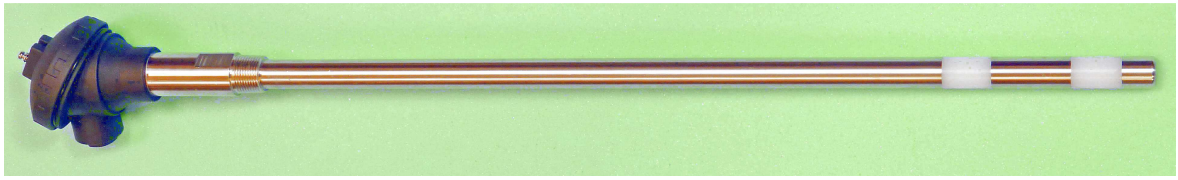
HYCONTROL
LEVEL MEASUREMENT SOLUTIONS

SMARTFOAM SENSORS

INSTALLATION AND OPERATION MANUAL



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1) SMARTFOAM SPECIFICATION

Power Supply: 24 V d.c. 100mA

Response Time: 1, 4, 10 seconds.

Sensitivity: 0 – 9 [0 = dense foam, 9 = light foam]

Nominal Impedance at each Sensitivity Setting (KΩ)									
0	1	2	3	4	5	6	7	8	9
0.5	1.75	3.3	5	7.5	10	14	20	27	35

Fouling Immunity: Sensitivity to fouling <1% of sensitivity to foam with Hycontrol Sensors.

Output: 'Volt-free' c/o contacts rated at 24 Volts d.c. at 500 mA max

Connections: Screw terminals.

Cable: 4 /5 core cable. (e.g. type 16-2-4C, 16x0.2mm)

Head: Polypropylene, IP66

Dimensions: 20mm Diameter, Length 60, 100 or 150cm

Process entry: ¾" BSPT (R3/4) on standard version

Materials: Body – 316 Stainless steel, Insulators – PVDF

Design Pressure: 1.5 bars

Design Temperature: 80° C

2) SMARTFOAM – HOW IT WORKS.

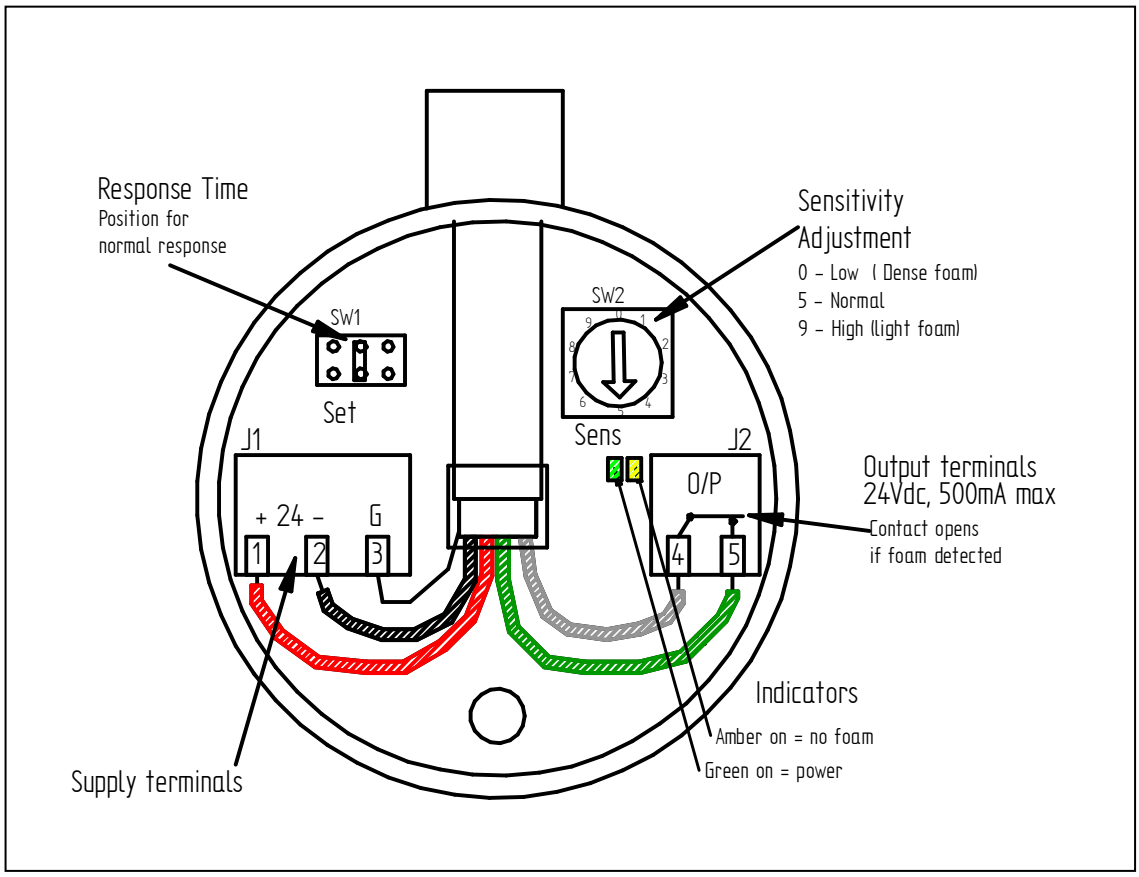
The SmartFoam is a new and unique product from Hycontrol designed to measure and control foam in a single unit which is easy and quick to install. The sensor contains its own transmitter located inside the head so it can connect directly to a process controller or a pump. The SmartFoam can be used to create an effective foam control system without the need for any additional transmitter. It is designed to be robust for industrial use.

The sensor is designed using the IMA Sensing™ technology which enables foam to be measured reliably even when it is covered with a build-up of sticky material which frequently happens during foam measurement. The sensor works by using a small current passing through the foam into the liquid surface, which is used to measure the foam density.

3) CONNECTIONS

The terminals and adjustments are shown in Figure 1 below.

Figure 1 – CONNECTIONS and ADJUSTMENTS



3.1) Indicators

There are two indicators in the head to show the status. These can be seen in the diagram above.

1. Green – Power on.

2. Amber – On when no foam is present. Off when foam is measured.

4) INSTALLATION

4.1) Installing the Sensor in a Tank

The sensor can be installed in a closed tank by connecting with the 3/4" BSP fitting. If the sensor needs to be sealed into the tank, the fitting should be sealed by using PTFE tape or a sealing compound. Alternatively the sensor can be fixed by a bracket over an open tank.

Fit the sensor in a position where the foam will come into contact with it. However it should not be too close to metal structures (e.g. baffles or tank wall) as a "bridge" of foam can stick between the sensor and the structure and cause false alarms. Ensure 50mm of clearance exists between the end of the sensor and any other metal parts.

The sensor should be connected with a 4-core screened cable. The cable carries the power (24V dc) as well as the sensor output and in some cases the earth/return signal. See figure 1 for connections.

The sensor requires a return path for the measurement to work correctly. If the foam is measured in a metal tank, the return can be an earth/ground connection. If a plastic tank is used then a separate electrode in the water may be required or a connection to metal pipework can be used.

The easiest return path is simply the screwed fitting in connection with the metal tank which provides a return path though the sensor. (See figure 2) Alternatively the return can be connected via the cable screen and the earth nnetwork. (See figure 3)

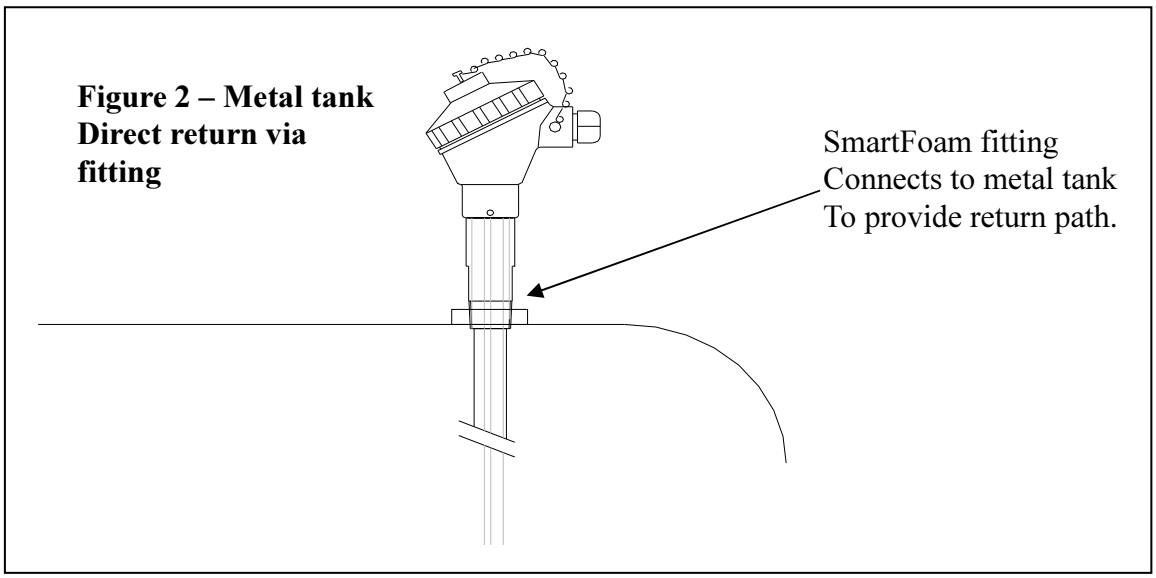


Figure 2 – Metal tank Direct return via fitting

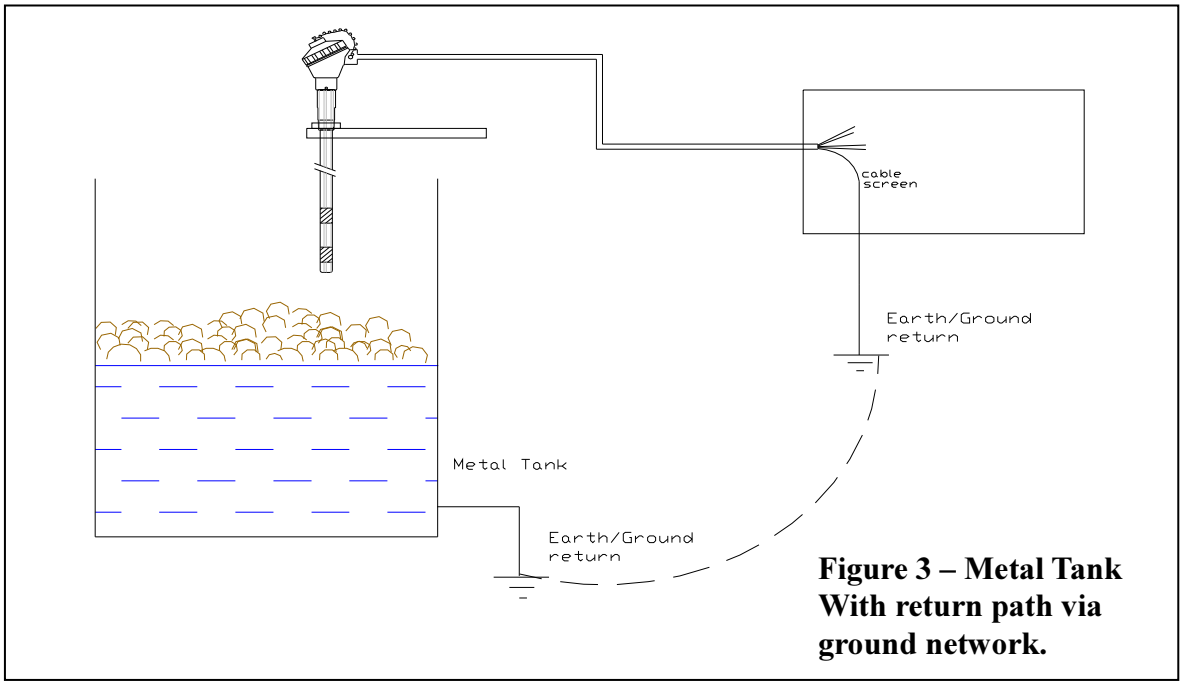


Figure 3 – Metal Tank With return path via ground network.

However, if a plastic tank is used, then an earth electrode is required in the liquid. An electrode may be a simple stainless steel rod or pipe which is partially immersed in the liquid. This should be connected using a wire to earth as shown in figure 4 with the sensor cable screen also connected to earth/ground. Alternatively the earth electrode can be connected directly to the sensor process fitting as shown in figure 5. If a metal pipe is in contact with the liquid this may be used in place of an electrode.

It is essential that a return path is connected for the measurement to work correctly.

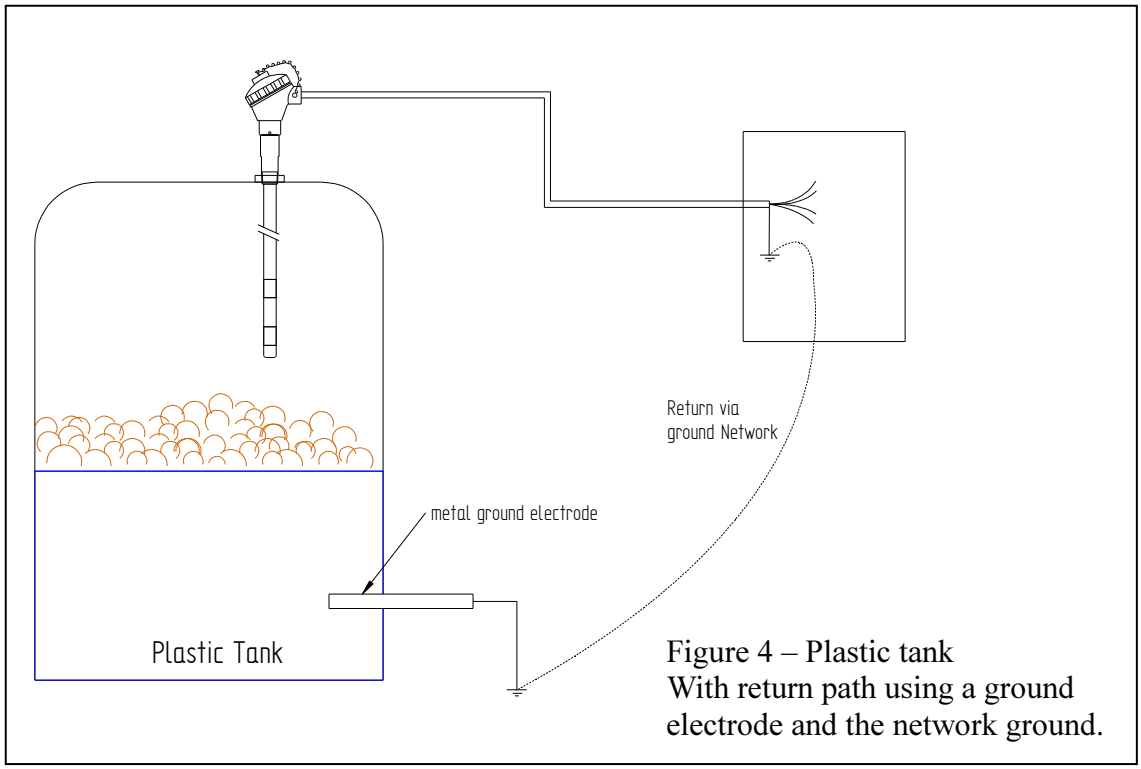


Figure 4 – Plastic tank
With return path using a ground electrode and the network ground.

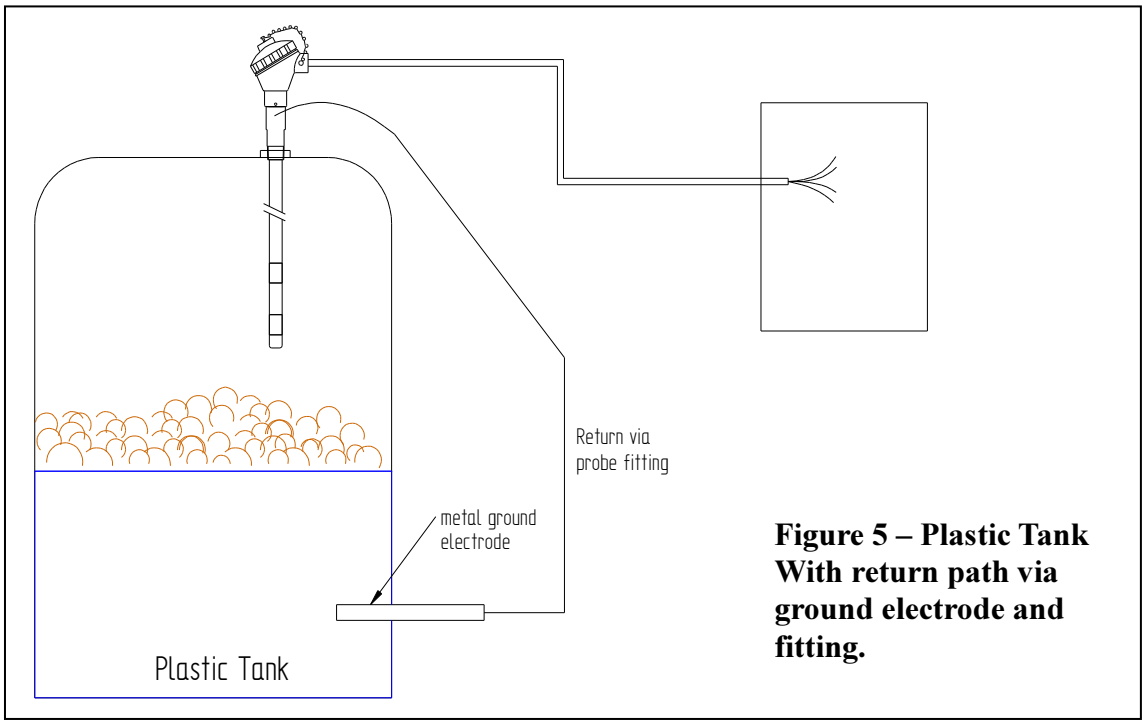


Figure 5 – Plastic Tank With return path via ground electrode and fitting.

4.2) Cabling and Connections

The easiest way to connect the sensor is to use a 4-core screened cable. The cable does not need to be screened for shielding purposes but the screen is a convenient way to connect the earth return if the set-up in figure 3 or 4 is used. If the sensor is fitted to a metal tank with the fitting connected to the tank as shown in figure 2 then the screen is not required.

The sensor output has volt-free contacts which open when foam is detected. This can be used to switch 24V dc to a PLC or a pump. Some PLC inputs can be wired directly to volt-free contacts and can detect the contact closure. The output contacts are provided by an isolated solid state switch. The maximum load is 500mA. If switching inductive loads then a suppressor or snubber should be fitted to protect the output contacts.

The power supply required is 24V dc. The maximum current required is less than 100mA so the cable rating is not critical. See figure 1 for connections.

5) COMMISSIONING

5.1) Setting-Up

There is very little to set up as in most cases the sensor can be fitted without any adjustment. However there are adjustments for sensitivity and response time, should they be needed. To test the sensitivity arrange for the foam to increase to reach the sensor. The sense electrode at the send of the sensor is the sensitive part. Once the foam makes a good contact with the sense electrode the probe should be able to detect the foam. If it's impractical to make foam for a test then a simple test is to touch the end of the sensor against the wall of the tank. This is a very coarse test and does not show that it will measure the foam, however it will trigger the sensor to allow the connections to be tested.

If the test above does not trigger the sensor then there is almost certainly an earth return problem.

5.2) Sensitivity Setting

The sensitivity can be set by the small adjuster in the head. The adjustment is from 0 –9 where 0 is the lowest sensitivity. The factory setting of 5 is suitable for most applications. However if the foam is very light the sensitivity may need to be increased. Alternatively with very dense sticky foam it is advisable to reduce the sensitivity. See Table 1 below for more details of the sensitivity settings. .

If the sensor is in contact with foam but does not trigger then increase the sensitivity setting to a higher figure.

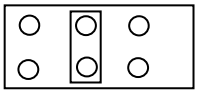
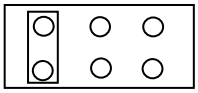
Table 1 Sensitivity Adjustment – SW2

Sensitivity Setting	Application	
0	Liquid	Lowest Sensitivity
1	Very dense heavy foam	
2	Processed food with high salt level	
3	Waste water with high solids	
4	Waste water	
5	Most applications	Default Setting
6		
7	Light foam from detergent	
8		
9	Very light foam	Highest Sensitivity

5.3) Response Time

The response time is the time taken by the sensor to respond to foam. The factory set response time is 4 seconds. This is optimum for most applications and allows sufficient time for rejection of splashing and spurious triggers. However in rare cases foam can build up within a few seconds to a high level for which 4 seconds may be too slow. Typical fast applications are vacuum cooling and gas stripping. To change the response time remove the small white link on sw2 and refit as shown below. In cases of high splashing the response time can be increased to 10 seconds. See table 2 below.

Table 2 – Response Time adjustment

Application	Response	Setting SW1
Almost all	Standard – 4 seconds	
Vacuum cooling	Fast – 1 second	
Effluent	Slow – 10 seconds