





Flameproof LVCS FP (Flameproof Continuous Level Sensor)

The Deeter LVCS FP is a magnetic float on a reed switch or Hall Effect sensor stem for control and indication of a liquid level while in a potentially explosive atmosphere.

 II 1/2G 2D
EX d IIC (*) Ga/Gb
Ex t IIIC (*) Db IP68
-20°C ≤ Ta ≤ +85°C

 II 2GD
EX d IIC (*) Gb
Ex t IIIC (*) Db IP68
-20°C ≤ Ta ≤ +85°C

* Temperature class options to suit environment and process temperatures
T5 / T100°C for process temperatures ≤ 85°C
T4 / T135°C for process temperatures ≤ 125°C
T3 / T200°C for process temperatures ≤ 180°C

Atex Certificate: Sira 11ATEX1365
IECEX Certificate: IECEX SIR 11.0159
Refer to certificate for clarification of directive code and equipment protection level.



Features include:

- Standard lengths or custom length sensor stems up to 4 Metres.
- Stainless steel 316L housing and wetted components.
- Atex and IECEX approved.
- Suitable for gas and dust environments.
- IP68 Ingress protection.
- Reed switch or Hall Effect sensing technology.
- Voltage and current loop analogue output.
- Factory programmable set point triggers available.
- M20 and ½"NPT cable connections.
- Custom mounting options available.
- Narrow sensor stem and mounting for tanks without internal access.
- Suitable for high liquid temperatures.

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Type	Specification	
Sensor technology	Magnetic float with reed switch or Hall Effect	Note 1
Reed switch sensing resolution Ø12mm stem Ø8mm stem	5mm 6mm	
Hall Effect sensing resolution	15mm	
Interface options: 4-20mA 0-2V 0-4V 0-10V 4-20mA Loop powered Multi interface	4 to 20mA for 10Ω to 1.2KΩ load 0 to 2.048V @ 5mA 0 to 4.096V @ 5mA 0 to 10.0V @ 5mA 4 to 20mA for 10Ω to 1.2KΩ load 4 to 20mA for 10Ω to 1.2KΩ load and 0 - 10V @ 5mA and 2 X open collector transistor	
Sensor tube and wetted materials	Stainless steel 316L	
Connection head material	Stainless steel 316L	
IP rating with suitable cable gland	IP68	
Approximate weight Ø12mm stem Ø8mm stem	1Kg+process connector + 0.5Kg/Metre 1Kg+process connector + 0.3Kg/Metre	
Float Diameter: Specific gravity Ø12mm stem Ø8mm stem	53mm : 0.65 30mm : 0.75	Other floats available
Maximum liquid temperature Reed switch Hall Effect	-20 to +85°C -10 to +45°C	Note 2
Maximum head temperature	-20 to +80°C	Note 3
Maximum operating pressure	150PSI / 10Bar standard 450PSI / 31Bar	Note 4
Thread connection-Sensor tube	½"-14 NPT	
Thread connection-Wiring port	½"-14 NPT or M20X1.5	
Connection head height	95mm	
Power supply: 4-20mA 0 to 2V 0 to 4V 0 to 10V 4-20mA Loop powered Multi interface	15 to 28Volts. Typical 24V@0.6Watts 5 to 28Volts. Typical 12V@0.25Watts 7 to 28Volts. Typical 12V@0.25Watts 14 to 28Volts. Typical 24V@0.5Watts 17 to 25Volts via current loop 8 to 25Volts. Typical 24V@0.6Watts	
Current loop output. R _{Load}	10Ω to 1.2KΩ	Note 5
Multi interface - open collector transistor	28Vdc Max. 50mA Max	

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Note 1: Due to the variability of components, the output may be non-monotonic. If this could cause a problem in your application, please call our technical sales department.

Note 2: LVCS FP for liquids with temperature between 85°C and 180°C are available, Call Deeter for assistance.

Note 3: When this equipment is intended to be used in a liquid with a process temperature above 85°C it is an essential requirement that the sensor head temperature is measured to determine if the ambient air cooling is sufficient to keep the head below 80°C. See installation manual for detail.

Note 4: The LVCS FP sensor float and tube can withstand the stated pressure when sealed inside a tank. The connection head and resin seal inside the sensor stem must not be pressurised. The standard zone0 fittings are rated at 10bar, these fittings are not part of the certified flameproof seal and should not be considered as part of an explosion proof containment. Please call our technical sales department regarding sensors for liquid pressures up to 31bar.

Note 5: Maximum load resistance is determined by the formula:

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

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

An approximate formula is:

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

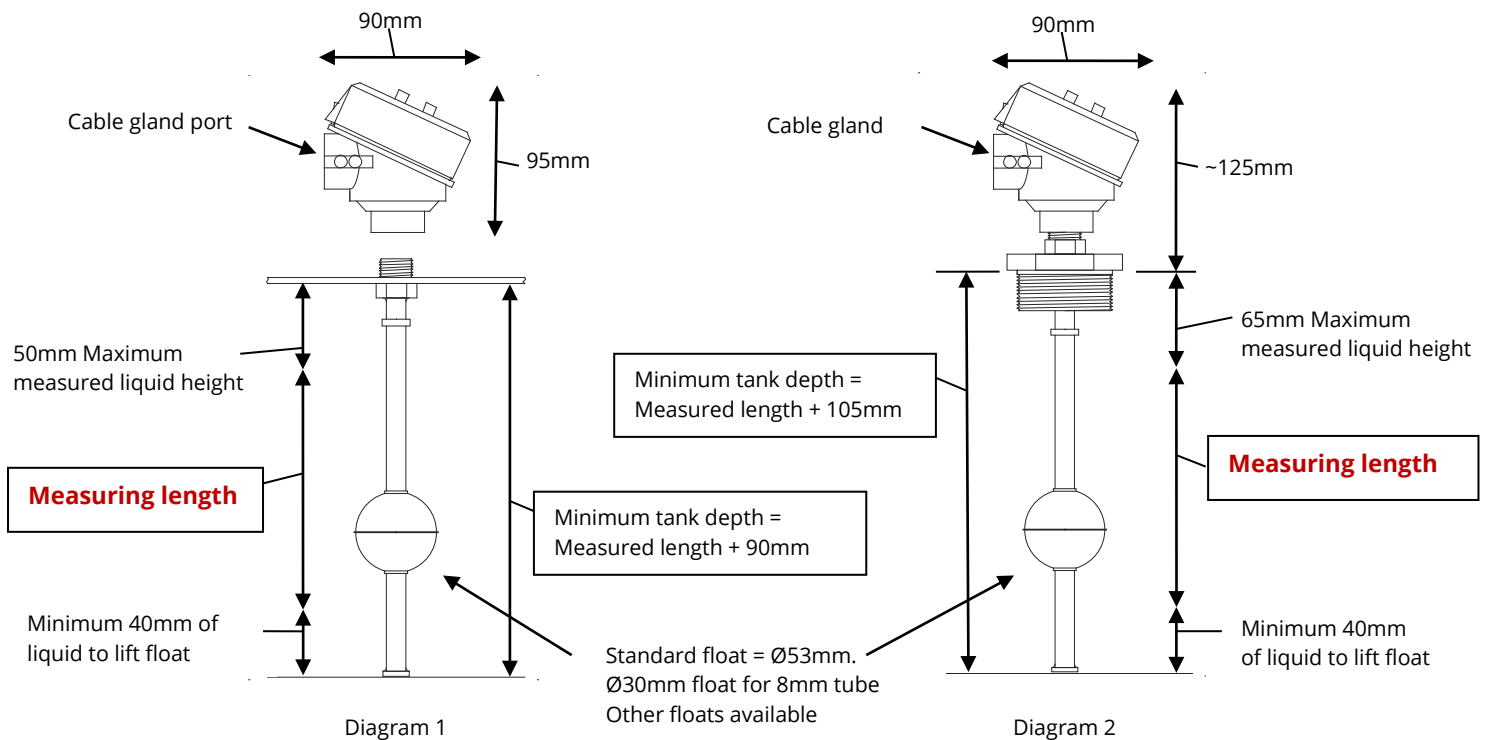
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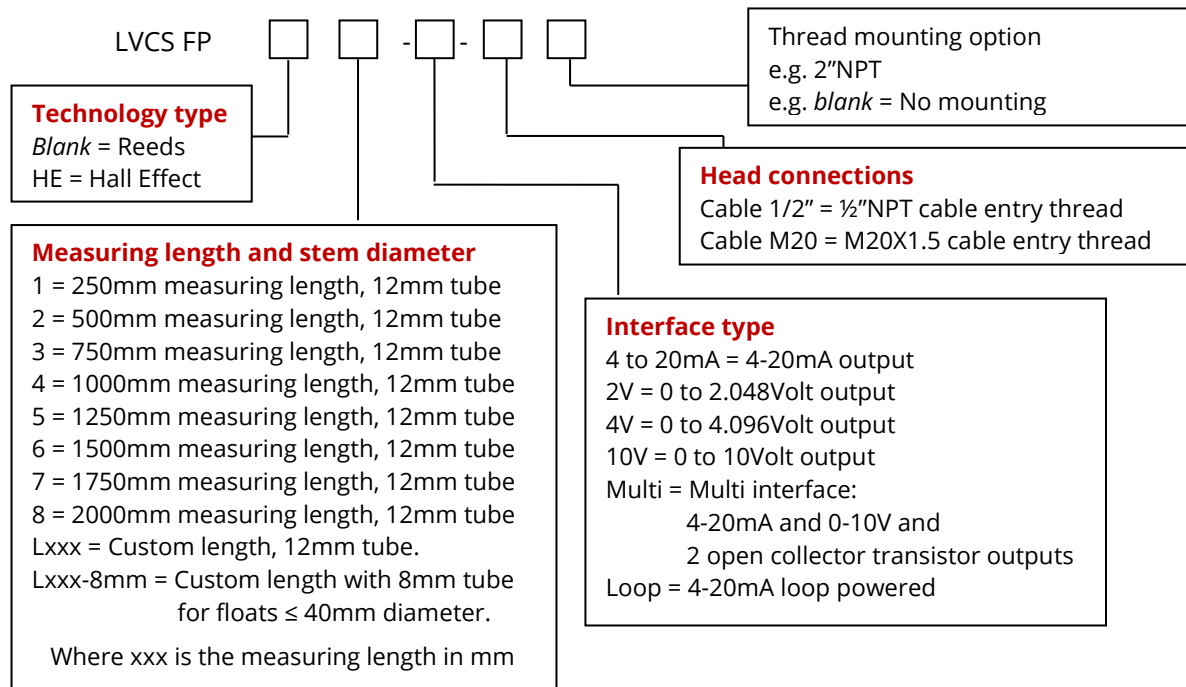


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Ordering information

Due to the various options available please call our sales office to discuss your requirements. Options include: Probe length, interface board, Threaded mounting/seal options, Reed/Hall Effect technology, float sizes, 8 or 12mm sensor tube, cable entry thread.



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.

Don't forget: Tank depth must be at least 90mm longer than the measuring length.

Example: LVCS FP HE-L635-loop-cable1/2"-2"BSP is a Flame proof liquid level sensor using Hall Effect technology. Measuring length =635mm, Overall sensor length =740mm using a 12mm tube. Interface is a loop powered 4-20mA board housed in a thermocouple head with1/2"NPT port for a cable gland, and a 2"BSP pipe fitting welded to the top of the stem for mounting the sensor into a tank of liquid.

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

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

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Identification

The LVCS FP sensors covered by this document can be identified by these labels attached to the sensor head.

Both the head label and the sensor tube end stop are marked with their date of manufacture in the form of 2 letters.

The S/N:xxxxxx is a unique serial No. given to each piece of equipment.

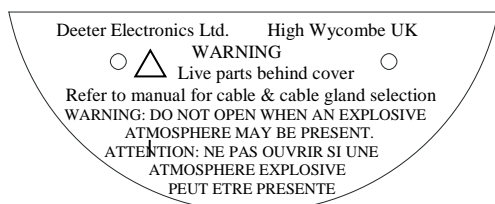
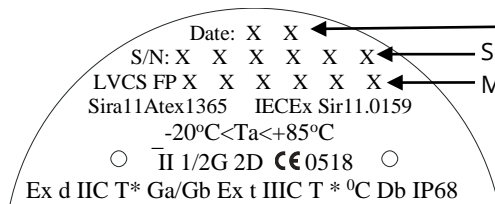
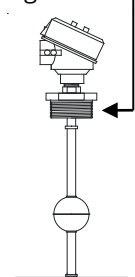
The LVCS FP:xxxxxx is a 6 digit model code.

The model code is also the Deeter reference number of a drawing which identifies the electrical connections and custom mechanical dimensions. A copy of this drawing should be attached to this manual.

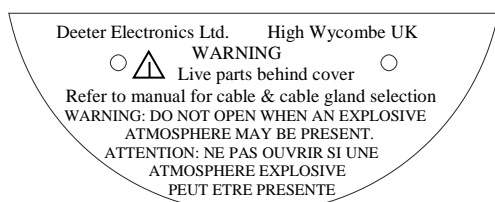
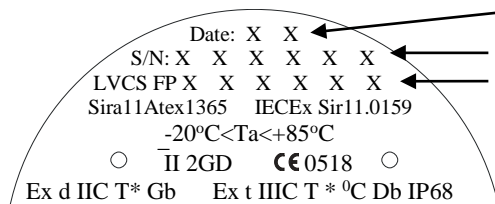
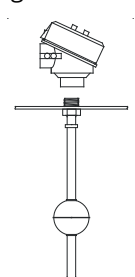
The temperature class shown here as a * will be either T5/100°C, T4/135°C or T3/200°C

Head labels

Sensors with a zone separation fitting



Sensors without a zone separation fitting



Date of manufacture	
Date: X X	
First letter	Second letter
A = January	M = 2012
B = February	N = 2013
C = March	O = 2014
D = April	P = 2015
E = May	Q = 2016
F = June	R = 2017
G = July	S = 2018
H = August	T = 2019
I = September	U = 2020
J = October	V = 2021
K = November	W = 2022
L = December	X = 2023
	Y = 2024
	Z = 2025

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Instruction for mounting and wiring a LVCS FP

1) This document details the installation of all versions of standard Deeter LVCS FP and their optional mounting / zone seal. Separate documents are available for single/multi point float switches.



2) Do not open the lid or disconnect any part of the sensor when an explosive atmosphere may be present.

This device must be installed in accordance with IEC/EN60079-14

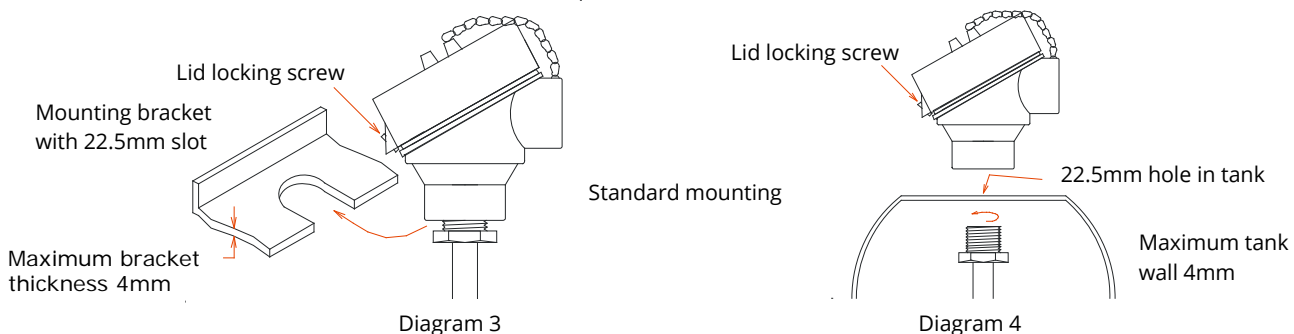
3) LVCS FP without a custom mounting option can be installed by suspending the sensor over the liquid as shown in diagram 3 and 4.

Only LVCS FP with a custom mounting, as shown in diagram 5, can be installed across a Zone 0 and Zone 1 boundary. It is essential that equipment mounted across a Zone 0 and Zone 1 boundary are installed with a sufficiently tight joint in accordance with clause 4.6 of EN60079-26 to provide an IP67 seal between zones.

4) All versions of LVCS FP must be mounted vertically $\pm 5^\circ$ with the head positioned so it will not become immersed in liquid during normal operation. A LVCS FP with a liquid tight seal can be mounted from the bottom of a tank with the stem above the head if required. The magnetic float and sensor stem must be installed away from any magnetic field or ferrous materials which could influence its operation. Mounting and wiring must only be carried out in a safe environment.

5) All versions of LVCS FP must be mounted where the ambient temperature will allow the sensor head to cool to below 80°C. This is especially significant where the process temperature is above 85°C.

6) The standard LVCS FP sensor is supplied ready to mount through a 22.5mm hole in the top of a tank or onto a mounting bracket as shown in diagram 3. The thickness of the tank or bracket must not exceed 4mm thick.



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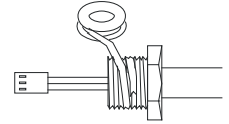


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7) Loosen the lid locking screw and unscrew the top of the head. Detach the wires going into the sensor stem by pulling the connector off the circuit board.

Unscrew the stem from the head.

Remove old PTFE tape and apply several layers of new PTFE tape to the stem thread.



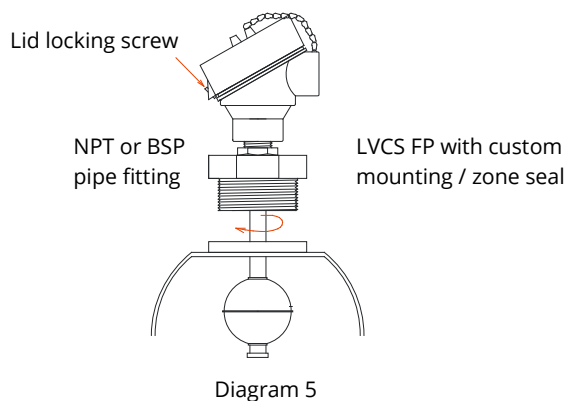
8) Mount the stem in the tank and screw the head back on top.

Clamp the head and use a 24mm spanner on the stem hexagon to tighten the joint. Do not use grips on the tube or end stop.

The head / stem joint must be tightened with a minimum of 5 revolutions of thread engagement. Ensure the stem is tight into the head and it has not gripped the mounting bracket or tank wall.

9) LVCS FP with a custom mounting do not require the separation of the head and stem, but during installation the head/stem joint should be checked that it is secure as described above.

10) All LVCS FP with custom mounting options are supplied with a drawing to identify the supplied fitting. The supplied mounting will enable the installer to screw or clamp the sensor into place. It is not possible to install a sensor by welding as the welding process will damage the sensors internal electronics. When tightening a threaded pipe fittings as shown in diagram 5, do not use the grips on the stem or use the head as a lever, always use a spanner on the pipe fitting.



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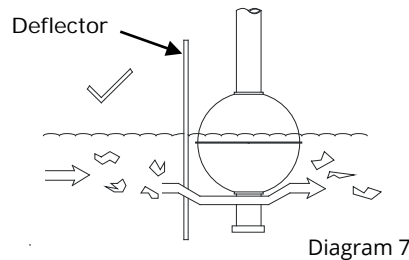
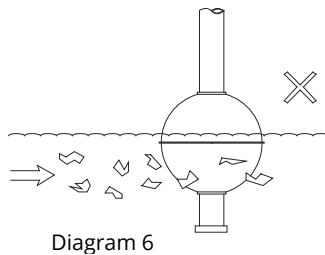


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11) When a sensor is installed in a position where it may be exposed to excessive vibration, stress or impact from liquid bound particles. Then the sensor must be protected by additional support or deflectors as shown in diagram 7.



12) When this equipment is intended to be used in a liquid with a process temperature above 85°C it is an essential requirement that the sensor head temperature is measured to determine if the ambient air cooling is sufficient to keep the head below 80°C.

With the sensor stem immersed to its maximum level in the process liquid at maximum temperature, a measurement of the temperature at the base of the head must be taken. Consideration of the ambient temperature during the measurement should be made and an evaluation of the maximum temperature the sensor head may reach should be recorded.

Where the head temperature is expected to rise above 80°C then additional air cooling is required to keep the head below 80°C.

When the sensor is intended for use in a dust environment the above test should be carried out with a layer of dust covering the sensor head.



13) With the LVCS FP mounted in the tank the cables can be connected.

The sensor head is not normally supplied with a cable gland so the installer is free to select a suitable explosion proof gland or conduit to mate with the M20X1.5 or ½"-14NPT port in the stainless steel head.

When selecting components to attach to the LVCS FP the following conditions should be considered.



If ambient temperature around the sensor head is greater than 65°C the connecting cable and its gland or stopping box must be able to withstand the increased temperature range. These components must have a minimum temperature specification of 5°C above the maximum possible ambient temperature and have a minimum ingress protection rating of IP68.

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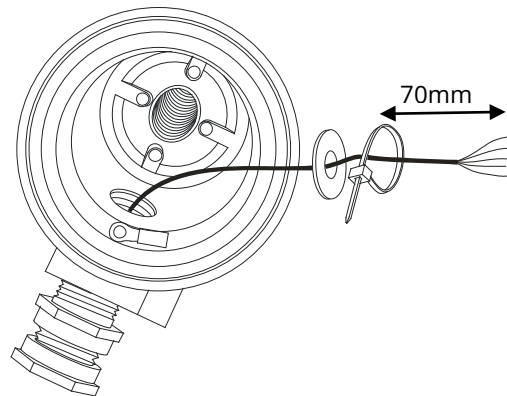
When using conduit a stopping box must be fitted no more than 50mm from the sensor head. The stopping box and conduit must be installed in accordance with clause 13.2.2 IEC/EN60079-1.

14) A cable strain relief can be made by passing the cable through the nylon washer and fixing a cable tie tight to the cable, leaving a minimum of 70mm after the cable tie.



15) The connecting wires to the 4-20mA or voltage output boards must be between 16 to 22AWG (Metric capacity 1.5mm²) and with 6mm stripped ends. The earth wire should be connected to the screw point in the head using the crimp terminal provided.

EXd flameproof cable gland for enclosures with internal volume ≥ 0.5 litres and suitable for gas, zone, temperature and cable type being used. IP6x glands must be used in dust environments



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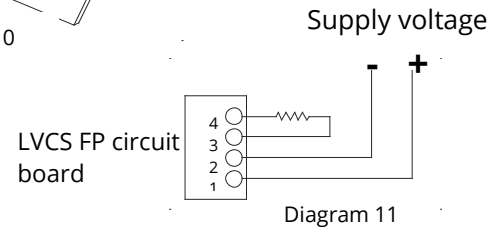
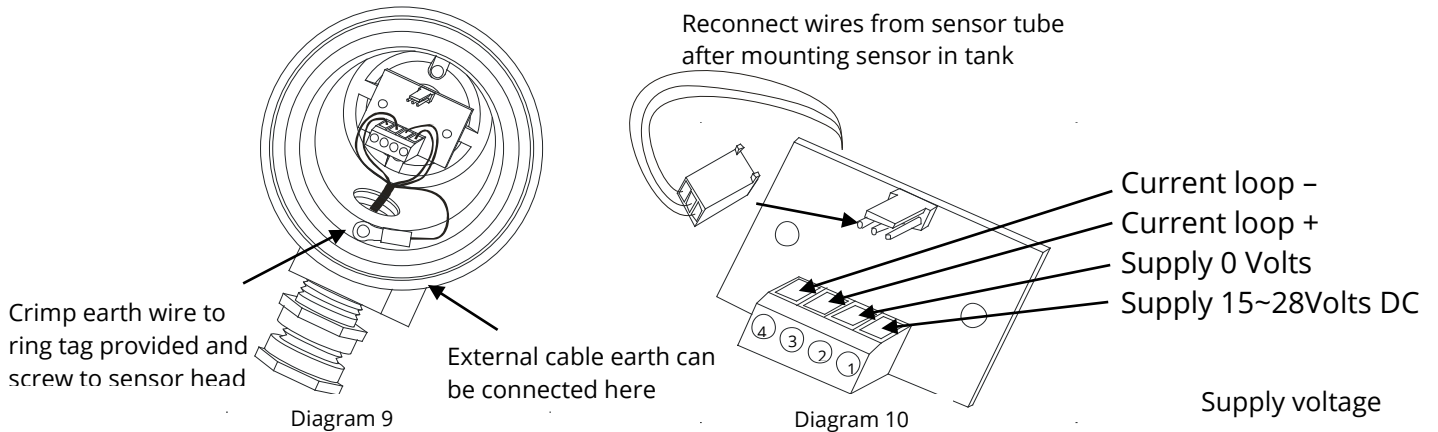


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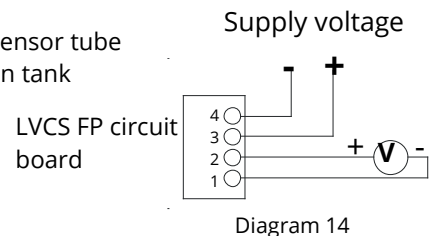
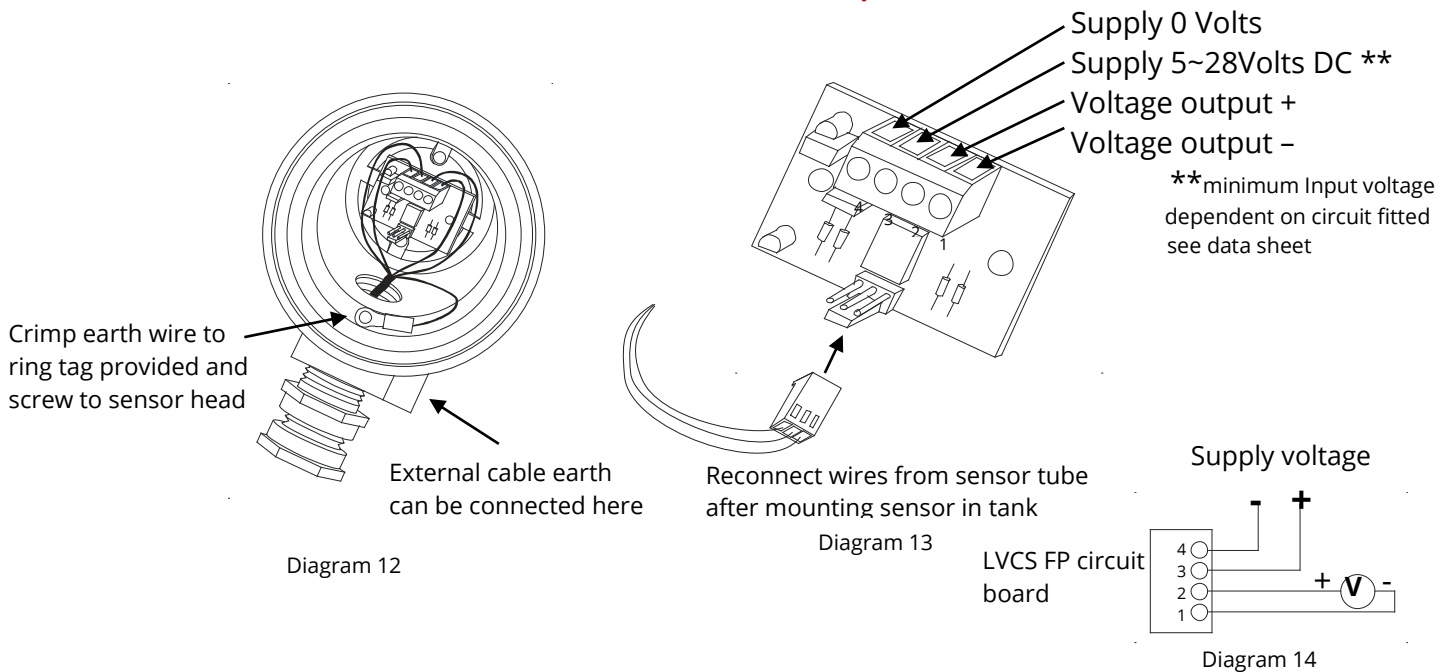
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16) The electrical wiring required depends on the electrical output of your LVCS FP sensor.

16a) LVCS FP with powered 4-20mA output



16b) LVCS FP with 0 to 2Volt, 0 to 4Volt or 0 to 10Volt output



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16c) LVCS FP with Multi Interface

The Multi Interface board is capable of simultaneously outputting a voltage and current loop signals and also operating two open collector transistors at pre programmed set points. Outputs that are not required may be left unconnected.

set points are programmed at manufacture.

Default set points are:

Digital output #1 is On with level below 10%, Off above 20%

Digital output #2 is On with level above 90%, Off below 80%

Other thresholds can be set on request.

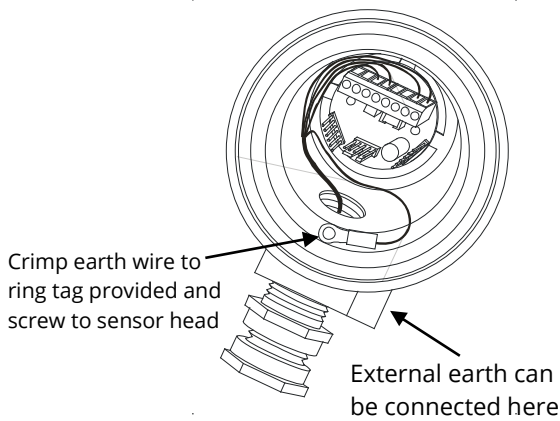
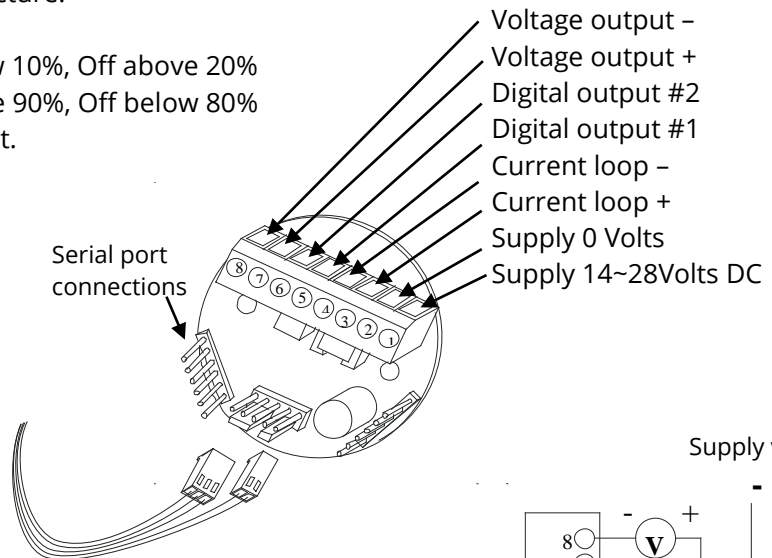


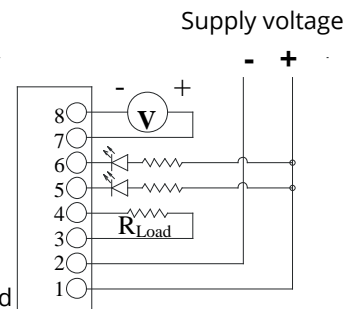
Diagram 15



Reconnect wires from sensor tube after mounting sensor in tank.
Hall Effect sensors have 5 wires,
reed sensors have 2 or 3 wires.

Diagram 16

LVCS FP
circuit board



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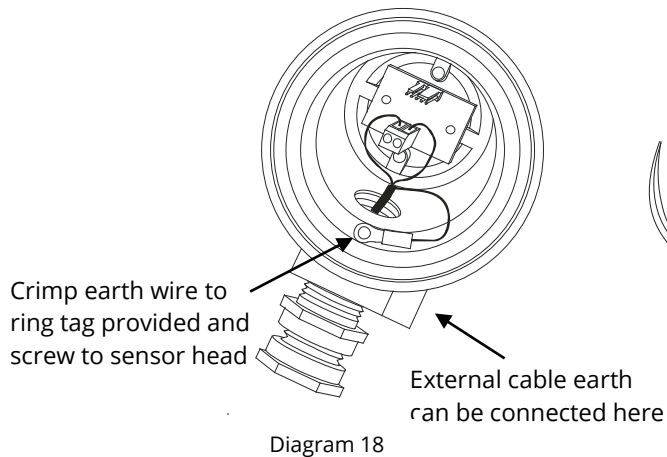
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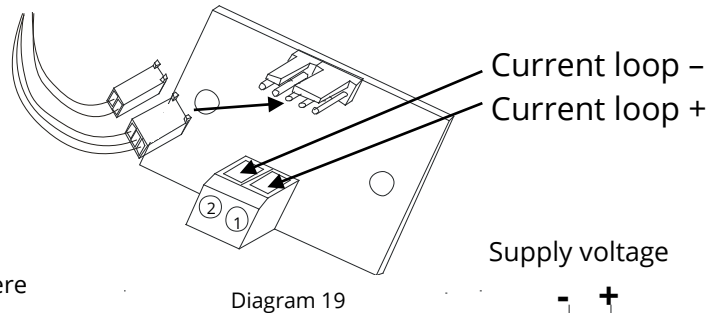
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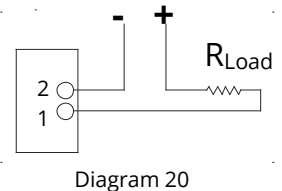
16d) LVCS FP with Loop powered 4-20mA output



Reconnect wires from sensor tube after mounting sensor in tank.
Hall Effect sensors have 5 wires,
reed sensors have 3 wires.



LVCS FP circuit board



17) The electrical supply to the sensor must be connected through a protection device to limit excess current should a fault occur. A fast blow 250mA fuse can be used to limit the maximum current drawn. The fuse must be placed in a position where it protects the cable and the sensor should a fault occur.

18) After connecting the earth, supply and output wires screw the lid down hand-tight, keep applying torque by hand until the lid cannot be turned any further. Tighten the lid-locking screw so the lid cannot be accidentally removed.

The electrical connections to a safe power supply and monitoring device depends on the output type of your LVCS FP sensor.

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Maintenance/Repair

Any repairs or replacements parts must be carried out by the manufacturers or their appointed repair agent.

Sensors with a long unsupported stem or in contact with fast moving liquids should include a maintenance plan to inspect the welded joints for fracture and fatigue.

A sensor stem immersed in hot or aggressive chemicals should be checked for corrosion on a regular basis with special attention to the stem end stop weld.

Where additional air cooling was required in the installation process, the effectiveness of the cooling should be checked as described in section 12.

Only the LVCS FP multi interface board contains a fuse. This can be replaced with a 500mA 2.69X2.69X6.1mm anti-surge fuse.

The three flameproof threads as show in diagram 21, and there interconnecting parts must be clean and free from dust or debris before assembly.

Damage to flameproof threads must not be repaired, contact Deeter Electronics for replacements.

The Oring under the head cover should be inspected for damage.

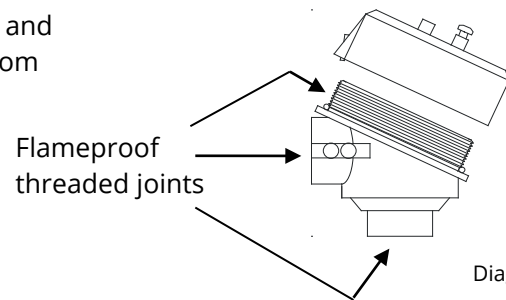


Diagram 21

Storage

Store in dry conditions without strong magnetic influence. Protect the float from impact.

Transport

Transport in rigid container with sensor head supported. Support sensor stem evenly and limit the float from moving along the stem. Protect float sides from impact by supporting sensor stem in the middle of the packing. Remove packing material from around the float to avoid secondary impact to the float. The float must not be used to support the stem.

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