MX•CAL™

CALIBRATION AND BUMP STATION

for the MX4 Product Line of Hand-held Multi-gas Monitors

Operation • Troubleshooting

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Hardware Overview

Figure 1. Hardware Overview of the front of the MX•Cal Calibration and Bump Station
Figure 2. Hardware Overview of the back of the MX•Cal Calibration and Bump Station
Warnings and Cautionary Statements

⚠️ WARNING: Read and understand this manual before operating.

⚠️ CAUTION: For safety reasons, this equipment must be operated and serviced by qualified personnel only.

⚠️ WARNING: Failure to perform certain procedures or note certain conditions may impair the performance of this product. For maximum safety and optimal performance, please read and follow the procedures and conditions listed below.

- Never cover or insert foreign objects into the alarm signal opening. The opening must remain clear and free of foreign objects, otherwise any alerts made during an alarm state may not be heard or identified.

- Contact your service representative immediately if you suspect that the MX•Cal is working abnormally.

Unpacking the Instrument

The table below lists components and part numbers of accessories and peripheral equipment used with the MX•Cal Calibration and Bump Station.

Table 1. MX•Cal Components

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18107680</td>
<td>MX•Cal Calibration Station</td>
</tr>
<tr>
<td>1</td>
<td>17147679</td>
<td>User Manual</td>
</tr>
<tr>
<td>1</td>
<td>17093659</td>
<td>Urethane tubing (4 feet)</td>
</tr>
<tr>
<td>1</td>
<td>17121310</td>
<td>USB cable</td>
</tr>
<tr>
<td>1</td>
<td>17118027</td>
<td>Fitting (for gas inlet)</td>
</tr>
<tr>
<td>1</td>
<td>17124074</td>
<td>Fitting (for fresh air cylinder)</td>
</tr>
<tr>
<td>1</td>
<td>17121070</td>
<td>Industrial Scientific Accessory Software Suite CD</td>
</tr>
<tr>
<td>1</td>
<td>17051710</td>
<td>Power Cord (North America)</td>
</tr>
<tr>
<td>1</td>
<td>17122126</td>
<td>Power Supply</td>
</tr>
</tbody>
</table>
General Operation

Introduction
The MX•Cal is a stand-alone calibration station designed to work in conjunction with the MX4 Multi Gas Monitor. The calibration station performs bump test and calibrations of the instrument. The station saves the test results and can send them to an external serial printer (via TTL-serial connection) or to a PC via a USB interface.

Calibration and Bump Station Hardware
The calibration station’s interface with the user is comprised of:

- character LCD display
- two pushbuttons
- three LEDs
- physical connection point for the instrument.

The eight-character by two-line LCD display shows the status of the calibration station (Figure 3). The LCD display has a software-controlled backlight that is enabled when the station is performing a task.

The two calibration station pushbuttons:
- Bump button
- Calibrate button.

These buttons are used to initiate a bump test or a calibration on the installed instrument. In addition, they can be used to navigate through the setup screens for the calibration station. Most of the navigation is controlled by “simple” button pushes.

Three software-controlled LEDs show the status of the installed instrument:
- **Green** Calibration or bump test passed
- **Amber** Calibration or bump test in progress or charging
- **Red** Calibration or bump test failed
- **No LED** Station “Ready” with no buttons pressed.
NOTE: The Calibration and Bump Station has a mechanical switch that signals the processor that an instrument has been installed or removed.

NOTE: Placing an instrument on the calibration station does initiate communications with the instrument to check for charge mode. Pressing one of the buttons will also initiate the communications with the instrument.

Operational States – Startup Mode

Upon initial power up, the station runs through a set of initialization diagnostics. During the current checks, “Checking Currents” is displayed.

- Power on
- Display “MX•Cal vX.X” (Software Version)
- Display “Warming Up”, then “12345678” and “ABCDEFGH”
- Flash red, amber, and green LEDs individually and all at the same time, while displaying “Verify LEDs”
- Turn on all segments of the display
- Board current check
- Solenoid current check
- Pump current check
- Display “Checking Clock” then display the station’s date and time
- Perform a Memory test

If the current draw by the station falls outside acceptable limits, an error is displayed on the LCD, as shown in Figure 4. The EEPROM is written to/then read from to verify its operation. If there is a problem with the read/write function of the EEPROM, the display will show “EEPROM Error”, as shown in Figure 5. If the station has more than one failure, the screens will cycle and display each anomaly. If no problems are noted, the station will display “Ready” (if no instrument is installed) or “Charging” (if an instrument is installed and charging) on the display to indicate to the user that the calibration station is turned on, and operational, as shown in Figure 6.
Figure 4. Sample Hardware Error Screens

When any of the screens shown in Figure 4 are displayed, the station is not able to perform a bump test or a calibration until the errors are corrected. The set-up screens and the USB communications will still be available.

If “EEPROM Error” is displayed, the data records for any calibrations and bump tests may not be saved correctly and the station will ignore button presses.

Figure 5. Read/Write (EEPROM) Error Screen

If the “Ready” screen is displayed, the station is operational, all functions are available.

Figure 6. Ready Screen Indicating the Station is Operational

When an instrument is installed, “Waiting to Connect…” will be displayed, as shown in Figure 7. On this screen, the MX•Cal will attempt to establish communication with the MX4. If communication with the MX4 is established, the MX•Cal will immediately switch to the “Ready” or “Charging” screen, depending
on the battery status of the instrument. If no communication is established within 3 minutes, an instrument communication error will be displayed as “Inst Comm Err”.

![Waiting] [Connect]

**Figure 7.** Waiting to connect alternates between the two screens.

**NOTE:** Cycle the power of the MX•Cal to clear errors.

**Bump Test**

When the bump button is held for 5 seconds, the MX•Cal will put the instrument in gas reading mode, and then deliver gas to the instrument. If the MX4 instrument is in charging mode, it will need to warm up before the bump test can begin. During that time, the station will notify the user of this on the LCD. The two screens in Figure 8 will alternate every 3 seconds.

![Warming Up] [iQUAD MX4]

**Figure 8.** Instrument Warming Up Status

If one or more of the sensors are in a zero or cal fail state the bump test will not be performed, but a calibration will automatically start (once the bump button has been pressed). While bump testing is in progress, the amber LED will be illuminated, and “Bump in Progress” will be displayed, and cycled with the expected gas screen (see Figure 9). The bump test parameters (gas percentage and response time) are read from the instrument and used by the MX•Cal. For oxygen instruments, the gas used during a bump test is 19.0%. This value is not stored in the instrument; it is programmed into the station and cannot be changed by the user.
When the bump test is complete, the station will send a bump test report to the printer (via the 25-pin serial port) and save a copy in memory. If an instrument fails bump testing, the red LED will be illuminated, and the display will show “Bump Fail” (Figure 10), alternating with a list of the sensor(s) that failed the bump test. After 10 seconds, any sensors that failed the bump test will automatically be calibrated. The failed bump test report will still be printed and saved. If the instrument passes the bump test, the green LED will be illuminated and “Bump Pass” will be displayed (Figure 11). These screens will be displayed until the user removes the instrument from the station.

If the “Bump in Progress” or the gas type and concentration screen is displayed, all button presses and USB communication will be ignored.

If the “Bump Fail” screen is displayed, pressing the bump button within 10 seconds will initiate another bump test.

If the “Bump Pass” screen is displayed, all functions of the MX•Cal are available.

**Calibration**

When the calibration button is pressed, the station will perform an interrogation to determine if the instrument has just been calibrated. If the instrument has NOT been calibrated previously, the station will first zero the instrument (if it has a Toxic or LEL sensor) and then calibrate it. If the instrument is oxygen only, the zeroing is not done, and the station will initiate the calibration sequence.
NOTE: If any sensor in the MX4 instrument is in data fail status, calibration will not begin. The LCD will display “Sensor Error” and the red LED will be illuminated until the instrument is disconnected.

If the instrument has been calibrated recently, “Cal Again?” will be displayed, as shown in Figure 12. If the user presses the calibrate button again, the instrument will be calibrated. If the instrument is removed, or no calibrate button press is noted within 10 seconds, the instrument is NOT calibrated again.

If the MX4 instrument is in charging mode, it will need to warm up before zeroing or calibration can begin. During that time, the station will notify the user of this on the LCD. The two screens in Figure 8 will alternate every 3 seconds.

While zeroing and calibrating, the amber LED is illuminated. When zeroing, the display shows “Zero in Progress”, as shown in Figure 73. When the instrument is calibrating, “Cal in Progress” will be displayed as well as the gas concentration expected. The two screens will be cycled, as shown in Figure 148. If the instrument is set in the Quick Cal mode, the gas concentrations will not be displayed. When the calibration is complete, the calibration report will be sent out the printer port, and saved in memory.

If an instrument fails either zero or calibration, the red LED will be illuminated, and “Cal Fail” will be displayed (see Figure 159), alternating with a list of the sensor(s) that failed calibration. If the instrument passes calibration, the green LED will be illuminated, and “Cal Pass” will be displayed (see Figure 1596).
These pass/fail screens will be displayed until the user removes the instrument from the station. If the until fails a zero or a calibration, the instrument will be unusable until a good zero and calibration are performed on the instrument. If the “Zero in Progress” screen is displayed, button presses and USB communication will be ignored by the station.

![Cal in Progress](image1)

**Figure 148. Calibration Test and Gas Type/Concentration Screens**

If the “Cal in Progress” or the gas type and concentration screen is displayed, button presses and USB communication will be ignored by the station. If the “Cal Pass” screen is displayed, all functions of the station are available.

![Cal Pass](image2)

**Figure 159. Calibration Pass and Fail Screens**
If the “Cal Fail” screen is displayed, the bump test is disabled, but all other functions of the station are available.

**Operational States – USB Connection**

If the host PC is downloading calibration and bump test reports from the instrument, or from the station, and a button is pressed during the USB process, the display will show “Busy Wait” (Figure 17) for 10 seconds, and then return to the screen that was displayed.

When the download of information is complete, the station will show the “Ready” screen again and the buttons will be available.

If the “Busy Wait” screen is displayed, button presses are ignored by the station.

**Charging**

The MX•Cal has the capability of charging MX4 instruments with Lithium batteries. “Charging” will be displayed on the LCD (Figure 18) when an instrument is installed and charging. The amber LED will also be illuminated until the charging process is complete.

**Printer Interface**

The Calibration and Bump Station interfaces to a printer through a serial 25-pin connection. If the temperature is too low for the printer to function, “Prn off Low Temp” will be displayed to show the printer error (Figure 19).
After a calibration is completed, the station and printer will produce a process record with the format shown in Figure.

<table>
<thead>
<tr>
<th>Industrial Scientific Corp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;MX4&gt; &lt;Official Name of Station&gt; &lt;Software Version&gt;</td>
</tr>
<tr>
<td>Date: &lt;Actual date of operation&gt; &lt;Actual Time&gt;</td>
</tr>
</tbody>
</table>

| Serial Number: <Actual Instrument Serial Number> |
| Software v <Actual instrument software version> |
| Hardware v <Actual instrument hardware version> |
| Calibration: <Pass or Fail> |

<table>
<thead>
<tr>
<th>Sensor 1: &lt;Sensor Type&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span Reserve: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Cal Gas Conc.: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>High Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Low Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Result: &lt;Pass or Fail&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor 2: &lt;Sensor Type&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span Reserve: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Cal Gas Conc.: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>High Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Low Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Result: &lt;Pass or Fail&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor 3: &lt;Sensor Type&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span Reserve: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Cal Gas Conc.: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>High Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Low Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Result: &lt;Pass or Fail&gt;</td>
</tr>
</tbody>
</table>
Sensor 4: <Sensor Type>
Span Reserve: <xx.x>
Cal Gas Conc.: <xx.x>
High Alarm: <xx.x>
Low Alarm: <xx.x>
Result: <Pass or Fail>

Next Cal Due: <Recommended date for next calibration>

Cylinder Lot No. _____________________
Technician Initials ____________________

Figure 20. Sample Calibration Process Record

If zeroing fails, calibration will not be performed, and the printout will look as shown in Figure 21:

Industrial Scientific Corp.
<MX4> <Official Name of Station><Software Version>
Date: <Actual date of operation><Actual Time>

Serial Number: <Actual Instrument Serial Number>
Software v<Actual instrument software version>
Hardware v<Actual instrument hardware version>
Zero: FAIL

Sensor 1: <Sensor Type>
Cal Gas Conc.: <xx.x>
High Alarm: <xx.x>
Low Alarm: <xx.x>
Zero: <Pass or Fail>
<table>
<thead>
<tr>
<th>Sensor 2: &lt;Sensor Type&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cal Gas Conc.: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>High Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Low Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Zero: &lt;Pass or Fail&gt;</td>
</tr>
<tr>
<td>Sensor 3: &lt;Sensor Type&gt;</td>
</tr>
<tr>
<td>Cal Gas Conc.: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>High Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Low Alarm: &lt;xx.x&gt;</td>
</tr>
<tr>
<td>Zero: &lt;Pass or Fail&gt;</td>
</tr>
<tr>
<td>Sensor 4: &lt;Sensor Type&gt;</td>
</tr>
<tr>
<td>Cal Gas Conc.: &lt;xx.x&gt;</td>
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<tr>
<td>High Alarm: &lt;xx.x&gt;</td>
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<td>Low Alarm: &lt;xx.x&gt;</td>
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<tr>
<td>Zero: &lt;Pass or Fail&gt;</td>
</tr>
<tr>
<td>Cylinder Lot No.</td>
</tr>
<tr>
<td>Technician Initials</td>
</tr>
</tbody>
</table>

**Figure 21. Sample Zero Fail Process Record**

After a bump process is completed, the station and printer will produce a process record as shown in Figure 22122.
Operation: Bump Test

Sensor 1: <Sensor Type>
Gas Reading: <xx.x>
Cal Gas Conc.: <xx.x>
High Alarm: <xx.x>
Low Alarm: <xx.x>
Result: <Pass or Fail>

Sensor 2: <Sensor Type>
Gas Reading: <xx.x>
Cal Gas Conc.: <xx.x>
High Alarm: <xx.x>
Low Alarm: <xx.x>
Result: <Pass or Fail>

Sensor 3: <Sensor Type>
Gas Reading: <xx.x>
Cal Gas Conc.: <xx.x>
High Alarm: <xx.x>
Low Alarm: <xx.x>
Result: <Pass or Fail>

Sensor 4: <Sensor Type>
Gas Reading: <xx.x>
Cal Gas Conc.: <xx.x>
High Alarm: <xx.x>
Low Alarm: <xx.x>
Result: <Pass or Fail>
USB Communications Interface

The station can communicate with a host PC across a USB connection, when the PC is running the Instrument Accessory Software. The following capabilities are included in the calibration station, with respect to commands from the Host PC software:

- Download datalog from the instrument
- Download event log from the instrument
- Download bump and calibration records from the station

Instrument Detection

The MX•Cal will be able to detect if an instrument is installed by use of a mechanical switch. If the switch indicates an instrument is present, the user presses a button to initiate a calibration or a bump, and the instrument does not respond, “Inst Comm Err” will be displayed, as shown in Figure 23123.

If the user attempts to begin a bump test or calibration, and the switch does not detect an instrument, “No Inst Detected” will be displayed, as shown in Figure 24Error! Reference source not found..
established, the screen will still show “Inst Comm Err”; otherwise the appropriate function will start. All other station functionality is available.

If the “No Inst Detected” screen is displayed, the button presses will not initiate any bump test or calibration functions. The USB communications is available as well as access to the setup screens.

**Manual Setup of the Station**

The station will be able to be setup using the LCD, the calibrate button, and the bump button. Once the station is configured and running, pressing and holding both the calibrate button and the bump button for 3-5 seconds will take the user to the setup mode. Figure 25 shows the screens to be displayed, with “Print Events” as the starting point. Pressing the bump button will scroll to the next screen. Each screen is explained in the sections that follow. Once in the setup screens, if no buttons are pressed within 10 seconds, the set-up mode times out and the station returns to either the “Ready”, “Charging” or test result screen.

![Setup Mode Flowchart](image)

**Figure 2513. Setup Mode Flowchart**
If any of the screens in Figure 25 are displayed, pressing the bump button will advance to the next set-up screen, while pressing the calibrate button will select the feature shown on the display.

**Print Events**

If the calibrate button is pressed while the “Print Events” screen is displayed, the “Print OK” screen is shown, verifying the user’s selection to download and print the saved event data from the instrument (Figure 26). An instrument must be installed to print the events from it.

If the user presses the bump button, No is selected, and the user is returned to the “Print Events” screen.

If the user presses calibrate, Yes is selected, the data is downloaded and sent to the printer port, and “Printing Events” is displayed. When printing is complete, the “Print Buffer” screen is displayed.

If “Printing Events” is displayed, all button presses and USB communication is ignored until the events have been printed. Figure 27 shows an example of an event print-out.

![Figure 146. Print Events Screens](image-url)
Hardware v1

** Alarm Event **
Sensor Type: CO  
Sensor S/N: 1234567890  
High Alarm Setting: 70 ppm  
Low Alarm Setting: 35 ppm  
Peak Exposure: 104 ppm  
Seconds in Alarm: 36  
Time of Alarm:  
30 Sep 2008 08:51:23  
User: John Doe  
Site: Boiler Room

** Alarm Event **
Sensor Type: H2S  
Sensor S/N: 1543534650  
High Alarm Setting: 50.0 ppm  
Low Alarm Setting: 25.0 ppm  
Peak Exposure: 72.9 ppm  
Seconds in Alarm: 73  
Time of Alarm:  
30 Sep 2008 17:41:31  
User: John Doe  
Site: Production #1

User:__________________________
Date:__________________________
Time:__________________________
Print Buffer

If the calibrate button is pressed while the “Print Buffer” screen is displayed, the “Print OK” screen is shown, verifying the user’s selection to print every saved bump test and calibration report (Figure 28).

If the user presses the bump button, No is selected, and the user is returned to the “Print Buffer” screen.

If the user presses calibrate, Yes is selected, every saved bump and calibration report is sent to the printer port, and “Printing” is displayed. The buffer is NOT erased. When the printing is finished, the “Clear Buffer” screen is displayed.

The buffer can hold up to 150 records then will over-write. If the buffer is full, it will take up to an hour to print the entire contents.

If “Printing…” is displayed, all button presses and USB communication is ignored until the records have been printed.

Figure 158. Print Buffer Screens
Clear Buffer

If the calibrate button is pressed while the “Clear Buffer” screen is displayed, the “Clear OK” screen is shown, verifying the user’s selection to clear every saved bump and cal report (Figure 29).

If the user presses the bump button, No is selected, and the user is returned to the “Clear Buffer” screen.

If the user presses calibrate, Yes is selected, every saved bump and cal report is cleared, and “Buffer Cleared” is displayed. After 5 seconds, the “Cal Days” screen is displayed.

Setting Next Cal Day (Cal Days 30)

If the calibrate button is pressed while the “Cal Days” screen is displayed, the “30 Days” screen is shown, allowing the user to increase the number of days until the next calibration by pressing the bump button (Figure 30). The number 30 will increase slowly (in increments of 1), then faster while the bump button is held. The rollover point is set at 365 days, after which the counter restarts at 1.

If the user presses calibrate, the new number of days that is displayed will be saved into memory and the “Set Date” screen is displayed.

If “Cal Days” or “30” are displayed, the USB communication is ignored by the station.

Figure 169. Clear Buffer Screens

Figure 30. Cal Days Screens
Set Date

If the cal button is pressed while the “Set Date” screen is displayed, the “01 Month” screen is displayed, allowing the user to increase the month to set the correct date (Figure 31). The month number will increase as the bump button is pressed.

If the user presses calibrate, the new month number is saved to the clock and the “01 Day” screen is displayed. The date of the month will increase as the bump button is pressed.

If the user presses calibrate, the new day number is saved to the clock and the “05 Year” screen is displayed. The year screen (which displays only the last two digits of the year) cycles up to 99, and then restarts at 00, as the bump button is pressed.

If the user presses calibrate, the new year number is saved to the clock and the “12 Hour” screen is displayed. The clock is set using a 24-hour clock. The hours cycle up to 23, and then restart at 00 by pressing the bump button.

If the user presses calibrate, the new hour number is saved to the clock and the “00 Min” screen is displayed. The Min screen cycles up to 59, and then restarts at 00 by pressing the bump button.

If the user presses calibrate, the new minute’s value is saved to the clock and the “Select Language” screen is displayed.

If any of the “Set Date” screens are displayed, the USB communications will be ignored by the station.

Figure 31. Set Date Screens
Select Language

If the calibrate button is pressed while the “Select Language” screen is displayed, the “English” screen is shown (Figure 32). This allows the user to select English as the default language by pressing the calibrate button, after which the “System Check” screen is displayed.

Pressing the bump button will display the “Español” selection. While “Español” is displayed, pressing calibrate will select Spanish as the default language and display the “System Check” screen.

Pressing the bump button will display the “Français” screen, which allows the user to select French as the default language. By pressing the calibrate button, French is selected and the “System Check” screen is displayed.

Pressing the bump button will display the “Deutsch” screen allowing German to be selected as the default language.

Pressing the bump button will display the “Select Language” screen. Pressing the calibrate button will select German as the default language and display the “System Check” screen.

If any of the “Select Language” screens are displayed, USB communication will be ignored by the station.

Figure 3217. Select Language Screens
System Check

If the bump button is pressed while the “System Check” screen is displayed, the “Exit” screen is displayed. If the calibrate button is pressed while the “System Check” screen is displayed, the calibrator starts a check of all the systems.

Any errors will be reported as shown in Figure 4, when the check is finished. These errors will be displayed for 15 seconds, and then the calibrator will return to the “System Check” screen. Once the user exits the setup mode, the errors will be visible again on the display.

If the “Running Check” screen is displayed, all USB communications is ignored by the station.

Exit

If the bump button is pressed while the “Exit” screen is displayed, the “Print Events” screen is displayed.

If the calibrate button is pressed while the “Exit” screen is displayed, the setup mode is exited and the calibration station is returned to normal operation. If there is no instrument installed, the station will display “Ready”. If there is an instrument installed and it has been through a calibration or bump test, the result will be displayed, i.e., “Cal Pass”, if it has not been tested, the screen may say “Charging” when appropriate.

If “Exit” is displayed, all USB communication will be ignored by the station.
Industrial Scientific Accessory Software Suite installation on the PC

The Accessory Software Suite is provided on a CD that ships with the Calibration and Bump Station. The CD contains the software program interface that allows you to access and program the monitoring device from your PC. The program is called the Industrial Scientific Accessory Software Suite.

The software must first be installed onto your PC before the monitoring device can be commissioned from the PC. It is only necessary to perform this installation process one time on the target PC.

To install the software, insert the software CD into the CD drive of the target PC. The program should automatically start and begin the installation process. If not, use the RUN… command from the start menu and select the INSTALL.EXE program from the corresponding CD drive. Follow the on-screen instructions to complete the installation of the software.

The Accessory Software Suite provides a user-friendly interface for communication with and setting the parameters of the monitoring device. Use the on-line help feature to navigate the interface screens.
Using the PC Software

The accessory software is a PC-based interface program that works hand in hand with the MX4 Charger/Datalink and the MX•Cal calibration and bump station. The same software (which consists of USB drivers and the application component) is used for both the Charger/Datalink and the MX•Cal devices. After the application software and USB drivers are installed and configured, the software interface provides access to a variety of configuration, programming, and log information.

Currently, the following operating systems support the accessory software. Additional operating systems (e.g., Windows VISTA) are expected in later releases.

- Windows 2000
- Windows XP

The application software must be installed prior to connecting the MX•Cal device to a PC using a USB cable. Once the application software is installed, the MX•Cal should be connected to the PC, and the USB drivers should will be installed automatically (two USB drivers will need to be installed). After the USB drivers are installed, the application software can be opened and run.

To begin using the software, choose the appropriate connection port, the appropriate device (Charger/Datalink or MX•Cal), and click the Connect button. As an alternative, you may choose to work offline by clicking the Work Offline button.

**WARNING:** The application software must be installed from the CD prior to connecting the MX•Cal to the PC

**NOTE:** Two USB drivers will need to be installed for the MX•Cal to communicate to a PC.

**NOTE:** The MX4 instrument must be inserted into the MX•Cal (or Charger/Datalink), prior to pressing the “Connect” button.
Working offline gives you the following capabilities:

- View data with no device connected to the PC
- Works for Charger/Datalink and MX•Cal
- View all saved reports.

To Work Offline, select the serial number of the target unit. The serial numbers of available units are displayed in the Open window.

After the device is chosen (either via direct connection or through offline serial number selection), the Main Software screen is displayed.

Make sure the MX•Cal button is selected when connected to the MX•Cal.
Figure 206. Sample Open Window Showing Serial Numbers of Available Instruments

Figure 217. Main Software Screen – General Tab
The Main Software screen has several tabs used to organize the instrument’s information into logical groups. These are shown in the table below.

**Table 2. Tabs of the Main Software Screen**

<table>
<thead>
<tr>
<th>Tab</th>
<th>Function/Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Administration information of the device</td>
</tr>
<tr>
<td>Options</td>
<td>Configure instrument options</td>
</tr>
<tr>
<td>Users and Sites</td>
<td>Shows active user and site saved in instrument (not viewable on instrument)</td>
</tr>
<tr>
<td>Components</td>
<td>Shows details of installed components</td>
</tr>
<tr>
<td>Calibrations</td>
<td>Shows calibration data associated with each instrument (can view saved records or download the latest)</td>
</tr>
<tr>
<td>Bump Tests</td>
<td>Shows bump test data associated with each instrument (can view saved records or download the latest)</td>
</tr>
<tr>
<td>Event Log</td>
<td>Shows log files and associated data for each instrument</td>
</tr>
<tr>
<td>DataLogging</td>
<td>Shows datalog files and associated data for each instrument</td>
</tr>
</tbody>
</table>

Each of the tabs and a short description are shown on the following pages.
The instrument configuration options can be set and changed from this screen. A check mark indicates the option is enabled. For more information on the functionality of these options, refer to the MX4 user manual.
**Figure 39. Users and Sites**

The user can enter one active user and site, which will be saved in the instrument but not viewable on the instrument.
Figure 40. Components Tab

The components screen lists all components installed in the instrument. Highlighting and clicking “Open” allows information about that component to be viewed and modified (see Figure for more details). The sensor details screen allows the alarm set points as well as the calibration gas concentration for the sensors to be changed.

Figure 41. Sample Sensor Detail Screen
The calibration tab lists all calibration certificates for the select (or connected instrument) that have been downloaded from the calibration station. To retrieve calibration reports from the MX•Cal, click the “Download” button. To view downloaded reports, highlight the desired report and click “Open”. Figure 43 shows a sample calibration report.

Figure 42. Calibration Tab

Figure 43. Sample Calibration Report
The Bump Test tab lists all bump test certificates for the select (or connected instrument) that have been downloaded from the calibration station. To retrieve bump test reports from the MX•Cal, click the “Download” button. To view downloaded reports, highlight the desired report and click “Open”. Figure 45 shows a sample bump test report.
The Event Log Tab lists all downloaded event logs for the connected instrument. This screen also allows event logs to be downloaded from the connected instrument by simply clicking the “Download” button. To view an event log, simply highlight the log file and click “Open”. Figure 47 shows an example of an event log.
MX4 iQuad 0812075-027

4/16/2009 3:58:02 PM
Serial Number: 0812075-027  Access Code: 000
Type: MX4 iQuad  Calibration Interval: 30 Days
Part Number: MX4-12345  Recording Interval: 10 Seconds
Job Number: DEVJOB
Setup Technician: DEV  TWA Time base: 8 Hours
Setup Date: 3/17/2009  User:
Software Version: 1.00.54  Site:

INSTRUMENT OPTIONS

<table>
<thead>
<tr>
<th>Can bump in field</th>
<th>On</th>
<th>Confidence indicator enabled</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bump past due warning enabled</td>
<td>Off</td>
<td>Calibration past due warning enabled</td>
<td>Off</td>
</tr>
<tr>
<td>Can zero in field</td>
<td>On</td>
<td>Alarm latching</td>
<td>Off</td>
</tr>
<tr>
<td>Can perform quick calibration</td>
<td>Off</td>
<td>Can calibrate in field</td>
<td>On</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor SN</th>
<th>Sensor Type</th>
<th>Enabled</th>
<th>Cal Gas</th>
<th>Cal Gas Conc</th>
<th>Low Alarm</th>
<th>Hi Alarm</th>
<th>TWA Alarm</th>
<th>STEL Alarm</th>
<th>Calibration Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>081216X4000029</td>
<td>Combustible-LEL Sensor</td>
<td>Yes</td>
<td>Pentane</td>
<td>25 LEL</td>
<td>10 LEL</td>
<td>20 LEL</td>
<td>N/A</td>
<td>N/A</td>
<td>1/1/2000 12:00:00 AM</td>
</tr>
<tr>
<td>081203X4000125</td>
<td>Oxygen Sensor</td>
<td>Yes</td>
<td>Oxygen</td>
<td>20.9 VOL</td>
<td>19.5 VOL</td>
<td>23.5 VOL</td>
<td>N/A</td>
<td>N/A</td>
<td>4/8/2009 2:16:43 PM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm Time</th>
<th>Duration</th>
<th>Gas</th>
<th>Sensor SN</th>
<th>Hi Alarm</th>
<th>Low Alarm</th>
<th>Peak Reading</th>
<th>User</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/16/2009 11:30:35 AM</td>
<td>00:03</td>
<td>Oxygen</td>
<td>081203X4000125</td>
<td>23.5</td>
<td>19.5</td>
<td>24.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/16/2009 8:52:03 AM</td>
<td>00:05</td>
<td>Oxygen</td>
<td>081203X4000125</td>
<td>23.5</td>
<td>19.5</td>
<td>19.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 47. Sample Event Log Data
Figure 48. DataLog Tab

The DataLog Tab lists all downloaded datalog for the connected instrument. This screen also allows the datalog to be downloaded from the connected instrument by simply clicking the “Download” button. To view a datalog, simply highlight the log file and click “Open”. Figure 49 shows an example of a datalog.
Figure 49. Datalog Example

The sensor session can be shown graphically, printed, or exported to a comma separated variable file. By highlighting a single sensor and clicking on the “Detail” button, the session period for that sensor will be shown. The user can click on “Detail” again to get the complete list of readings for that sensor stored in that session’s datalog.
## Trouble Shooting

### Diagnosing Common Problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Likely Cause(s)</th>
</tr>
</thead>
</table>
| Display is blank…                            | • No power to the instrument  
• Display is damaged                           |
| Unit resets…                                 | • Internal error. Cycle the power. If problem persists, contact factory.        |
| Instrument continually fails bump test or calibration… | • Ensure calibration gas is connected and the bottle is full.                   |
| Printer is not working…                     | • Ensure paper is in printer and printer ribbon is in place.                   |
| No communication to PC…                     | • Ensure application software and both USB drivers are installed on PC. Ensure USB cable is plugged in. |
| MX•Cal does not communicate with instrument…| • Ensure IR ports on both MX•Cal and instrument are clean from dirt and debris. |
| MX•Cal PC software will not connect to instrument | • Ensure instrument is placed in instrument bay  
• Ensure IR ports on both MX•Cal and instrument are clean from dirt and debris |
Performance Specifications

Table 3. Performance Specifications

<table>
<thead>
<tr>
<th>Category</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature Range</td>
<td>0°C to +50°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20°C to +60°C</td>
</tr>
<tr>
<td>Operating Humidity Range</td>
<td>0 – 80% RH up to 31°C, decreasing linearly to 50% RH at 40°C</td>
</tr>
<tr>
<td>External Power Supply Ratings</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>110-240 VAC</td>
</tr>
<tr>
<td>Frequency range</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Current Rating</td>
<td>1.5A</td>
</tr>
<tr>
<td>Installation Category</td>
<td>2</td>
</tr>
<tr>
<td>Pollution Degree</td>
<td>2</td>
</tr>
</tbody>
</table>

CAUTION: Equipment is rated for indoor use only. Use only indoors at altitudes below 2000 meters (6000 feet).

NOTE: The MX•Cal is designed and intended for indoor use only. After installation, the MX•Cal should be cleaned only with a soft cloth. Do not use solvents or other liquids to clean the MX•Cal. Upon visual inspection if there is any damage to the equipment please consult the factory for service and repair information.

CAUTION: Compressed gas cylinders and their contents may present specific hazards to the user. Use only in a well ventilated area. Use only in accordance with the instructions and warnings as marked on the cylinder and the appropriate Material Safety Data Sheets.
NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user’s own expense.