Crystal pressure

XP²ⁱ LabVIEW™ Driver Library
Instruction Manual

Contents

Overview

INTRODUCTION

The XP2i LabVIEW Driver Library is a set of VIs (Virtual Instruments) that implements the serial commands of the XP2i. A sample test panel is also provided to demonstrate the use of each of the VIs, as well as a simple data plotting example.

This documentation and the associated driver library assume a reasonable working understanding of LabVIEW, and are not meant to be a tutorial or trainer on developing applications within the LabVIEW development environment.

DATA COLLECTION AND THE XP2I

The XP2i is a command/response instrument, meaning that it waits for a command to arrive over the serial port and then takes action and responds accordingly. Data collection is straightforward: issue a pressure query and the instrument will respond with the indicated pressure. The *XP2i Pressure Query.vi* implements this data query.

USING THE LIBRARY

The library is made up of two basic parts: the command and query VIs that implement the XP2i commands and queries, such as *Zero*, *Pressure?*, and *Clear Peaks*; and the supporting functions that provide common functionality. In addition, there is a sample *XP2i Test Panel.vi* that demonstrates the use of all commands and the data collection components.

The VISA handle should be opened by using *XP2i Initialize.vi*, as it will setup the correct serial parameters. This handle should then be passed to all VIs. While each of the VIs provides a VISA resource name (dup) output, it's not required to use this output, as the handle properties are not modified within any of the VIs. That standard LabVIEW VISA Close can be used to close the serial port.

Virtual Instruments

LIBRARY VIS

The XP2i LabVIEW library contains all the VIs that control and collect data from the instrument. Each of the library's VIs is documented in the following section. Most of the VIs have VISA handles or error clusters as inputs and outputs, and more information on these elements can be found in the LabVIEW documentation. Inputs or outputs specific to this library are documented below.

In addition, there are two VIs that are not considered part of the library, but are provided as example VIs that use the library. These VIs are documented in the Sample VIs section.

Note: Many of the functions return both the pressure as indicated by the XP2i, along with the units of that pressure, as well as the pressure converted to PSI. In the case where the XP2i's units are inches of water (inH$_2$O or "H$_2$O), the conversion assumes a water reference of 68°F. For other water temperatures, use *XP2i Convert to PSI.vi* and pass in the correct water reference.

The VIs *XP2i Query.vi*, *XP2i Query, 2-line.vi*, *XP2i Flush.vi*, and *XP2i Command.vi* are internal functions used by the library and test panel, and are not documented here. However, their block diagrams are included if you wish to browse through them.

VI DESCRIPTIONS

XP2i Clear Peaks Command.vi

The clear peaks command will clear the high and low peaks, effectively resetting them to the current value. This VI has the same effect as pressing the **(zero)** button while viewing a peak value.
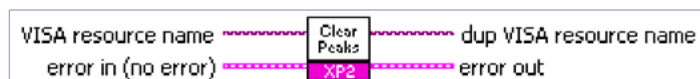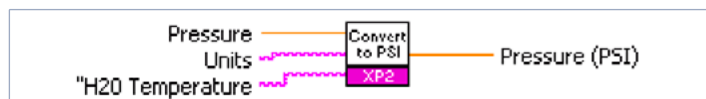

▶ **Inputs and Outputs**
Only standard VISA handles and error clusters.

XP2i Convert to PSI.vi

A useful function to convert any reading to PSI. Uses the units field as returned by the *XP2i Pressure Query.vi* as the source units.
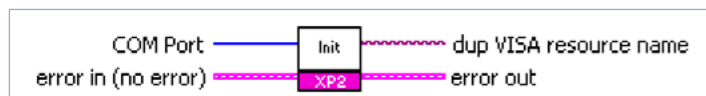

▶ **Inputs and Outputs**

Pressure . . . . Input pressure

Units . . . . Units of input pressure, case insensitive. Valid values are: PSI, inH₂O, inHg, kpa, mmHg, Bar, mBar, and kg/cm².

"H₂O Temp . . . . Only applies if Units are inH₂O, and functions as the water temperature reference. Valid values are: 4°C, 60°F, 68°F. Values are case insensitive, and the default value is 68°F.

Pressure (PSI) . . . . Pressure, in PSI.

XP2i Initialize.vi

Opens and initialized the serial port to which the XP2i is connected. Output handle should be closed via a VISA Close.
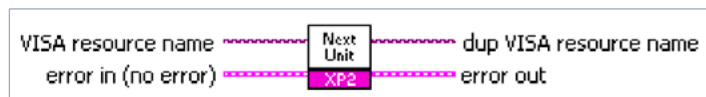

▶ **Inputs and Outputs**

COM Port . . . . The serial port to which the XP2i is connected.

XP2i Next Unit Command.vi

Changes the displayed units (PSI, "H₂O, etc.) on the front panel of the XP2i. Effect is the same as pressing the **(units)** button. Also changes the units of the returned pressure value.
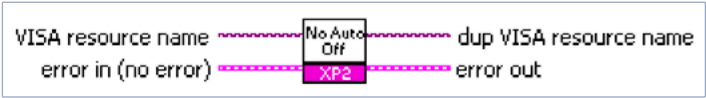

▶ **Inputs and Outputs**

Only standard VISA handles and error clusters.

XP2i No Auto Off Command.vi

Issues a No Auto Off command to the XP2i to prevent the unit from shutting down after 20 minutes of no activity. This is useful when sampling data from the XP2i and the samples are made more than 20 minutes apart.
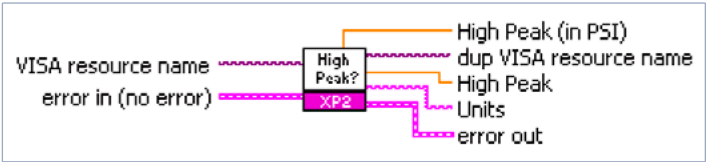

▶ **Inputs and Outputs**

Only standard VISA handles and error clusters.

XP2i Peak High Query.vi

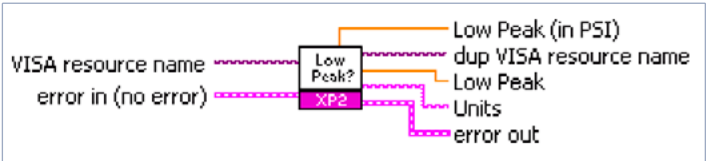This VI returns the high peak value in the currently selected units.

▶ **Inputs and Outputs**

High Peak . . . . The high peak value.

Units . . . . The units of High Peak. Valid values are: PSI, inH_2O, inHg, kpa, mmHg, Bar, mBar, and kg/cm^2.

High Peak (in PSI) . . . . The High Peak value converted to PSI.

XP2i Peak Low Query.vi

This VI returns the low peak value in the currently selected units.

▶ **Inputs and Outputs**

Low Peak . . . . The low peak value.

Units . . . . The units of Low Peak. Valid values are: PSI, inH_2O, inHg, kpa, mmHg, Bar, mBar, and kg/cm^2.

Low Peak (in PSI) . . . . The Low Peak value converted to PSI.

XP2i Pressure Query.vi

This VI returns the indicated pressure.
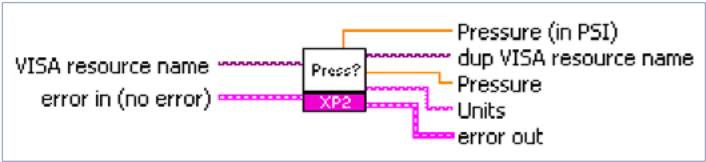
▶ **Inputs and Outputs**

Pressure . . . . Pressure reading, as displayed on the XP2i.

Units . . . . Units of output pressure. Valid values are: PSI, inH_2O, inHg, kpa, mmHg, Bar, mBar, and kg/cm^2.

Pressure (in PSI) . . . . Pressure reading, converted to PSI

XP2i Reset Command.vi

Resets the XP2i. Has the same effect as removing the batteries and re-inserting them. After a reset, the unit will clear peak and zero values.

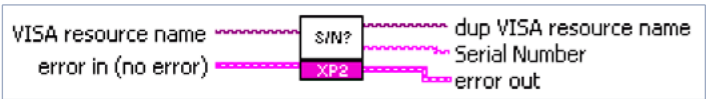A reset will take between 4 and 14 seconds to complete.
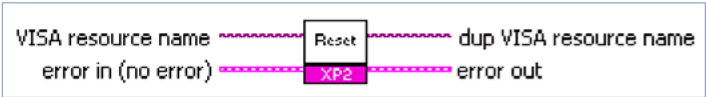
▶ **Inputs and Outputs**

Only standard VISA handles and error clusters.

XP2i Serial Number Query.vi

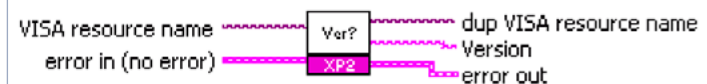Returns the serial number of the XP2i, as recorded in its internal EEPROM.

▶ **Inputs and Outputs**

Serial Number . . . . The serial number of the unit.

XP2i Version Query.vi

Returns the version of firmware that is loaded into the unit. Not all XP2is support this command.
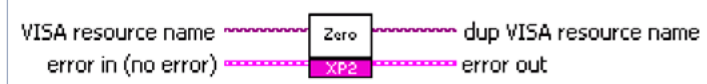

▶ **Inputs and Outputs**

Version. . . . . .The version number of the firmware, usually in a Ryyxx format, where yy represents the hardware version and xx represents the firmware version.

XP2i Zero Command.vi

This VI will zero the reading on the unit by basically subtracting what is currently displayed from all subsequent readings.

▶ **Inputs and Outputs**

Only standard VISA handles and error clusters.

XP2i Zero Query.vi

XP2i Zero Query will return the current zero value that is being subtracted from the displayed reading.
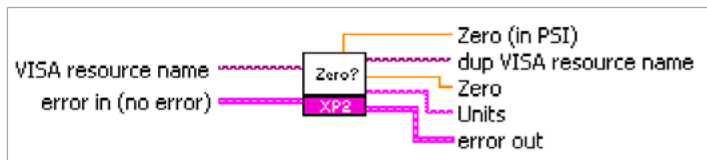
▶ **Inputs and Outputs**

Zero . . . . .Zero value in the currently displayed units.

Units . . . . .Units of the zero value. Valid values are: PSI, inH$_2$O, inHg, kpa, mmHg, Bar, mBar, and kg/cm^2.

Zero (in PSI) . . . . .The zero value, converted to PSI.

SAMPLE VIS

Two VIs are provided as examples of how to use the XP2i library. They are *XP2i Test Panel.vi* and *XP2i Collect Pressure Point.vi*.

XP2i Test Panel.vi

This top level VI demonstrates the use of each of the VIs within the library. It also demonstrates a sample data collecting loop, including the graphing of the pressure or mA readings from the unit. As it is a top level VI, it has no inputs or outputs.

The COM Port numeric control should be set to the proper COM port prior to executing the VI. To stop executing, press the Stop button on the VI. Do not use the LabVIEW stop command, as it will leave the serial port open until LabVIEW is exited, or the VI is rerun and its stop button is pressed.

XP2i Collect Pressure Point.vi

This VI is a simple data collection VI that calls XP2i Pressure Query.vi and appends the result to the Data array.
Time stamps are based off of the Start time (tick count) input.
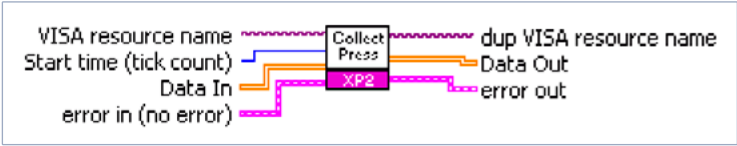
▶ **Inputs and Outputs**

Start Time . . . . The start of data collection, in milliseconds.

Data In . . . . Input 2xN array of data elements.

Data Out . . . . Output 2xN array of data elements. The XP2i pressure reading added to the end, with column one equal to the current tick count minus the Start time (tick count) input, and column two equal to the sensor reading.

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SERVICE AND SUPPORT

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