



Metrology Made Simple



# ADT161 Calibration Manual

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## 1.0 – Scope

The Additel ADT161 series are digital pressure modules that provide accurate, reliable, and economic solutions for a wide range of pressure applications. These silicon pressure sensors are offered in a variety of accuracies and ranges to fit the customer's needs. Intrinsically safe (Ex) models are also available for use in hazardous environments. These modules are designed as external pressure modules for Additel calibrators (ADT761A, ADT760, and ADT226/ADT227). Please read this document carefully before attempting to perform any type of verification or adjustment. Also ensure that the operator has the metrological expertise and equipment to perform the work.

## 2.0 – References

- Additel 773, 783, and 793 User Manual
- Additel 151 Digital Pressure Module Datasheet
- Additel 161 Intelligent Digital Pressure Modules Datasheet
- Additel 761A User Manual
- Additel 760 Automatic Handheld Pressure Calibrator User Manual
- Additel 226/227 Multifunction Process Calibrator User Manual

## 3.0 – Recommended Equipment and Specifications

Equipment	Specifications	Recommended Model/ Item Number/Description
Pressure Controller	Applicable to the ADT161 pressure ranges	ADT773, ADT783, ADT793
Reference Standard Modules	Applicable to the ADT161 pressure ranges	ADT151, ADT161
Manifold	Applicable to the ADT161 pressure ranges	ADT121, ADT123
Hoses	Applicable to the ADT161 pressure ranges	ADT100-HTK's, silicone tubes
Connection Cables	LEMO 5-Pin Male to USB type A LEMO 5-Pin Male to LEMO 5-Pin Male	9060 9064
Readout Device / Calibrators	Applicable to the ADT161 pressure ranges	ADT761A, ADT760, ADT226/ADT227

## 4.0 – Environmental Conditions

- Ideal Temperature and Humidity Conditions:
  - $23 \pm 5^{\circ}\text{C}$  with less than 80% relative humidity

## 5.0 – General Diagrams and Descriptions

Diagram 5.1  
(Basic Structure -  
ADT161)

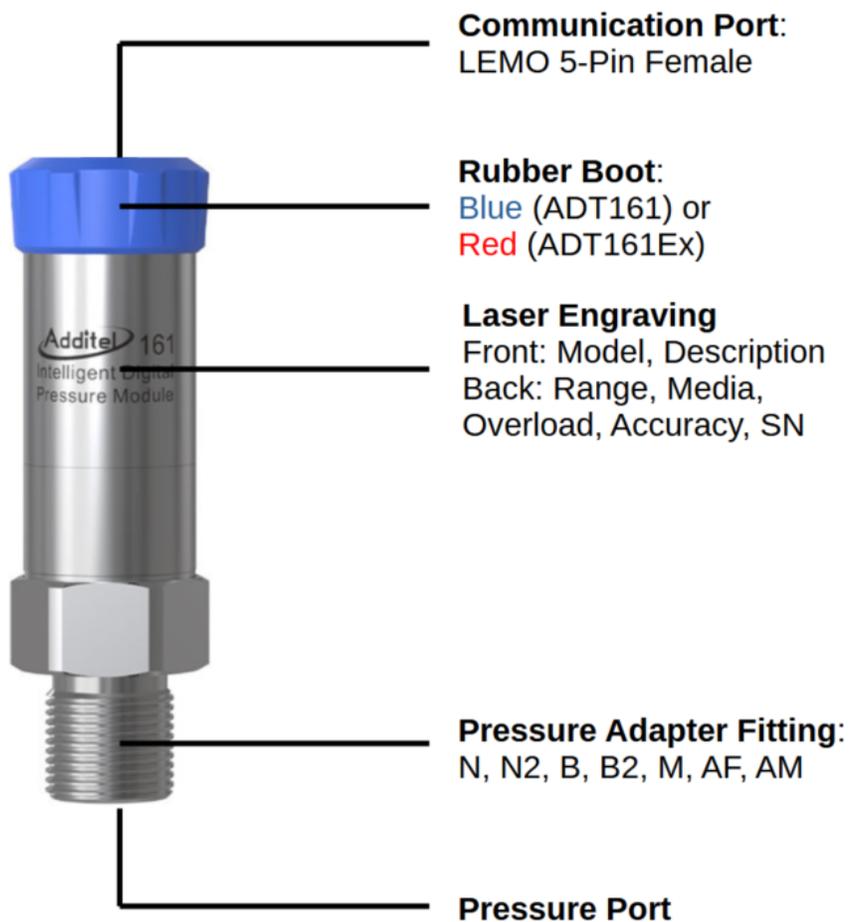
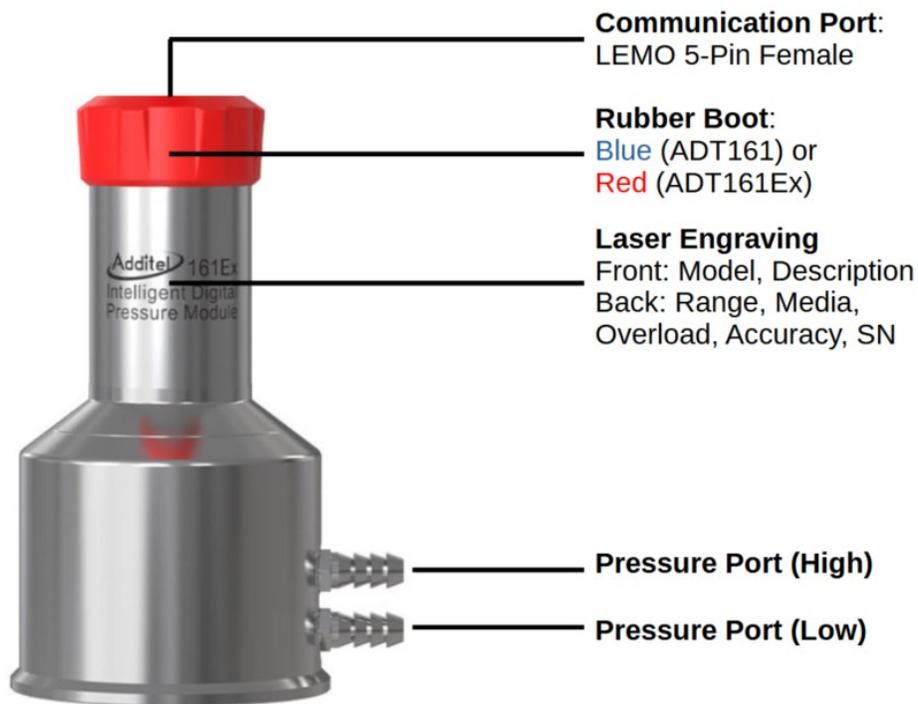


Diagram 5.2  
(Basic Structure -  
ADT161DP)



## 6.0 – Calibration Procedure

### 6.1 – Exercise & Zero

#### 6.1.1 – Exercise

- 1) Connect the module to the appropriate pressure system and ensure that all connections are sealed to prevent any pressure leakage. Refer to the following diagrams for the Connection Ports of different models.

Diagram 6.1  
(Pressure Connection -  
ADT161)

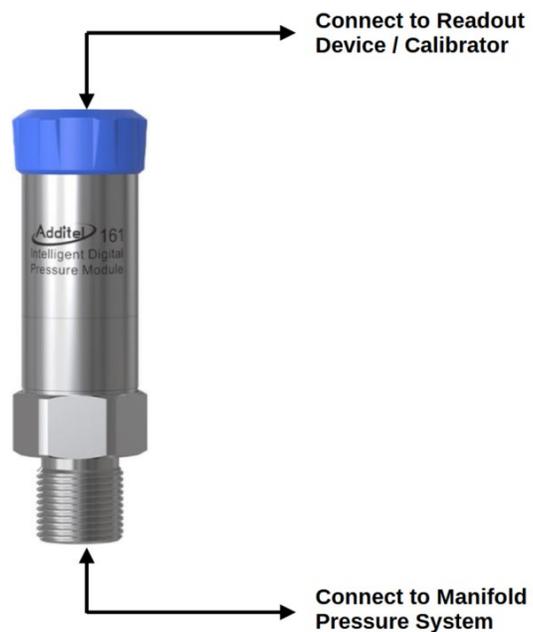
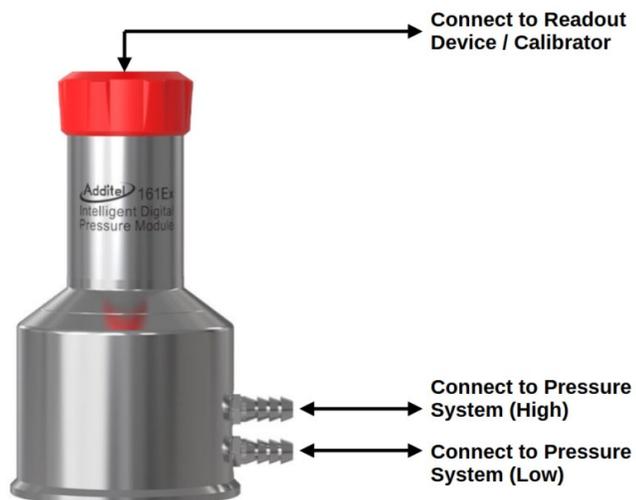


Diagram 6.2  
(Pressure Connection -  
ADT161DP)



- NOTE: Please ensure that all equipment is rated to handle the maximum pressure of the unit under test.
- 2) Connect the communication port of the ADT161 module to one of the external module ports (A or B) on the readout device.
  - 3) Ensure that the readout device is set to measure pressure.
  - 4) Pressurize the system to the lower limit range of the unit and allow it to stabilize for a sufficient amount of time. Additel typically allows 60 seconds of stabilization time.
  - 5) Pressurize the system to the upper limit range of the unit and allow it to stabilize for a sufficient amount of time.
  - 6) Repeat the lower and upper limit exercise for an additional two cycles, then vent the system when done.

### 6.1.2 – Zero

- 1) Vent the system for a sufficient amount of time to allow any trapped gas to escape.
- 2) On the main display of the readout device, there should be a section for the connected external module. Press the **Zero Icon/Option** on the display of the readout device to manually zero the module before pressure verification.
  - NOTE: The 161 should not be zeroed when in absolute pressure mode because doing so will add an offset to the test values.

## 6.3 – Pressure Verification

- 1) Ensure the Unit Under Test - UUT (ADT161) is connected to the appropriate pressure system. Refer to Diagrams 6.1 and 6.2 for the pressure connections of different models.
- 2) Ensure that the correct reference standards are being used for an acceptable TUR and the system is sealed properly in order to prevent any leakage.
- 3) Ensure that the ADT161 module is connected to the readout device and that the readout device is set to measure pressure.
- 4) Determine the test points for the appropriate range. Additel uses the following:
  - **Gauge Pressure – GP** typically has 9 test points:  
(0%, 25%, 50%, 75%, 100%, 75%, 50%, 25%, 0%) max range,  
Example: GP100 test points are (0, 25, 50, 75, 100, 75, 50, 25, 0) psi
  - **Compound Pressure – CP** typically has 11 test points:  
(-13psi, -7.25psi, 0%, 25%, 50%, 75%, 100%, 75%, 50%, 25%, 0%) max range,  
Example: CP100 test points are (-13, -7.25, 0, 25, 50, 75, 100, 75, 50, 25, 0) psi
  - **Differential Pressure – DP** typically has 9 test points:  
(-100%, -75%, -50%, -25%, 0%, 25%, 50%, 75%, 100%) max range  
Example: DP100 test points are (-100, -75, -50, -25, 0, 25, 50, 75, 100) inH2O
  - **Absolute Pressure – AP** typically has 11 test points:  
(1.5 psi.a, 14.5 psi.a, 25%, 50%, 75% 100%, 75%, 50%, 25%, 14.5 psi.a, 1.5 psi.a)max range, Example: AP100 test points are (1.5, 14.5, 25, 50, 75, 100, 75, 50, 25, 14.5, 1.5) psi.a
  - **Barometric Pressure – BP** typically has 9 test point:  
(60, 75, 90, 105, 110, 105, 90, 75, 60) kPa.a
- 5) Source the correct amount of pressure for each test point.

- 6) Allow appropriate time for each test point to stabilize and record each measured value.
- 7) Compare the reference and UUT test values for the pressure verification. Additel recommends maintaining less than 50% of the tolerance limit.

## 6.4 – Pressure Calibration

- Calibration can be performed using a variety of Additel calibrators or readout devices. The following sections will guide the operator during the calibration process depending on what readout device is being using.

### 6.4.1 – ADT761A as a Readout Device

- 1) Ensure that the ADT161 is connected to either the external module port A or B of the ADT761A.
- 2) Press the **Setup Button** on the 761A to enter the system settings interface.
- 3) Press **Calibration** on the touch screen display and input the password as **123456**. Press the **Check Icon** to confirm.
- 4) Press **Pressure Modules** to select which module to calibrate.
- 5) Select the corresponding **External Module (A or B)** to calibrate the appropriate 161 module.
- 6) Determine the calibration points for the appropriate range. CP and DP ranges typically have 3 calibration points: lower limit, zero, and upper limit. GP, AP and BP ranges typically have 2 calibration points: lower limit and upper limit.
- 7) The display will show the Calibration Points. If necessary, edit the points using the touch screen display.
- 8) Press the **Play Icon** to begin the calibration.
- 9) The display will now show three columns: Calibration Points, References, and Measured Pressure.

- 10) The lower limit row will be highlighted. Source the lower limit pressure and allow enough time to stabilize. If necessary, adjust the Reference for the lower limit using the touch screen display. Press the **Next Icon** to confirm the lower limit calibration. Repeat this step for the zero and upper limit calibration points.
- 11) Press **OK** to save the external module pressure calibration data.
- 12) Press the **Home Button** to return to the main pressure display.
- 13) Repeat the Zero procedure (6.1.2) and Pressure Verification (6.3) for the 161.

#### 6.4.2 – ADT760 as a Readout Device

- 1) Ensure that the ADT161 is connected to either the external module port A or B of the ADT760.
- 2) Press the  **Icon** on the touch screen display of the 760 to open up the menu options.
- 3) Press **Setup** to open up the system settings interface.
- 4) Press **Services** to view the service options.
- 5) Press **Calibration** and input the password as **123456**. Press the **Check Icon** to confirm.
- 6) Select the corresponding **External Module Icon**  /  to calibrate the appropriate 161 module.
- 7) Determine the calibration points for the appropriate range. CP and DP ranges typically have 3 calibration points: lower limit, zero, and upper limit. GP, AP and BP ranges typically have 2 calibration points: lower limit and upper limit.
- 8) The display will show the Calibration Points. If necessary, edit the points using the touch screen display.
- 9) Press the **Play Icon** to begin the calibration.

- 10) The display will now show three columns: Calibration Points, Reference, and Measured Pressure.
- 11) The lower limit will be highlighted. Source the lower limit pressure and allow enough time to stabilize. If necessary, adjust the Reference for the lower limit using the touch screen display. Press the **Next Icon** to confirm the lower limit calibration. Repeat this step for the zero and upper limit calibration points.
- 12) Press **OK** to save the external module pressure calibration data.
- 13) Press the **Back Icon** multiple times to return to the main pressure display.
- 14) Repeat the Zero Procedure (6.1.2) and Pressure Verification (6.3) for the 161.

### 6.4.3 – ADT226/ADT227 as a Readout Device

- 1) Ensure that the ADT161 is connected to the external module port A or B of the ADT226/ADT227.
- 2) Press the **Home Icon** to view all the calibrator functions.
- 3) Press **Setup** to open up the system settings interface.
- 4) Press **Service** to view the service options.
- 5) Press **Calibration** and input the password as **123456**. Press the **Check Icon** to confirm.
- 6) Select the corresponding **ExtA or ExtB** to calibrate the appropriate 161 module.
- 7) Determine the calibration points for the appropriate range. CP and DP ranges typically have 3 calibration points: lower limit, zero, and upper limit. GP, AP and BP ranges typically have 2 calibration points: lower limit and upper limit.
- 8) Press **Multi-Point Calibration**.
- 9) Press the **Play Icon** to begin the calibration.

- 10) The display should show three columns: Calibration Points, References, and Actual Value.
- 11) The lower limit will be highlighted. Source the lower limit pressure and allow enough time to stabilize. If necessary, adjust the Reference for the lower limit using the touch screen display. Press the **Next Icon** to confirm the lower limit calibration. Repeat this step for the zero and upper limit calibration points.
- 12) Press **OK** to save the external module pressure calibration data.
- 13) Press the **Home Icons** then press **Calibrator** to return to the main pressure display.
- 14) Repeat the Zero Procedure (6.1.2) and the Pressure Verification (6.3) for the 161.