

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

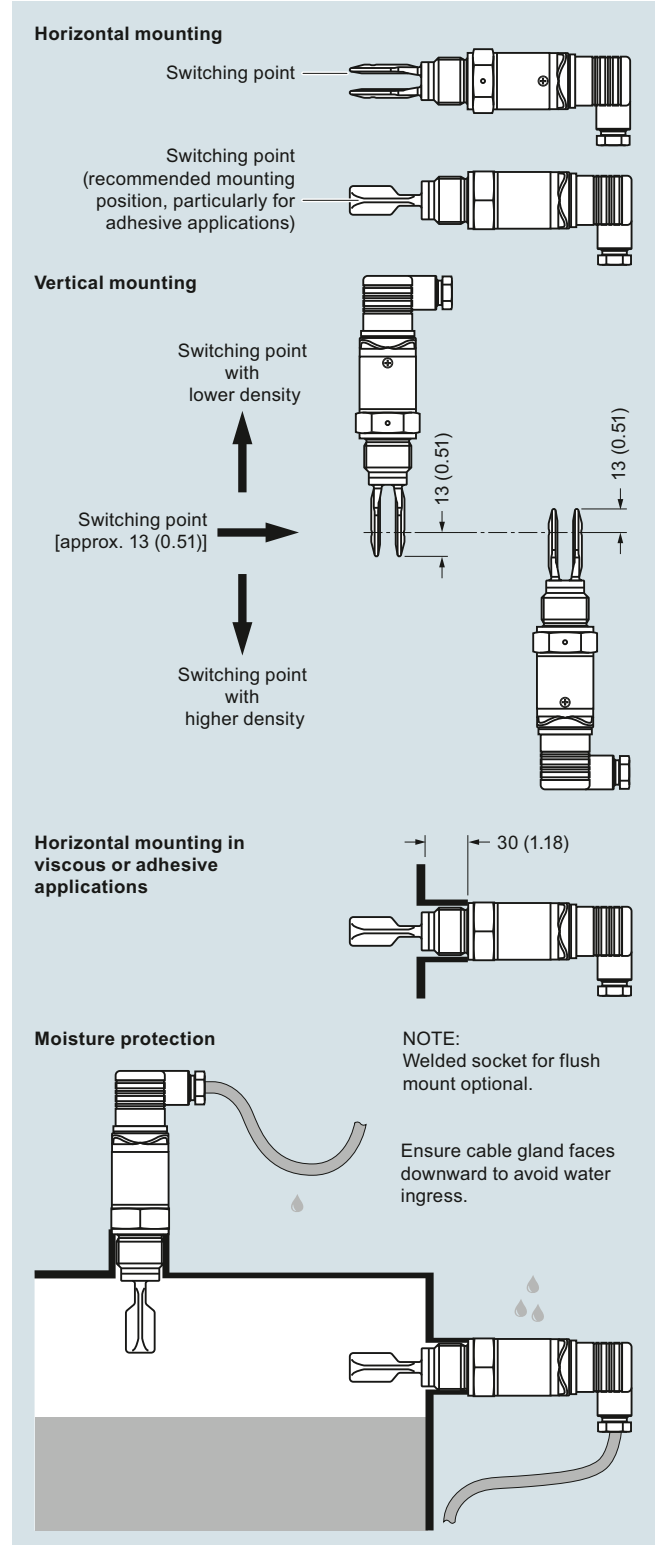
Application

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)
• 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

Level Measurement

Point level measurement

Vibrating switches

SITRANS LVL100

Selection and Ordering data

Article No.

SITRANS LVL100

Compact vibrating level switch for use in liquid and slurry applications such as overflow, high, low, and demand applications, as well as pump protection. Ideal for use in confined spaces.

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

Approvals

Without approvals
Shipping approvals⁵⁾
Overfill protection (WHG)¹⁾
Canada/US for Ex-free area (including Ordinary Location Approval)⁷⁾

Process temperature

Standard -40 ... +100 °C (-40 ... +212 °F)²⁾
Extended -40 ... +150 °C (-40 ... +302 °F)²⁾⁶⁾
Hygienic applications -40 ... +150 °C (-40 ... +302 °F)³⁾

Process connection

Thread G $\frac{3}{4}$ " A PN 64/316L A 0
Thread G $\frac{3}{4}$ " A PN 64/316L Ra < 0.8 µm A 1
Thread $\frac{3}{4}$ " NPT PN 64/316L A 2
Thread $\frac{3}{4}$ " NPT PN 64/316L Ra < 0.8 µm A 3
Thread G1" A PN 64/316L A 4
Thread G1" A PN 64/316L Ra < 0.8 µm A 5
Thread 1" NPT PN 64/316L A 6
Thread 1" NPT PN 64/316L Ra < 0.8 µm A 7
Tri-Clamp 1" PN 16 DIN 32676/316L Ra < 0.8 µm A 8
Tri-Clamp 1 $\frac{1}{2}$ " PN 16 DIN 32676/316L Ra < 0.8 µm B 0
Tri-Clamp 2" PN 16 DIN 32676/316L Ra < 0.8 µm B 1
Bolting DN 25 PN 40 DIN 11851/316L Ra < 0.8 µm B 2
Bolting DN 40 PN 40 DIN 11851/316L Ra < 0.8 µm B 3
Bolting DN 50 PN 25 DIN 11851/316L Ra < 0.8 µm B 4
SMS DN 38 PN 6 316L Ra < 0.8 µm B 5
Hygienic fitting with compression nut F40 PN 25/316L Ra < 0.8 µm B 6
Thread G $\frac{1}{2}$ " (DIN 3852-A) PN 64 / 316L C 0
Thread G $\frac{1}{2}$ " (DIN 3852-A) PN 64 / 316L Ra < 0.8 µm C 1
Thread $\frac{1}{2}$ " NPT (ASME B1.20.1) PN 64/316L C 2
Thread $\frac{1}{2}$ " NPT (ASME B1.20.1) PN 64/316L Ra < 0.8 µm C 3
Thread R $\frac{3}{4}$ " PN 64, EN 10226-1/316L D 0
R1 Thread R1 PN 64, EN 10226-1/316L D 1
RF Thread R1 PN 64, EN 10226-1/316L (Ra < 0.8 µm) D 2

Electronics

Contactless electronic switch 20 ... 250 V AC/DC⁴⁾ 1
Transistor output PNP 10 ... 35 V DC 2

Housing

316L 1

Electrical connection/Protection

M12 x 1/IP67 A
According to ISO4400 including plug/ IP65 B
According to DIN 43650 incl. plug with QuickOn connection/IP65 C
M12 x 1 incl. 5 m cable/IP68 (0.2 bar) D

¹⁾ Available only with Electronics option 2

²⁾ Available only with process connection A0, A2, A4, A6, C0, C2, D0 and D1

³⁾ Available only with process connection A1, A3, A5, and A7 ... B6, C1, C3 and D2

⁴⁾ Available only with Electrical connection/Protection option B and C

⁵⁾ Available only with Process Temperature options A and B

⁶⁾ Available only with shipping approvals DNV and GL

⁷⁾ Available only with Electrical connection/Protection option B

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article No. and specify Order code(s).

Cleaning including certificate (oil, grease and silicone free)

W01

Identification Label, foil laser marking

Y16

Acceptance test Certificate 2.2 for material EN 10204

C15

3.1-Inspection Certificate for instrument with test data (EN 10204)

C25

Operating Instructions

All literature is available to download for free, in a range of languages, at <http://www.siemens.com/processinstrumentation/documentation>

Spare Parts

LVL100 Threaded Welded Socket

Article No.

G $\frac{3}{4}$ " A/316L with FKM Seal

7ML1930-1EE

G1" A/316L with FKM Seal

7ML1930-1EF

M27 x 1.5/316L with FKM Seal

7ML1930-1EG

G $\frac{3}{4}$ " A/316L with EPDM Seal

7ML1930-1EH

G1" A/316L with EPDM Seal

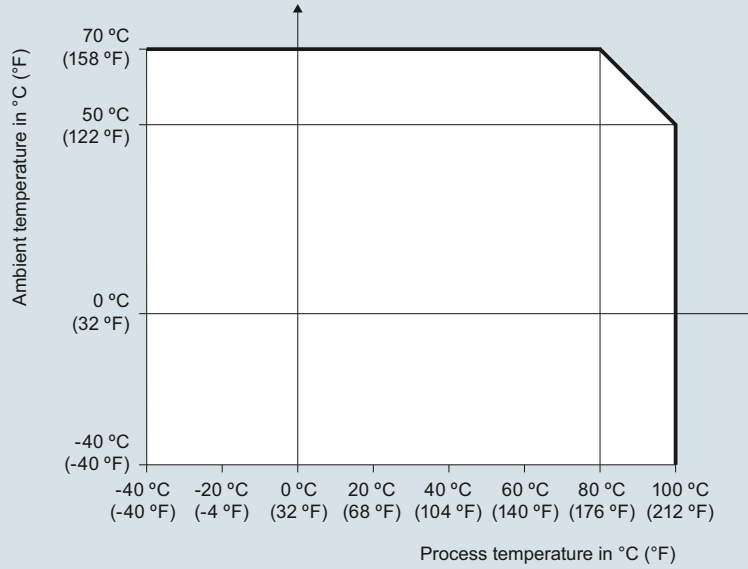
7ML1930-1EJ

M27 x 1.5/316L with EPDM Seal

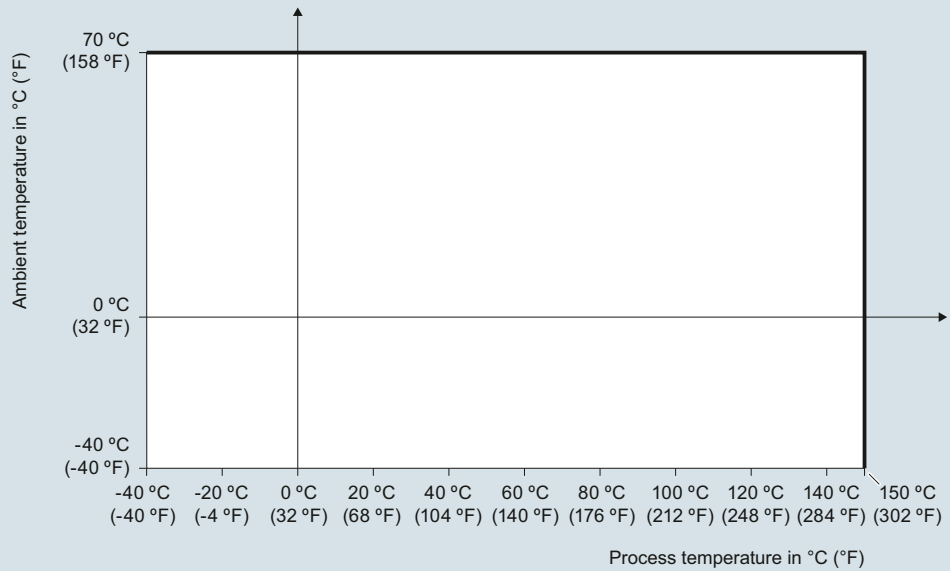
7ML1930-1EK

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

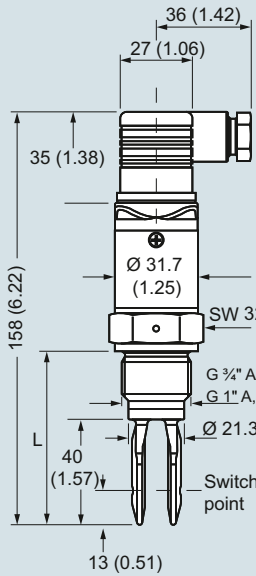
Point level measurement
Vibrating switches

SITRANS LVL100

Dimensional drawings

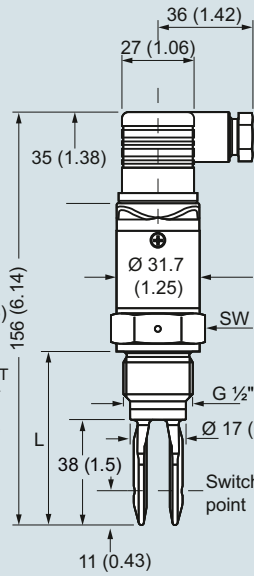
SITRANS LVL100 (standard)

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)

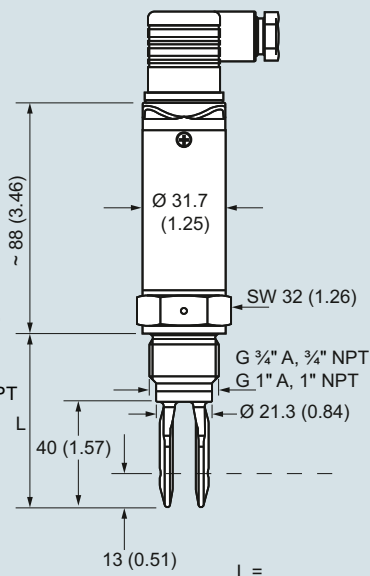
Thread G 1/2" A
(DIN ISO 228/1),
1/2" NPT
(valve plug ISO 4400)



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

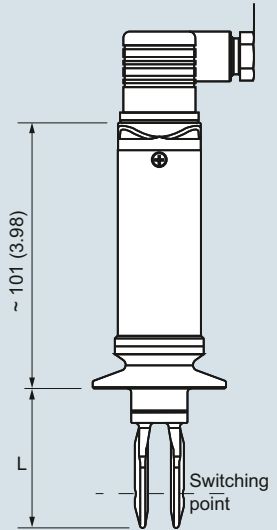
SITRANS LVL100 (extended high temperature)

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

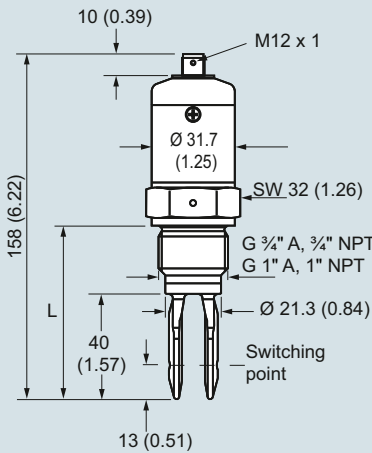


L =
Length with G 3/4" A, 3/4" NPT: 66 (2.6)
Length with G 1" A, 1" NPT: 69 (2.7)
Length with Tri-clamp: 53 (2.1)

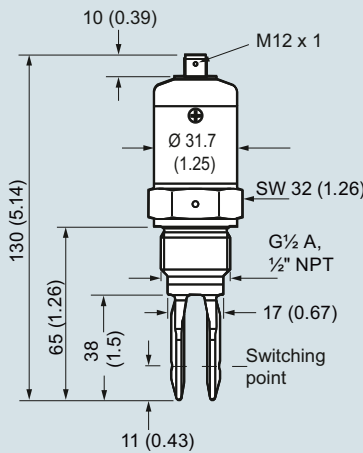
Tri-clamp (valve plug DIN 43650)



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)

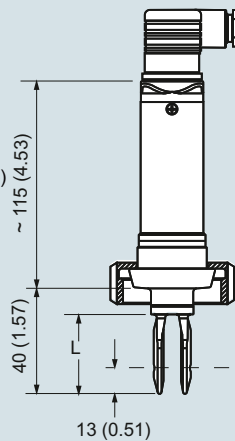


L =
Length with G 1/2" A, 1/2" NPT: 62 (2.4)

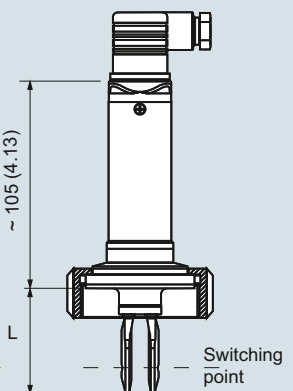
SITRANS LVL100 (extended, high temperature)

Bolting DIN 11851
(valve plug DIN 43650)

SMS 1145
(valve plug DIN 43650)

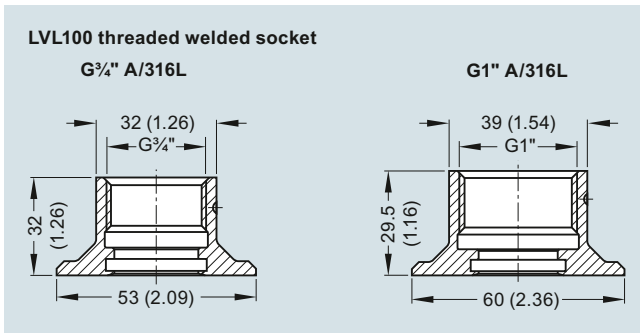


L =
Length with bolting: 53 (2.1)
Length with SMS 1145: 53 (2)



SITRANS LVL100, dimensions in mm (inch)

Options



SITRANS LVL100 welded socket, dimensions in mm (inch)

Level Measurement

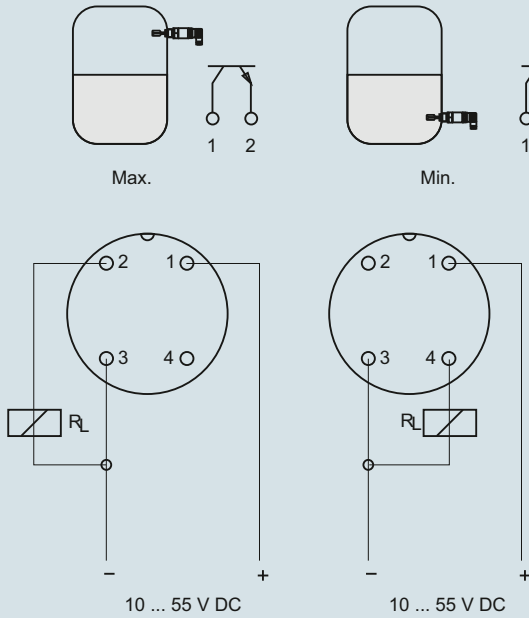
Point level measurement

Vibrating switches

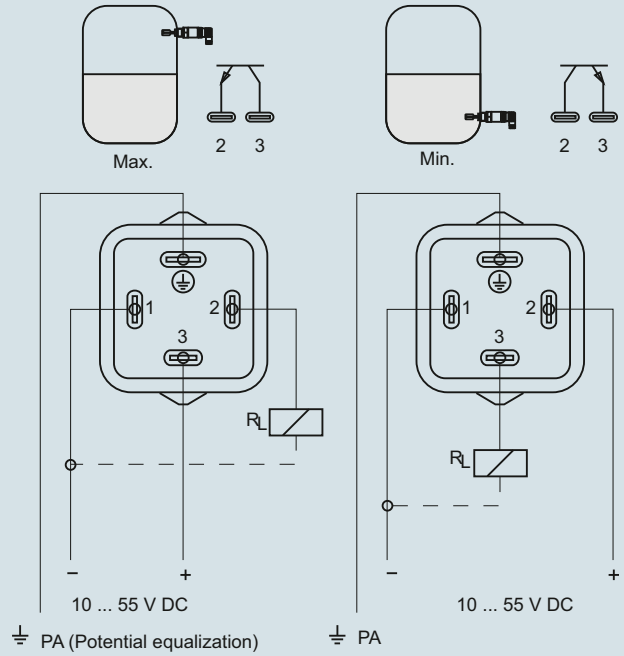
SITRANS LVL100

Circuit diagrams

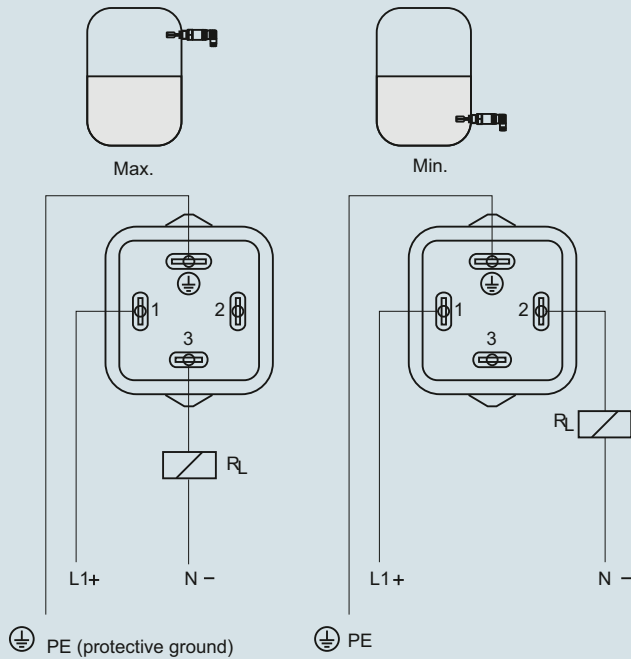
Transistor PNP (M12 x 1 plug connection)



Transistor PNP (with valve plug DIN 43650)



Contactless electronic switch (valve plug DIN 43650)



SITRANS LVL100 connections

4



EU Declaration of Conformity
EU-Konformitätserklärung
EU-Déclaration de Conformité

No. A5E41945001A/001

Manufacturer: <i>Hersteller:</i> Fabricant: Address: <i>Anschrift:</i> Adresse: Product description: <i>Produktbezeichnung:</i> Identificateur:	Siemens Canada Limited Siemens Milltronics Process Instruments Process Industries and Drives Division <hr/> 1954 Technology Drive, P.O. Box 4225; Peterborough, Ontario; K9J 7B1, Canada <hr/> Electromechanical Switch for Point Level Measurement SITRANS LVL100 7ML5745-abxxc-xxA0 a = 1, 2, 3 b = A, B, C c = 1, 2
---	--

The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:

Le produit mentionné ci-dessus, tel qu'il est livré, est conforme aux dispositions des Directives Européennes suivantes :

- | | |
|------------------------|--|
| 2014/30/EU

EMC | Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
<i>Richtlinie des Europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit</i>
<i>Directive du parlement Européen et du conseil relative à l'harmonisation des législations des États membres concernant la compatibilité électromagnétique</i> |
| 2014/35/EU

LVD | Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
<i>Richtlinie des Europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt</i>
<i>Directive du parlement Européen et du conseil relative à l'harmonisation des législations des États membres concernant la mise à disposition sur le marché du matériel électrique destiné à être employé dans certaines limites de tension</i> |
| 2011/65/EU

RoHS | Directive of the European Parliament and the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
<i>Richtlinie des Europäischen Parlaments und des Rates zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräte.</i>
<i>Directive du parlement Européen et du relative à la limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques</i> |

Annex A is integral part of this declaration.
Anhang A ist integraler Bestandteil dieser Erklärung.
L'annexe A fait partie intégrante de la présente déclaration

This declaration certifies the conformity to the specified directives but contains no assurance of properties.
 The safety documentation accompanying the product shall be considered in detail.
Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie nach §443 BGB.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
La présente déclaration atteste la conformité aux Directives citées. Elle n'est pas assimilable à un descriptif justifiant certaines propriétés.
La documentation relative à la sécurité accompagnant le produit doit être examinée en détail.

EU Declaration of Conformity
EU-Konformitätserklärung
EU-Déclaration de Conformité

No. A5E41945001A/001

Peterborough, 2017.06.01
Siemens Canada Limited
Siemens Milltronics Process Instruments

Jean Rene Larocque,
Research & Development / Entwicklung

Valerie McQueen,
Quality / Qualität



signature / Unterschrift



signature / Unterschrift

Anhang A ist integraler Bestandteil dieser Erklärung
Annex A is integral part of this declaration
L'annexe A fait partie intégrante de la présente déclaration

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties.
The safety documentation accompanying the product shall be considered in detail.
La documentation relative à la sécurité accompagnant le produit doit être examinée en détail.

Annex A to the EU Declaration of Conformity
Anhang A zur EU-Konformitätserklärung
Annexe A de la Déclaration de conformité

No. A5E41945001A/001

Product description: Electromechanical Switch for Point Level Measurement
 Produktbezeichnung: SITRANS LVL100
 Identificateur: 7ML5745-abxxc-xxA0 a = 1, 2, 3 b = A, B, C c = 1, 2

Conformity to the Directives indicated on page 1 is assured through the application of the following standards (depending on versions):

Die Konformität mit den auf Blatt 1 angeführten Richtlinien wird nachgewiesen durch die Einhaltung folgender Normen (variantenabhängig):

La conformité aux Directives indiquées sur la page 1 est garantie par l'application des normes suivantes (selon les versions) :

Directive <i>Richtlinie</i> <i>Directive</i>	Standard / Reference number <i>Norm / Referenznummer</i> <i>Norme / référence</i>	Edition <i>Ausgabedatum</i> <i>Edition</i>	a =	b =	c =
2014/30/EU	EN 61326-1 *	2013	1	A, B, C	1, 2
			2	A	1, 2
			3	A, B, C	2
2014/35/EU	EN 61010-1	2010	1	A, B, C	1, 2
			2	A	1, 2
			3	A, B, C	2

* all environments included / *beinhaltet alle Umgebungen/dans tout type d'environnement*

Vibrating Switches

SITRANS LVL100

- contactless electronic switch

Operating Instructions • 12/2015



SITRANS

SIEMENS

Safety Guidelines: Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel: This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Unit Repair and Excluded Liability:

- The user is responsible for all changes and repairs made to the device by the user or the user's agent.
- All new components are to be provided by Siemens.
- Restrict repair to faulty components only.
- Do not reuse faulty components.

Warning: Cardboard shipping package provides limited humidity and moisture protection. This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Note: Always use product in accordance with specifications.

Copyright Siemens AG 2015. All Rights Reserved	Disclaimer of Liability
<p>This document is available in bound version and in electronic version. We encourage users to purchase authorized bound manuals, or to view electronic versions as designed and authored by Siemens. Siemens will not be responsible for the contents of partial or whole reproductions of either bound or electronic versions.</p>	<p>While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.</p> <p>Technical data subject to change.</p>

Contact Siemens Technical Publications at the following address:

Technical Publications
 Siemens Canada Limited
 PD PA PI LW
 1954 Technology Drive, P.O. Box 4225
 Peterborough, Ontario, Canada, K9J 7B1
 Email: techpubs.smpi@siemens.com

European Authorized Representative

Siemens AG
 Industry Sector
 76181 Karlsruhe
 Deutschland

- For a selection of Siemens level measurement manuals, go to: **www.siemens.com/processautomation**. Under Process Instrumentation, select *Level Measurement* and then go to the manual archive listed under the product family.
- For a selection of Siemens weighing manuals, go to: **www.siemens.com/processautomation**. Under Weighing Technology, select *Continuous Weighing Systems* and then go to the manual archive listed under the product family.

Contents

1	About this document	
1.1	Function	4
1.2	Target group	4
1.3	Symbols used.....	4
2	For your safety	
2.1	Authorised personnel	5
2.2	Appropriate use.....	5
2.3	Warning about incorrect use.....	5
2.4	General safety instructions	5
2.5	Safety label on the instrument	6
2.6	CE conformity.....	6
3	Product description	
3.1	Configuration.....	7
3.2	Principle of operation.....	7
3.3	Operation	8
3.4	Packaging, transport and storage.....	8
4	Mounting	
4.1	General instructions	10
4.2	Mounting instructions	12
5	Connecting to power supply	
5.1	Preparing the connection	14
5.2	Wiring plan	15
6	Setup	
6.1	Indication of the switching status.....	19
6.2	Simulation	19
6.3	Function table.....	20
7	Maintenance and fault rectification	
7.1	Maintenance	21
7.2	Rectify faults.....	21
7.3	Instrument repair	21
8	Dismount	
8.1	Dismounting steps.....	22
8.2	Disposal	22
9	Supplement	
9.1	Technical data	23
9.2	Dimensions	26

1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbols used



Information, tip, note

This symbol indicates helpful additional information.



Caution: If this warning is ignored, faults or malfunctions can result.



Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.



Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



Ex applications

This symbol indicates special instructions for Ex applications.



SIL applications

This symbol indicates instructions for functional safety which must be taken into account particularly for safety-relevant applications.

- **List**

The dot set in front indicates a list with no implied sequence.

- **Action**

This arrow indicates a single action.

- 1 **Sequence of actions**

Numbers set in front indicate successive steps in a procedure.



Battery disposal

This symbol indicates special information about the disposal of batteries and accumulators.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

The SITRANS LVL100 is a sensor for point level detection.

You can find detailed information about the area of application in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- SITRANS LVL100 point level switch
- Test magnet
- Documentation
 - This operating instructions manual
 - If necessary, certificates

Constituent parts

The SITRANS LVL100 consists of the components:

- Housing with electronics
- Process fitting with tuning fork



Fig. 1: SITRANS LVL100

Type label

The type label contains the most important data for identification and use of the instrument:

- Article number
- Serial number
- Technical data
- Article numbers, documentation

3.2 Principle of operation

Application area

SITRANS LVL100 is a point level sensor with tuning fork for point level detection.

It is designed for industrial use in all areas of process technology and can be used in liquids.

Typical applications are overflow and dry run protection. With a tuning fork of only 38 mm length, SITRANS LVL100 can be also mounted e.g. in pipelines from DN 25. The small tuning fork allows use in vessels, tanks and pipes. Thanks to its simple and robust measuring system, SITRANS LVL100 is virtually unaffected by the chemical and physical properties of the liquid.

It functions even under difficult conditions such as turbulence, air bubbles, foam generation, buildup, strong external vibration or changing products.

Function monitoring

The electronics module of SITRANS LVL100 continuously monitors the following criteria via frequency evaluation:

- Strong corrosion or damage on the tuning fork
- Loss of vibration
- Line break to the piezo drive

If a malfunction is detected or in case of power failure, the electronics takes on a defined switching condition, i.e. the contactless electronic switch opens (safe state).

Functional principle

The tuning fork is piezoelectrically energised and vibrates at its mechanical resonance frequency of approx. 1100 Hz. When the tuning fork is submerged in the product, the frequency changes. This change is detected by the integrated electronics module and converted into a switching command.

Voltage supply

SITRANS LVL100 is a compact instrument, i.e. it can be operated without external evaluation system. The integrated electronics evaluates the level signal and outputs a switching signal. With this switching signal, a connected device can be operated directly (e.g. a warning system, a pump etc.).

The data for power supply are specified in chapter "*Technical data*".

3.3 Operation

The switching status of SITRANS LVL100 can be checked when the housing is closed (signal lamp). Products with a density $> 0.7 \text{ g/cm}^3$ (0.025 lbs/in^3) or optionally with a density $> 0.5 \text{ g/cm}^3$ (0.018 lbs/in^3) can be detected.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 ... 85 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument coming in direct contact with the process, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions, such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" and on the nameplate.

Switching point

In general, SITRANS LVL100 can be installed in any position. The instrument only has to be mounted in such a way that the tuning fork is at the height of the desired switching point.

Keep in mind that the switching point can vary dependent on the installation position.

The switching point refers to the medium water ($1 \text{ g/cm}^3/0.036 \text{ lbs/in}^3$). Please keep in mind that the switching point of the instrument shifts when the medium has a density differing from water.

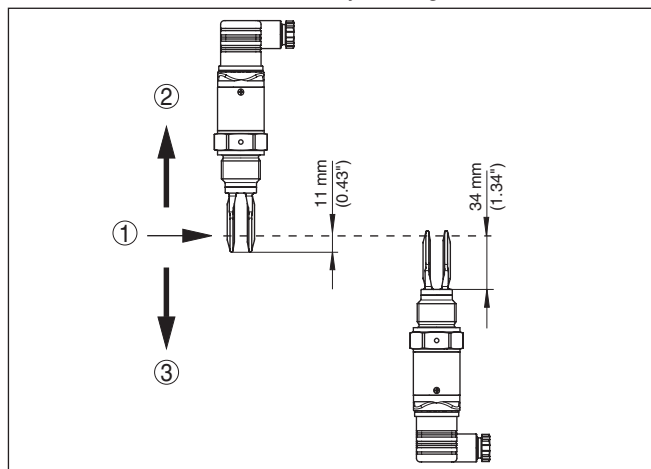


Fig. 2: Vertical mounting

- 1 Switching point in water
- 2 Switching point with lower density
- 3 Switching point with higher density

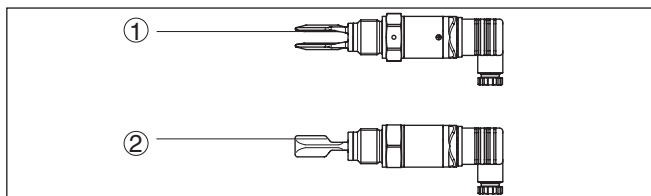


Fig. 3: Horizontal mounting

- 1 Switching point
- 2 Switching point (recommended mounting position, particularly for adhesive products)

Moisture

Use the recommended cables (see chapter "Connecting to power supply") and tighten the cable gland.

You can give your SITRANS LVL100 additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

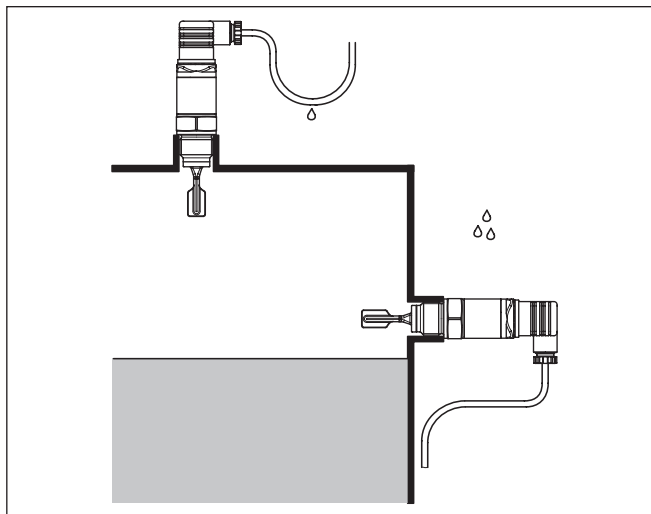


Fig. 4: Measures against moisture ingress

Transport

Do not hold SITRANS LVL100 on the tuning fork.

Pressure/Vacuum

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "Technical data" or on the type label of the sensor.

Handling

The vibrating level switch is a measuring instrument and must be treated accordingly. Bending the vibrating element will destroy the instrument.



Warning:

The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

Use the hexagon above the thread for screwing in.

Welding socket

4.2 Mounting instructions

For threaded versions of SITRANS LVL100 in combination with a mounting boss with O-ring in front and welding marking.

SITRANS LVL100 with thread sizes $\frac{3}{4}$ " and 1" have a defined thread runoff. This means that every SITRANS LVL100 is in the same position after being screwed in. Remove therefore the supplied flat seal from the thread of SITRANS LVL100. This flat seal is not required when using a welded socket with front-flush seal.

Before welding, unscrew SITRANS LVL100 and remove the rubber ring from the welded socket.

The welded socket is provided with a marking (notch). For horizontal mounting, weld the socket with the notch facing upward or downward; in pipelines (DN 25 to DN 50) aligned with the direction of flow.

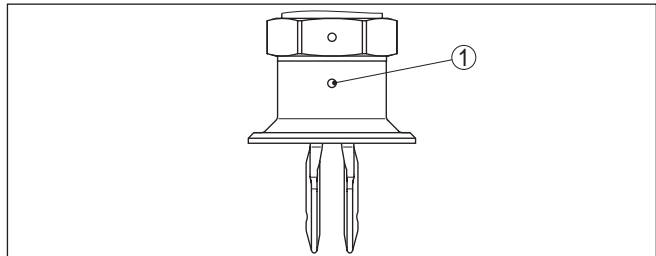


Fig. 5: Marking on the welded socket

1 Marking

Adhesive products

In case of horizontal mounting in adhesive and viscous products, the surfaces of the tuning fork should be vertical in order to reduce buildup on the tuning fork. The position of the tuning fork is indicated by a marking on the hexagon of SITRANS LVL100. With this, you can check the position of the tuning fork when screwing it in. When the hexagon touches the seal, the thread can still be turned by approx. half a turn. This is sufficient to reach the recommended installation position.

In adhesive and viscous products, the surfaces of the tuning fork should protrude into the vessel to avoid buildup. Therefore sockets for flanges and mounting bosses should not exceed a certain length.

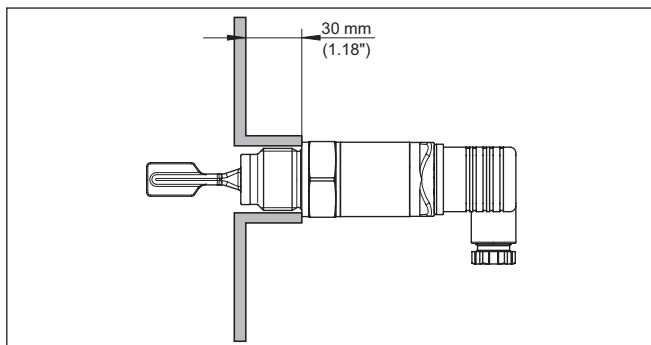


Fig. 6: Adhesive products

Inflowing medium

If SITRANS LVL100 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount SITRANS LVL100 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

Product flow

To make sure the tuning fork of SITRANS LVL100 generates as little resistance as possible to product flow, mount the sensor so that the surfaces are parallel to the product movement.

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:



Warning:

Connect only in the complete absence of line voltage.

- The electrical connection must only be carried out by trained personnel authorised by the plant operator.
- Always switch off power supply, before connecting or disconnecting the instrument.

Connection cable

The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross section. Depending on the plug connection, you have to select the outer diameter of the cable respectively so that the seal effect of the cable gland is ensured.

- Valve plug ISO 4400, \varnothing 4.5 ... 7 mm
- Valve plug ISO 4400 with IDC crimping technology, \varnothing 5.5 ... 8 mm

Cable glands

Use cable with a round wire cross section and tighten the cable gland.

When mounting outdoors, on cooled vessels or in moist areas in which cleaning is made with steam or high pressure, the sealing of the cable gland is very important.

5.2 Wiring plan

Housing overview

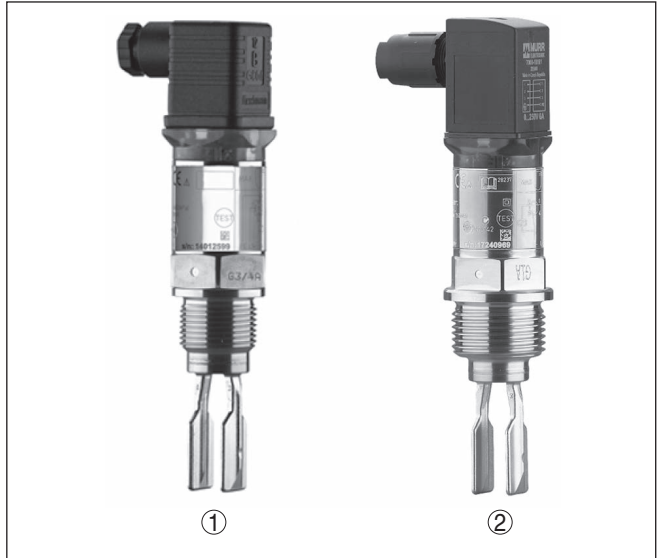


Fig. 7: Overview of the connection versions

- 1 Valve plug ISO 4400
- 2 Valve plug ISO 4400 with IDC method of termination

Plug versions

Valve plug ISO 4400

For this plug version, standard cable with round wire cross-section can be used. Cable diameter 4.5 ... 7 mm, protection IP 65.

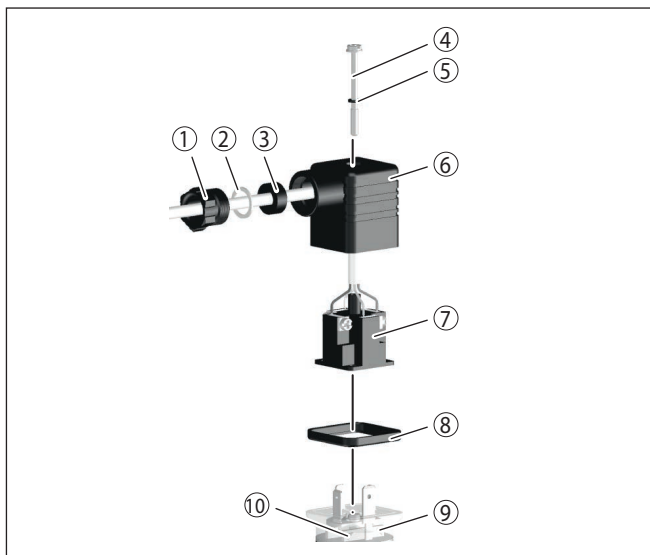


Fig. 8: Connection, valve plug ISO 4400

- 1 Pressure screw
- 2 Pressure disc
- 3 Seal ring
- 4 Fixing screw
- 5 Seal washer
- 6 Plug housing
- 7 Plug insert
- 8 Profile seal
- 9 Control lamp
- 10 SITRANS LVL100

Valve plug ISO 4400 with IDC method of termination

For this plug version you can use standard cable with round wire cross-section. The inner conductors do not have to be stripped. The plug connects the conductors automatically when screwing in. Cable diameter 5.5 ... 8 mm, protection IP 67.

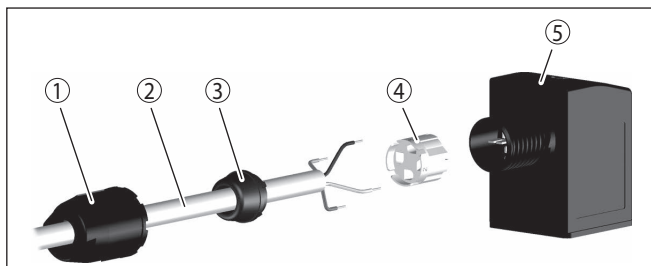


Fig. 9: Connection, valve plug ISO 4400 with IDC crimping technology

- 1 Compression nut
- 2 Cable
- 3 Seal ring
- 4 Terminal insert
- 5 Plug housing

Contactless electronic switch

We recommend connecting SITRANS LVL100 in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).



Warning:

The instrument must not be operated without an intermediately connected load, because the electronics would be destroyed if connected directly to the mains. It is not suitable for connection to low voltage PLC inputs.

Examples for typical applications:

- Load resistance at 24 V DC: 88 ... 1800 Ω
- Rated power, relay 253 V AC: > 2.5 VA
- Rated power, relay 24 V AC: > 0.5 VA

For direct control of relays, contactors, magnet valves, warning lights, horns etc.

Domestic current is temporarily lowered below 1 mA after switching off the load so that contactors, whose holding current is lower than the constant domestic current of the electronics (3 mA), are reliably switched off.

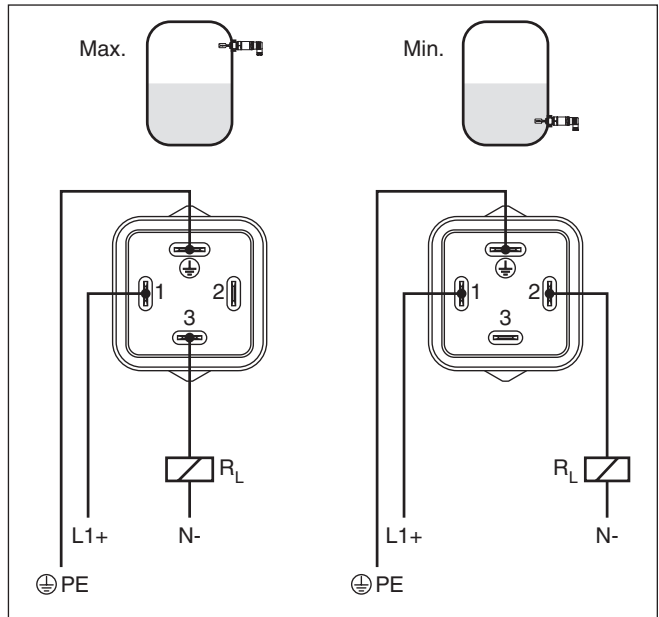


Fig. 10: Wiring plan, contactless electronic switch with valve plug ISO 4400
 PE Protective ground
 R_L Load resistance (contactor, relay, etc.)

6 Setup

6.1 Indication of the switching status

The switching status of the electronics can be checked via the signal lamps (LEDs) integrated in the upper part of the housing.

The signal lamps have the following meaning:

- Green lights - voltage supply connected
- Yellow lights - vibrating element covered
- Red lights briefly - function test during instrument start (for 0.5 s)
- Red lights - shortcircuit or overload in the load circuit (sensor output high-impedance)
- Red flashes - Error on the vibrating element or the electronics (sensor output high impedance)

6.2 Simulation

The SITRANS LVL100 has an integrated function for simulation of the output signal which can be activated magnetically. Please proceed as follows:

- Hold the test magnet (accessory) against the circle symbol with the label "TEST" on the instrument housing

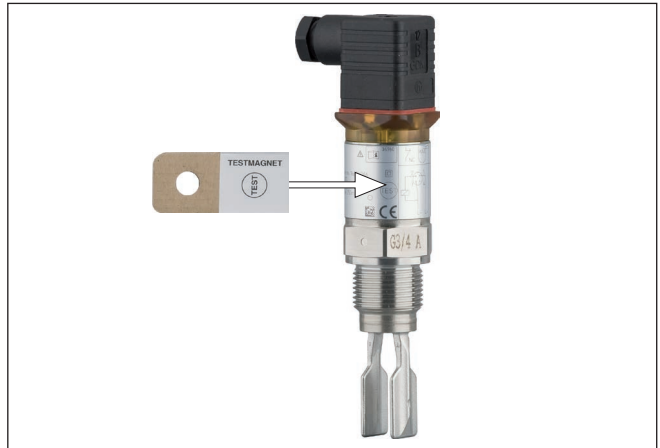


Fig. 11: Simulation of the output signal

The test magnet changes the current switching condition of the instrument. You can check the change on the signal lamp. Please note that all connected device are activated during the simulation.













If SITRANS LVL100 does not switch over after several tests with the test magnet, you have to check the plug connection and the connection cable and try it again. If there is no switching function, the electronics will be defective. In this case you have to exchange the electronics or return the instrument to our repair department.

**Caution:**

It is absolutely necessary that you remove the test magnet from the instrument housing after the simulation.

6.3 Function table

The following table provides an overview of the switching conditions depending on the set mode and the level.

	Level	Switching status	Control lamp Yellow - coverage	Control lamp Green - voltage indication	Control lamp Red - fault signal
Mode max.		closed	○		○
Mode max.		open			○
Mode min.		closed			○
Mode min.		open	○		○
Fault	any	open	any		

7 Maintenance and fault rectification

7.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

7.2 Rectify faults

The operator of the system is responsible for taking suitable measures to rectify faults.

Reaction when malfunction occurs

Causes of malfunction

SITRANS LVL100 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measure to take is to check the output signal. In many cases, the causes can be determined this way and the faults quickly rectified.

Checking the switching signal

Error	Cause	Rectification
Green signal lamp off	Voltage supply interrupted.	Check the voltage supply and the cable connection
	Electronics defective	Exchange the instrument or send it in for repair
Red signal lamp lights (switching output high-impedance)	Error with the electrical connection	Connect the instrument according to the wiring plan
	Shortcircuit or overload	Check the electrical connection
Red signal lamp flashes (switching output high-impedance)	Vibrating frequency out of specification	Check the vibrating element on buildup and remove it
	Buildup on the vibrating element	Check the vibrating element and the sensor if there is buildup and remove it
	Vibrating element damaged	Check if the vibrating element is damaged or extremely corroded

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Set up" may have to be carried out again.

7.3 Instrument repair

If it is necessary to repair the instrument, please contact Siemens Milltronics Process Instruments Inc. You find the locations on our homepage "www.siemens.com/processautomation".

8 Dismount

8.1 Dismounting steps



Warning:

Before dismantling, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the parts to be easily separable.

WEEE directive 2002/96/EG

This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

9 Supplement

9.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts

- Tuning fork 316L
- Process seal Klingersil C-4400
- Process fittings 316L

Materials, non-wetted parts

- Housing 316L and plastic PEI

Weight approx. 250 g (9 oz)

Process fittings

- Pipe thread, cylindrical (DIN 3852-A) G $\frac{1}{2}$, G $\frac{3}{4}$, G1
- American pipe thread, conical (ASME B1.20.1) $\frac{1}{2}$ NPT, $\frac{3}{4}$ NPT, 1 NPT
- hygienic fittings Clamp 1", Clamp 1 $\frac{1}{2}$ ", Clamp 2", PN 16 DIN 32676, ISO 2852/316L, slotted nut DN 25 PN 40, slotted nut DN 40 PN 40, slotted nut DN 50 PN 25, SMS DN 38 PN 6

Max. torque - process fitting

- Thread G $\frac{1}{2}$, $\frac{1}{2}$ NPT 50 Nm (37 lbf ft)
- Thread G $\frac{3}{4}$, $\frac{3}{4}$ NPT 75 Nm (55 lbf ft)
- Thread G1, 1 NPT 100 Nm (73 lbf ft)

Surface quality

- Standard $R_a < 3.2 \mu\text{m}$ (1.26⁻⁴ in)
- Hygienic version $R_a < 0.8 \mu\text{m}$ (3.15⁻⁵ in)

Measuring accuracy

Hysteresis approx. 2 mm (0.08 in) with vertical installation

Switching delay approx. 500 ms (on/off)

Can be ordered as an option: 0.5 ... 60 s

Measuring frequency approx. 1100 Hz

Ambient conditions

Ambient temperature on the housing -40 ... +70 °C (-40 ... +158 °F)

Storage and transport temperature -40 ... +80 °C (-40 ... +176 °F)

Process conditions

Process pressure -1 ... 64 bar/-100 ... 6400 kPa (-14.5 ... 928 psig)

Process temperature - Standard -40 ... +100 °C (-40 ... +212 °F)

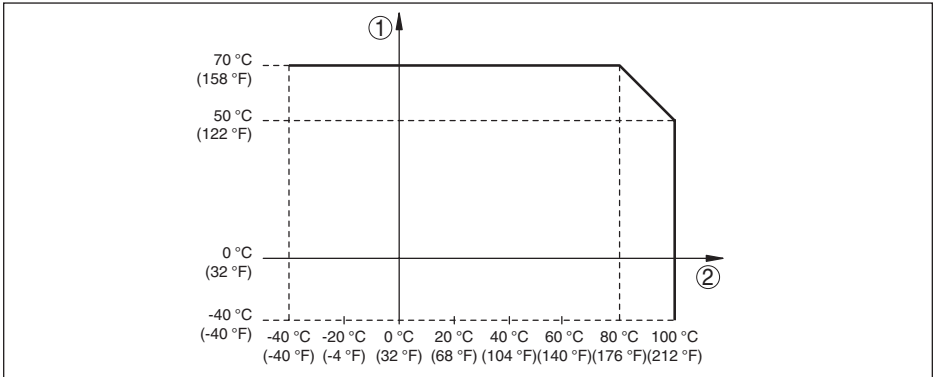


Fig. 30: Dependency ambient temperature to process temperature

- 1 Ambient temperature in °C (°F)
- 2 Process temperature in °C (°F)

Process temperature - High temperature -40 ... +150 °C (-40 ... +302 °F)
version (option)

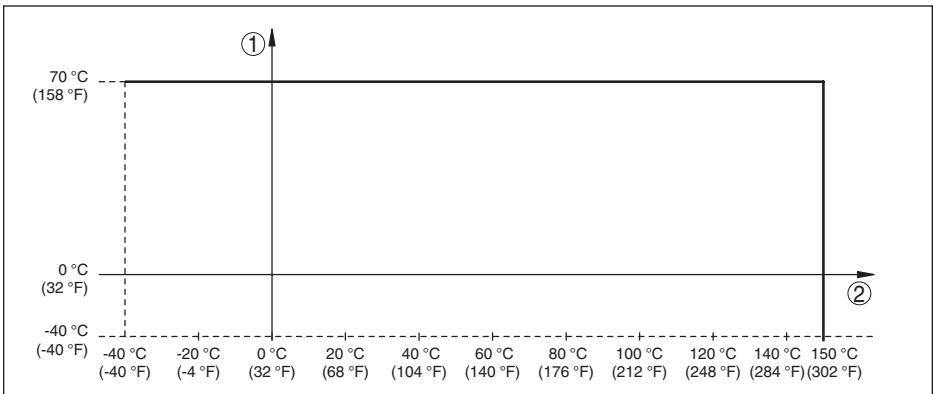


Fig. 31: Dependency ambient temperature to process temperature

- 1 Ambient temperature in °C (°F)
- 2 Process temperature in °C (°F)

Viscosity - dynamic	0.1 ... 10000 mPa s
Flow velocity	max. 6 m/s (with a viscosity of 10000 mPa s)
Density	
– Standard	0.7 ... 2.5 g/cm ³ (0.025 ... 0.09 lbs/in ³)
– Optionally	0.5 ... 2.5 g/cm ³ (0.018 ... 0.09 lbs/in ³) ¹⁾

Operation

Plug connections Specification see "Connecting to power supply"

¹⁾ Only for instruments without approval.

Signal lamps (LED)

- Green	Voltage supply on
- Yellow	Vibrating element covered
- Red	Fault

Output variable

Output	Contactless electronic switch
Modes min / max (changeover by electrical connection)	
- Max.	Max. detection or overflow/overflow protection
- Min.	Min. detection or dry run protection

Voltage supply

Operating voltage	20 ... 253 V AC/DC
Power consumption	max. 0.5 W
Load current	
- Min.	10 mA
- Max.	250 mA

Electromechanical data

Valve plug ISO 4400

- Wire cross-section	1.5 mm ² (0.06 in ²)
- Outer cable diameter	4.5 ... 7 mm (0.18 ... 0.28 in)

Valve plug ISO 4400 with IDC method of termination

- Wire cross-section	for wire cross-section of 0.5 ... 1 mm ² (0.02 ... 0.04 in ²)
- Single-wire diameter	> 0.1 mm (0.004 in)
- Wire diameter	1.6 ... 2 mm ² (0.06 ... 0.08 in ²)
- Outer cable diameter	5.5 ... 8 mm (0.22 ... 0.31 in)
- Connection frequency	10 x (on the same cross-section)

Electrical protective measures

Protection rating

- Valve plug ISO 4400	IP 65 (NEMA 3SX)
- Valve plug ISO 4400 with IDC method of termination	IP 67 (NEMA 4X)

Overvoltage category III

Protection class I

Approvals

Depending on the version, instruments with approvals can have different technical data. For these instruments, please note the corresponding approval documents. They are included in the scope of delivery.

9.2 Dimensions

SITRANS LVL100, standard version - thread G $\frac{1}{2}$, $\frac{1}{2}$ NPT

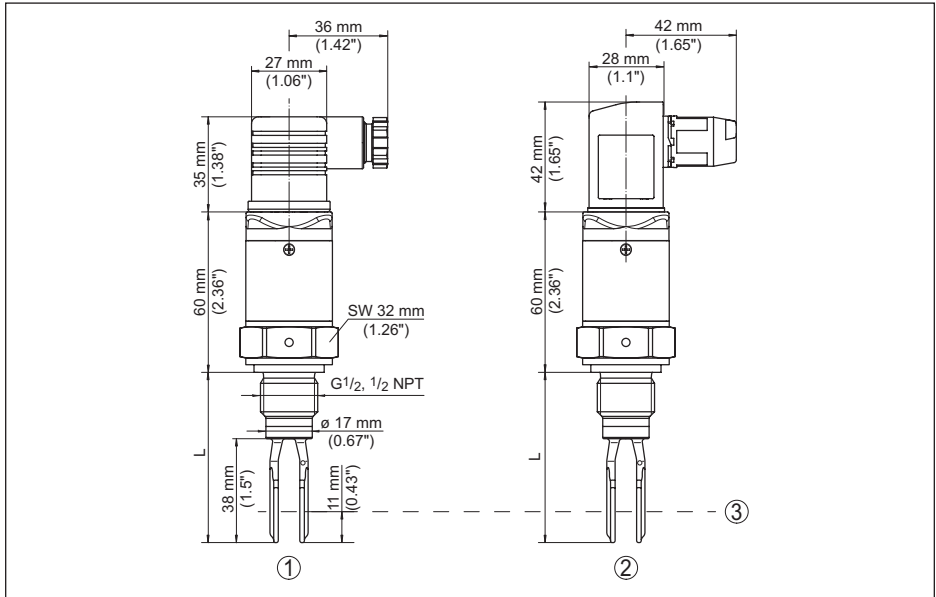


Fig. 32: SITRANS LVL100, standard version - thread G $\frac{1}{2}$, $\frac{1}{2}$ NPT

- 1 Thread G $\frac{1}{2}$ (DIN ISO 228/1), $\frac{1}{2}$ NPT (valve plug ISO 4400)
- 2 Thread G $\frac{1}{2}$ (DIN ISO 228/1), $\frac{1}{2}$ NPT (valve plug ISO 4400 with DC method of termination)
- 3 Switching point
- L Length with G $\frac{1}{2}$ (DIN ISO 228/1), $\frac{1}{2}$ NPT: 62 mm (2.44 in)

SITRANS LVL100, standard version - thread G $\frac{3}{4}$, G1 / $\frac{3}{4}$ NPT, 1 NPT

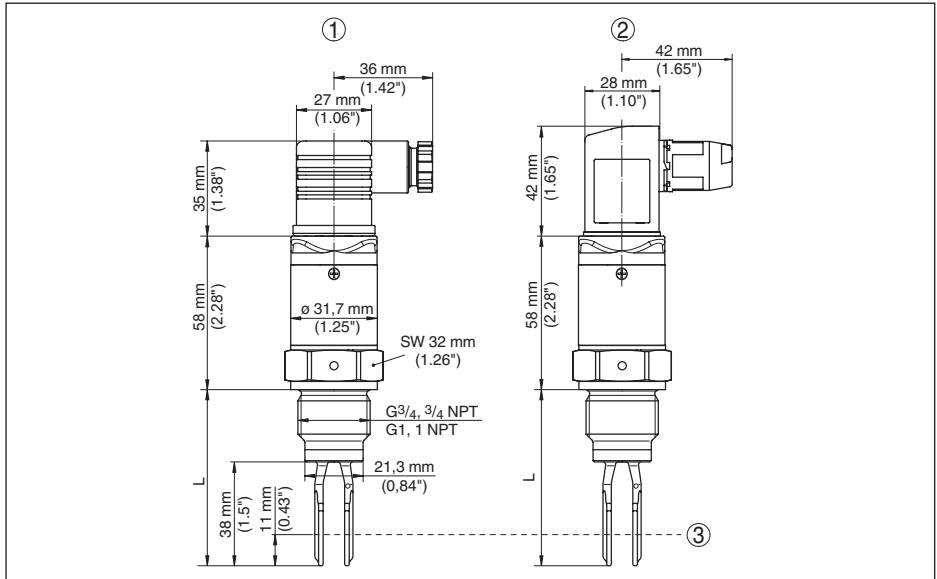


Fig. 33: SITRANS LVL100, standard version - thread G $\frac{3}{4}$, G1 / $\frac{3}{4}$ NPT, 1 NPT

- 1 Thread G $\frac{3}{4}$, G1 (DIN ISO 228/1), $\frac{3}{4}$ NPT or 1 NPT (valve plug ISO 4400)
- 2 Thread G $\frac{3}{4}$, G1 (DIN ISO 228/1), $\frac{3}{4}$ NPT or 1 NPT (valve plug ISO 4400 with IDC crimping technology)
- 3 Switching point
- L Length with G $\frac{3}{4}$ (DIN ISO 228/1), $\frac{3}{4}$ NPT: 64 mm (2.5 in)
- L Length with G1 (DIN ISO 228/1), 1 NPT: 67 mm (2.64 in)

SITRANS LVL100, high temperature version

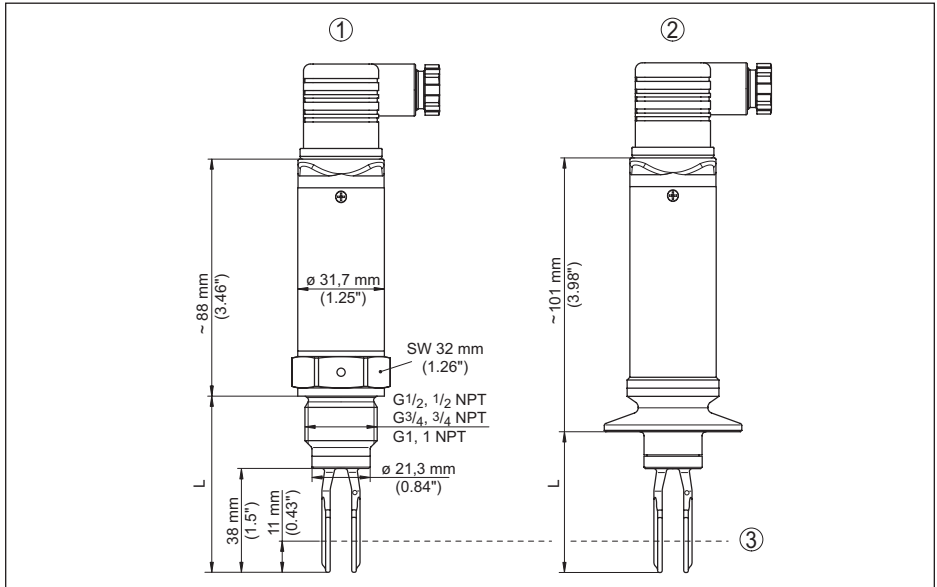


Fig. 34: SITRANS LVL100, high temperature version

- 1 Thread G $\frac{1}{2}$, G $\frac{3}{4}$, G1 (DIN ISO 228/1), $\frac{1}{2}$ " NPT, $\frac{3}{4}$ " NPT or 1 NPT (valve plug ISO 4400)
- 2 Clamp (valve plug ISO 4400)
- 3 Switching point
- L Length with G $\frac{1}{2}$ (DIN ISO 228/1), $\frac{1}{2}$ " NPT: 62 mm (2.44 in)
- L Length with G $\frac{3}{4}$ (DIN ISO 228/1), $\frac{3}{4}$ " NPT: 64 mm (2.5 in)
- L Length with G1 (DIN ISO 228/1), 1 NPT: 67 mm (2.64 in)
- L Length with Clamp: 53 mm (2.1 in)

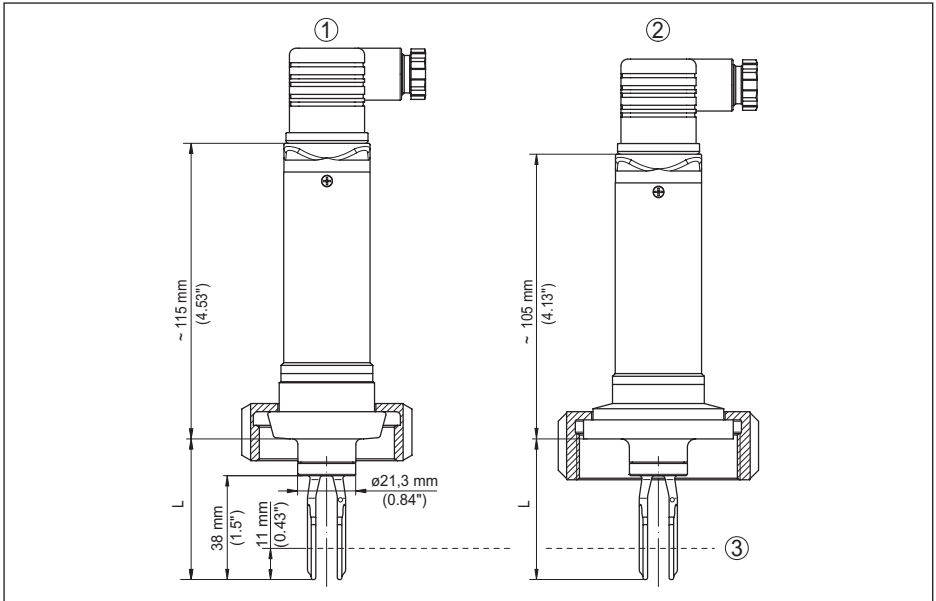


Fig. 35: SITRANS LVL100, high temperature version

- 1 Slotted nut (valve plug ISO 4400)
- 2 SMS 1145 (valve plug ISO 4400)
- 3 Switching point
- L Length with slotted nut: 53 mm (2.1 in)
- L Length with SMS 1145: 53 mm (2.1 in)

9.3 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/originator.

Notes

For more information

www.siemens.com/level

www.siemens.com/weighing



Siemens Canada Limited
PD PA PI LW
1954 Technology Drive
P.O. Box 4225
Peterborough, ON
K9J 7B1, Canada

email: techpubs.smpi@siemens.com

www.siemens.com/processautomation

Subject to change without prior notice
Rev. 2.0

© Siemens AG 2016