Installation, operating and maintenance Instructions for Seemag bypass level indicator

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Type G35

General information

The Seetru bypass magnetic level indicator, abbreviate SEEMAG, serves to show the filling level of fluids in tanks, basins, tubes etc. The Seemag operates on the basis of the communicating vessels with float and magnetic transmission. Depending upon the actual requirements the Seemag can be equipped with a high/low level switching device and able to monitor levels. Heating is also available for more viscous liquids.

Type Approval

For a SEEMAG that requires installation to a relevant marine Type Approval, refer to the specific Type Approval Certificate for installation conditions. Contact Seetru for a copy of these conditions.

Application

Use the Seemag only with fluids that guarantee reliable functioning of the float and to which the materials employed for the Seemag are adequately resistant.

In addition: No heavy soiling
No coarse particles
No crystallisation

Revert to the ordering data sheet for correct pressure/temperature ratings and specific gravity settings.

Installation

Installation must be undertaken by qualified technicians and to good engineering practice. In addition, user's attention is drawn to our joint responsibility to ensure that the Health and Safety at Work Act is not contravened by incorrect installation, commissioning, or servicing.

Attach the Seemag on the side of the tank to be monitored with the appropriate process connections (1) and seal it with a suitable seal (2). **Minimum clearance below drain tube must be 420mm to allow for the float removal.** Ensure guard tube (10) is free from loading, as misalignment can cause the follower (9) to stop moving and fail. Remove the bottom plug (3) and place the cylinder float (4) with 'TOP' uppermost in the drain tube (5) of the Seemag. Ensure the follower (9) is resting between the fixed pin in the guard tube and the locking pin (6). With the level indicator locking pin (6) still in position, replace the bottom drain plug (3). Remove locking pin (6) and slowly open any isolating valve between Seemag and tank.

Dimensions from bottom connection centre line to end of drain [ref. purposes only]

5th DIGIT	S.G	BOTTOM CAP	BOTTOM CAP & DRAIN
1	0.7 - 0.8	301mm	389mm
2	0.8 - 0.9	202mm	290mm
3	0.9 - 1.1	136mm	224mm
4	1.1 - 1.3	103mm	191mm

A support bracket(s) item (11) is supplied with gauges with centres over 2.5m. A slotted hole is provided in the bracket to allow for studding (not included) to be fitted. The guard tube needs to be rotated to allow for the bracket to be removed. See page 10 for suggested fixing arrangement. Studding is included on gauges fitted with heating.

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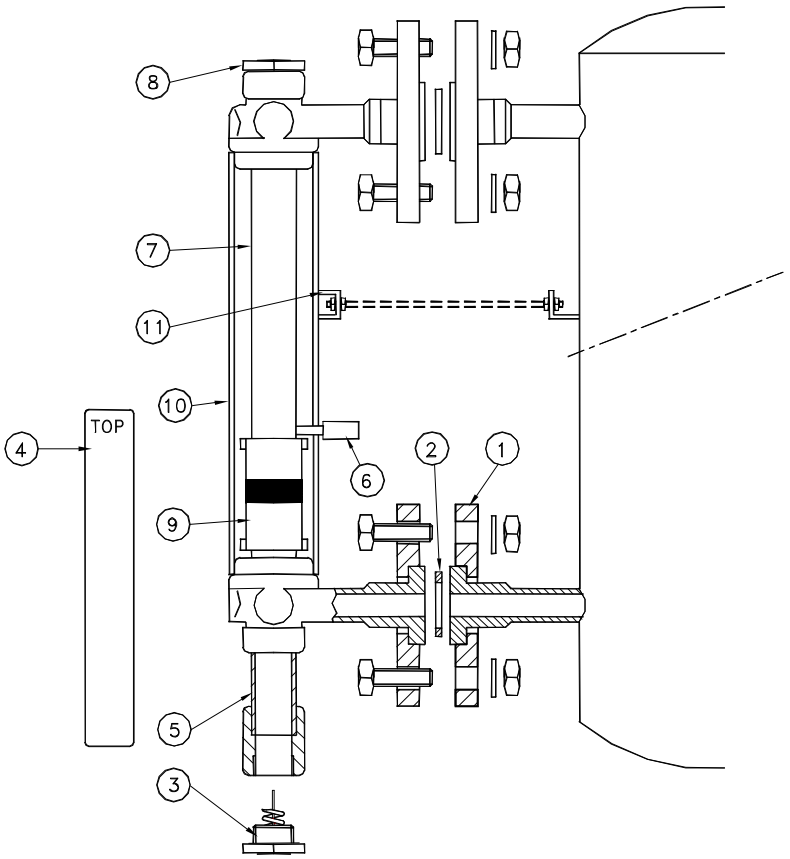
Maintenance

It may be necessary to drain the by-pass tube (7) if build up of sludge has occurred or it is known that the follower (9) has become unattached from the float (4), when in service. This will be evident as the green band at the bottom of the bypass tube not being visible, and needs to be reset. Isolate and depressurize the Seemag. Slowly drain the Seemag, if drain valve is fitted and then slowly remove bottom plug (3), as float will come away with the plug. If cleaning, remove top plug (8) to allow for roding through of bypass tube. If no drain valve is fitted, take extra caution removing the plug, as a small amount of liquid will be in the drain tube, which should be discharged at a location, which will not cause a hazard to personnel, particular attention being given to hazardous fluids or particles. Reset locking pin (6) once fully drained and cleaned and replace top plug. After cleaning, replace float as described in the installation instructions. Label at the top of Seemag, indicates maximum height of follower.

! Warning !

If guard tube (10) is removed for any reason, the float and follower need to be reset. Firstly, drain the Seemag and remove float as described above. Replace rear guard tube (10), ensuring locking pin (6) is in place and follower rests between fixed pin in the guard tube and locking pin. Replace front cover and screws and replace float as described in the installation instructions.



Note:
For marine applications an approved isolation valve must be installed between Seemag and tank.

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Digital Panel General Meter

The Rototherm Model 300 is a digital linearised panel meter that requires a d.c. current input usually driven by a pressure transmitter as described on page 7.

Transmitter input	: 4-20mA
Power supply	: 240Vac 50Hz
Internal supply	: 24V to power transmitter
Case size	: DIN 96 (W) x 48 (H) x 163 (D)
Environmental	: Operating temp 0-50 Deg.C

Alarm/Control Specification

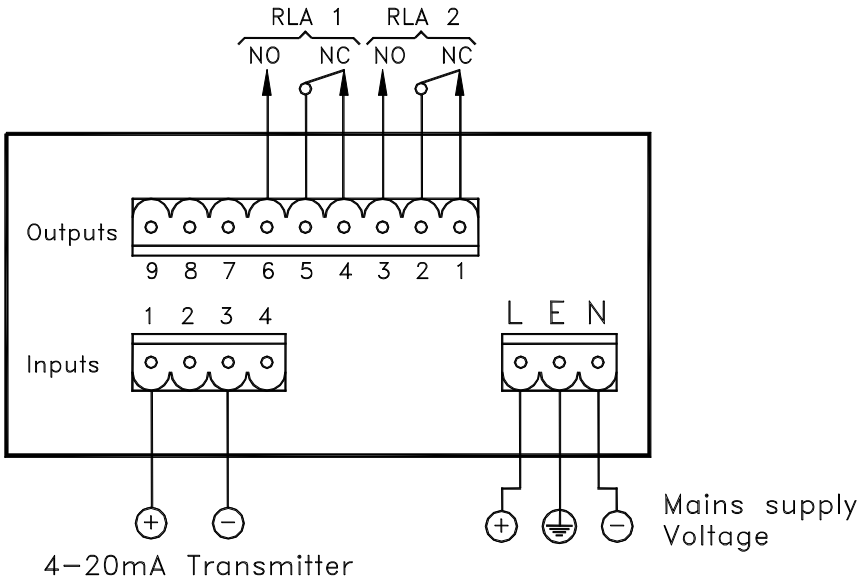
Single pole change over, de-energised on alarm.
Switched current 6A (max)
Switched voltage 30V dc/277V ac
Switched load 150 w/1660VA (max)

Unpacking And Inspection

The meter is fully calibrated and inspected prior to despatch and carefully packed for shipment. Check the instrument label to ensure that the power supply and input signal to be used are suitable for the meter.

Installation

The meter is suitable for flush panel mounting within a cut out that conforms to standard DIN dimensions. The unit is inserted from the front of the panel and held securely in place by two retaining screws carried in the retaining bracket.



Rear view of unit

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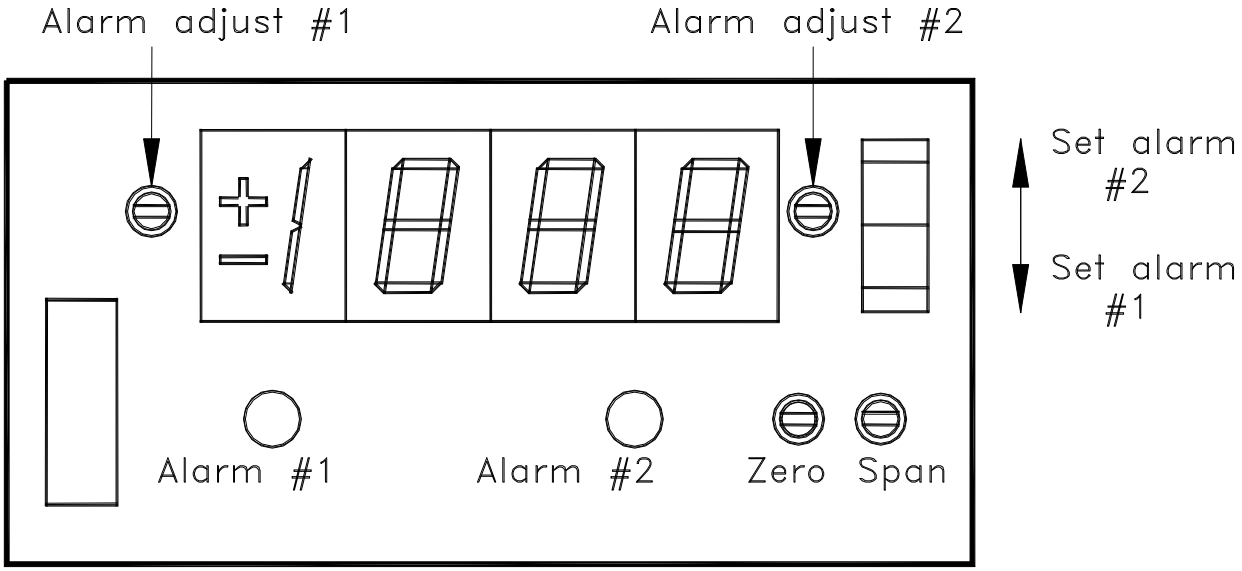
Calibration

If re-calibration is required, follow instructions below.

1. The zero and span trimmer potentiometers are accessible from the front of the unit once the bezel and display window have been removed.
2. Apply power to the meter and allow 15 minutes for the operating temperature to stabilise.
3. Apply an input signal corresponding to the full-scale reading and adjust the span potentiometer until the correct indication is obtained
4. Apply an input signal corresponding to zero and adjust the zero potentiometer.

Repeat steps 3 & 4 until both zero and full-scale readings are correct.

N.B The span potentiometer should be set before the zero.



Front view of unit with bezel removed.

Setting Alarm Set Point

The alarm set points may be adjusted from the front panel using a fine instrument screwdriver. Pressing the front panel rocker switch either up or down will display #2 or #1 set point respectively. When the switch is in the centre position the input variable is displayed.

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Steam Heating
8mm O/D copper tube is attached to the rear guard tube in a continuous loop from the bottom of the indicator and is designed to heat the liquid in the indicator. An enclosure is fitted around the indicator to protect the copper tube. Steam is fed through the pipe to transfer heat to the liquid in the by-pass tube so that the liquid being measured remains at a low viscosity.

Example

Ambient air temperature	= 20°C
Steam pressure 1.5 bar	= 68°C Liquid Temperature
Steam pressure 3 bar	= 85°C Liquid Temperature

Notes

1. Maximum working temperature should not exceed 180°C
2. It is recommended that the pipe work from the tank that is being measured; to the back of the indicator enclosure is fully insulated to ensure the liquid remains at a low viscosity before entering the indicator.
3. Due to heat transfer the liquid will always be at its hottest at its measured display point.

! Warning !
External enclosure will become very hot during steam operations.

Oil Heating
6mm O/D copper tube is attached to one side of the rear guard tube, from the bottom of the indicator and then exits the indicator at the top. It then runs down the outside of the indicator in one continuous loop.

An enclosure is fitted around the indicator to protect the copper tube. Heated oil is fed through the pipe to transfer heat to the liquid in the by-pass tube, so that the liquid being measured remains at a low viscosity.

The oil-heated system was designed to be used with a supply of oil heated at 180^0C. This will heat the fluid in the indicator to 50-70^0C, with a surrounding ambient air temperature of 20^0C.

Notes

4. Maximum working temperature should not exceed 180°C
5. It is recommended that the pipe work from the tank that is being measured; to the back of the indicator enclosure is fully insulated to ensure the liquid remains at a low viscosity before entering the indicator.
6. Due to heat transfer the liquid will always be at its hottest at its measured display point.

! Warning !
External enclosure will become very hot during heated oil operations.

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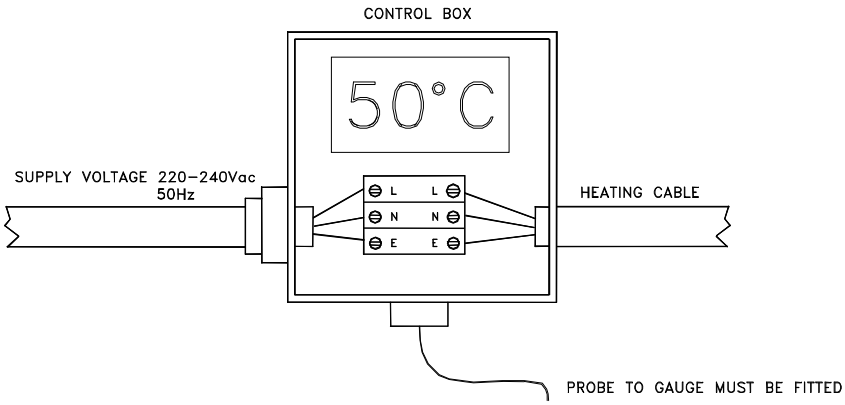
Electrical Trace Heating

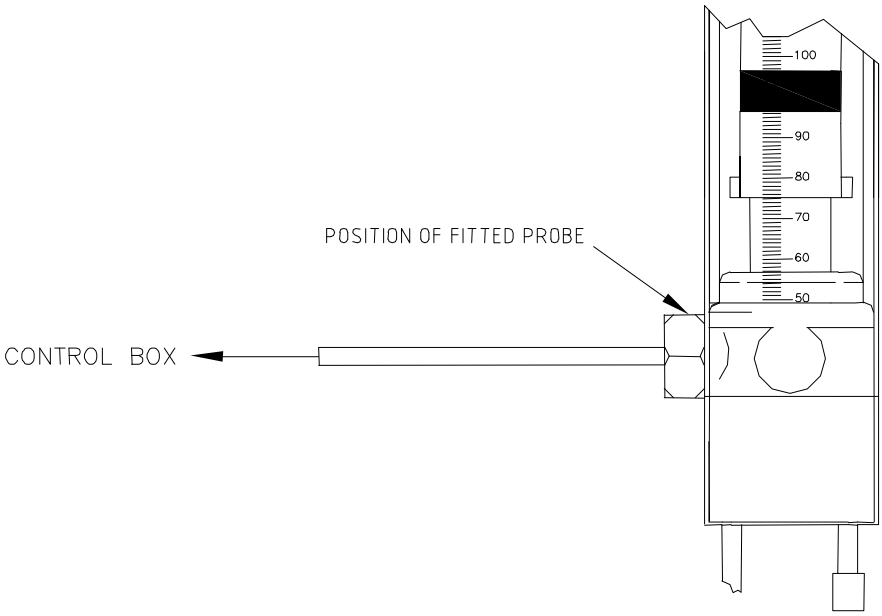
The electrical trace heating cable is self-regulating producing a maximum of 60 W/m. The cable is attached to the rear guard tube on a continuous loop from the bottom of the indicator and is designed to heat the liquid in the indicator and remain at a low viscosity. An enclosure, with fireproof insulation, is fitted around the indicator to protect the cable.

To ensure the correct fluid temperature is maintained in the indicator, the cable must be attached to a control box and the temperature probe fitted to the gauge. If required, the cable can be extended via a suitable junction box so the control box can be positioned further away from the indicator.



Note: There are two black-sheathed cables, and one earth sheathed cable on the heating cable, a black-sheathed cable can go into either an L or N connection.

The probe must be attached to the gauge via the threaded adaptor, before operation.



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! Warning !
External enclose will become very hot during electrical operation

Notes

1. Recommended maximum operating temperature is 70°C via the probe.
2. It is recommended that the pipe work from the tank that is being measured, to the back of indicator enclosure, is fully insulated to ensure the liquid remains at a low viscosity before entering the indicator.
3. Due to heat transfer the liquid will always be hottest at its measured display point. Which is usually slightly higher than the probe indication.
4. Full instructions on the control box set up, are included in the control box.

Standard Pressure Transmitter
This type of pressure transmitter should only be used on vented systems. The vessel being measure must not be pressurised.
The pressure transmitter works independently from the Seemag and can be used for continuous reading and switching points.

Differential Pressure Transmitter
This type of pressure transmitter should be used on pressured systems. Ensure the maximum pressure of the pressure transmitter is not exceeded. Connection 'Hi' must be connected to the low level of the indicator & 'Lo' must be connected to the top level.

NOTE:
The differential transmitters are WET/WET type.
Transmitter Data Sheets available on request.

Output signal:	4-20mA
Supply voltage:	12-28Vdc
Operating temperature range:	
Ambient:	–25 +85°C
Fluid:	–25 +100°C
Accuracy:	0.2% FS BSL

!CAUTION!
Due to packing constraints, some Seemag's may be delivered without the pressure transmitter fitted. Ensure connection holes are blocked or fitted with transmitter before allowing liquid into the Seemag.

Connections:
DIN 43650. Use electrical cable of external diameter between 6 and 8mm (Pg9) well squeezed by the gasket of the cable gland.
Wiring diagrams can be found on the manufactures transmitter or by contacting Seetru Limited.

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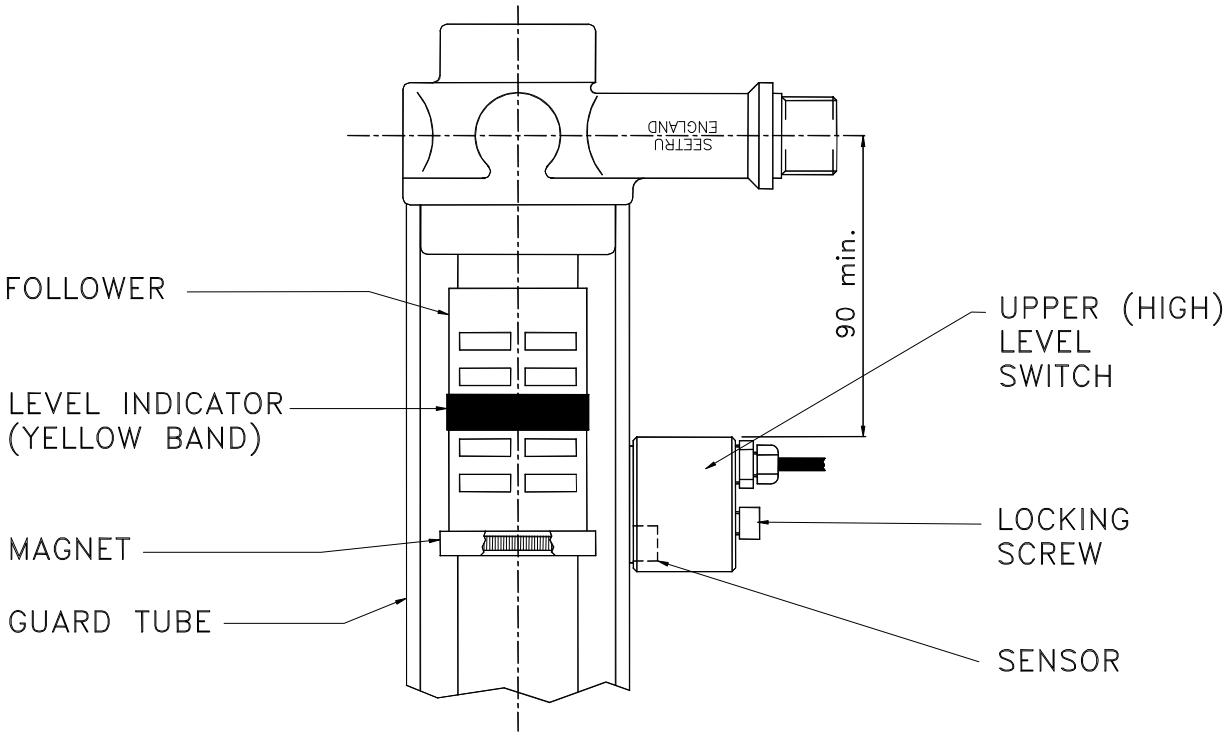
Level Switching

General

Level switches work as an integral part of the Seemag. Switches are activated when the magnet in the bottom of the follower passes by the sensor in the level switch. The level switch position can be adjusted via a locking screw with a 6mm A/F key.
Where switches are used on a Seemag that contains a viscous liquid, response time in level changes should be taken into account



As shown above, there is a minimum setting distance for an upper (high) level switch. The switch will not operate if this distance is not maintained. The level switches should be used in conjunction with a power supply and relay (not supplied). Suitable combinations are listed on our data sheets. These switches are not intended for use in a severe environment.

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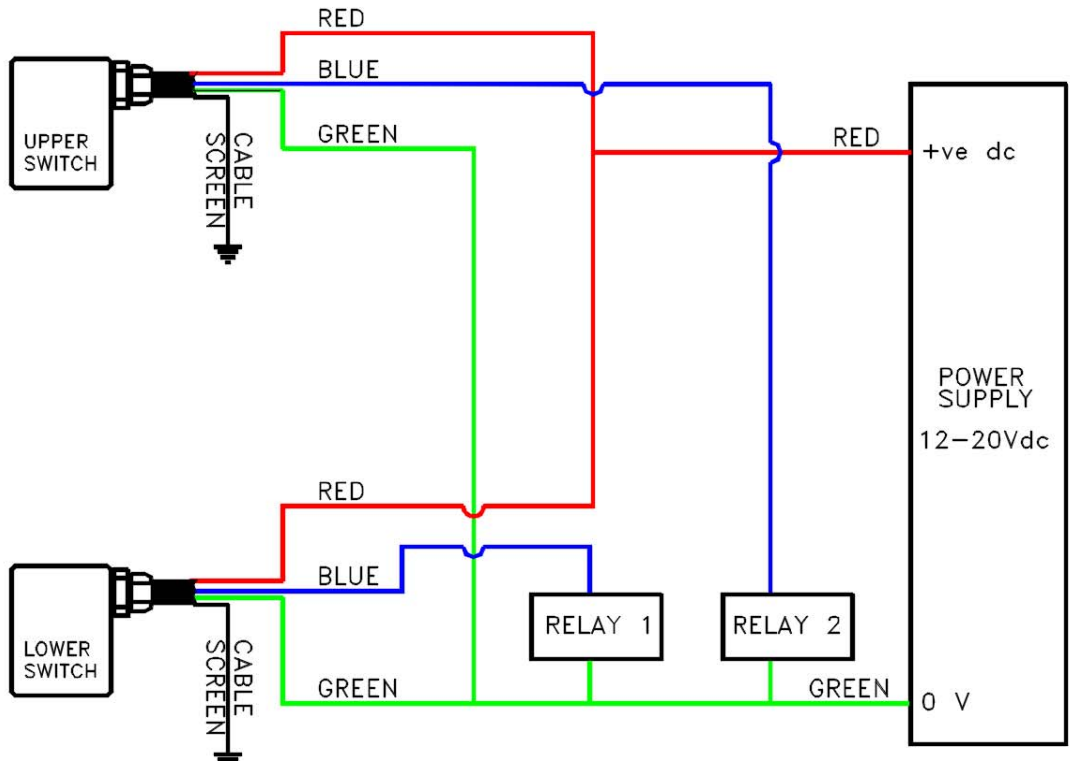
Termination
The following switch layouts show a typical scheme for the level switches and their recommended termination

Typical Two-Switch Layout

Operation
Once all the termination has been completed and mains power has been applied the switches need to be reset. To achieve this the magnet in the follower needs to pass each switch at least once. This can be carried out by filling and emptying the Seemag past the switches or by unlocking the switch and moving it past the magnet in the follower. Switches also need to be reset if the power has been lost.



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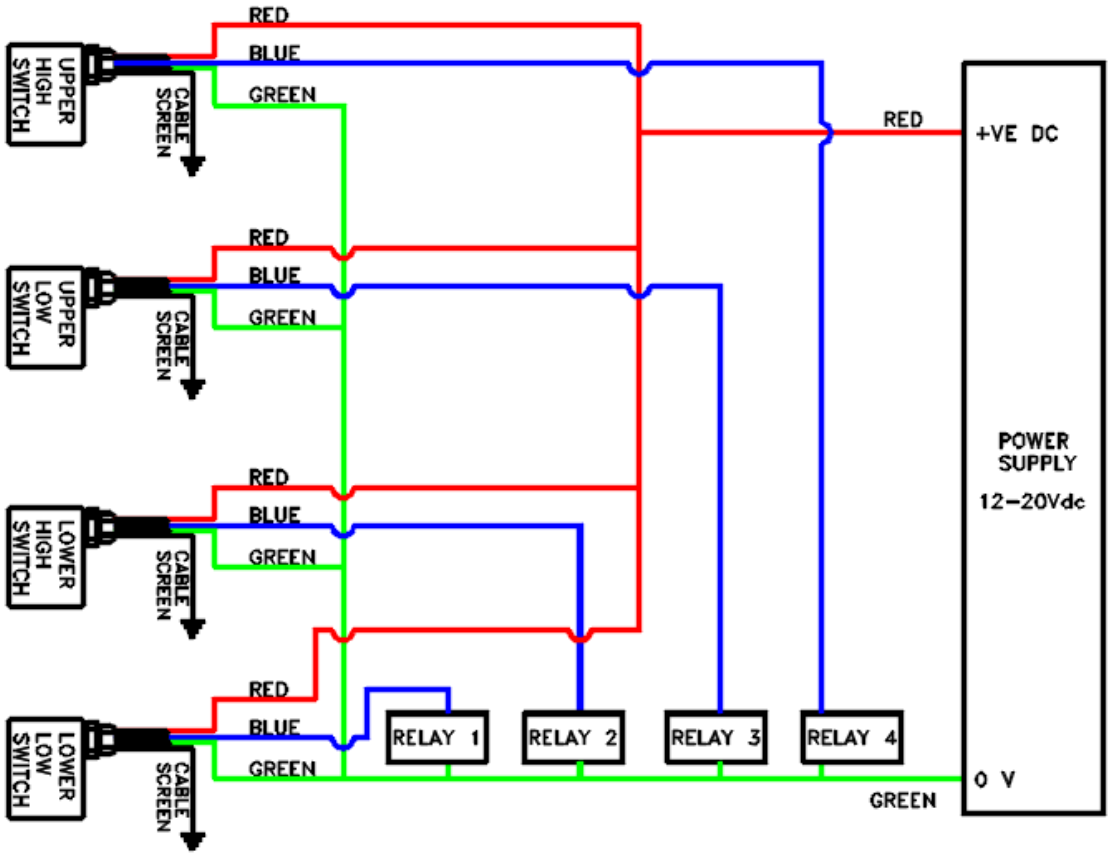
Typical Four-Switch Layout



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Electrical Specification for Switches

Power supply
Voltage range: 12 – 20VDC (note: supply voltages outside the range 10 – 20V should not be applied).
Current: 50mA plus load current.

Load current
To activate the switches, a minimum recommended load current of 10 uA is required. Maximum load current: 250mA.

Low input current loads
In the event of driving a low input current PLC a 470Ω, 2W resistor should be put across the blue and green cables.

Support Bracket Installation
For gauges over 2.5m centres, the guard tube is supplied with a multi purpose support bracket. This bracket runs up the back of the aluminium section. The purpose of this bracket is to ensure the guard tube does not flex or rotate and is kept square during service. The bracket should be secured to a fixed object, via studding (not supplied), to ensure stability, and at a suitable midway point up the gauge. It is important that the fixings keep the guard tube straight, central, and in-line with the by-pass tube. This will ensure that the follower does not foul on the guard tube.

To remove the bracket(s) rotate the guard tube and slide it off one end. Fit suitable studding (M8 suggested) in the slot provided.

Replace the bracket complete with studding, and rotate the guard tube back to its original position.

If the follower has become detached from the float, reset as in the front of these instructions (page 1)

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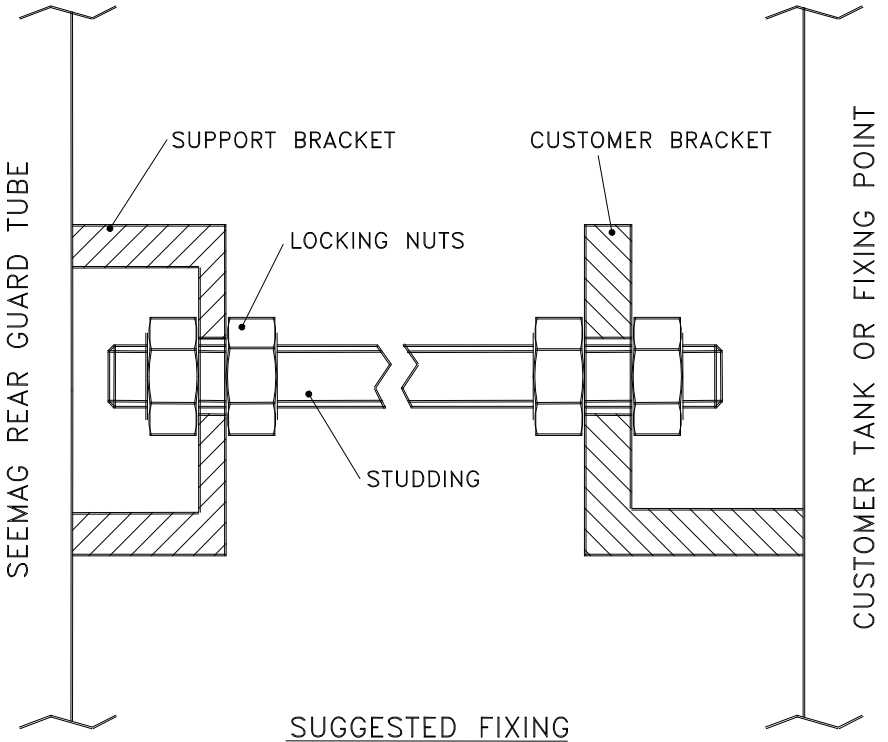

SUGGESTED FIXING ARRANGEMENT

PROBLEM	POSSIBLE CAUSE	HOW TO CORRECT
Follower not rising at lowest liquid level.	Locking pin preventing follower movement.	Remove locking pin.
	Isolation valves closed.	Open top and bottom isolation valves slowly.
	Incorrect liquid density for float supplied.	Check float density range is suitable for liquid being measured. GSA661200 – 1.11 - 1.30 S.G. GSA650200 – 0.91 – 1.10 S.G. GSA662200 – 0.81 – 0.90 S.G. GSA663200 – 0.70 – 0.80 S.G.
	Density of fluid reduced due to the effects of heating.	Check density of liquid, at elevated working temperature, are within the fitted floats S.G. band.

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	Float and follower not engaged.	Check float is in correct orientation ('TOP' is uppermost) when fitted and then reset.
Follower not rising in time with estimated liquid level.	Incorrect liquid density for float supplied.	Check float density range is suitable for liquid being measured.
Follower not rising or falling in time with estimated liquid level.	Float and follower not engaged.	Check float is in correct orientation ('TOP' is uppermost) when fitted and then reset.
	Viscosity of liquid too high for float movement.	Heating of the liquid maybe required to reduce viscosity.
	Viscosity of liquid too high for float movement.	Removal of PTFE 'O' ring on float maybe required to aid buoyancy.
Follower stops travelling after initial movement.	By-pass tube not central with outer guard tubes causing follower to foul.	Check by-pass tube is central, and any support brackets are correctly installed.
	By-pass tube not central with outer guard tubes causing follower to foul.	Check centres of indicator and tank connections are within permitted tolerances. It is essential that the by-pass tube is not bent in any direction when fitted.
Follower falls to bottom of indicator.	By-pass tube not central with outer guard tubes causing follower to foul.	Check by-pass tube is central, and any support brackets are correctly installed.
	By-pass tube not central with outer guard tubes causing follower to foul.	Check centres of indicator and tank connections are within permitted tolerances. It is essential that the by-pass tube is not bent in any direction when fitted.
Follower does not return to lowest point when indicator is empty.	Sludge build up in the drain tube.	Isolate indicator and carefully remove bottom plug for investigation.
	Float and follower not engaged.	Check float is in correct orientation ('TOP' is uppermost) when fitted and then reset.