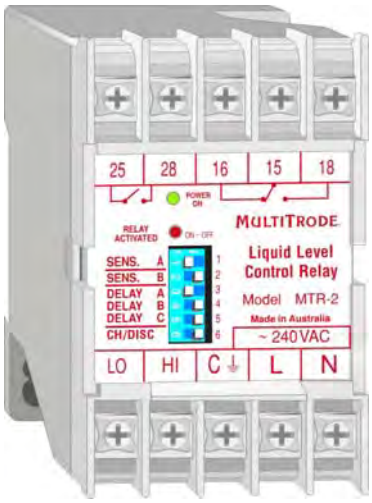
1 Introduction

The MultiTrode level control relay is a solid-state electronic module in a hi-impact plastic case with a DIN rail attachment on the back, making a snap-on-snap-off installation. Any number of relays can be easily added to the DIN metal rail then wired together to form a complex pumping system that other wise may have to be controlled and operated by a programmed PLC.

The relay is normally matched with the MultiTrode probe which works in conjunction with the relay and uses the conductivity of the liquid to complete an electrical circuit.

2 Electrical Overview



There are 10 screw terminals on the unit. Facing the relay as shown, we look at the bottom terminals (left to right):

- Lo – (Charge mode). This is the point when the probe is dry the relay will turn on.
- Lo – (Discharge mode). This is the point when the probe in the tank is dry the relay will turn off.
- Hi – (Charge mode). This is the point when the probe in the tank is wet a relay will turn off
- Hi – (Discharge mode). This is the point when the probe in the tank is wet a relay will turn on.
- C - is common earth. All earth bonding must be terminated here for correct operation.
- " L " is "live" (240V AC)
- " N " is "neutral" (240V AC)

If the tank is plastic, or if you are conducting tests in a plastic bucket, or the vessel has no earth point inside, you must install an earth rod within the tank, vessel or bucket and make sure that it is bonded back to C on the relay unit.

3 DIP Switches

3.1 DIP Switches

(See Wiring Diagram for full program functions.)

3.1.1 DIP 1 & 2

DIP 1 and 2 control the Sensitivity, in other words the cleaner the liquid the higher the sensitivity setting must be. Concentrated acids, minerals are by their own chemical composition highly conductive, so a low level of sensitivity is required, purified water is almost an insulator against electrical current flow so a higher sensitivity inside the relay is required.

3.1.2 DIP 3, 4 & 5

DIP switches 3, 4 and 5, control delay on activation. For example, in discharge mode with DIP switches 3, 4 and 5 set to 10 seconds, when the Hi point becomes wet it will activate the motor and it will take 10 seconds of continual coverage of the probe sensor to make the relay close and start the pump. This is invaluable when the probe is in a turbulent part of a well where fluid is splashing around touching the sensors momentarily, and false activation cannot be tolerated.

3.1.3 DIP 6

DIP switch 6 controls the charge/discharge function. Set "ON" for charge, and "OFF" for discharge

3.2 Relay Contacts & their Applications

3.2.1 Contacts 15, 16 & 18

Contacts 15, 16, and 18 are used for electronic or visual notification of a change in state at the pump itself. Contacts 15, 16, and 18 are used for more advanced applications because they are a changeover relay, their state may be the same as contacts 25, 28 or the opposite. Both sets of contactors are triggered simultaneously. An example is when in discharge mode, (see Figure 1).

You have a gravity flow coming in so the fluid reaches the lower sensor PB1, contacts 15 and 18 are open (15 being common to both contact 16 and 18) contacts 25 and 28 are also normally open but contacts 15 16 in this current situation are closed, whether PB1 is wet or dry is of no concern all will stay the same. The level now rises to PB2 and both relays change state, contacts 25 and 28 close to turn on the pump, contacts 15 and 16 are open, with 15 and 18 closed.

In advanced applications this state change may be fed into a logic device to indicate the pump is running or the pump has stopped and perhaps light an LED or incandescent light source for visual confirmation that a change has occurred in the relay.

3.2.2 Contacts 25 & 28

Contacts 25 and 28 are used to control pump states. Contacts 25 and 28 are mostly used for turning on motors via a starting relay or solenoid, so, these sets of contacts react to the rising or falling levels of the fluid inside the tank, they will operate to turn on a pump in discharge mode when the top sensor is wet and in charge mode turn on the pump when the bottom sensor is dry.

4 Practical Overview

4.1 Discharge Mode – DIP switch 6 set to “OFF”

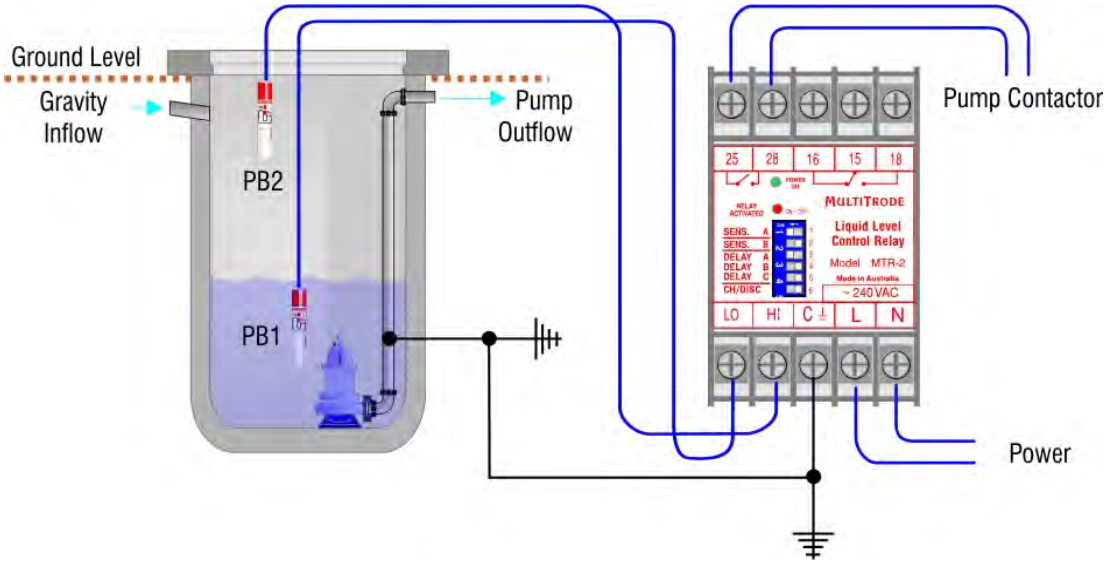
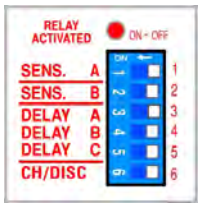


Figure 1 – Discharge Mode

Figure 1 shows two probes, (PB1 connected to Lo and PB2 connected to Hi). The pit is mostly underground and there is a gravity-fed inlet at the top left-hand side. The pit is empty with PB1 completely dry. Dipswitch 6 is set to “OFF.”



The relay operation depends on the electrical conductivity of liquid in the pit, i.e. no liquid = no current flow. The level starts to rise and covers PB1.

This is a discharge operation so we do not want the relay to close and start a pump until the well is full so as the water rises it reaches PB2, the relay closes and the pump starts. The level now drops below PB2 but the pump still continues to run, the level continues to drop below PB1 the relay opens the pump stops.

4.2 Charge Mode – DIP switch 6 set to "On"

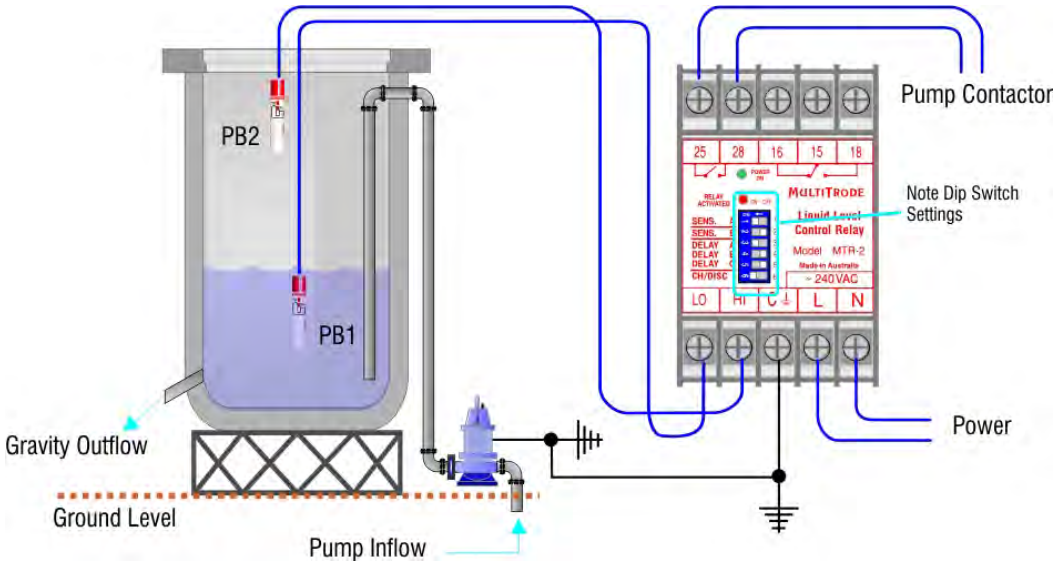


Figure 2 – Charge Mode

NOTE:
"C" is connected to common bonded earth. The unit will not operate correctly if not earthed.

Let's look at the same relay but in a tank that is charging (DIP 6 is now on). See Figure 3, where liquid is being pumped into a tank, and discharging through a gravity feed, the tank is on steel stands "x" metres above the ground.

With the tank full, PB1 and PB2 will be wet, the relay is off, and the pump has stopped. Water is slowly fed out from the bottom, and now as PB2 (HI) becomes dry nothing happens; the water now drops to below PB1 (Lo), and the pumps restarts to fill the tank.

The pump will continue to fill the tank until PB2 (HI), becomes wet again.

4.3 MTRA Relay with Alarm (Discharge Applications Only)

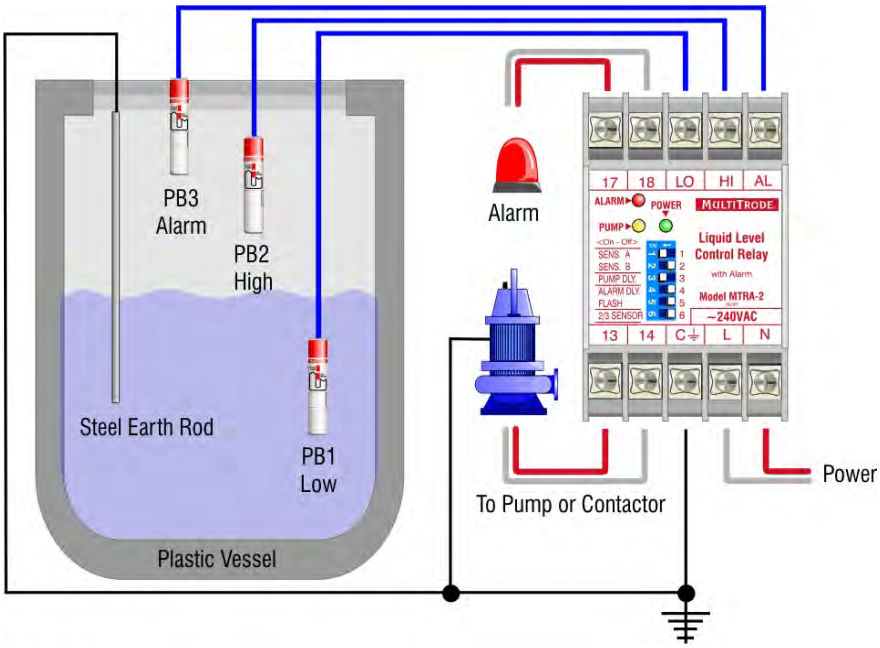


Figure 3 - MTRA Operation

The MTRA relay works in the same way as the MTR relay except the MTRA has a separate alarm output, and does not have a charge mode. The planned application is to close a contact to illuminate a warning alarm light. . Various other applications have included introducing a third probe to latch another relay.

In Figure 2 we see three probes in a pit that is plastic, note the steel rod in the tank. (In a plastic vessel a steel rod must be used to create an earth return in the liquid so probes can function.) PB1, PB2, and PB3 are dry, and the relay power LED is on. When water enters the pit and wets PB1, nothing happens, water now reaches PB2 causing contacts 13 and 14 to close, the pump LED to light, and the water to drop.

If, for example, the pump has its inlet partially blocked, the level continues to rise and wets PB3. This closes a separate relay that can activate a red flashing light, an audible fog horn or send a 5 volt pulse into another device with the common cause to warn human beings that a spill is due to occur. If the pumps become unclogged and PB3 becomes dry the alarm opens again and breaks the circuit that stops the light from flashing or the foghorn from sounding.

5 Most Common Installation Problems

The relay requires a path between the probes to earth through the liquid. If you are testing in a plastic bucket, have installed the probe in a plastic tank or have no good earthing in the vessel you will need to install a separate earth and make sure all earth bonding comes back to the C terminal. Most problems like these are traced back to a lack of or poor earthing, or open circuits in the probe wiring.

Now is the time to check the relay by using “the bridge testing line technique” remember you must simulate a fluid flow to correctly ascertain a good relay or a bad one. (All DIPswitch settings from 1 to 6 should be off.)

Cut two pieces of insulated flexible copper wire one black one red 250 mm long, strip both ends back 10 mm on both cables, and join one black end and one red end. Insert the joined ends into C on the relay box, observing all safe electrical practises. You should have one black wire and one red wire free.

Set your relay for discharge mode (DIP switch 6 is off) with no sensors connected to the unit, connect the red wire to Lo – nothing should happen (if it does return the relay for replacement or repair*). Now connect the black wire to the Hi terminal the relay activated LED should light instantly (if it does not, the relay should be returned for repair*).

6 Troubleshooting

I have checked all the DIPswitches and settings but in discharge mode as soon as the bottom sensor gets wet the pump turns on then turns off almost straight away.	• This is the most common problem encountered with relay set up and commissioning, the probe in the bottom of the tank is wired into the Hi terminal instead of the Lo terminal.
The installation went fine but now and again the pump will not turn on even though I am sure the probe is wet.	• Check the sensitivity level set on the relay, some times the level is set for foul water but due to changes in the flow the water becomes grey or clear, try changing the setting from 20KΩ to 80KΩ and monitor the results carefully.
All wiring is complete and all DIPswitches have been checked but the pump will not turn on at all.	• If you have completed the test schedule for the relay and it passed then check the wiring to the sensors – for this is now where the problem lies or in the earthing arrangements. If possible check the resistance between the sensor cable and the steel sensor on the probe to prove a solid connection.

*** Please contact your distributor or agent before returning any product for repair or warranty claim.**

MultiTrode Pty Ltd—UK Operations
Ivybridge, Devon

Tel: +44 1752 547355
Fax: +44 1752 894615

E-mail:UKsales@multitrode.com

MultiTrode Pty Ltd—Head Office
Brisbane Technology Park
18 Brandl Street

PO Box 4633
Eight Mile Plains Qld 4113

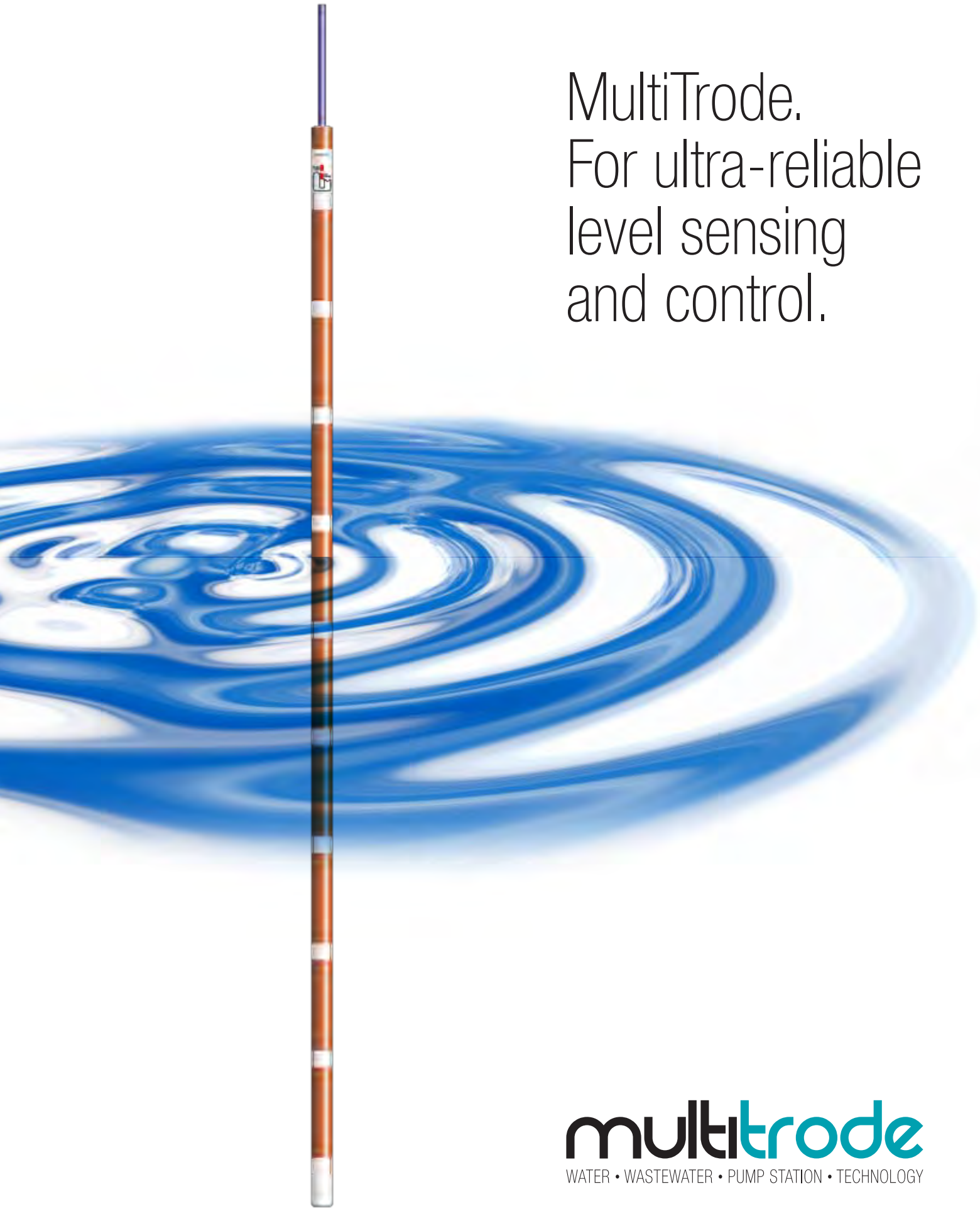
Ph: +61 7 3340 7000
Fx: +61 7 3340 7077
E-mail: AUsales@multitrode.com

MultiTrode Inc—USA
Unit 3, 990 South Rogers Circle
Boca Raton Florida 33487

Tel: +1 561 994 8090
Fax: +1 561 994 6282

E-mail: USsales@multitrode.net

Visit www.multitrode.com for the latest information



MultiTrode. For ultra-reliable level sensing and control.

multitrode

WATER • WASTEWATER • PUMP STATION • TECHNOLOGY

The Liquid Level Sensor you don't need to clean.

The most reliable and cost-effective level sensor for wastewater.

Lasts for over 20 years!

- Reduces maintenance costs.
- No more false readings or burnt-out pumps.
- Simple to install and guaranteed for 10 years.
- Cuts the risk of spills.

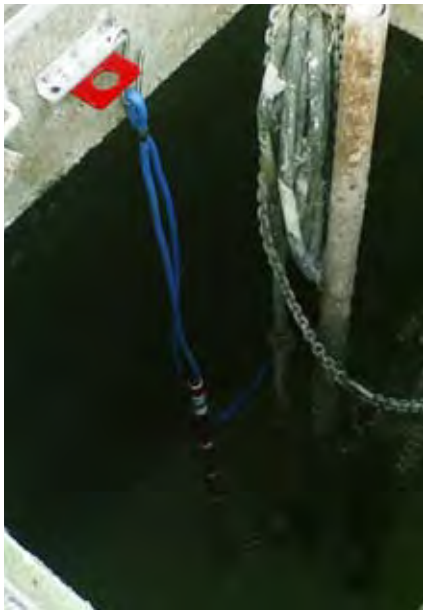
Why is it so reliable?

No electronics and no moving parts means there is nothing to fail – that's why it gets a 10-year warranty.

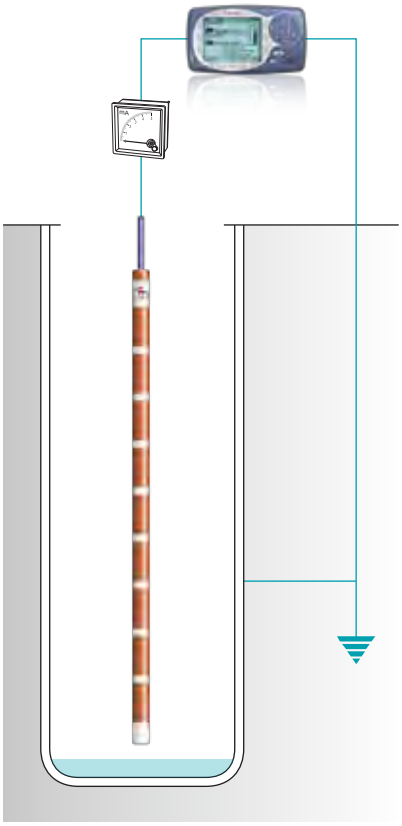
How does it work?

The Probe works by using the conductive properties of the water itself to complete a circuit with a controller. It's mounted near the inflow, allowing the turbulence to keep it clean. Even if a build-up does occur it's usually conductive (in wastewater) and so the Probe keeps right on working.

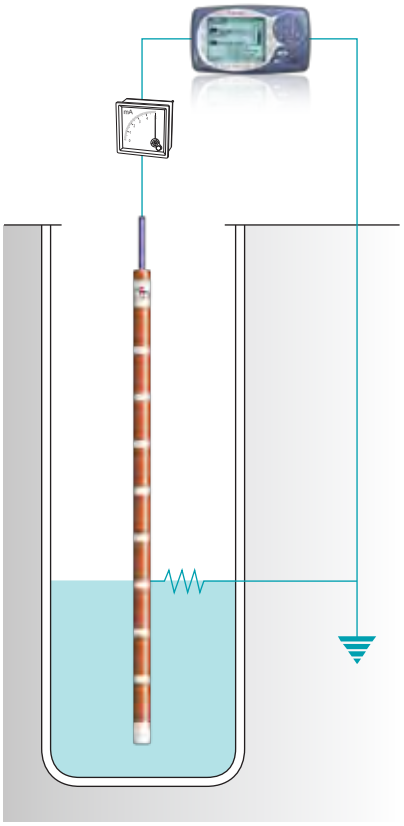
When cleaning is required, the probe is installed off a mounting bracket that includes a cleaning device.



Typical installation in the UK.



When a sensor is not covered with liquid there is no circuit to ground/earth.



Each sensor completes a separate circuit to ground/earth through the liquid.

Primary Level in Wastewater.

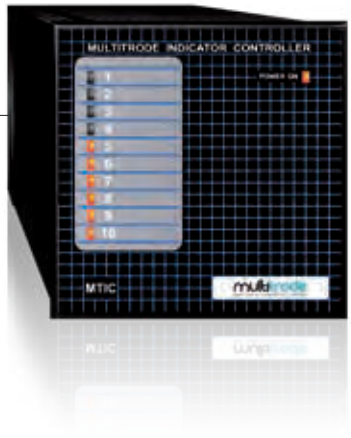
Connects to:

MultiSmart Pump Station Manager

Full control and monitoring with SCADA connectivity – see MultiSmart brochure for details.

MTDPC Pump Controller

Simple lead/lag control with level display, typically non-utility.



MTIC Indicator Controller

4-20mA output to connect to PLC control and 10 Digital Outputs (for each level sensor) for simple control.

MTISB Intrinsically Safe Barrier

The MTISB is used between the MultiTrode probes and control equipment. It eliminates the risk of dangerous energy entering the potentially explosive environment where the probe is located. 5-channel (MTISB5) and 10-channel (MTISB10) barriers available.

Primary Level in Industrial Applications.

Single Pump Control.

Works well in confined spaces and with a wide variety of effluents.

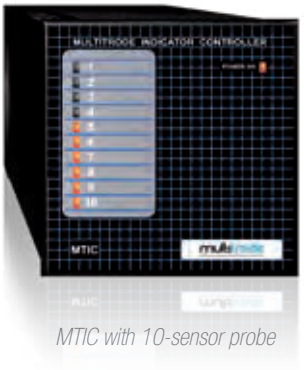
MTR with 2 single sensor probes

MTRA with 3 single sensor probes

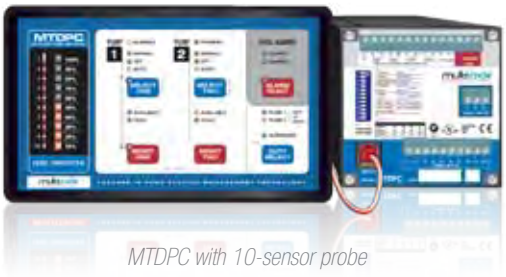
SafeSmart-TL version with 3-sensor probe

Two single sensor probes (e.g. from a sump pack), with optional extender bracket.

2 Pump Control.



MTIC with 10-sensor probe



MTDPC with 10-sensor probe

How accurate is the Probe?

The probe gives 10% resolution, more than enough for most pump stations.

Why is it easier to install than other level devices?

All you do is hang the Probe on its own cable into your wet well, using the bracket we supply. Installation is simple – any one of your technicians could do it in an hour or so. What's more, you install the Probe relatively low down in the wet well, so compared to ball floats it allows the well to be cleaned out more thoroughly. That means less debris build-up, odors and pump clogs.

Why do we like the Probe? It's simple, safe, cuts maintenance time and makes life so much easier!

Gray Walls, Public Works Director, Town of Troy, NC

Backup Control - Simple Spill Preventer.

The sump pack (MTR or MTRA with 2-single sensor probes) is ideal as a spill preventer. Instead of having a high level float wired as a high level alarm, the sump pack provides simple but effective backup control for those times when the primary control system has failed.

It keeps the well emptied, giving you more time to deal with the problem.

Better Backup Control - Advanced Spill Preventer.

The SafeSmart family provides better backup control by reading the thermal state of the pump (via thermistors and thermal switches) to ensure the pump doesn't run while too hot, even under backup conditions.

Specifications for ordering the Probe.

The mounting bracket is a standard accessory supplied with the multi-sensor probes (3-sensor and 10-sensor probes) and is available as an optional extra on the single sensor probe.

ORDERING EXAMPLES AND INFORMATION

Model Code	Probe Length	Number of Sensors	Sensor Separation
0.2/1-xx	0.2m / 8in	1	N/A
0.5/3-xx	0.5m / 16in	3	150mm / 6in
1.0/10-xx	1.0m / 40in	10	100mm / 4in
1.5/10-xx	1.5m / 60in	10	150mm / 6in
2.0/10-xx	2.0m / 80in	10	200mm / 8in
2.5/10-xx	2.5m / 96in	10	250mm / 10in
3.0/10-xx	3.0m / 115in	10	300mm / 12in
6.0/10-xx	6.0m / 224in	10	600mm / 24in
9.0/10-xx	9.0m / 368in	10	900mm / 35in

xx = 10 (for 10m or 33ft of cable); or 30 (for 30m or 100ft of cable)

Probes are supplied with a standard length of cable in either 10m / 33ft or in 30m / 100ft lengths.

SPECIAL PROBES

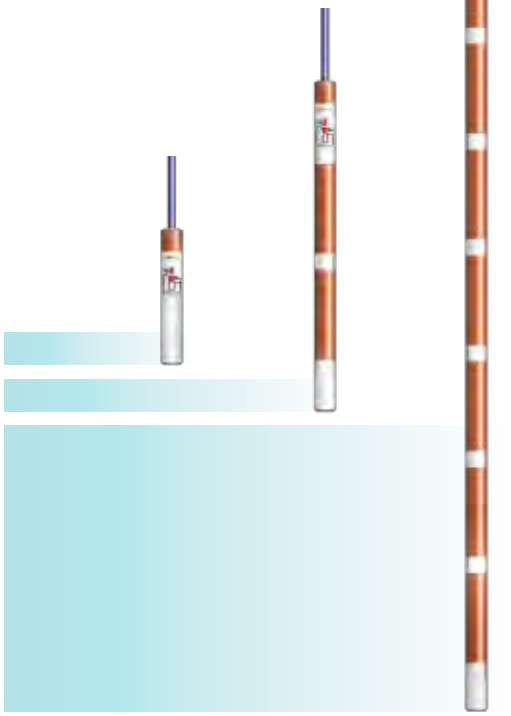
Special Probes with custom sensor spacing are available to suit your every application (18 sensors maximum).

Please call our office and speak with our design team for your customized drawing.

2.5 / 10-10

Probe Length (meters)	Sensor Points	Cable Length (meters)
2.5	10	10

Add "FSP" to the end of the part number to order the failsafe probe (for use with MultiSmart and the SafeSmart range).



The sump pack is also ideal for primary pump control in industrial applications.

MTDPC

Simple 2-pump control, with operator interface. Suitable for empty (pump down) and fill (pump up) applications and for use with the MultiTrode probe.

The MTDPC integrates all basic control functions into one panel – with setpoints for two pumps with alternation, a fault input for each pump and an operator interface showing pump status at a glance.

- Level display, pump and fault status indication.
- Alternation or fixed sequence.
- Adjustable setpoints via the keypad.
- Adjustable sensitivities for a wide range of liquids.
- Cost-effective and simple to use.
- Pump auto / off / manual selection.
- Level simulator via keypad to test the control panel.

Applications:

- Effluent and stormwater pits.
- Sullage pits.
- Water tanks.
- Car park pits.
- Wash down pits.
- Basement sumps.

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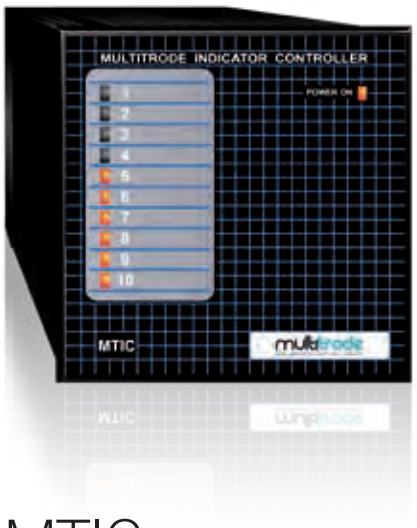
MTDPC SPECIFICATIONS

MODE OF OPERATION:	
Mode	Fill or Empty (Charge or Discharge) Selectable via function switch
Pump Alternation	Alternation or Fixed: Selectable via Keypad
LEVEL SENSING PROBE INPUTS:	
Number of inputs	10
Output voltage	10VAC Nominal (open circuit)
Output current	0.8mA max. (per sensor)
Sensitivity settings	1k, 4k, 20k and 80k Ohm Via function switch
Max cable length	50m
BUTTONS:	
Pump Mode:	Auto / Off / Manual
Fault Resets:	Pump 1 , 2 and Level Alarms.
Configuration:	Alternation / fixed sequence
	Level and alarm setpoints
	Level simulation
FAULT INPUTS	
Fault Input:	Critical (Lockout) or Non-Critical (Auto Reset);
	Selectable via function switch, one fault input per pump
RELAY OUTPUTS:	
No. of relay outputs	2 pump N/O, 2 alarm (steady or flash) N/O 1 common alarm N/O
Relay contact rating	250VAC 5A Resistive, 2A Inductive
Relay contact life	10^5 @ 2A Operations
DISPLAY:	
LEDS	Hi intensity (Red & Green)
PHYSICAL PRODUCT:	
Controller Dimensions	3 ¾"H x 3 ¾"W x 5 11/16"D (inches) 95H x 95W x 145D (mm)
Material	Aluminium and Polycarb
Mounting	DIN Rail Mounted
Terminal size	2 x 13 AWG / 2.5mm^2
Keypad Dimensions	4 1/8"H x 6 7/8"W x 1"D / 105H x 175W x 24D (mm)
Material	Polycarbonate
Mounting	Panel Mounted
POWER SUPPLY:	
Supply voltage AC	MTDPC 3 110VAC nom. 50/60Hz MTDPC 2 240VAC nom. 50/60Hz
Power Consumption	6VA max.
ENVIRONMENTAL RANGE:	
Operating Temp.	-10°C to +60°C (+14°F to 140°F)
Humidity	90% non condensing
RECOMMENDED PROBE 10-SENSOR PROBE	



MTIC

Connect the MultiTrode probe to a PLC/RTU – or provide independent control.

The MTIC Indicator Controller provides continuous level indication and pump control from the MultiTrode probe.

The 4-20mA output allows the probe to be connected to a PLC or dedicated pump controller system. The 10 Digital Outputs (one for each probe input) provide a mechanism for simple pump control without any other control device.

- 4-20mA output.
- 10 digital outputs.
- Bargraph for level indication.
- Control up to 3 pumps.

MTIC SPECIFICATIONS

MODE OF OPERATION:	
Mode	Fill or Empty (Charge or Discharge)
PROBE INPUTS:	
Sensor Inputs	10
Sensor Voltage	10VAC Nominal
Sensor Current	0.8mA max (per sensor)
Sensitivity	1k, 4k, 20k, 80k Ohms
RELAY OUTPUTS:	
Selectable Delays	0, 5, 10, 15 sec
Relay contact rating	250VAC 5A Resistive, 2A Inductive
Relay contact life	10^5 Operations
Terminal size	2 x 2 x 13 AWG / 2.5mm^2
ANALOG OUTPUT:	
Analog	4-20mA RLoad < 940 Ohms
DISPLAY:	
LEDs	10 LED bargraph & Power On
PHYSICAL PRODUCT:	
Dimensions	3.78"H x 3.78"W x 5.12"D (inches) 96H x 96W x 130D (mm)
Mounting	Panel mounted through cut-out (brackets supplied)
Enclosure	Extruded alumium
POWER SUPPLY:	
Supply Voltage AC	MTIC2 240V, 50/60Hz MTIC3 110V, 50/60Hz
Power Consumption	16VA max.
Supply Voltage DC	MTIC5 24V MTIC6 12V
Power Consumption	10W max.
ENVIRONMENTAL RANGE:	
Operating Temp.	-10°C to +60°C (+14°F to 140°F)
Humidity	90% non condensing
RECOMMENDED PROBE	**10-SENSOR PROBE**

NEW

SAFE-FSP & SAFE-TL

SafeSmart Backup Controllers.

For the rare times when the primary control or primary level device fails, an independent backup control system reduces the risk of spills.

SafeSmart Backup Controllers, used with a 3-sensor probe (or 3 single-sensor probes), are the next generation of backup systems for wastewater lift stations.

Most utilities have been using a high level sensor into their primary control device, so if the primary control device fails the operations staff find out through a 'Comms Fail' alarm from the SCADA system. This puts time pressure on every aspect of the organization. A SafeSmart Backup Controller helps avoid this risk.

Complete back up controller including pump control, level alarms and pump sensor inputs:

- Perfect pump control for one pump (either primary or redundant control).
- One level alarm - either high or low.
- Manual (hand) operation from an external selector switch or (SAFE-TL only) keypad.
- Pump thermal protection (thermistor, thermal switch or Flygt FLS).
- Adjustable delays for pump start / stop and alarms.
- Failed Probe detection (requires new failsafe probe).
- Adjustable sensitivity for MultiTrode probe.
- Parallel operation with MultiSmart.

SAFE-TL also has:

- Seal and thermal protection from Flygt FLS input.
- Remote mount keypad.

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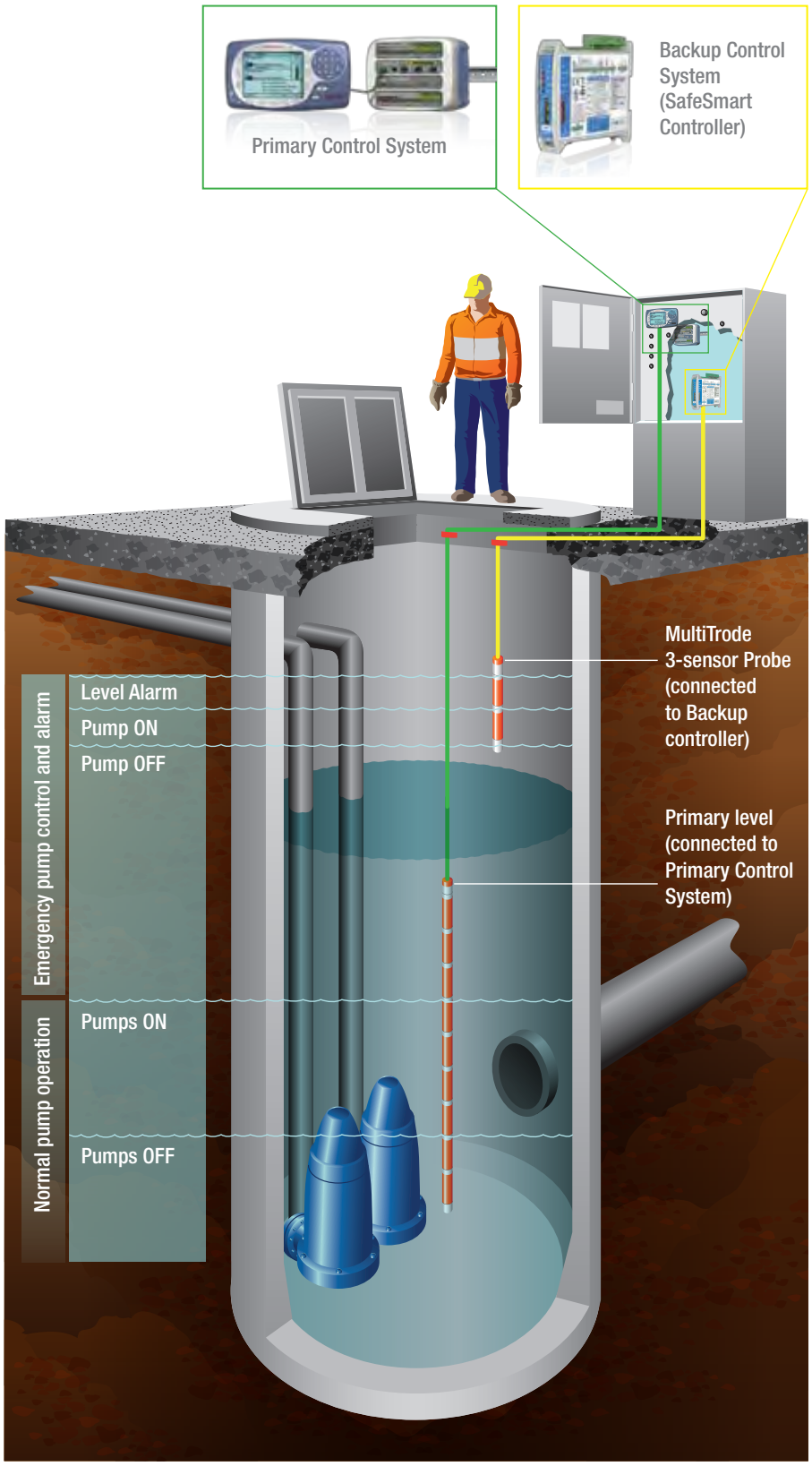
SAFE-FSP SPECIFICATIONS

MODE	Fill or Empty (Charge or Discharge) Start / Stop / High level or Low Level Alarm
RELAY OUTPUTS	Pump, Alarm, Probe Fail
RELAY RATINGS	5A Resistive, 2A Inductive, 30VDC or 250VA Contact Life 10^5 operations
PROBE INPUTS	Low / High / Alarm / Alarm failsafe
PUMP INPUT	PTC thermistor or Thermal N/C or Flygt FLS [note] Can work in parallel with MultiSmart pump controller
DIGITAL INPUTS	- Manual (hand) mode - Off mode
DIP SWITCHES	- Empty or Fill mode - High or Low level alarm - Pump Activation Delay 0.5 or 30s - Pump Deactivation Delay 0.5 or 30s - Alarm Activation & Deactivation Delay 0.5 or 30s - Level Alarm & Probe Alarm Outputs N/C or N/O - Probe Sensitivity 1k, 4k, 20k or 80k
DISPLAY LEDS	- Power - Level Alarm - Pump Relay - Thermal Fault - Probe Fault
POWER SUPPLY	11-30v DC @ 0.15A 85-265V 50/60Hz, 3VA
PHYSICAL PRODUCT	DIN rail mounted (4.2"H x 3.0"W x 0.7"D (inches) 106H x 75W x 17D (mm)
ENVIRONMENTAL RANGE	-10°C to +60°C (+14°F to 140°F) Relative Humidity 5 to 90%, non-condensing
ORDERING INFORMATION	SAFE-FSP
RECOMMENDED PROBE	ONE FAILSAFE 3-SENSOR PROBE

SAFE-TL SPECIFICATIONS

MODE	Start / Stop / High level or Low Level Alarm
RELAY OUTPUTS	Pump, Alarm, Thermal / FLS
RELAY RATINGS	5A Resistive, 2A Inductive, 30VDC or 250VA Contact Life 10^5 operations
PROBE INPUTS	Low / High / Alarm / Alarm failsafe
PUMP INPUT	PTC thermistor or Thermal N/C or Flygt FLS [note] Can work in parallel with MultiSmart pump controller - Seal
DIGITAL INPUTS DIP SWITCHES	- Manual (hand) mode - Empty or Fill mode - High or Low level alarm - Pump Activation Delay 0.5 or 10s - Seal Fault Operates DO3 or Indicates LED only - Thermal Input to be Thermal Only or Thermal & Seal (miniCAS) - Thermal Reset is Manual or Auto - Probe Sensitivity 1k, 4k, 20k or 80k
DISPLAY LEDS	- Power - Level Alarm - Pump Relay - Thermal Fault - Seal Fault
POWER SUPPLY	11-30v DC @ 0.15A 85-265V 50/60Hz, 3VA
PHYSICAL PRODUCT	DIN rail mounted (4.2"H x 3.0"W x 0.7"D (inches) 106H x 75W x 17D (mm)
ENVIRONMENTAL RANGE	-10°C to +60°C (+14°F to 140°F) Relative Humidity 5 to 90%, non-condensing
ORDERING INFORMATION	SAFE-TL
RECOMMENDED PROBE ONE FAILSAFE 3-SENSOR PROBE	



SAFE-FS

SafeSmart Failsafe Level Alarm Relay.

The Safe-FS is the next generation of ultra-reliable high level alarming for lift stations and pump stations. It adds failsafe probe functionality, for example, for a situation where rats have been eating through cables. The -FS verifies that the high level alarm is always functioning.

Level Alarm Relay for use with the new failsafe probe.

- Separate relays for level alarm & loss of probe.
- N/O or N/C outputs.
- Adjustable delays.
- LED indication for power, level alarm, loss of probe alarm.

SAFE-FS SPECIFICATIONS

MODE	High Level or Low Level Alarm
RELAY OUTPUTS	- Level alarm N/O or N/C, 0.5s or 10s delay - Probe fail N/O or N/C, 0.5s or 10s delay [note] requires failsafe probe
RELAY RATINGS	- 5A Resistive, 2A Inductive, 30VDC or 250VA - Contact Life 10^5 operations
PROBE INPUTS	- Alarm sensor - Failsafe for alarm sensor
DISPLAY LEDS	- Power On Green, flashes when low - Level Alarm Red, flashes when alarm active - Probe Alarm Red, flashes when alarm active
POWER SUPPLY	11-30v DC @ 0.15A max
PHYSICAL PRODUCT	(4.2"'H x 3.0"W x 0.7"D (inches) DIN rail mounted 106H x 75W x 17D (mm)
ENVIRONMENTAL RANGE	-10°C to +60°C (+14°F to 140°F) Relative Humidity 5 to 90%, non-condensing
ORDERING INFORMATION	SAFE-FS
RECOMMENDED PROBE	ONE FAILSAFE SINGLE SENSOR PROBE

multitrode
WATER • WASTEWATER • PUMP STATION • TECHNOLOGY

MTR family

Simple, reliable and effective – for use with MultiTrode probes or in any control application.

The MTR family gives an ultra-reliable, maintenance free level control system. Use it with the MultiTrode conductive probes and it works in the worst kind of liquids:

- Wastewater.
- Stormwater.
- Industrial effluent.
- Sullage pits.

The adjustable conductivity settings and adjustable delays give it the flexibility that other systems lack.

The MTR controls one pump in fill (pump up) and empty (pump down) applications. The MTRA controls one pump and one alarm in empty only mode.

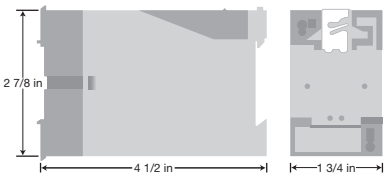
The MTR family is also available with single sensor probes as a package: MT-SSP

To order the Sump Pack, use the order code MTSSP - relay part number - probe cable length in m.

E.g. MTSSP-MTR3-10 is the ordering code for the sump pack with MTR3 and 2-single sensor probes each with 10m / 33ft of cable.

MTR SPECIFICATIONS

MODE OF OPERATION:			
MTR Mode	Fill or Empty (Charge or Discharge)		
MTRA Mode	Empty ONLY		
PROBE INPUTS:			
Sensor inputs	MTR : 2 / MTRA : 3		
Sensor voltage	10 / 12VAC Nominal		
Sensor current	0.8mA max. (per sensor)		
Sensitivity	1k, 4k, 20k, 80k		
RELAY OUTPUTS:			
MTR relay output	2 contact sets : 1 N/O & 1 C/O		
MTR output delay	0, 2.5, 5, 10, 20, 40, 80, 160 sec		
MTRA relay output	2 relays : both N/O		
MTRA output delay	Pump: 0.5, 10; Alarm: 0.5, 15 sec		
Relay contact rating	250 VAC 5A Resistive, 2A Inductive		
Relay contact life	10^5 Operations		
Terminal size	2 x 13 AWG / 2.5mm^2		
DISPLAY			
LEDs:	Power On	Pump	Alarm
MTR	Green	Red	
MTRA	Green	Yellow	Red
PHYSICAL PRODUCT:			
Dimensions	2.7/8"H x 1.3/4"W x 4.1/2"D (Inches)		
	72H x 45W x 114D (mm)		
Mounting	DIN Rail or 2 x #6 Screws / 2 x M4 Screws		
Enclosure	Makrolon (self-extinguishing)		



POWER SUPPLY:			
Supply Voltage AC	MTR-2 / MTRA-2 240V 50/60Hz		
	MTR-3 / MTRA-3 110V 50/60Hz		
	MTR-4 / MTRA-4 24V 50/60Hz		
Power Consumption	3.5W max.		
Supply Voltage DC	MTR-5 / MTRA-5 24V		
	MTR-6 / MTRA-6 12V		
Power Consumption	3W max.		
ENVIRONMENTAL RANGE:			
Operating Temp.	-10°C to +60°C (+14°F to 140°F)		
Humidity	90% non condensing		
RECOMMENDED PROBE			
MTR	2 single-sensor probes		
MTRA	3 single-sensor probes, or a 3-sensor probe		

A 10-sensor probe can also be connected to the sensors, when you need to have the versatility to change setpoints without going back into the pit.

All specifications subject to change without notice.

MultiTrode Inc - USA

Unit 3, 990 South Rogers Circle

Boca Raton Florida 33487

Tel: +1 561 994 8090 Fax: +1 561 994 6282

USsales@multitrode.com

MultiTrode UK

Ivybridge, Devon

Tel: +44 1752 547355 Fax: +44 1752 894615

UKsales@multitrode.com

MultiTrode Pty Ltd - Australia

Brisbane Technology Park 18 Brandl Street

PO Box 4633 Eight Mile Plains Qld 4113

Tel: +61 7 3340 7000 Fax: +61 7 3340 7077

AUsales@multitrode.com

multitrode

WATER • WASTEWATER • PUMP STATION • TECHNOLOGY

The MultiTrode Probe

MultiTrode probes are unsurpassed for rugged reliability, cost effectiveness and simplicity. Designed for the tough, turbulent conditions found in water, sewage and industrial tanks and sumps, the probes can be found in the simplest and the most complex water and wastewater management systems around the world.

- Low maintenance
- Simple installation
- Excellent in turbulence
- Short & long term cost savings
- Environmentally friendly
- Safe, low sensing voltage
- Unaffected by fat, grease, debris and foam
- Positive pump cut-out
- Safe – MTISB Barrier

Reliable in all conditions

Operation is unaffected by build up of fat, grease debris and foam, which causes other systems such as floats, bubblers, pressure and ultrasonic transducers to fail. Turbulence does not affect the probe operation. The rugged, streamlined design eliminates tangling and is ideal for confined spaces.

Positive pump cut-out

Operational consistency is important to longevity, low maintenance and cost control. The positive pump cut-out ensures pumps are turned off at the same level every time. This avoids damage due to pump over run and the cost of additional control equipment.

Safe for people and environment

The extra low sensing voltage ensures operators and maintenance staff are protected. All MultiTrode products are environmentally safe, containing no mercury or other harmful contaminants.

Cost savings

The low cost of equipment, installation and maintenance makes MultiTrode one of the most efficient level control systems available. Plus robust construction and longevity ensures continued cost savings when compared to other systems on the market.

Standard and custom probes

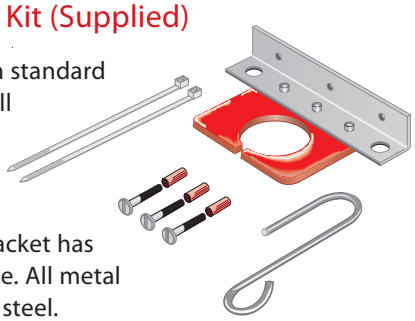
MultiTrode manufactures a wide range of standard probes, from a single sensor (200mm) to a ten-sensor probe (1000mm increasing to a maximum of nine metres). Custom probes can be manufactured to suit your requirements.

Installation

Installation is straightforward. Probes are easy to install without entering the wet area. The probe is simply lowered in from the top and suspended by its own cable, using the mounting kit supplied.

MTAK-1 Mounting Kit (Supplied)

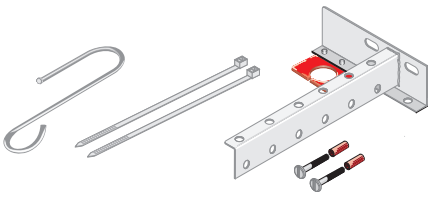
The mounting bracket is a standard accessory supplied with all multi-sensor probes (not standard with 0.2/1-xx single sensor probe).



The MTAK-1 mounting bracket has an integral cleaning device. All metal components are stainless steel.

MTAK-2 Mounting Kit (Optional extra)

This extended bracket provides up to 300mm extra wall clearance. This bracket is not included as standard with probes.



Ordering Examples and Information

Model Code	Probe Length (m/in)	Sensor Separation (mm/in)	Cable Length* (m/ft)	Number of Sensors
0.2/1-10	0.2/8	N/A	10/33	1
0.5/3-10	0.5/16	150/6	10/33	3
1.0/10-10	1/40	100/4	10/33	10
1.5/10-30	1.5/60	150/6	30/100	10
2.0/10-30	2/80	200/8	30/100	10
2.5/10-30	2.5/96	250/10	30/100	10
3.0/10-30	3/115	300/12	30/100	10
6.0/10-30	6/224	600/24	30/100	10
9.0/10-30	9/368	900/40	30/100	10

*Cable Length 10m/33ft or 30m/100ft

Probe Length (meters)	Sensor Points	Cable Length (meters)
2.5	10	10

MultiTrode Pty Ltd · Australia
Brisbane Technology Park 18 Brandl Street
PO Box 4633 Eight Mile Plains Qld 4113
Tel: +61 7 3340 7000 Fax: +61 7 3340 7077
sales@multitrode.com.au

MultiTrode Inc · USA
6560 East Rogers Circle
Boca Raton Florida 33487
Tel: +1 561 994 8090 Fax: +1 561 994 6282
sales@multitrode.net

1 Correct Probe Installation

Important Notes

- Hang probe in turbulent area of wet well
- Do not install the probe in a stagnant area or corner where grease and debris may collect. Stilling wells are not suggested.
- Ensure a minimum of 300 mm (12 inches) clearance from any surface
- Ensure bottom of probe is 12 mm (½ inch) above minimum pumping level
- Do not use the bottom sensor as earth or ground
- The probe cable must be buried (outside the well) in a separate metal conduit and shielded for correct operation of the level-sensing device
- Most pits are adequately earthed or grounded and do not require any reference rods, however PVC or Fibre Glass Tanks without pumps or metallic grounded pipe require reference rods

2 Probe Location

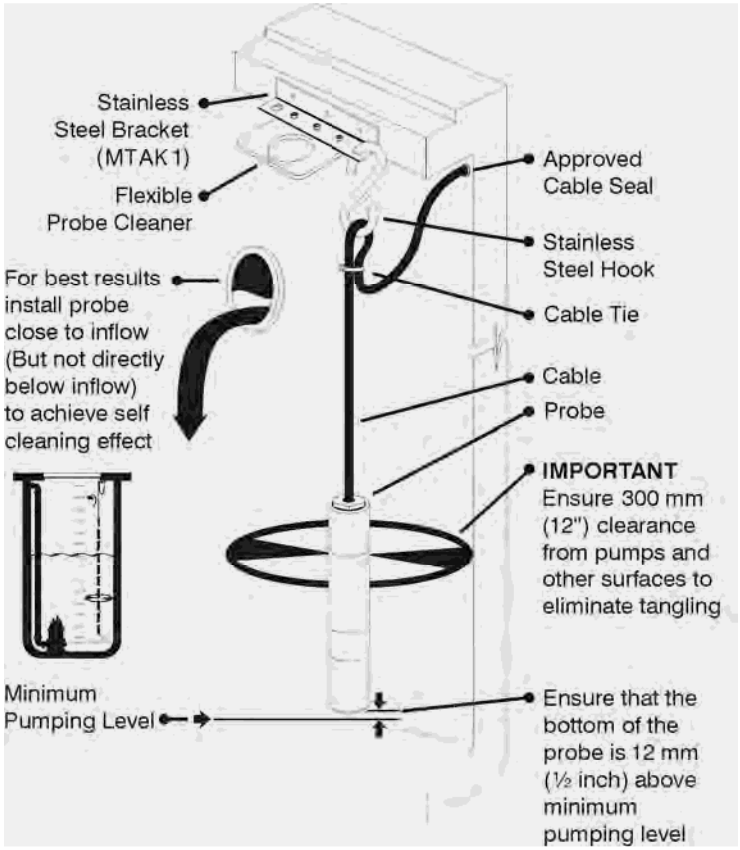


Figure 1 – Locating the probe in the vessel

The MultiTrode probe is designed to be supported on its control cable (see *Figure 1*) from the Suspension/ Cleaning bracket supplied with the probe. It is desirable for the probe to be located near the inflow in a reasonably turbulent area of the wet well.

The inflow should not be allowed to run directly on to the probe, but the surface agitation of the inflow area is beneficial in keeping the probe clean. Before deciding on the probe location, the wet well should be pumped down as far as possible and the probe suspended from its approximate position to ensure that adequate clearance exists from objects in the pit.

A minimum of 300 mm (12 inches) clearance should be maintained from any conductive surfaces.

Probe sensor points are numbered from 1 to x with 1 being the sensor closest to the cabled end of the probe, and where x is the total number of sensor points.

3 Mounting

Fix the Suspension/Cleaning Bracket MTAK 1 in *Figure 1*, (not supplied with single-sensor probes) on to the inside of the wet well, ensuring the clearance form covers and the ladder access. To mount the probe, first thread the cable through the stainless steel hook provided. Place the hook onto the mounting bracket or eyeball and adjust the cable length until the bottom of the probe is 12 mm (½ inch) above the minimum liquid level. Fasten the cable to the hook using cable ties. Draw the loose end through the conduit to the control panel.

4 Cleaning

Provide sufficient slack in the cable to allow the probe to be drawn through the cleaning bracket (*Figure 1*), or taken out of the well for cleaning. MultiTrode systems are designed so that the need for probe cleaning is greatly reduced or eliminated. This is achieved by correctly positioning the probe and selecting sensitivity on the level controller.

5 Accessories

MTAK 2 Extended Mounting Bracket

The MTAK 2 (*Figure 2*) is an optional extra. It is made from 2.5mm (1/8 inch) 316 stainless steel and can be used with all multi-sensored probes to give a greater, free-swinging area. It has an in-built squeegee blade style probe cleaner and includes stainless steel hook and cable ties.

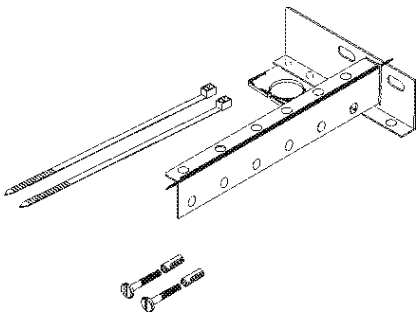


Figure 2 – MTAK 2 Extended Mounting Bracket Kit

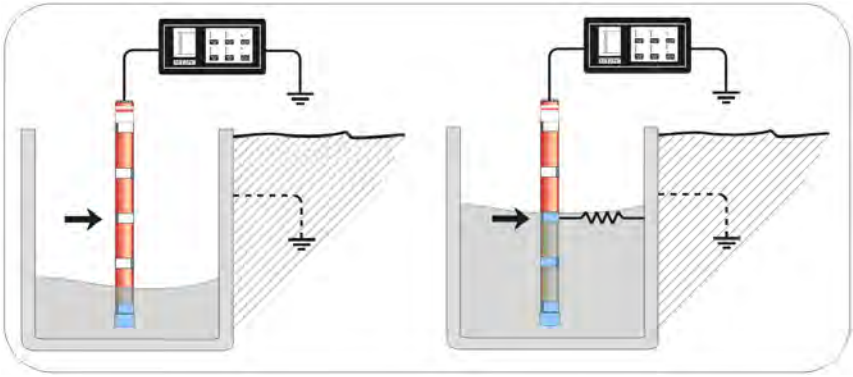


Figure 3 – How the probe works

6 How the MultiTrode Probe Works

As the level rises and contacts a probe sensor, a circuit is completed through the liquid and ground. See *Figure 3* above.

If the tank is made from PVC, fibreglass or other non-conductive material and there are no metal grounded objects such as pipes or pumps within, then the system will need an earth or ground reference rod. Suggest a 6 mm (¼ inch) stainless steel rod suspended in liquid, then grounded. See *Figure 4*.

For water applications (not sewage) there is an alternative to the earth rod and that is to use a *custom* probe with an Earth Button located at the bottom of the probe. So the return path for the level signal is no longer through ground but instead back through another conductor in the probe. See *Figure 5*.

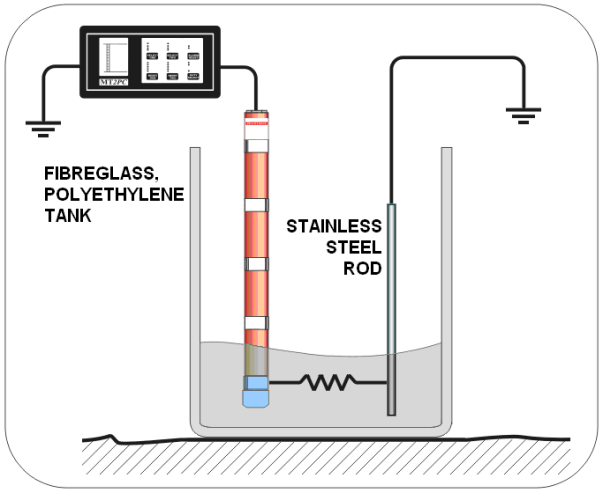


Figure 4 – Ground Reference Rod for Non-Conductive Tanks.

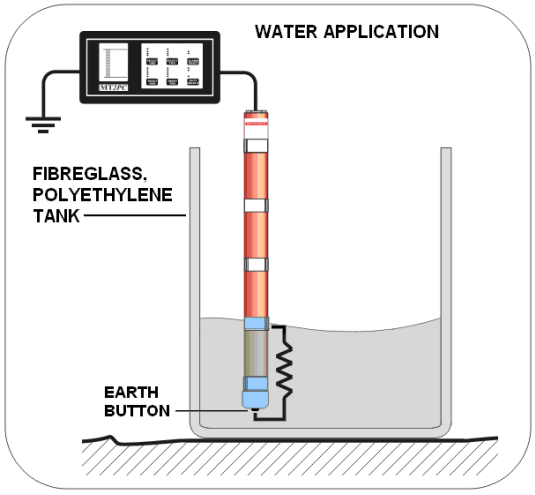


Figure 5 – Probe with Earth Button

7 Probe Construction

The probe is manufactured from uPVX moulded Housing incorporating 2 sensors of Avesta 254 SMO high-grade stainless alloy per sensing point.

7.1 Standard Probe

The probe has no moving parts and no electronic components inside; the probe utilizes the conductive state of the liquid to complete a circuit.

7.2 DuoProbe

This is a standard 10 sensor probe with the addition of a pressure transducer (4-20 mA) located at the base of the probe. This pressure sensor in conjunction with a second pressure sensor contained in the MultiSmart Pump Station Manager are used to provide a high resolution level. The 10 sensor probe allows for accurate calibration of the pressure sensors and also acts as a backup level device should the analog signal fail.

8 Probe Connections

MultiTrode recommends that the probe cable is directly connected to the MultiTrode relay or controller with no intermediate terminal strips or junction boxes.

The probe cable is numbered from "1 ONE" to x, where x is the total number of sensors. "1 ONE" is connected to the sensor closest to the cabled end of the probe (i.e. the highest sensor). For probes with 1 or 3 sensors, an additional orange wire is present for FailSafe (labelled "FS"). For 10 sensor probes, two additional wires are present – red ("POS") and black ("NEG").

Example wiring diagrams are shown below. The correct wiring is dependent on the type of probe (standard probe or DuoProbe) and the number of sensors.

8.1 Standard Probe - 1 and 3 Sensors

Connect as shown in *Figure 6* below. If the Fail Safe (FS) feature is not required or not present, leave the orange wire disconnected and trim or cable tie out of harms way.

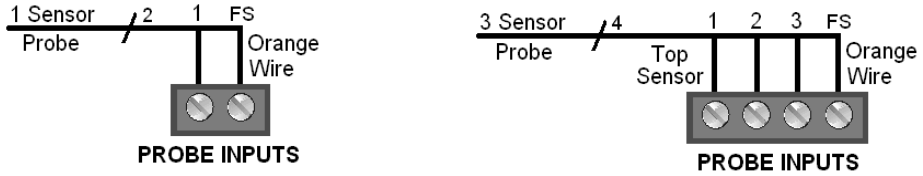


Figure 6 - Single and Three Sensor Probe Connections

8.2 Standard Probe – 10 Sensors

Connect as shown in *Figure 7* & *Figure 8* below. If the Fail Safe (FS) feature is not required or not present, leave the red and black wires disconnected and trim or cable tie out of harms way.

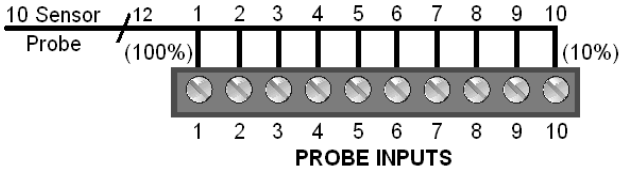


Figure 7 – Ten Sensor Probe Wiring (Excludes MultiSmart)

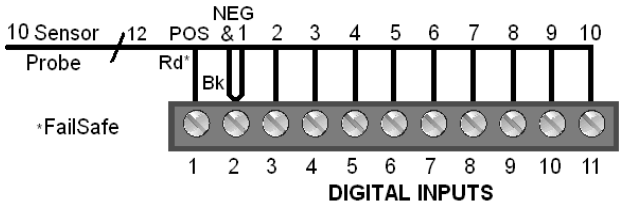


Figure 8 – MultiSmart Ten Sensor Probe Wiring

8.3 DuoProbe (MultiSmart Option Only)

Connect the probes wires from Din 2 to Din 11 and connect the red wire to the DC + power terminal and the black wire to the positive side of the analog input (e.g. 1+). The negative terminal of the analog input (e.g. 1-) is linked to the negative analog output (or to another ground), see *Figure 9* below.

There are hardware and firmware requirements which must be satisfied before the DuoProbe can be used as the level device on a MultiSmart.

- Build Version – firmware installed must be version 2.30 or higher
- HW Version – the processor board must be version PCB40001r01 or higher

To confirm if the Build and Hardware versions are correct, navigate to:

Info → More... → Version Information

For a first time DuoProbe installation, further configuration of the MultiSmart is necessary, refer to the MultiSmart Installation & Operation Manual.

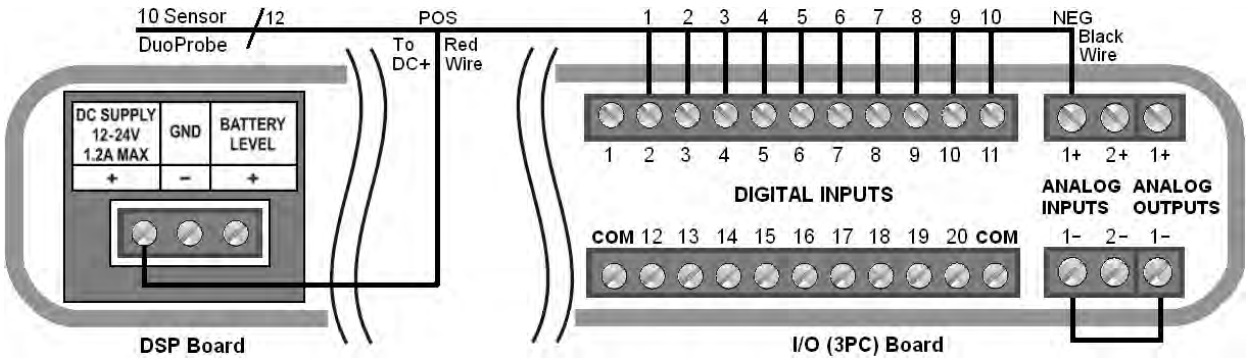
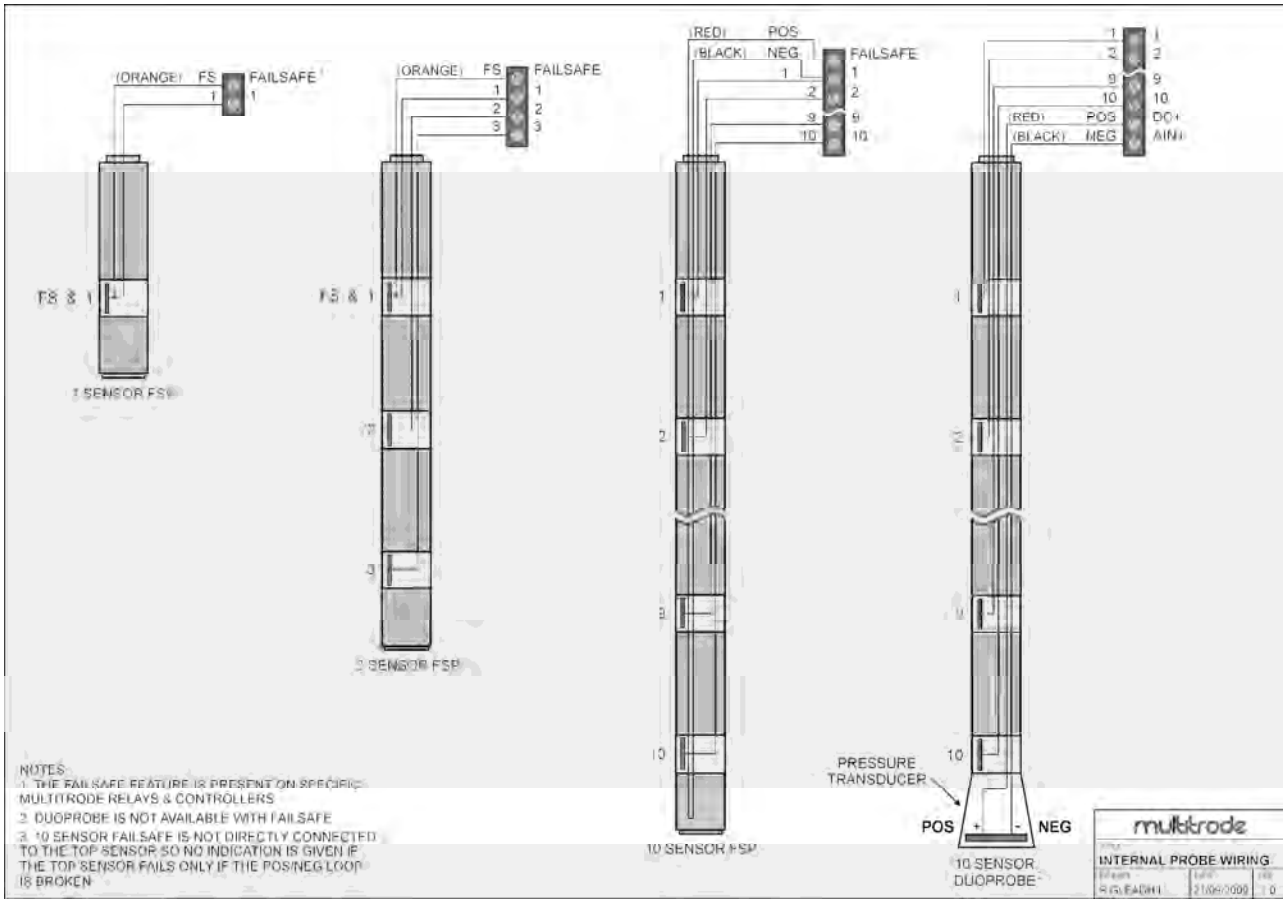


Figure 9 – MultiSmart DuoProbe Wiring

Internal Probe Wiring



9 Trouble Shooting

Controller fails to activate (when expected)	• Remove probe connection from controller • Short circuit the probe inputs on the controller to ground, start with p10 working your way down to p1
Does the controller activate?	• No, Setup problem or actual faults on controller - go to trouble shooting guide or the product manual • Yes, This means controller functional - while the probe (or probe segment) is immersed measure the resistance to ground of that sensor with a high Ω resistance meter. • Is it-opened circuit? • Yes - end of issue – wires faulty – check for damages cables • No – Check grounding on earth rod in pit, and grounding on Controller, check for earth continuity across installation *Note: External contamination such as excess oil can insulate probe in areas such as wash down plants and workshops for diesel motors.*
Pumps activate prematurely	• Check sensitivity setting on controller. Set to next lowest setting. *Note: This is caused by external contaminates of sticky composition, and also very conductive – can cause premature activation in some industrial applications.*
Excessive fat build-up on probes	• Move probe to a more turbulent area of pit, preferably close to inflow
Probe works erratically	• Check any junctions in probe cable, especially where moisture can penetrate. *Note: Running the probe cable in the same conduit as pump power cables can cause inductance into probe cable and give false readings.*
High alarm activates after some delay when sensor is immersed	• Check build-up on sensor – clean *Note: This may be caused by some areas containing heavy sludge such as finals of treatment plants, the sludge can, over extended time, dry out over sensor. A delay of 20 to 60 seconds can be experienced due to moisture slowly penetrating build-up. Increasing sensitivity will also remedy the problem.*

10 Technical Specifications

Operation

Failsafe and Conductive sensors:

Characteristic	Specification	Units	Notes
Voltage	10	VAC	1,2
Current	<1	mA	3
Maximum Voltage	22	VAC	1,4

(1) Peak value

(2) Supplied from controller

(3) For controller output impedance Z_o=15K

(4) As specified in UL61010-1 for equipment installed in wet locations with accessible parts. It should be verified that this value is safe for the intended application and that any other applicable standards are consulted. The lowest voltage from the applicable standards should be used.

Pressure Transducer (2 Wire 4-20mA Loop):

Characteristic	Specification	Units	Notes
Red wire	Positive		
Black wire	Negative		
Voltage range	11-28	VDC	1
Max current	22	mA	
Reverse polarity protection	100	V	
Transient protection	400	Watts	2

(1) It should be verified that the final voltage used is safe for the intended application and that any applicable standards are consulted. The lowest voltage from the applicable standards should be used.

(2) 10/1000us Tr/Th waveform

Environmental:

Characteristic	Specification	Units	Notes
Max Submersion Depth	20	metres	
Minimum Liquid Temperature	0	degrees Celsius	1
Maximum Liquid Temperature	40	degrees Celsius	
Min Cable Temperature	-40	degrees Celsius	2
Max Cable Temperature	80	degrees Celsius	2

(1) Non-freezing

(2) Non-flexing

Storage

Characteristic	Specification	Units	Notes
Min Storage Temperature	-20	degrees Celsius	
Max Storage Temperature	70	degrees Celsius	
Min Storage Humidity	5	%	
Max Storage Humidity	95	%	1

(1) Non-condensing