LUDLUM MODEL 9-4 CONTROL SOFTWARE

August 2015

Serial Number 265751 and Succeeding

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LUDLUM MEASUREMENTS, INC
501 OAK STREET, P.O. BOX 810
SWEETWATER, TEXAS 79556
325-235-5494, FAX: 325-235-4672

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Description

The primary purpose of the Model 9-4 Control Software is to calibrate and configure the Model 9-4 through the use of a special calibration cable connected between the PC and the instrument. In doing so, the control software reads the current calibration and configuration parameters stored in the Model 9-4's non-volatile memory, displays the information in a user friendly format, accepts changes to the existing calibration and configuration information, and allows the user to write this information back into the Model 9-4's non-volatile memory.

Other features of the software include the ability to:
- save calibration and configuration data to a file
- load calibration and configuration data from a file
- print calibration and configuration data to a local printer

Section

2

Installation

To install the software, insert the CD into target computer's CD-ROM drive. If the CD does not automatically begin installation of the software package upon insertion into the CD-ROM drive, open Windows Explorer© and click on the CD-ROM drive which contains the copy of the Model 9-4 Control Software. Locate the setup.exe file in the main directory of the CD and execute the program.

Software Program

The software will recommend that the installer close all applications that may be running (see Figure 1).

Figure 1 – Setup Welcome Screen

Press OK to continue.

Note: While the Figures in the Installation section indicate v1.0.1 software, the installation procedures are the same for all versions of software. As a result, your version number may differ.

While it is recommended that the software be installed in the default directory (see Figure 2), the program may be installed in any directory on the target computer. Simply click Change Directory and specify the new directory. Should a different directory be chosen, please make a note of the new location should it become necessary to contact technical support regarding any software issues you may experience. Otherwise, click on the installation button to begin installation of the software package.
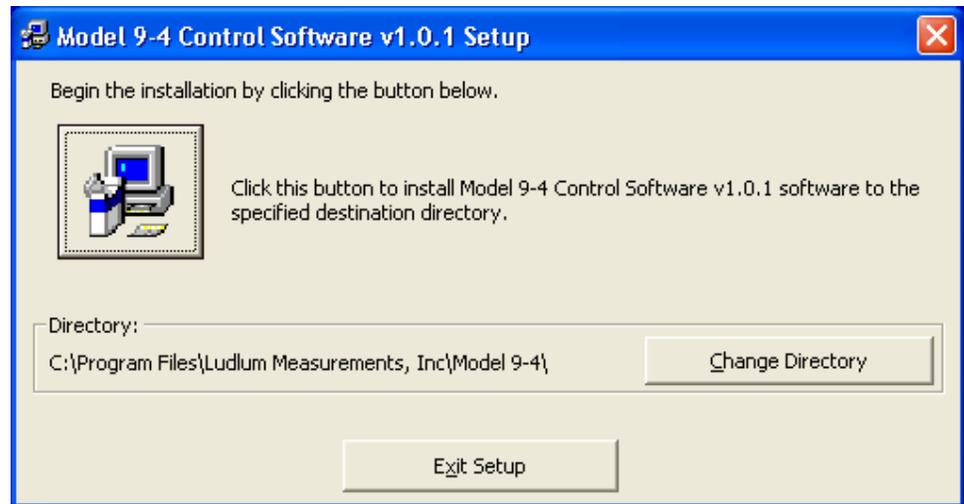
Figure 2 – Setup Installation Screen

Next, select the Program Group in which the application will be placed (see Figure 3) and press Continue.
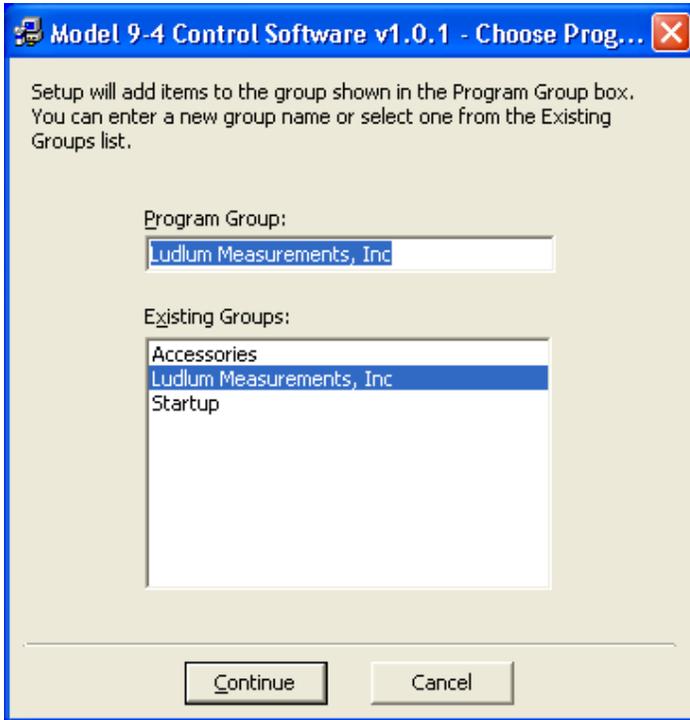
Figure 3 – Setup Configuration Screen

Once installation of the software is complete (see Figure 4), press OK but do not remove the CD from the CD-ROM drive.
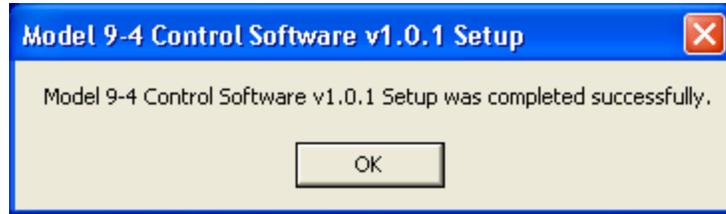
Figure 4 – Setup Completion Screen

Device Driver

Insert the USB Calibration Interface into an available USB port on the computer. Windows© will detect the device and will begin installation of the necessary drivers for the device (see Figure 5).

Figure 5 – Device Driver Welcome Screen

Select "No, not this time" and press Next.

Windows Hardware Wizard will prompt for the next step in the installation process (see Figure 6).
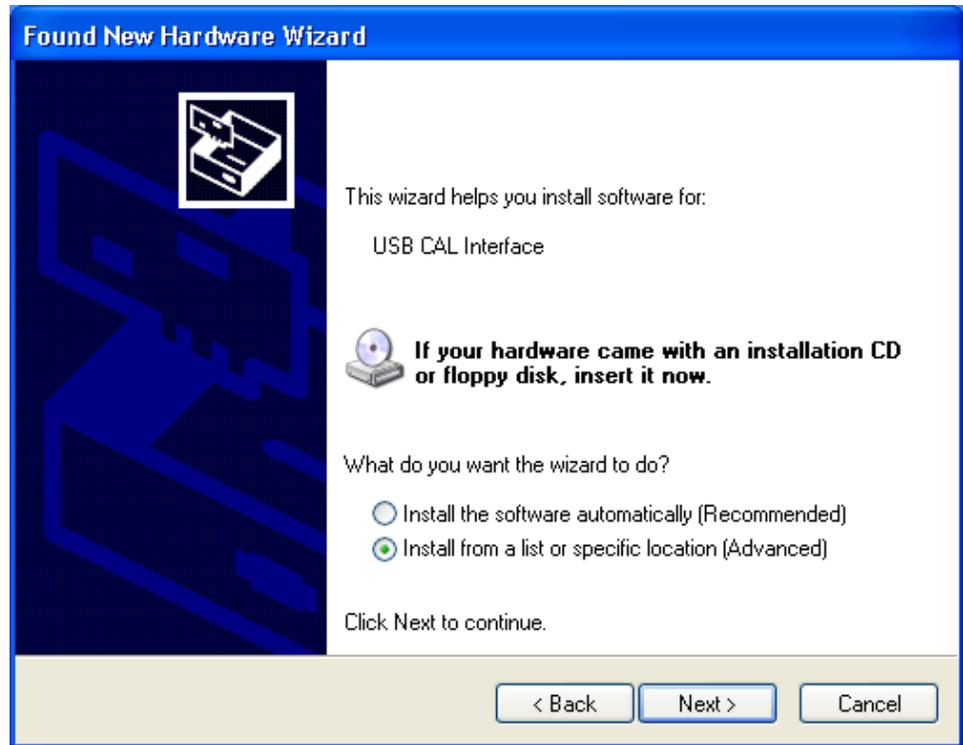
Figure 6 – Device Driver Hardware Screen

Select "Install from a list or specific location (Advanced)" and press Next.

Finally, the location of the new device drivers needs to be specified (see Figure 7).
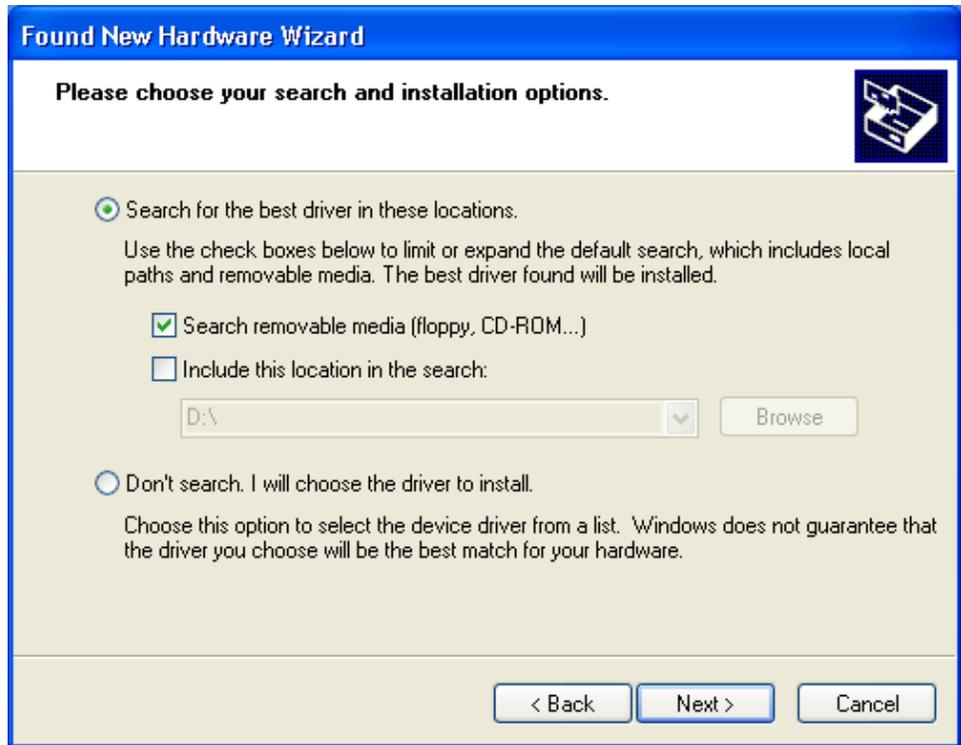
Figure 7 – Device Driver Search Screen

Select "Search for the best driver in these locations" and click on "Search removable media (floppy, CD-ROM…)". The New Hardware Wizard will then search the CD-ROM for the appropriate device drivers once the Next button is pressed.

After installation of the device driver, the New Hardware Wizard" may be closed by pressing Finish (see Figure 8).
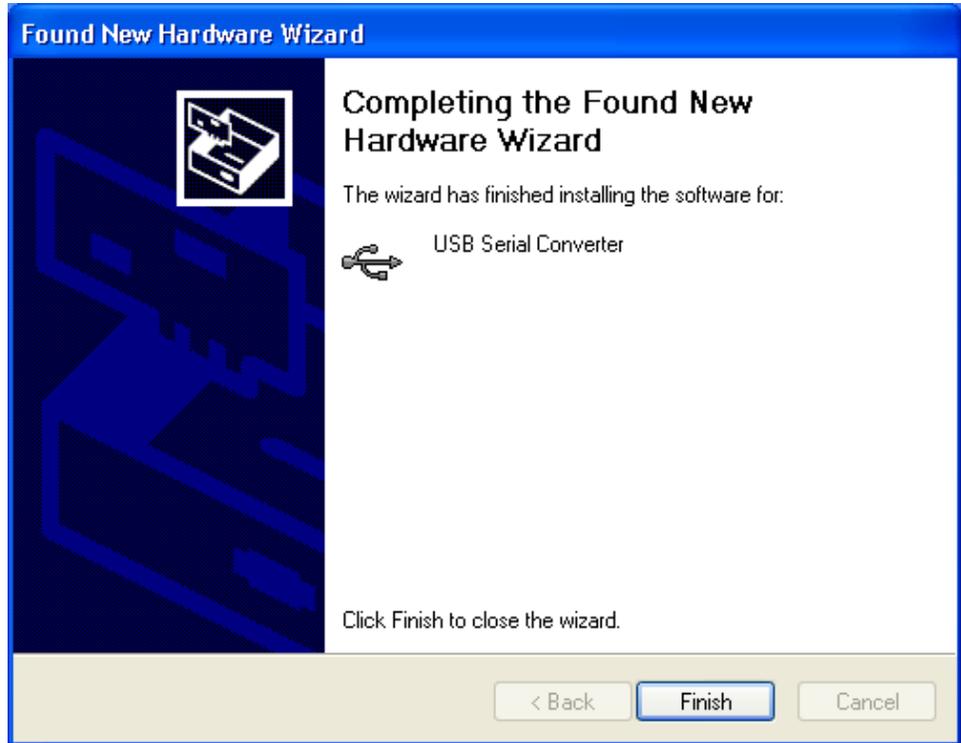
Figure 8 – Device Driver Completion Screen

Once the USB Serial Converter driver has been installed, Windows© will detect that a second device has been found and will begin installation of the necessary drivers for the device (see Figure 9).
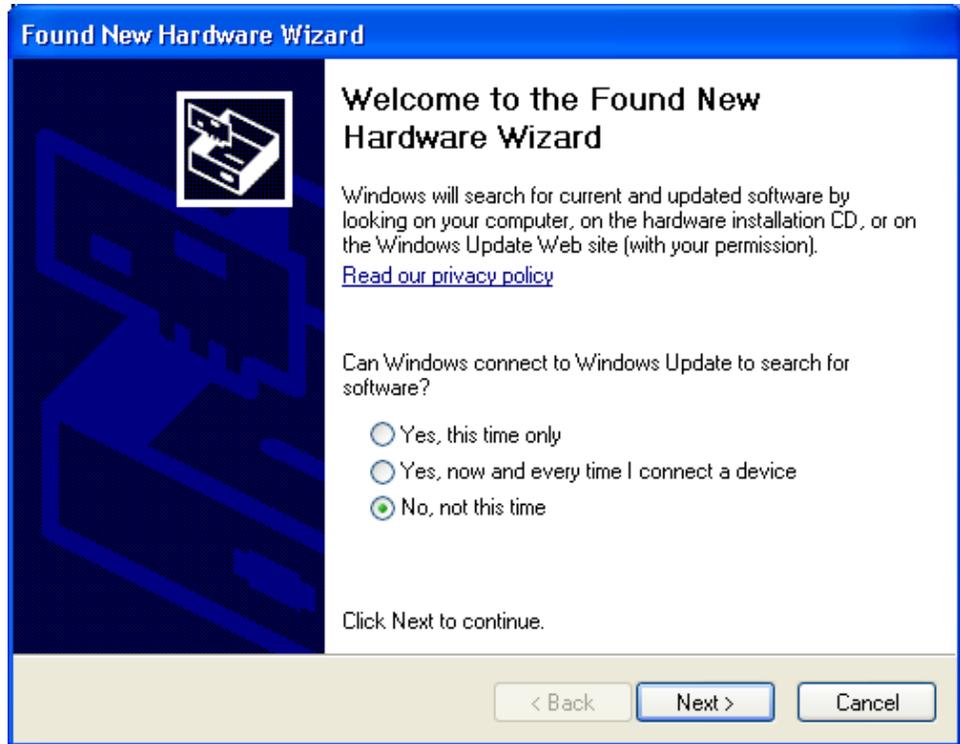
Figure 9 – Device Driver Welcome Screen

The installation process is the same for this driver as it was for the previous driver. Select "No, not this time" and press Next.

Select "Install from a list or specific location (Advanced)" and press Next (see Figure 10).
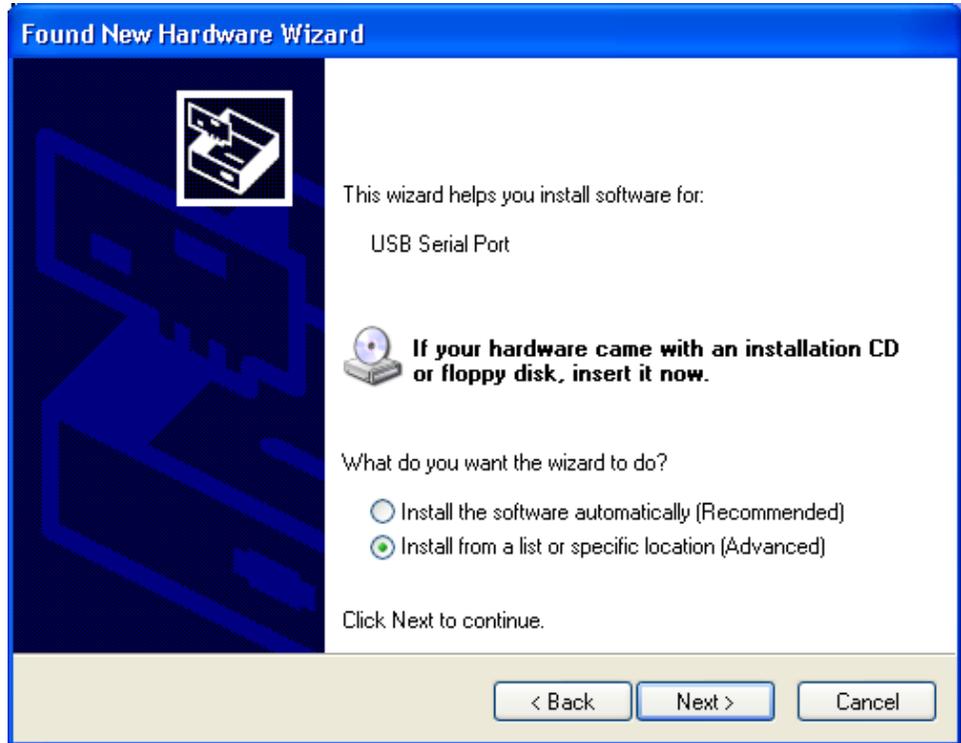
Figure 10 – Device Driver Hardware Screen

Select "Search for the best driver in these locations" and then click on "Search removable media (floppy, CD-ROM…)" and press Next (see Figure 11).
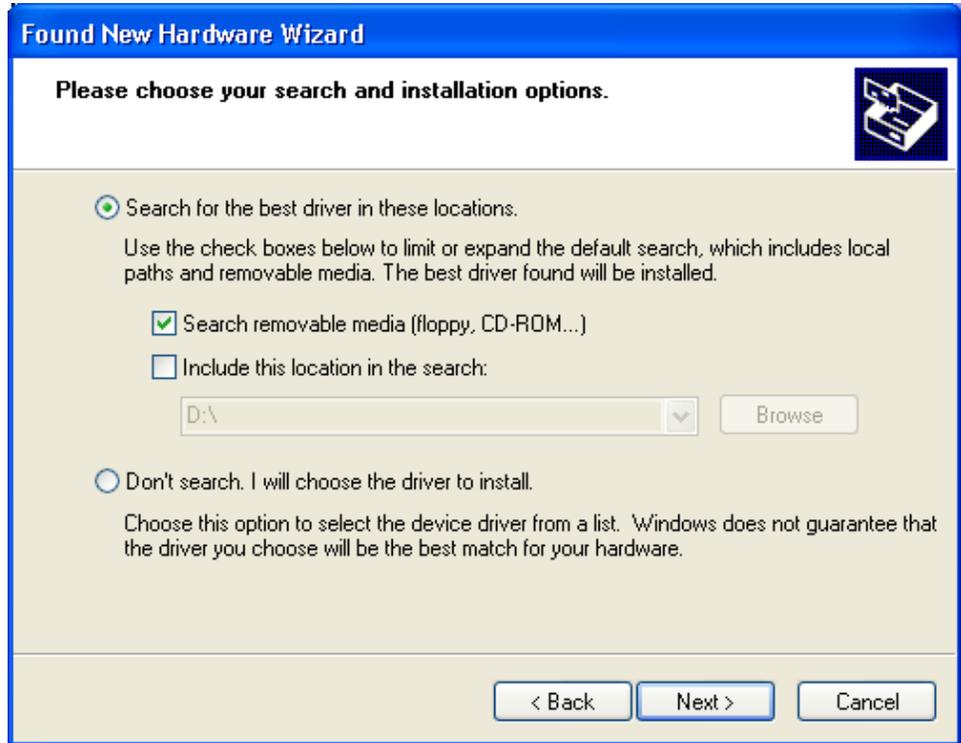
Figure 11 – Device Driver Search Screen

Finally, press Finish to complete the installation of the USB Serial Port driver, which is used by the USB Serial Converter (see Figure 12)

Figure 12 – Device Driver Completion Screen

Section

3

Operation

Initialization

When the software is started, a dialog box (see Figure 13) is displayed allowing the user to select the serial number of the USB adapter attached to their Model 9-4. A serial number and device description are displayed for each detected USB CAL Interface device. After the serial number for the Model 9-4 USB adapter is selected and OK is pressed, the instrument's parameters are loaded and displayed on the main screen.

Figure 13 – USB Calibration Interface Detection Screen

Main Screen

The main screen consists of a tabbed interface separating the general calibration operations from the restore settings operations and a menu bar.

Menu Bar

The menu bar offers quick access to common functions including the File Menu, the Parameters Menu, and the Help Menu.

File Menu

Load Defaults: This menu item loads the file "default.cfg" and saves the settings to the instrument.

Parameters Menu

Update (Ctrl-U): This menu item is the same as clicking on the "Update" button.

Load from File (Ctrl-O): This menu item loads in settings from a user-defined text file.

Save to File (Ctrl-S): This menu item will save the current settings to a user-defined file.

Reload All Data (Ctrl-R): This menu item will reload all data from the instrument and refresh the restore values.

Print Parameters (Ctrl-P): This menu item will send a report of all parameters to a printer.

Help Menu

9-4 Manual: This menu item will bring up the Model 9-4 manual.

About: This menu item will bring up information on LMI, the Model 9-4 software version, and system information.

Calibration Configurations Tab

The Calibration Configurations Tab is the tab which should have focus during the calibration and configuration of the Model 9-4 Main Board. Using this tab during configuration, the user can configure sampling, delays, and compensations required for proper operation of the Model 9-4. Using this tab during calibration, the user can calibrate the meter face, enter calibration constants for all ranges, and calibrate the pressure sensor.

Instrument Serial Number

This box is used to enter the six-digit serial number of the instrument being calibrated. This value is used during print parameters to obtain a printout with the current instrument parameters and the instrument serial number included.

Battery Calibration Constant

This value is the calibration constant for determining a low battery. The value range is (1 - 65535).

Range Calibration Constants (X1 - X10K)

These values are the calibration constants for each range of the meter. The value ranges are (1 - 65535).

Calibration Low Pressure

This number represents the actual low pressure (kPa) that the instrument pressure sensor is exposed to when setting the low-pressure calibration. The range of this value is (0.00 - 115.00) kPa.

Calibration High Pressure

This number represents the actual high pressure (kPa) that the instrument pressure sensor is exposed to when setting the high pressure calibration. The range of this value is (0.00 - 115.00) kPa.

Pressure Calibration Button

When the value of the calibration low or high pressure is changed, this button is highlighted and enabled. Calibration low and high values are not sent to the instrument until the button is pressed and all the calibration steps are completed. The highlighted button state simply indicates changes have been made and serves as a reminder to send the information to the instrument. See the calibration section for details on the calibration procedures.

Temperature Compensation

When selected, the instrument readings will be corrected based on changes in ambient temperature.

Pressure Compensation

When selected, the instrument readings will be corrected based on changes in ambient pressure.

Meter Reset

When selected, the meter operates in the normal default mode.

Test Meter UCP

When selected, the meter needle is deflected towards the mark indicating the expected reading when the instrument is calibrated at the Upper Calibration Point.

Test Meter LCP

When selected, the meter needle is deflected towards the mark indicating the expected reading when the instrument is calibrated at the Lower Calibration Point.

Meter Full Scale

When selected, the meter needle is deflected to full scale and the Up and Down buttons are enabled. The Up and Down buttons are to be used to adjust the meter needle to exactly full scale. The 'Adjust By Value' is the numerical value the ADC value is adjusted by, and a larger number (max of 20) will make the needle move further each time a button is pressed. Fine tuning can be made by setting the 'Adjust By Value' to 1.

Meter Zero Scale

When selected, the meter needle is deflected to zero on the scale and the Up and Down buttons are enabled. The Up and Down buttons are used just as they are used for Meter Full Scale; however, now the needle is being moved to exactly 0 on the display.

Battery Voltage

This indicates the instruments current battery voltage.

Temperature

This indicates the ambient temperature of the instrument.

Uncompensated Pressure

This indicates the pressure measured by the instrument pressure sensor.

Compensated Pressure

This indicates the pressure measure by the instrument pressure sensor with the value compensated for the ambient temperature.

Pressure Sample Period

This indicates the amount of time, (1 to 36000 where 1 equals 100 ms), between pressure and temperature samples used to determine the atmospheric pressure.

Electrometer Transient Delay

This indicates the amount of time (1 to 100 where 1 equals 100 ms) the electrometer will hold and display the last reading after pressing the reset button in order to reduce transients resulting from the reset action.

Update Button

When pressed, the instrument is updated with values that have changed. When values have been changed, the Update button will be highlighted until the instrument has been updated with the new changes.

Restore Tab

The Restore Tab is the tab which should have focus if it is necessary to restore previously saved settings into a Model 9-4. Simply hold down the CTRL key and press O and select the file to load. Next, press Restore Parameters to load the previously saved parameters into the Model 9-4. In addition to the calibration constants seen on the Calibration Configurations tab, the restore feature also loads the following values.

Meter Full Scale DAC Value

This is the digital to analog converter numerical value (0 – 4095) that results in a specific analog voltage output to place the meter needle at the full scale position.

Meter Zero Scale DAC Value

This is the digital to analog converter numerical value (0 – 4095) that results in a specific voltage output to place the meter needle at the zero scale position.

Low Pressure ADC Value

This is the analog to digital converter numerical value (0 – 1023) that results from the analog voltage from the pressure sensor, which represents the low pressure value for the instrument.

High Pressure ADC Value

This is the analog to digital converter numerical value (0 – 1023) that results from the analog voltage from the pressure sensor, which represents the high pressure value for the instrument.

Restore Low Pressure

This is the low pressure value, in kPa, that represents the low pressure calibration point for the instrument.

Low Pressure Calibrated

If checked, this indicates that the value stored in the Restore Low Pressure text box is the result of an actual low pressure calibration reading.

Restore High Pressure

This is the high pressure value, in kPa, that represents the high pressure

calibration point for the instrument.

High Pressure Calibrated

If checked, this indicates that the value stored in the Restore High Pressure text box is the result of an actual high pressure calibration reading.

Calibration Temperature

This is the temperature, in Celsius, during the high pressure calibration of the instrument.

Restore Parameters Button

When pressed, this button sends the values present in the Restore tab to the instrument to restore specific calibration values.