Mounting and Wiring

Rigidly mount the probe no closer than 50mm (2") from the closest target and no farther than 940mm (37") from the farthest target. The AC-201 probe mounting bracket is ideal for most installations. Mount the control unit in a NEMA type 1, 4, or 12 enclosure according to the anticipated environmental exposure.

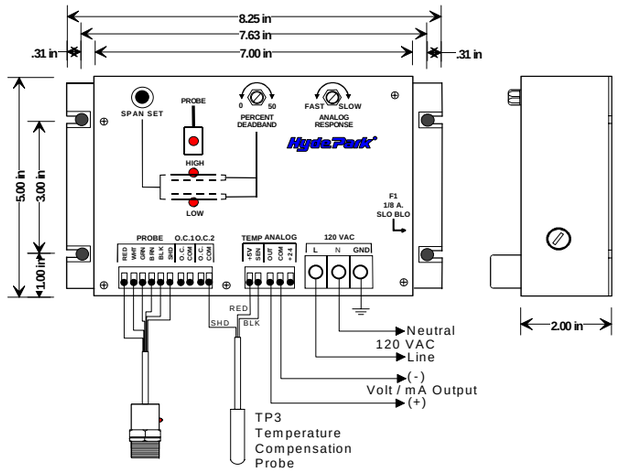


Figure 1 - Wiring Diagram

Configuration Switches and Jumpers (Figure 1)

SW1-1 -Proportional or Inverse Mode

OFF Proportional (Direct) Mode

The analog output is proportional to the target distance from the low limit with the target positioned between the high and low span limits. The analog output value is maximum when the sensed target is at or above the high limit.

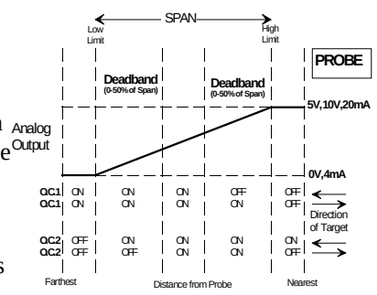


Figure 2 - Proportional Mode

Open Collector #1 (OC1) turns OFF when the target moves just beyond the high span limit. OC1 turns ON when the target returns to the deadband setting which may be at or below the high span limit.

Open Collector #2 (OC2) turns OFF when the target moves just beyond the low span limit. OC2 turns ON when the target returns to the deadband setting which may be at or above the low span limit.

ON Inverse Mode

The analog output is inversely proportional to the target distance from the high limit with the target positioned between the high and low span limits. The analog output is maximum when the sensed target is at or below the low limit.

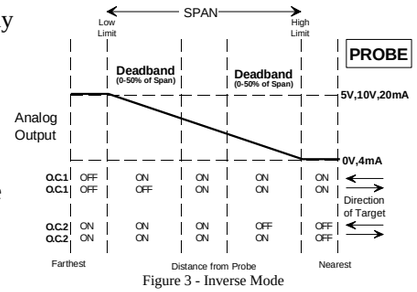


Figure 3 - Inverse Mode

Open Collector #1 (OC1) turns OFF when the target moves beyond the low span limit. OC1 turns ON when the target returns to the deadband setting and may be at or above the low span limit.

Open Collector #2 (OC2) turns OFF when the target moves just beyond the high span limit. OC2 turns ON when the target returns to the deadband setting which may be at or below the high span limit.

SW1-2,3 - Probe Sensitivity Mode

Optimum sensitivity for target surface conditions and sensing distances.

SW1-2	SW1-3		
OFF	OFF	Low	Hard surfaces or short
ON	OFF	Low/Medium	sensing distances
OFF	ON	Medium/High	Soft surfaces or long
ON	ON	High	sensing distances

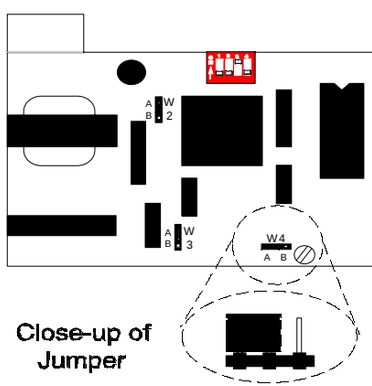
SW1-4 - Span Limit Setup Time Mode

ON Unlimited time for setting high and low span limits.

OFF Limited 20 second time period for setting high and low limits

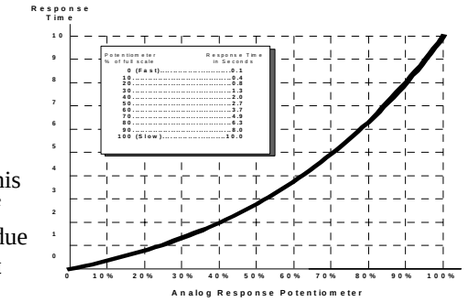
Jumpers for Analog Output

	W2	W3	W4
4-20 mA	A	A	A
0-5 Volts	B	B	B
0-10 Volts	A	B	B



Analog Response Adjustment

A one turn potentiometer allows adjustment of the analog signal response to abrupt probe-to-target distance changes. The response time is adjustable from 0.1 to 10 seconds. This feature enables damping of rapid or spurious changes due to erratic or irregular target profiles and patterns,



allowing smooth speed modulation or control regulation of process equipment. The responses of the open collector outputs, the analog output, and the span limit LED indicators are affected by the response potentiometer setting. Figure 4 graphically illustrates the analog signal response time relationship to the potentiometer setting.

Deadband Adjustment

A one-turn potentiometer allows the user to adjust the width of the deadband or zone separating the ON and OFF states for the two open collector span limit outputs. Open collector outputs, O.C.1 and O.C.2 turn OFF respectively at the set response time after the target moves just beyond the corresponding span limit. The deadband determines the point at or inside the span limits where the open collector outputs turn back ON. See Figures 2 and 3. Deadband adjustment is from 0-50% of the set span. A setting of 0% turns the two open collectors ON at their respective span limits. A setting of 50% turns the two open collectors ON at the midpoint between the span limits.

Loss of Echo Signal Hold

If the system fails to receive echoes from within its sensing range for more than one second (loss of signal), both open collector outputs turn OFF and the analog output holds the value last known position of the object. When the system again receives echoes from within its sensing range, the open collector and analog outputs reflect the probe-to-target distance. The analog signal update rate is determined by the setting of the "ANALOG RESPONSE" potentiometer.

Temperature Compensation

The controller uses feedback from an optional temperature sensor (Model TP3) to maintain stable span limits and distance readings over wide temperature ranges. If there is a need to maintain close tolerances, and the sensing is in areas of wide temperature variations, the use of the TP3 probe is recommended. It should be placed in close proximity to the PR100 or PR101 for best results.

Span Limit Setup

Span limits are set using the Span Set pushbutton on the controller. To set, position a target at the distance desired for one of the limits. (Either limit may be set first).

When using limited setup time (SE1-4 OFF), the low and high LEDs flash alternately after the first press of the Span Set pushbutton. Reposition the target for the other limit, press and release the Span Set pushbutton. The LEDs stop flashing, indicating the new span limits are now set and stored in the non-volatile memory of the controller. If the second limit is not selected within 20 seconds, the LEDs stop flashing, and the span limits revert back to the previous settings.

When using the unlimited setup time period (SW 1-4 ON) to set the span limits, the LEDs flash alternately after setting either one of the limits and continue flashing indefinitely until the other limit is set into the controller memory or until power is turned OFF.

Minimum allowed span between limits is ½". The low and high LEDs flash simultaneously after the press and release of the Span Set pushbutton if the attempted span setting is less than ½". The LEDs continue to flash until the Span Set pushbutton is pressed again or 10 seconds have elapsed. Pressing and releasing the Span Set pushbutton re-initiates the setup process. If 10 seconds elapse, the span limits revert back to the previous settings.

During the setup operation, both open collector outputs are turned OFF, and the analog output value is set as if the object or target is at the high limit.

Indicators

The high and low LEDs have special meaning during setup. The following is for normal operation.

High LED	**ON**	Sensed target position is above the high limit
	OFF	Sensed targer position is below the high limit.
Low LED	**ON**	Sensed target position is above the low limit.
	OFF	Sensed target position is below the low limit.
Probe LED	**ON**	Sensed target is inside range
	OFF	Sensed target is either outside range or not returning a recognizable echo

General Specifications

Power Supply:

Supply Voltage:	100-132 VAC 50-60Hz.
Current:	100mA (typ.)

Sinking Output (OC1 and OC2):

Maximum load current:	100 mA
Maximum applied voltage (breakdown):	60 VDC
Response Time:	0.1 - 10 seconds
Protection:	ESD and over-current

Analog Output:

Configurable:	0-5 Volts min. load 500Ω 0-10 Volts min. load 1kΩ 4-20 mA max. load 700Ω (1kΩ w/3-wire)
Linearity:	±0.635mm (0.025") over range of sensor

Sensing:

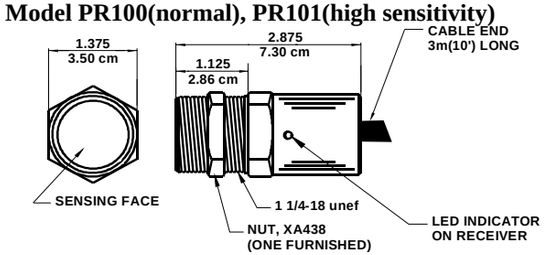
Range:	50mm to 940mm (2"-37")
Sensor Angle with Respect to Target:	90° ±10°
Repeatability:	±0.254mm (0.10") from smooth flat surface at constant air temperature
Maximum Probe mounting distance:	200ft. (Belden cable type 9535)

Temperature:

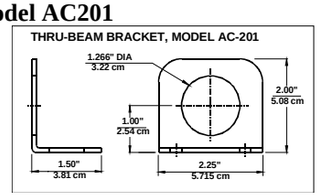
Operating Temperature:	0°C to 50°C (32°F to 122°F), @ 100% relative humidity

Probe Ratings and Approvals:	NEMA 1, 3, 4x, 12, 13, and IP 67
Material:	303 Stainless Steel

Probes, Model PR100(normal), PR101(high sensitivity)



Probe Bracket, Model AC201



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SUPERPROX®

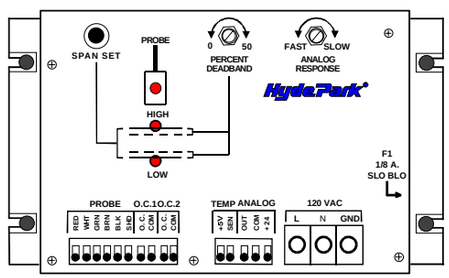
SP186

sensing and control solutions

Ultrasonic Level/Distance Sensing System w/Loss of Echo Signal Hold

Operating Instructions

This stand-alone ultrasonic sensing system monitors the position of a target and generates a proportional analog output signal relative to two established set points. When product level in a filler machine is the target, the analog signal modulates the product flow to maintain a constant level as the machine speed changes. This continuous level correction ensures a smoother process flow and a more uniform fill of the product. The analog signal may also modulate the speed of processing and packaging machinery as well as control other equipment through two discrete limit outputs. Or, the analog signal may connect to programmable controller analog input modules for closed loop control or simple status monitoring. The analog controller output is jumper selectable for either 0-5 volts, 0-10 volts, or 4-20 milliamps. The analog signal linearly tracks the target



position in the zone between the high and low span limits which are set through a push button on the control unit. When power is off or interrupted, the span limits are retained in a non-volatile memory.

Two open collector outputs are included for operating alarm devices or controlling associated process equipment. Both open collectors are ON when the target is at or between the high and low span limits. One open collector output turns OFF when the target moves just beyond the high span limit. The other turns OFF when the target moves just beyond the low span limit.

Analog signal response damping is a standard feature that prevents sudden analog signal changes from occurring when abrupt changes occur in the sensed probe-to-target distance. This feature provides a smooth following signal for optimum process control.