PROCON

MODEL 900L
LIQUID LEVEL CONTROLLER

-STATUS-

○ HH SENSOR

○ HI SENSOR

○ LO SENSOR

○ LL SENSOR

-INPUT-

▲

▼

SIL / FILL

STOP / RESET

PROCON

LIQUID LEVEL CONTROLLER

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MODEL 900L
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MODEL 900L
LIQUID LEVEL CONTROLLER

The Model 900L is a Microprocessor based Stand Alone Liquid Level Controller. The following are highlights of some of the main features of the controller:

    *COMPATIBLE WITH CONDUCTIVE OR DRY CONTACT PROBES
    *ADJUSTABLE SENSOR SENSITIVITY
    *PROGRAMMABLE SENSOR TIME DELAY
    *PROGRAMMABLE ANTI-FLOOD FILL TIMER
    *2 AMP, AC, SOLID STATE OUTPUTS
    *ACCESS CODE PARAMETER PROTECTION
    *EEPROM PARAMETER MEMORY (MINIMUM 10 YEAR LIFE)
    *AUDIO ANNUNCIATOR
    *ALL PARAMETERS SET IN SOFTWARE -
    *BRIGHT FOUR DIGIT LED DISPLAY
    *SMOOTH FACE CONSTRUCTION

The following table lists the models that are available:

MODEL	VOLTAGE
900LA	24 VAC
900LB	120 VAC

A 2 Amp, AC, Solid State Output is provided to control the Fill solenoid.

A 2 Amp, AC, Solid State Output is provided to indicate the HI-HI Alarm.

Common emitter outputs are provided to indicate the alarm status of the controller.

Independent time delays can be set for each of the four Liquid Level probe inputs.

LED DISPLAY

A four character Seven Segment display is utilized for operator interface. Several messages are used to indicate the current system mode and any alarms that might be active. If multiple alarms are present, only the lowest number alarm will be displayed. The following is a description of the display messages:

STDB – This indicates that the system is in the STANDBY mode. In this mode, the fill output is turned off and the Status LED's show the state of the Liquid Level Sensors. The controller will power up in this mode if the Auto Start parameter is set to NO.

FILL – This indicates that the system is in the FILL mode. The controller will power up in this mode if the Auto Start parameter is set to YES

NOR – This indicates that the system is in the MAINTAIN (NORMAL) mode.

ERR0 – This ALARM indicates that there is an internal malfunction of the controller and that the system might not be operating properly.

ERR1 – This ALARM indicates that the tank was not empty when the controller entered the FILL mode. This alarm is disabled when the Start Empty parameter is set to NO or when the system is in the STANDBY mode.

ERR2 – This ALARM indicates that liquid has been detected at the High-High sensor. This alarm will turn off the Fill output and turn on the HI HI Alarm output

ERR3 – This ALARM indicates that the fluid level has dropped below the Low-Low sensor. This alarm will only be monitored when the controller is not in the STANDBY mode and after fluid has initially been detected at the Low-Low sensor.

ERR4 – This ALARM indicates that an invalid sensor combination has been detected. The LED indicators can be used to determine which probe is out of sequence. This alarm will turn off the Fill output

ERR5 – This ALARM indicates that the Fill Timer has timed out, a possible tank overflow or low flow condition. This alarm will turn off the Fill output.

NOTE – If more than one alarm is active, only the lowest number alarm will be displayed.

LED INDICATORS

Four discrete LEDs are provided to indicate the current system status. They are labeled HH SENSOR, HI SENSOR, LO SENSOR, and LL SENSOR:

HH SENSOR - Indicates that the fluid level is at the HH Probe.

HI SENSOR - Indicates that the fluid level is at the HI Probe. This LED will blink to indicate that the Fill output is ON and the tank is filling to this level.

LO SENSOR - Indicates that the fluid level is at the LO Probe. This LED will blink to indicate that the Fill output is ON and the tank is filling to this level.

LL SENSOR - Indicates that the fluid level is at the LL Probe. This LED will blink to indicate that the Fill output is ON and the tank is filling to this level.

KEYS

The four keys marked: SIL/FILL, STOP/RESET, UP and DOWN are used to operate and program the unit. The following is a listing of each of the keys and their functions:

SIL/FILL - This is a multifunction key that is used in both Operation and Setup. The function of this key is dependant on the current mode of the system.

> **STANDBY MODE** - When in the STANDBY mode, this key will initiate the FILL function.

> **MAINTAIN MODE** - When in the MAINTAIN mode, this key will initiate the FILL function.

> **ALARM MODE** - When in the ALARM mode, this key will silence the alarm.

> **SETUP MODE** - When in the SETUP mode, this key causes the controller to step through the parameters.

STOP/RESET - This is a multifunction key that is used in both Operation and Setup. The function of this key is dependant on the current mode of the system.

> **FILL MODE** - When in the FILL mode, this key will place the controller in the STANDBY mode.

> **MAINTAIN MODE** - When in the MAINTAIN mode, this key will place the controller in the STANDBY mode.

> **ALARM MODE** - When in the ALARM mode, this key will reset the alarm.

> **SETUP MODE** - When in the SETUP mode, this key will exit the SETUP mode.

(Note: by depressing and holding the STOP/RESET key at power up, the EEPROM will default to zeroes in the parameter stack. This provides an easy means of resetting the controller parameters.)

UP - In the SETUP mode, depressing the UP key will cause the display to advance. Depressing the key once and releasing will allow the accurate setting of the least significant digit. Holding the key down will activate the automatic, rapid incrementing of the display.

DOWN - In the SETUP mode, depressing the DOWN key will cause the display to decrease. Depressing the key once and releasing will allow the accurate setting of the least significant digit. Holding the key down will activate the automatic, rapid decrementing of the display.

SETUP

The SETUP mode is entered by depressing and holding the UP key and then depressing the DOWN key. While in this mode, the SIL/FILL key is used to step through the parameters. The following is a listing of the Code prompts that will appear in the display, when in the SETUP mode. The code will alternately flash with the selected value to indicate to the user the parameter that is currently viewed or set.

CODE	DESCRIPTION
TD1	Time Delay – LL Sensor
TD2	Time Delay – LO Sensor
TD3	Time Delay – HI Sensor
TD4	Time Delay – HH Sensor
FT	Fill Timer
AS	Auto Start
SE	Start Empty
AC1	Access Code 1
AC2	Access Code 2

CODE	SETTING RANGE
TD1	0:00 to 99:59 Min:Sec
TD2	0:00 to 99:59 Min:Sec
TD3	0:00 to 99:59 Min:Sec
TD4	0:00 to 99:59 Min:Sec
FT	0:00 to 99:59 Min:Sec
AS	Yes or No
SE	Yes or No
AC1	0 to 9999
AC2	0 to 9999

TD1-TD4 –The Time Delay parameters allow a delay between when the input is detected and when action is taken on the input. It is recommended that these delays be set 10 seconds apart to avoid an out of sequence alarm condition.

FT - The Fill Timer is used to prevent flooding or indicate that the system is not filling. This time period will determine the maximum amount of time that the Fill solenoid can be on. If set to 0:00, this timer is disabled. If this timer elapses, the ERR5 alarm will be activated.

AS – The Auto Start parameter determines the startup mode of the controller. If set to YES, the controller will power up in the Fill mode. If set to No, the controller will power up in the STANDBY mode.

SE – The Start Empty parameter determines whether the tank must be empty when the Fill

is initiated from the STANDBY mode. If set to YES, the controller will check the status of the Liquid Level Probes when the FILL key is depressed and the system is in the STANDBY mode. If water is detected at any of the probes, the ERR1 alarm will be activated.

AC1 - The Access Code 1 is the number that must be matched to allow entry into the Programming mode. This number may be changed at any time, but a note should be kept of its value. If set to 0, this function is eliminated.

AC2 - The Access Code 2 is the number that must be matched to reset the alarms.

To exit the SETUP mode, the STOP/RESET key is depressed. When exiting, the unit automatically enters a SAVE mode. This causes the parameters to be written into the EEPROM memory. This is a permanent (10-year minimum life) memory that does not require battery backup.

OPERATION

After the controller has been programmed in the SETUP mode, the Liquid Level System can be run by depressing the SIL/FILL key. The following is a description of controller operation.

STANDBY – In this mode all outputs are off. The Status LED's show the state of the Liquid Level Sensors. Depressing the STOP/RESET key while in either the FILL or MAINTAIN modes will place the controller in this mode.

FILL MODE – The FILL mode is entered by depressing the SIL/FILL key when no alarms are present. This mode can be entered from either the STANDBY or MAINTAIN modes. If this mode is entered from the MAINTAIN mode, the controller will turn ON the Fill output until the fluid reaches the HI Probe, this provides a "Top Off" function. The controller will then enter the MAINTAIN mode.

If this mode is entered from the STANDBY mode, and the Start Empty parameter is set to YES, the controller will check the status of the Liquid Level sensors. If liquid is detected at the Low-Low probe, the controller will enter the ALARM mode and the display will show ERR1. If the tank is empty, the Fill output will turn ON. The Fill output will remain ON until the fluid level reaches the HI Probe. The controller will then enter the MAINTIAIN mode.

MAINTAIN MODE – This mode is entered automatically once the initial FILL has been completed. When this mode is first entered, the Fill output will turn OFF. The output will remain OFF until the fluid drops below the LO Probe. Then the Fill output will turn ON until the fluid reaches the HI Probe. While in this mode, under normal operations, the Fluid level will cycle between the HI Probe and LO probe. If the fluid reaches the HI-HI Probe, the ERR2 alarm will activate and the output will be turned off. If the fluid drops below the LO-LO Probe, the ERR3 alarm will activate.

ALARM MODE – This mode indicates that a failure has been detected in the system. While in this mode the display will flash indicate the failure mode. If the SIL/FILL key is depressed while in this mode, the audio portion of the alarm will be silenced but the display will continue to flash the current alarm. All alarms are of a latching type and must be manually reset.   To reset an alarm the UP and DOWN keys must be depressed simultaneously. The display will then show 'CODE'. The UP and DOWN keys are then used to enter the value set in the ACCES CODE 2 parameter (AC2). Then the SIL/FILL key is depressed to reset the alarms. If the alarm has been silenced, but not reset, the alarm audio will re-sound after 3 Minutes.

STARTUP MODE –This controller has a special feature that selects the mode of the controller when it is first turned on. If the Auto Start parameter (AS) is set to YES, the controller will automatically enter the FILL mode. If the Auto Start parameter is set to NO, the controller will power up in the STANDBY mode.

FILL TIMER – A special timer is incorporated into the controller to help prevent flooding or detect a Low or No Flow condition. It is possible that the tank could overflow if the top two Liquid Level Probes were faulty or became disconnected, or never fill if a manual valve were turned off. This timer will limit the amount of time that the Fill solenoid can remain on. If the Fill Timer times out, the ERR5 alarm will activate and the Fill output will be turned OFF.

TARGET LEVEL INDICATOR – This feature will indicate that the Fill output is ON and identify the target fluid level of the tank. For example, if the Tank is empty and the system is in the STANDBY mode, when the FILL key is depressed, the Low-Low LED will blink. Once the level reaches the Low-Low Sensor, the Low-Low LED will stay on and the Low LED will blink. When the fluid reaches the Low Sensor, the Low LED will remain on and the HI LED will blink. When the fluid reaches the HI Sensor, the HI LED will remain on. At this point the controller will enter the MAINTAIN mode and the Sensor LED's will remain on to indicate that the Fill output is off. When the fluid drops below the LO Sensor the LO LED will blink and the process detailed above will repeat.

SENSITIVITY ADJUSTMENT – Sensitivity adjustment is provided through potentiometers that are accessible from the side of the controller. Each Liquid Level probe input has an independent sensitivity adjustment.

AC OUTPUTS – The controller has two 2 Amp Solid State Outputs. The following describes the function of each output:

> **HI-HI ALARM (HAC)** – This is an alarm output. This output will be normally ON. It will only turn off when a HI-HI Alarm condition is present.

> **FILL SOLENOID (SAC)** –This is the Fill output. This output will be ON or OFF based on the operating mode of the system.

DC OUTPUTS – The controller has three Common-Emitter alarm outputs to indicate failures that are detected by the controller. These outputs are configured such that they can be connected to an external supply to interface with a PLC, or can be connected using the internal +12V supply. Refer to the backpanel drawing number 13-090081-10-00 for connection details. The following is a description of each of the DC Outputs.

> **GENERAL ALARM** –This output will be active anytime an alarm is active. This output will turn off when an alarm is silenced.

> **HI HI ALARM** – This output will be active anytime the "HI HI" alarm is active.

> **LO LO ALARM** – This output will be active anytime the "LO LO" alarm is active.

ALARM TIMER - A special timer is incorporated into the system to re-sound any alarms that have been silenced, but not cleared, after 3 minutes.

ACCESS CODES - In some cases, it may be desirable to restrict access to the SETUP and ALARM RESET modes. An Access Code system is incorporated. The following describes the Access Codes used in the system:

> **ACCESS CODE 1** - If Access Code 1 is set to 0000, the function is eliminated and the system operates as previously described. The code is any number from 1 to 9999, as programmed into the system by the customer's authorized personnel.

> **ACCESS CODE 2** - All alarms are latching. After the alarm condition is cleared, the alarm must be manually reset. Access Code 2 is the number that must be matched to reset the alarms

Once this code is entered, any attempt to enter the SETUP mode will cause 'CODE' to appear in the Timer display. The UP and DOWN keys are then used to enter the Access Code. Once the proper code has been selected, the user simply depresses the FILL key to gain entry into the SETUP parameters and Alarm Reset Function.

BACKDOOR CODE

A special code has been incorporated into the software to insure factory access to all functions no matter what the customer has done with the Access Codes. This code is 953.

MANUAL REVISIONS

Revision #	Program #	Engineering #	Revisions Made
Rev 01	DT953LB	DT900L	Origination

LIMITED WARRANTY

WARRANTY: JPC CONTROLS WARRANTS ITS NEW PRODUCTS TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP UNDER THE SERVICE FOR WHICH THEY ARE INTENDED. THIS WARRANTY IS EFFECTIVE FOR TWELVE MONTHS FROM THE DATE OF SHIPMENT.

EXCLUSIONS: THIS WARRANTY IS **IN LIEU OF** ANY OTHER WARRANTY EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF **MERCHANTABILITY** OR FITNESS FOR A PARTICULAR PURPOSE.

JPC CONTROLS IS NOT LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

NO PERSON OTHER THAN AN OFFICER IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR ASSUME ANY LIABILITY.

REMEDIES: THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY SHALL BE: (1) THE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS OR PRODUCTS, WITHOUT CHARGE. (2) AT THE OPTION OF **JPC CONTROLS**, THE REFUND OF THE PURCHASE PRICE.

SPECIFICATIONS

**MODEL 900L
LIQUID LEVEL CONTROLLER**

TIME DELAY RANGE   0:00 - 99:59 Min:Sec

RESOLUTION   1 Sec.

LIQUID LEVEL SENSITIVITY   50 Ohms – 75 kOhms

DISPLAY   Four, 0.56 Inch High, Seven Segment,
                               LED Uniplanar numerals.
                               Four Discrete LEDs
                               (Red, Green, Amber).

ANNUNCIATOR   Audio Tone, ~ 3200 HZ

SETUP MEMORY   EEPROM, All Parameters

MEMORY RETENTION   10 Years w/o Power

OPERATING RANGE   0 to 50 Degrees C

STORAGE RANGE   -40 to 60 Degrees C

CONSTRUCTION   Enclosure - Kydex, Grey
                               Face - Lexan, Back Printed

SIZE   8.25 x 3 x 5.25 inches (HxWxD)
                               210 x 76 x 133mm

WEIGHT $\leq$ 3 Lbs. (1.4 kg)

CONNECTION   Rear, Screw-Type, 3/8 Inch Centers

OUTPUT   **DC-** Common Emitter Transistor - 100 mA max
                               AC- Triac, 2 Amps max

POWER   900LA - 7 VA,   24 VAC $\pm$10%, 50/60 HZ
                               900LB - 7 VA, 120 VAC $\pm$10%, 50/60 HZ

EXTERNAL POWER SUPPLY OPTION
FOR HI-HI ALARM, LO-LO ALARM,
AND GENERAL ALARM
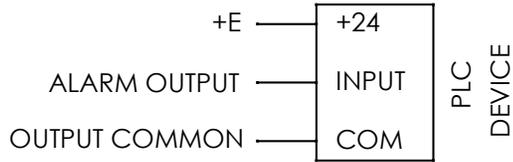
+E —— +24

ALARM OUTPUT —— INPUT

OUTPUT COMMON —— COM

PLC DEVICE

INTERNAL POWER SUPPLY OPTION
FOR HI-HI ALARM, LO-LO ALARM,
AND GENERAL ALARM

+E

+I

ALARM OUTPUT

+ INTERNAL SUPPLY —— +I

HI-HI ALARM —— HHA

LO-LO ALARM —— LLA

GENERAL ALARM —— GA

HH —— HI-HI PROBE

HI —— HI PROBE

LO —— LO PROBE

LL —— LO-LO PROBE

PC —— PROBE COMMON

+E —— + EXTERNAL POWER SUPPLY

OC —— OUTPUT COMMON

HAC —— HI-HI ALARM (AC)

SAC —— SOLENOID (AC)

G / G

H / H   SEE TABLE

N / C

MODEL	VOLTAGE
900LA	24 VAC
900LB	120 VAC
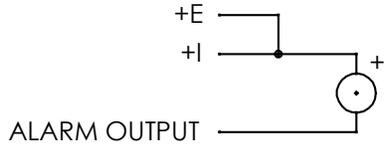
TYPICAL WIRING OF SOLENOID AND
HI-HI ALRM (AC) OUTPUTS

ALARM OUTPUT

QUENCH ARC

N OR C
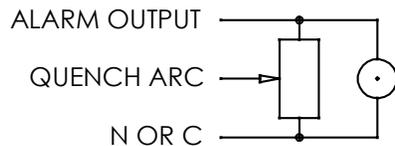
NOTE:

WE RECOMMEND THE USE OF A
QUENCH ARC ON EVERY MECHANICAL
RELAY AND SOLENOID IN THE
SYSTEM. USE PAKTRON P/N
104M06QC100 OR EQUIVALENT.
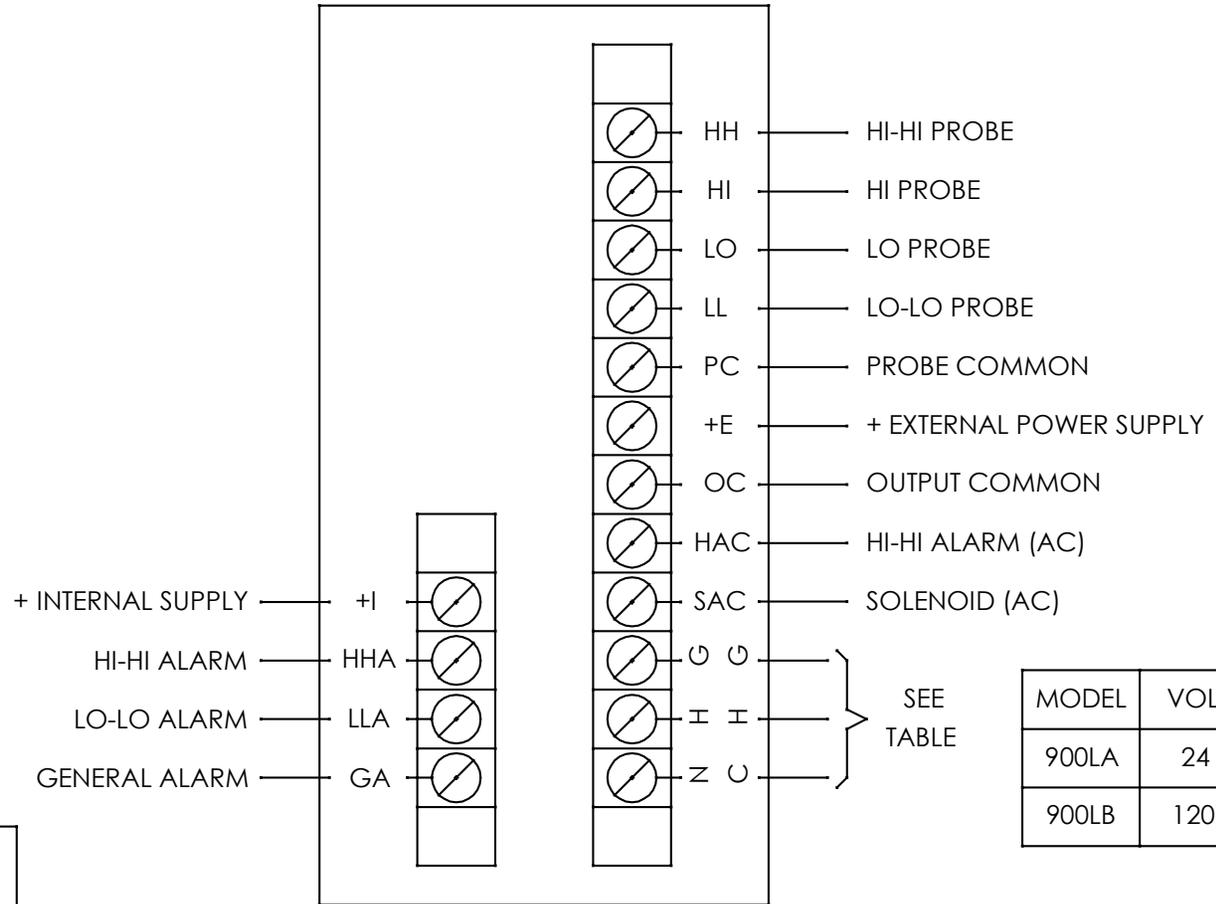
NOTE: +I TERMINAL RATED 12-20 VDC UNREGULATED (100mA).

TOLERANCES UNLESS OTHERWISE SPECIFIED	JPC CONTROLS	A DIVISION OF LLOYD INDUSTRIES, INC. 102 COMPASS PT. DR. STE. D ST. CHARLES, MO. 63301 (636) 946-3300						
	PROCON MODEL 900L LIQUID LEVEL CONTROLLER REAR PANEL							
ALL DIMENSIONS ARE IN INCHES	APPROVAL		DWN BY MPJ	DATE 11/12/02	SCALE NONE	CHKD BY		
	ENG	DATE	SHEET					
PATH = E:\CC\DT900\900LB10.DRW	QA	DATE	1 OF 1	13	090081	10	00	

2.750

TOP VIEW
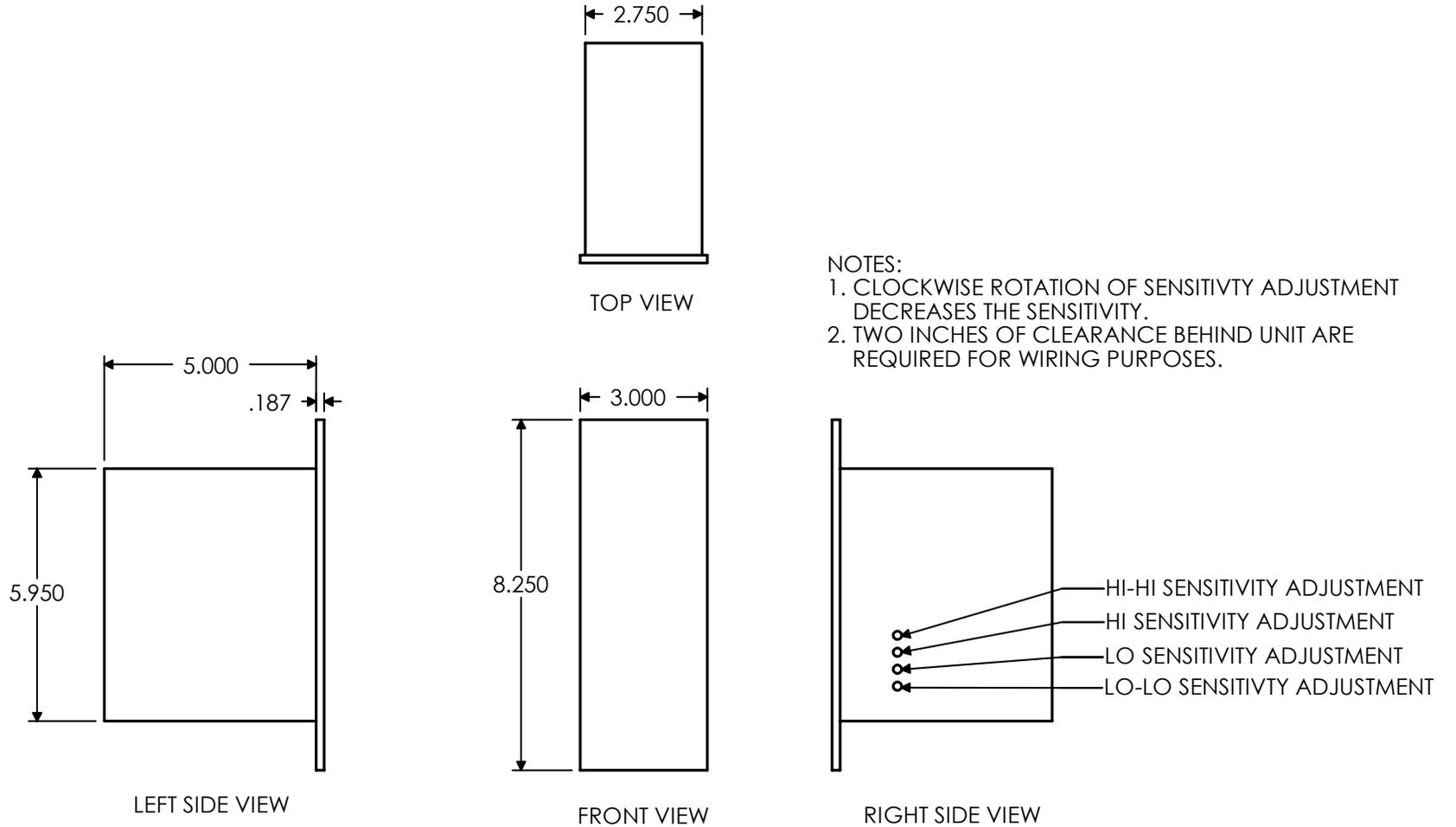
NOTES:
1. CLOCKWISE ROTATION OF SENSITIVTY ADJUSTMENT DECREASES THE SENSITIVITY.
2. TWO INCHES OF CLEARANCE BEHIND UNIT ARE REQUIRED FOR WIRING PURPOSES.

5.000

.187

5.950

3.000

8.250

LEFT SIDE VIEW

FRONT VIEW

RIGHT SIDE VIEW

HI-HI SENSITIVITY ADJUSTMENT
HI SENSITIVITY ADJUSTMENT
LO SENSITIVITY ADJUSTMENT
LO-LO SENSITIVTY ADJUSTMENT

TOLERANCES UNLESS OTHERWISE SPECIFIED		**JPC CONTROLS**	A DIVISION OF LLOYD INDUSTRIES, INC. 102 COMPASS PT. DR. STE. D ST. CHARLES, MO. 63301 (636) 946-3300						
		PROCON MODEL 900L LIQUID LEVEL CONTROLLER PHYSICAL DIMENSIONS							
		APPROVAL		DWN BY	MPJ	DATE 11/12/01	SCALE 1=4	CHKD BY	
ALL DIMENSIONS ARE IN INCHES		ENG	DATE	SHEET					
PATH =E:\CC\DT900\900LP10.SLDDRW		QA	DATE	1 OF 1		44	090082	10	00