



LVP180007 Rev. C

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## LP-30 Pulse Point™



# INSTALLATION, OPERATION & MAINTENANCE MANUAL

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# ***SAFETY INFORMATION***

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**Before installing the Pulse Point level switch, please read these instructions and familiarize yourself fully with the requirements and functions of the sensor.**

**Do not dispose of the carton or packing material until the unit has been inspected for damage. If the unit is received damaged, notify the carrier or the factory for instructions. Failure to do so may void your warranty.**

**The Pulse Point sensor is a precision device. Very high voltage is present on the fork terminals. Always remove power before servicing.**

**All wiring must conform to NEC requirements or local electrical codes.**

**If any questions or problems arise during installation of this equipment, please contact the Bindicator Applications Department at 800-778-9242 or 864-574-8960.**

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## 1.0 PRODUCT DESCRIPTION

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### 1.1 Function

The Pulse Point™ is an electronic, vibratory level control designed for use in powders and granular solids. The Pulse Point uses a vibrating "tuning fork" to sense the presence of material.

The tuning fork contains two piezoelectric crystal assemblies: one "transmit" and one "receive" Piezo crystals convert electrical signals to mechanical movement, and vice versa. High-voltage pulses applied to the transmit crystal cause the tines of the fork vibrate. This vibration is mechanically coupled to the receive crystal which produces a small electrical signal (one-volt pulses). The receive crystal will produce low voltage pulses as long as the fork is vibrating.

If the fork stops vibrating, as it does when in contact with material in the vessel, the receive pulses stop. The electronics recognizes this loss of signal and causes the output relay to change state.

### 1.2 Applications

Unlike radio frequency and capacitance technology sensors, the Pulse Point senses material using a mechanical principle and is therefore not affected by the dielectric constant of the material. This makes it an ideal sensor in plastics, dust, shavings, and low-density powders and food. The Pulse Point can easily sense material as light as 2 lbs/cubic foot (32kg/cubic meter). It can be applied in any free flowing dry material up to 9/16" (14.3mm) in particle size.

### 1.3 Features

Features of the LP-30 Pulse Point include:

- Various models, mounting configurations, and fork coatings available to suit almost any application
- No calibration required
- Adjustable time delay
- Selectable fail-safe operation (high or low level)

## 1.4 Model Code Identification

The Pulse Point LP-30 Series are integral units, which have the electronics and tuning fork in the same enclosures. The fork may be pipe extended up to 10 feet.

### LP-30 Series

LP3 - - A - - G - - 10 -

#### Type (Specify insertion length in inches if applicable)

- 0 = No Pipe Extension (Standard NPT Mounting)
- A = Galvanized 3/4" Pipe Extension
- B = 316 SS 3/4" Pipe Extension
- 1 = Mild Steel Mounting Plate & Galvanized 3/4" Pipe Extension
- 3 = 304 SS Mounting Plate & 316 SS 3/4" Pipe Extension

#### Mounting Configuration

- A = 1 1/2" NPT Mounting
- B = 1 1/2" Pipe Extended
- C = 1 1/4" Mounting
- D = 1 1/4" Pipe Extended

#### Enclosure Rating

G = General Purpose - NEMA 4X

#### Voltage

- 1 = 120VAC
- 2 = 240VAC
- 3 = 100 VAC (Consult Factory)

#### Enclosure Material

A = Aluminum, Polyester Coated

#### Tuning Fork

- 1 = 316 SS
- 3 = 316 SS - Teflon® Coated

#### Pulse Point™ LP-30

**Note:** For direct replacement of Roto-Bin-Dicator control, order the 1 1/4" Pulse Point mounting configuration.

## 1.5 Technical Specifications

### LP-30 Series

<b>Power Requirements</b>	120 VAC or 240 VAC or 100 VAC, 50/60 Hz
<b>Power Consumption</b>	5 VA
<b>Operating Temperature</b>	Electronics: -40° F to 140° F (-40° C to 60° C); Tuning Fork: -55° F to 248° F (-48° C to 120° C)
<b>Output</b>	6A SPDT @ 240 VAC or 28 VDC
<b>Pressure Rating</b>	150 psi (10.5 kg/cm <sup>2</sup> ) with 1½" NPT; 5 psi (0.35 kg/cm cm <sup>2</sup> ) with with mounting plate
<b>Time Delay</b>	Field programmable: ON, OFF or both; Adjustable (0-20 sec)
<b>Fail Safe</b>	Field selectable high/low level
<b>Enclosure Material</b>	Polyester coated aluminum
<b>Enclosure Rating</b>	General purpose NEMA 4X
<b>Tuning Fork</b>	316 SS standard; 316 SS with Teflon coating
<b>Conduit Entry</b>	3/4" NPT Dual
<b>Mounting</b>	1½" or 1¼" NPT; Extended forks can be mounted directly through 1½" or 1¼" NPT coupling
<b>Mounting Plate Material</b>	Mild Steel, 304 SS
<b>Extended Pipe Material</b>	Galvanized or 316 SS
<b>Maximum Pipe Extension</b>	10 ft (3 m)
<b>Status Indicator</b>	None
<b>Minimum Material Density</b>	2 lbs/ft <sup>3</sup> (32 kg/m <sup>3</sup> )

### 1.6 Dimensions

Figures 1 and 2 illustrate the dimensions of the standard 1½" and 1¼" LP-30 units. See the Appendix beginning on page 16 for additional dimensions.

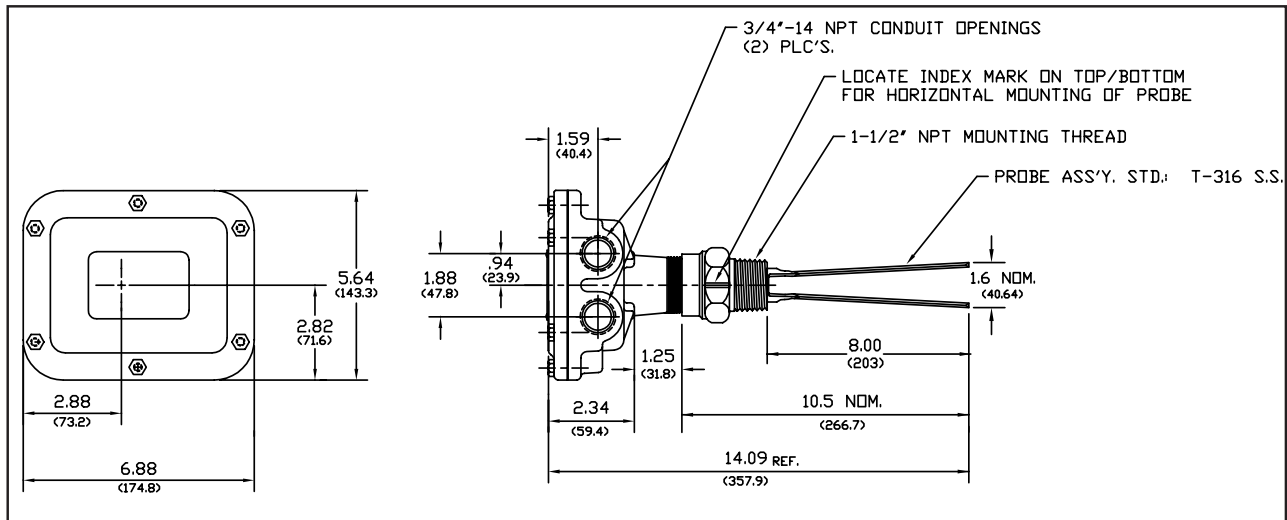


Figure 1. 1½" LP-30 Dimensions

in (mm)

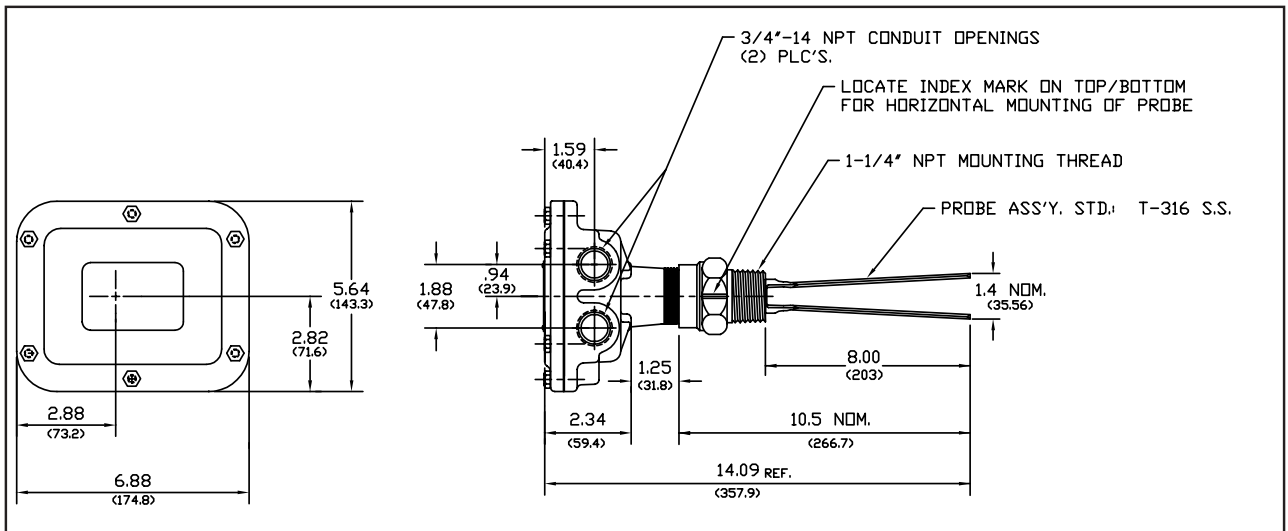


Figure 2. 1 1/4" LP-30 Dimensions

in (mm)

## 2.0 HANDLING & STORAGE

### 2.1 Inspection and Handling

Each package should be inspected upon receipt for damage that may have occurred due to mishandling during shipping. If damage is discovered, notify the shipping carrier immediately. Do not dispose of the carton or packing materials. If you have any problems or questions, consult Bindicator Customer Care at 1-800-778-9242.

### 2.2 Storage

If the Pulse Point sensor is not scheduled for immediate installation following delivery, the following steps should be observed:

1. Following inspection, repackage the unit into its original packaging.
2. Select a clean dry site, free of vibration, shock, and impact hazards.
3. If storage will be extended longer than 30 days, the unit must be stored in a non-condensing atmosphere less than 100% humidity.

**Do not store a non-powered unit outdoors for a prolonged period.**

## 3.0 MECHANICAL INSTALLATION

### 3.1 Guidelines

The following precautions should be observed when installing and operating the Pulse Point:

- The tuning fork assembly is a precision device - handle it carefully
- Remove power from the unit before making any adjustments

**CAUTION: Very high voltage is present on the fork terminals**

- Do not allow moisture to enter the electronics enclosure. Conduit should slope downward from the Pulse Point housing. Install drip loops. Seal conduit with silicone rubber product.
- All wiring must conform to NEC requirements or local electrical codes.

### 3.2 Mounting

The Pulse Point fork must be located at the position where level indication is desired. The fork may be mounted through the top or side wall of the vessel. To ensure reliable operation, observe the following guidelines when choosing the mounting location. See Table 1 (Section 1.4) for mounting types.

- Avoid locations where high levels of vibration are present.
- The fork assembly must be horizontal or pointing downward. DO NOT mount the fork pointing upward. (See Figure 3)

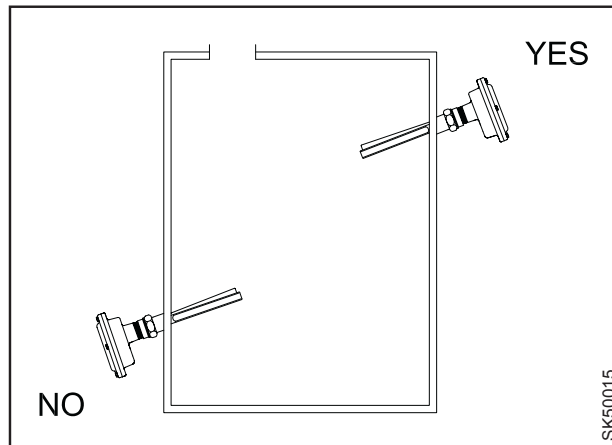


Figure 3. Mounting Dimensions

- The maximum allowable downward force on the fork assembly is 88 pounds. (See Figure 4)
- Calculate the maximum solids head height above a horizontally mounted fork as follows:

$$\text{Maximum height of material (in ft)} = \frac{2200}{\text{bulk density (lbs/ft}^3\text{)}}$$

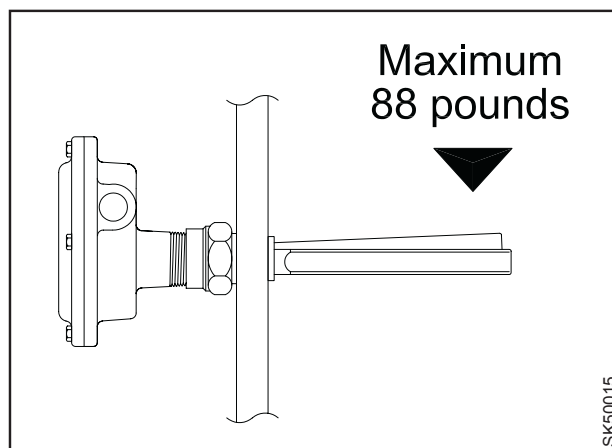


Figure 4. Maximum Downward Force



Do not mount the fork directly in the flow of material. If necessary, use a baffle to protect the fork from falling material. The baffle should be placed 6 to 8 inches above the fork so that material will not become packed between the fork and the baffle. (See Figure 5)

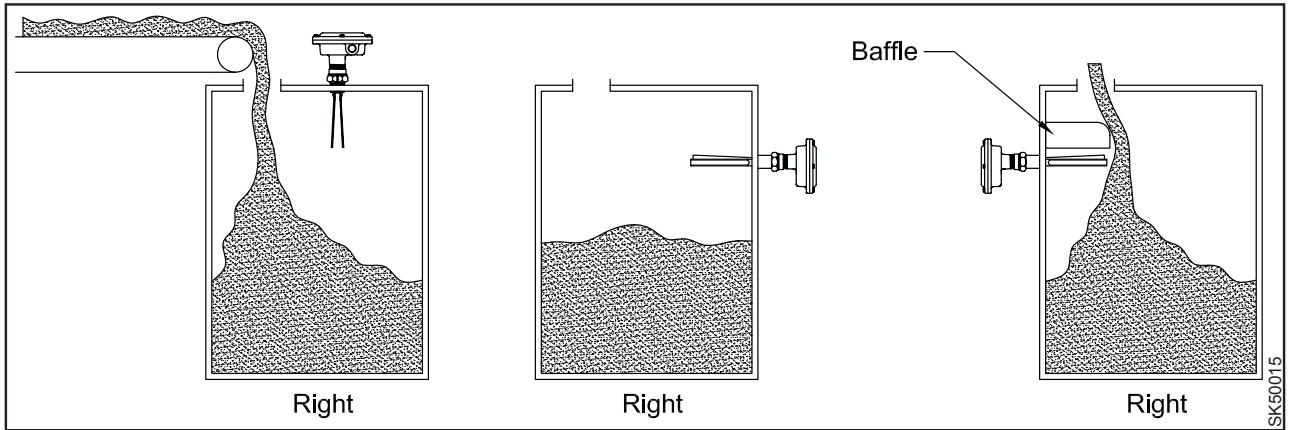


Figure 5. Mounting in Relation to Flow of Material

If the fork is mounted horizontally, it must be positioned so that the material will not accumulate on top of or between the tines. There is an index mark on the mounting nut to assist in proper positioning of the fork. (See Figure 6)

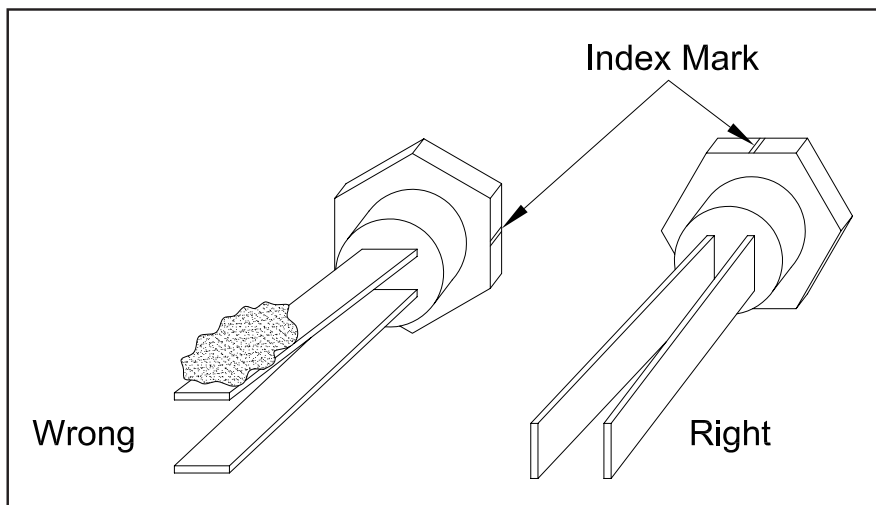


Figure 6. Index Mark

## 4.0 ELECTRICAL WIRING

### 4.1 Guidelines

Electrical connections to the LP-30 Pulse Point are shown in drawing LVP180011. All wiring must be completed in accordance with applicable electrical codes.

### 4.2 Connection Information / Wiring Diagrams

The markings at TB-2 on the circuit board indicate the status of the relay contacts when the unit is operating in non-alarm condition, which is the powered, unalarmed state. This status may be opposite that of other brands of level controls. Contacts as marked on TB2 are not the relays nomenclature, but are marked so contacts are in “normal” positions when unit is powered and unalarmed (see Section 5.2).

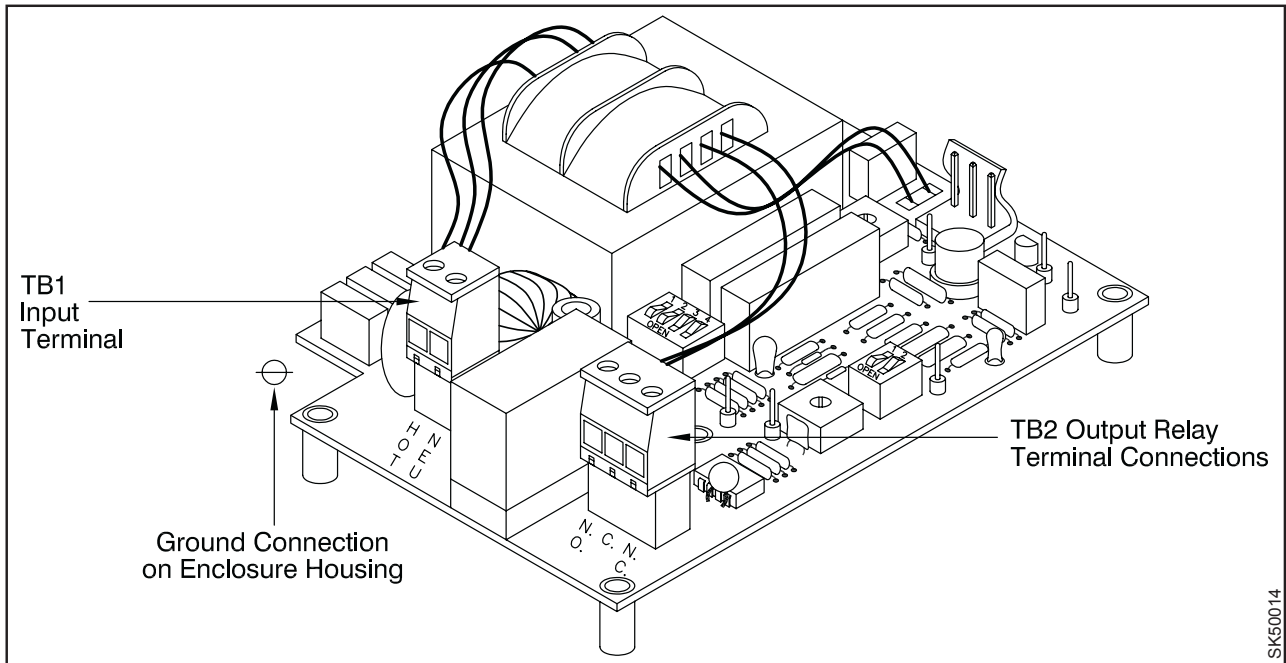


Figure 7. TB2 Output Relay Terminal Connections

## 5.0 SET-UP & PROGRAMMING

### 5.1 Operation

The Pulse Point does not require calibration. When power is applied to the unit, the tines of the fork will begin vibrating (if the fork is not impeded by contact with material or some other object). The green light LED will be lighted whenever power is applied to the unit. The status of the red LED will be determined by the selected fail-safe mode and whether or not the fork is allowed to vibrate. (Refer to Fail-Safe Operation section below)

### 5.2 Set-Up / User Options

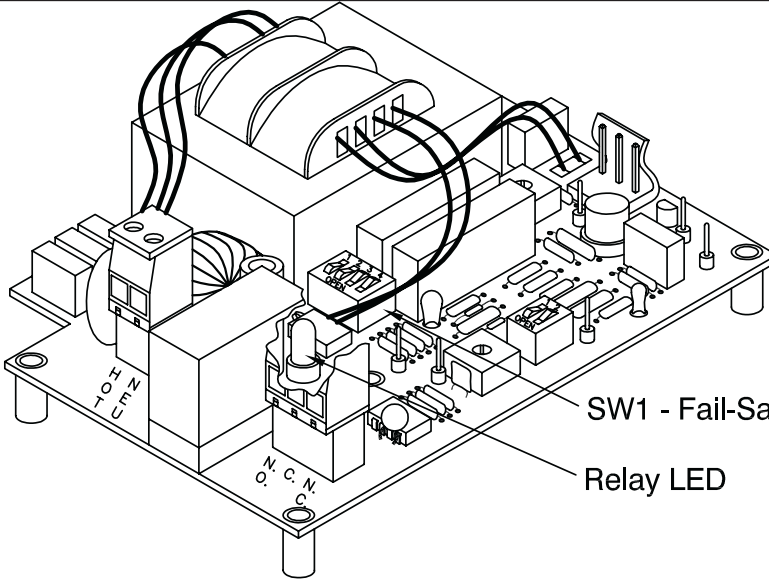
The Pulse Point allows the user to control several operating characteristics to suit individual applications.

#### Fail-Safe Selection

The output relay on the Pulse Point is energized when the unit is operating in non-alarm state. This is known as “fail-safe” operation; the Pulse Point will give an alarm indication in the event of power failure.

Fail-safe operation may be selected for high-level (HLFS) or low-level (LLFS) applications by setting the 4 DIP switches of SW1 as shown in Figure 8. The chart below shows the various operating conditions, which will exist in each of the fail-safe modes:

<u>Fail-Safe Mode</u>	<u>Fork Status</u>	<u>Relay Status</u>	<u>Red LED</u>	<u>Terminal N.O. to C</u>	<u>Terminal N.C. to C</u>
HLFS	Vibrating	Energized	On	Open	Closed
HLFS	Not vibrating	Not Energized	Off	Closed	Open
LLFS	Vibrating	Not Energized	Off	Closed	Open
LLFS	Not Vibrating	Energized	On	Open	Closed



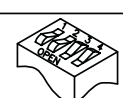

Fail-Safe Mode	SW1 - Switches				Illustration
	1	2	3	4	
High Level Fail-Safe (HLFS)	Closed	Closed	Open	Open	
Low Level Fail-Safe (LLFS)	Open	Open	Closed	Closed	

Table 2: Fail-Safe Mode Switches

**Time Delay Selection**

"Time delay" is the interval between change of fork status (vibrating or not vibrating) and change of output relay status (alarmed or not alarmed).

There are four modes of time delay operation as selected by setting the 2 DIP switches of SW2 as shown in Figure 9.

- "A" - delay between start of fork vibration and relay change
- "B" - delay between stoppage of fork vibration and relay change
- "C" - delay between both start and stoppage of fork vibration and relay change
- "D" - minimum delay

Potentiometer R8 adjusts the time delay interval. Minimum time delay is zero seconds (R8 fully counter-clockwise); maximum time delay is 20 seconds (R8 fully clockwise).

**Note:** Pulse Point units are shipped from the factory with SW2 in "minimum delay" R8 adjusted for minium time delay.

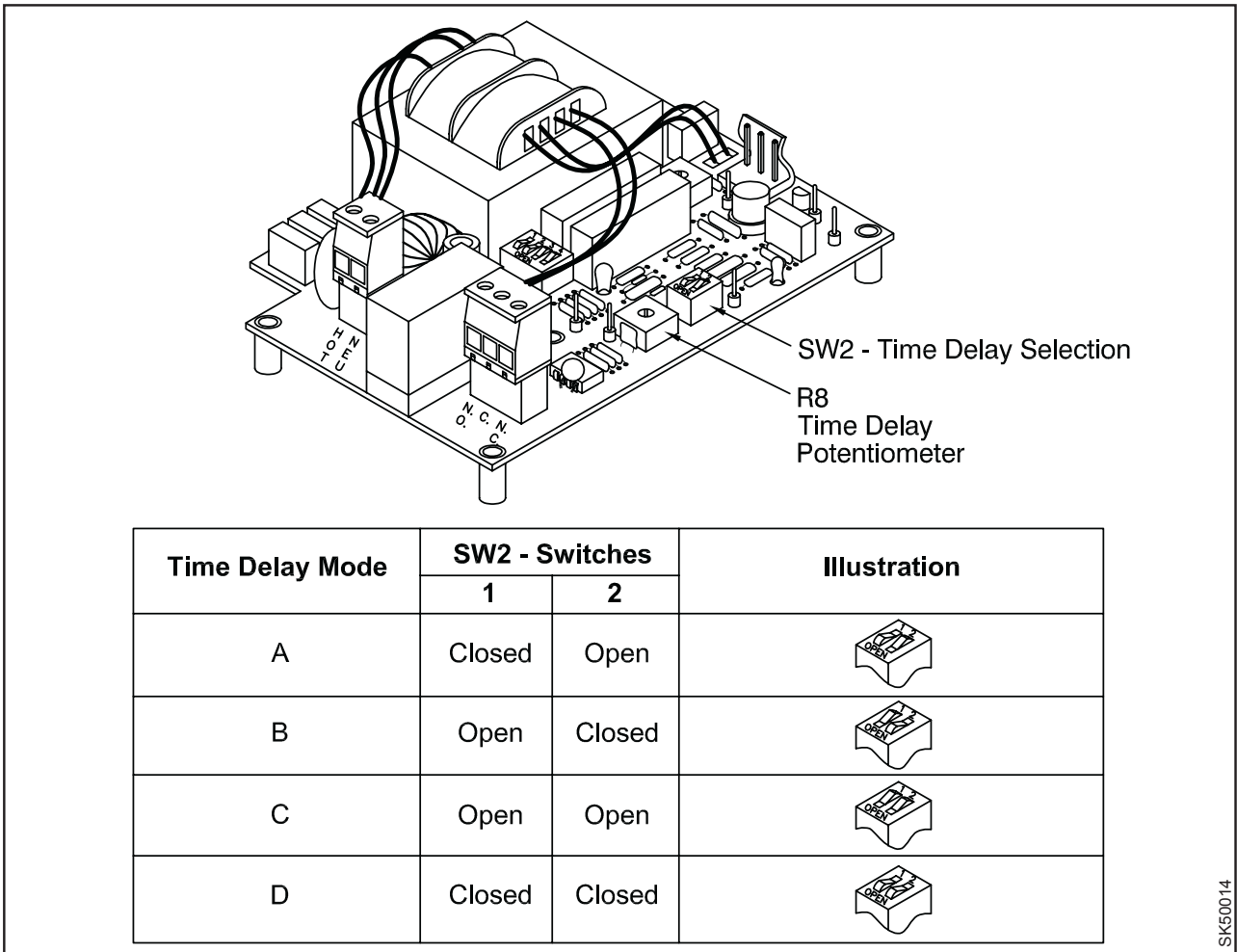


Figure 9. Time Delay Set-up

SK50014

### Sensitivity Adjustment

For most applications the sensitivity control R22 should be left in the factory default position (fully clockwise). For applications with very low density materials, the fork drive should be reduced by turning potentiometer R22 counter-clockwise (see Figure 10).

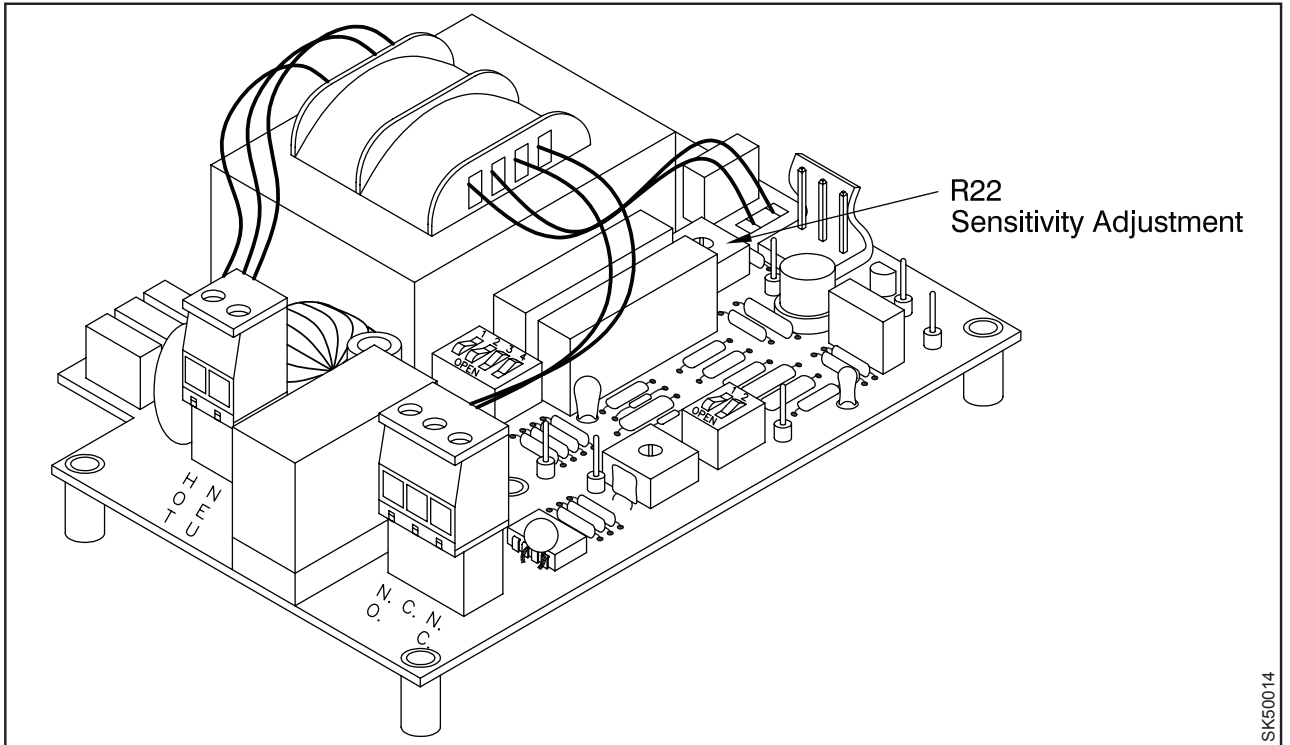


Figure 10. R22 Sensitivity Adjustment

SK50014

## 6.0 MAINTENANCE / PARTS LIST

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### 6.1 Preventative Maintenance

No scheduled preventative maintenance is required for Pulse Point units when properly applied and installed correctly.

### 6.2 Spare / Replacement Parts

<u>Product Code</u>	<u>Description</u>
<b>Electronics</b>	
LVP130302	120VAC Printed Circuit Board
LVP110257	240VAC Printed Circuit Board
LVP130307	100VAC Printed Circuit Board (consult factory for availability)
<b>Tuning Forks</b>	
LVP130300	1½" NPT Integral Tuning Fork 316 SS
LVP130301	1½" NPT Extended Tuning Fork 316 SS
LVP130310	1¼" NPT Integral Tuning Fork 316 SS
LVP130311	1¼" NPT Extended Tuning Fork 316 SS
LVP130316	1½" Standard Tuning Fork Teflon® Coated
LVP130318	1¼" Standard Tuning Fork Teflon® Coated
LVP130320	1¼" Extended Tuning Fork Teflon® Coated
LVP130325	1½" Extended Tuning Fork Teflon® Coated
<b>Mounting Plates</b>	
LVP110059	1½" NPT Mild Steel Mounting Plate
LVP110060	1½" NPT 304 SS Mounting Plate
LVP110130	1¼" NPT Mild Steel Mounting Plate
LVP110071	1¼" NPT 304 SS Mounting Plate
<b>Flanges</b>	
LUB042612	2" with 1¼" NPT Tapped Female, 316 SS
LUB042901	2" with 1¼" NPT Tapped Female, Carbon Steel
LUB042615	2" with 1½" NPT 304 SS
LUB042761	3" with 1¼" NPT Tapped Female, 316 SS
LUB042603	3" with 1¼" NPT Tapped Female, Carbon Steel
LUB042740	3" with 1½" NPT 316 SS
LUB042940	3" with 1½" NPT 304 SS
LUB042733	3" with 1½" NPT Carbon Steel
LUB042855	4" with 1¼" NPT Tapped Female, 304 SS
LUB042910	4" with 1¼" NPT Tapped Female, Carbon Steel

## 7.0 TROUBLESHOOTING

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The following section may be used as a troubleshooting guide in the unlikely event that problems are found with operation of the Pulse Point.

**Problem:** Fork vibrates, but unit will not alarm

**Solution:** Make sure problem is not an improperly set time delay.  
Test by turning R8 fully counter-clockwise to set time delay to minimum.  
Verify proper setting of fail-safe switches, SW1. See section 5.2 Set-Up / User Options on page 11.

Contact your local factory representative if additional assistance is needed. Please provide the following information:

- Model number
- Date of Purchase
- Application information (type of material, mounting configuration, etc.)
- Description of problem

If your local representative is unable to determine the cause of difficulty, you will be referred to a factory engineer. Equipment shipped back to the factory without proper authorization will be refused and returned at the shipper's expense.

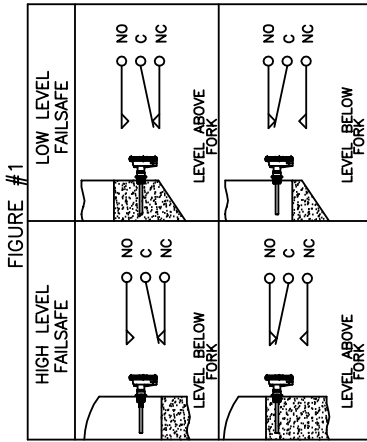
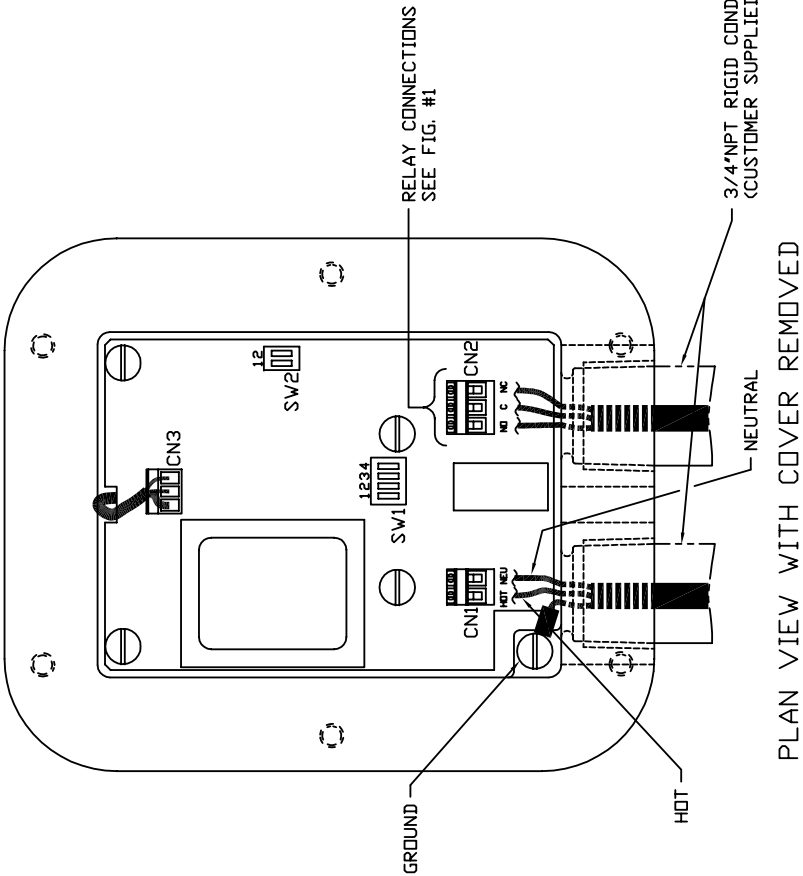
## 8.0 APPENDIX

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<u>Drawing Description</u>	<u>Drawing Number</u>	<u>Page Number</u>
LP-30 110/220 VAC Hookup	LVP180011	17
LP-30 1½" Dimensions	LVP180012	18
LP-30 1¼" Dimensions	LVP180018	19
LP-30 1½" Stainless Steel Extended Dimensions	LVP180013	20
LP-30 1¼" Stainless Steel Extended Dimensions	LVP180020	21
LP-30 1½" Galvanized Steel Extended Dimensions	LVP180014	22
LP-30 1¼" Galvanized Steel Extended Dimensions	LVP180019	23



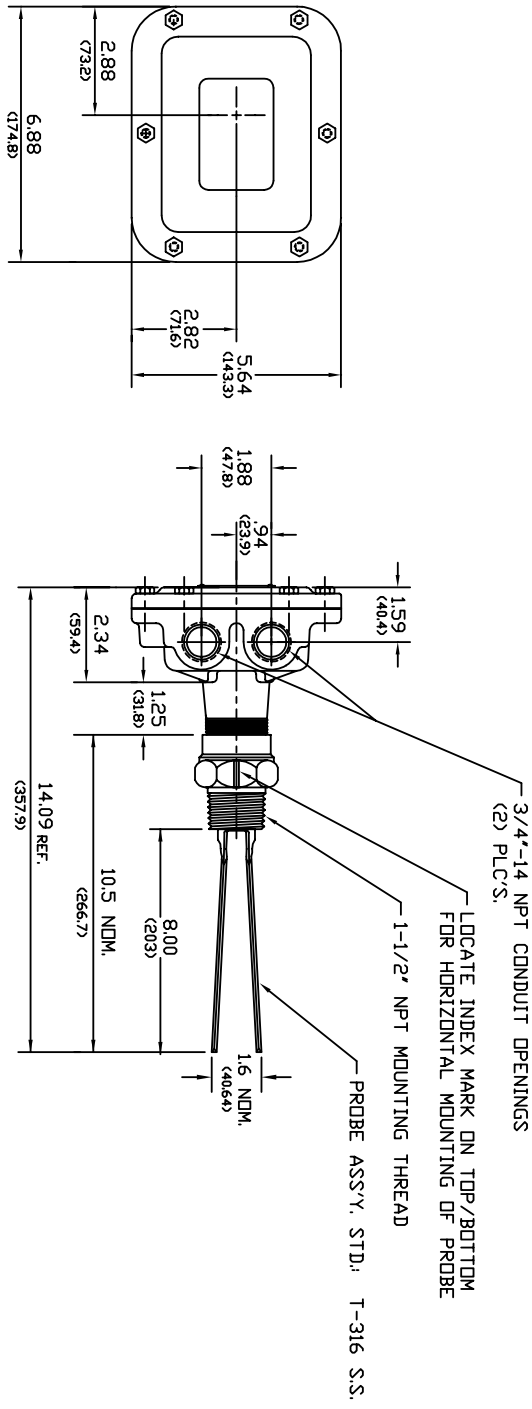
REVISES		ECN	DRWN/CHK'D BY	APP'D BY
A	NEW TITLEBLOCK	03-203	SE	JD
			DATE	DATE
			9-27-03	9-27-03



- NOTES:
- 1) FIELD WIRING SHALL BE ACCORDING TO LOCAL STANDARDS, POWER TO UNITS 18AWG. MINIMUM RECOMMENDED.
  - 2) ON EX/P UNITS, EXPLOSION PROOF SEAL FITTING MUST BE INSTALLED WITHIN 18" OF CONDUIT OPENINGS.
  - 3) CAUTION! HIGH VOLTAGE ON FORK TERMINALS.

SCALE	NONE
TITLE	HOOKUP, MANUAL LP30 110-220VAC
SIZE	B
SHEET	---
PART	LVP180011
FILE	LVP180011_B_*
UNRECORDED TEL. NO.	
TELEPHONE NO.	
ADDRESS	
CITY	
STATE	
COUNTRY	
FINISH	

DO NOT SCALE DIM'S. ARE IN INCHES  
BRACKETED DIMENSIONS ARE IN MILLIMETERS



REV	DESCRIPTION	DATE	BY
A	ISSUED TITLE FOR 1-1/2"	99-205	TK
B	REVISED TO SHOW ELEMENT IN 1/2 INCHES	03-203 SE	JL

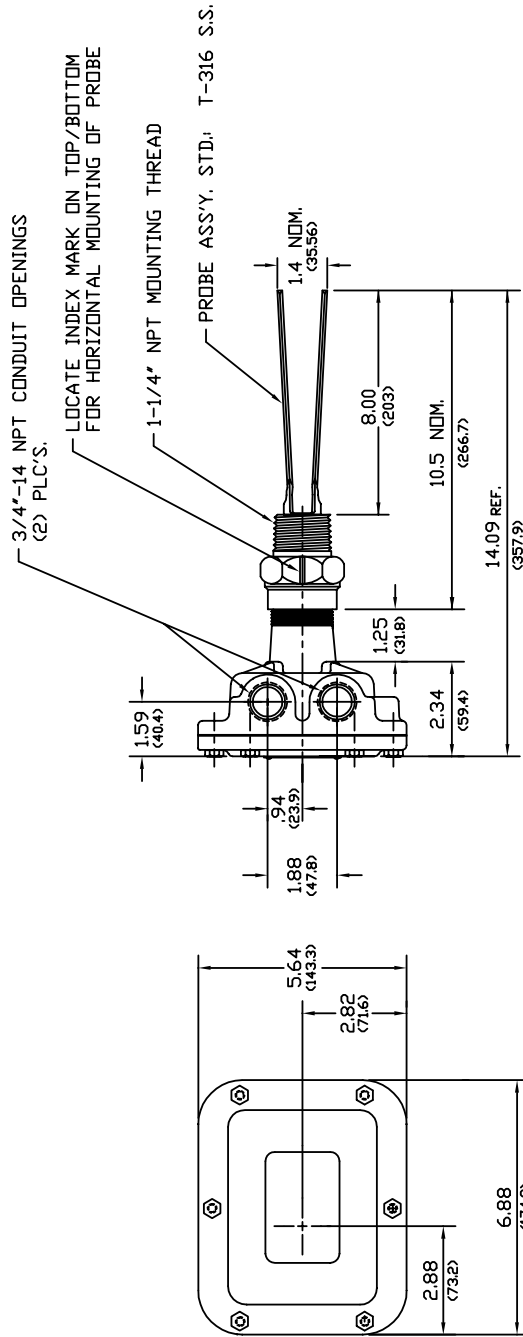
**Venture**  
MEASUREMENT  
150 VENTURE BLVD.  
SPARTANBURG, SC 29306

FILE LVP180012\_B\_\*

UNFINISHED SURFACES	UNFINISHED	FINISH	SCALE
REWORK TO BE DONE	REWORK TO BE DONE	REWORK TO BE DONE	REWORK TO BE DONE
VENTURE, INC. 801	VENTURE, INC. 801	VENTURE, INC. 801	VENTURE, INC. 801

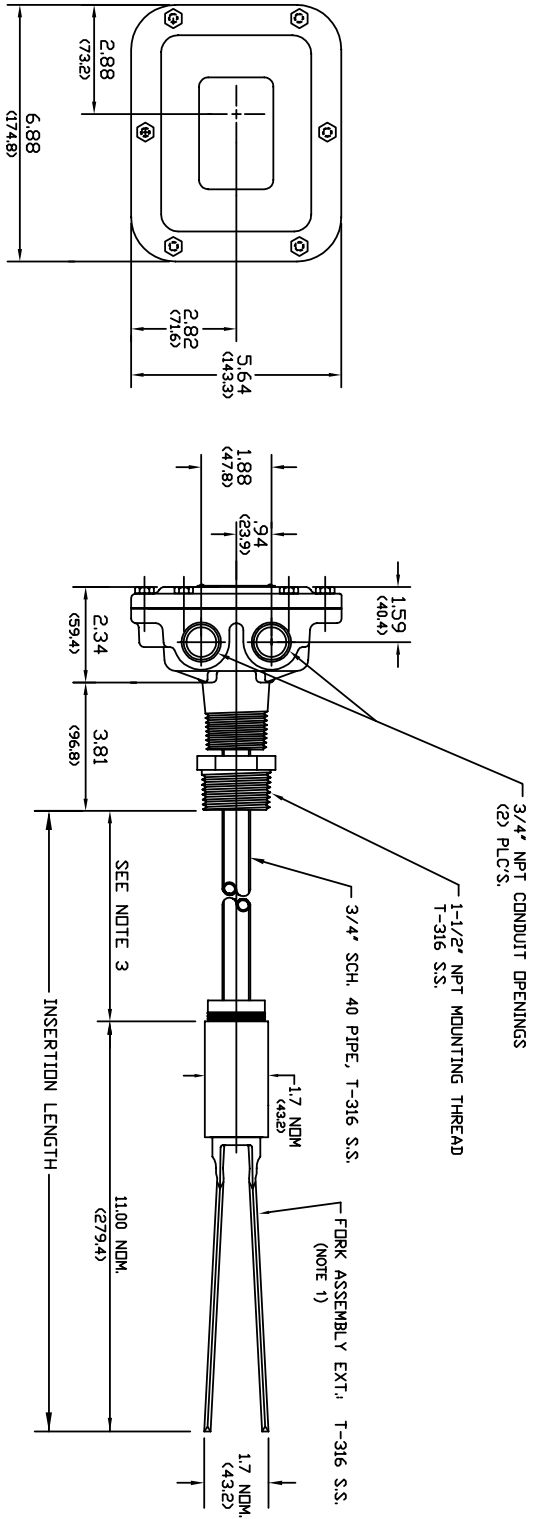
DO NOT SCALE DIM'S. ARE IN INCHES  
BRACKETED DIMENSIONS ARE IN MILLIMETERS

REVISES		ECN #	DRAWN/CHG BY	APPROV BY
			DATE	DATE
A	INITIAL RELEASE	99-205	TK	TK
B	REVISED TO SHOW CURRENT PART NUMBERS	03-203	SE	JD

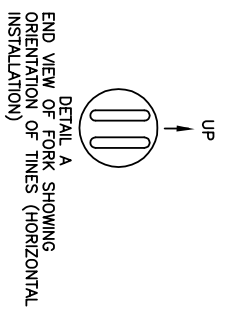


<b>venture</b>		TITLE	SCALE
MEASUREMENT		OUTLINE, MANUAL 1-1/4" PULSE POINT	NONE
50 VENTURE BLVD.			SIZE
SPRINGBURG, SC 29306			B
P/N LVP180018_B_* REF			SHEET
			---
UNFINISHED TOLERANCES		PART	
MINIMUM .005			LVP180018
HOLE .0017			
FINISH			
① = CONTROL DIA. OR MORE			

DO NOT SCALE DIM'S. ARE IN INCHES  
BRACKETED DIMENSIONS ARE IN MILLIMETERS



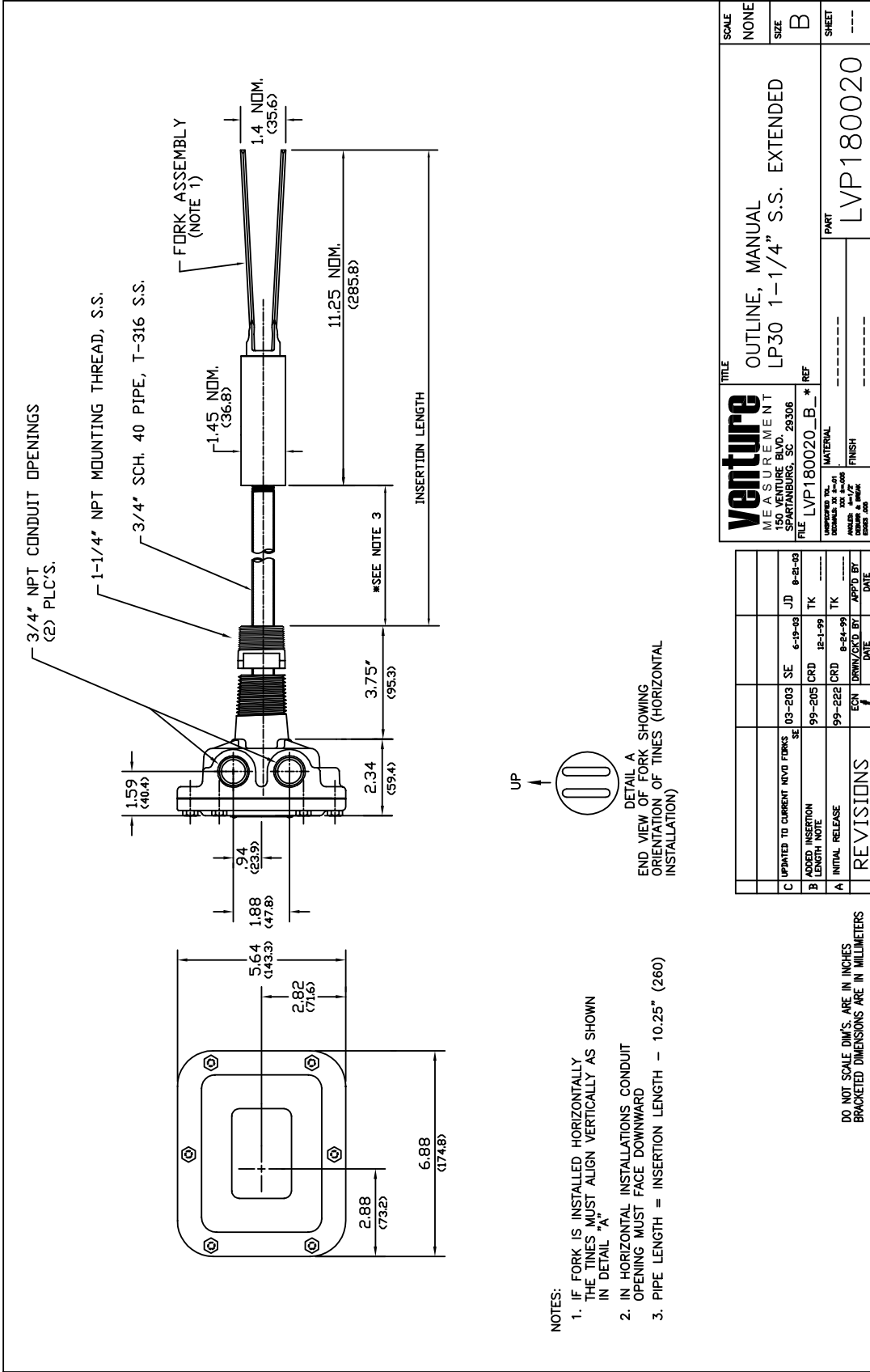
- NOTES:
1. IF FORK IS INSTALLED HORIZONTALLY, THE TINES MUST ALIGN VERTICALLY AS SHOWN IN DETAIL "A"
  2. IN HORIZONTAL INSTALLATIONS CONDUIT OPENING MUST FACE DOWNWARD
  3. PIPE LENGTH = INSERTION LENGTH - 10.25" (260)



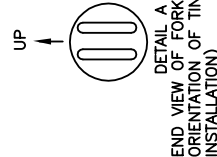
DO NOT SCALE DIM'S, ARE IN INCHES  
BRACKETED DIMENSIONS ARE IN MILLIMETERS

REV	DESCRIPTION	DATE	BY	CHKD
A	FORK LENGTH 10.25 WAS 11.75	11/75	JH	ECN
B	UPDATED TO CURRENT NPT FORKS	03-2003	SE	198-06-5
			AC	7-22-98
			JD	8-21-03
			BVC	

<b>venture</b> MEASUREMENT 150 VENTURE BLVD. SPARTANBURG, SC 29306		TITLE <b>OUTLINE, MANUAL</b> <b>LP30 1-1/2" T-316SS EXTENDED</b>		SCALE NONE
FILE LVP180013_B_* MATERIAL FINISH	REF	PART <b>LVP180013</b>	SHEET ---	SIZE <b>B</b>



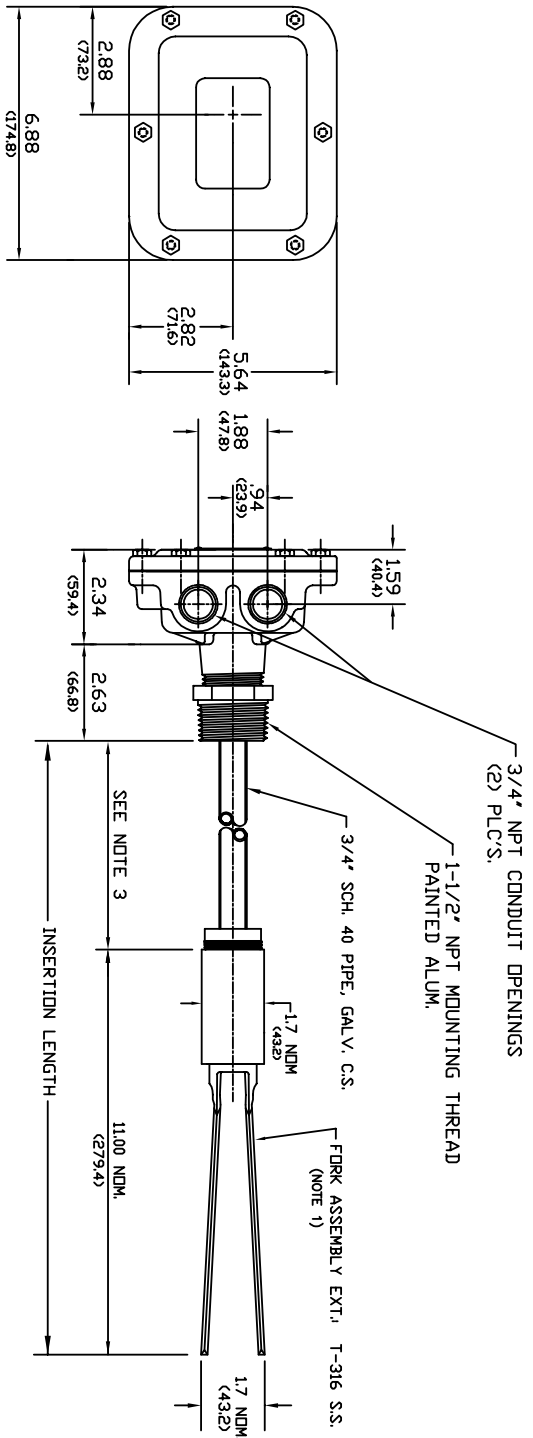
- NOTES:
1. IF FORK IS INSTALLED HORIZONTALLY, THE TINES MUST ALIGN VERTICALLY AS SHOWN IN DETAIL "A"
  2. IN HORIZONTAL INSTALLATIONS CONDUIT OPENING MUST FACE DOWNWARD
  3. PIPE LENGTH = INSERTION LENGTH - 10.25" (260)



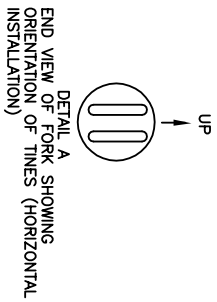
SCALE	NONE
	SIZE
TITLE	OUTLINE, MANUAL
	LP30 1-1/4" S.S. EXTENDED
FILE	LVP180020_B_ * REF
MATERIAL	---
FINISH	---
PART	LVP180020

REVISIONS	DATE	BY	DATE
A	99-222 CRD	8-24-99	TK
B	99-205 CRD	12-1-99	TK
C	03-203 SE	6-19-03	JD

DO NOT SCALE DIM'S. ARE IN INCHES  
BRACKETED DIMENSIONS ARE IN MILLIMETERS

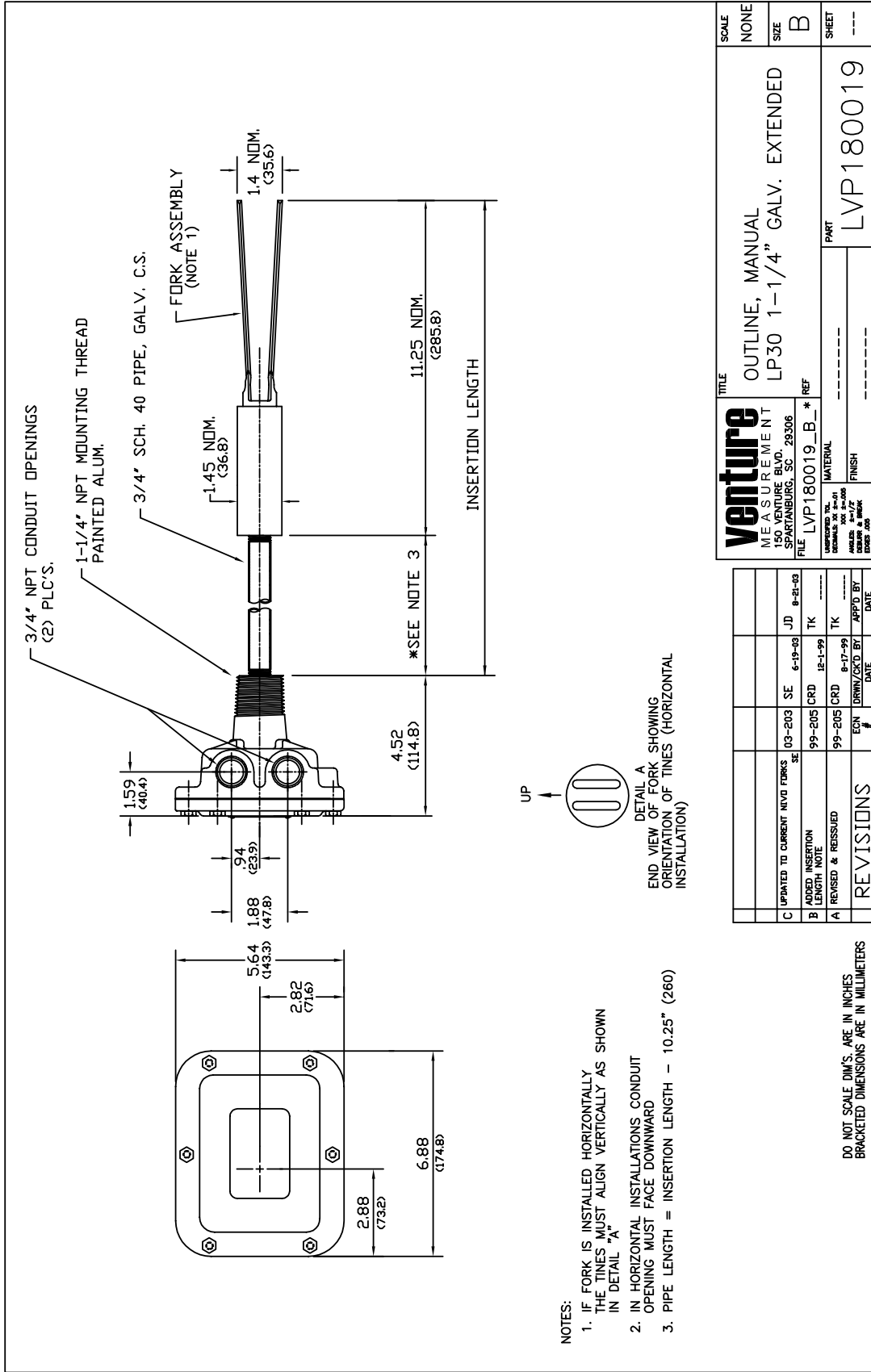


- NOTES:
1. IF FORK IS INSTALLED HORIZONTALLY THE TINES MUST ALIGN VERTICALLY AS SHOWN IN DETAIL A
  2. IN HORIZONTAL INSTALLATIONS CONDUIT OPENING MUST FACE DOWNWARD
  3. PIPE LENGTH = INSERTION LENGTH - 10.25" (260)



REVISED TO CURRENT RVDG FORMS	SE	03-2013	SE	6-19-03	JD	6-21-03
A	REVISED & REDESIGNED	99-2015	CRD	8-17-99	TK	
DO NOT SCALE DIM'S. ARE IN INCHES BRACKETED DIMENSIONS ARE IN MILLIMETERS						
REVISED TO	BY	DATE	BY	DATE	BY	DATE
REVISED TO	BY	DATE	BY	DATE	BY	DATE

<b>Venture</b> MEASUREMENT 150 VENTURE BLVD. SPARTANBURG, SC 29306 FILE LVP180014_B_* REF		TITLE <b>OUTLINE, MANUAL</b> LP30 1-1/2" GALV. EXTENDED		SCALE NONE
UNDERGOING THE APPROVAL PROCESS APPROX. 2-1/2 TO 3-1/2 WEEKS	MATERIAL FINISH	PART LVP180014	SHEET ---	SIZE B



- NOTES:
1. IF FORK IS INSTALLED HORIZONTALLY THE TINES MUST ALIGN VERTICALLY AS SHOWN IN DETAIL "A"
  2. IN HORIZONTAL INSTALLATIONS CONDUIT OPENING MUST FACE DOWNWARD
  3. PIPE LENGTH = INSERTION LENGTH - 10.25" (260)

DETAIL A  
 END VIEW OF FORK SHOWING  
 ORIENTATION OF TINES (HORIZONTAL  
 INSTALLATION)



REV	DATE	BY	CHKD	APP'D	DATE
C	6-19-03	SE	JD	8-21-03	
B	12-1-99	CRD	TK		
A	9-17-99	CRD	TK		

**venture**  
 MEASUREMENT  
 150 VENTURE BLVD.  
 SPARTANBURG, SC 29306

TITLE: OUTLINE, MANUAL  
 LP30 1-1/4" GALV. EXTENDED

SCALE: NONE  
 SIZE: B

FILE: LVP180019\_B\_\* REF

MATERIAL: LVP180019\_B\_\*  
 FINISH: ---

UNREVISED TOL. DIMENSIONS: 0.005  
 HOLE: ±0.012  
 BORE: ±0.005

PART: LVP180019  
 SHEET: ---

DO NOT SCALE DIM'S. ARE IN INCHES  
 BRACKETED DIMENSIONS ARE IN MILLIMETERS

REVISIONS



150 Venture Boulevard  
Spartanburg, SC 29306  
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**venture**  
MEASUREMENT

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