

# XP2i

## -DP Digital Test Gauge Operation Manual

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CRYSTAL  
engineering corporation

## Introduction

**Thank you for choosing the XP2i-DP Differential Pressure Digital Test Gauge from Crystal Engineering Corporation.** Your **XP2i-DP** is a combination of leading edge technology, double-sided isolated differential pressure sensing and rugged industrial design.

Based on the XP2i Series platform, the –DP has all the key features of the product line with additional features that include:

- Wet/wet differential transducer
- Excellent performance in long term high vacuum applications

The **XP2i-DP** is a very rugged, intrinsically safe, wet/wet differential digital pressure gauge with 0.1% of reading accuracy. The differential pressure sensor is a double-sided, media compatible, piezoresistive silicon pressure sensor packaged in a stainless steel housing.

## Operating Instructions

The XP2i-DP operates just like all the XP2i Series products. The uniqueness of the differential pressure capability comes from the integration of the differential sensor and process fitting system. The keypad and remote functions are the same as on all XP2i Series products. Refer to the XP2i Operation Manual (PN 3731) for further details about these common features.

## Installation Tips

### Differential Pressure Measurement

The XP2i-DP may be used to determine accurate differential pressure measurements across a range of applications or installations such as rotary meters, filters, orifice plates, valves, etc. For example, in a piping system with an upstream static pressure of approximately 80 psig, the XP2i-DP may be used to determine the 10 psid pressure drop across the device under test (DUT) as shown in Figure 1. In this case, the product would be connected as shown at right.

The pressure measurement accuracy of the gauge in this example is a combination of the standard accuracy statement and the static line pressure effect. The 10 psid pressure, when compared to the 100 psi full scale product used, will require the 0 to 20% of Full Scale,  $\pm(0.02\%$  of Full Scale) accuracy statement. The static line pressure effect relates to the lowest test pressure applied in the test, or in this case 70 psi. The pressure measurement accuracy for this test condition is as follows:

$$\pm(0.02\% \times 100 \text{ psi}) + (0.0003 \text{ psi} \times 70 \text{ psi}) = \pm 0.041 \text{ psi.}$$

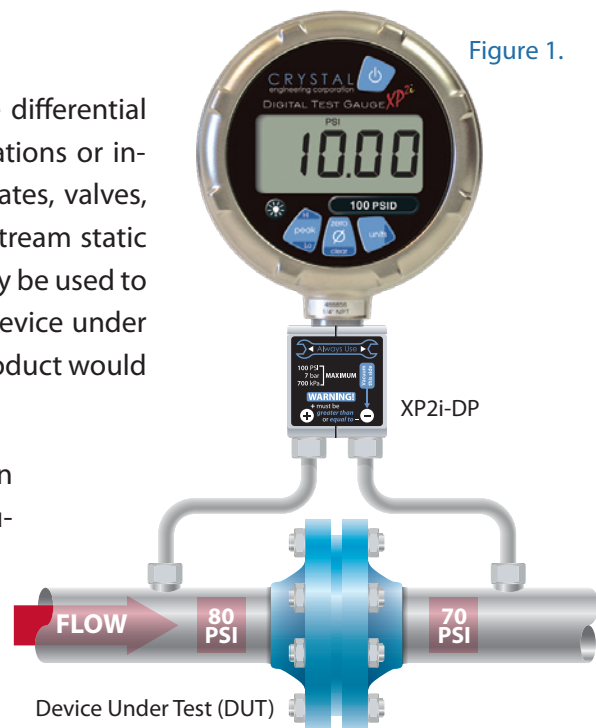


Figure 1.

## Continuous Vacuum Applications

The unique design of the differential pressure sensor integrated into the XP2i-DP allows for long term vacuum use without fear of permanent damage to the sensing chip or sensing package. When measuring high vacuum gauge pressures continuously it is recommended to connect the static line pressure to the right (-) port marked "Vacuum this side". To achieve gauge measurements, the left (+) port is left vented to atmospheric pressure as shown in Figure 2.

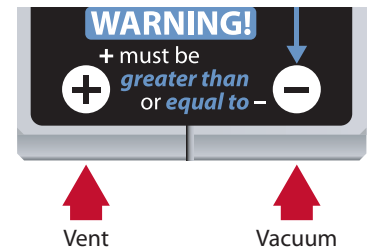


Figure 2.

**NOTE:** When connected in this orientation, the XP2i-DP display will invert the sign on the gauge display. For example, a pressure of -12 psi on the negative port will display +12 psi. To invert the sign to read -12 psi, use ConfigXP Software (V 2.4 or later) as shown below in Figure 3.

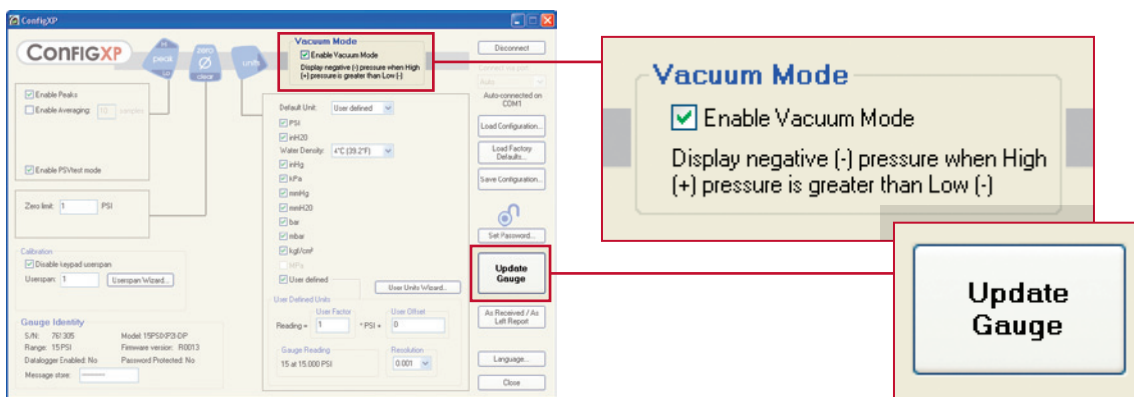


Figure 3—Select Enable Vacuum Mode and update the gauge to properly display a negative pressure value.

**WARNING:** Pressure applied to the + sensor port must be greater than or equal to the pressure applied to the – sensor port.

The pressure measurement accuracy of the gauge in this example will be calculated the same as a differential measurement. Therefore, in this example when compared to the 15 psi full scale product used, it will require the 20 to 100% of Full Scale,  $\pm(0.1\%$  of Reading) accuracy statement. The pressure measurement accuracy for this test condition is as follows:  $\pm(0.1\% \times 12 \text{ psi}) = \pm 0.012 \text{ psi}$ .

## Specifications

### Differential Pressure Accuracy

20 to 100% of Full Scale: . . . . .  $\pm(0.1\%$  of Reading)

0 to 20% of Full Scale: . . . . .  $\pm(0.02\%$  of Full Scale)

Static line pressure effect is 0.0003 psi per lowest applied test pressure.

### Pressure Ranges

Refer to *Pressure Ranges, Display Scales, and Resolution* on page 6.

Note: Density of water conversion can be selected via the keypad: 4°C, 60°F or 20°C /68°F.

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## Temperature

Operating & Compensated... -10°C to 50°C (14°F to 122°F)  
Storage..... -40°C to 75°C (-40°F to 167°F)

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## Backlit Display

Description..... 5 Full (seven segment) digits  
Display Rate..... 3 readings per second  
Numerical Display Height .... 16.5mm (0.65") single line display

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## Connections

Pressure Connections..... 1/8" Female NPT (both + and - ports)  
Electrical Connection ..... DB9, RS-232 (environmentally sealed)  
Do not use the RS-232 connector in a hazardous atmosphere.

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## Media Compatibility

Liquids and gases compatible with 300 Series stainless steel and buna-n (o-ring).

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## Power

Battery ..... Three size AA (LR6) batteries  
Battery Life ..... 1500 hours typical (alkaline battery)

**WARNING:** The unit is intrinsically safe only if powered by Rayovac Maximum Plus, Energizer E91, Energizer EN91, or Duracell MN 1500 batteries. Replace batteries only in non-hazardous locations.

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## Enclosure

(U.S. Patent D612277)

Description..... Aluminum alloy  
Dimensions..... 165.1 mm (6.5") H x 112 mm (4.4") W x 33 mm (1.3") D  
Weight ..... 915g (2.0 lbs), including batteries

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## Sensor

Permanent fill dual diaphragm seal (filled with Dow Corning 200).  
Max Static Line Pressure ..... 100 PSI

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## Intrinsic Safety



Exia Intrinsically Safe, Class I, Division 1  
Groups A, B, C & D, Temperature Code T4



Ex ia IIC T4, KEMA 04 ATEX 1053 X  
CE 0344 II 1 G



IECEx Scheme Compliant  
IECEx CSA 05.0001X

**NOTE:** Refer to the XP2i Operation Manual (PN 3731)  
for further details about use in hazardous atmospheres.

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## Certifications

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



This XP2i complies with the Australian requirements for the C-tick mark. The instrument was tested against AS/NZS 3584, C-tick EMC/EMI requirements.



Crystal Engineering declares that the XP2i is in accordance with the Electromagnetic Compatibility Directive per our declaration.



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.

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## Options

### Panel Mounting (option F4)

A panel mount flange allows an XP2i-DP to fit in a 4½" gauge cutout • An XP2i-DP with the F4 option can also be adapted to 6 or 8½" gauge cutouts.

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### Rear Port Fitting (option RP)

The rear port fitting may be ordered separately, but is included automatically with the panel mount flange option (F4).

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## Software

### ConfigXP

Customize your XP2i-DP with ConfigXP software. This software provides an easy way to enable or disable features. ConfigXP is available as a free download at [www.xp2i.com](http://www.xp2i.com).

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### DataLoggerXP

A firmware upgrade to transform an intrinsically safe XP2i-DP into a pressure datalogging device.

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## Accessories

### RS232 Cable

6' (2m) • P/N 2400 **WARNING:** Do not use RS232 Cable in a hazardous atmosphere.

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### USB to RS232 Adapter

P/N 3313 **WARNING:** Do not use the USB to RS232 Adapter in a hazardous atmosphere.

## Accessories (continued)

### Flange Adapter Kit

6" (152mm) • P/N 2955

### Flange Adapter Kit


8½" (216mm) • P/N 2956

### AC Adapter Kit

P/N 2984 **WARNING:** Do not use AC Adapter in a hazardous atmosphere.

### Protective Boot

P/N 3696 **WARNING:** Not assessed for use in hazardous atmosphere.

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

## Pressure Ranges, Display Scales, and Resolution

▶ <b>PSI</b>	▶ <b>bar</b>	▶ <b>kPa</b>	Over-pressure (+/- ports)
P/N Prefix	P/N Prefix	P/N Prefix	
15PSI	1BAR	100KPA	6.5x / 3.0x
100PSI	7BAR	700KPA	2.0x / 2.0x

▶ **Pressure Units and Resolution**

	PSI	kg/cm <sup>2</sup>	inch Hg	inch H <sub>2</sub> O	mm Hg	mm H <sub>2</sub> O	kPa	bar	mbar
●	0.001	0.0001	0.001	0.01	0.01	1	0.01	0.0001	0.1
○	0.01	0.0001	0.01	0.1	0.1	1	0.01	0.0001	0.1

- Pressure units not desired may be disabled via RS-232, using optional ConfigXP configuration software.
- XP2i-DPs will indicate pressure up to 10% above their stated pressure rating. Above 110% of this rating, the XP2i-DP display will flash, indicating that the applied pressure exceeds the calibrated pressure range, and that the displayed pressure may not be accurate.
- Overpressure is the maximum pressure the gauge can withstand without damage. The gauge will not indicate pressure up to this value.
- kPa models can display pressure in kPa and bar (or mbar), only. PSI and bar models have all available units.

## Warranty

Crystal Engineering Corporation warrants the **XP2i-DP** 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.

Note (USA only): Some states do not allow limitations of implied warranties or the exclusion of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

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**Web** [www.crystalengineering.net](http://www.crystalengineering.net)

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 Crystal Engineering.

Send your comments to: [sales@crystalengineering.net](mailto:sales@crystalengineering.net)

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BUREAU VERITAS  
Certification

N° 191559



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