

# LEVEL PROBE

### TYPICAL APPLICATION

For use with any of MPE's pump controllers or conductance relays designed to operate with conductance probe.

#### MADE IN THE U.S.A.

#### DESCRIPTION

The Level Probe provides a rugged, safe, reliable and cost-effective means measure liquid level for waste water pumping applications. The Level Probe may ordered with one, two, three or ten electrodes with various spacing in between.

The Level Probe is typically connected to a pump controller (or conductance relay) t is designed to monitor a conductance probe and perform level measurement. level is detected when the liquid level is high enough to touch one or more of stainless steel electrodes on the Level Probe. The controller (or conductance rel sends out a level sense signal to each electrode on the Level Probe. The sig typically consists of an  $\pm 8V$  or  $\pm 12V$  square wave, capable of supplying no more the 1.5mA. When the liquid being measured touches one of the electrodes, the squ wave signal is diverted to ground through the conductive liquid. The change in signal is detected by the control device and used to determine the liquid level.

The Level Probe is suitable for use in conductive liquids such as waste water, should not be used in storm water, well water, lake water, or other liquids which are conductive enough to provide a reliable level measurement.

All non single point probes come standard with a LPB-1 (small level probe brack and S Hook.

٦г

				60
				3.5"
	1	Π	昌	Ļ
	2	Г		5
	3	I		Ĭ
to be	4	г		
that The	5	I		D 
the lay)	6	Г		_
han	7	H		
the and	8	Е		
not	9	H		 2"
ket)	10	Г	<u>+</u> 1.25"	2.5"

SPECIFICATIONS				ORDERING INFORMATION				
Electrode N	/laterial:	High Grade Stainless Steel Alloy		I Probe Leng	Part Number: th (inches) —	LP - <u>A</u> - <u>B</u> - <u>C</u>		
Probe Casi	ng Material:	PVC		Number of I	Electrodes			
Cable Mate Multi-Ele Single-E	erial ectrode: Electrode:	PVC/PVC EPDM		Available C	combinations:			
Operating <sup>-</sup>	Гетр:	+32 to +140 °F		Probe Length (inches)	Number of <u>Electrodes</u>	Spacing Between <u>Electrodes (inches)</u>		
				<b>A</b> 7	<b>В</b> 1	D X		
				19	3	6		
				52	10	5		
		UL 913		61	10	6		
( U	<b>'</b>	//		79	10	8		
ß	シ	UL FILE #		97	10	10		
119	TEN	E189808		115	10	12		
LIS	ICU							
Intrinsically Safe; For use in Class 1, Groups A, B, C, D. Hazardous Locations when installed with suitable Intrinsically Safe Barrier,				Contact M.P. Ele	ectronics for cu	stom probe availability.		
in accordance with Control Drawing No. 0304.			Cable Length (f	eet) C 50, 1	00			

### **LEVEL PROBE**

#### Control Drawing No. 0304 Page 1 of 2

#### **TYPICAL LIFT STATION APPLICATION**



Notes for Control Drawing 0304 Page 1 of 2:

- 1. Level Probe Entity Parameters: Vmax = 30.3 V Imax = 88.6 mA Pmax = 672 mW Ci = 6 nF Li = 20 μH
- 2. The Barrier output current must be limited by a resistor such that the output voltage versus current plot is a straight line drawn between the open-circuit voltage and the short-circuit current.
- 3. The Barrier must be third party listed as providing intrinsically safe circuits for the application, and have Voc not exceeding Vmax, Isc must not exceeding Imax, and Po of the Barrier must be less than or equal to the Pmax of the Level Probe, as shown in Table 1.
- 4. The capacitance and inductance of the cable from the Level Probe to the Barrier shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci, must be less than the marked capacitance, Ca, shown on the Barrier used. The same applies for inductance (Lcable, Li and La respectively). Where cable capacitance and inductance per foot are not known, the following values shall be used: Ccable = 60 pF/ft, Lcable = 0.2 µH/ft.
- 5. If Po of the Barrier is not known, it may be calculated using the formula Po = (Voc \* lsc)/4.
- 6. The Barrier must be installed in accordance with its manufacturer's control drawing and Article 504 of the National Electric Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.
- 7. The hazardous location ground and the Barrier ground must be connected to the ground bus in the power distribution panel. The ground bus must be connected to a suitable ground electrode per the National Electric Code (ANSI/NFPA 70) or other local codes, as applicable. The resistance of the ground path from the Barrier to the ground electrode must be less than 1 Ohm.
- 8. This associated apparatus (Barrier) must not be used in combination with another associated apparatus unless permitted by the associated apparatus certification.

Level Probe Part Number: LP					
Probe Length (inches) Number of Electrodes 1, 2, 3, or 10					
Cable Length (feet)					

	Table 1	
Level Probe		Barrier
Vmax	≥	Vt
Imax	≥	lt
Pmax	≥	Po
Ci + Ccable	≤	Ca
Li + Lcable	≤	La

Revision Date: 7-13-10

### LEVEL PROBE

#### Control Drawing No. 0304 Page 2 of 2

#### UNGROUNDED TANK APPLICATION



Notes for Control Drawing 0304 Page 2 of 2:

- 1. Level Probe Entity Parameters: Vmax = 30.3 V Imax = 88.6 mA Pmax = 672 mW Ci = 6 nF Li = 20 μH
- 2. The Barrier output current must be limited by a resistor such that the output voltage versus current plot is a straight line drawn between the open-circuit voltage and the short-circuit current.
- 3. The Barrier must be third party listed as providing intrinsically safe circuits for the application, and have Voc not exceeding Vmax, Isc must not exceeding Imax, and Po of the Barrier must be less than or equal to the Pmax of the Level Probe, as shown in Table 1.
- 4. The capacitance and inductance of the cable from the Level Probe to the Barrier shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci, must be less than the marked capacitance, Ca, shown on the Barrier used. The same applies for inductance (Lcable, Li and La respectively). Where cable capacitance and inductance per foot are not known, the following values shall be used: Ccable = 60 pF/ft, Lcable = 0.2 µH/ft.
- 5. If Po of the Barrier is not known, it may be calculated using the formula Po = (Voc \* Isc)/4.
- 6. The Barrier must be installed in accordance with its manufacturer's control drawing and Article 504 of the National Electric Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.
- 7. The hazardous location Ground Probe and the Barrier ground must be connected to the ground bus in the power distribution panel. The ground bus must be connected to a suitable ground electrode per the National Electric Code (ANSI/ NFPA 70) or other local codes, as applicable. The resistance of the ground path from the Barrier to the ground electrode must be less than 1 Ohm.
- 8. This associated apparatus (Barrier) must not be used in combination with another associated apparatus unless permitted by the associated apparatus certification.

Level Probe Part Number: LP	
Probe Length (inches) Number of Electrodes 1, 2, 3, or 10 Cable Length (feet)	

	Table 1	
Level Probe		<b>Barrier</b>
Vmax	≥	Vt
Imax	≥	lt
Pmax	≥	Po
Ci + Ccable	≤	Ca
Li + Lcable	≤	La

Ground Probe Part Number: LP - 7 - 1 - Cable Length

Revision Date: 7-13-10

2.5

(+)

TO CONTROL INPUTS

TBC 1 2 3 4 5 6 7 8 9 10

TO CONTROL INPUTS

LPSA10

6 7 8 9 10



## LEVEL PROBE SURGE ARRESTOR

49

Æ

LEVEL PROBE SURGE ARRESTOR

LPSA10

(Hole Sized for #8 Mounting Hardware)

GND

٩

TBL

0.165"

2

3

4

5 h ELECTRODE

(+)

#### TYPICAL APPLICATIONS

For use with MPE's level control devices that have conductance probe inputs for level measurement.

#### DESCRIPTION

The Level Probe Surge Arrestor provides transient surge protection for the control inputs of any of MPE's pump control devices that have conductance probe inputs for level measurement.

The unit has ten channels and may be used with any of MPE's ten electrode conductance probes (Level Probes), but can also be used with single electrode, or three electrode probes.

Each channel has an MOV (Metal-Oxide Varistor) that is capable of shunting large transient currents to ground (up to 1000 Amps).

Following each MOV is a TVS (Transient Voltage Suppressor Diode) capable of limiting the voltage going to the controls inputs from going beyond ±26V.

Between each MOV and TVS is a  $100\Omega$ . 5 Watt wirewound resistor that protects the TVS from excessive voltages and currents not stopped by the MOV.

The grounding terminal on the LPSA10 must be connected to the control panel ground by a 12AWG wire.



## LEVEL PROBE CONVERTER



MADE IN THE U.S.A.

#### **TYPICAL APPLICATIONS**

For use with any 10 electrode conductance probe where an analog 4-20mA level signal is required.

#### **DESCRIPTION**

The Level Probe Converter senses liquid level and provides a 4-20mA analog output for use by a pump controller or PLC to control liquid level. The unit monitors the ten electrodes on a Level Probe, and provides an analog signal that is proportional to level. All setup is easily done using the four DIP switches on the unit. The Sensitivity of the unit must be set for the type of liquid being detected (see table below). The Analog Output Delay setting provides control over how fast the analog output transitions from one level output value to another. It takes 10 times the Analog Output Delay setting value to go from 4mA to 20mA, when the electrodes are covered quickly. When the electrodes are slowly covered one at a time, the Analog Output Delay is used to provide a smooth transition as the level goes from electrode to electrode.

DIP S	LEVEL PRO	BE Y	OFF OFF	TYPICAL SEWAGE		ON LIC OFF SE	GHT EWAGE
3 I 4	ANALOG OUTPUT DELAY	OFF 2 OFF	SEC	ON 5 SEC OFF	OF	F 10 SEC	ON ON 30 SEC

#### **SPECIFICATIONS**

Supply Voltage: Supply Current: Analog Output:

Sensor Output Voltage: Sensor Output Current: Operating Temp: Storage Temp: Enclosure:  $\begin{array}{l} 24 \, \text{VDC} \pm 10\% \\ 75 \, \text{mA max} \\ \text{Non-Isolated} \ 4-20 \, \text{mA} \\ \text{Maximum Load} \ 600 \, \Omega \\ \pm 8 \, \text{V} \ \text{Square Wave} \ @ \ 60 \, \text{Hz} \\ 0.8 \, \text{mA max} \ (\text{per sensor}) \\ -20 \ \text{to} \ +65 \ ^{\circ}\text{C} \\ -45 \ \text{to} \ +85 \ ^{\circ}\text{C} \\ \text{Aluminum, Din Rail Mounted} \end{array}$ 



ORDERING INFORMATION Model Number: LPC420

### LEVEL PROBE CONVERTER

#### **CONNECTION DIAGRAM**





## LEVEL PROBE **CONVERTER REVERSE MOUNT**

MADE IN THE U.S.A.

### TYPICAL APPLICATIONS

For use with any 10 electrode conductance probe where an analog 4-20mA level signal and a panel mounted level display are required.

#### DESCRIPTION

The Reverse Mount LPC420 allows for viewing of the level display with the deadfront door closed, as well as open. Settings and connections are made on rear of unit.

The Level Probe Converter senses liquid level and provides a 4-20mA analog output for use by a pump controller or PLC to control liquid level. The unit monitors the ten electrodes on a Level Probe, and provides an analog signal that is proportional to level. All setup is easily done using the four DIP switches on the unit. The Sensitivity of the unit must be set for the type of liquid being detected (see table below). The Analog Output Delay setting provides control over how fast the analog output transitions from one level output value to another. It takes 10 times the Analog Output Delay setting value to go from 4mA to 20mA, when the electrodes are covered quickly. When the electrodes are slowly covered one at a time, the Analog Output Delay is used to provide a smooth transition as the level goes from electrode to electrode.

DIP S	LEVEL PRO SENSITIVIT	BE Y	OFF OFF	TYPICAL SEWAGE		ON LIG	GHT EWAGE
3 I 4 WITCH	ANALOG OUTPUT DELAY	OFF 2 OFF	SEC	ON 5 SEC OFF	OF ON	F 10 SEC	ON ON 30 SEC

#### **SPECIFICATIONS**

Supply Voltage: Supply Current: Analog Output:

Sensor Output Voltage: Sensor Output Current: Operating Temp: Storage Temp: Enclosure:

24 VDC ±10% 65 mA max Non-Isolated 4-20 mA Maximum Load 600 Ω ±8 V Square Wave @ 60 Hz 0.8 mA max (per sensor) -20 to +65 °C -45 to +85 °C Aluminum, Panel Mounted



Model Number: LPC420-RM

### LEVEL PROBE CONVERTER



## LEVEL PROBE CONVERTER w/ RELAYS



MADE IN THE U.S.A.

**TYPICAL APPLICATIONS** For use with any 10 electrode conductance probe where an Analog 4-20mA level signal and Relay Outputs are required.



#### **DESCRIPTION**

The Level Probe Converter senses liquid level and provides a 4-20mA analog output for use by a pump controller or PLC to control liquid level. The unit monitors the ten electrodes on a Level Probe, and provides an analog signal that is proportional to level. The unit also provides 10 Relay Outputs with contacts that close as the liquid covers the respective Level Probe electrodes. The Relay Outputs may be used for pump control, level alarms or telemetry.

All setup is easily done using the four DIP switches on the unit. The Sensitivity of the unit must be set for the type of liquid being detected (see table below). The Analog Output Delay setting provides control over how fast the analog output transitions from one level output value to another. It takes 10 times the Analog Output Delay setting value to go from 4mA to 20mA, when the electrodes are covered quickly. When the electrodes are slowly covered one at a time, the Analog Output Delay is used to provide a smooth transition as the level goes from electrode to electrode.

DIP S	LEVEL PRO	BE Y	OFF OFF	TYPICAL SEWAGE		ON LIG	GHT EWAGE
	ANALOG OUTPUT	OFF	SEC	ON 5 SEC	OF	F 10 SEC	ON 30 SEC
	DELAT	011		011			011

SPECIFICATIONS					
Input Power:	120 VAC ±10% 7.7 VA max or 24 VDC ±10% 160 mA max				
Analog Output:	Non-Isolated 4-20 mA Maximum Load 600 Ω				
Relay Outputs:	6 A @ 120 VAC				
Sensor Output Voltage:	±8 V Square Wave @ 60 Hz				
Sensor Output Current:	0.8 mA max (per sensor)				
Operating Temp:	-20 to +65 °C				
Storage Temp:	-45 to +85 °C				
Enclosure:	Aluminum, Din Rail Mounted				







ORDERING INFORMATION Model Number: LPC420R

## LEVEL PROBE CONVERTER w/ RELAYS



CONNECTION IS REQUIRED ON BOTH J2 PIN 3 AND J4 PIN G.



### LEVEL PROBE CONVERTER w/ RELAYS REVERSE MOUNT

#### TYPICAL APPLICATIONS

For use with any 10 electrode conductance probe where an analog 4-20mA level signal, relay outputs and a panel mounted level display are required.



#### DESCRIPTION

The Reverse Mount LPC420 allows for viewing of the level display with the deadfront door closed, as well as open. Settings and connections are made on rear of unit.

The Level Probe Converter senses liquid level and provides a 4-20mA analog output for use by a pump controller or PLC to control liquid level. The unit monitors the ten electrodes on a Level Probe, and provides an analog signal that is proportional to level. The unit also provides 10 Relay Outputs with contacts that close as the liquid covers the respective Level Probe electrodes. The Relay Outputs may be used for pump control, level alarms or telemetry.

All setup is easily done using the four DIP switches on the unit. The Sensitivity of the unit must be set for the type of liquid being detected (see table below). The Analog Output Delay setting provides control over how fast the analog output transitions from one level output value to another. It takes 10 times the Analog Output Delay setting value to go from 4mA to 20mA, when the electrodes are covered quickly. When the electrodes are slowly covered one at a time, the Analog Output Delay is used to provide a smooth transition as the level goes from electrode to electrode.

DIP S	LEVEL PRO	BE Y	OFF OFF	TYPICAL SEWAGE		ON LIC	GHT EWAGE
MITCH	ANALOG OUTPUT DELAY	OFF 2 OFF	SEC	ON 5 SEC OFF	OF ON	F 10 SEC	ON ON 30 SEC

#### **SPECIFICATIONS**

Input Power:	120 VAC ±10% 7.7 VA max or
	24 VDC ±10% 160 mA max
Analog Output:	Non-Isolated 4-20 mA Maximum Load 600 Ω
Relay Outputs:	6 A @ 120 VAC
Sensor Output Voltage:	±8 V Square Wave @ 60 Hz
Sensor Output Current:	0.8 mA max (per sensor)
Operating Temp:	-20 to +65 °C
Storage Temp:	-45 to +85 °C
Enclosure:	Aluminum, Panel Mounted









ORDERING INFORMATION Model Number: LPC420R-RM

## LEVEL PROBE CONVERTER w/ RELAYS



4. WHEN THE UNIT IS POWERED FROM 120VAC, A GROUND CONNECTION IS REQUIRED ON BOTH J2 PIN 3 AND J4 PIN G.



## LEVEL PROBE RELAY

MONITORS CONDUCTANCE PROBE AND PROVIDES PUMP CONTROL OR LEVEL ALARM





MADE IN THE U.S.A.

#### DESCRIPTION

The Level Probe Relay senses liquid level and provides a relay output for controlling a pump or level alarm. The unit has two inputs, an ON and an OFF, for connection to two electrodes of a conductance probe. All setup is easily done using the seven DIP switches on the unit. When used for a level alarm the ON and OFF inputs may be connected to the same electrode on the probe, or the ON input may be used by itself. When used for pump control the ON and OFF inputs are typically connected to two different level probe electrodes to provide a latching function. The unit has two pump control modes, Pump Down (empty a tank) and Pump Up (fill a tank) (see table below). When in the Pump Down mode and both inputs detect liquid, the unit energizes the relay and keeps it energized until the level drops to the point where the OFF input no longer detects liquid. When in the Pump Up mode and both inputs detect no liquid, the unit energizes the relay and keeps it energized until the level rises to where the OFF input detects liquid. The Sensitivity of the unit must be set for the type of liquid being detected (see Dip Switch table below). The unit provides a 10 second power up delay to prevent a pump from being turned on too soon after a power interruption. An adjustable ON Delay is provided for use as a lag pump delay.

The adjustable OFF Delay is provided so that the unit may be used to provide timed off, backup pump control. (See the Dip Switch table for the ON and OFF delay settings).

DIP SWITCH	1	SENSITIVITY	OFF TYPICAL SEWAGE		ON LIGHT SEWAGE OFF	
	3	PUMP MODE	OFF - PUMP DOWN (EMPTY)		ON - PUMP UP (FILL)	
	4	ON DELAY	OFF 1 SEC OFF	ON 5 SEC OFF	OFF 10 SEC ON	ON 15 SEC ON
	6	OFF DELAY	OFF 1 SEC OFF	ON 5 SEC OFF	OFF 30 SEC ON	ON 60 SEC ON

#### SPECIFICATIONS

Input Power: Relay Type: Output Rating:

Sensor Output Voltage: Sensor Output Current: Operating Temp: Storage Temp: Enclosure: Base:

120 VAC ±10%, 3.8 VA max DPDT 5 A Resistive @ 240 VAC 5 A Inductive @ 240 VAC ±12 V Square Wave ±1.2 mA max (per sensor) -40°C to +60°C -45°C to +85°C White Lexan Phenolic







12 - PROBE - OFF 11 - PROBE - ON 10 - GROUND 9. 8 🖛 120 VAC 7 - NEUTRAL

#### **ORDERING INFORMATION**

Part Number: LPR-1

# LEVEL PROBE RELAY

#### **APPLICATION EXAMPLE**

The following is an example of how to connect three LEVEL PROBE RELAYs to a LEVEL PROBE, to provide a High Level Alarm and Lead & Lag Pump Call outputs for a typical duplex pump down application:



#### Notes:

- 1. The liquid in the wet well must be grounded to the control panel ground. Where a submersible pump is present, the grounded housing of the pump will provide the required ground connection. If there is no ground connection, a single point Level Probe may be placed near the bottom of the wet well and connected to the control panel ground.
- 2. The High Alarm, Lead On, Lag On and Off Levels are set by selecting the appropriate terminals on the terminal strip (TB), as shown above.
- 3. A Lag Pump Delay may be accomplished by setting 5, 10, or 15 seconds on DIP Switches 4 & 5 on the Lag Pump Call Level Probe Relay.