PT-400
User Manual

APG®

Doc #9002825
Part # 200201
Rev G, 04/2024

Table of Contents

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 on our website 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)

Vmax U_i= 28VDC, Imax I_i = 110mA, Pmax P_i = 0.77W, C_i = 0.055µF, L_i = 7.95µH
Install in accordance with drawing 9002794, sheet 2 (page 10).

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

Vmax U_i= 28VDC, Imax I_i = 110mA, Pmax P_i = 0.77W, C_i = 0µF, L_i = 0µH
Install in accordance with drawing 9002794, sheets 3 & 4 (page 11 & 12).

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

Vmax U_i= 28VDC, Imax I_i = 110mA, Pmax P_i = 0.77W, C_i = 0.055µF, L_i = 7.95µH
Install in accordance with drawing 9002794, sheet 1 (page 9).

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.

The following approvals only apply to the L1 (4-20mA) version

ATEX Directive:

Sira 12ATEX2294

II 1G Ex ia IIB T4 Ga
Ta: -40°C to 85°C
$U_i \leq 28$ V, $I_i \leq 110$ mA, $P_i \leq 0.77$ W, $C_i = 0.055\mu F$, $L_i = 7.95\mu H$

IECEx CSA 12.0018
Ex ia IIB T4 Ga

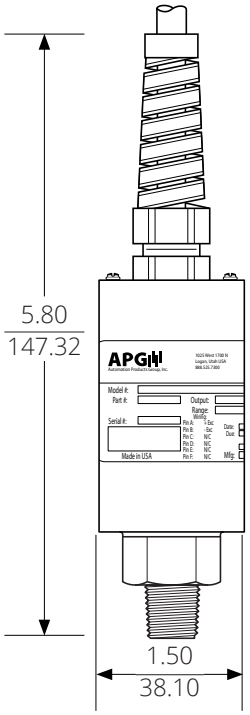
Warranty Statement

This product is covered by APG's warranty to be free from defects in material and workmanship under normal use and service of the product for 24 months. For a full explanation of our Warranty, please visit www.apgsensors.com/resources/warranty-certifications/warranty-returns/. Contact Technical Support to receive a Return Material Authorization before shipping your product back.

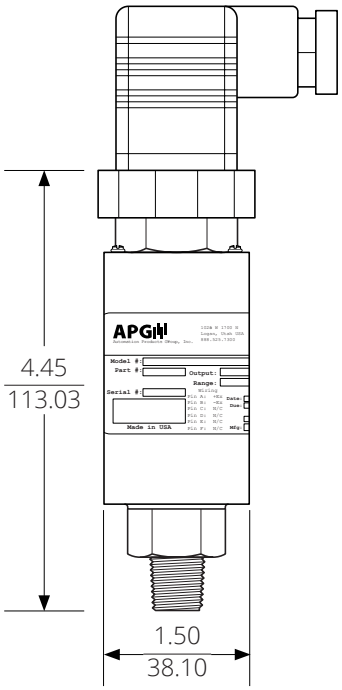
Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • www.apgsensors.com • sales@apgsensors.com

Chapter 1: Specifications and Options

- **Dimensions**

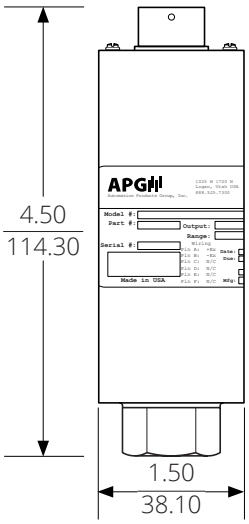


PT-400 with Pigtail and male NPT

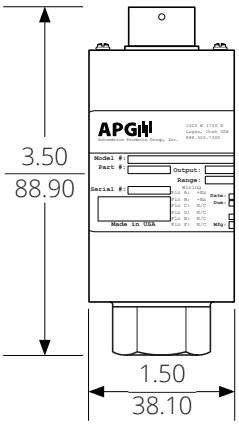


PT-400 with DIN 43650 and L-Bracket and male NPT

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 Long Can and female NPT



PT-400 with 4 or 6 pin Bayonet on Short Can and female NPT

• Specifications

Performance

Pressure Ranges	0 to 30K psi
Analog Output	4-20mA, 0-5VDC, 0.5-4.5VDC, 1-5VDC, 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, Hysteresis & Repeatability	±0.25% of Full Scale (BFSL) (1% for pressure ≤ 1 psi)
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 - 85°C / -40 - 185°F
Compensated Temperature	
≤ 5 psi:	No temperature specification
5 < x ≤ 10 psi:	0º - 60ºC / 32º - 140ºF
10 < x ≤ 1000 psi:	-10º - 70ºC / 14º - 158ºF
> 1000 psi:	-17º - 54ºC / 0º - 130ºF
Enclosure Protection	IP67

Electrical

Supply Voltage (at sensor)	4-20 mA:	9-28 VDC
	0 to 5 VDC:	9-28 VDC
	0.5 to 4.5 VDC:	9-28 VDC
	1 to 5 VDC:	9-28 VDC
	0 to 10 VDC:	12.5-28 VDC
	RS-485:	9-28 VDC
Output Signal @ 21°C / 70°F	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 Stainless Steel (≤ 1,000 psi)
	17-4 Stainless Steel (> 1,000 psi)
	Incoloy (10,000 - 30,000 psi)
Enclosure	316L Stainless Steel

Mechanical

Pressure Connection	See model number configurator for complete list
Weight	283g (10 oz.)
Zero & Span Protective Set Screws Torque	28 oz-in

Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • www.apgsensors.com • sales@apgsensors.com

• 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
□ **L12** 1 - 5 VDC output
□ **L20** 0.5 - 4.5 VDC output

Modbus †

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

B. Common Pressure Ranges - PSI*

□ **5**	□ **50**	□ **200**	□ **1000**	□ **5000**
□ **15**	□ **60**	□ **300**	□ **2000**	□ **10000**
□ **30**	□ **100**	□ **500**	□ **3000**	□ **30000**

*Other ranges available. Please consult factory.

C. Units of Measure

□ **psi**▲ □ **bar** □ **kPa** □ **inH_2O**
□ **fH_2O** □ **mmH_2O** □ **inHG**

D. Pressure Type

□ **A** Absolute (10 - 200 psi)
□ **S**▲ Sealed (200 psi - 30,000 psi)
□ **G** Gauge (≤ 500 psi)
□ **CG** Compound Gauge (-1 - 1 psi or -15 - 15 psi)

E. Electrical Connection**

(Mating connector sold separately unless noted otherwise)

□ **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)
□ **E19** 1/2 in male NPT with cable, short can
□ **E34** Junction Box
□ **E36** 1/2 in male NPT with 6 in flying leads, long can
□ **E40** 3 pin bayonet†††
□ **E41** Blue Junction Box
□ **E45** 4 pin minifast Turck

**Other connectors available. Please consult factory.

F. Electrical Cable Length

□ __ Number represents cable length, in 1-ft increments, included on E5 and E19 options.
(ex. E5-10 equals pigtail, 10 ft cable)

G. Process Connection

□ **P0**▲ 1/4 - 18 male NPT (≤ 10,000 psi)
□ **P1** 1/2 - 14 male NPT (≤ 10,000 psi)
□ **P5** 1/4 - 18 female NPT (≤ 15,000 psi)
□ **P6** 1/2 female NPT (≤ 10,000 psi)
□ **P38** 1 1/2 in. tri-clover with 3/4 in. diaphragm (≤ 1,000 psi)
□ **P52** 1 1/2 in. male NPT (≤ 1,000 psi)
□ **P54** 7/16 - 20 UNJF-3A Male w/ Cone (≤ 1,000 psi)
□ **P56** F250C High Pressure (10,000 psi - 30,000 psi)
□ **P57** F562-C40 High Pressure (10,000 psi - 30,000 psi)

H. Accuracy

1-5,000 PSI

□ **N0***▲ ±0.25% (1% for pressure ≤ 1 psi)
□ **N1*** ±0.25% with NIST certification
□ **N2** ±0.1% with NIST certification

*Note: ±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 (≤ 1,000 psi)
□ **M2** 17-4 SS (> 1000 psi)
□ **M7** Incoloy (10,000 psi - 30,000 psi; P56/P57 only)

J. Compensated Temperature Range

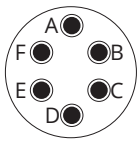
□ **S0**▲ -17º - 54ºC / 0º - 130ºF (> 1000 psi)
□ **S1** -40º - 82ºC / -40º - 180ºF (> 1,000 psi)
□ **S3** -34º - 77ºC / -30º - 170ºF (> 1,000 psi)
□ **S9**▲ 0º - 60ºC / 32º - 140ºF (5 < x ≤ 10 psi)
□ **S10**▲ -10º - 70ºC / 14º - 158ºF (10 < x ≤ 1000 psi)
□ **S11**▲ No Temperature Specification (≤ 5 psi)

▲This option is standard

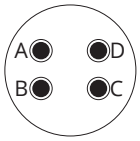
†Modbus output requires a long can
††Note: Not currently available with L5/L31 Modbus Output
†††Note: L1 4-20 mA Output only

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

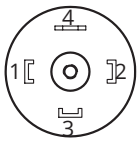
PT-400 Series Pin Out Table



		4-20 mA	0-5 / 0.5-4.5 / 1-5 VDC	0-10 VDC	RS-485
6 Pin Bayonet	A	+ Excitation	+ Excitation	+ Excitation	+ Excitation
	B	- Excitation	+ Output	+ Output	- Excitation
	C	N/C	- Output	- Output	N/C
	D	N/C	- Excitation	- Excitation	B (Tx-)
	E	N/C	N/C	N/C	A (Tx+)
	F	N/C	N/C	N/C	Case Gnd



4 Pin Bayonet	A	+ Excitation	+ Excitation	+ Excitation	N/A
	B	- Excitation	+ Output	+ Output	N/A
	C	N/C	- Output	- Output	N/A
	D	N/C	- Excitation	- Excitation	N/A



4 Pin DIN	1	+ Excitation	+ Excitation	+ Excitation	+ Excitation
	2	- Excitation	+ Output	+ Output	A (Tx+)
	3	N/C	- Output	- Output	B (Tx-)
	4	Case Ground	- Excitation	- Excitation	- Excitation

4 Pin M12	1	+ Excitation	+ Excitation	+ Excitation	+ Excitation
	2	- Excitation	+ Output	+ Output	A (Tx+)
	3	N/C	- Output	- Output	- Excitation
	4	N/C	- Excitation	- Excitation	B (Tx-)

Cable	Red	+ Excitation	+ Excitation	+ Excitation	+ Excitation
	Grn	N/C	+ Output	+ Output	B (Tx-)
	Wht	N/C	- Output	- Output	A (Tx+)
	Blk	- Excitation	- Excitation	- Excitation	- Excitation
	Shld	Gnd	Gnd	Gnd	

Flying Leads	Red	+ Excitation	+ Excitation	+ Excitation	+ Excitation
	Grn	No wire	+ Output	+ Output	B (Tx-)
	Wht	No wire	- Output	- Output	A (Tx+)
	Blk	- Excitation	- Excitation	- Excitation	- Excitation
	Shld	No wire	No wire	No wire	No wire
	Grn/ Ylw	Case Ground	No wire	No wire	No wire

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

PT-400 Series Supply Power Table

	4-20 mA	0-5 / 0.5-4.5 / 1-5 VDC	0-10 VDC	RS-485
Power Supply	9-28 VDC	9-28 VDC	12.5-28 VDC	9-28 VDC

Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • www.apgsensors.com • sales@apgsensors.com

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.

• Physical Installation Notes

The PT-400 should be installed in an area--indoors or outdoors--which meets the following conditions:

- Ambient temperature between -40°C and 85°C (-40°F to +185°F)
- Relative humidity up to 100%
- Altitude up to 2000 meters (6560 feet)
- IEC-664-1 Conductive Pollution Degree 1 or 2
- IEC 61010-1 Measurement Category II
- No chemicals corrosive to stainless steel (such as NH_3, SO_2, Cl_2 etc.)
- Ample space for maintenance and inspection
- Class II power supply

• Mounting Instructions

Mounting your pressure transducer is easy if you follow a few simple steps:

- Ensure that the fitting on your sensor matches the fitting on your tank/vessel/pipe/etc. If the fittings do not match, do not attempt to install the sensor. Contact the factory immediately.
- 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°C and 82°C (-40°F to 180°F).

DANGER: Removing your PT-400 Pressure Transmitter while there is still pressure in the line could result in injury or death.

Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • www.apgsensors.com • sales@apgsensors.com

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 protective screw(s) with 5/64 allen wrench.
- Ensure that the transmitter is at 0 psig or 0 psia (vacuum if absolute).
- Using a jeweler's screwdriver or a suitable instrument, adjust the "Z" pot until you have a 4 mA, 0 V, 0.5 V, or 1 V output.
- Replace protective screws(s) when finished.

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.

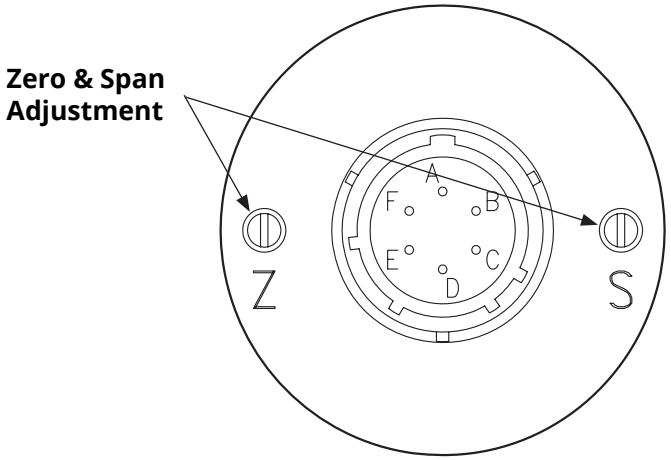


Figure 3.1

DANGER: Protective screws must be replaced using 28 oz-in of torque to create seal.

• Re-Calibration

This procedure requires a known pressure source of at least ±0.1% accuracy in order to fully utilize the accuracy potential of the PT-400. (If not available, you can return it to the factory for re-calibration.)

- Ensure that the transmitter 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.

• Repair and Returns

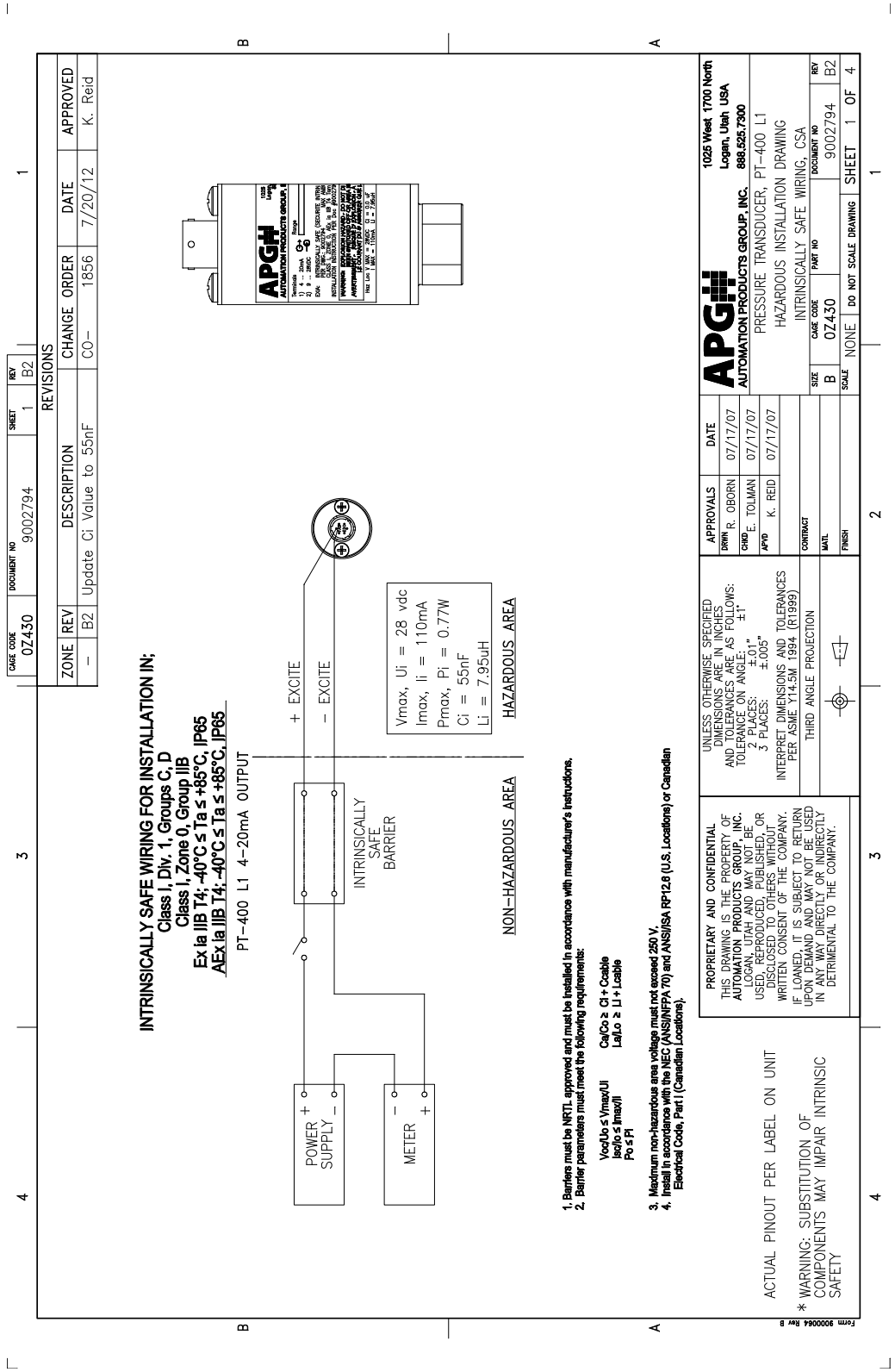
Should your PT-400 series pressure transmitter require service, please contact the factory via phone, email, or online chat. We will issue you a Return Material Authorization (RMA) number with instructions.

- Phone: 888-525-7300
- Email: sales@apgsensors.com
- Online chat at www.apgsensors.com

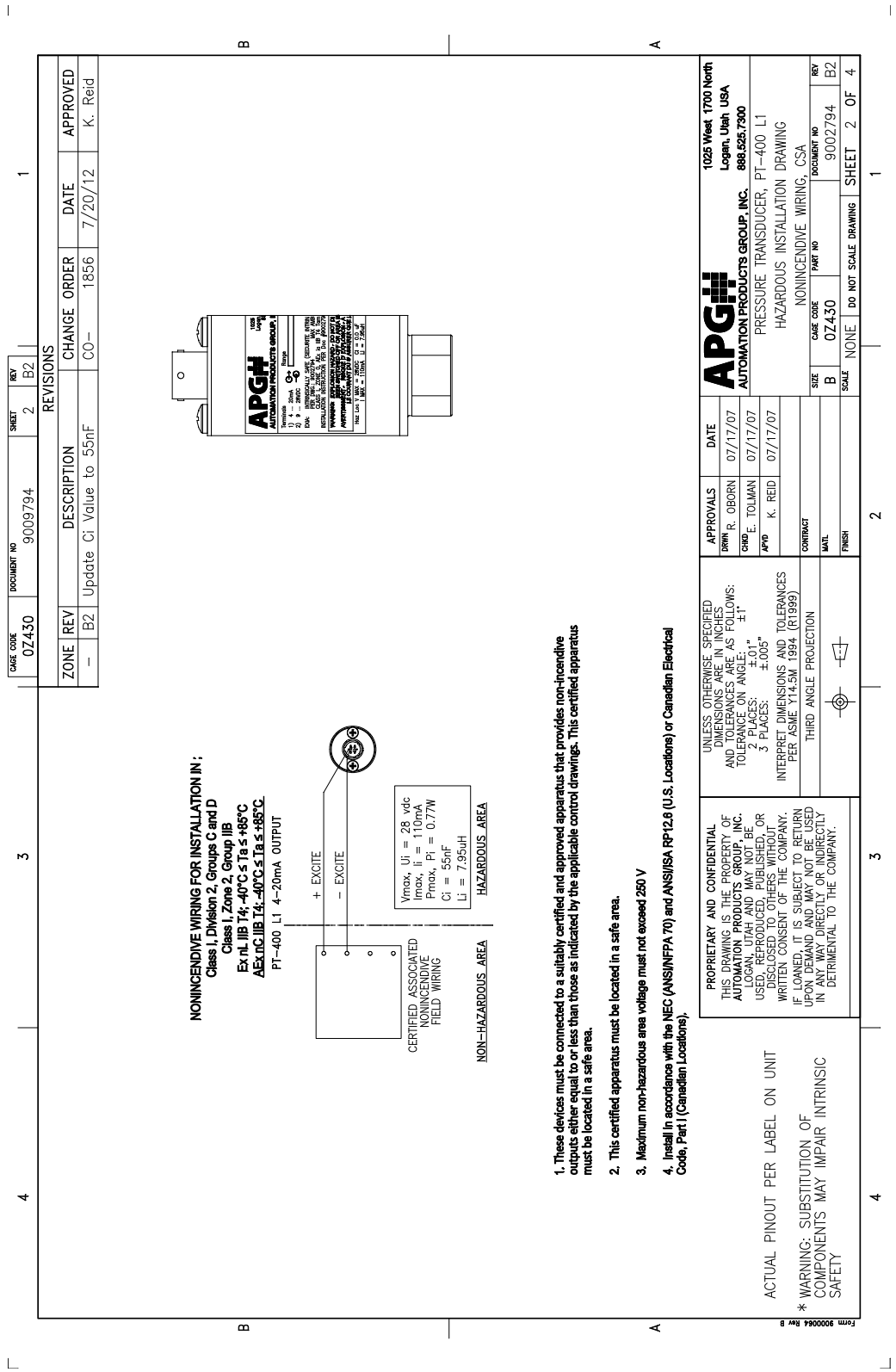
Please have your PT-400’s part number and serial number available. See Warranty Statement for more information.

Chapter 4: Hazardous Location Installation and Certification

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

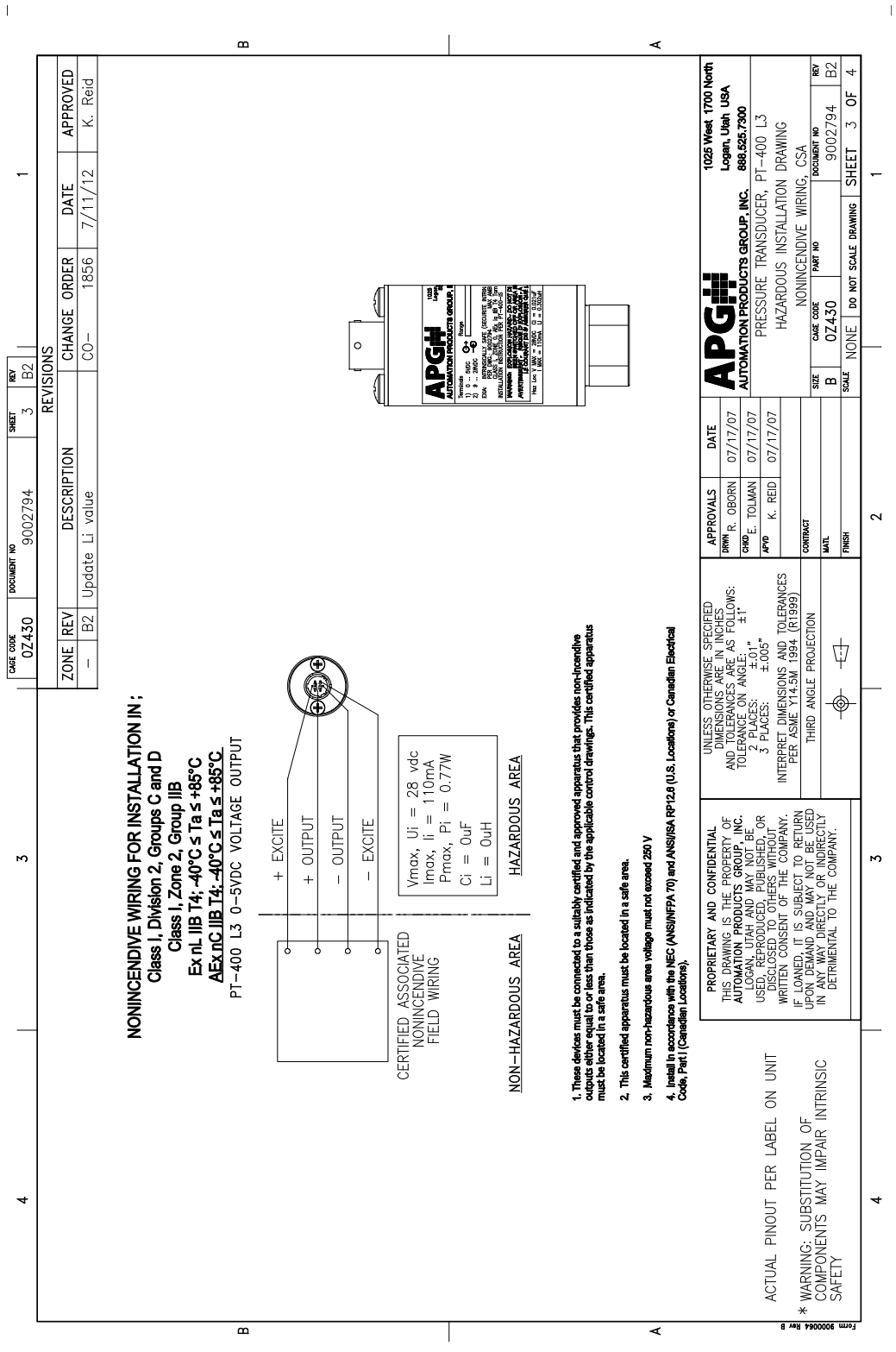


- **Non-Incendive Wiring Diagram (4-20mA Output)**

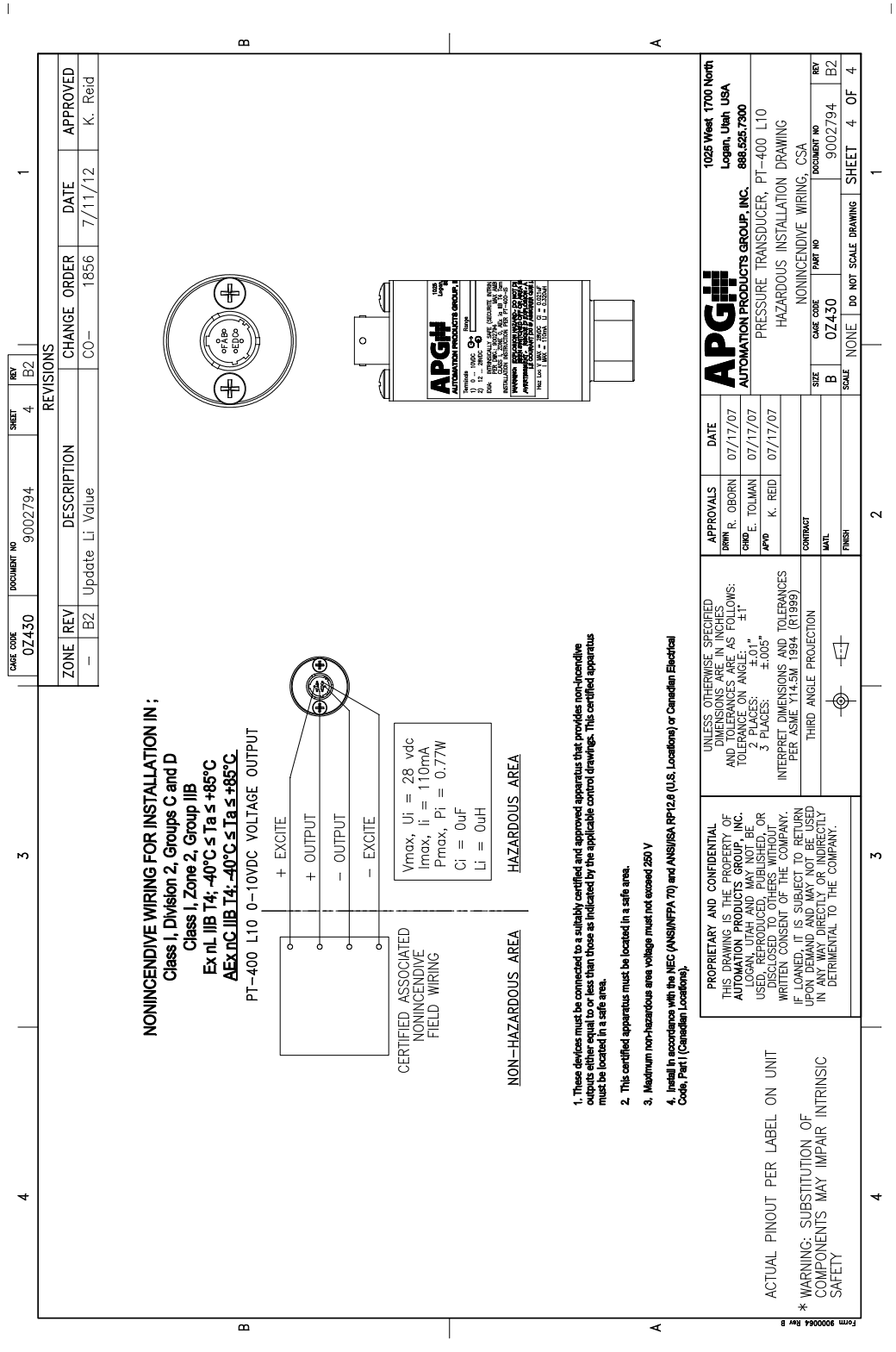


Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • www.apgsensors.com • sales@apgsensors.com

- **Non-Incendive Wiring Diagram (0-5VDC Output)**



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



Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • www.apgsensors.com • sales@apgsensors.com

Automation Products Group, Inc.
Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • www.apgsensors.com • sales@apgsensors.com