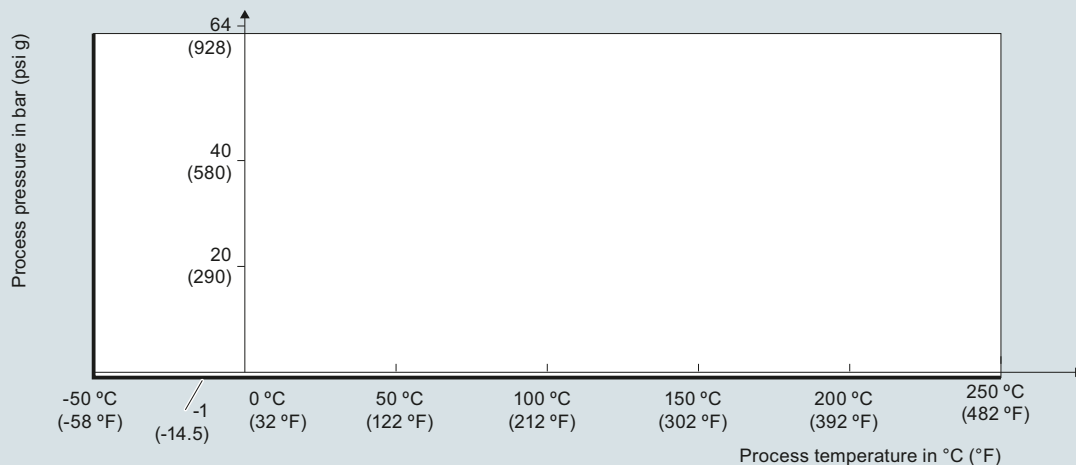
SITRANS LVL200

Characteristic curves

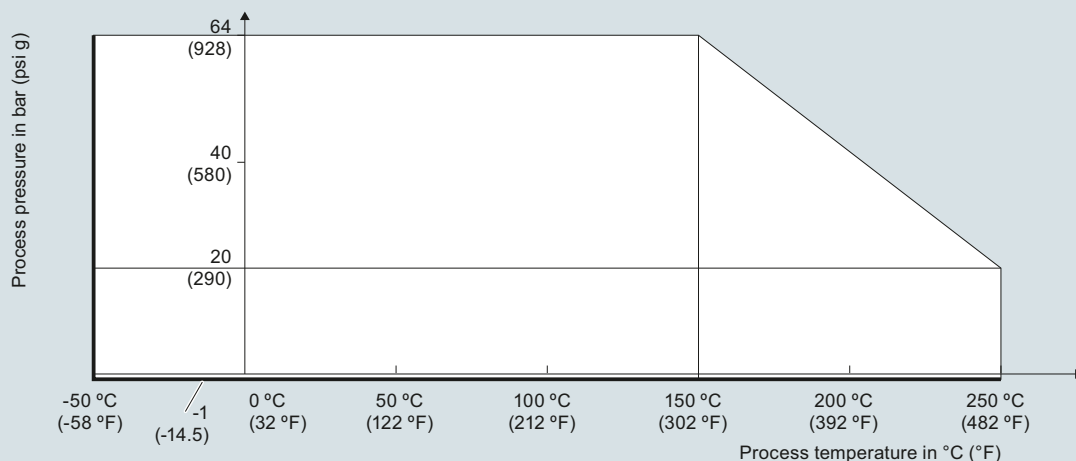
Ambient/Process temperature



Process pressure with switch position 0.7 g/cm³ (mode switch)

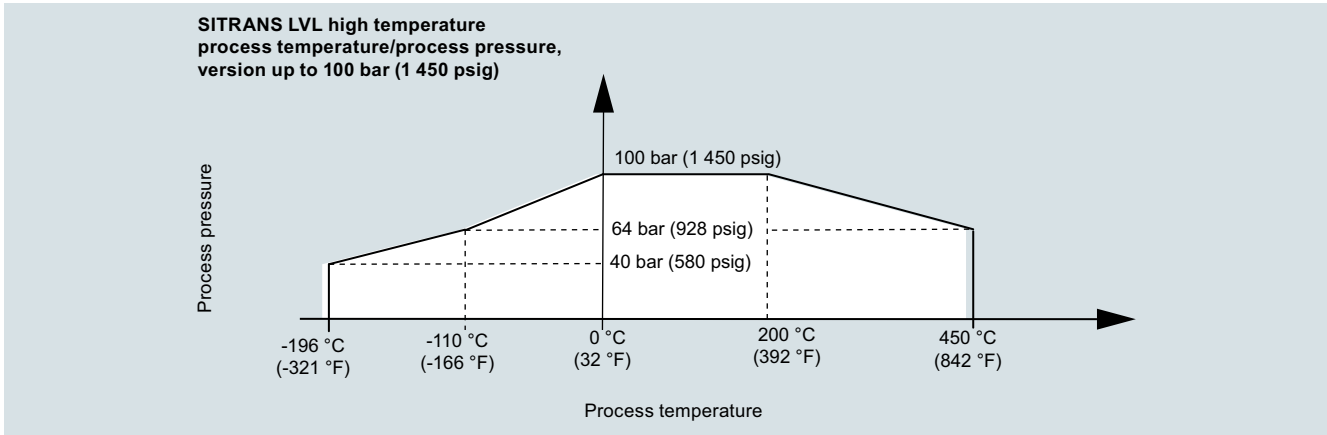


Process pressure with switch position 0.5 g/cm³ (mode switch)

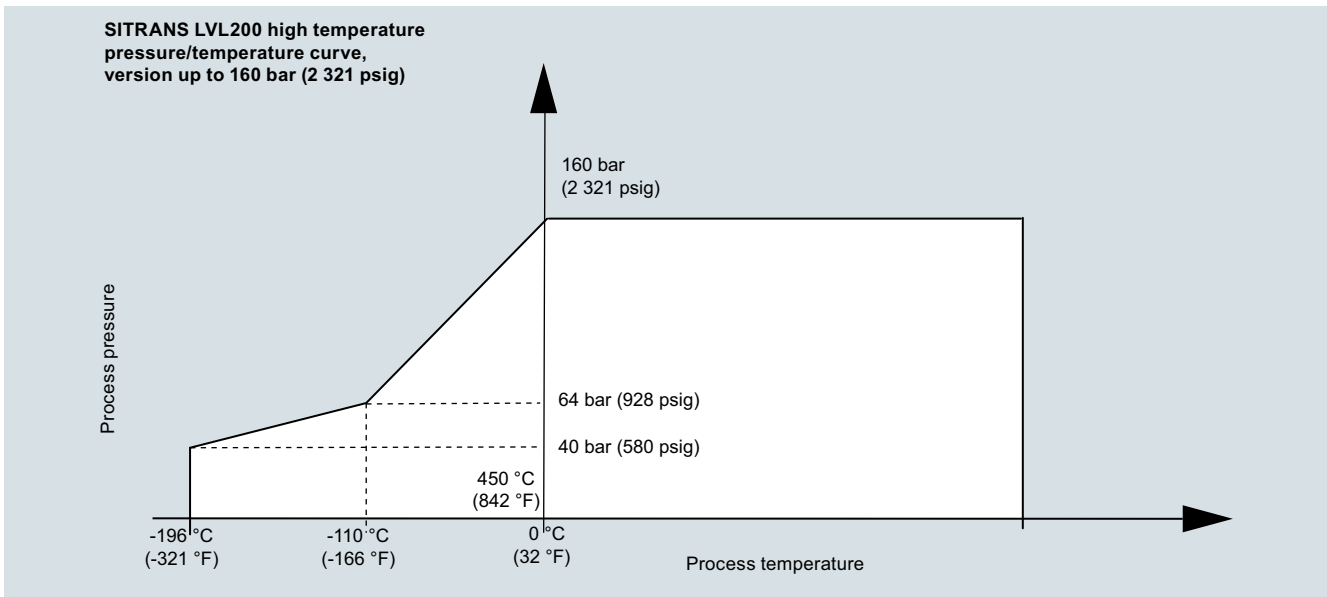


SITRANS LVL200 process pressure/process temperature/ambient temperature derating curves

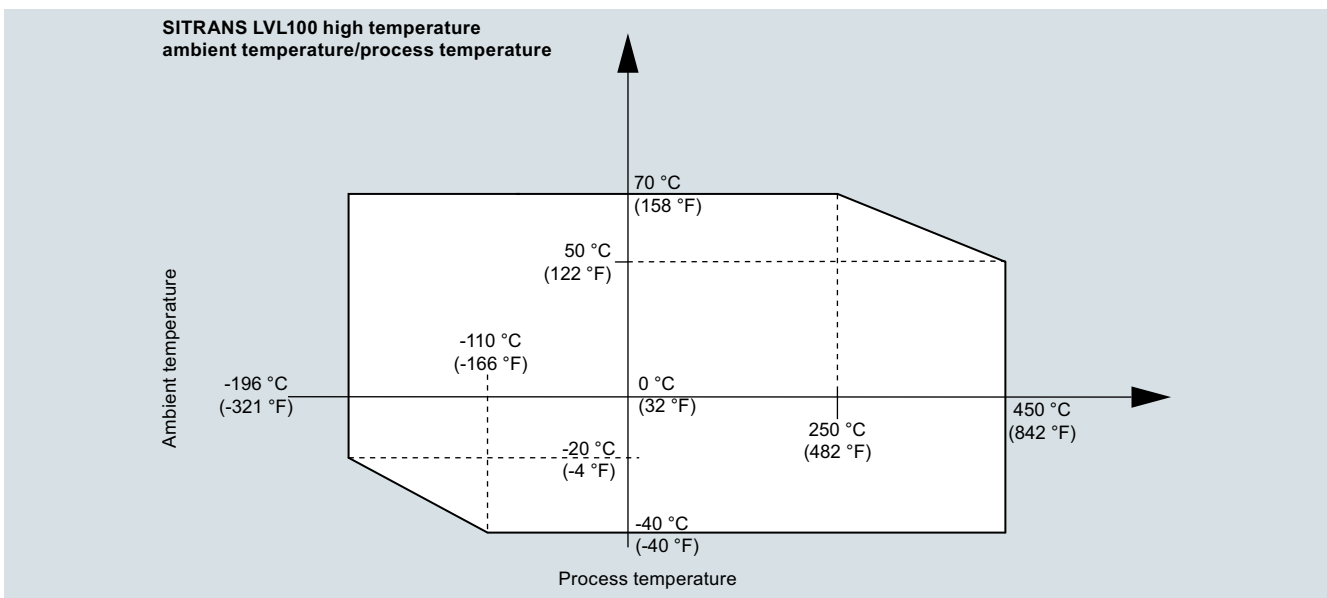
Characteristic curves (continued)



SITRANS LVL200 high temperature process temperature/process pressure curve, version up to 100 bar (1 450 psig)



SITRANS LVL200 high temperature pressure/temperature curve, version up to 160 bar (2 321 psig)



SITRANS LVL200 high temperature ambient temperature/process temperature

Level measurement

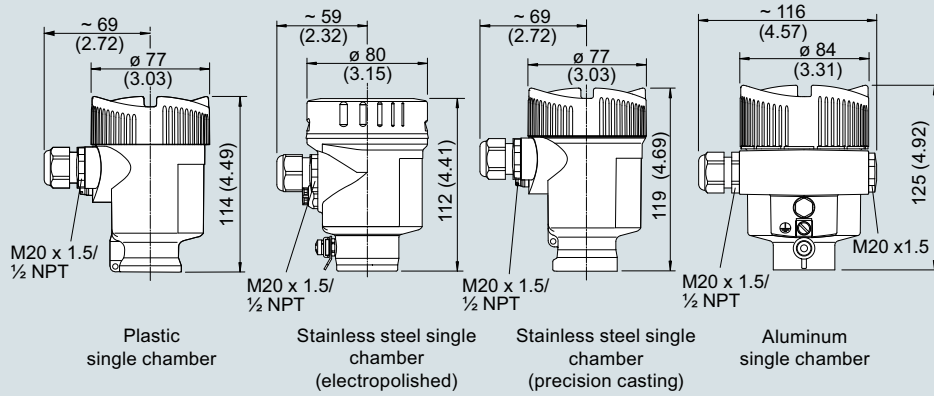
Point level measurement

Vibrating switches

SITRANS LVL200

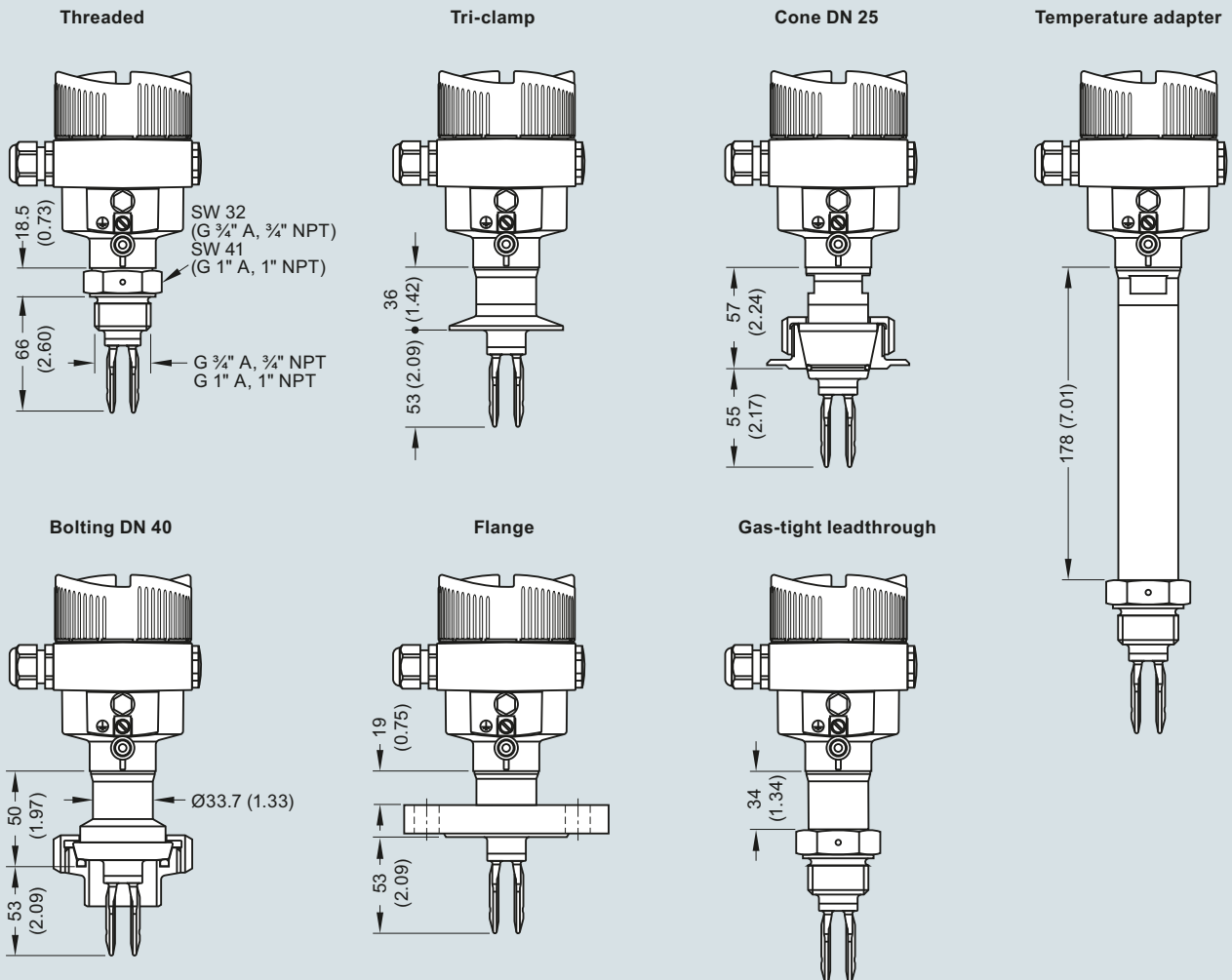
Dimensional drawings

SITRANS LVL200, housing



SITRANS LVL200 housing, dimensions in mm (inch)

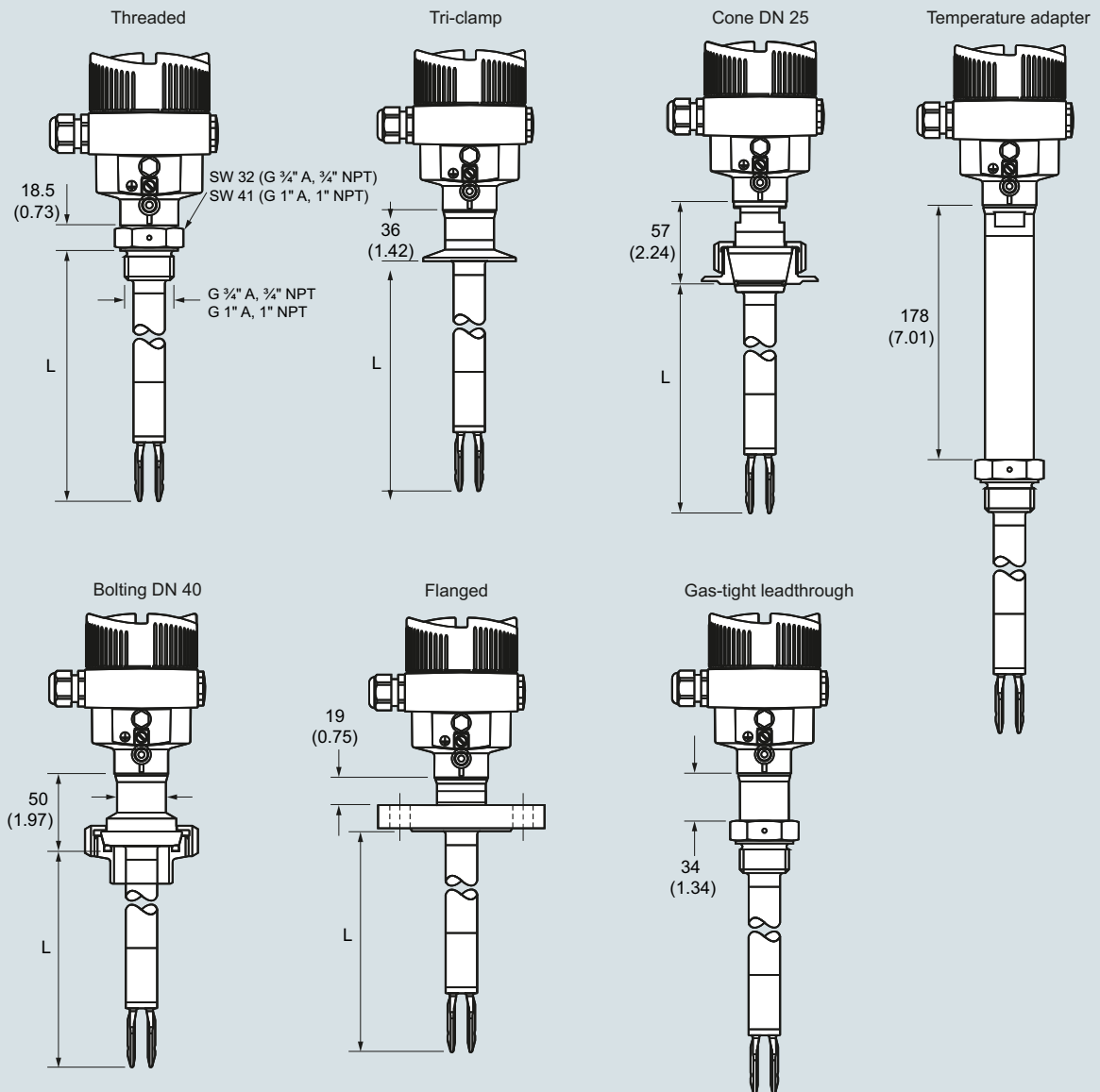
SITRANS LVL200 standard



SITRANS LVL200 (standard), dimensions in mm (inch)

Dimensional drawings (continued)

SITRANS LVL200 extended



Sensor length (L)

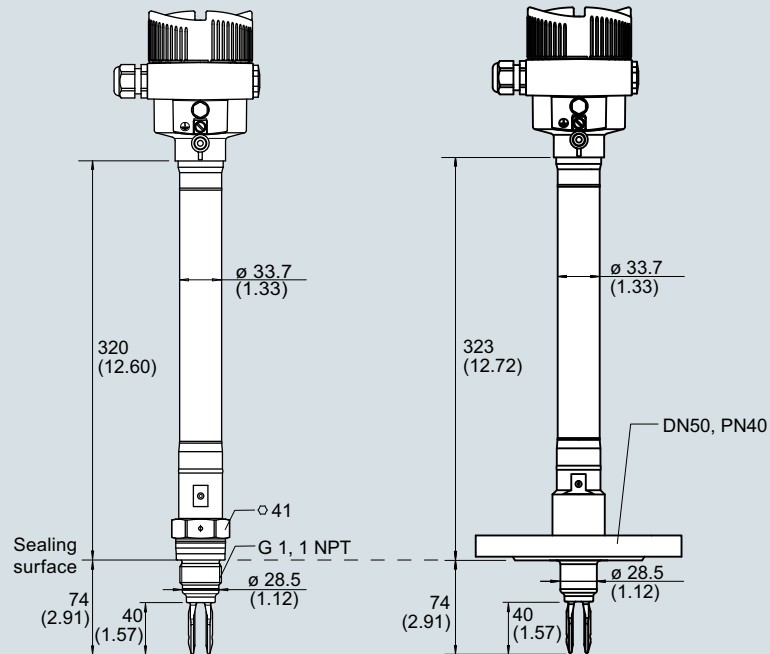
316L, Alloy C22 (2.4602)	80 ... 6 000 mm (3.15 ... 236.2 inch)
Enamelled	80 ... 1 500 mm (3.15 ... 59.06 inch)
316L, ECTFE coated	80 ... 3 000 mm (3.15 ... 118.1 inch)
316L, PFA coated	80 ... 4 000 mm (3.15 ... 157.5 inch)

SITRANS LVL200 (extended), dimensions in mm (inch)

Level measurement

Point level measurement

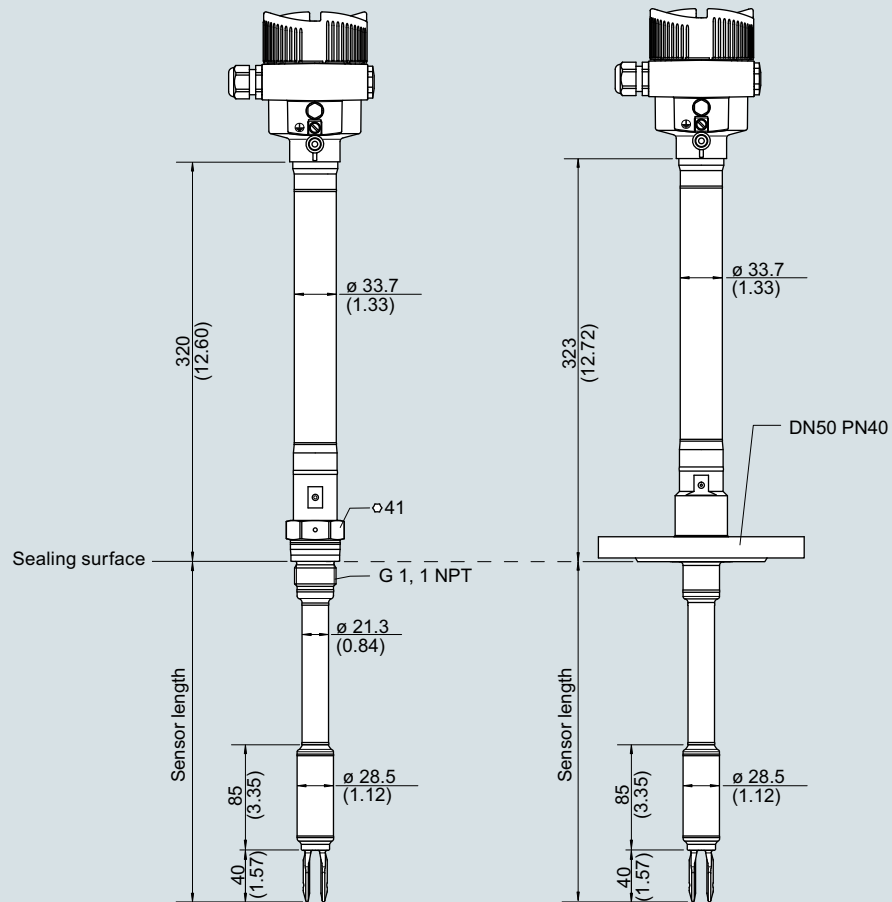
Vibrating switches

SITRANS LVL200**Dimensional drawings** (continued)**SITRANS LVL200 high temperature, compact version**

SITRANS LVL200 high temperature, compact version, dimensions in mm (inch)

Dimensional drawings (continued)

SITRANS LVL200 high temperature, tube version



SITRANS LVL200 high temperature, tube version, dimensions in mm (inch)

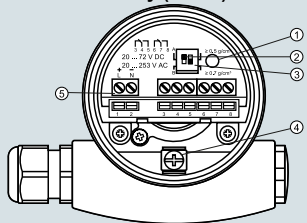
Level measurement

Point level measurement
Vibrating switches

SITRANS LVL200

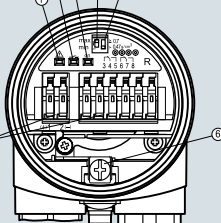
Circuit diagrams

**SITRANS LVL200S, LVL200E
Relay (DPDT)**

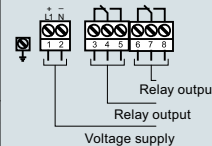


- | | |
|---|---|
| ① | Control lamp |
| ② | DIL switch for characteristics reversal |
| ③ | DIL switch for sensitivity adjustment |
| ④ | Ground terminal |
| ⑤ | Connection terminals |

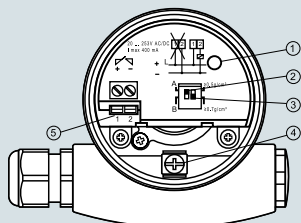
**SITRANS LVL200H
Relay (DPDT)**



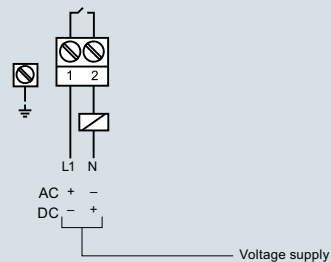
- | | |
|---|---|
| ① | Control lamp - fault indication (red) |
| ② | Control lamp - Switching status (yellow) |
| ③ | Control lamp - Operating status (green) |
| ④ | Mode switch for selecting the switching behaviour (min./max.) |
| ⑤ | DIL switch for sensitivity adjustment |
| ⑥ | Ground terminal |
| ⑦ | Connection terminals |



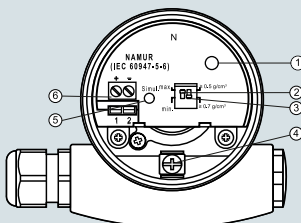
Contactless



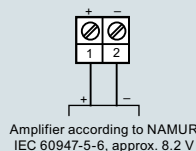
- | | |
|---|---|
| ① | Control lamp |
| ② | DIL switch for mode adjustment |
| ③ | DIL switch for switching point adaptation |
| ④ | Ground terminal |
| ⑤ | Connection terminals |



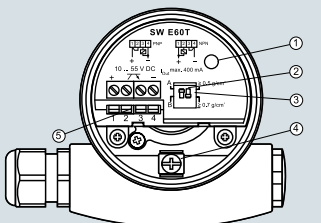
NAMUR



- | | |
|---|---|
| ① | Control lamp |
| ② | DIL switch for characteristics reversal |
| ③ | DIL switch for sensitivity adjustment |
| ④ | Ground terminal |
| ⑤ | Simulation key |
| ⑥ | Connection terminals |

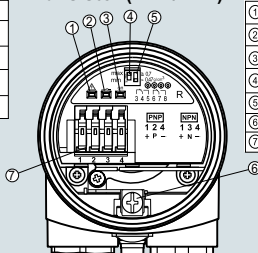


**SITRANS LVL200S, LVL200E
Transistor (NPN/PNP)**

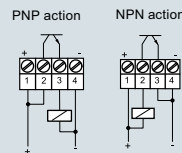


- | | |
|---|--------------------------------|
| ① | Control lamp |
| ② | DIL switch for mode adjustment |
| ③ | DIL switch for switching point |
| ④ | Ground terminal |
| ⑤ | Connection terminals |

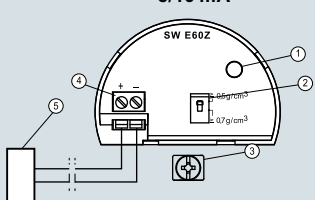
**SITRANS LVL200H,
Transistor (NPN/PNP)**



- | | |
|---|---|
| ① | Control lamp - fault indication (red) |
| ② | Control lamp - Switching status (yellow) |
| ③ | Control lamp - Operating status (green) |
| ④ | Mode switch for selecting the switching behaviour (min./max.) |
| ⑤ | DIL switch for sensitivity adjustment |
| ⑥ | Ground terminal |
| ⑦ | Connection terminals |

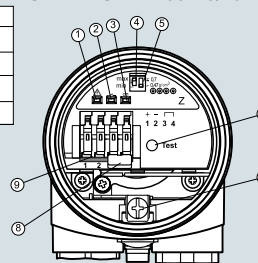


**SITRANS LVL200S, LVL200E
8/16 mA**

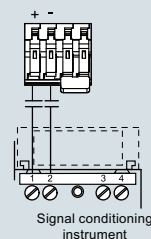


- | | |
|---|---------------------------------------|
| ① | Control lamp |
| ② | DIL switch for sensitivity adjustment |
| ③ | Ground terminal |
| ④ | Connection terminals |
| ⑤ | Processing system or PLC |

SITRANS LVL200H 8/16 mA



- | | |
|---|--|
| ① | Control lamp - fault indication (red) |
| ② | Control lamp - switching status (yellow) |
| ③ | Control lamp - operating status (green) |
| ④ | Mode switch for selecting the switching behavior (min./max.) |
| ⑤ | DIL switch for sensitivity behavior (min./max.) |
| ⑥ | Test key |
| ⑦ | Ground terminal |
| ⑧ | Connector block |
| ⑨ | Connection terminals |



SITRANS LVL200 connections