



INSTALLATION, OPERATING
& MAINTENANCE MANUAL

VERTICAL FLOAT SWITCHES

TYPE: FS11, FS12, FS21 & FS22

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WARNING:

Failure to comply with the instructions described within this manual can lead to malfunction or damage to the switch and if the switch is incorrectly installed the ATEX certification may be void.

1. Safety Instructions

Read these instructions before installing the FS11 / FS12 / FS21 / FS22 Vertical float switches and placing them into operational service.

These instructions are intended for the personnel responsible for the installation and commissioning of the float switch.

Comply with the relevant safety regulations when using the equipment.

Do not install the float switch in the immediate vicinity of any strong electromagnetic fields (recommended min distance >1 meter).

Do not subject the float switch to heavy mechanical loads.

2. Functional Description

AMS magnetic float switches are ideal for high and low liquid level alarm, and pump control duties. These Liquids should not contain heavy soiling or coarse suspended matter and must not show a tendency to crystallize when drying out. If the liquids that the float switch is being used to measure do have conditions as listed above then routine maintenance should be carried out to ensure the float has free movement on the guide tube.

The Vertical float switch are designed to open or close a circuit ("switch") as a changing liquid level within a vessel passes the level of the float (the Switch Point).

When the process liquid level is below the Switch Point, the contacts are either open circuit (NO) or closed circuit (NC) depending on the switch configuration as determined by the customer, when the liquid level raises the float will become buoyant and as the liquid level increases passed the switch point the contacts will change over.

The floats have an in- built magnetic which operates the reed switch contact through the wall of the guide tube. Thus the switching operation is without direct contact to the liquid, free of wear and tear, and does not require any power supply.

Benefits of using AMS Magnetic Float Switch Technology

- i) Over 40 years of experience - a proven design (Ex Alan Cobham)
- ii) Simple, reliable, and cost effective level measurement technology
- iii) Tough, rugged design for long life in aggressive environments
- iv) Operates in almost any liquid at high pressures and temperatures
- v) Measurement is unaffected by changes in process temperature, dielectric, or the presence of vapours

3. Areas of Application

3.1 FS11 / FS12 Weatherproof Vertical Float Switches

The FS11 and FS12 Vertical series float switch are IP65 rated and designed to be installed in any areas either internally or externally to a building, apart from areas that are designated as an ATEX Hazardous area.

3.2 FS21 / FS22 Flameproof Vertical Float Switches

An approval has been issued for the FS21 / FS22 Vertical float switches for use as explosionprotected equipment within the scope of application defined by EU Guideline 94/9/EC ATEX in hazardous areas.

They comply with the specifications concerning equipment and protective systems intended for use in potentially explosive atmospheres.

THE TECHNICAL DATA IN THIS OPERATING INSTRUCTION MUST BE COMPLIED WITH.

FS21 / FS22 Vertical Float Switches carry the following ATEX Certification plate:

⊕ AM SENSORS LTD	FLAMEPROOF SWITCH	⊕
+44 (0) 1278 444650	www.amsensors.com	
Max.Liq.& amb.temp. 70°C T6	Ex II 2/1 G Exd IIC T Gb	
85°C T5	Ser.No:	
Yr of Manuf. 120°C T4	Max.rating:	
150°C T3	ATEX Certificate no:	
⊕	0359 ITS 14 ATEX 17989	⊕

4. Installation

4.1 Removal of transport packaging

Remove the float switch carefully from the transport packaging; never forcibly remove the float switch from the packaging.

Always handle the float switch by the switch body, gently supporting the float switch guide tube.

Do not lift the float switch up by the guide tube as this can cause the tube to bend and invalidate any warranty.

Make sure all packaging components have been removed and that the float moves freely on the guide tube.

4.2 Installation

Top Mounted Version

The top mounted Vertical float switches types FS11 / FS12 / FS21 / FS22 are designed to be solely installed in the vertical position, do not attempt to install this switch design in the horizontal position as the float will not operate the reed switch.

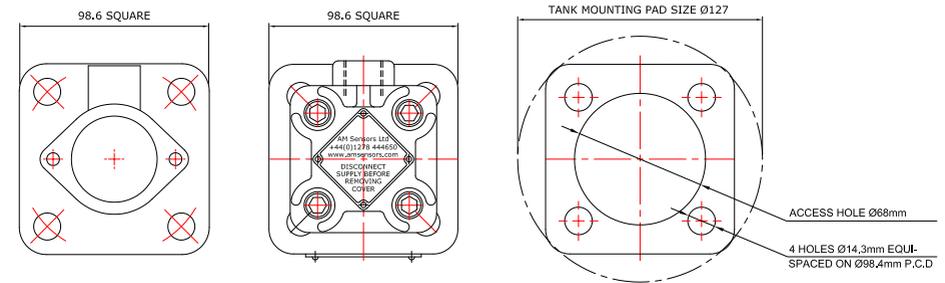
Side up / Side down Version

These switches have been designed to be installed in the horizontal position while leaving the float and guide tube in the vertical position. This version of the float switch is only available in the FS21 / FS11 non checkable versions.

Prior to installing the float switches confirm that the vessel has the correct mounting arrangement for the float switch. The standard mounting arrangement is indicated in Fig 1, with adaptor flanges and screwed process connections options available.

Installation

Fig 1.



For ease of any future maintenance and removal of the float switches with the standard mounting option, we recommend that that 4 off M14 studs are used installed on a PCD of Ø98.4mm.

Insert the float switch and gasket provided through the mounting hole into the vessel; handle the float switch by the float switch body supporting the guide tube as you insert the switch into the vessel.

When installing the side up / down version always ensure that the cable entry is facing downwards to prevent any water ingress through the cable gland.

Assemble the float switch to the vessel using suitable bolts and washers; tighten the float switch mounting nuts to the specific torque rating for the studs and bolts.

5. Electrical Connections

5.1 FS21 & FS22 Flameproof Versions

WARNING:

It is essential that the electrical supply to the switch does not exceed the electrical rating of the reed switch and that loads in excess of the maximum reed switch operation are not applied.

Ensure the switch is not operated outside its designated temperature range (see label).

Install an M20 ATEX Ex 'd' rated cable gland to the cable entry (Item 4) of the float switch; ensure that the manufactures instructions are strictly followed.

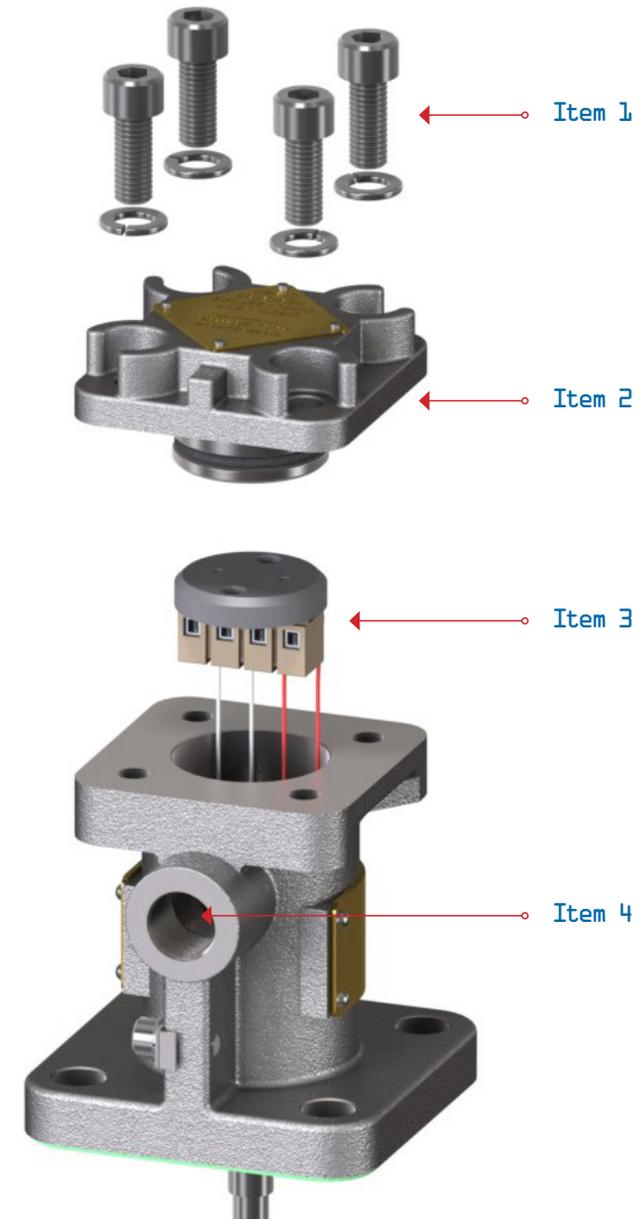
Undo the 4 off M10 socket headed screws and spring washers (Item 1), and while holding the float switch body, carefully lift the lid (Item 2) in an linear direction (gently rotating clockwise and anti-clockwise aids removal of the lid).

Remove the terminals and terminal base (Item 3) in an upwards direction, being careful not to put any strain on the switch wiring.

Once the switches have been terminated to the system, gently insert the terminals and terminal base (Item 3) back into the float switch body; replace the lid (Item 2) onto the body making sure that the O-ring is not trapped.

Replace and tighten the 4 off M10 socket headed screws (Item 1), to no greater than 10 Lbs. torque.

Electrical Connections



Electrical Connections

5.2 FS11 & FS12 Weatherproof Version

WARNING:

It is essential that the electrical supply to the switch does not exceed the electrical rating of the reed switch and that loads in excess of the maximum reed switch operation are not applied.

Install an M20 cable gland to the cable entry (Item 4) of the float switch; ensure that the manufactures instructions are followed.

Undo the 2 off M6 socket headed screws (Item 1), lift the lid (Item 2) in an upwards direction to gain access to the terminals.

Care should be taken when removing the lid, not to lose the gasket (item 3).

Once the switches have been terminated to the system, replace the lid (Item 2) onto the body making sure that the gasket (item 3) is installed correctly to maintain the IP rating.

Replace and tighten the 2 off M6 socket headed screws to no greater than 10 Lbs. torque.

Electrical Connections



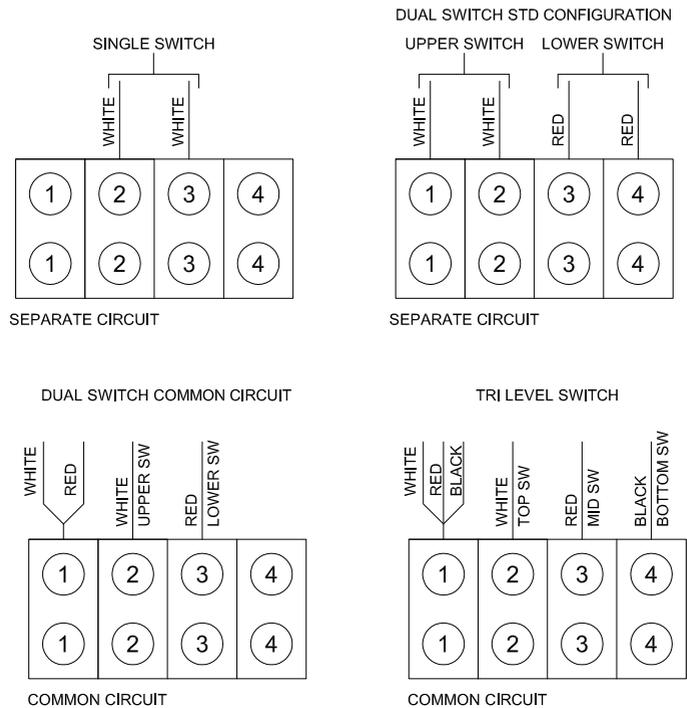
Electrical Connections

5.3 Switch Wiring Configuration

Single pole / single throw switches are terminated using two wires per switch, these wires have the following colours:

(Single) Upper level switch	White Wires
Middle level switch	Red Wires
Lower level switch	Black Wires

The switch wires are terminated to a four way terminal block in the following configuration:



Electrical Connections

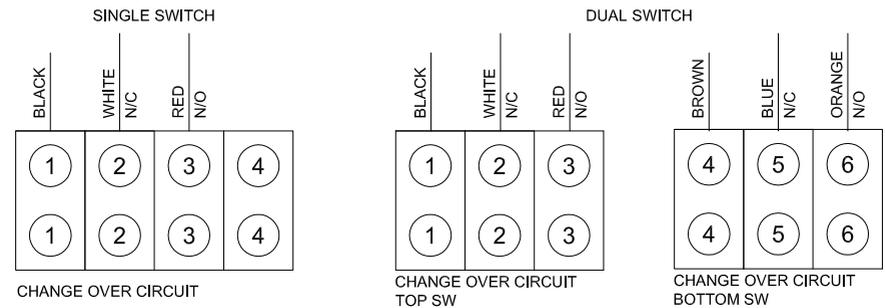
Single pole / double throw switches (options) are terminated using 3 wires; these wires have the following colours and configuration:

Single Switch

Normally closed (N/C) contact	White Wire
Normally open (N/O) contact	Red Wire
Common contact	Black Wire

Dual Switch

Normally closed (N/C) contact	Blue Wire
Normally open (N/O) contact	Orange Wire
Common contact	Brown Wire



Electrical Connections

5.4 Earthing Flameproof Versions

The Flameproof Float switch has 2 earthing points, the internal earth point is provided in the float switch lid, while the second earthing point is external to the float switch on the body.

Both earthing points have an earthing tag secured in place with a Stainless Steel M6 socket headed bolt and spring washer.

All switches should be earthed correctly to maintain the ATEX certification.

6. Commissioning / Functional Testing

Functional Testing – FS11, FS12, FS21 & FS22

Before the float switch is installed, it can be checked for functionality using a continuity checker or ohmmeter.

- i) Remove the terminal cover lid as described in section 5.1 / 5.2.
- ii) Connect the continuity checker to the wires for the switch (switch configuration as shown in section 5.3).
- iii) Raise the float between the float stops and confirm that the switch changes state.
- iv) Repeat steps I. To IV for the remaining switch points (if applicable).

Commissioning

The FS11 or FS21 - Non-Checkable type Vertical float switches can only be tested from the vessel internally or tested with the liquid level rising / falling in the vessel. It is therefore recommended that the FS11 or FS21 type Vertical float switch is functional tested before the switch is installed in the vessel.

The FS12 & FS22 - Checkable type Vertical float switch have an in-built checkable function and this type of switch can be tested after installation or as part of a routine maintenance plan.

- i) Remove the padlock from the test handle.
- ii) Operate the test handle in an upwards direction.
- iii) With the test handle pulled, confirm on the system that the switch is connected to responds in the correct manner.
- iv) Operate the test handle in a downwards
- v) Apply the padlock to the test handle.

Commissioning / Functional Testing

WARNING:

The padlock must be refitted after every functional test.

When the FS21 or FS22 is being used in an explosive atmosphere, any supplies to the switch MUST be isolated before removing the float switch lid.

Operation of the checkable design functions.

Design 1

If the liquid level within the vessel is lower than the switching set point, lifting the test handle will switch the contacts.

If the liquid level within the vessel is greater than the switching set point, lifting the test handle will not have any effect on the switch.

If a dual level switch has been installed and the liquid level is only at the lower switching point then lifting the test handle will enable you to test the upper float switching point.

The test handle operates the float in an upwards direction but cannot force the float in a downwards direction.



Commissioning / Functional Testing

Design 2

If the liquid level within the vessel is lower than the switching set point, lifting the test handle will not have any effect on the switch.

If the liquid level within the vessel is greater than the switching set point, lifting the test handle will switch the contacts.

If a dual level switch has been installed and the liquid level is only at the lower switching point then lifting the test handle will enable you to test the lower float switching point.

The test handle operates the float in a downwards direction but cannot lift the float.



Design 3

This design combines the functionality of Design 1 & 2.

If the liquid within the vessel is lower than the upper float switch point but higher than the lower float switch point, lifting the test handle will switch the contacts.



7. Maintenance

The Vertical Float switches are designed to give long periods of satisfactory trouble-free life, and under normal conditions, they require little maintenance. Only technically competent personnel should repair or maintain the product and only spares supplied from AM Sensors Ltd are to be used. Products may not be modified without written permission as this would invalidate approvals and warranty.

Where switches are used in liquids having a tendency to form deposits or in the case of some oils, there is a tendency for a 'varnishing' effect to be produced on the immersed section of the stem tube and float. If this occurs, it is advisable to remove the unit and remove any deposits likely to hinder the float operation.

AMS recommend that the FS11 / FS12 / FS21 / FS22 Vertical float switches are periodically functional tested every 6 months to confirm operation, if the process medium contains heavy soiling or coarse suspended matter it is recommended to reduce this testing interval, to confirm that the float still has free movement on the guide tube and is not obstructed from operating.

Note: *Float stops must not be slackened or removed from the stem under any circumstances. The float switch switching points are fixed and not adjustable.*

If the switch fails to operate, the unit should be returned to AM Sensors along with a completed declaration returns form (this form is available upon request).

8. Technical Specifications

RS7 Reed Switch

Switching Action	SPST (NO or NC contacts depending on configuration).
Switching Voltage	250 V AC/DC
Switching Current	5.0 A Max
Max. Power	250 Watt

RS13 Reed Switch

Switching Action	SPDT (Change over option)
Switching Voltage	400 V AC/DC
Switching Current	1.0 A Max
Max. Power	60 Watt

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