Remote Transducer Utility

CPC6000

Silicon Transducer Cal Sled

PN 0017657001: Assy – CPC6000 Transducer Cal Sled

Barometer

Barometer Cal Sled

PN 0018752001: Assy – Cal Sled Baro Ref CPG2500/CPC8000/CPC4000/CPC6050 USB
PN 0018752002: CPC6000 RS-232

CPC4000 / CPC6050

Transducer Cal Sled

PN 0019095001: Assy – Cal Sled CPC4000
PN 0019095001: Assy – Cal Sled CPC6050

CPC8000

Silicon and Premium Transducer Cal Sled

PN 0018778001: Assy – Cal Sled CPC8000

CPA8001 Vacuum

Vacuum Transducer Cal Sled

PN 0018979001: Assy – Cal Sled Vacuum Transducer CPA8001 USB

CPA8001 / CPA2501

Dual Silicon Sensor Cal Sled

PN 0018990001: Assy – Cal Sled Dual Transducer CPA8001

CPG2500 / CPT61XX

Transducer Com Cable

PN 0017245002: RS-232 Communication Cable with Power

CPT6010

Transducer Com Cable

PN 0017125001 : RS-232 Communication Cable with Power for CPT6010

CPT9000

Transducer Com Cable

PN 0020528001: RS-232 Powered Communication Cable, CPT9000
PN 0020528002: RS-485 Powered Communication Cable, CPT9000

CPT6030

Calibration Adapter

PN 0019825001: RS-232 Calibration Adapter with Power

Table of Contents

Mensor Remote Transducer Utility
Part Number: 0018767001 Rev: G

1.0 Introduction

The included software enables the user to calibrate a standalone Mensor transducer. The following products are supported:

0017218XXX REFERENCE PRESSURE TRANSDUCER FOR CPC6000

0018748XXX BARO REF, REMOVABLE

0018700XXX REFERENCE PRESSURE TRANSDUCER FOR CPC8000

0018720XXX PREMIUM PRESSURE TRANSDUCER FOR CPC8000

0018710XXX DUAL PRESSURE TRANSDUCER FOR CPA8001/CPA2501

0018780XXX VACUUM TRANSDUCER FOR CPA8001

0019090XXX REFERENCE PRESSURE TRANSDUCER FOR CPC4000/CPC6050

001923XXXX REFERENCE PRESSURE TRANSDUCER FOR CPG2500

0019288XXX CPT61XX – SILICON PRESSURE TRANSDUCER

0017065XXX CPT6010 – STANDARD PRESSURE TRANSDUCER

0020490XXX CPT9000/CPT6020 – PREMIUM PRESSURE TRANSDUCER

0020550XXX CPT6030 – 4-20 mA PRESSURE TRANSDUCER

2.0 Setup

To install the software, run the setup program on this disk (setup.exe). The setup program will install all the necessary files to run the program. It will register all files appropriately so that it can be completely removed using the Windows® add/remove program. Upon installation, a desktop shortcut and start menu shortcut will be added. If this is not necessary, the “Xducer_Utility.exe” program may be run directly.

The computer on which the software is run must have Windows® XP or greater. It must have an available RS-232 serial port capable of running at 57600 baud. Finally, Microsoft .NET Framework 4.0 or greater must be installed. This is included as the file “dotNetFx40_Full_x86_x64.exe”. The latest version can be downloaded from:

http://www.microsoft.com/net

Calibration Sled Hardware Setup: Connect the AC adapter of the power supply to an AC power socket. Then connect the power supply to the circular power connector on the rear of the calibration sled. Connect the 9 pin d-sub connector on the calibration sled to any available RS-232 connector on the computer. This connection is made through the straight 9 pin male to 9 pin male cable.

Transducer Com Cable Setup: Connect the AC adapter of the power supply to an AC power socket. Then connect the “Computer” side of the cable to any available RS-232 connector on the computer. Connect the “Transducer” side of the cable to the transducer.

3.0 Program Operation

When the program is started, the following screen is displayed:

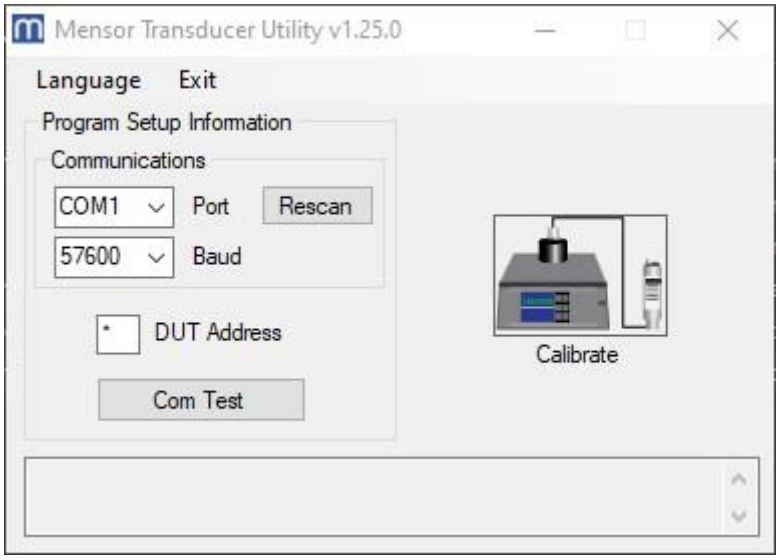


Figure 1 – Main Screen

The program will automatically find all available serial com ports. Select the serial com port connected to the transducer and the appropriate baud rate. The default baud rate is 57600 baud. The Com Test button will perform a quick communication check to read the identification string back from the transducer. If successful and Auto-detect is selected, the type of transducer found will be shown.

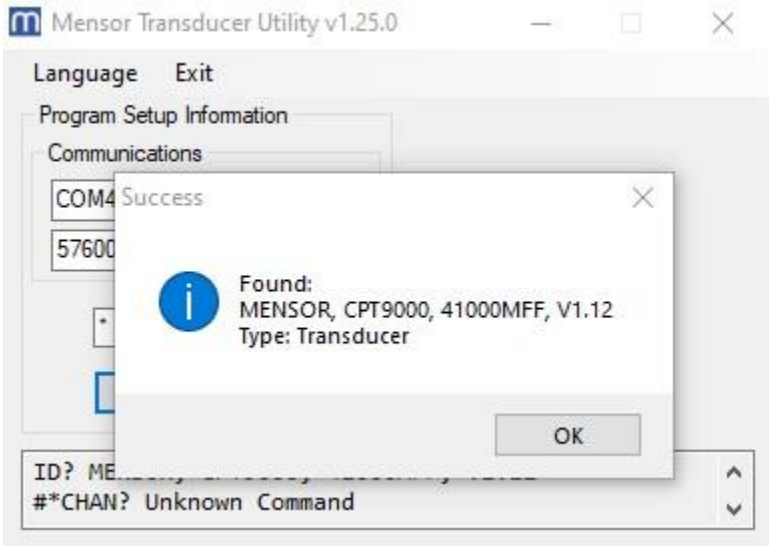


Figure 2 – Successful Com Test

For troubleshooting purposes, the bottom of the main screen contains a log box of all commands sent to the transducer (in Figure 2, the last command can be seen).

To calibrate a transducer, click the Calibrate icon. The program will take a few seconds to retrieve all the information from the transducer. (NOTE: The program will force the transducer into mode 3 in order to read the pressure correctly. If the transducer is required to be in a different mode, please record the mode of the transducer before calibration and change it back using the “#*M X” where X is a number between 1-9 which represents the mode.)

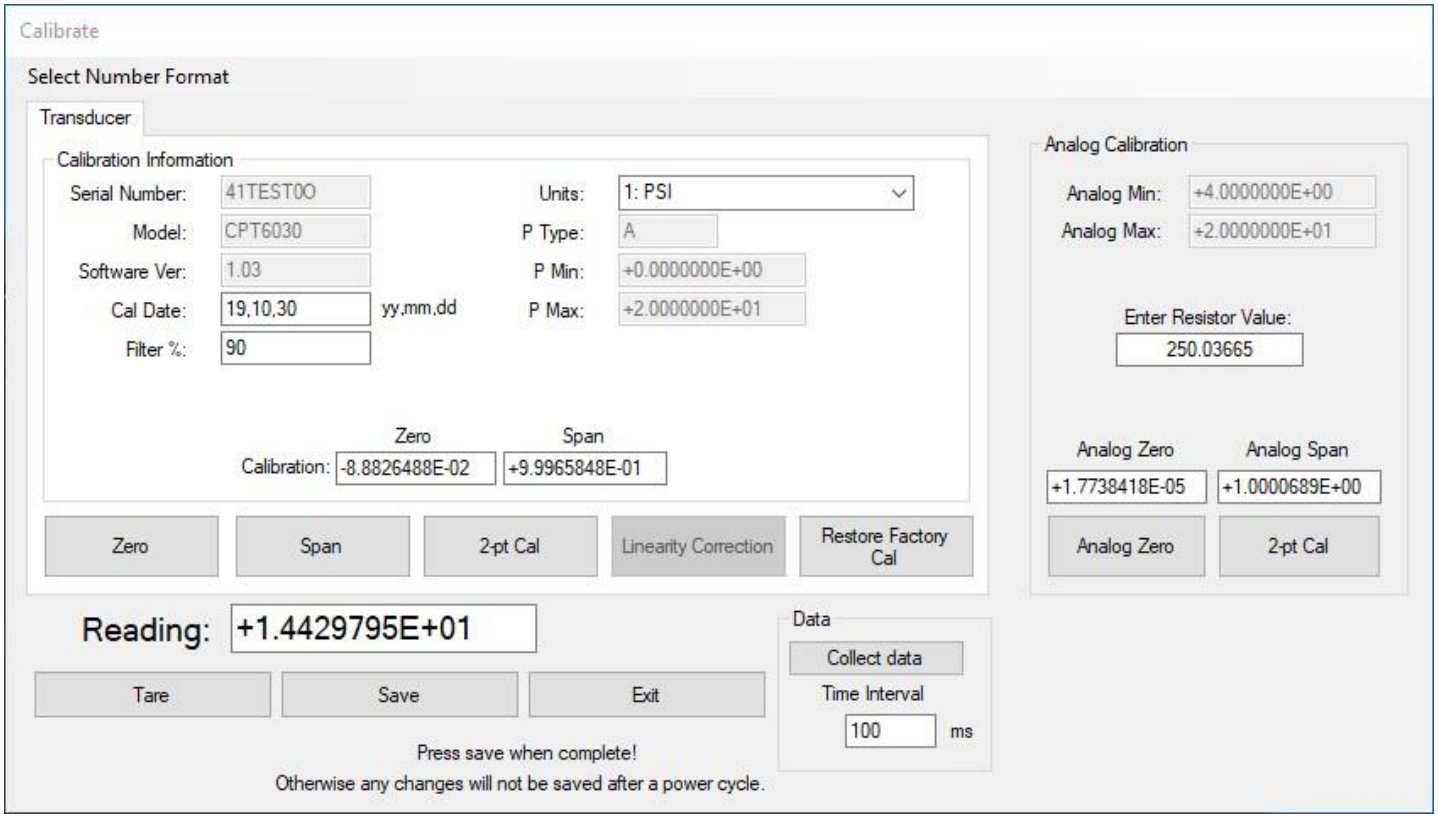


Figure 3 – Calibration/Data Screen

If calibrating a Dual Transducer (i.e. a CPA8001 transducer) or a Transducer with turndowns, 2 tabs will be available: Channel A and Channel B / Turndown 1 and Turndown 2. The frame on the right 'Analog Calibration Information" appears if a transducer with an analog output is being calibrated

The following fields may be updated:

Calibration Date – a six digit number can be entered. The calibration date entered should be of the form "MMDDYY" so that the Mensor instrument will convert the date correctly for the different locales available from the supported languages.

Filter – a value from 0 to 100 may be entered. The filter is an exponential filter that is just used by this program to make readings quieter. If the transducer is installed in a Mensor instrument, the instrument may reset this value to 0 when the transducer is reinstalled.

Cal ID# – a 16 character string can be entered. The Cal ID# is an arbitrary string you may use to identify the calibration of the sensor.

Units – the user may choose to have the pressure reading converted to a different pressure unit. If not in the native units of the sensor, there will always be 7 digits of resolution displayed.

Zero – a value between ± 0.1% of range, usually close to 0. This is the calibration offset used to adjust the zero reading of the sensor. The zero offset is unit based so enter the value in the native units of the sensor.

Span – a value between 1 ± 0.15% of range, usually close to 1.0. This is the calibration correction multiplier used to adjust the span reading of the sensor.

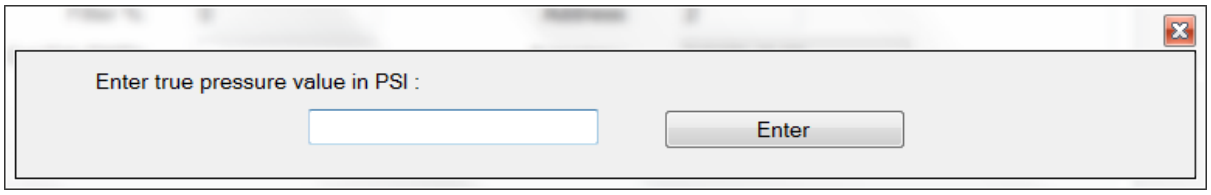
Analog Zero – a value between ± 0.1% of range, usually close to 0. This is the calibration voltage offset used to adjust the zero reading of the analog output of the sensor in volts. Note: Only visible if the transducer supports analog calibration. External voltmeter required.

Analog Span – a value between 1 ± 0.15% of range, usually close to 1.0. This is the calibration correction multiplier used to adjust the span reading of the analog output of the sensor. Note: Only visible if the transducer supports analog calibration. An external voltmeter is required.

Resistor Value – this is the value of the resistor inside of the calibration adapter for a CPT6030 only.

Button Operation:

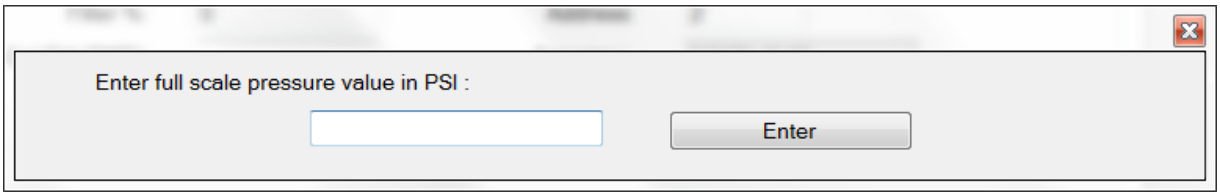
Zero (Analog Zero) – This allows a calibration offset to be set on the digital or analog output of the transducer. A known pressure as close as possible to zero should be applied to the transducer. When the Zero button is clicked, the known pressure should be entered into the data entry box that appears:



Any value may be entered, so be careful. Click the Enter button when the pressure is stable,. The new zero offset value will be calculated and stored in the active sensor.

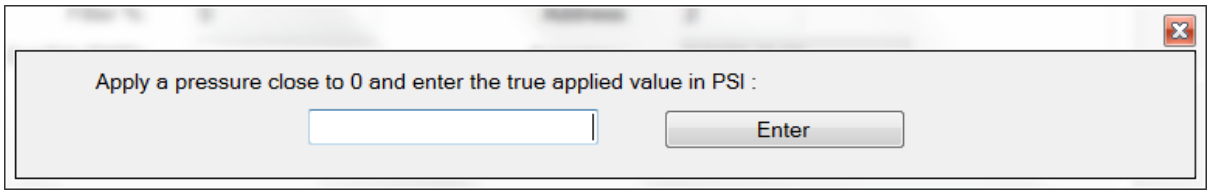
Important Note: If the transducer is an absolute pressure type, do not try to zero the transducer at too low of a pressure. Depending upon the physical calibration setup, the pressure will not be equal across the calibration system if the pressure is too low and no longer in a viscous flow condition. Typically a pressure of around 600 mTorr is used as a zero pressure point at the factory.

Span – This allows a calibration slope to be set on the transducer. A known pressure as close as possible to the maximum range (or minimum range – whichever is further from zero) of the active sensor should be applied to the transducer.



Enter the true applied pressure and click the Enter button when the pressure is stable,. When this is done, the software calculates a new slope correction value and stores it in the active sensor.

2-pt Cal (2-pt Analog Cal) – Calibrates the offset and slope for digital or analog output of the transducer. First apply a known pressure as close as possible to the minimum range of the active sensor.



Enter the true applied pressure (or voltage) and click the Enter button when the pressure is stable,.

Next apply a known pressure as close as possible to the maximum range of the active sensor, and enter the true applied pressure (or voltage.) When this is done, the software calculates new zero offset and slope correction values and stores them in memory for the active sensor.

Tare – This temporarily zeroes the current pressure reading. It is not saved on the transducer.

Reset Tare – This resets the current pressure reading back to the actual reading of the sensor.

Restore Factory Cal – Set the zero offset to 0 and the span multiplier to 1, and restores factory linearity coefficients. This is the condition in which the transducer leaves the factory.

Collect data – A pop-up appears to save a file to your computer. The file will contain the time in seconds and pressure reading, delimited by the semicolon character ";". Example output:

```
Seconds;Pressure in PSI
0.0000;+1.3984281E+01
0.1674;+1.3984427E+01
0.3340;+1.3979765E+01
0.5027;+1.3978772E+01
```

The time interval between pressure readings for the data collection may be changed. If the time interval is faster than the transducer can respond, , the pressure readings will be gathered as fast as the transducer can respond and the computer can receive the output and write it to the file.

Linearity Correction – Adjusts the linearity of the transducer. Note: Linearity correction is not available on all products. If linearity correction is unavailable, the “Linearity Correction” button will be disabled.

The setup for linearity correction allows changing the number of points, and if upscale and downscale pressures will be entered.

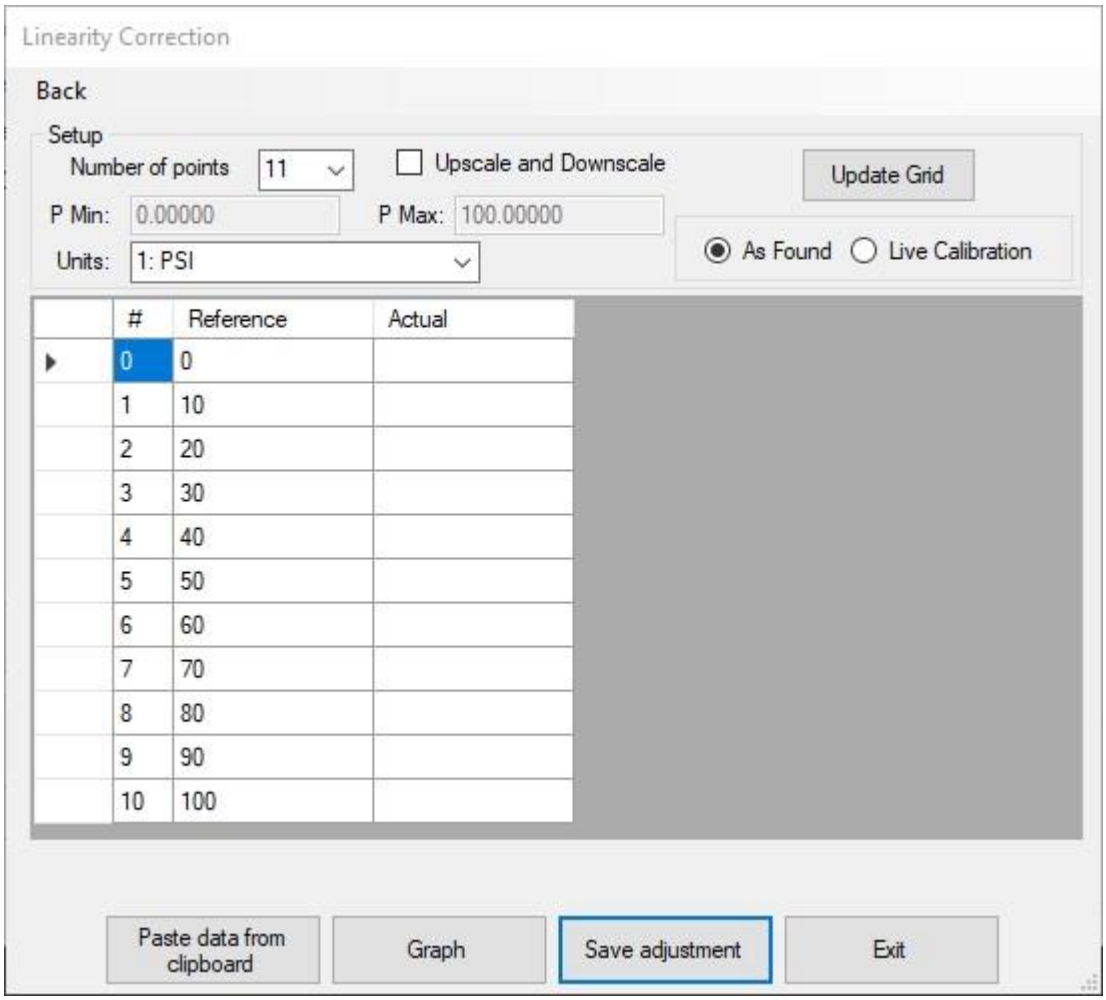


Figure 4 – Linearization Correction in one direction

Enter the true applied pressure under the “Reference” column and the actual pressure read from the Mensor transducer under the “Actual” column.

Alternatively, the necessary values may be gathered in a spreadsheet and then paste into the program using the “Paste data from clipboard” button.

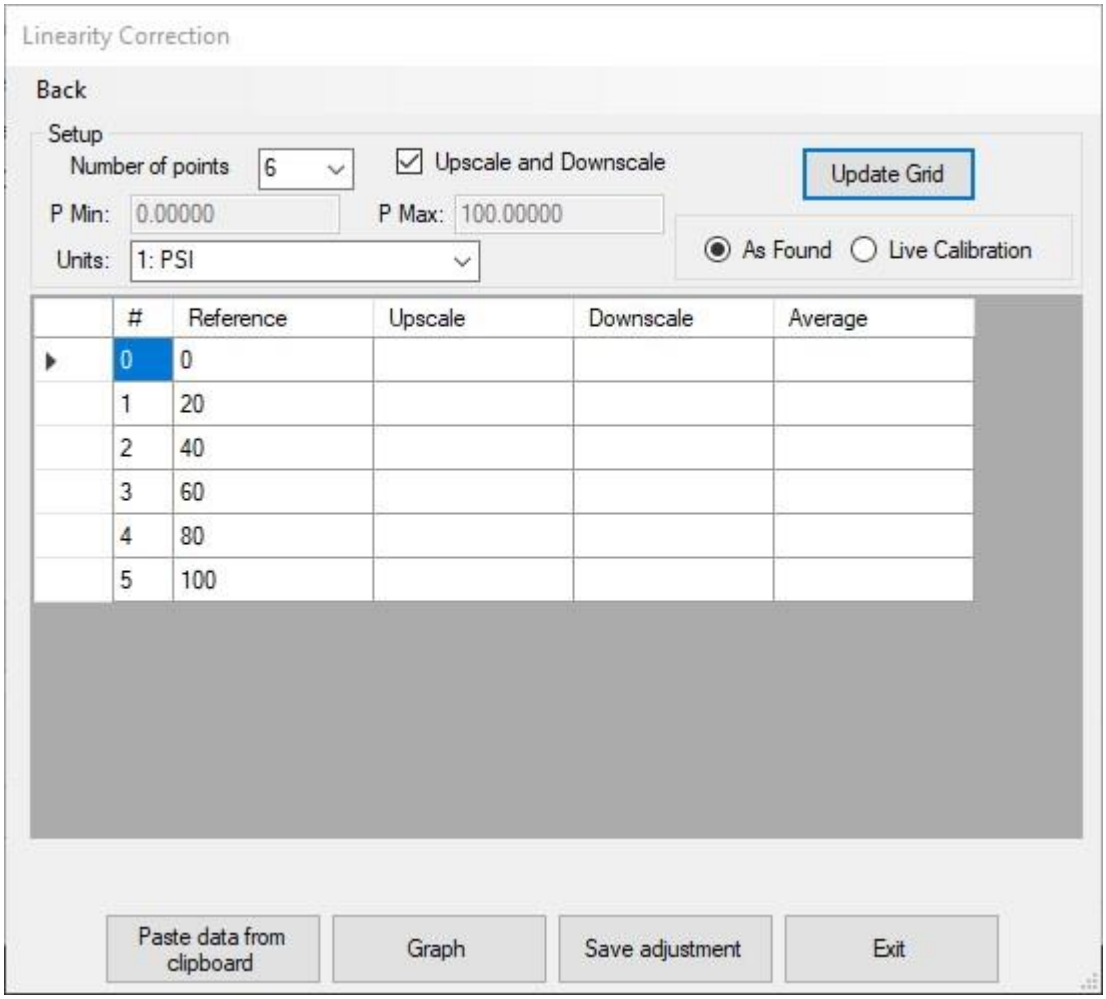


Figure 5 – Linearization Correction in both upscale & downscale directions

There is also the option to enter both upscale and downscale actual pressure points. Choose “Upscale and Downscale” and then “Update Grid” button. The “Average” column will automatically fill in after both the upscale and downscale columns are filled in.

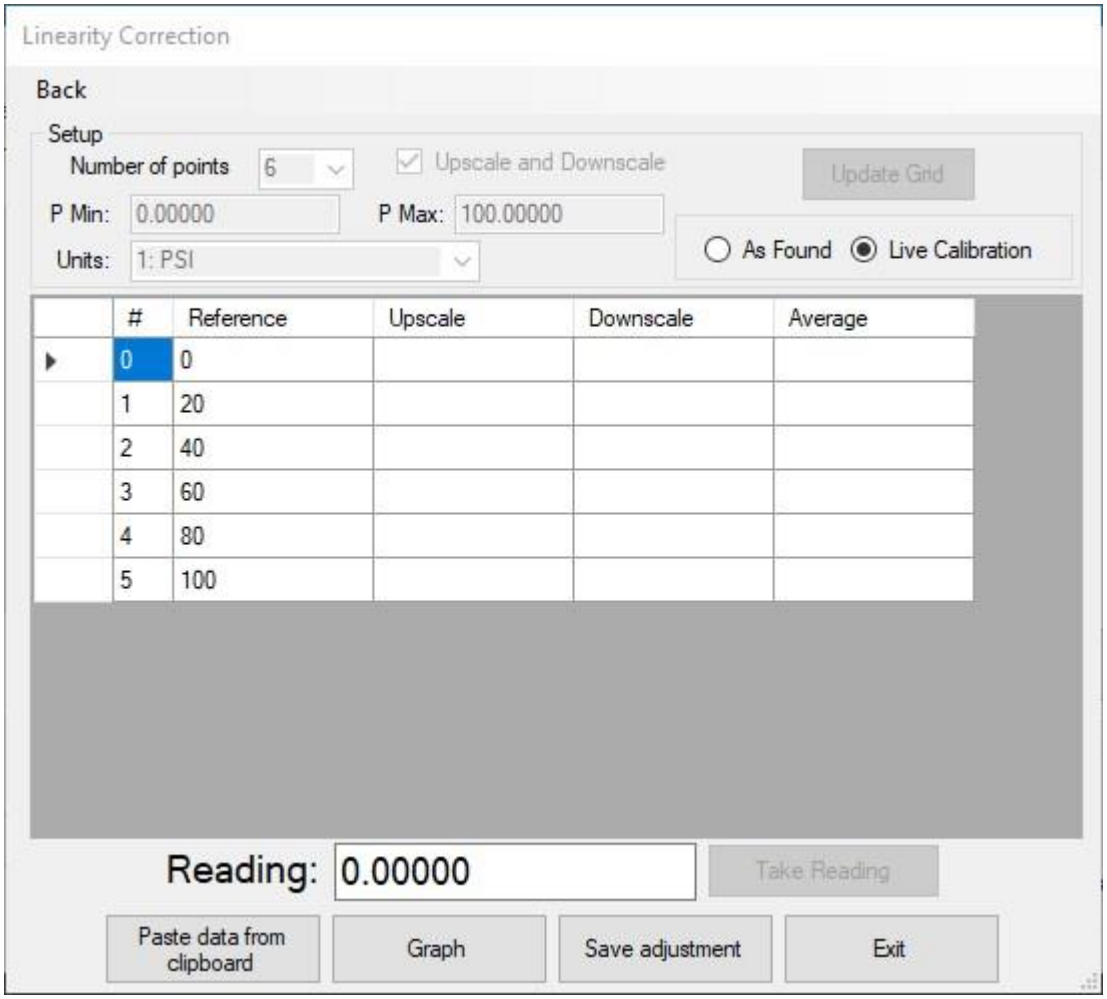


Figure 6 –Linearization Correction, Live Calibration

The Live Calibration function allows a live pressure reading to be displayed. The “Take Reading” button can be used to populate the highlighted cell with the current reading from the transducer.

The “Graph” button may be used to see the adjustments that will be made compared to the accuracy of the transducer. See Figure 7 for an example.

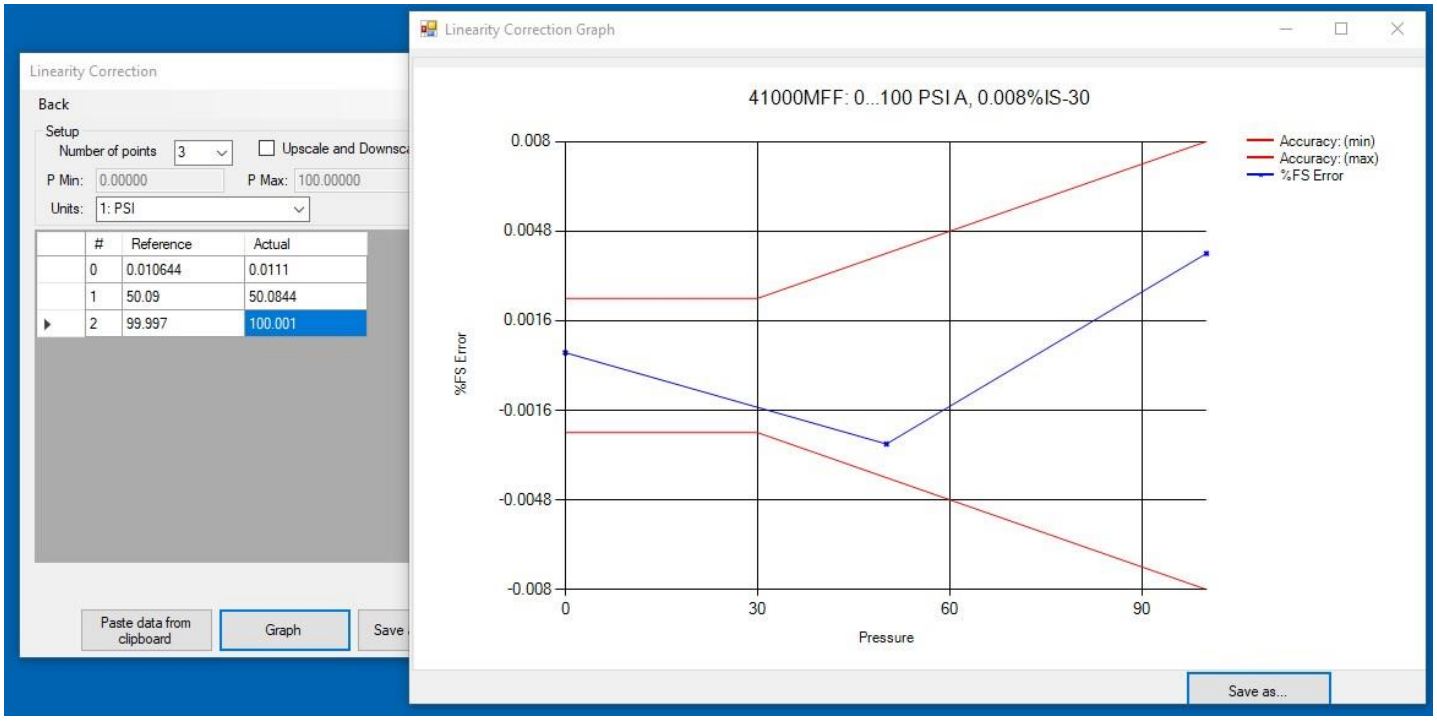
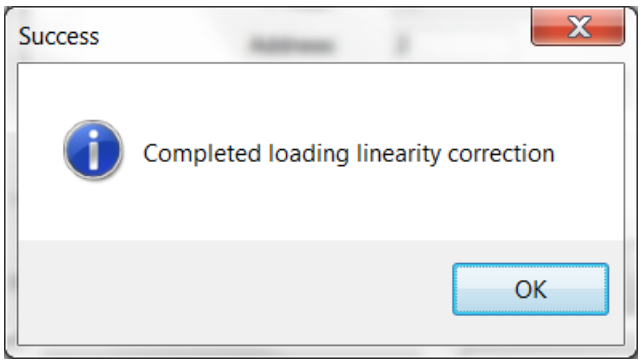


Figure 7 – Example of linearity correction graph

After entering all the necessary values, press “Save adjustment” to perform the correction. After the new linearity correction coefficients are loaded in the transducer, a message will pop up indicating it is complete.



4.0 Calibration Procedure

1. Connect pressure standard to the pressure port of the transducer or calibration sled.
    a. If the transducer is a dual CPA8001 sensor:
        i. If the transducer is a Ps/Pt version, no special procedures are necessary.
        ii. When calibrating the Qc side of a Ps/Qc, If the Qc calibration is done with elevated reference pressure, the elevated pressure must be in the range of Ps. Connect Qc reference (top port) to the Ps pressure port.
2. Connect the transducer or calibration sled to the computer via RS-232, RS-485, or USB.
3. Start the software program “Xducer_Utility.exe”.

4. Select the serial communication port connected to the transducer. Verify communication to the device with Com Test button.

5. Allow at least 15 minutes for the transducer to warm up.

6. Exercise the transducer by cycling the pressure standard from the minimum to the maximum pressure, dwelling at each end for 2 to 3 minutes.

7. Set the pressure standard close to the minimum pressure and wait until the transducer pressure readings stabilize. If calibrating an absolute transducer, apply a pressure of 600+50 mTorr to the transducer for the minimum pressure.

8. After the pressure has stabilized, check if the reading is within tolerance.

9. Repeat steps 7 and 8 for each remaining applied value (typically 0 to 100% in 10% increments).

10. If all readings are in tolerance, proceed to the next step. Otherwise, perform an appropriate adjustment: zero adjustment, span adjustment, 2-point calibration adjustment, or linearity correction. If hysteresis is present, use the “Up and Down” averaged linearity correction method.

11. Analog Calibration (Voltage Output) – CPT6100, CPR2500:

    a. Follow steps 1 through 10, then connect an external voltmeter to the black (-) and white (+) cables that come from the cable shown on the cover page (0017245002) for the CPT6100. Note: You may have to strip the insulation on the wires back the first time the cable is used for the CPT6100. For CPG2500II analog calibration, use the green connector located below the pressure ports. Pin 1 is positive and pin 2 is negative.

    b. Set the supply pressure to the value shown in the P Min box on Figure 3, the voltmeter should read close to the value shown in the A Min box. If it does not, adjust the Analog Zero until the voltmeter reading matches the value shown in the A Min box. Note: The formula for what value to enter is as follows: Analog Zero Offset = Analog Min – Voltmeter Reading.

    c. Set the supply pressure to the value shown in the P Max box on Figure 3, the voltmeter should read close to the value shown in the A Max box. If it does not, adjust the Analog Span until the voltmeter reading matches the value shown in the A Max box. Note: The span is a multiplier, not an offset, so the formula is as follows: Analog Span Adjustment = (Voltmeter Reading / Analog Max).

12. Analog Calibration (Current Output) – CPT6030:

    a. Calibrate digital output first, by following steps 1 through 10. Then, connect an external voltmeter to the terminals shown on the calibration adapter (0019825001).

    b. Set the supply pressure to the value shown in the P Min box on Figure 3, the voltmeter will read the voltage drop across the precision 250-ohm resistor inside the calibration adapter. At the minimum pressure, the voltage should be near 1 VDC.

    c. Set the supply pressure to the value shown in the P Max box on Figure 3, the voltmeter should read a value near 5 VDC.

    d. If all readings are in tolerance, proceed to the next step. Otherwise, perform an appropriate adjustment: analog zero adjustment, analog span adjustment, or analog 2-point calibration adjustment.

       Note: The span adjustment is a multiplier, not an offset, so the formula is as follows: Analog Span Adjustment = (Voltmeter Reading / 250 (or labeled resistor value) / A Max).

13. Vent the system and disconnect pressure lines and communication cables.

NOTES

Mensor
201 Barnes Drive
San Marocos, Tx 78666
Tel_ 1.512.396.4200
1.800.984.4200 (USA only)
web site: www.mensor.com
fax: 1.512.396.1820
e-mail: sales@mensor.com
tech.support@mensor.com

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
D-63911 Klingenberg/Germany
TEL: (+49) 93 72/132-9986
FAX: (+49) 93 72/132-8767
E-mail: testequip@wika.de
www.wika.de