

Hammer Union Pressure Transmitter

For the Recalibratable HU1502I

User Manual

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INTRODUCTION

Thank you for purchasing a Hammer Union Pressure Transmitter from APG. We appreciate your business! Please take a few minutes to familiarize yourself with your Hammer Union and this manual.

APG's Recalibratable Hammer Union Pressure Transmitters are designed for the harsh environments of land-based and offshore drilling installations. Designed specifically for use with the 1502 Hammer Wing Union, the HU1502I features a NPT-sealed port for digital zero and span recalibration. The HU1502I is constructed from NACE compliant incoloy for use with sour gas (H₂S), sodium chloride (NaCl), calcium chloride (CaCl₂), and in corrosive environments.

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.

Electrical ratings



Input: 10 to 28 VDC; Output: 4-20 mA / 0-5 VDC (per order)

Class I, Division 1, Groups C, D

Class I, Zone 0

Ex ia IIB T4: -40°C to 85°C; Enclosure Type IP67

AEx ia IIB T4: -40°C to 85°C; Enclosure Type IP67

$V_{max} U_i = 28VDC$, $I_{max} I_i = 110mA$, $P_{max} P_i = 1W$, $C_i = 60.89nF$, $L_i = 7.7mH$

The following approvals only apply to the L24 (4-20mA) version

ATEX Directive: 0344

Sira 13ATEX2023



II 1G Ex ia IIB T4 Ga

Ta: -40°C to 85°C

$U_i \leq 28 V$, $I_i \leq 110 mA$, $P_i \leq 1 W$, $C_i \leq 60.89 nF$, $L_i \leq 7.7 mH$

IECEX CSA 13.0004
Ex ia IIB T4 Ga

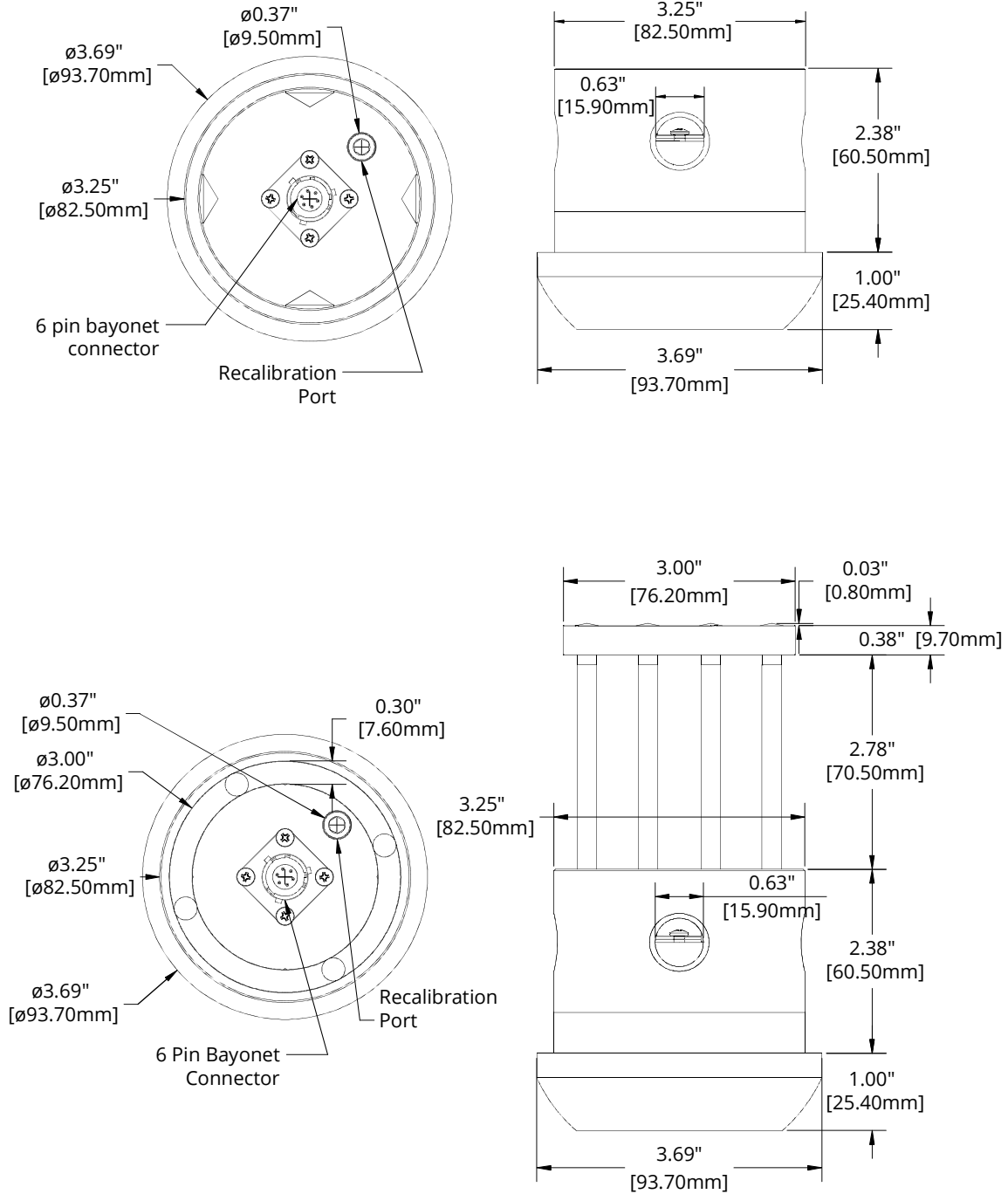
i **IMPORTANT:** Recalibratable Hammer Union Pressure Transmitter **MUST** be installed according to drawing 9002460 (Intrinsically Safe Wiring Diagram) on page 13 to meet listed approvals. Faulty installation will invalidate all safety approvals and ratings.

WARRANTY AND WARRANTY RESTRICTIONS

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.

CHAPTER 1: SPECIFICATIONS AND OPTIONS

Dimensions



Specifications

Performance

Pressure Ranges	0 to 20K PSIS (Per Part Number)
Analog Output	4-20mA, 0-5VDC
Over Pressure	1.5X Full Scale, or limit of wing nut fitting, whichever is smallest
Burst Pressure	3.0X Full Scale, or limit of wing nut fitting, whichever is smallest
Life	10 million cycles, minimum

Accuracy

Linearity, Hystereses & Repeatability	±0.25% of Full Scale (BFSL)
Thermal Zero Shift	±0.026% FSO/°C (±0.01% FSO/°F)
Thermal Span Shift	±0.026% FSO/°C (±0.01% FSO/°F)

Environmental

Operating Temperature	-40 to 85°C	(-40 to 185°F)
Compensated Temperature	-40 to 65°C	(-40 to 150°F)
Enclosure Protection	IP67/IP65	

Electrical

Supply Voltage	10-28 VDC on sensor
Output Signal @ 21°C	4-20 mA: 3-30 mA max. 0 to 5 VDC: 7mA max

Materials of Construction

Wetted Materials	Incoloy 925 NACE MR-01-75 and ISO 15156-3
Enclosure	316L Stainless Steel

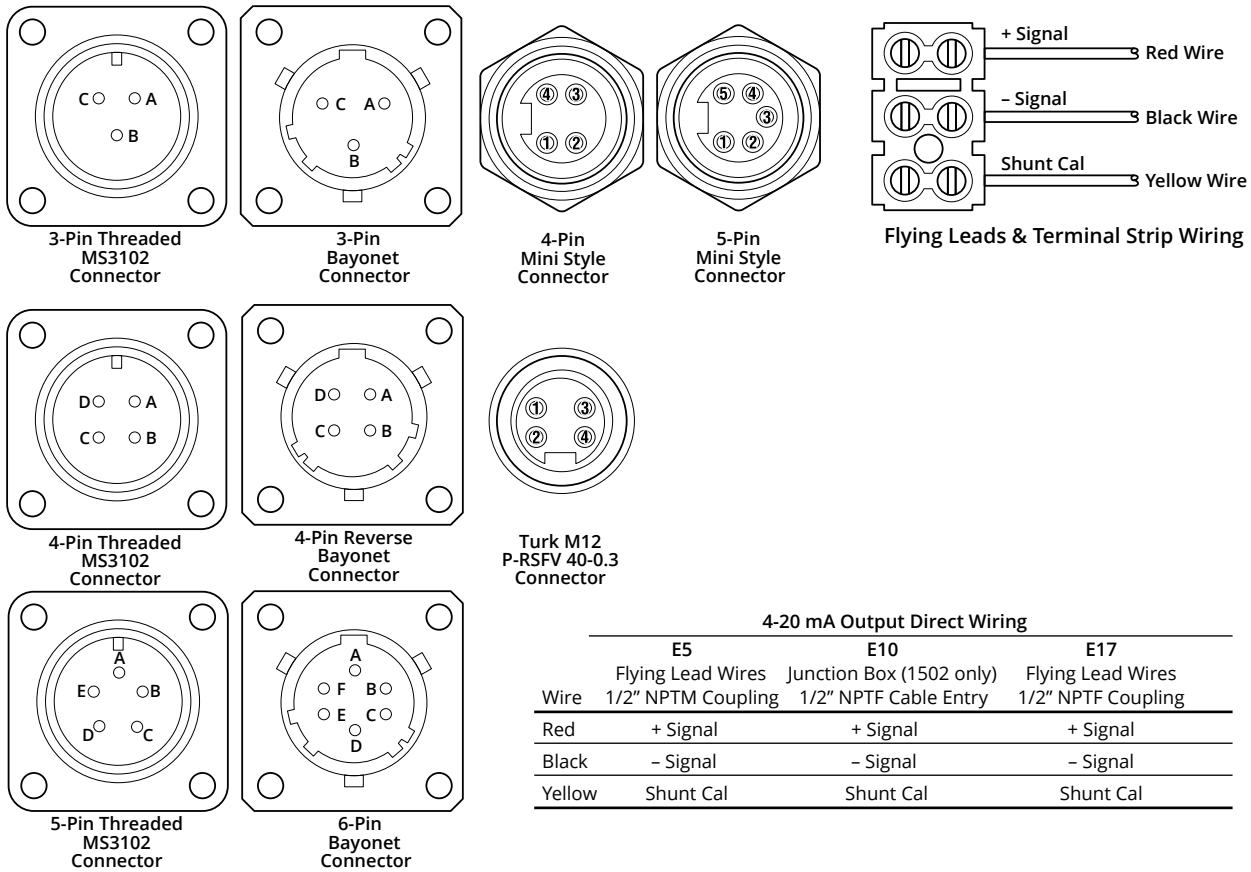
Mechanical

Pressure Connection	WECO® standard 1502 or equivalent
Weight	2.3kg (5.10 lbs)

i IMPORTANT: To maintain the IP67/65 rating, the equipment shall be installed with a certified IP67/65 mating connector.

Electrical Connectors and Pinout Table

Face view of male connector on HU



4-20 mA Output Direct Wiring			
	E5	E10	E17
	Flying Lead Wires	Junction Box (1502 only)	Flying Lead Wires
Wire	1/2" NPTM Coupling	1/2" NPTF Cable Entry	1/2" NPTF Coupling
Red	+ Signal	+ Signal	+ Signal
Black	- Signal	- Signal	- Signal
Yellow	Shunt Cal	Shunt Cal	Shunt Cal

Pin	0 to 5 VDC Output				4-20 mA Output		
	E3	E14	E1	E2	E7	E8	E9
	4 pin MS3102	6 pin Bayonet	4 pin Mini	5 pin Mini	4 pin Bayonet	5 pin MS3102	3 pin MS3102
	Electroplate Nickel	Stainless Steel	Nickel Plated Zinc	Nickel Plated Zinc	Stainless Steel	Stainless Steel	Stainless Steel
A (1)	+ Power	+ Power	+ Signal	+ Signal	+ Power/Signal	No Connection	No Connection
B (2)	- Power	+ Signal	- Signal	- Signal	- Power/Signal	- Power/Signal	+ Power/Signal
C (3)	+ Signal	-Power	Shunt Cal	No Connection	Shunt Cal	+ Power/Signal	- Power/Signal
D (4)	- Signal	- Signal	No connection	Shunt Cal	No Connection	Shunt Cal	-
E (5)	-	+Shunt Cal	-	No Connection	-	No Connection	-
F	-	-Shunt Cal	-	-	-	-	-

Note: Mating connectors sold separately.

Pin	4-20 mA Output							
	E11	E13	E15	E16	E20	E28	E40	E45
	4 pin MS3102	7 Pin Jup./Souriau	6 pin Bayonet	4 pin MS3102	4 pin M12	6 pin Bayonet	3 pin Bayonet	6 pin Bayonet
	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
A (1)	No Connection	+ Power/Signal	+ Power/Signal	+ Power/Signal	-Power/Signal	+ Power/Signal	+ Power/Signal	+ Power/Signal
B (2)	- Power/Signal	- Power/Signal	- Power/Signal	- Power/Signal	+ Power/Signal	- Power/Signal	- Power/Signal	- Power/Signal
C (3)	+ Power/Signal	No Connection	No Connection	Case Ground	No Connection	No Connection	Shunt Cal	No Connection
D (4)	Case Ground	No Connection	Case Ground	Shunt Cal	Case Ground	No Connection	-	Case Ground
E (5)	-	Shunt Cal	+ Shunt Cal	-	-	No Connection	-	Shunt Cal
F (6)	-	No Connection	- Shunt Cal	-	-	No Connection	-	No Connection
G (7)	-	No Connection	-	-	-	-	-	-

Note: Mating connectors sold separately.

CHAPTER 2: INSTALLATION AND REMOVAL PROCEDURES AND NOTES

Tools Needed

You will need the following tools to install your HU1502I Hammer Union Pressure Transmitter:

- A hammer
- 1502 wing nut

Specific Conditions of Use

- To maintain IP67/65 rating, the equipment shall be installed with a certified IP67/65 mating connector.
- This device must be connected to an approved safety barrier.

Physical Installation

- Ensure mating union faces are clean, dry, and free of debris.
- Mate your Hammer Union Pressure Transmitter onto the socket.
- Place the wing nut on the Transmitter and spin into place.
- Hammer the wing nut until tight.

Electrical Installation

- Check the pinout table on your Hammer Union Pressure Transmitter against your order.
- Check that your electrical system wiring matches the pinout table on your Hammer Union.
- For instruments with connectors, make the connection. Otherwise, connect the flying leads or junction box to your electrical system.

i **IMPORTANT:** To maintain the IP67/65 rating of your Hammer Union, you must use a certified IP67/65 mating connector.

Shunt Calibration Procedures

APG's Hammer Union Pressure Transmitters can be configured with either a single-pin shunt calibration or two-pin switched shunt calibration.

Single-Pin Shunt Calibration Procedure

APG's Hammer Union Pressure Transmitters with single-pin shunt cal provide a full scale output (20.0 mA or 5 VDC) when 10 to 28 VDC is applied to the designated shunt cal pin. See the pinout chart on your Hammer Union Pressure Transmitter's label.

- Check the pinout table on your Hammer Union Pressure Transmitter.
- For 0 - 5 VDC Hammer Unions, connect +/- Power and +/- Signal, with a volt meter connected across +/- Signal.
- For 4-20 mA Hammer Unions, connect +/- Signal, with - Signal connected through an Ammeter.
- Apply 10 to 28 VDC to the Shunt Cal pin.
- If the instrument electronics are operating properly, the output signal will go to full scale (5 VDC or 20 mA).

Two-Pin Shunt Calibration Procedure


APG's Hammer Union Pressure Transmitters with two-pin shunt cal provide a full scale output (20.0 mA or 5 VDC) when + Shunt is shunted to - Shunt. This is usually accomplished via an external switch. See the pinout chart on your Hammer Union Pressure Transmitter's label.

- Check the pinout table on your Hammer Union Pressure Transmitter.
- For 0 - 5 VDC Hammer Unions, connect +/- Power and +/- Signal, with a volt meter connected across +/- Signal, and an open switch between + Shunt Cal and - Shunt Cal.
- For 4-20 mA Hammer Unions, connect +/- Signal, with - Signal connected through an Ammeter, and an open switch between + Shunt Cal and - Shunt Cal.
- Close the open switch between + Shunt Cal and - Shunt Cal, effectively applying power to - Shunt Cal. (+ Power for 0 - 5 VDC, and + Signal for 4 - 20 mA, is tied to + Shunt Cal inside the Hammer Union)
- If the instrument electronics are operating properly, the output signal will go to full scale (5 VDC or 20 mA) when the switch is closed.

Removal Instructions

Removing your Hammer Union Pressure Transmitter from service must be done with care. It's easy to create an unsafe situation if you are not careful to follow these guidelines:

- Make sure the pressure is completely removed from the line where your sensor is installed. Follow any and all procedures for safely isolating any media contained inside the line or vessel.
- Remove the Hammer Union wing nut.
- Remove your Pressure Transmitter.
- Clean the sensor's fitting and diaphragm of any debris (see above instructions) and inspect for damage.
- Store your sensor in a dry place, at a temperature between -40° F and 180° F.

 **DANGER:** Removing your Hammer Union Pressure Transmitter while there is still pressure in the line could result in injury or death.

CHAPTER 3: MAINTENANCE

General Care

Your Hammer Union Pressure Transmitter is designed to be maintenance free. As such, there are no customer servicable parts on or in the device. However, in general, you should:

- 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.
- See Chapter 4 Recalibration Procedure for recalibration instructions.

Repair and Returns

Should your Hammer Union 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 Hammer Union Pressure Transmitter's part number and serial number available. See Warranty and Warranty Restrictions for more information.

i **IMPORTANT:** All repairs and adjustments of the Recalibratable HU1502I Pressure Transmitter must be made by the factory. Modifying, disassembling, or altering the Recalibratable HU1502I Pressure Transmitter, other than factory approved recalibration, is strictly prohibited.

CHAPTER 4: RECALIBRATION PROCEDURE

Recalibration Wiring Diagrams

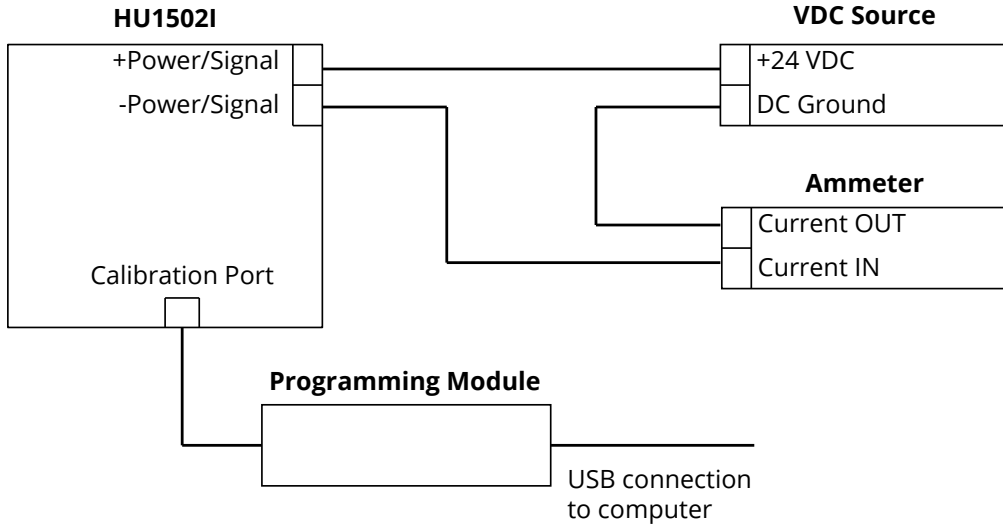


Figure 4.1

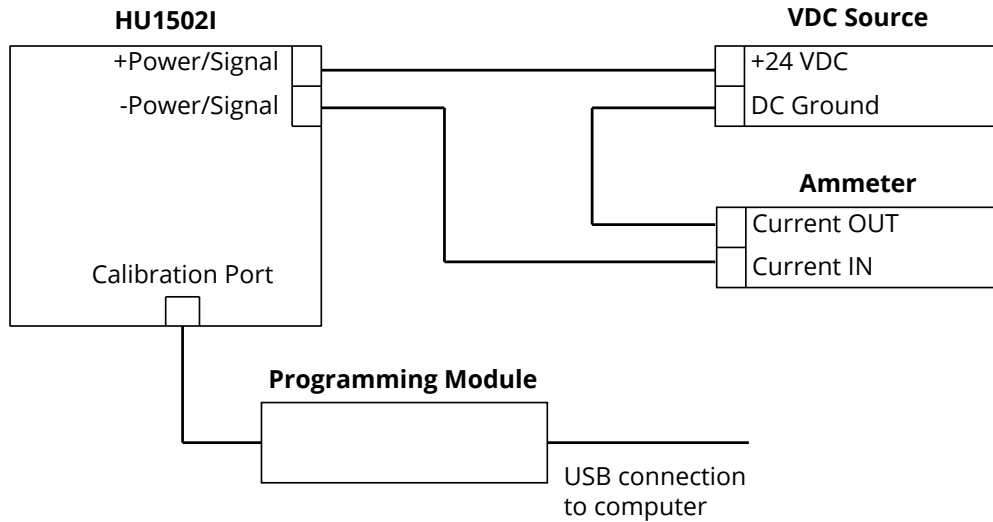


Figure 4.2

Tools Needed

You will need the following tools to recalibrate your HU1502I Hammer Union Pressure Transmitter:

- A hammer
- 1502 wing nut
- Hex driver
- +24 VDC source
- Ammeter or voltmeter (per HU1502I output)
- Computer with USB port
- Hammer Union test station capable of applying calibrated full scale pressure to the HU1502I

Recalibration Set Up - Computer

Prior to connecting your HU1502I Pressure Transmitter to the Programming Module:

Install the Hammer Union Calibrator software on the computer to be used for recalibration.

www.apgsensors.com/resources/product-resources/software-downloads/

i IMPORTANT: Hammer Union Calibrator software must be installed on a computer with a USB port.

Recalibration Set Up - HU1502I

Setting up your HU1502I Pressure Transmitter for recalibration must be done with care. It's easy to create an unsafe situation if you are not careful to follow these guidelines:

- Install the HU1502I in a test station capable of applying calibrated full scale pressure to the transducer. Begin with 0 pressure applied to the HU1502I.
- Use a ratchet and Allen socket to remove the NPT plug covering the recalibration port.
- Connect the HU1502I to a 24 VDC source and an ammeter or voltmeter. Consult the pinout on the HU1502I label and the wiring diagrams on page 8 (Figure 4.1 for 4-20 mA Output, Figure 4.2 for 0-5 VDC output) to ensure correct pin/wire connections.
- Power on VDC Source and ammeter/voltmeter. The meter should show a reading at or near zero pressure (4 mA or 0 VDC) if everything is connected correctly.
- Plug 3.5mm on Programming Module into HU recalibration port.

Software User Interface

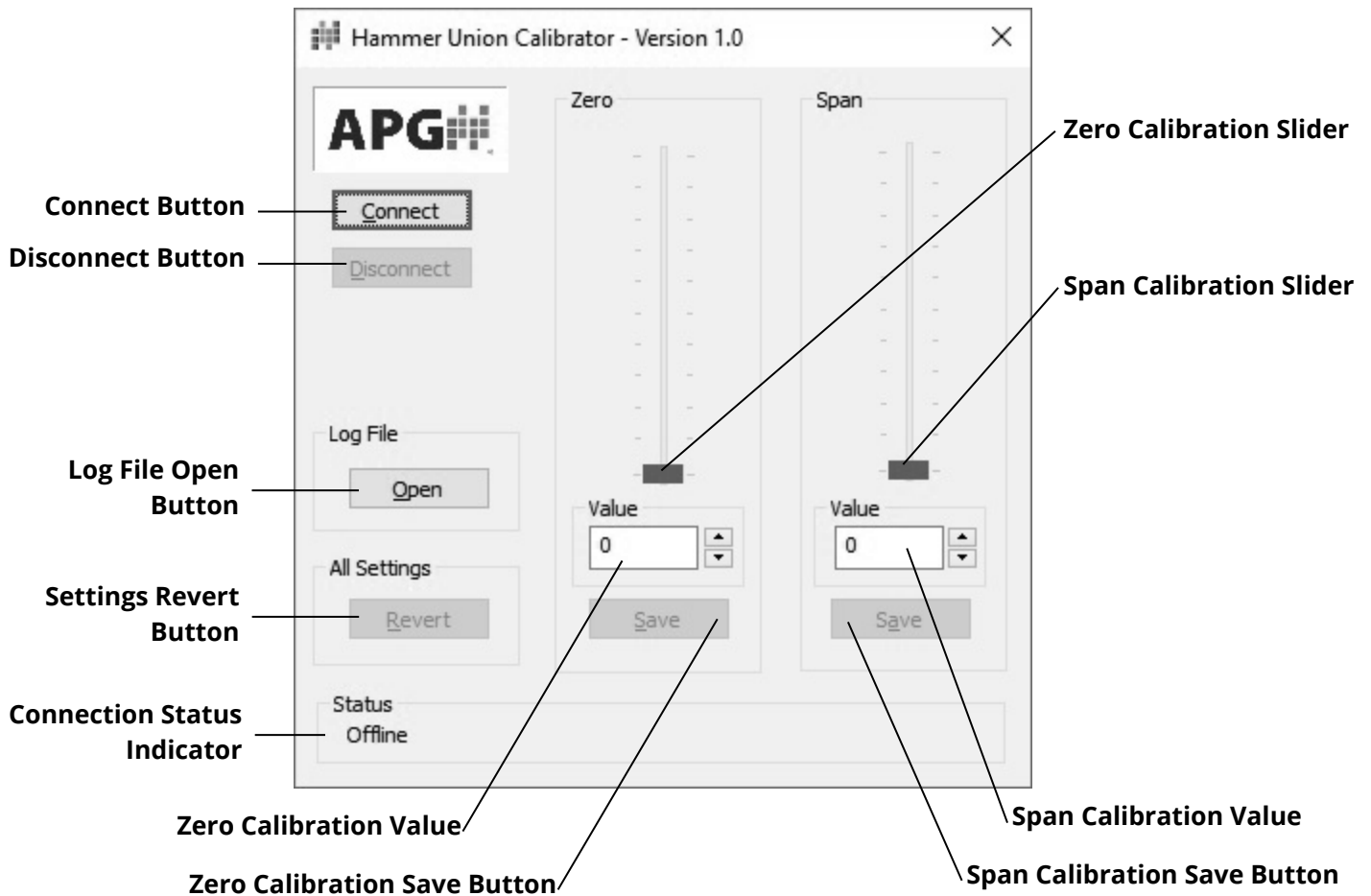


Figure 4.3

Button and Slider operations and Displays

Connect Button:

Initiates connection between Hammer Union Calibrator software and Recalibratable HU1502I.

Disconnect Button:

Ends connection between Hammer Union Calibrator software and Recalibratable HU1502I.

Log File Open Button:

Opens Log File txt. Every attempt to write a calibration value is logged as successful or unsuccessful.

Settings Revert Button:

Clears UNSAVED calibration adjustments. Sliders will not reset, but ammeter/voltmeter will display initial output value.

Zero Calibration Slider:

Adjusts zero output (4 mA/0 VDC). Can be adjusted with mouse or ↑ and ↓ buttons.

Zero Calibration Value:

Displays current calibration adjustment. Can be cleared via Settings Revert Button before clicking Zero Calibration Save Button. CANNOT read current calibration value on Recalibratable HU1502I.

Zero Calibration Save Button:

Writes Zero Calibration Value to Recalibratable HU1502I.

Span Calibration Slider:

Adjusts full scale output (20 mA/5 VDC). Can be adjusted with mouse or ↑ and ↓ buttons.

Span Calibration Value:

Displays current calibration adjustment. Can be cleared via Settings Revert Button before clicking Span Calibration Save Button.

Span Calibration Save Button:

Writes Span Calibration Value to Recalibratable HU1502I.

Connection Status Indicator:

Displays current status of connection between Hammer Union Recalibrator software and Recalibratable HU1502I, and success or failure of write attempts to Recalibratable HU1502I (See Figure 4.5).

Recalibration Procedure

After completing the set up instructions above, follow the these steps to recalibrate your HU1502I:

1. Connect programming unit to computer with Hammer Union Calibrator software already installed via USB port.
2. Launch Hammer Union Calibrator software.
3. Click Connect Button (See Figure 4.3) to initiate connection between Hammer Union Calibrator software and HU1502I. Wait for Connection Status Indicator to read “Open Successful” (See Figure 4.4).
4. With 0 pressure applied to the HU1502I, adjust Zero Calibration Slider (See Figure 4.3) until ammeter reads 4 mA or voltmeter reads 0 VDC, to the desired precision. Allow 1 second for ammeter/voltmeter reading to stabilize after adjusting slider.
5. When desired reading shows on ammeter/voltmeter, press Zero Calibration Save Button.
6. Apply full scale pressure to HU1502I.
7. Adjust Span Calibration Slider until ammeter reads 20 mA or voltmeter reads 5 VDC. Allow 1 second for ammeter/voltmeter reading to stabilize after adjusting slider.
8. When desired reading shows on ammeter/voltmeter, press Span Calibration Save Button.
9. Release pressure applied to HU1502I.
10. Repeat Steps 4 - 9 as necessary (usually two or three iterations) until Zero and Span readings are calibrated to desired precision.
11. To reinstall 1/8” plug in recalibration port, wrap the plug with 3 wraps of PTFE tape. Tighten the plug to 1 full turn past hand-tight using an Allen socket and ratchet.

i **IMPORTANT:** Zero Calibration Value and Span Calibration Value are not written unless the corresponding Save Button is clicked.

pencil **Note:** Any adjustments made can be discarded BEFORE clicking a Calibration Save Button by clicking the Settings Revert Button (See Figure 4.3). Slider position and value will not reset, but ammeter/voltmeter reading will reset to value prior to slider adjustment.

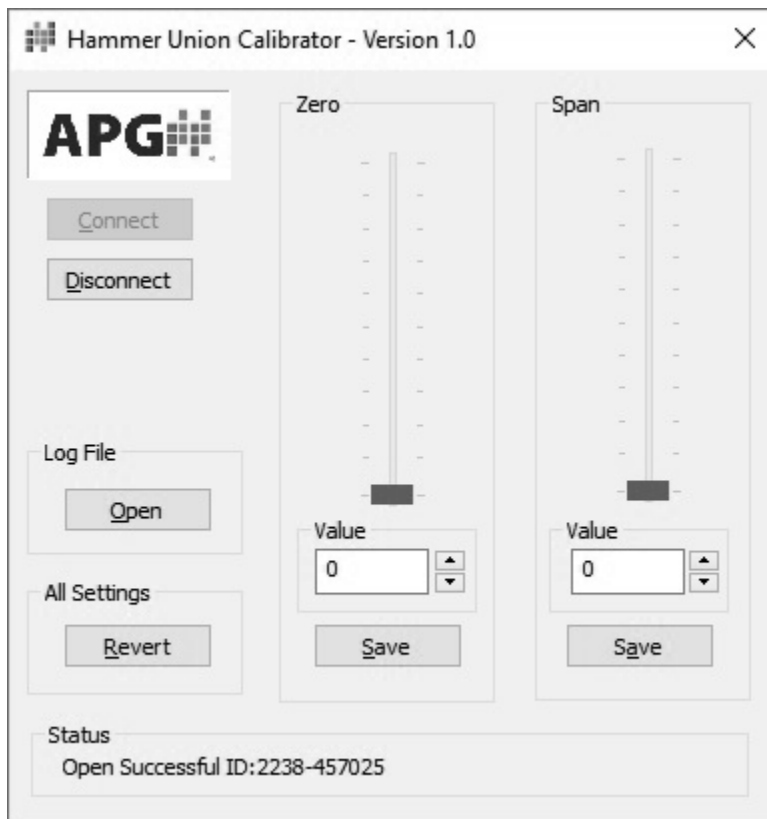


Figure 4.4

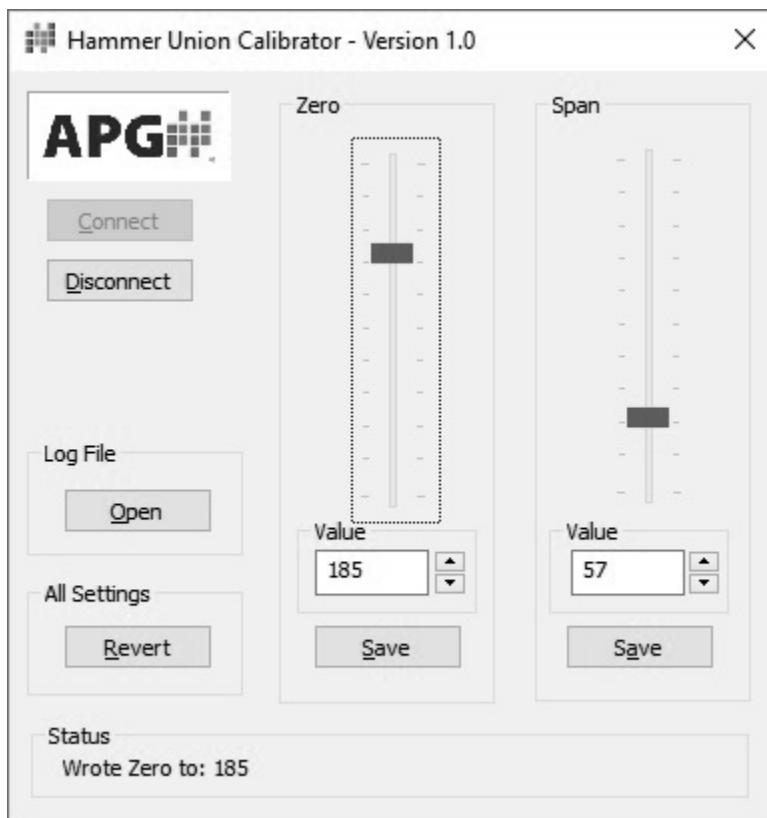
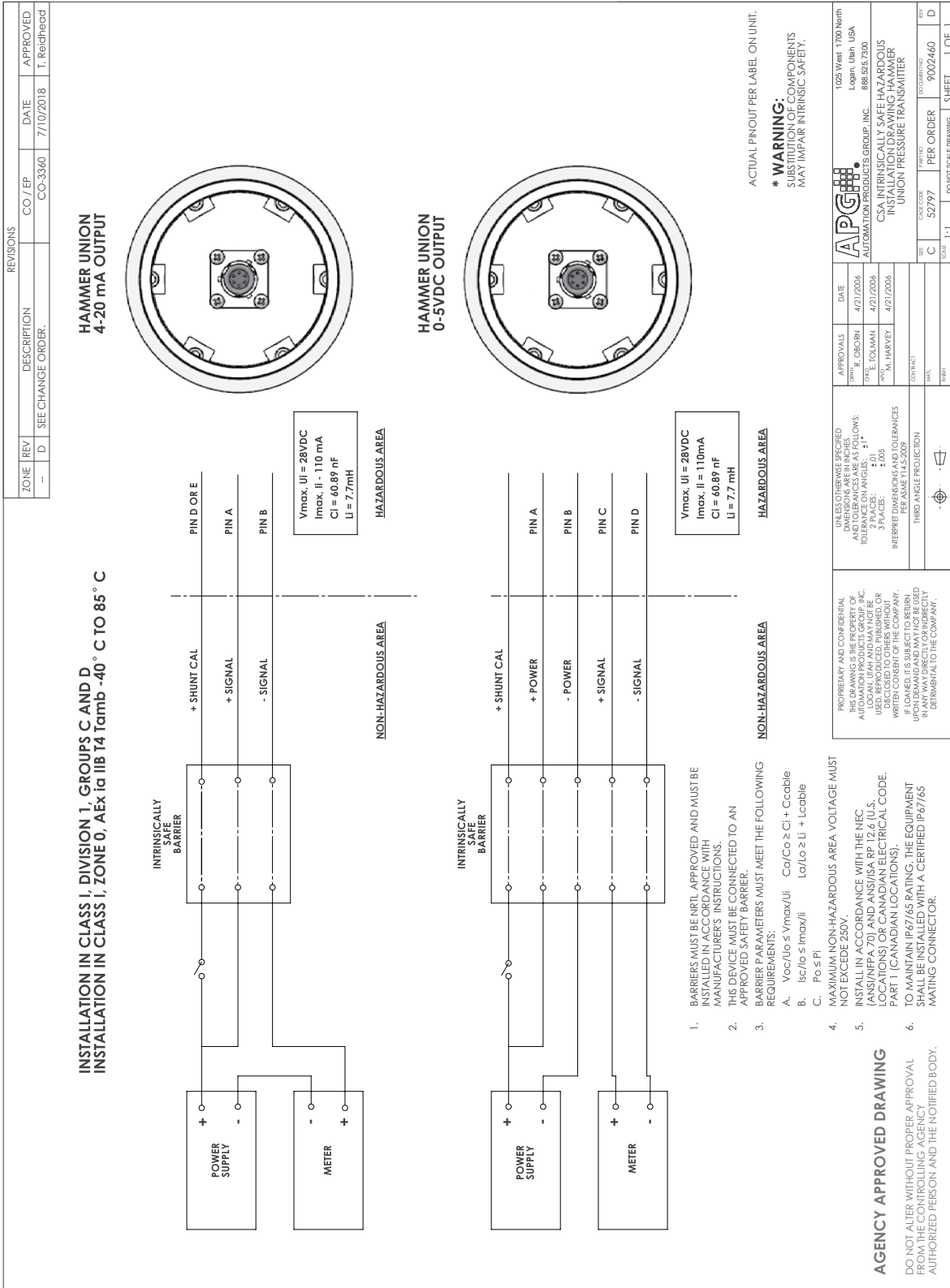


Figure 4.5

CHAPTER 5: HAZARDOUS LOCATION INSTALLATION

Intrinsically Safe Wiring Diagram





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