

LVCSi FP Flameproof Continuous Level Sensor

The LVCSi FP is an analogue vertical liquid level sensor with an integrated display meter and output driver specifically designed for continuous, in-situ monitoring of your tank while in a potentially explosive atmosphere. With optional temperature sensing and MODBUS communications protocols, the LVCSi-FP is an all-in-one ATEX/ IECEx solution for liquid level monitoring.



II 1/2G 2D

Ex db IIC T5/T4/T3 Ga/Gb

-40°C ≤ Ta ≤ +85°C

Ex tb IIIC T100°C / T135°C / T200°C Db
IP68

-40°C ≤ Ta ≤ +85°C



II 2GD

Ex db IIC T5/T4/T3 Gb

-40°C ≤ Ta ≤ +85°C

Ex tb IIIC T100°C / T135°C / T200°C Db
IP68

-40°C ≤ Ta ≤ +85°C

Environment and process temperatures

T5 / T100°C for process temperatures ≤ +85°C and ≥ -55°C

T4 / T135°C for process temperatures ≤ +120°C and ≥ -55°C

T3 / T200°C for process temperatures ≤ +180°C and ≥ -55°C

ATEX Certificate: ExVeritas 17ATEX0301X

IECEx Certificate: IECEx EXV17.0030X

Refer to certificate for clarification of directive code and equipment protection level.

The LVCSi-FP features include:

- ATEX and IECEx approved
- Suitable for gas and dust environments
- Stainless steel 316L wetted components
- A display for direct read-out of level and temperature
- Temperature sense range up to +120°C
- Two pairs of analogue outputs (4-20mA and 0-10V)
- Two set point digital outputs
- An RS485 communications port
- Reed switch or Hall Effect sensing technology.
- IP Rating of IP68
- Stem Lengths up to 6m
- Custom mounting options available.
- Optional Modbus
- Can be specified for process temperatures down to -55°C
- Optional custom name plate



Type	Specification	
Head dimensions	110mm x 100mm x 81mm (Excluding sensor stem and cable glands/port fixings)	
Stem length	Standard sizes are from 250mm to 2000mm in 250mm increments. Custom sizes available on request.	
Level sensing resolution	5mm (reed) or 15mm (Hall-effect)	
Temperature sensing range	-40°C to +120°C	
Temperature sensing resolution	0.1°C	
Max. temperature error	< ±1.0°C over the full sensing range (subject to correct calibration)	
Current-loop output range	4-20mA (with 0mA fault indication)	Note 3
Voltage output ranges	0-10V, 0-5V, 0-2V	
Max. analogue output error	-0.3% to +1.0% full-scale (subject to correct calibration)	
Transistor output	NPN open-collector Maximum pull-up voltage of 36Vdc. Current-limited to 50mA	
Head operating temperature	-40°C to +85°C	
Stem operating temperature		
Reed LVCSi	-20°C to +120°C (standard) -55°C to +180°C (full range)	
Hall-effect LVCSi	-20°C to +80°C	
Power supply	15 – 30Vdc at 100mA	
Fuse	500mA anti-surge Omni-Blok® cartridge	
Mounting Options	½" BSP Custom options available	
Float Diameter: Specific gravity	53mm : 0.65	Other floats available
Operating Pressure	Stem and float 10 Bar standard. Up to 60bar on request	
IP rating with suitable cable gland	IP68	
Sensor tube and wetted materials	Stainless steel 316L	
Connection head material	Stainless steel 316L and glass	
Approximate weight	1.2Kg+process connector + 0.5Kg/Metre	
Maximum liquid temperature	-55°C to +85°C for T5 rated hazardous environment -55°C to +120°C for T4 rated hazardous environment -55°C to +180°C for T3 rated hazardous environment	Note 1
Maximum head temperature	-40 to +80°C	Note 2
Thread connection-Wiring port	Two M20X1.5 ports or Two ½" NPT ports, cable glands not included	

Note 1: LVCSi FP for liquids with maximum temperature above 120°C or minimum temperatures below -20°C are available – please call the sales office for assistance.

Note 2: When this equipment is intended to be used in a liquid with a process temperature above +85°C or below -40°C it is an essential requirement that the sensor head temperature is measured to determine if the ambient air temperature is sufficient to keep the head temperature between -40°C and +80°C. See installation manual for detail.

Note 3: Maximum load resistance is determined by the formula:

$$R_{load(max)} = (\text{supply Voltage} - 2V) / 20mA.$$

At maximum specified voltage and temperature, the minimum load resistance increases to approximately 500Ω

An approximate formula is:

$$R_{load(min)} = (\text{Supply voltage}) / 20mA - (150C - (\text{Ambient temperature})) / 0.04C/\Omega$$

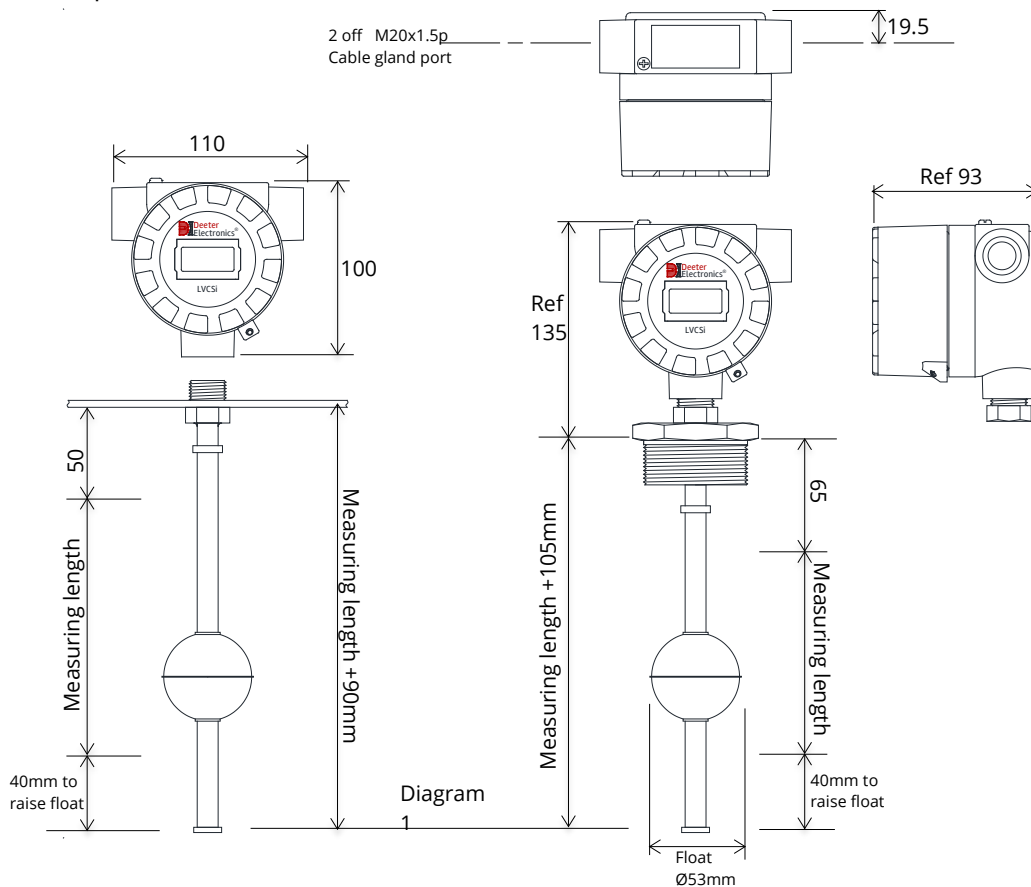
The LVCS FP and LVCSi FP range of analogue level sensors feature a magnetic float moving along a stem to provide a continuous analogue output that indicates liquid level. Sensors in the stem detects small step-changes in level and the output gives a continuous analogue signal.

The following range of user-selectable analogue outputs are supplied as standard: 0-2V, 0-5V, 0-10V and the industrial standard 4-20mA current loop. Level outputs can be inverted, ideal for level sensors mounted from the bottom of a tank.

The standard LVCSi FP is designed to fit a 21mm hole in the top of a tank, secured by its stainless steel head, and has a ½ inch NPT thread. Sensing resolution is 5mm with measuring lengths of 250mm, 500mm, 750mm and 1000mm or 15mm resolution with 1250mm, 1500mm, 1750mm and 2000mm Hall-effect sensing technology. It is housed in an robust stainless steel instrument enclosure that screws to the top of a sensor stem and has a tempered glass viewing window.

All fittings to the stem are made from 316L stainless steel and are welded to make a tough and durable sensor. The LVCSi FP is therefore ideally suited for use in food and petrochemical applications, and for use in harsh environments. It also has an IP rating of IP68.

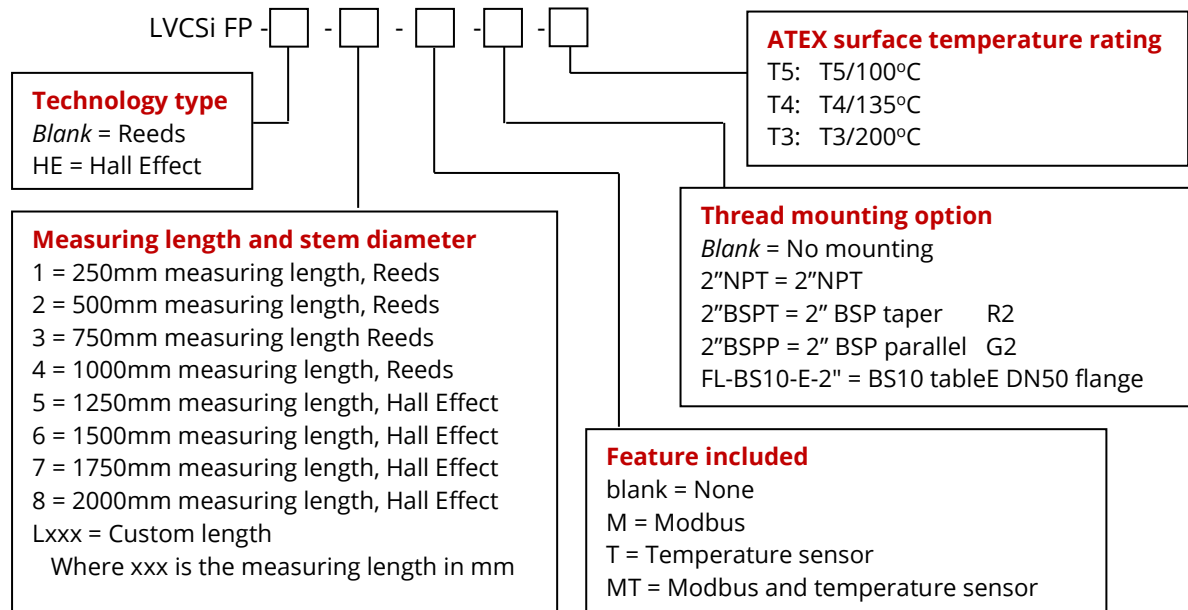
The optional Modbus protocols allow for full remote monitoring and setup. The LVCSi FP conforms to the Modbus RTU and Modbus ASCII command and response framing standards as a slave device – please see the manual for details.



Ordering information

Due to the various options available please call our sales office to discuss your requirements or order from the standard part No. options below.

Options include: Probe length, Threaded mounting/seal options, Reed/Hall Effect technology, ATEX 'T' rating, non-standard float size, Output voltage, No temperature sensing, Mod bus, Custom name plate / Logo.



Upon receipt of the above information a drawing and Deeter part No. will be issued to identify the options selected. This part No. will be required when making your order.

Note: Tank depth must be at least 90mm longer than the measuring length.

Example: LVCSi FP HE-L1635-T-2"BSPT-T5 is a Flame proof liquid level sensor using Hall Effect technology. Measuring length =1635mm, Overall sensor length =1740mm, Temperature sensor included. A 2"BSP taper pipe fitting welded to the top of the stem for mounting the sensor into a tank of liquid. T5 temperature rating for liquid process temperatures between -20°C and +85°C

All electrical equipment should be installed by a qualified/certified electrician.

Deeter Electronics Ltd follows a policy of continual development of its products and reserves the right to change specifications and/or features without notice.

All electrical equipment should be installed by a qualified/certified person. Reed Switches are easily damaged by inductive loads. Please ensure adequate electrical protection is in place before use.

1 EU - Type Examination Certificate

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

3 Certificate Number: ExVeritas 17ATEX0301X Issue: 1

4 Equipment: Liquid Vertical Continuous Sensor, Flameproof (LVCS FP) Float Switch, Flameproof (F/S FP) Liquid Vertical Continuous Sensor with integrated display, Flameproof (LVCSi FP)

5 Manufacturer: Deeter Electronics Ltd

6 Address: Deeter House, Valley Road, Hughenden Valley, High Wycombe, Bucks, HP14 4LW, UK

7 This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

8 ExVeritas, Notified Body number 2585 in accordance with Article 9 of the Council Directive 2014/34/EU of 26 February 2014, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems for use in potentially explosive atmospheres given in Annex II to the Directive

9 Compliance with the applicable Essential Health and Safety Requirements has been assured by compliance with the following Standards and section 16 of this certificate:

BS EN IEC 60079-0: 2018
BS EN 60079-31:2014

BS EN 60079-1:2014

BS EN 60079-26:2015

10 If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EU-Type Examination Certificate relates only to the design, construction, examination and tests of the specified equipment or protective system in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment shall include the following:

 II 1/2G (or 2G) Ex db IIC T* Ga/Gb (or Gb) -55°C ≤ T_{amb} ≤ +85°C

 II 2 D Ex tb IIIC T* Db -40°C ≤ T_{amb} ≤ +85°C



No. 8613

On behalf of ExVeritas


Sean Clarke CEng MSc FIET
Certification Manager

This certificate may only be reproduced in its entirety and without any change, schedule included.

The certificate is only valid when it carries an original signature.

For help or assistance relating to this certificate, contact info@exveritas.com.

ExVeritas, Units 16-18, Abenbury Way, Wrexham Industrial Estate, Wrexham, United Kingdom LL13 9UZ.

ExVeritas® is a registered trademark, unauthorised use will lead to prosecution.



Schedule

13 Description of Equipment or Protective System

The LVCS FP (Liquid Vertical Continuous Sensor) and F/S FP (Float Switch) are liquid level sensors with either a continuous analogue or switching output. The equipment comprises of a flameproof, component certified instrument housing with stainless steel level guide which is threaded into the housing. The level guide consists of either an 8mm or 12mm stainless steel tube which contains the sensing electronics. The instrument housing is used for termination and mounting of optional PCB's, depending on the communication and I/O's required. The level guides can be various lengths and are mounted with up to seven stainless steel floats, each containing a magnetic ring. The equipment can be supplied with an optional threaded adaptor or equivalent gas tight seal for mounting across a boundary of two hazardous area zones.

When connected to process temperatures above 85°C, the instrument housing must be sufficiently cooled to keep it below 80°C, as detailed in the manufacturer's instructions.

The following temperature classes are applicable based on the process temperature which the equipment is connected to:

Model	Level guide length (mm)	Sensing device	Input/Output Options	Process Temperature and associated temperature class	Cable Entry sizes
LVCS	100 to 6000	Reed switch or Hall effect	Optional PCB's for various input/outputs	≤85°C (T5) (T100°C) ≤125°C (T4) (T135°C) ≤180°C (T3) (T200°C)	M20 x 1.5 or ½" NPT
F/S	60 to 6000	Reed switch	Between 1 to 7 I/O float switches, direct output	≤85°C (T5) (T100°C) ≤125°C (T4) (T135°C) ≤190°C (T3) (T200°C)	M20 x 1.5 or ½" NPT

The following ratings are applicable:

- 0 to 2v output. 5 to 25vdc input @ 25mA
- 0 to 4 v output. 7 to 25Vdc input @ 25mA
- 0 to 10v output. 14 to 28vdc input @ 35mA
- 8 to 28vdc input @30mA Multi interface 4-20mA, voltage output
- 0-50VDC 0-240V AC 1Amp (F/S FP reed switch only)

Certificate: ExVeritas 17ATEX0301X Issue 1

This certificate may only be reproduced in its entirety and without any change, schedule included.

For help or assistance relating to this certificate, contact info@exveritas.com.

ExVeritas, Units 16-18, Abenbury Way, Wrexham Industrial Estate, Wrexham, United Kingdom LL13 9UZ.

ExVeritas® is a registered trademark, unauthorised use will lead to prosecution.

Schedule

13.1 Details of changes



The following changes are incorporated in Issue 1 of the certificate:

- Update to the latest edition of EN 60079-0 as detailed on page 1 of the certificate.
- Inclusion of the LVCSi range of vertical liquid level sensors with integrated display and optional temperature sensor.

Model	Level guide length (mm)	Sensing device	Input/Output Options	Process Temperature and associated temperature class	Cable Entry sizes
LVCSi	100 to 6000	Reed switch or Hall effect. Optional temperature sensor	Optional PCB's for various input/outputs	≤85°C (T5) (T100°C) ≤125°C (T4) (T135°C) ≤180°C (T3) (T200°C)	2 off M20 x 1.5 or 2 off ½" NPT

10-30Vdc @ 100mA

The marking of the LVCSi range shall include the following:

 II 1/2G (or 2G) Ex db IIC T* Ga/Gb (or Gb) -40°C ≤ T_{amb} ≤ +85°C
 II 2 D Ex tb IIIC T* Db -40°C ≤ T_{amb} ≤ +85°C

14 Descriptive Documents

14.1 Associated Report and Certificate History:

Report Number	Cert Issue Date	Issue	Comment
R1288/A/1	14/12/2017	0	Initial issue of the Prime Certificate
R2757/A/1	24/09/2020	1	Issue of the first variation.

14.2 Compliance Drawings:

Issue 0

Number	Date	Issue	Description
D 600779	29/11/2017	2	LVCS FP all versions Sheet 1 of 2
D 600779_2	29/11/2017	3	LVCS FP all versions Sheet 2 of 2
D 600781	29/11/2017	2	F/S FP all versions Sheet 1 of 2
D 600781_2	29/11/2017	3	F/S FP all versions Sheet 2 of 2
Dwg 950553	11/8/2017	2	Adaptor ½" NPT Long thread to 12mm Sheet 1 of 2
Dwg 950568	11/8/2017	2	Adaptor ½" NPT long thread to 8mm Sheet 1 of 2

Issue 1

Number	Date	Issue	Description
D600850	11 th March 2020	Rev 1	LVCSi FP all versions (Sheets 1 to 2)
-	17/09/2020	-	LVCSi FP manual

Certificate: ExVeritas 17ATEX0301X Issue 1

This certificate may only be reproduced in its entirety and without any change, schedule included.

For help or assistance relating to this certificate, contact info@exveritas.com.

ExVeritas, Units 16-18, Abenbury Way, Wrexham Industrial Estate, Wrexham, United Kingdom LL13 9UZ.

ExVeritas® is a registered trademark, unauthorised use will lead to prosecution.



Schedule

15 Conditions of Certification

15.1 Special Conditions for Safe Use

- When intended to be operating with process temperatures above 85°C, the sensor head shall be sufficiently cooled to keep it below 80°C. See installation manual for details.
- The LVCSi may be operated with process temperatures down to -55°C, when used at temperatures below -40°C, the sensor head shall be kept at a temperature of at least -40°C. See installation manual for details.
- Refer to manual for cable entry thread size and type.

15.2 Conditions for Use

- The LVCS FP and F/S FP range of sensors are subject to a routine tests on production in accordance with clause 16 of EN/IEC 60079-1 to a pressure of at least 57.2 Bar.
- The level guide assembly of the LVCSi shall be subject to a routine over pressure test in accordance with clause 16 of EN/IEC 60079-1 to a pressure of at least 17.2 Bar.
- The equipment covered under this certificate incorporates previously certified components, it is therefore the responsibility of the manufacturer to monitor the status of the certification of these components and inform ExVeritas of any changes that may affect the explosion safety design of their products.

16 Essential Health and Safety Requirements

Essential Health and Safety Requirements are addressed by the standards listed in section 9 and where required the report listed in section 14.1

The manufacturer shall inform the Notified Body of any modifications to the design of the product described by this schedule.

Certificate: ExVeritas 17ATEX0301X Issue 1

This certificate may only be reproduced in its entirety and without any change, schedule included.

For help or assistance relating to this certificate, contact info@exveritas.com.

ExVeritas, Units 16-18, Abenbury Way, Wrexham Industrial Estate, Wrexham, United Kingdom LL13 9UZ.

ExVeritas® is a registered trademark, unauthorised use will lead to prosecution.



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx EXV 17.0030X** Page 1 of 6 [Certificate history:](#)
Issue 0 (2017-12-19)

Status: **Current** Issue No: 1

Date of Issue: 2020-09-25

Applicant: **Deeter Electronics Limited**
Deeter House, Valley Road
Hughenden Valley
High Wycombe
Bucks
HP14 4LW
United Kingdom

Equipment: **Liquid Vertical Continuous Sensor, Flameproof (LVCS FP) and Float Switch, Flameproof (F/S FP)**

Optional accessory:

Type of Protection: **Equipment protection by flameproof enclosure "d", Equipment with EPL Ga and Equipment dust ignition protection by enclosure "t"**

Marking: Ex db IIC T* Ga/Gb or Ex db IIC T* Gb -50°C ≤ Tamb ≤ +85°C
Ex tb IIIC *°C Db -40°C ≤ Tamb ≤ +85°C

Approved for issue on behalf of the IECEx
Certification Body:

S Clarke CEng MSc MIET

Position:

Certification Manager

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.



Certificate issued by:

ExVeritas Limited
Units 16-18 Abenbury Way
Wrexham Ind. Est.
Wrexham LL 139UZ
United Kingdom





IECEx Certificate of Conformity

Certificate No.: **IECEx EXV 17.0030X**

Page 2 of 6

Date of issue: 2020-09-25

Issue No: 1

Manufacturer: **Deeter Electronics Limited**
Deeter House, Valley Road
Hughenden Valley
High Wycombe, Bucks, HP14 4LW
United Kingdom

Additional
manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-1:2014-06 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

IEC 60079-26:2014-10 Explosive atmospheres – Part 26: Equipment with Equipment Protection Level (EPL) Ga
Edition:3.0

IEC 60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
Edition:2

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

[GB/EXV/ExTR17.0029/00](#)

[GB/EXV/ExTR20.0072/00](#)

Quality Assessment Report:

[GB/SIR/QAR12.0004/07](#)



IECEx Certificate of Conformity

Certificate No.: IECEx EXV 17.0030X

Page 3 of 6

Date of issue: 2020-09-25

Issue No: 1

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The LVCS FP (Liquid Vertical Continuous Sensor) and F/S FP (Float Switch) are liquid level sensors with either a continuous analogue or switching output. The equipment comprises of a flameproof, component certified instrument housing with stainless steel level guide which is threaded into the housing. The level guide consists of either an 8mm or 12mm stainless steel tube which contains the sensing electronics. The instrument housing is used for termination and mounting of optional PCB's, depending on the communication and I/O's required. The level guides can be various lengths and are mounted with up to seven stainless steel floats, each containing a magnetic ring. The equipment can be supplied with an optional threaded adaptor or equivalent gas tight seal for mounting across a boundary of two hazardous area zones.

When connected to process temperatures above 85°C, the instrument housing must be sufficiently cooled to keep it below 80°C, as detailed in the manufacturer's instructions.

The following temperature classes are applicable based on the process temperature which the equipment is connected to:

Model	Level guide length (mm)	Sensing device	Input/Output Options	Process Temperature and associated temperature class	Cable Entry sizes
LVCS	100 to 6000	Reed switch or Hall effect	Optional PCB's for various input/outputs	≤85°C (T5) (T100°C) ≤125°C (T4) (T135°C) ≤180°C (T3) (T200°C)	M20 x 1.5 or ½" NPT
F/S	60 to 6000	Reed switch or Hall effect	Between 1 to 7 I/O float switches, direct output	≤85°C (T5) (T100°C) ≤125°C (T4) (T135°C) ≤190°C (T3) (T200°C)	M20 x 1.5 or ½" NPT

SPECIFIC CONDITIONS OF USE: YES as shown below:

- When intended to be operating with process temperatures above 85°C, the sensor head shall be sufficiently cooled to keep it below 80°C. See installation manual for details.
- The LVCSi may be operated with process temperatures down to -55°C, when used at temperatures below -40°C, the sensor head shall be kept at a temperature of at least -40°C. See installation manual for details.
- Refer to manual for cable entry thread size and type.



IECEx Certificate of Conformity

Certificate No.: **IECEx EXV 17.0030X**

Page 4 of 6

Date of issue: 2020-09-25

Issue No: 1

Equipment (continued):

The following ratings are applicable:

- 0 to 2v output. 5 to 25vdc input @ 25mA
- 0 to 4 v output. 7 to 25Vdc input @ 25mA
- 0 to 10v output. 14 to 28vdc input @ 35mA
- 8 to 28vdc input @30mA Multi interface 4-20mA, voltage output
- 0-50VDC 0-240V AC 1Amp (F/S FP reed switch only)

Routine Tests:

- The LVCS FP and F/S FP range of sensors are subject to a routine tests on production in accordance with clause 16 of EN/IEC 60079-1 to a pressure of at least 57.2 Bar.
- The equipment covered under this certificate incorporates previously certified components, it is therefore the responsibility of the manufacturer to monitor the status of the certification of these components and inform ExVeritas of any changes that may affect the explosion safety design of their products.
- The level guide assembly of the LVCSi shall be subject to a routine over pressure test in accordance with clause 16 of EN/IEC 60079-1 to a pressure of at least 16.3 Bar.



IECEx Certificate of Conformity

Certificate No.: IECEx EXV 17.0030X

Page 5 of 6

Date of issue: 2020-09-25

Issue No: 1

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

The following changes are introduced:

- Update to IEC 60079-0 Edition 7.0
- Inclusion of the LVCSi range Vertical Liquid Level Sensor with integrated display and optional temperature sensor.

Model	Level guide length (mm)	Sensing device	Input/Output Options	Process Temperature and associated temperature class	Cable Entry sizes
LVCSi	100 to 6000	Reed switch or Hall effect, Optional temperature sensor	Optional PCB's for various input/outputs	$\leq 85^{\circ}\text{C}$ (T5) (T100°C) $\leq 125^{\circ}\text{C}$ (T4) (T135°C) $\leq 180^{\circ}\text{C}$ (T3) (T200°C)	2 off M20 x 1.5 or 2 off 1/2" NPT

Rating - 10-30Vdc @ 100mA

The marking of the LVCSi range shall include the following:

Ex db IIC T* Ga/Gb (or Gb) $-40^{\circ}\text{C} \leq \text{Tamb} \leq +85^{\circ}\text{C}$

Ex tb IIIC T* Db $-40^{\circ}\text{C} \leq \text{Tamb} \leq +85^{\circ}\text{C}$



IECEx Certificate of Conformity

Certificate No.: **IECEx EXV 17.0030X**

Page 6 of 6

Date of issue: 2020-09-25

Issue No: 1

**Additional information:
Technical Documents:**

Title:	Drawing No.:	Rev. Level:	Date:
LVCSi FP all versions Sheets 1 to 2)	D600850	Rev 1	11 th March 2020
LVCSi FP manual	-	-	17/09/2020