

PT-400 User Manual



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Introduction

Thank you for purchasing a PT-400 series pressure transmitter from APG. We appreciate your business! Please take a few minutes to familiarize yourself with your PT-400 and this manual.

The PT-400 series of pressure transmitters offers reliability over a wide range of pressures and in harsh industrial conditions and hazardous locations. It is certified intrinsically safe for hazardous areas in the US, Canada, Europe and internationally by CSA, ATEX, and IECEx for Class 1, Zone 0 environments. The small size, integrated electronics, wide operating temperature range, and durability, make the PT-400 the perfect instrument for static and dynamic pressure measurements with an amplified output signal.

Reading your label

Every APG instrument 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 refer to the Certificate of Compliance and Declaration of Conformity at the back of this manual for further details.

Electrical ratings



Input: 9 to 28 Volts DC; Outputs: 4-20mA / 0-5VDC / 0-10VDC (per order)

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

PT-400-L1 (4-20mA)

V_{max} U_i = 28VDC, I_{max} I_i = 110mA, P_{max} P_i = 0.77W, C_i = 0.055 μ F, L_i = 7.95 μ H

Install in accordance with drawing 9002794, sheet 2 (page 9).

PT-400-L3/L10 (0-5V/0-10V)

V_{max} U_i = 28VDC, I_{max} I_i = 110mA, P_{max} P_i = 0.77W, C_i = 0 μ F, L_i = 0 μ H

Install in accordance with drawing 9002794, sheets 3 & 4 (page 10 & 11).



Input: 9 to 28 Volts DC; Output: 4-20mA (per order)

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

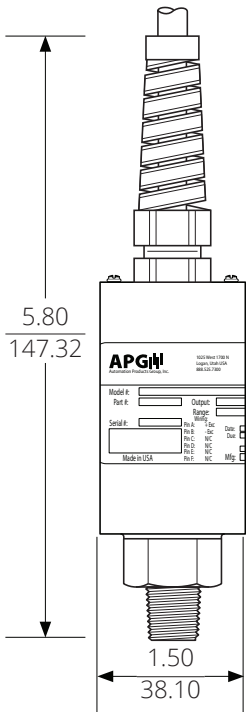
V_{max} U_i = 28VDC, I_{max} I_i = 110mA, P_{max} P_i = 0.77W, C_i = 0.055 μ F, L_i = 7.95 μ H

Install in accordance with drawing 9002794, sheet 1 (page 8).

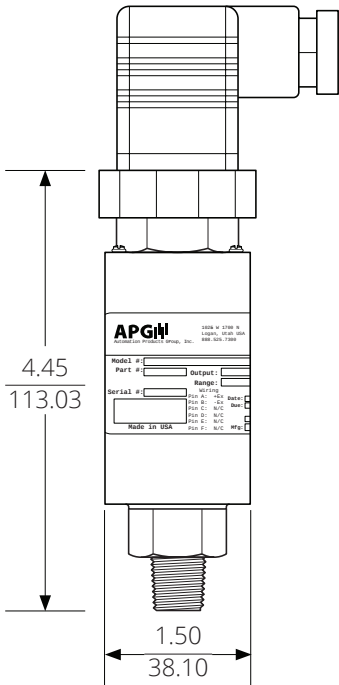
i IMPORTANT: Your PT-400 MUST be installed according to drawing 9002794 (Intrinsically Safe Wiring Diagram or Non-Incendive Wiring Diagrams) as indicated above to meet listed approvals. Faulty installation will invalidate all safety approvals and ratings.

Chapter 1: Specifications and Options

- Dimensions

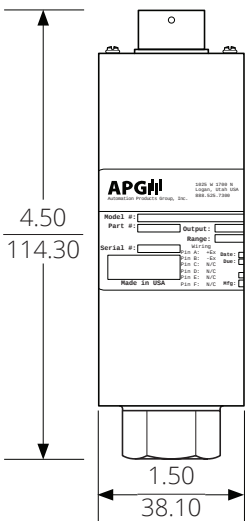


PT-400 with Pigtail and NPTM

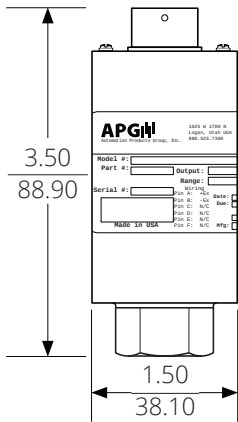


PT-400 with DIN 43650 and L-Bracket and NPTM

Total length of PT-400 with DIN 43650 and L-Bracket is equal to total length of PT-400 with Pigtail.



PT-400 with 4 or 6 pin Bayonet on Extended Can and NPTF



PT-400 with 4 or 6 pin Bayonet and NPTF

• Specifications

Performance

Pressure Ranges	0 to 10K PSIS (Per Part Number)
Analog Output	4-20mA, 0-5VDC, 0-10VDC
Over Pressure	2X Full Scale or limit of fitting, whichever is less
Burst Pressure	3.0X Full Scale or limit of fitting, whichever is less

Accuracy

Linearity, Hystereses & Repeatability	±0.25% of Full Scale (BFSL)
Thermal Zero Shift	[±0.036% FSO/°C (±0.02% FSO/°F)]
Thermal Span Shift	[±0.036% FSO/°C (±0.02% FSO/°F)]

Environmental

Operating Temperature	-40 to 85°C	(-40 to 185°F)
Compensated Temperature	-17 to 54°C	(0 to 130°F)
Enclosure Protection	IP67	

Electrical

Supply Voltage (at sensor)	4-20 mA:	9-28 VDC
	0 to 5 VDC:	9-28 VDC
	0 to 10 VDC:	12.5-28 VDC
Output Signal @ 21°C	4-20 mA:	3-30 mA max.
	0 to 5 VDC:	7mA max
	0 to 10 VDC:	14mA max

Materials of Construction

Wetted Materials	316L or 17-4 Stainless Steel
Enclosure	316L Stainless Steel

Mechanical

Pressure Connection	See model number configurator for complete list
Weight	283g (10 oz.)

- **Model Number Configurator**

Model Number: PT-400 - - - - - - - - - -

A B C D E F G H I J

A. Operation / Output

- ☐ **L1**▲ 4 - 20 mA output
- ☐ **L3** 0 - 5 VDC output
- ☐ **L10** 0 - 10 VDC output

Modbus

- **L5** RS-485 (Modbus/RTU), 4-wire
Pressure reading only
(Approvals Pending)
- **L31** RS-485 (Modbus/RTU), 4-wire
Level calculations, tank volume
(Approvals Pending)

B. Common Pressure Ranges - PSI*

- | | | | | |
|-----------------------------|------------------------------|------------------------------|-------------------------------|--------------------------------|
| ☐ 5 | ☐ 50 | ☐ 200 | ☐ 1000 | ☐ 5000 |
| ☐ 15 | ☐ 60 | ☐ 300 | ☐ 2000 | ☐ 10000 |
| ☐ 30 | ☐ 100 | ☐ 500 | ☐ 3000 | |

*Other ranges available. Please consult factory.

C. Units of Measure

- ☐
- psi ▲
- ☐
- bar
- ☐
- kPa
- ☐
- kgcm
- ²
- ☐
- fsw

D. Pressure Type

- ☐ **A** Absolute
- ☐ **S▲** Sealed (100 psi or greater)
- ☐ **G** Gauge (less than 1000 psi)
- ☐ **CG** Compound Gauge
- ☐ **V** VAC

E. Electrical Connection

(Mating connector sold separately)

- **E3** 4 pin bayonet (PT 1H-8-4P or equiv.)
- **E4** 4 pin M12 micro connector.
- **E5** ▲ Pigtail with cable (specify cable length below)
- **E6** 4 pin per DIN 43650, short can
(mating connector included)
- **E17** 6 pin bayonet (PT02E-10-6P) short can
- **E18** 1/2 in NPTM with 6 in flying leads, short can
- **E19** 1/2 in NPTM with cable, short can
- **E36** 1/2 in NPTM with 6 in flying leads, long can
- **E38** 1/2 in NPTM with cable, long can
- **E39** 4 pin per DIN 43650 w/Solderless screw, long can
(mating connector included)

▲ This option is standard

F. Electrical Cable Length

- — Number represents cable length, in 5-ft increments, included on E5, E19, & E38 options.
(ex. E5-10 equals pigtail, 10 ft cable)

G. Process Connection

- **P0** ▲ 1/4 - 18 NPTM, 316L SS
- **P1** 1/2 - 14 NPTM
17-4 SS above 500 psi; 316L SS below 500 psi
- **P5** 1/4 - 18 NPTF
17-4 SS above 500 psi; 316L SS below 500 psi
- **P6** 1/2 NPTF
17-4 SS above 500 psi; 316L SS below 500 psi
- **P9** H.P. SnoTriK female (F-250C, Autoclave female)
- **P30** H.P. SnoTriK male (M-250C, Autoclave female)
- **P38** 1 1/2 in. tri-clover with 3/4 in. diaphragm
Available on ranges below 500 psi, 316L SS
- **P52** 1 1/2 in. NPTM flushmount w/ 1/2in. diaphragm
Available on ranges below 5K, 316L SS

H. Accuracy

1-5,000 PSI

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

*Note: $\pm 0.25\%$ available at 10,000 psi for 4-20 mA output only.

10,000 PSI

- **N12** ±0.5%
- **N13** ±0.5% with NIST certification

I. Materials

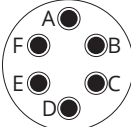
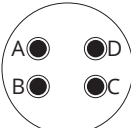
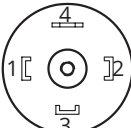
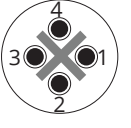
- **M1**▲ 316L SS (available on ranges up to 5,000 psi)
- **M2** 17-4 SS (available on ranges > 200 psi)

J. Temperature

- **S0**▲ Standard: 0° - 130°F (-17° - 54°C)
- **S1** Extended: -40° - 180°F (-40° - 82°C)
- **S4** Extended: 0° - 185°F (-17° - 85°C)

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

PT-400 Series Pin Out Table

6 Pin Bayonet		4-20 mA	0-5 VDC	0-10 VDC	 6 Pin Bayonet Connector
	A	+ Excitation	+ Excitation	+ Excitation	
	B	- Excitation	+ Output	+ Output	
	C	N/C	- Output	- Output	
	D	N/C	- Excitation	- Excitation	
	E	N/C	N/C	N/C	
	F	N/C	N/C	N/C	
4 Pin Bayonet	A	+ Excitation	+ Excitation	+ Excitation	 4 Pin Bayonet Connector
	B	- Excitation	+ Output	+ Output	
	C	N/C	- Output	- Output	
	D	N/C	- Excitation	- Excitation	
4 Pin DIN	1	+ Excitation	+ Excitation	+ Excitation	 4 Pin DIN Connector
	2	- Excitation	+ Output	+ Output	
	3	N/C	- Output	- Output	
	4	Case Ground	- Excitation	- Excitation	
4 Pin M12	1	+ Excitation	+ Excitation	+ Excitation	 4 Pin M12 Micro Connector
	2	- Excitation	+ Output	+ Output	
	3	N/C	- Output	- Output	
	4	N/C	- Excitation	- Excitation	
Pigtail	Red	+ Excitation	+ Excitation	+ Excitation	
	Grn	N/C	+ Output	+ Output	
	Wht	N/C	- Output	- Output	
	Blk	- Excitation	- Excitation	- Excitation	
	Shld	Gnd	Gnd	Gnd	

N/C indicates no connection
For alternate pinouts, please consult factory

PT-400 Series Supply Power Table

	4-20 mA	0-5 VDC	0-10 VDC
Power Supply	9-28 VDC	9-28 VDC	12.5-28 VDC

Chapter 2: Installation and Removal Procedures and Notes

• Tools Needed

- Wrench sized appropriately for your PT-400's process connection.
- Thread tape or sealant compound for threaded connections.

• Mounting Instructions

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.

• Electrical Installation

- Check the pinout table on your PT-400 against your order.
- Check that your electrical system wiring matches the pinout table on your PT-400.
- For instruments with connectors, make the connection. Otherwise, attach your wires to the provided terminal strip.

• Removal Instructions

Removing your PT-400 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:

- Make sure the pressure is completely removed from the line or vessel where your sensor is installed. 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).
- 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 PT-400 Pressure Transmitter while there is still pressure in the line could result in injury or death.

Chapter 3: Maintenance

• General Care

Your PT-400 series pressure transmitter is very low maintenance and will need little care as long as it is installed correctly. However, in general, you should:

- 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 with extreme care. If using a tool is required, make sure it does not touch the diaphragm.

• Zero Trimming

- Remove the protective screw.
- Ensure that the transmitter is at 0 psig or 0 psia (vacuum if absolute). For compound ranges, i.e., -15 psi to 30 psi, the 4 mA or 0 V set point is also at vacuum.
- Using a jeweler's screwdriver or a suitable instrument, adjust the "Z" pot until you have a 4 mA (4-20 mA) or 0 V (5 VDC, 10 VDC) output.

i IMPORTANT: Do not make changes to the Span adjustment (the "S" pot to the right, see Figure 3.1) as part of the zero trimming. The Span should only be changed as part of the recalibration of a gauge with a known pressure source.

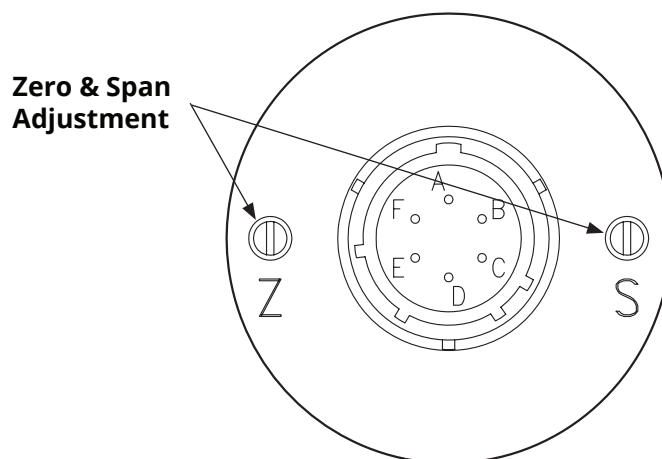


Figure 3.1

- **Re-Calibration**

Ensure that the transducer is at 0 psig or 0 psia (vacuum if absolute), and adjust zero as per instructions for zero trimming.

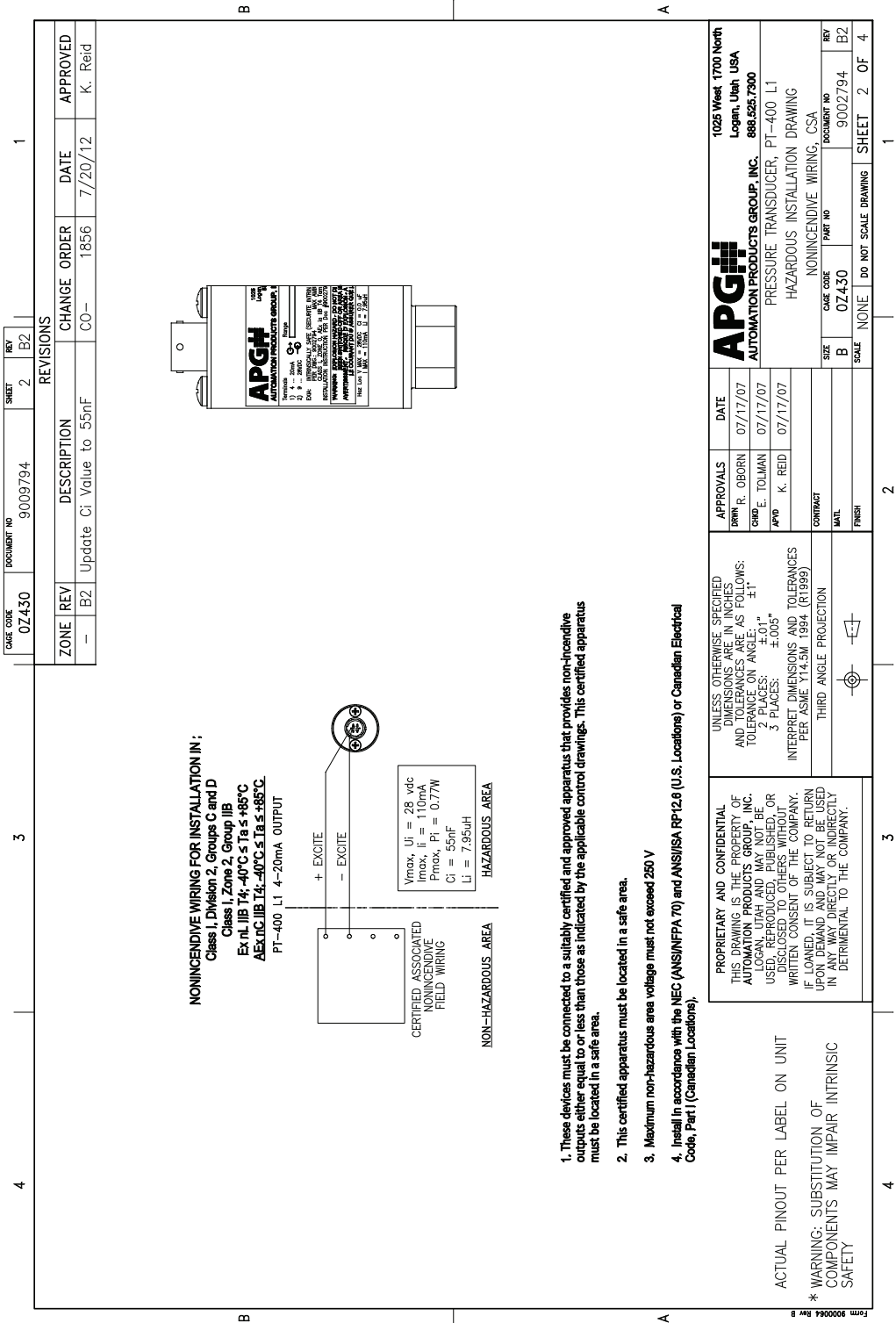
- Apply full scale pressure to the pressure port and adjust the Span ("S") pot (on the right of Figure 3.1) until the full scale signal is reached.
- Re-check zero and re-adjust the zero ("Z") pot if required
- Repeat previous two steps until no further adjustment is required.

 NOTE: You may also return the PT-400 to the factory for repair and/or adjustment.

- **Intrinsically Safe Wiring Diagram (4-20mA Output)**

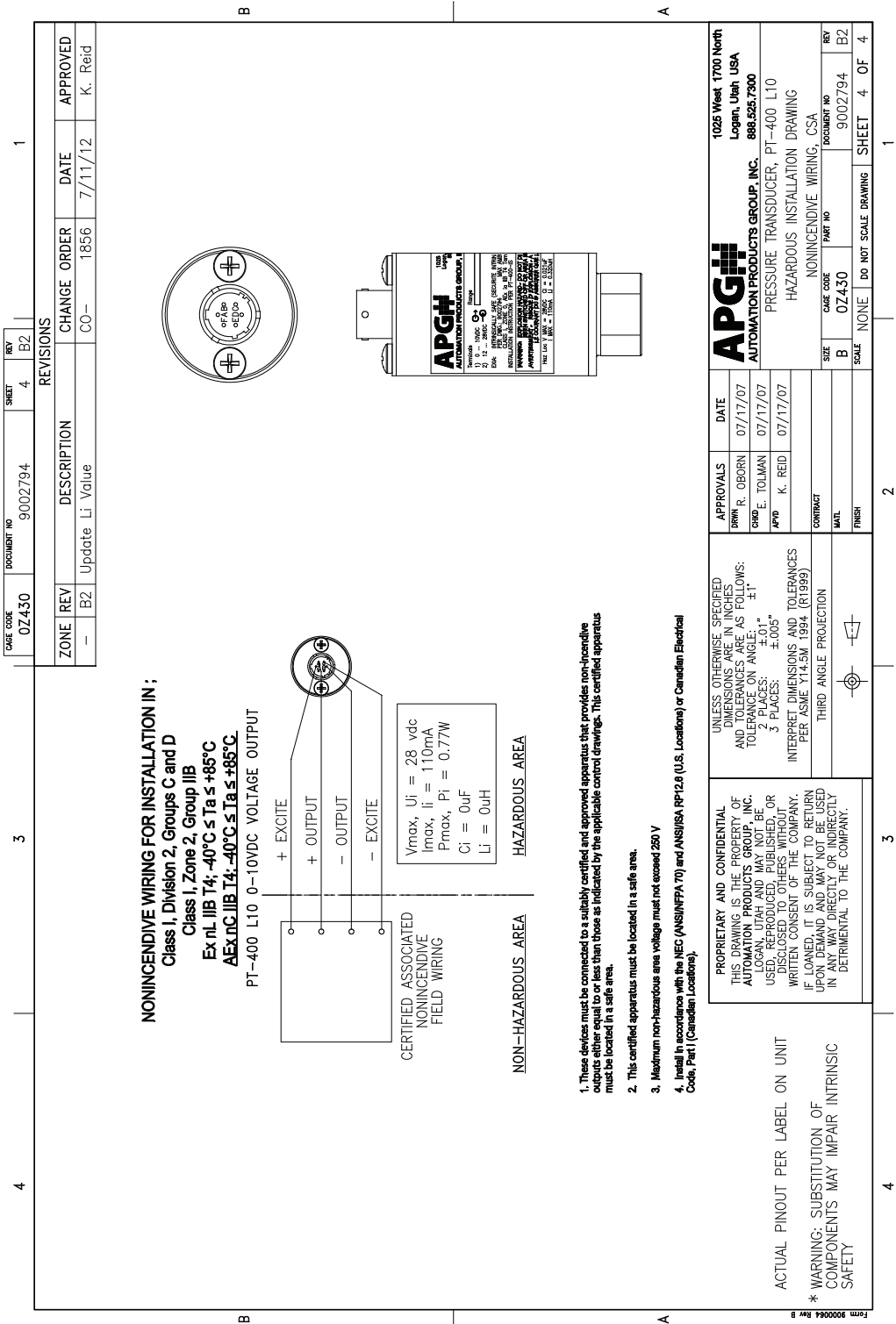


• Non-Incendive Wiring Diagram (4-20mA Output)



APG

• Non-Incendive Wiring Diagram (0-10VDC Output)



- **CSA Certificate of Compliance**



Certificate of Compliance

Certificate: 1984045

Master Contract: 237484

Project: 2587208

Date Issued: December 17, 2012

Issued to: Automation Products Group Inc

1025 West 1700 North

Logan, UT 84321

USA

Attention: Karl Reid

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Eshwar Kashyap

Issued by: Eshwar Kashyap

PRODUCTS

CLASS 2258 03 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non - Incendive Systems - For Hazardous Locations

CLASS 2258 83 - PROCESS CONTROL EQUIPMENT-Intrinsically Safe and Non-Incendive - Systems-For Hazardous Locations-Certified to U.S. Standards

Class I, Div. 2, Groups C and D

Class I, Zone 2, Group IIB

Ex nL IIB T4; Ta: -40°C ... +85°C

AEx nC IIB T4; Ta: -40°C ... +85°C

- Model PT-400-L1xxxx Pressure Transmitter. Rated 9-28VDC, 4-20mA. Maximum Ambient 85° C; Temperature Code T4; Maximum Working Pressure 10,000 PSI. Enclosure type: IP65. Installed as per Drawing 9002794. Non-Incendive with the following Entity Parameters:

V_{max}, U_i = 28V

I_{max}, I_i = 110mA

P_{max}, P_i = 0.77W



Certificate: 1984045

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Project: 2587208

Date Issued: December 17, 2012

$C_i = 0.055\mu F$

$L_i = 7.95\mu H$

- Model PT-400-L3/L10xxxx Pressure Transmitter. Rated 9-28VDC, 4-20mA or 0-5V, 20mA or 0-10V, 20mA; Maximum Ambient 85° C; Temperature Code T4; Maximum Working Pressure 10,000 PSI. Installed as per Drawing 9002794. Non-Incendive with the following Entity Parameters:

$V_{max}, U_i = 28V$

$I_{max}, I_i = 110mA$

$P_{max}, P_i = 0.77W$

$C_i = 0\mu F$

$L_i = 0\mu H$

- Model PT-500-xxxx Pressure Transmitter, Rated 10-28VDC, 4-20mA; Maximum Ambient 85° C; Temperature Code T4; Maximum Working Pressure 10,000 PSI; Non-Incendive with the following Entity Parameters:

$V_{max}, U_i = 28V$

$I_{max}, I_i = 110mA$

$P_{max}, P_i = 0.77W$

$C_i = 0\mu F$

$L_i = 0\mu H$

Notes for Models PT-400, PT-500:

1. The "x" in the Model designations may be any alpha-numeric character, to denote minor mechanical options, not affecting safety.
2. These devices must be connected to a suitably certified and approved apparatus that provides non-incendive outputs either equal to or less than those as indicated by the applicable control drawings. This certified apparatus must be located in a safe area.

CLASS 2258 04 - Process Control Equipment - Intrinsically Safe, Entity - For Hazardous Locations



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Date Issued: December 17, 2012

CLASS 2258 84 - Process Control Equipment - Intrinsically Safe, Entity - For Hazardous Locations - Certified to US Standards

Class I, Div. 1, Groups C, D

Class I, Zone 0, Group IIB

Ex ia IIB T4; Ta: -40°C ... +85°C

AEx ia IIB T4; Ta: -40°C ... +85°C

- Model PT-400-L1xxxx Pressure Transmitter. Rated 9-28VDC, 4-20mA. Maximum Working Pressure: 10,000 PSI. Installed as per Drawing 9002794. Ambient Range: -40°C to +85°C. Enclosure type: IP65. Intrinsically safe with the following entity parameters:

$V_{max}, U_i = 28V$

$I_{max}, I_i = 110mA$

$P_{max}, P_i = 0.77W$

$C_i = 0.055\mu F$

$L_i = 7.95\mu H$

- Model PT-500-xxxx Pressure Transmitter; Maximum Ambient 85° C; Temperature Code T4; Maximum Working Pressure 10,000 PSI; Entity parameters as follows: $V_{max}, U_i = 28V$

$I_{max}, I_i = 110mA$

$P_{max}, P_i = 0.77W$

$C_i = 0.042\mu F$

$L_i = 0.320\mu H$

Notes for Models PT-400, PT-500:

1. The "x" in the Model designations may be any alpha-numeric character, to denote minor mechanical options, not affecting safety.
2. These devices must be connected to a NRTL approved safety barrier (located in a safe area).



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APPLICABLE REQUIREMENTS

C22.2 No 0 - M1991	General Requirements - Canadian Electrical Code Part II.
C22.2 No 0.4 - M2004	Bonding and Grounding of Electrical Equipment (Protective Grounding).
C22.2 No 142 - M1987	Process Control Equipment.
C22.2 No 157 - M1992	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations.
C22.2 No 213 - M1987	Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations.
CAN/CSA-C22.2 No. 60079-0:11	Explosive Atmospheres - Part 0: Equipment - General requirements
CAN/CSA-C22.2 No. 60079-11:11	Explosive Atmospheres – Part 11: Equipment protection by intrinsic safety "i"
CAN/CSA-C22.2 No. 60079-15:12	Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection "n" electrical apparatus
CAN/CSA-C22.2 No. 60529:05	Degrees of protection provided by enclosures (IP Code)
UL 508, 17th Edition	Industrial Control Equipment.
UL 913, 7Th Edition	Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II, III, Division 1, Hazardous (Classified) Locations.
ANSI/ISA-12.12.01-2007	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
ANSI/UL 60079-0:09	Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements
ANSI/UL 60079-11:09	Electrical apparatus for Explosive Gas Atmospheres - Part 11: Intrinsic Safety "i"
ANSI/UL 60079-15:09	Electrical apparatus for Explosive Gas Atmospheres - Part 15: Type of Protection "n"
ANSI/IEC 60529:2004	Degrees of Protection Provided by Enclosures (IP Code)