


PT-500 Analog Output Series User Manual

4-20 mA, 0-5 VDC, 0-10 VDC, mV/V

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 **NOTE:** Wiring and CSA Certification information in this User Manual is specific to the Analog Output Series of the PT-500. If you have a Modbus Series sensor, please consult the factory at 402-434-9102, or our website at www.binmaster.com/literature, for the appropriate manual for your sensor.

Introduction

Thank you for purchasing a PT-500 Analog Output series submersible pressure transmitter from BinMaster. We appreciate your business! Please take a few minutes to familiarize yourself with your PT-500 and this manual.

PT-500 submersible pressure transmitters offer reliability in harsh industrial conditions and hazardous locations. The 4-20 mA model is certified intrinsically safe for hazardous areas in the US and Canada by CSA for Class I, Division 2, Groups C and D, Class I, Zone 2, Group IIB, and Class I, Division 1, Groups C and D, Class I, Zone 0, Group IIB environments. The small size, integrated electronics, wide operating temperature range, and durability make the PT-500 the perfect instrument for static and dynamic pressure measurement.

Reading your label

The PT-500 comes with a label that includes the instrument's model number, part number, serial number, and a wiring pinout table. Please ensure that the part number and pinout table on your label match your order. The following electrical ratings and approvals are also listed on the label. Please request the Certificate of Compliance and Declaration of Conformity for further details.

Electrical ratings



Input: 10 to 28 Volts DC; Output: 4-20 mA
Exia Class I, Division 2; Groups C, D T4
Class I, Zone 2, Group IIB
AEx nC IIB T4: Ta: -40°C to 85°C
Ex nL IIB T4: Ta: -40°C to 85°C
Maximum Working Pressure: 10,000 PSI

$V_{max} U_i = 28VDC$, $I_{max} I_i = 110mA$, $P_{max} P_i = 0.77W$, $C_i = 0\mu F$, $L_i = 0\mu H$
Install in accordance with drawing 9002803, sheet 2 (page 9).



Input: 10 to 28 Volts DC; Output: 4-20mA
Exia Class I, Division 1; Groups C, D T4
Class I, Zone 0, Group IIB
AEx ia IIB T4: Ta: -40°C to 85°C
Ex ia IIB T4: Ta: -40°C to 85°C
Maximum Working Pressure: 10,000 PSI

$V_{max} U_i = 28VDC$, $I_{max} I_i = 110mA$, $P_{max} P_i = 0.77W$, $C_i = 0.042\mu F$, $L_i = 0.320\mu H$
Install in accordance with drawing 9002803, sheet 1 (page 8).

i IMPORTANT: Your 4-20 mA PT-500 MUST be installed according to drawing 9002803 (Intrinsically Safe Wiring Diagram or Non-Incendive Wiring Diagram) as indicated above to meet listed approvals. Faulty installation will invalidate all safety approvals and ratings.

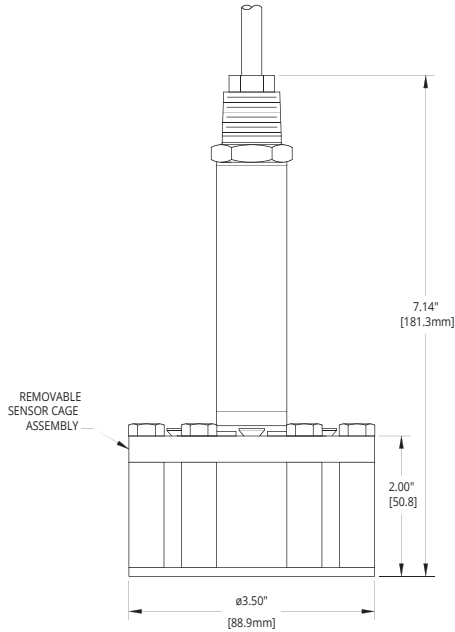
Warranty and Warranty Restrictions

BinMaster warrants this product against defects in material and workmanship for two (2) years according to the following terms;

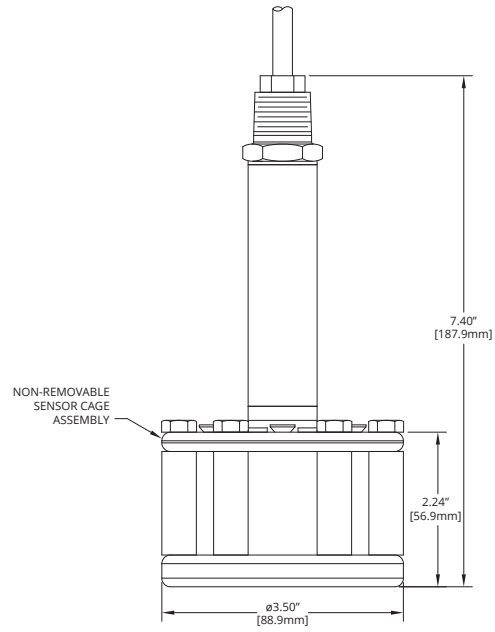
- 1.) This warranty extends to the original purchaser only and commences on the date of original purchase.
- 2.) BinMaster's sole obligation under said warranty is to repair, or at its option replace the defective parts. The buyer shall have no other remedy. All special, incidental and consequential damages are excluded. The buyer must deliver the product under warranty prepaid to the factory. BinMaster's obligation is limited to the cost of material and labor to repair or replace, and does not include transportation expenses.
- 3.) This warranty shall be voided, in our sole judgment, by alterations of equipment except by BinMaster, or tampering with, improper installation or maintenance, accident or misuse, or act of God. This warranty expressly excludes all damage to the product resulting from careless or neglectful packaging or transportation. The warranty does not extend to repairs made necessary by normal wear.
- 4.) This warranty is in lieu of all other warranties, expressed or implied including any implied warranties or merchantability or fitness for particular purpose. No employee, agent, franchise dealer or other person is authorized to give any warranties of any nature on behalf of BinMaster.
- 5) BinMaster shall in no event be responsible for any warranty work done without first obtaining BinMaster's written consent.
- 6) Except as provided herein, BinMaster shall have no liability, loss or damage caused or alleged to be caused directly or indirectly by this equipment.
- 7) This warranty gives the buyer specific legal rights, and you may also have other rights which vary from state to state.
- 8) For service, please call 402-434-9102.

Chapter 1: Specifications and Options

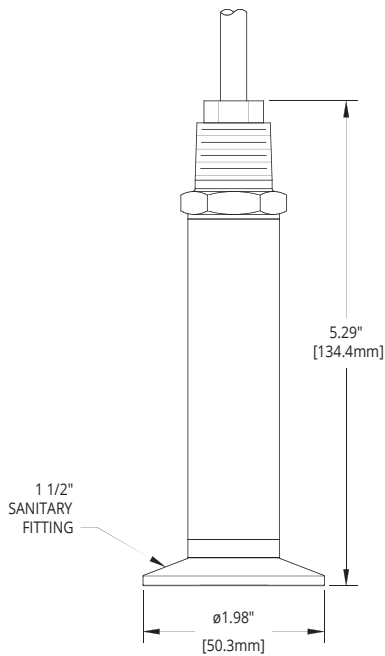
- Dimensions



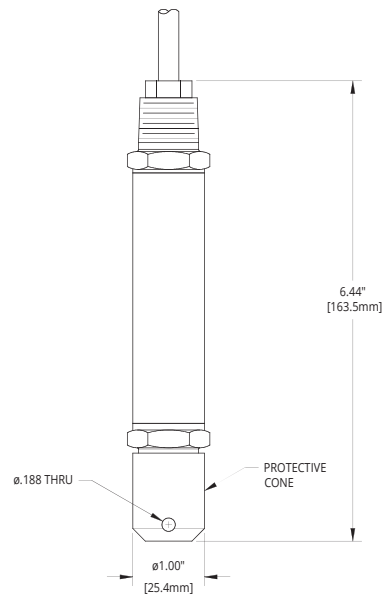
PT-500 with Reusable Cage



PT-500 with Welded Anti-slag Cage



PT-500 with Tri-clover Sanitary Fitting



PT-500 with Removable Plastic Nose Cone

• Specifications

Performance

Pressure Ranges	0 to 300 PSIG
Analog Outputs	4-20mA, 0-5VDC, 0-10VDC, mV/V
Over Pressure	2X FSO
Burst Pressure	3.0X FSO
1 Year Stability	0.75% FSO

Accuracy

Linearity, Hystereses & Repeatability	±0.25% of Full Scale (BFSL) up to ±0.1% of Full Scale
Thermal Zero Shift @ 70 °F	±0.045% FSO/°C (±0.025% FSO/°F)
Thermal Span Shift @ 70 °F	±0.045% FSO/°C (±0.025% FSO/°F)

Environmental

Operating Temperature	-40 to 85°C (-40 to 185°F)
Compensated Temperature	-17 to 54°C (0 to 130°F)
Maximum Submersible Depth	462.2 ft / 140.88 m / 300 psig

Electrical

Supply Voltage (at sensor)	4-20 mA: 9-28 VDC	0-10 VDC: 14-28 VDC
	0-5 VDC: 9-28 VDC	mV/V: 10 VDC*
Output Signal @ 21°C	3-30 mA max.	
Protection	Reverse Polarity and Surge (per IEC 61000-4-5)	
Load Limitation	$R_{(max)} = ((V_s - 12V)/0.02A) - (0.042\Omega \text{ per ft. of cable})$	
Startup Time	4-20 mA: 100 ms	0-10 VDC: 300 ms
	0-5 VDC: 300 ms	
Current Draw	4-20 mA: 3-30 mA	0-10 VDC: 3 mA
	0-5 VDC: 3 mA	

Materials of Construction

Wetted Materials	316L Stainless Steel
Anti-snag Cage	316L Stainless Steel
Cable	Urethane, PVC, or Hytrel
Protective Nose Cone	Delrin
Seal	Viton ETP-s

Mechanical

Pressure Connection	See model number configurator for complete list
Cable Tensile Strength	Up to 200 pounds

Patents

US Patent No. 7,787,330

*mV/V output is calibrated to 10 VDC input.

• Model Number Configurator

Part Number: PT-500 _____ - _____ - _____ - _____ - _____ - _____ - _____ - _____
 A B C D E F G H

A. Cable Type

- ▲** Urethane - Blue (with vent tube)
- A** PVC - Black (no vent tube - sealed unit)
- B** Hytrel .31" Ø - Black (with vent tube)
- C** PVC - Black (with vent tube)
- D** Hytrel .25" Ø - Black (with vent tube)

B. Pressure Range

- Specify range in desired unit of measure

_____ Max Water Depth
462.2 ft. (140.9 m), 300 psig

C. Standard Units of Measure

- PSI**
- FTH2O**
- INWC**
- INH2O**
- MMH2O**
- FWC**

D. Output

- L1▲** 4-20 mA, 2-wire
- L3** 0-5V, 4-wire*
- L9** 10 mV/V, 4-wire*
- L10** 0-10V, 4-wire*

- L5** Modbus RTU, 4-wire RS-485*
Pressure reading only

- L31** Modbus RTU, 4-wire RS-485 *
Level calculations, tank volume

E. NPTM

- E0▲** 1/2" NPTM fitting for conduit, with pigtail
- E5** Pigtail without conduit connection

F. Process Connection

- P1▲** 1/2" NPTM with removable plastic nose cone
- P5** 1/4" NPTF
- P37** Welded Cage (anti-snag 1 piece fitting)
- P38** 1-1/2" tri-clover with 3/4" diaphragm
- P39** Reusable Cage (includes P38 fitting)

G. Cable Length

- (specify length of cable needed in feet)

H. Accuracy

- N0▲** ±0.25%
- N1** ±0.25% with NIST certification
- N2** ±0.1% with NIST certification

Note: ▲ Indicates this option is standard.
Note: *Indicates this option does not yet have CSA Approvals.

- **Electrical Pinout Table and Supply Power Table**

PT-500 Analog Output Series Pin Out Table

Pigtail		4-20 mA	Voltage
	Red	+ Power/Signal	+ Power
	Black	- Power/Signal	- Power
	Green	-	+ Out
	White	-	- Out
	Shield	Case Gnd	Case Gnd

PT-500 Analog Output Series Supply Power Table

	4-20 mA	0-5 VDC	0-10 VDC	mV/V
Power Supply	9-28 VDC	9-28 VDC	14-28 VDC	10 VDC*

* mV/V output calibrated to 10 VDC input

Chapter 2: Installation and Removal Procedures and Notes

- **Tools Needed**

- Wrench sized appropriately for your PT-500's process or conduit connection.
- Thread tape or sealant compound for threaded connections.


- **Mounting Instructions**

Your PT-500 can be mounted in three ways: via NPT process connection, free-hanging suspension, or conduit mounted. Mounting your pressure transducer is easy if you follow a few simple steps:

- Never over-tighten the sensor. This can compress the diaphragm, changing how it reacts to pressure. In all cases, tighten the sensor as little as possible to create an adequate seal. On straight threads, tighten only until you feel the o-ring compress - making sure you don't damage or extrude the o-ring.
- Always use thread tape or sealant compound on tapered threads. Wrap thread tape in the opposite direction of the threads so it does not unravel as you screw the sensor into place. Unraveling can cause uneven distribution and seal failure. For straight threads use an o-ring.
- Always start screwing in your sensor by hand to avoid cross-threading. Thread failure can be a problem if you damage threads by over-tightening them or by crossing threads.
- For suspension mounting the PT-500, drill a 3/16" hole into a 1/2" NPTF to 1/2" NPTF hex coupler and secure it to the 1/2" NPTM coupler fitting of the PT-500. Attach a .060" diameter 316L SS cable of desired length to the hex coupler and secure the steel cable according to your application requirements.

- **Electrical Installation**

- Attach the wires of your PT-500 to your control system according to the pinout table above.

 **NOTE:** If your PT-500 has a vent tube, do not seal, cover, or close the vent tube with anything other than an BinMaster-provided venting cap or desiccant drying cartridge (See Figure 3.3 and 3.4). Unapproved seals or covers will prevent proper sensor operation.

• **Removal Instructions**

Removing your PT-500 from service must be done with care. It's easy to create an unsafe situation, or damage your sensor, if you are not careful to follow these guidelines:

- For sensors installed via NPT process connection, make sure the pressure is completely removed from the line or vessel. Follow any and all procedures for safely isolating any media contained inside the line or vessel.
- Remove the sensor with an appropriately sized wrench (per your process connection).
- For suspended sensors, retrieve the sensor from the vessel. Follow any and all procedures for safely isolating any media contained inside the line or vessel.
- Carefully clean the sensor's fitting and diaphragm of any debris (see General Care) and inspect for damage.
- Store your sensor in a dry place, at a temperature between -40° F and 180° F.


 **DANGER:** Removing your process connected PT-500 Pressure Transmitter while there is still pressure in the line could result in injury or death.

Chapter 3: Maintenance

• **General Care**

Your PT-500 series pressure transmitter is very low maintenance and will need little care as long as it is installed correctly. However, in general, you should:

- For process connected sensors, keep the transmitter and the area around it generally clean.
- Avoid applications for which the transmitter was not designed, such as extreme temperatures, contact with incompatible corrosive chemicals, or other damaging environments.
- Inspect the threads whenever you remove the transmitter from duty or change its location.
- Avoid touching the diaphragm. Contact with the diaphragm, especially with a tool, could permanently shift the output and ruin accuracy.
- Clean the diaphragm or the diaphragm bore only with extreme care. If using a tool is required, make sure it does not touch the diaphragm.

 **IMPORTANT:** Any contact with the diaphragm can permanently damage the sensor. Use extreme caution.

- **Zero Adjust (4-20 mA, 0-5 VDC, and 0-10 VDC only)**

The zero output (4mA, or 0 VDC) can be adjusted by holding a magnet perpendicular to the can, approximately 1-1/2" from the top or bottom of the can.

Holding the magnet close to the top of the can increases the output (See Figure 3.1). Holding the magnet close to the bottom of the can decreases the output (See Figure 3.2).

If the zero output values do not change right away, hold the magnet in place near the top of the can until the values change, for up to two minutes. If there is no change, repeat the procedure near the bottom of the can. If there is still no change, consult the factory.

Unvented PT-500A transmitters do not automatically adjust to changes in barometric pressure. We recommend that PT-500A transmitters be zeroed upon receipt, and after major weather events.



Figure 3.1



Figure 3.2

 **NOTE:** Span calibration must be done at the factory for all analog models.

- **Vent Tube Drying**

Condensation in the vent tube can damage the electronics in your sensor, resulting in unreliable readings. BinMaster offers two methods of preventing vent tube condensation: a venting cap, and a desiccant drying cartridge.

The venting cap is a PVC tube with a hydrophobic patch that allows moisture to pass out of the tube without allowing water in (See Figure 3.3). The cap is sealed by an o-ring, and is easily installed in the field.

The desiccant drying cartridge with vent tube adapter absorbs any moisture in the vent tube to keep vapor from condensing (See Figure 3.4). The installation of the desiccant drying cartridge is quick and easy. Common installation methods are cable tie, Velcro, and cable clamps.



Figure 3.3



Figure 3.4

Note: Desiccant crystals change from blue to pink as they become saturated. Cartridge must be replaced when all crystals have saturated.

Important: Do NOT use desiccant cartridge in the presence of vapors or liquids containing phosphate esters, synthetic lubricants, hydrocarbon solvents, methanol, acetone, lacquer solvents, or other organics.

• Repair and Returns

Should your PT-500 series pressure transmitter require service, please contact the factory. We will issue you a Return Material Authorization (RMA) number with instructions.

- Phone: 402-434-9102
- Email: info@binmaster.com

Please have your PT-500's part number and serial number available. See Warranty and Warranty Restrictions for more information.

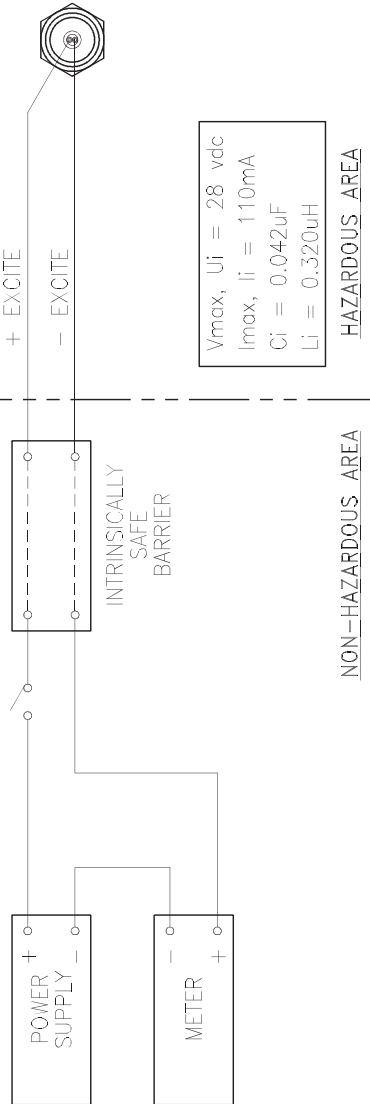
Chapter 4: Hazardous Location Installation and Certification

- Intrinsically Safe Wiring Diagram

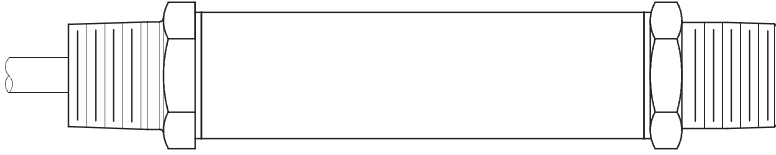
Drawing 9002803

INSTALLATION IN CLASS I, DIVISION I GROUPS C, & D,
 INSTALLATION IN CLASS I, ZONE 0, AEx ia IIB T4 Tamb -40° TO 60° C

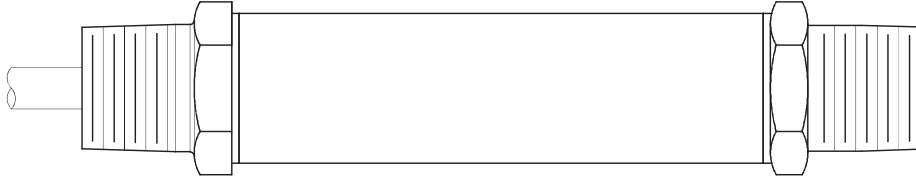
PT-500 L1 4-20mA OUTPUT



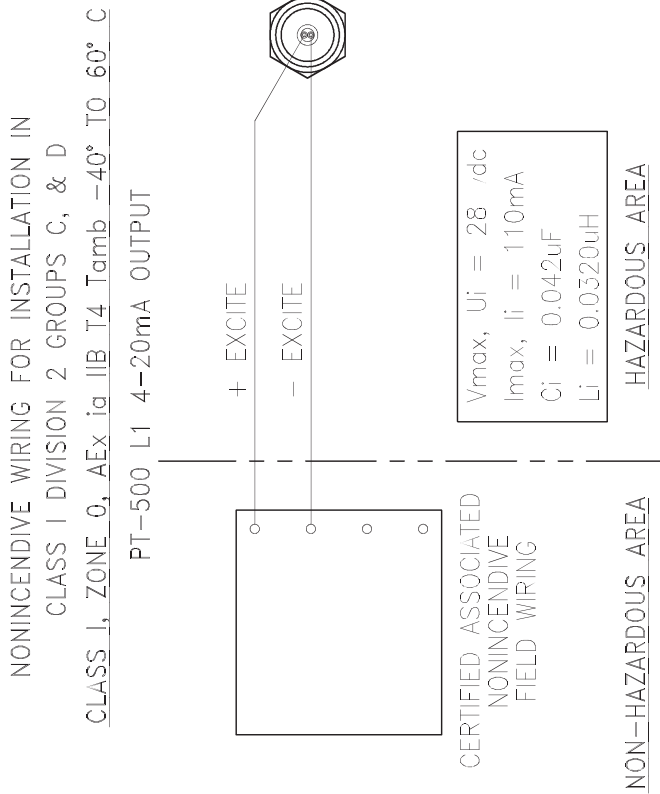
* WARNING: SUBSTITUTION OF COMPONENTS
 MAY IMPAIR INTRINSIC SAFETY
 AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS
 PEUT COMPROMETTRE LA SECURITE INTRINSEQUE



• **Non-Incendive Wiring Diagram**



Drawing 9002803



* WARNING: SUBSTITUTION OF COMPONENTS
MAY IMPAIR INTRINSIC SAFETY
AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS
PEUT COMPROMETTRE LA SECURITE INTRINSEQUE

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