Crystal pressure
AMETEK

XP2i Operation Manual

for XP2i Digital Test Gauge (Standard and Dual-Display(DD))

AMETEK®
SENSORS, TEST & CALIBRATION

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Overview

INTRODUCTION

Thank you for choosing the XP2i Digital Test Gauge from Crystal Engineering Corporation. Your XP2i is a combination of leading edge technology and rugged industrial design.

Accuracy is 0.1% "of reading", 0.02% "of Full Scale" or 0.05% "of Full Scale"—so any XP2i can typically replace several gauges you may have been using. The XP2i is ***fully temperature compensated***—so there is ***no change in accuracy throughout the entire operating temperature range!***

The XP2i's case is made from rugged aluminum alloy utilizing a gasket to seal the enclosure against dust and water intrusion. Even the RS-232 connector is fully sealed (with or without the red cover or rubber boot). Circuitry is mounted in shock absorbing elastomer supports and the batteries are easily accessible by removing four screws. But you won't need to change the batteries often, since 3 AA batteries operate the XP2i for up to 1500 hours of continuous use. Other features include:

- Continuous capture of peak and valley pressure readings
- PSV mode
- Programming interface
- User-defined units
- Intrinsically Safe
- All welded 316 stainless steel sensor
- Calibration due reminder

We hope your XP2i meets your expectations, and we're interested in any comments or suggestions you may have. You can send us a note at: crystal@ametek.com. *Many features in this and our other products are a direct result of your comments!*

Crystal Engineering is the company that designs, manufactures, markets, and services the nVision reference pressure recorder, XP2i**,** and 30 Series pressure calibrators, M1 Pressure Gauge, MultiCal multimeter pressure adapters, and a variety of industry specific pressure measuring equipment. Crystal Engineering pioneered features like full temperature compensation and "of reading" rated gauges and calibrators. Pressure measuring equipment is the only thing we do and that's why we say:

Pressure Is our **Business** ™

Your XP2i can be customized, through the use of our free ConfigXP™ software. Your personal computer can disable, enable, or modify a variety of features of your XP2i. Look for the CONFIGXP PROGRAMMABLE logo for programmable features, like:

- A user defined pressure scale, and/or disable unused pressure units
- Password protection to prevent unauthorized changes
- Disable keypad recalibration, (peak) button, and/or (units) button
- Expand or decrease allowable Zero range
- Set the gauge to a different density of water factor (4° C, 60° F, or 68° F)
- Store a 12 digit ID or tag number in non-volatile memory
- Adjust calibration values

OPERATING INSTRUCTIONS

The XP2i is shipped with batteries installed, so it's ready to use. Press and hold the (on/off) button. The XP2i will first test all LCD segments. Release the (on/off) button when the XP2i indicates pressure.

The XP2i always resumes operation in the mode and the units of the pressure last used, and it *does not automatically rezero when turned on.*

Connect the XP2i to your system.

! CAUTION: Use a wrench (¾" or 19mm) for installation and removal of XP2i! There is a limit to how much rotational force can be applied to the case, so don't rely on, or use, the case to screw the XP2i into a fitting, and don't use the case to remove the XP2i fitting, either.

! CAUTION: Never insert any object into the pressure connection! The sensor diaphragm is very thin and can be damaged or destroyed by solid or sharp objects. Cleaning of the sensor must be done with appropriate solvents only.

! WARNING: Severe injury or damage can occur through improper use of pressure instruments! Do not exceed recommended pressure limits of tubing and fittings. Be certain all pressure connections are secured.

Most XP2i's are intended for gauge pressure measurement. That is, they indicate the difference between applied pressure and ambient barometric pressure. However, the (zero) button can be used to force an XP2i to read zero pressure at any applied pressure, up to the full scale rating of the gauge. The factory default setting limits the maximum zero value to 20 psi, but this limit can be changed with CONFIGXP.

! WARNING: This gauge can display zero pressure when connected to a source of pressure! Do not rely on the display indication before disconnecting—it may not be indicating true pressure. Never disconnect pressure instrumentation without first relieving system pressure!

Functions

Units Button

Pressing this button causes the XP2i to select the next available unit of pressure measurement.
See Pressure Ranges, Display Scales, & Resolution on page 29 or the list of pressure units available for your model.

CONFIGXP PROGRAMMABLE Units that you don't need or never use can be turned off. You can also define a special unit for your XP2i with ConfigXP. You can use the XP2i to display directly in a unit not otherwise available, such as feet of seawater, or foot-pounds of torque. When you select your custom unit from the keypad, the screen displays the USER icon.

Peak Button

On the XP2i, pressing the (peak) button causes the display to cycle through the following , depending on your setting in ConfigXP.

<No Icon>	.... Live Pressure display
HI	.... Maximum detected pressure
LO	.... Minimum detected pressure
(blinking) HI	.... PSV Mode, maximum *
(blinking) LO	.... PSV Mode, minimum *
AVG	.... Average pressure
REC	.... DataLoggerXP datalogging mode

* From the factory this setting is disabled. Use ConfigXP to enable.

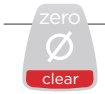
Peak High and Peak Low values are not saved when the gauge shuts off; they will reset to the current reading when the XP2i is turned on or reset.

CONFIGXP PROGRAMMABLE In some cases the ability to display a peak value may not be needed, or may even be dangerous. ConfigXP allows you to disable this button.

XP2is can average 1 to 10 readings, recalculated every time pressure is measured (4 times per second). Enable and set the number of readings to be averaged with ConfigXP.

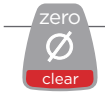
On the -DD, dual-line display XP2i, pressing the (peak) button causes the display to cycle through the following, depending on your setting in ConfigXP:

<No Icon>	.... Live Pressure display
HI	.... Maximum detected pressure
LO	.... Minimum detected pressure
(blinking) HI	.... PSV Mode maximum *
(blinking) LO	.... PSV Mode minimum *
AVG	.... Average pressure
REC	.... DataLoggerXP datalogging mode *(remaining points displayed on lower line)*
TARE	.... Tare *
/min	.... Rate of change *
HI LO	.... Differential Mode *
HI LO + AVG	.... Average Differential Mode *



Resetting (Clearing) Recorded Peak Values

Peak values can only be cleared when displaying either a Peak High or Peak Low recorded pressure. Press the (clear) button for at least ½ second. Dashed lines will briefly appear across the display indicating that both Peak values have been cleared. Both Peak High and Peak Low values will then display the current applied pressure. Pressing the (clear) button while either the Peak High (HI) or Peak Low (LO) icon is displayed will not affect the zero value. If you need to rezero the gauge, you must turn off both peak icons by pressing the (peak) button.



Zero

CONFIGXP PROGRAMMABLE If you attempt to zero the gauge while applying a pressure which exceeds the Zero Limit (set in ConfigXP, defaults to 20 psi), the command will be ignored and "--HI-" will be displayed.

▶ To Zero the XP2i

Turn off peak indication by pressing the (peak) button repeatedly until the HI and LO icons are off, then press the (zero) button for at least ½ second when the gauge is vented to atmosphere.

The display will then briefly flash all dashed lines (-----), indicating that it has been re-zeroed.

! WARNING: This gauge can display zero pressure when connected to a source of pressure! Do not rely on the display indication before disconnecting—it may not be indicating true pressure. Never disconnect pressure instrumentation without first relieving system pressure!

▶ To Clear the Zero Value on an XP2i

Turn off peak indication as described above, then press and hold the (zero) button until the display changes from (-----) to (- - -).

Tare (-DD, Dual-Line Display XP2i Only)

Tare is a constant value subtracted from the true pressure. For instance, if you were mixing gases by partial pressure, you might want to fill a tank to 1760 psi with air, then add another 440 psi of helium. To reduce the chance of error, you could tare the gauge at 1760 psi. Then you would add helium until the indication reached 440.

Fill to pressure

Press the Tare button

Top-off with helium

In contrast to the Zero function discussed previously, Tare is not subject to the Zero Limit set in ConfigXP. Tare is available only when the **TARE** icon is on. To use the Tare feature, press the (peak) button repeatedly until the screen displays the **TARE** icon. The **TARE** icon will flash to remind you that live pressure may not be indicated on the screen. Apply pressure to the gauge until you reach the desired value. Press the (zero) button. The top line will change from true pressure to zero. The amount of the tare will be displayed on the second line.

To clear the tare, press and hold the (zero) button until the tare value changes from (- - - - -) to (- - -).

CONFIGXP PROGRAMMABLE The Tare function is disabled by default, but can be enabled with ConfigXP.

Rate (-DD, Dual-Line Display XP2i Only)

Rate is the measurement of pressure change per minute. When in Rate mode, the second line will display the rate, and the **/min** icon will display. Rate is calculated at every pressure measurement (4 times per second), and the displayed value is the average of the most recent 3 to 10 calculations. By increasing the number of calculations in the average, the XP2i will indicate a more stable rate. However, the XP2i will react more slowly to changes in rate.

To use the rate feature, press the (peak) button repeatedly until the **/min** icon displays. As pressure changes, the second line will indicate rate of change.

CONFIGXP PROGRAMMABLE The rate function is disabled by default, but can be enabled and configured with ConfigXP. The number of calculations can also be set with the digital interface.

Differential Mode (-DD, Dual-Line Display XP2i Only)

Differential mode allows the XP2i-DD gauge (the master) to be connected to a second XP2i or XP2i-DD gauge (the slave) and display the pressure difference between the two gauges. A standard RS232 cable (p/n 2400) and null modem adapter (p/n 3456) or a null modem cable are required to directly connect the gauges. You must use ConfigXP to enable this feature, and once enabled, use the (peak) button on the master gauge until the Peak High (HI) and Peak Low (LO) icons are displayed simultaneously. An XP2i-DD gauge must be running firmware version R0114 or later, and an XP2i gauge must be running firmware version R0014 or later for this feature to work. Use XP2iUpdate to upgrade to the latest firmware.

CONFIGXP PROGRAMMABLE The differential mode is disabled by default, but can be enabled and configured with ConfigXP.

Automatic Shut-off

The XP2i has a shutoff timer and will turn off automatically after 20 minutes of non-operation. Pressing any button or sending any command via the RS-232 connection resets the shutoff timer for another 20 minutes of operation. The XP2i will briefly display ***Auto Off 20*** when turned on.

To disable the shutoff feature, turn on the XP2i by pressing the (on/off) and (zero) buttons simultaneously. The XP2i will briefly display the words ***No Auto Off*** to indicate that it will not turn off. The shutoff feature can be enabled again when turning the XP2i on, by pressing the same (on/off) and (zero) buttons. These settings are retained when the product is powered down.

Note: This key combination will not toggle the auto-shutoff feature if ConfigXP is set to require a password before changing settings.

Backlight

Pressing the (backlight) button instantly lights the display at maximum brightness. Hold down the button for 1 second to keep it on. The display will flash briefly, indicating that it will stay on for 1 minute. If you press the (backlight) button again, the backlight will go into a lower brightness setting to extend battery life, and remain on for 2 minutes after the last key is pressed. Press the (backlight) button once more and the light will go out.

If you start the XP2i in the No Auto Off mode, you may select the brightness level in the same way. The light will never time out and turn off. Turn off the XP2i, or press the (backlight) button repeatedly, to turn off the backlight.

Measuring Vacuum

All versions of the XP2i can be used to measure moderate vacuum, though only ranges of 300 psi (and 20 bar or 2000 kPa) and lower are actually tested and certified for vacuum operation.

When measuring pressure less than ambient barometric conditions, a minus (-) sign will appear.

! CAUTION: XP2is are not recommended for continuous use below -14.5 psig.

For continuous use below -14.5 psig with high accuracy, choose our XP2i-DP Differential Pressure Gauge.

Water Density (Inches of Water)

The following applies *only* to models where inches of water is a selectable pressure unit. As shipped from the factory, the XP2i is set to display inches of water corresponding to the density of water at 4° C (39.2° F). You may require a different water density for your application, so the XP2i can be set to use the density of water at 20° C (68° F) or 15.6° C (60° F) instead.

To check and/or change the water density setting from the keypad, turn on the XP2i by pressing the (on/off) button and the (peak) button simultaneously. The display will indicate either ***4C***, ***60F***, or ***68F***.

Press the (units) button until the display cycles to the desired water density, then press the (zero) button to store the selection (this will not zero the gauge).

CONFIGXP PROGRAMMABLE Select and set the desired density of water.

Note: If the XP2i is password protected, or inches of water is disabled, you will not be able to view or change the water density from the keypad.

Overpressure Conditions

The XP2i will read pressure up to approximately 110% of the rated pressure range. Above 110%, the display will indicate ***+OL***, and readings will stop updating. The zero function does not affect when the display will indicate ***+OL***, so depending on the zero value it is possible that the display will indicate ***+OL*** without the maximum pressure being displayed.

For instance, if a 100PSIXP2i is zeroed when 30 psi is being applied, it will indicate that the overpressure condition has been reached at 80 psi (i.e., 110% x 100 psi – 30 psi = 80 psi).

Overpressure can affect accuracy, but the effect is only temporary unless the sensor has been destroyed. See Pressure Ranges, Display Scales, & Resolution on page 29 for maximum overpressure.

PSVtest Mode

PSVtest mode is designed for PSV and PRV ("Pressure Safety Valve" and "Pressure Relief Valve", respectively) as well as for Rupture Disc (also known as "Burst Disc") testing. It increases the measurement rate of the XP2i gauge to approximately eight times per second, to capture the peak pressure when the valve opened, and adds a method of *automatically* capturing the closing reseat pressure.

Use ConfigXP to activate PSVtest Mode. When the Peak High icon (HI) flashes, PSVtest mode is enabled. A special feature of PSVtest is that Peak Low is automatically reset to the Peak High value whenever a new Peak High value is detected. Once pressure stops increasing, as when a PSV opens (and the pressure drops below the maximum pressure) XP2i detects the new minimum pressure values (the Peak Low), capturing the closing pressure of a PSV.

Press the (peak) button once to view the captured reseat pressure. The Peak Low icon (LO) will flash on the display.

To clear the peaks, press the (clear) button while the display shows the High (HI) or Low (LO) icons.

Application note *AN-006—Pressure Safety Valve Testing* detailing the operation of the PSVtest mode is available on our website, and includes examples on how to use the gauge in relief valve and burst disk testing.

Calibration Due Reminder

The XP2i has a calibration reminder feature that can help to assure that you never use the gauge after its calibration certificate has expired. It can be programmed to alert you prior to, on, and after the gauge's calibration due date. Due dates, reminder times, and message types can be set through our free ConfigXP software.

▶ Calibration Reminder Alert

Enter the Cal Due date and the notification time prior. Once the defined time prior is reached, the XP2i will flash ***Cal Soon*** three times during the startup process. It will do this on every start-up until the calibration due date is reached, or the dates are updated.

▶ Calibration Due Alert

Once the calibration due date has been reached, the XP2i has three options to choose from. On Startup, will flash ***Cal Due*** three times during the startup process. After this, no additional warnings will occur until power is recycled again. Alternate, will alternate displaying ***Cal Due*** and live pressure readings. Always, will display ***Cal Due*** until a button is pressed and then the gauge operates normally. After this, no additional warnings will occur until power is recycled. Add Password Protection to make the gauge non-operational and always display ***Cal Due***.

Note: Protect the settings by using password protection.

Low Battery Indication

The Battery icon ( ) uses three bars to display the battery level. When the icon displays all three bars, the batteries are full. The XP2i will continue to operate accurately while the icon is visible. When the batteries are exhausted, the letters ***batt*** will appear across the display. After ***batt*** appears, no pressure measurements will be possible until the batteries are replaced.

Battery Replacement

The XP2i uses 3 AA batteries. Loosen the four rear panel screws to gain access to the battery compartment. These four panel screws are captive inside the panel and are not removable. Pull the panel up to expose the battery compartment. After replacing the batteries, the XP2i will start operating immediately (without having to press the (on/off) button). This indicates that a complete reset has occurred, and is normal.

! WARNING: Do not remove or change the batteries in hazardous locations.

! WARNING: T4 or T3 Temperature Class is based on selection of approved battery. See the table below.

! CAUTION: Do not mix battery types or manufacturers.

ATEX/IECEx: The XP2i is Intrinsically Safe only if powered by one of the following battery types:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91*		
Energizer EN91*	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

* Energizer is manufactured by Energizer Holdings, Inc., and the Eveready Battery Company, Inc.

Many other battery types and models have been tested but failed to meet the requirements for Intrinsic Safety—do not assume other models are equivalent.
The XP2i can be operated from an external power supply (AC adapter kit PN: 2984).

! WARNING: Do not use AC adapter in hazardous locations.

CSA: The XP2i is Intrinsically Safe only if powered by one of the following battery types:
CSA: The XP2i est un système à sécurité Intrinsèque seulement s'il est alimenté par un des Piles de type suivant:

Approved Battery Type (Approuvé Type de Batterie)	Ta=	Marking (Marquage)
Rayovac Max Plus 815	-20 to 45° C	Class I, Division 1, A, B, C, D T4 (Classse I, Division 1, A, B, C, D T4)
Energizer E91	-20 to 50° C	Class I, Division 1, A, B, C, D T3C (Classse I, Division 1, A, B, C, D T3C)
Energizer EN91		
Rayovac Max Plus 815		

! WARNING: Use of Duracell MN1500 batteries is not approved for CSA certification.

Reset

If for some reason the XP2i needs to be reset, remove any battery for at least one minute, then reinstall the battery. If the reset is successful, the XP2i will start operating without pressing the (on/off) button. Reset will clear the zero, peak values will be reset to the current reading, and the XP2i will be set to the default engineering units.

! WARNING: Do not remove or change the batteries in hazardous locations.

Communications/Programming

The XP2i responds to a query-based command language which allows remote control of the gauge. Please refer to the XP2i Programming Instructions for documentation of this feature.

Data Logging with DataLoggerXP

WHAT IS DATALOGGERXP?

DataLoggerXP is an optional data logging mode available for the XP2i gauge. You may purchase the DataLoggerXP option with your original order or add it later.

With the XP2i's long battery life, and Ultra Low Power (ULP) mode, you can log data over an entire year, without the need for external power supplies or battery replacements.

Download the DataLoggerXP software from the Crystal website and use it to save the data recorded on your XP2i.

Note: An evaluation mode allows you to record 100 data points before requiring purchase.

With an XP2i and DataLoggerXP you can:

- Record up to 32 000 pressure measurements (data points) into non-volatile flash memory.
- Save battery life and record over an entire year with Ultra Low Power (ULP) mode.
- Change data collection parameters, with or without a computer.
- Start and stop multiple collection runs from the keypad.
- Record pressure readings at intervals as fast as once per second or as slow as once every 18 hours.
- Record the averages, averages and peaks, or just the pressure indication.
- Store an indicated pressure by pushing one button.
- View the data on any Windows-equipped computer.
- Save the data files directly into Microsoft® Excel spreadsheets (requires Excel 2003, 2007, or 2010), or as comma separated text files.

DataLoggerXP Terminology

Clear . . . . . Removes all stored data from the XP2i memory. Individual runs cannot be removed.

Download . . . . . The act of copying stored data from the XP2i to a computer using DataLoggerXP software.

Events . . . . . Non-data readings, optionally displayed as part of a run. These include tare values, low battery indications, or logging parameters.

Logging Interval . . . . . The time, in seconds, between each data point.

Logging Type . . . . . The type of data stored for each reading.

Logging Parameters . . . . . The Logging Interval and Logging Type are referred to, in this document, as the Logging Parameters.

Run . . . . . A set of one or more readings taken by the XP2i. The user can specify different logging parameters for each successive run.

Note: A maximum of 64 runs can be stored in memory.

Typical Usage

While there are a variety of ways in which the DataLoggerXP software and XP2i can be used, a typical way to use the DataloggerXP might be like this:

1. Set the logging parameters—either with DataLoggerXP software or directly from the keypad.
2. Enable data logging mode (the Record icon (REC) will illuminate).
3. Take a recording.
4. Use DataloggerXP software to download your data into an Excel worksheet or a text file.

INSTALLING THE SOFTWARE

Install DataLoggerXP by downloading it from ametekcalibration.com.

Installing from the Internet

Visit ametekcalibration.com and select the DataLoggerXP software page to download the latest version of the software.

Once the setup application begins, follow the on-screen prompts to complete the installation. If DataloggerXP is being upgraded, the prior version does not need to be uninstalled, as the new version will be installed over any existing version.

AUTHORIZING A GAUGE

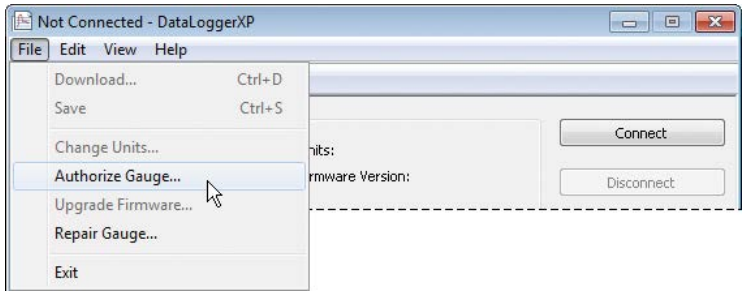
The gauge must be authorized using a purchased authorization key to obtain the full 32 000 data point recording capability. The key is specific to a gauge's serial number, and can only be used with the gauge it was meant to authorize.

To Authorize a Gauge

1 Connect the gauge to your computer.

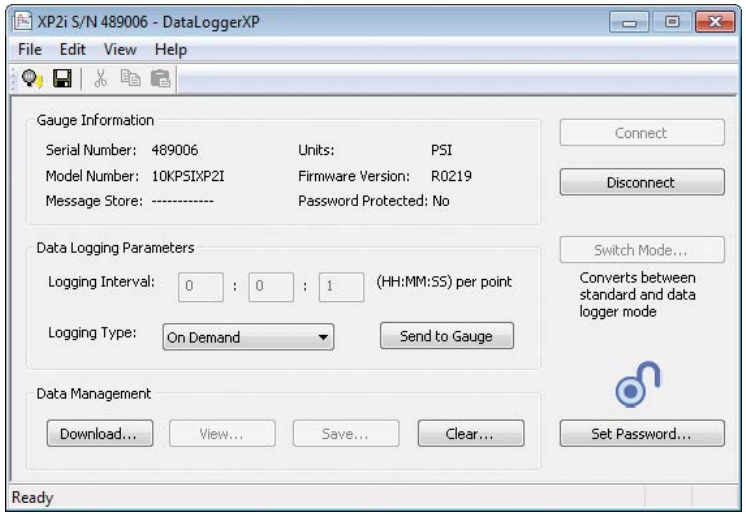
2 From the File menu, choose Authorize Gauge to start the Authorization Wizard.

3 Follow the on-screen instructions.



DATALOGGERXP SOFTWARE OPERATION

As described in the prior section, the DataLoggerXP application provides complete control of the settings for data logging mode on the XP2i. You can change logging parameters and download data using the application. In this section, you will find a description of each of the functional areas of the application.



The DataLoggerXP Main Window

Working in the Main Window

▶ Setting the Options

By default, DataLoggerXP is configured for automatic serial port detection. However, in some cases automatic serial port detection may not work.

To select a specific serial port, open the Options dialog box, by choosing View > Options. Select the serial port and press OK to save any changes.

If your installation supports additional langauges, you can choose the language from the Select Language drop-down list. The settings for Excel templates are covered in Excel Templates on page 22.

To Connect to the Gauge

1. Plug the serial cable into the computer and XP2i gauge ports.
2. In the DataLoggerXP main window, click Connect.

   The program will retrieve the current logging parameters, and then allow downloading, viewing, and saving data, as well as updating the logging parameters.

Password Protection

The password protection feature of the gauge allows you to prevent unauthorized changes to the data logging parameters. Once the password is set, the Send to Gauge button will require the password. Changing logging parameters and Auto-Off settings through the keypad will be disabled. Passwords can only be set or removed using DataLoggerXP or ConfigXP. In the event you lose the password, you will need to contact the factory for an unlock code, which will remove the password protection. To set a password:

1. In the DataLoggerXP main window, click the Set Password button.
2. In the Change Password dialog box, enter and confirm your password and click OK.

Data Logging Parameters

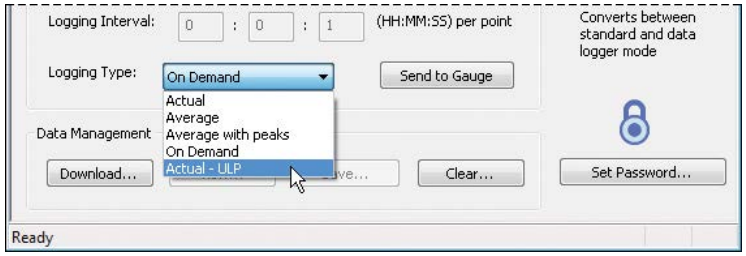
Logging parameters can be set up one of two ways: on a computer connected to an XP2i, or from the XP2i keypad. This second option allows the user to make changes in the logging parameters while in the field. Once the logging parameters have been selected, the gauge can begin recording data. The two parameters that affect data logging (logging interval and logging type) are covered below.

Logging Interval

The logging interval controls how frequently the gauge takes a measurement. XP2i data logging features a minimum recording time of 1 second and a maximum recording time of 18 hours.

To Choose a Logging Type

- From the Logging Type drop-down list, choose a logging type.



The gauge may operate in five logging types:

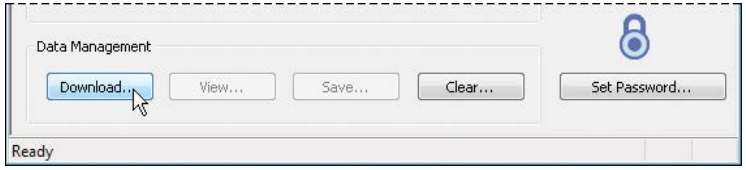
- **Actual:** The gauge stores the value displayed on the gauge at each logging interval.
- **Average:** The gauge calculates and stores the average of all readings taken (4 per second) during each logging interval. For example, if the recording interval is 10 seconds, the logged value is the average of the last 40 readings (10 seconds x 4 readings/second).
- **Average with Peaks:** The highest and lowest value of each logging interval is recorded along with the average value.
- **On Demand:** This mode differs from the other three, in that the logging interval does not apply. Press the (peak) button to store the displayed pressure value and the current timestamp.
- **Actual-ULP:** Similar to Actual; Ultra-Low Power mode extends recording time to over an entire year on one set of batteries. The gauge will display ULP instead of the live pressure. Stop the recording to view the live pressure display.

Data Management

▶ To Download Data from the Gauge

1 Connect the gauge to your computer.

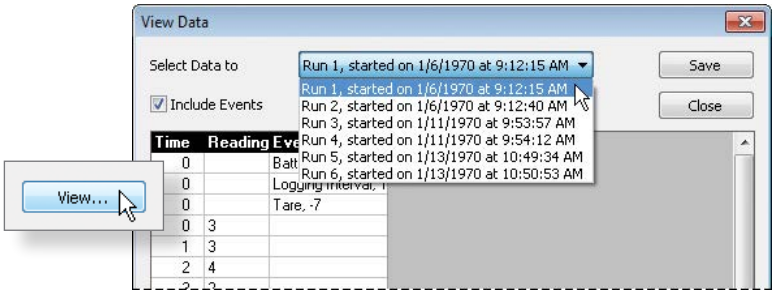
2 In the DataLoggerXP main window, click the Download button.



Depending on the number of readings, it can take up to 15 seconds to download all the data. Once the data has been downloaded, the View and Save buttons will be available.

▶ To View a Data Run

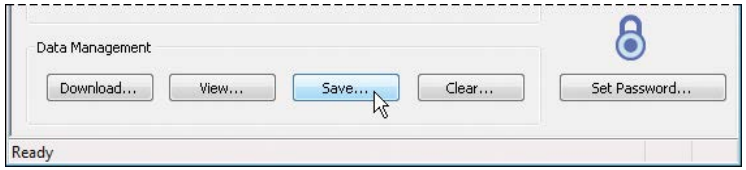
- In the DataLoggerXP main window, click the View button to open the Data View dialog box.



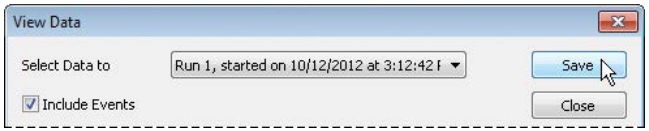
In the Data View dialog box, you can select the run you wish to display, and choose to include or exclude recording events. ***Events*** are non-data readings, such as tare values, low battery indications, or logging parameters.

To Save a Data Run

- In either the DataLoggerXP main window or the View Data dialog box, click the Save button.



Save button in the DataLoggerXP main window.



Save button in the View Data dialog box.

You may download one recording run at a time. Each run will be saved to a separate file. The application will first ask for which data run to save, and then the name of the file to save. A file can be saved as either an Excel workbook or comma separated text file (".txt" or ".csv") format.

To Save a File in Excel Format

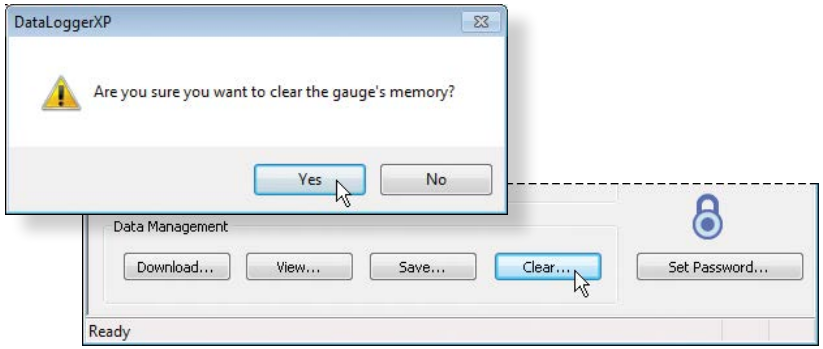
- From the Save as type dropdown box in the Save As dialog box, choose either an Excel template file (ending in ".xlt"), or an Excel workbook file (ending in ".xls").

If you choose the Excel template (".xlt") a new Excel document will be created using that template. If you choose the Excel worksheet (".xls"), you must have already selected the default Excel template in the Options dialog box. The Excel file will be created and saved using this default template.
For more information, see Excel Templates on page 22.

If the file name does not include a ".xlt" or ".xls" extension, the data will be saved as a comma separate text file (ending either ".txt" or ".csv") of that name.

To Clear All Data Runs

- In the DataLoggerXP main window, click the Clear button to erase all runs from the gauge, making all memory available for the next sequence of runs.



XP2I DATALOGGERXP GAUGE OPERATION

When in data logging mode, XP2i provides data logging capability along with many of the features of a standard XP2i. In order to allow operation as a data logger, some of the standard functionality of the standard XP2i is suspended.

Maximum Number of Readings

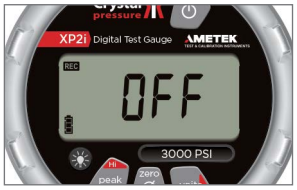
An XP2i with the authorized DataLoggerXP option can record up to 32 000 data points. By holding down the (units) button you can see the number of available data points on the gauge after the status is displayed. To avoid starting a recording, release the (units) button after you see the number of available points. The Dual Display (-DD) XP2i will display the number of available points on the second line, anytime data logging mode is selected.

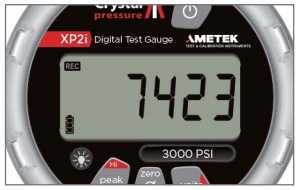
Recording Pressure

1 Press the (peak) button repeatedly until the record icon (REC) illuminates in the top left corner.

2 Connect the gauge to the pressure line to be monitored.

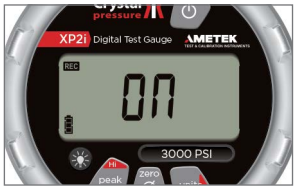
3 Press and hold the (units) button on the gauge until it says *Start*—data is now being logged. The units icon will blink to indicate a logging run is in progress.





The gauge displays the current state, then the number of data points available, and then the new state.

4 Once the test is complete, press and hold the (units) button again until it says *Stop*.



Keypad Usage

The following buttons and button combinations are used to control data logging runs on the XP2i. Where two keys are indicated, the operation is executed by pressing and holding down the first key, then pressing and holding down the second key until the action is completed.

Note: Start by turning off the gauge. Then use the following keypad shortcuts, in the order they appear.

▶ Units + Power: Setting Logging Parameters (Mode and Interval)

Used only when the gauge is turned off, this allows you to select the logging type and interval from the keypad.

Press the (peak) button repeatedly to cycle through the logging types. Press the (units) button to accept the format.

LE 1	Actual
LE2	Average
LE3	Average with Peaks
LE4	On Demand
LE5	Actual Ultra Low Power

For further information, see Ultra Low Power (ULP) Mode on page 21.

▶ Setting the Logging Interval

The display will advance to the logging interval, displayed in seconds. The (peak) button lengthens the logging interval. The (zero) button shortens the logging interval. The (units) button accepts the logging interval and the display reverts to normal.

Note: At this point, the record icon (REC) will illuminate on the display.

Note: If you select the On Demand logging type, you will not be asked to select a logging interval.

▶ Units

Pressing and holding the (units) button briefly causes the XP2i to display information about the logging state. If you continue to hold the (units) button, a logging run will begin or end. Immediately after pressing the (units) button, the gauge will display the operating mode as one of these values:

CLr	The logging memory is Clear, data is empty, and the XP2i is idle.
On	The XP2i is currently logging data.
Pb	The XP2i is logging in On Demand logging type.
OFF	The XP2i is not currently logging data and it contains stored data.
FULL	The XP2i is not logging data and memory is Full.
AUth	Authorization is required before additional logging is allowed.

If you continue to hold the (units) button, the number of remaining data points available in memory is displayed.

Holding the (units) button even longer will then cause the operating state to change as follows:

- If the gauge is in a Clear or Off state, the gauge will briefly display ***Start***, begin logging data, and change its state to On.
- If the gauge is in an On state, it will stop logging, briefly display ***Stop***, and change its state to Off.
- The Full state will not change by holding the (units) button. In order to get out of the Full state, you must clear the logging memory as shown below.

▶ Units + Zero

Holding these two keys will clear the logging memory of the XP2i. If the gauge is recording, you must first stop logging as described above. When these buttons are pressed, the gauge will first display its current state (***Off***, ***CLr***, etc), then the number of data points available, and then ***CLr***, indicating the clear action was successful.

▶ Peak

When the logging type is set to On Demand (***Pb***), hold down the (units) button to begin recording. The units icon will flash. Press the (peak) button to record the displayed reading. Each time a data point is stored, the Peak High (HI) and Peak Low (LO) icons will blink. Hold down the (units) button again to stop recording mode.

Ultra Low Power (ULP) Mode

The XP2i can log for extended periods with Ultra Low Power Mode, activated by the key combinations explained in Keypad Usage on page 19.

Ultra Low Power Mode takes readings in Actual Mode, according to the set logging interval. The letters ***ULP*** replace the live pressure reading during a recording. You must stop the recording to view the live pressure.

To begin or end a recording hold down the (units) button.

Note: To maximize battery life and recording time in ULP Mode, limit your use of the backlight.

Operating Behavior

Each time a data point is stored, the Peak High (HI) and Peak Low (LO) icons will blink, giving you visual feedback as data points are recorded. While logging is active, the unit icon will blink.

XP2i Reset or Battery Change

Data collected by the XP2i will not be lost with a gauge reset or battery change, although any run in progress will be stopped. A reset or battery change will affect the operation of the gauge's real-time clock. When the XP2i is connected to DataLoggerXP and the logging parameters are set, DataLoggerXP also sets the gauge's real-time clock. However, if the gauge resets, or if the batteries are changed or become momentarily disconnected (if the gauge is dropped to the floor, for instance), the real-time clock may be reset. When this occurs, the time stamps of subsequently logged data will no longer be correct. DataLoggerXP reacts to this by attempting to resynchronize the gauge's clock with the computer's clock which will allow the time stamps to be correctly read. However, if multiple resets have occurred with the gauge, only time stamps after the last reset will be fixed. When a reset occurs, it is stored as a run with a reset event and no data.

EXCEL TEMPLATES

In order to provide for a flexible reporting solution, DataLoggerXP is capable of directly interfacing with Microsoft® Excel to paste run data for reporting and graphing. DataLoggerXP supports Excel 2003, 2007, and 2010. This section assumes some familiarity with Excel.

Note: For information on how to save data to the different file types see To Save a File in Excel Format on page 17.

DataLoggerXP uses an existing Excel template file to create a new workbook. This allows any amount of formatting or graphing to be edited beforehand and stored as a template file. Then, when the Excel workbook is created, the template file is opened and data is copied to the location specified in the Options dialog box. When selecting the template file directly during the file save process, the new workbook is created with the Excel template using the name of the template file followed by a number, typically "1." The user must also save the file manually, making any changes to the file name as necessary.

The default template file, dataloggerxp.xlt, is located in the DataLoggerXP program directory, and can be used as—is or modified to meet the user's requirements. The default template produces a graph with an elapsed seconds time base. Choose one of the other appropriately named templates to graph with a time base of minutes, hours, or timestamps in DD-MM-YY or MM-DD-YY formatting.

Excel Password Protection

It is possible to password protect the Excel workbook by selecting the Password Protect Excel Documents checkbox in the Options dialog box. Only the data sheet and first sheet of the workbook will be password protected. To protect other sheets, password protect them in the template itself.

Data

Data is copied to the location specified in the Options dialog box. The user must provide the sheet, row, and column reference. If the reference is invalid, the data will not be exported to Excel.

Default Template File

Set the default template by selecting the Use default template check box in the View-Options dialog box. Use the Browse button to find and choose the template you want to use.

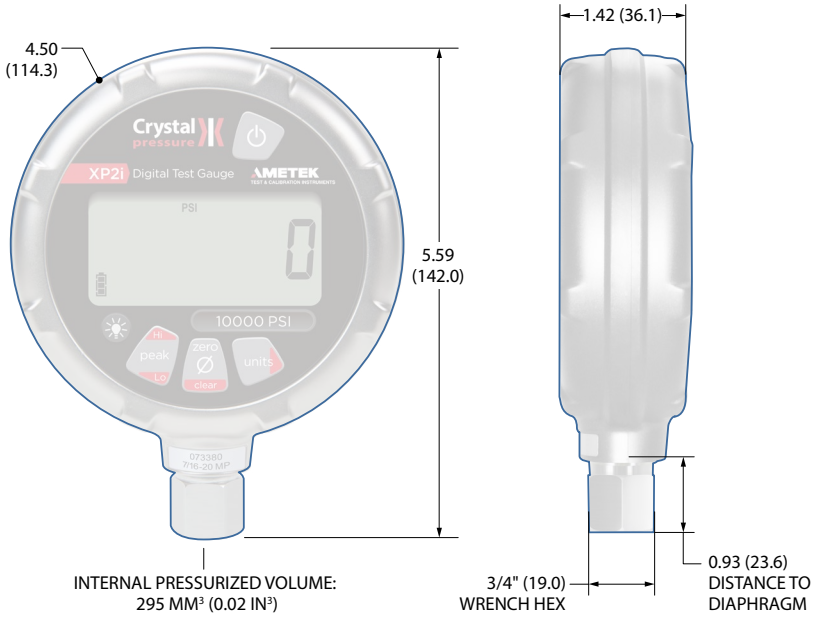
You can bypass this selection during the save process to choose a different template to save your data into. Select the Use Excel Template check box and use the Browse button to find and select an alternative template.

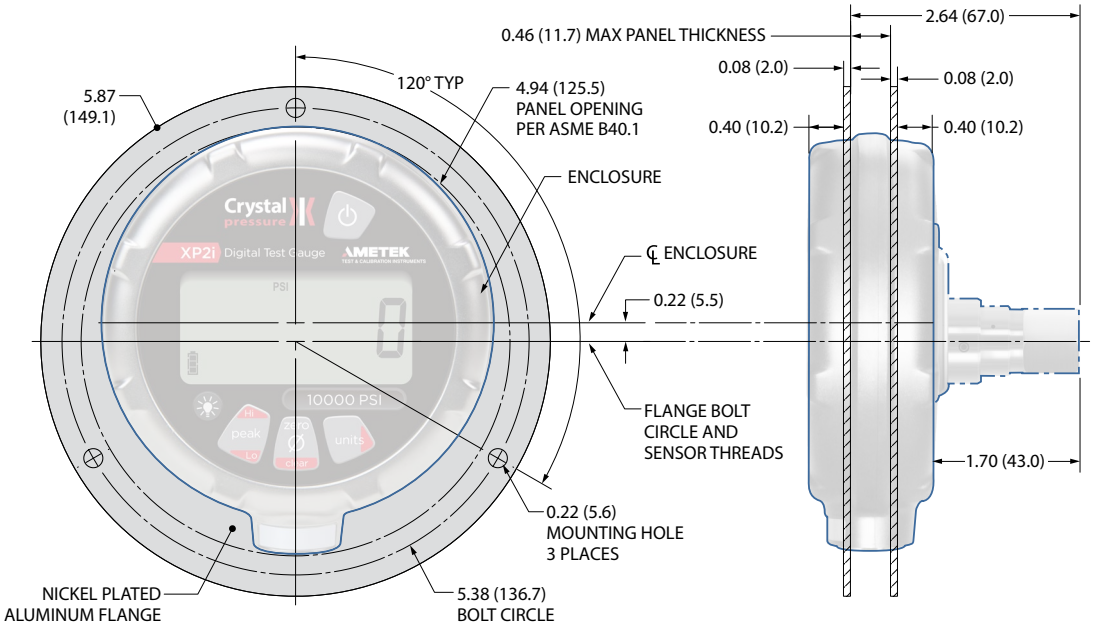
Enclosure

(U.S. Patent D612277)

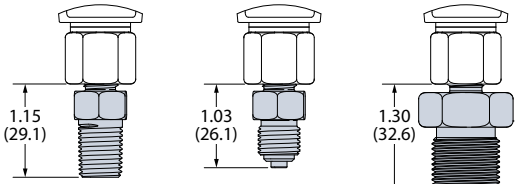
INFORMATION

Weight ..... 562 g (19.8 oz) (includes batteries)
Housing ..... Diecast, nickel plating over low copper, marine grade aluminum.
Rating ..... IP67.
Keypad and Labels ..... UV Resistant Polyester.





ADDITIONAL SENSOR LENGTH WITH OPTIONAL FITTING ADAPTERS



ALL DIMENSIONS ARE IN INCHES (MILLIMETERS)

SERIAL NUMBERS

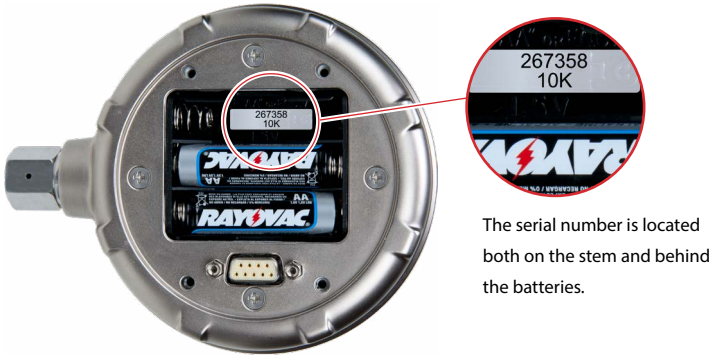
Serial Number Location

The serial number of your XP2i is located in two places; on the stem above the pressure fitting and behind the battery cover under the battery furthest from the serial port connection.

You may also find your serial number using ConfigXP software. See ConfigXP for more information.

Serial Numbering System

Serial Numbers consist of 6 numbers, with the left most digit representing the year of manufacture. For example: 267358 was manufactured during 2012.



The serial number is located both on the stem and behind the batteries.

Specifications

Accuracy

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.

Gauges must be exercised whenever exposed to significant changes in environmental conditions to achieve these specifications, and then re-zeroed. To exercise a gauge, cycle the gauge between zero (ambient barometric pressure) and the pressure of interest. A properly exercised gauge will return to a perfect zero reading (or return to the same ambient barometric reading).

Exposure to environmental extremes of temperature, shock, and/or vibration may warrant a more frequent recertification period.

▶ Standard Accuracy Version (-10 to 50° C)

0 to 20% of Range . . . . . ±(0.02% of Full Scale*).

20 to 110% of Range . . . . . ±(0.1% of Reading).

Vacuum . . . . . ±(0.25% of Full Scale), where F.S. = -14.5 psig, -1.0 bar, -100.0 kPa.

▶ –S5 Accuracy Option (-10 to 50° C)

Vacuum to 110% of Range . . . . . ±(0.05% of Full Scale*).

▶ –S2 Accuracy Option

Vacuum to 110% of Range . . . . . ± (0.02% of Full Scale*) 15 to 25° C
± (0.05% of Full Scale*) -10 to 15° C, 25 to 50° C, typical

* Full Scale is 100% of the Range.

Note: All models indicate vacuum, but vacuum specification applies only to 300 psi / 20 bar / 2000 kPa and lower pressure gauges.

! CAUTION: Not recommended for continuous use below -14.5 psig. Refer to the XP2i-DP data sheet for gauges that are intended for continuous high vacuum use.

Temperature

Operating . . . . . -10 to 50° C (14 to 122° F).

Non-condensing. No change in accuracy over operating temperature range. Gauge must be zeroed to achieve rated specification.

Storage. . . . . -40 to 75° C (-40 to 167° F).

Battery should be removed if stored for more than one month.

Media Compatibility

Liquids and gases compatible with 316 Stainless Steel.

Pressure Conversions

1 psi = 27.6806 inches of water column (water at 4° C [39.2° F])

27.7070 inches of water column (water at 15.6° C [60° F])

27.7292 inches of water column (water at 20° C [68° F])

2.03602 inches of mercury (mercury at 0° C [32° F])

51.7149 millimeters of mercury (mercury at 0° C [32° F])

703.087 millimeters of water column (water at 4° C [39.2° F])

0.070307 kilograms per square centimeter

68.948 millibar

6.8948 kilopascals

0.068948 bar

0.006895 megapascals

Connections

Communication . . . . . DB-9, RS-232 (environmentally sealed).

! WARNING: Do not use RS-232 in hazardous locations.

Pressure Connection . . . . . Crystal CPF◆ Female (1/4" medium pressure tube system). ◆U.S. Patent No. 8,794,677

Compatible with HiP LM4 and LF4 Series, Autoclave Engr SF250CX Male and Female Series.

CPF o-ring size and material: AS568A-012, Viton 80 durometer (P/N 3981).

CAUTION: To achieve CPF maximum allowable working pressures no o-ring substitutions are allowed. See Crystal Engineering's CPF brochure and CES-003 CPF Safety Instructions for further detail.

Display

Screen ..... 5.5 digits.

Display Rate ..... 4 readings/second (standard).
8 readings/second (PSV mode).

Numerical Display Height ..... 16.9 mm (0.67") single line display. LCD readable in sunlight with bright backlight.

Sensor

Wetted Materials ..... (Wrench Tight) 316 stainless steel
(Finger Tight) 316 stainless steel and Viton (internal o-ring)

Diaphragm Seal Fluid ..... Dow Corning 200

POWER

Batteries .....Three size AA (LR6) batteries.

! WARNING: Do not remove or change the batteries in hazardous locations.

Approved Batteries

ATEX/IECEx: The XP2i is Intrinsically Safe only if powered by one of the following battery types:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91*		
Energizer EN91*	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

* Energizer is manufactured by Energizer Holdings, Inc., and the Eveready Battery Company, Inc.

Many other battery types and models have been tested but failed to meet the requirements for Intrinsic Safety—do not assume other models are equivalent.
The XP2i can be operated from an external power supply (AC adapter kit PN: 2984).

Do not mix battery types or manufacturers.

CSA: The XP2i is Intrinsically Safe only if powered by one of the following battery types:
CSA: Le XP2i est un système à sécurité Intrinsèque seulement s'il est alimenté par un des Piles de type suivant:

Approved Battery Type (Approuvé Type de Batterie)	Ta=	Marking (Marquage)
Rayovac Max Plus 815	-20 to 45° C	Class I, Division 1, A, B, C, D T4 (Classse I, Division 1, A, B, C, D T4)
Energizer E91	-20 to 50° C	Class I, Division 1, A, B, C, D T3C (Classse I, Division 1, A, B, C, D T3C)
Energizer EN91		
Rayovac Max Plus 815		

! WARNING: Use of Duracell MN1500 batteries is not approved for CSA certification.

! WARNING: Do not use the AC Adapter kit in hazardous locations.

Battery Life.....1500 hours typical (alkaline battery).

Ultra Low Power .....> 1 year, typical with 20 minute recording interval in LT5 mode.

Battery Indicator.....3-segment Battery Icon: ( ) = Full Battery; ( ) = Used Battery; ( ) = Low Battery

Dead Battery Indication.....***batt***

PRESSURE RANGES, DISPLAY SCALES, & RESOLUTION

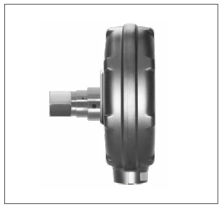
psi	bar	kPa	Overpressure	psi	inH_20	inHg	mmHg	mmH_20	kg/cm^2	bar	mbar	kPa	MPa
15PSI	1BAR	100KPA	6.5 x	0.001	0.01	0.001	0.01	1	0.0001	0.0001	0.1	0.01	0.00001
30PSI	2BAR	200KPA	3.0 x	0.001	0.01	0.001	0.1	1	0.0001	0.0001	0.1	0.01	0.00001
100PSI	7BAR	700KPA	2.0 x	0.01	0.1	0.01	0.1	1	0.0001	0.0001	0.1	0.01	0.00001
300PSI	20BAR	2KKPA	2.0 x	0.01	0.1	0.01	1		0.001	0.001	1	0.1	0.0001
500PSI	30BAR	3KKPA	2.0 x	0.01	1	0.1	1		0.001	0.001	1	0.1	0.0001
1KPSI	70BAR	7KKPA	2.0 x	0.1		0.1			0.001	0.001		0.1	0.0001
2KPSI	140BAR	14KKPA	2.0 x	0.1		0.1			0.01	0.01		1	0.001
3KPSI	200BAR	20KKPA	1.5 x	0.1		0.1			0.01	0.01		1	0.001
5KPSI	300BAR	30KKPA	1.5 x	0.1		1			0.01	0.01		1	0.001
10KPSI	700BAR	70KKPA	1.5 x	1					0.01	0.01		1	0.001
15KPSI	1000BAR	100KKPA	1.3 x	1					0.01	0.01		1	0.001

CPF Adapter Fitting is not included.

- Unneeded pressure units may be disabled via the RS-232 connector using ConfigXP software.
- kPa models can display pressure in kPa, MPa, and bar (or mbar) only. psi and bar models can display all available units.
- XP2i will indicate pressure up to 10% above Range Pressure. Above 110%, the XP2i display will flash, indicating that the applied pressure exceeds the calibrated pressure range. If the calibrated pressure range is exceeded, the pressure displayed may not be accurate.

PART NUMBERING SYSTEM

P/N	Model	Dual Display?	Accuracy	Adapter: Type	Connection: Location	Panel Mount?	Data-logging?
____	XP2I	_____	_____	_____	_____	_____	_____
		No . . . . . (omit)	0.1% of reading . . . (omit)	NPT. . . . . (omit)	Bottom . . (omit)	No . . . . . (omit)	No . . . . . (omit)
		Yes. . . . . **-DD**	0.02% of FS . . . . . **-S2**	G 1/4 B. . . . . **-BSP**	Back . . . . . **-RP**	Yes. . . . . **-F4**	Yes. . . . . **-DL**
			0.05% of FS . . . . . **-S5**	M20x1.5 . . . **-M20**	**"omit"** for -F4 panel mount	Includes -RP option	



-RP option Rear Pressure Fitting

-F4 option Panel Mount Flange

SAMPLE PART NUMBERS

300PSIXP2I . . . . . 300 psi standard gauge

200BARXP2I-DD . . . . . 200 bar dual-line display gauge

2KPSIXP2I-DL . . . . . 2000 psi gauge with data logging option

700KPAXP2I-S2 . . . . . 700 kPa gauge with 0.02% of FS accuracy

Safety & Certifications

HAZARDOUS LOCATIONS

Every XP2i pressure gauge includes the following Intrinsic Safety approvals:

II 1G Ex ia IIC T4/T3 Ga
FTZU 12 ATEX 0048 X

Ex ia IIC T4/T3 Ga
IECEx FTZU 12.0009 X

Exia Intrinsically Safe and Non-Incendive for Hazardous Locations:
Class I, Division 1, Groups A, B, C and D, Temperature Code T4/T3C.

Sécurité intrinsèque et non incendiaire pour dangereux Lieux:
Classe I, Division 1, Groupes A, B, C et D, Code de température T4/T3C.

! WARNINGS: The following warnings apply to the XP2i:

- **Use of Duracell MN1500 batteries is not approved for CSA certification.**
- **Do not use the RS-232 connector in hazardous locations.**
- **Replace batteries in non-hazardous locations and with approved types only.**
- **Do not mix battery types or manufacturers.**
- **T4, T3C, or T3 Temperature Class is based on selection of approved battery.** **See Approved Batteries on Page 28.**
- **Special conditions for safe use:**
  - **The equipment shall not be installed in a location where external conditions are conducive to the buildup of electrostatic charge.**
  - **Because the enclosure of the XP2i and XP2i-DD is made of aluminium, if it is mounted in an area where the use of category 1 G apparatus is required, it must be installed such that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.**

CERTIFICATIONS

The XP2i has been tested and certified to comply with a variety of international standards.

This XP2i complies with the Australian Radiocommunications (Electromagnetic Compatibility) Standard 2008.

Crystal Engineering declares that the XP2i is in accordance with the ATEX Directive, the Electromagnetic Compatibility Directive, and the Pressure Equipment Directive per our declaration(s).

This XP2i is approved for use as a portable test instrument for Marine use and complies with Det Norsjke Veritas' Rules for Classification of Ships, High Speed & Light Craft, and Offshore Standards.

ATEX/IECEX SAFETY INSTRUCTIONS

Bezpečnostní Instrukce Pro Prostředí s Nebezpečím Výbuchu – ČESKY (Czech)

- V prostředí s nebezpečím výbuchu nepoužívejte přípojku RS-232.
- Baterie vyměňujte pouze v bezpečném prostředí. Používejte pouze schválené baterie.
- Za správné použití tohoto přístroje v prostředí s nebezpečím výbuchu odpovídá jeho uživatel.
- Vybavení nesmí být instalováno v místech, kde vnější podmínky mohou vést ke vzniku elektrostatického náboje.
- Zařízení musí být nainstalováno takovým způsobem, aby ani v ojedinělých náhodných případech nemohlo dojít ke vzniku zdroje vznícení způsobeného jiskrami vzniklými nárazy a třením.

▶ Schválené Baterie – ČESKY (Czech)

Přístroj XP2i je jiskrově bezpečný pouze pokud je napájen jedním z následujících typů baterií:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Mnoho dalších druhů a typů baterií bylo zkoušeno, ale nesplnily požadavky na jiskrovou bezpečnost—nepředpokládejte, že jiné typy jsou rovnocenné.

Energizer vyrábí Energizer Holdings, Inc. a the Eveready Battery Company, Inc.

Sicherheitshinweise Für Explosionsgefährdeten Orten – DEUTSCH (German)

- Die RS-232 Schnittstellenverbindung darf niemals in einer explosionsgefährdeten Umgebung benutzt werden.
- Der Batteriewechsel muß ausschließlich in sicherer Umgebung mit den vom Hersteller vorgeschriebenen Batterie-Typen erfolgen.
- Der Benutzer ist für den richtigen Umgang des Digitalmanometers in explosions—gefährdeter Umgebung verantwortlich.
- Das Gerät darf nicht an einem Ort, wo die äußeren Bedingungen für die elektrostatische Aufladung sind installiert.
- Das Gerät muss so installiert werden, dass selbst bei seltenen Vorfällen Zündquellen aufgrund von Anprall, Stoß oder Reibung vermieden werden.

▶ Vom Hersteller Vorgeschriebene Batterien – DEUTSCH (German)

Das XP2i ist nur dann eigensicher, wenn die vom Hersteller vorgeschriebenen Batterien eingetzt werden:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Es wurden viele andere Batterietypen vom Hersteller getestet, aber diese haben den Hersteller—Anforderungen für Eigensicherheit nicht entsprochen.
Aus diesem Grund dürfen nur vom Hersteller vorgeschriebene Batterie-Typen in das Gerät eingesetzt werden, um die Eigensicherheit zu gewährleisten.

Energizer wird von Energizer Holdings, Inc., und der Eveready Battery Company, Inc. hergestellt.

Safety Instructions for Hazardous Locations – ENGLISH (English)

- Do not use the RS-232 connector in a hazardous location.
- Replace batteries in non-hazardous locations, with approved batteries, only.
- It is the users responsibility to understand the proper application of this product in potentially explosive atmospheres.
- The equipment shall not be installed in a location where the external conditions are conducive to the buildup of electrostatic charge.
- The equipment shall be installed in such a way, that even in the event of rare incidents, ignition sources due to impact and friction sparks shall be avoided.

▶ Approved Batteries – ENGLISH (English)

The XP2i is Intrinsically Safe only if powered by one of the following battery types:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Many other battery types and models have been tested but failed to meet the requirements for Intrinsic Safety—do not assume other models are equivalent.

Energizer is manufactured by Energizer Holdings, Inc., and the Eveready Battery Company, Inc.

Instrucciones De Seguridad Para Zonas Peligrosas – ESPAÑOL (Spanish)

- No use el conector RS-232 en zona clasificada.
- Cambie las pilas en zona no clasificada, solo con pilas aprobadas.
- Es responsabilidad del usario comprender la aplicación de este producto en atmósferas potencialmente explosivas.
- El equipo no se debe instalar en un lugar donde las condiciones externas son favorables a la acumulación de cargas electrostáticas.
- El equipo se deberá instalar de tal modo que, incluso en el caso de un accidente, las fuentes de ignición debido a chispas por fricción o impactos sean evitadas.

▶ Pilas Aprobadas – ESPAÑOL (Spanish)

El XP2i solo es intrínsecamente seguro si se alimenta con uno de los siguientes tipos de pilas:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Se han probado muchos otros tipos de baterías pero han fallado el cumplimiento de los requisitos para la seguridad intrínseca—No asuma que otros modelos son equivalentes.

Energizer está fabricado por Energizer Holdings, Inc., y por Eveready Battery Company, Inc.

Instructions De Sécurité Pour Les Zones Dangereuses – FRANÇAIS (French)

- Ne pas utilisez le connecteur RS-232 dans une Zone Dangereuse.
- Remplacez les piles dans des Zones non-dangereuses, avec les piles appropriées, uniquement.
- Il est de la responsabilité de l'utilisateur de bien comprendre l'application appropriée de ce produit en atmosphères explosives.
- L'équipement ne doit pas être installé dans un endroit où les conditions externes sont susceptibles d'engendrer l'accumulation d'une charge électrostatique.
- L'équipement doit être installé de manière à ce que, même lors d'incidents rares, les sources d'allumage suite à un impact et des étincelles de friction soient évitées.

▶ Piles Approuvées – FRANÇAIS (French)

Le XP2i est un système à sécurité Intrinsèque seulement s'il est alimenté par un des Piles de type suivant:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Beaucoup d'autres types et modèles de Piles ont été examinés mais ne conviennent pas pour répondre aux conditions de sécurité intrinsèque—Ne jamais supposez que d'autres modèles pourraient être équivalents.

Les batteries Energizer sont fabriquées par les sociétés Energizer Holdings inc. et Eveready Battery Inc.

CSA: The XP2i est un système à sécurité Intrinsèque seulement s'il est alimenté par un des Piles de type suivant:

Approved Battery Type (Approuvé Type de Batterie)	Ta=	Marking (Marquage)
Rayovac Max Plus 815	-20 to 45° C	Class I, Division 1, A, B, C, D T4 (Classse I, Division 1, A, B, C, D T4)
Energizer E91	-20 to 50° C	Class I, Division 1, A, B, C, D T3C (Classse I, Division 1, A, B, C, D T3C)
Energizer EN91		
Rayovac Max Plus 815		

Prescrizioni Di Sicurezza Per Area Pericolosa – ITALIANO (Italian)

- Non utilizzare il connettore Rs-232 in Area Pericolosa.
- Sostituire le batterie in Aree non Pericolose e solamente con Batterie approvate.
- E' responsabilità dell'utilizzatore comprendere l'adatta applicazione di questo prodotto in atmosfere potenzialmente esplosive.
- L'apparecchiatura non deve essere installata in una collocazione dove le condizioni esterne possano determinare l'accumulo di una carica elettrostatica.
- L'apparecchiatura deve essere installata in modo tale che, anche nell'ipotesi remota di un incidente, vengano evitate fonti di ignizione dovute a scintille da impatto e da frizione.

▶ Batterie Approvate – ITALIANO (Italian)

L' XP2i è a Sicurezza Intrinseca solo se alimentato da uno dei seguenti tipi di batteria:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Molti altri tipi e modelli di batteria sono stati testati ma non sono risultati conformi alle richieste per Sicurezza Intrinseca–non supponete che altri modelli siano equivalenti.

La batteria (Energizer) è fabbricata da Energizer Holdings Inc. e Eveready Battery Company Inc.

Veiligheidsinstructie Voor Gebruik In Een Explosie Gevaarlijke Omgeving – NEDERLANDS (Dutch)

- Het gebruik van de RS232 interface is niet toegestaan in een explosie gevaarlijke omgeving.
- Vervang de batterijen uitsluitend in een niet explosie gevaarlijke omgeving en gebruik alleen batterijen welke zijn goedgekeurd en toegestaan.
- De gebruiker dient er mee bekend te zijn welke gevaren er kunnen optreden in een explosie gevaarlijke ruimte bij gebruik van dit product
  Het is de verantwoordelijkheid van de gebruiker om dit product op een juiste wijze toe te passen.
- De apparatuur mag niet worden geïnstalleerd op een locatie waar de externe omstandigheden bijdragen aan het opbouwen van statische lading.
- De apparatuur dient dusdanig geïnstalleerd te worden, dat ontstekingsbronnen als gevolg van impacts- en wrijvingsvonken zelfs in geval van zeldzame incidenten vermeden dienen te worden.

▶ Batterijen Welke Zijn Goedgekeurd – NEDERLANDS (Dutch)

De XP2i is alleen intrinsiek veilig bij gebruik van de volgende batterijen:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Bij gebruik van andere niet gecertificeerde batterijen vervalt de intrinsiek veilige ATEX certificering. Een aantal andere batterij merken en types zijn getest maar voldeden niet aan de ATEX voorwaarden voor intrinsieke veiligheid, U mag er daarom niet van uitgaan dat andere equivalente types wel geschikt zullen zijn.

Energizer wordt gefabriceerd door Energizer Holdings, Inc en de Eveready Battery Company, Inc.

Instrukcja Bezpieczeństwa Dla Srefy Zagrożonej Wybuchem– POLSKI (Polish)

- Połączenie RS232 może być używane tylko poza strefą zagrożenia wybuchem.
- Wymiana baterii tylko poza strefą zagrożenia wybuchem, używaż tylko zatwierdzony typ baterii.
- Odpowiedzialnością użytkownika jest używanie tego produktu we wlaściwy sposób w strefie zagrożonej wybuchem.
- Wyposażenia nie wolno instalować w miejscach, w których występują zewnętrzne warunki przewodnictwa sprzyjające narastaniu ładunków elektrostatycznych.
- Wyposażenie należy instalować w taki sposób, aby nawet podczas rzadkich zdarzeń unikać źródeł zapłonu spowodowanego iskrzeniem z uderzeń lub tarcia.

▶ Zatwierdzone Baterie. – POLSKI (Polish)

XP2i wersja Iskrbezpieczna może być tylko zasilana przez nastepujące typy baterii:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Wiele innych typów i modeli baterii przetesowano lecz nie spelniały wymagań Iskrobezpieczeństwa—nie przyjmuje się że inne modele są równoważne.

Energizer jest produkowany przez Energizer Holdings, Inc. lub przez Eveready Battery Company, Inc.

Räjähdysvaarallisten Tilojen Turvallisuusohjeita – SUOMEN KIELI (Finnish)

- RS-232 väylää/liitintä EI saa käyttää räjähdysvaarallisissa tiloissa.
- RS-232 väylää/liitintä EI saa käyttää räjähdysvaarallisissa tiloissa. Käytettävä ehdottomasti ja ainoastaan hyväksyttyjä paristoja.
- Käyttäjän vastuulla on laitteen käyttö räjähdysvaarallisissa tiloissa. Mittausovellus ja käyttöympäristö on ehdottomasti selvitettävä ennen käyttöä.
- Laitetta ei tule asentaa paikkaan, jonka olosuhteet altistavat sähköstaattisen varauksen kerääntymiseen.
- Laite tulee asentaa siten, että siinä epätodennäköisessä tapauksessa, että hankaus aiheuttaa kipinöitä, ei lähellä ole syttyviä materiaaleja.

▶ Käyttöön Hyväksytyt Paristot – SUOMEN KIELI (Finnish)

XP2i mittari on turvallinen määritellyissä räjähdysvaarallisissa tiloissa ainoastaan, kun käytetään seuraavia paristoja:

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20 to 50° C	Ex ia IIC T4 Ga
Energizer E91		
Energizer EN91	-20 to 50° C	Ex ia IIC T3 Ga
Duracell MN1500		

Replace batteries with approved type in non-hazardous locations only

Monia muita paristotyyppejä on testattu, mutta on osoittautunut, etteivät ne täytä räjähdysvaarallisten tilojen vaatimuksia.

Energizer tuotemerkkiä valmistaa Energizer Holdings, Inc., ja Eveready Battery Company, Inc.

Support

TROUBLESHOOTING

The XP2i is a very high performance gauge. Due to the high resolution of this product, you may observe conditions that appear to be defects in the product, but are in fact a result of being able to resolve and measure pressure to a degree not possible with other instruments.

Noisy or Unstable Reading When Used with Fluids

When calibrating or comparing the indicated pressure from an XP2i against a hydraulic dead weight tester or piston gauge, the reading on the XP2i may appear unstable—the least significant digit jumps up and down several counts.

▶ **Reason:** Gas (usually air) is trapped in the line between the gauge and the deadweight tester. What is actually happening is the mass is oscillating up and down, and the combination of gas and fluid is acting like a spring. At higher pressures (above 2000 psi, typically) this may eventually diminish, as the gas dissolves into the fluid.

▶ **Solution:** Evacuate all tubing with a vacuum pump, before introducing fluid into the system.

Non-repeatability of Pressure Measurements

When checking the gauge against a hydraulic deadweight, increasing pressure measurements do not match decreasing pressure measurements.

▶ **Reason:** As in the previous note, gas has dissolved into the hydraulic fluid. When decreasing the pressure, the dissolved gas then leaves the fluid, but at an uneven rate, so small pressure differential (due to fluid head pressure) may exist between the reference deadweight and the gauge being tested.

▶ **Solution:** Evacuate all tubing with a vacuum pump, before introducing fluid into the system.

Err 1 Displayed

▶ **Reason:** The XP2i checks the integrity of internal calibration coefficients every time it's turned on. If any coefficients have been corrupted in any way, "Err 1" is displayed.

▶ **Solution:** Contact factory for instructions on how to restore the memory to the original factory settings.

Err 2 Displayed

▶ **Reason:** The XP2i has tried to display a number too large for the display (i.e., more than 5 digits). May be due to an electrical malfunction or numerical error.

▶ **Solution:** Contact factory for further instructions.

Err 4 Displayed on -DD, Dual Line Display Gauge.

▶ **Reason:** The gauge is a master in differential mode that cannot detect the slave device.

▶ **Solution:**

1. Turn on the slave gauge.
2. Ensure you are using a null modem RS232 cable or standard cable with a null modem adapter.
3. Use ConfigXP to remove the differential mode from the gauge.

Err 5 or Err 6 Displayed

▶ **Reason:** The XP2i pressure sensor is exhibiting out of normal operating condition behavior.

▶ **Solution:** Contact factory for sensor replacement.

CALIBRATION

Factory Adjustment

If adjustment is required, we recommend returning the unit to the factory. Factory service offers benefits you won't find anywhere else. We have the facilities to test your gauge at a variety of temperatures utilizing NIST traceable standards in our A2LA accredited laboratory (#2601.01), resulting in calibration certificates that provide performance data over temperature. Furthermore, upgrades may be available to add or enhance operating features. We designed the product to last, and we support it so that you can get the most from your investment.

Calibration Frequency

Under normal operating conditions, we recommend the XP2i be calibrated on an annual basis. Your quality system may require more or less frequent calibration, or your experience with the gauge, or operating environment may suggest longer or shorter intervals.

Although we prefer that you return the XP2i to Crystal Engineering for calibration, ordinary recertification and/or adjustments may be performed by any qualified personnel with appropriate training and equipment.

Span Factor

There are no internal potentiometers. The XP2i contains a "span" factor, set to approximately 1 (as shipped from the factory). As components age this may need to be changed to a value slightly higher or lower, to slightly increase or decrease all readings. This adjustment can be made with or without a computer (see ConfigXP Configuration Software on page 38).

▶ Span Factor adjustment

Note: The following instructions are ONLY intended for such qualified personnel with appropriate test equipment. We recommend that the calibration standards used have a minimum rated accuracy of 0.025% of reading, or equivalent in terms of percent of full scale. This level of accuracy requires the use of piston (deadweight) gauges or very high performance pressure controllers.

"Zero" the XP2i, then record displayed pressure for two or more pressure points. Determine if the XP2i would benefit from an overall increase or decrease of the indicated pressures.

To change the span factor from the keypad, turn off the XP2i, then press the (on/off), (units), and (peak) buttons simultaneously. The firmware version will be briefly displayed, followed by the word ***cal***, followed by the actual span value. The span factor may be adjusted by pressing either the (units) or (peak) button to increase or decrease the value, respectively. The value changes in 0.0001 increments. Press the (zero) button to store the new value in memory, or the (on/off) button to cancel the change.

CONFIGXP PROGRAMMABLE The span factor and zero value offset can be viewed and set directly by ConfigXP. Span factor adjustment through the keypad can be disabled by ConfigXP through the disable span factor feature or by password protecting the XP2i .

SOFTWARE

Programming Instructions

Control and communicate with XP2is using our Programming Instructions. Integrate XP2is into your test environment!

ConfigXP Configuration Software

Use ConfigXP to disable unwanted pressure units, set default pressure units, change water density, adjust calibration, and more via the RS-232 interface.

REPLACEMENT PARTS

The only user-replaceable parts are the batteries and the included CPF adapter fitting.

ACCESSORIES

P/N 2984 AC Adapter Kit
Permits operation of an XP2i from an AC supply of 90 - 264 VAC and 47 - 63 Hz. Includes interchangeable international plugs (for USA, Europe, U.K., and Australia).
Adapter will not charge batteries, but in the event of AC power loss, XP2is will automatically revert to battery operation.

! WARNING: Do not use the AC Adapter Kit in hazardous locations.

P/N 3009 Plastic Carrying Case
35.6 cm (14")L x 27.9 cm (11")W x 8.3 cm (3¼")H with egg-shell foam interior.

P/N 3696 Protective Boot
Skydrol™ resistant protective boot.

! WARNING: Do not use the Plastic Carrying Case or Protective Boot in hazardous locations.

P/N 2955 6" Gauge Adapter Kit
Adapts the 4½" Panel Mount (F4 option) to fit into a 6" gauge cutout.

P/N 2956 8½"Gauge Adapter Kit
Adapts the 4½" Panel Mount (F4 option) to fit into an 8½" gauge cutout.

P/N 3313 USB-RS232 Adapter
USB A receptacle to RS232 DB9M.

! WARNING: Do not use the USB-RS232 Adapter in hazardous locations.

P/N 2400 RS232 Cable
DB-9 male to DB-9 female straight pass-through cable.

! WARNING: Do not use the RS232 Cable in hazardous locations.

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*ISO 17025 accredited calibration lab, (A2LA #2601.01).

If calling, have ready the model number, serial number, date of purchase, and reason for return. You will receive instructions for returning the device to us.

FACTORY SERVICE

Please complete the Return Material Authorization (RMA) form. It will generate an authorization number and provide return instructions.

TRADEMARKS

This manual contains the following third-party trademarks, both registered and unregistered. All marks are the property of their respective companies.

Rayovac® and Maximum Plus™ .....Rayovac Corporation

Duracell® .....Duracell Inc. Corporation

Energizer® and Eveready .....Eveready Battery Company, Inc.

"Pressure is Our Business" is a registered trademark of Crystal Engineering Corp.

WARRANTY

Crystal Engineering Corporation warrants the XP2i Digital Test Gauge to be free from defects in material and workmanship under normal use and service for one (1) year from date of purchase to the original purchaser. It does not apply to batteries or when the product has been misused, altered or damaged by accident or abnormal conditions of operation.

Crystal Engineering will, at our option, repair or replace the defective device free of charge and the device will be returned, transportation prepaid. However, if we determine the failure was caused by misuse, alteration, accident or abnormal condition of operation, you will be billed for the repair.

CRYSTAL ENGINEERING CORPORATION MAKES NO WARRANTY OTHER THAN THE LIMITED WARRANTY STATED ABOVE. ALL WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ARE LIMITED TO A PERIOD OF ONE (1) YEAR FROM THE DATE OF PURCHASE. CRYSTAL ENGINEERING SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT OR OTHERWISE.

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Crystal pressure

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