

Model 3251 Operation Manual

for 10 PSIG Digital Pressure Gauge



Contents

Introduction	2
Operating Instructions.....	3
Troubleshooting	6
Digital Interface.....	7
Calibration	8
3251 Serial Number	9
Specifications.....	9
Enclosure	10
Software	11
Replacement Parts.....	11
Accessories	11
Contact Us	11
Trademarks	12
Warranty.....	12

INTRODUCTION

The Model 3251 is a 10 PSIG digital pressure gauge, commonly used for Pitot tube testing on Boeing aircraft, and for other applications. The 3251 is based on the Crystal Engineering Corp. model XP2i digital pressure gauge (www.xp2i.com). The XP2i pressure gauge has been repackaged so that it may be mounted in a portable enclosure, while retaining easy access to batteries and to the digital (RS-232) interface (both of which would otherwise be on the back of the gauge).

The gauge is fully temperature compensated - so there is no change in accuracy throughout the entire operating temperature range! Three AAA batteries provide up to 500 hours of continuous operation. The batteries are easily replaced by removing the two screws.

As supplied, the 3251 only measures PSI. Additional buttons to select different pressure units, and to capture peak maximum and minimum pressure, have been disabled to minimize operator errors. These features can be enabled, if desired, using the free "ConfigXP" software program, available on the www.xp2i.com website.

Look for the  logo for programmable features, like:

- Disable keypad recalibration, enable peak button and/or units button
- Expand or decrease allowable Zero range
- Enable other pressure units (like inches of mercury, kPa, bar, etc.)
- Create and enable a user-defined pressure unit
- Store a 12 digit ID or tag number in non-volatile memory
- Adjust calibration values

We hope the 3251 meets your expectations, and we're interested in any comments or suggestions you may have. You can send us a note at: feedback@crystalengineering.net. 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 XP2i, 30 series pressure calibrators, 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**™

OPERATING INSTRUCTIONS



The 3251 is shipped with batteries installed, so it's ready to use. Press and hold the **(on/off)** button. The gauge will first test all LCD segments. Release the **(on/off)** button when the gauge indicates pressure.

Note: The 3251 does not automatically re-zero when turned on.

! 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.

The 3251 is intended for gauge pressure measurement. It indicates the difference between applied pressure and ambient barometric pressure. However, the **(zero)** button can be used to force the 3251 to read zero pressure at any applied pressure, up to the full scale rating of the gauge. 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!



Units Button

CONFIGXP PROGRAMMABLE The units button has been disabled for the model 3251. However, if you have a need for different pressure units, such as bar, kPa, mmHg, etc., they can be enabled through the use of ConfigXP. Once enabled, pressing this button causes the 3251 to select the next available unit of pressure measurement



Zero

► To Zero the 3251

Press the **(zero)** button for at least ½ second. The display will then briefly flash all dashed lines (-----), indicating that it has been 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

Turn off peak indication by pressing the **(peak)** button repeatedly until the HI and LO icons are off, then press and hold the **(zero)** button until the display changes from (-----) to (- - -).

CONFIGXP PROGRAMMABLE You can change the point at which the Zero button will display “-HI-”. For instance, you could set the maximum zero to 1 PSI. You can also disable the zero button entirely, by setting the Zero value to a large negative number.



Peak Detection and Average

The peak button has been disabled for the model 3251. However, there may be cases where this feature is desirable. For instance, you could use the peak function to record the beginning and end pressure of a leak test. ConfigXP allows you to enable this button.

Once enabled, pressing the Peak button causes the display to cycle through the following:

	 Maximum detected pressure
	 Minimum detected pressure
	 Average Pressure *
<No Icon>	 Live Pressure display

* If enabled.

Peak high and low values are not saved when the gauge shuts off; they will reset to the current reading when the 3251 is turned on or reset.

The 3251 can be set to average 2 to 10 readings, recalculated every time pressure is measured (3 times per second). This reduces fluctuations in the indicated pressure due to wind or other disturbances. Enable and set the number of readings to be averaged with ConfigXP.



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.

Automatic Shut-off

The 3251 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.

The shutoff feature can be defeated, if desired, when turning the gauge on. Pressing the (on/off) and (zero) buttons simultaneously will prevent the 3251 from automatically turning off. The gauge will briefly display the words “No Auto Off” to indicate that it will not turn off.

Backlighting the Display



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 3251 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 3251, or press the (backlight) button repeatedly, to turn off the backlight.

Overpressure Conditions

The 3251 will read pressure up to approximately 110% of the rated pressure range. Above 110% percent of the range the display will start flashing and the readings will not be reliable. ***The zero function does not affect the point at which the display starts flashing to indicate overpressure,*** so depending on the zero value it is possible that the display can start flashing without the maximum pressure being displayed.

For instance, if the gauge is zeroed when 3 PSI is being applied, it will indicate that the overpressure condition has been reached at 8 PSI (i.e., $110\% \times 10 \text{ PSI} - 3 \text{ PSI} = 8 \text{ PSI}$).

Overpressure can affect accuracy, but the effect is only temporary unless the sensor has been destroyed. See [Specifications](#) for maximum overpressure.

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 3251 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.

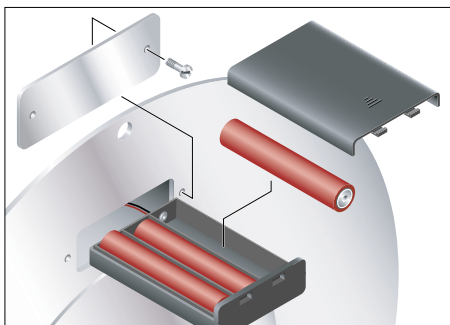
Battery Replacement

The 3251 uses 3 AAA alkaline batteries. *The batteries are located above the gauge behind a metal panel.*

With a small flat blade screwdriver, unscrew the two panel screws to gain access to the battery compartment.

Remove the battery holder and slide the cover off.

After replacing the batteries, the gauge will start operating immediately (without having to press the (on/off) button). This indicates that a complete reset has occurred, and is normal.



Reset

If for some reason the 3251 needs to be reset, remove any battery for at least one minute, then reinstall the battery. If the reset is successful, the gauge 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 gauge will be set to the default unit of pressure (psi).

TROUBLESHOOTING

The 3251 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 outdoors or in drafts, the reading may appear noisy or unstable.

- **Reason:** The 3251 is a very sensitive gauge. This is due to pressure variations in the ambient environment.
- **Solution:** Use the gauge in a draft free environment, or use the averaging feature to minimize this effect.

Err 1 Displayed

- ▶ **Reason:** The 3251 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 3251 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 5 or Err 6 Displayed

- ▶ **Reason:** The 3251 pressure sensor is exhibiting out of normal operating condition behavior.
- ▶ **Solution:** Contact factory for sensor replacement.

Display continuously flashes all segments

- ▶ **Reason:** After a reset, and after replacing batteries, the 3251 checks the integrity of program memory. If for some reason it has been modified or corrupted, it flashes all segments, and prevents normal operation.
- ▶ **Solution:** Contact factory for instructions on how to restore the memory to the original factory settings.

DIGITAL INTERFACE

The 3251 can be connected to a personal computer via RS-232, using an ordinary DB9 extension cable (male DB9 for the gauge connection, female DB9 for the PC side). The interface lets you record displayed readings and recorded peaks. The data string always includes the pressure units. And the 3251 can be operated remotely, as if you were pressing the buttons. You can use a simple terminal program to send the commands, or, you can incorporate them into your own software program. Refer to the XP2i Programming Instructions for details—available from our website at: www.xp2i.com.

CALIBRATION

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, 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.

Under normal operating conditions, we recommend the 3251 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 3251 to Crystal Engineering for calibration, ordinary recertification and/or adjustments may be performed by any qualified personnel with appropriate training and equipment. 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%.

There are no internal potentiometers. The 3251 contains a "span" factor: "Userspan", 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).

"Zero" the gauge, then record displayed pressure for two or more pressure points. Determine if the 3251 would benefit from an overall increase or decrease of the indicated pressures.

To change the Userspan factor from the keypad, turn off the gauge, 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 Userspan value. The Userspan 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 userspan level can be viewed, set directly, and disabled by ConfigXP.

3251 SERIAL NUMBER

The serial number of your 3251 is located on the front panel. It is also stored digitally within the gauge.

SPECIFICATIONS

Accuracy specifications are for one year, and include all effects of linearity, hysteresis, repeatability, and temperature within the specified operating temperature range.

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

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

One-Year Accuracy

± 0.1% of Full Scale (10 psig)

Resolution: 0.001 psig

Temperature

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

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

Humidity

Temperature Range	Humidity
-10 to 10° C	Uncontrolled
10 to 30° C	0 to 95% Relative
30 to 40° C	0 to 75% Relative
40 to 50° C	0 to 45% Relative

Media Compatibility

Liquids and gases compatible with PTFE (Polytetrafluoroethylene) penetrated, anodized aluminum sensor manifold, 316 stainless steel (sensor), and PTFE tape.

Connection

Pressure Fitting: 1/8" female NPT.

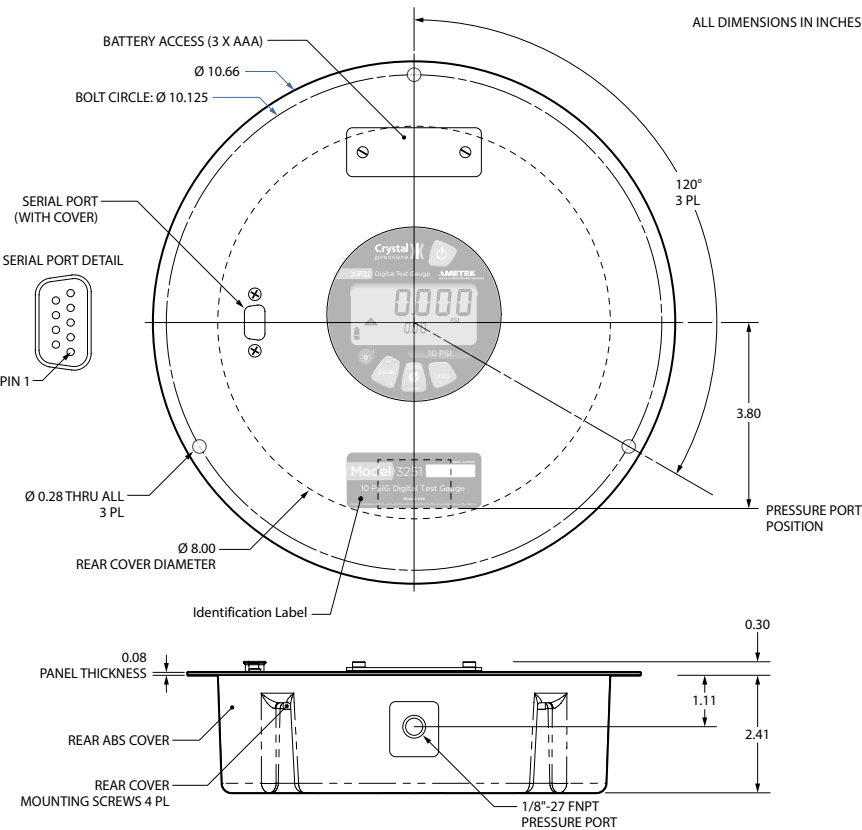
Power

Batteries: 3 x AAA, alkaline recommended
Battery Life: 500 hours continuous operation

Low Battery Indicator: Battery Icon ()
Dead Battery Indication: "batt"

ENCLOSURE

Aluminum and stainless steel.
Weight: 1.1 kg (2.5 lbs), including batteries.



SOFTWARE

LabVIEW™ Drivers

Control and communicate with the 3251 using National Instrument's LabVIEW.

ConfigXP Configuration Software

ConfigXP 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.

ACCESSORIES

AC Adapter Kit

P/N 2984: Permits operation of a 3251 from an AC supply of 90–264 VAC and 47–63 Hz. Includes interchangeable international plugs (for USA, Europe, U.K., and Australia). The adapter will not charge batteries, but in the event of AC power loss, the gauge will automatically revert to battery operation.

RS-232 Cable

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

CONTACT US

Crystal Engineering • California *

Tel +1 (800) 444 1850

Fax +1 (805) 595 5466

crystal@ametek.com

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

TRADEMARKS

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

LabVIEW™ is a registered trademark of National Instruments.

“Pressure is Our Business™” is a registered trademark of Crystal Engineering Corp.

WARRANTY

Crystal Engineering Corporation warrants the Model 3251 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.



© 2015 Crystal Engineering Corporation
708 Fiero Lane, Suite 9, San Luis Obispo, California 93401-8701

