Analytical Gas Monitoring

Analytical Gas Monitoring System : User Guide

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Original	8/10/2010
Revision	E. Moortgat
Revision	V378P, Sept 2018

Introduction

The analytical gas monitoring system is a collection of hardware, software, and infrastructure designed to record, report, and alert interested parties in the current and historical status of various analytical gases. The monitoring system currently comprises 4 primary parts:

- Hardware
- Data logging software
- *Database/Web services (??)*
- Reporting/viewing software

Quick Start

Load the web page: {*}{_}http://web.ship.iodp.tamu.edu/tasapps/gasstatus_* on any computer on the ship to view the current status of gas supply (*Figure 1*).
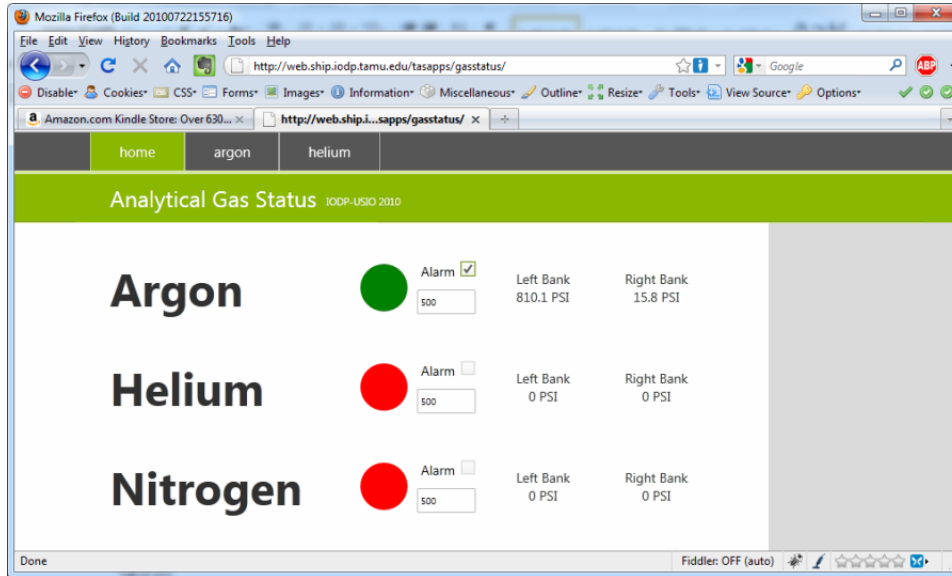
Figure 1. Current gas status.

This screen provides a quick overview of the pressure of each gas attached to the system, as well as an alarm setting. If the alarm button is checked, when the pressure of both banks falls below the threshold shown the alarm box an audible alert will sound. The alarm can be silenced by unchecking the alarm box.

This screen can be left minimized on any computer on the ship and will alert when a low pressure situation occurs.

Hardware

This system comprises four pieces of hardware purchased from DataQ Instruments (http://*www.dataq.com*).

Part Number	Description	Quantity
DI-718B-E	Ethernet data logger/data acquisition system	1
DI-8B38-05	Isolated signal conditioning module, strain, 10 VDC, 2 mV/V	3
FSH00827	Female port pressure sensor (PFP350 Series) 0-3000psi	3
FSH01785	Thirty foot cable with LEMO connector.	3

This system is comprised of four pieces of hardware purchased from National Instruments (http://www.ni.com/en-us.html).

Part Number	Description	Quantity
NI-9237/779521-01	4-channel C series strain/bridge input module (RJ50 connectors)	1
cDaq-9181/781496-01	1-Slot, ethernet CompactDAQ chassis	1
DI-8B38-05	*Isolated signal conditioning module, strain, 10 VDC, 2 mV/V*	*3*
FSH00827	Female port pressure sensor (PFP350 Series) 0-3000psi	3
FSH01785	Thirty foot cable with LEMO connector.	3

DI-718B-E Ethernet data logger

The data acquisition system is an input-conditioned intrinsically safe Ethernet-based data logger and data acquisition board. It has 8 input channels, of which we currently use 3. The device collects data from the module installed in each of these inputs and sends it over an Ethernet network to client software (either WinDaq or client software written using the DataQ SDK).
The device is currently installed in the lower pallet stores, against the back wall.
The Mac address is 00:29:4A:C4:59:E8. It connects via Ethernet to port 39 in the pallet stores.

Data logger

Data acquisition board

Three acquisition channels in use

Data acquisition device labeling

8B38 Isolated signal conditioning module

Three of these signal conditioning modules are currently installed in the data logger. They provide electrical isolation and signal conditioning necessary to convert the output of the pressure sensors to a 0–5 V final output range.

One of these units is required for each sensor connected to the data logger, up to a maximum of 8.

Figure 8. Isolated signal conditioning module.

FSH00827 0–3000 psi Futek pressure sensor

The pressure sensor measures pressure in the 0–3000 psi range. It is supplied an excitation of 10 V and has an LEMO connector. Connector pin out is listed on the side of the sensor, with an output positive and negative and excitation positive and negative.

Three of these sensors are currently installed. These require no maintenance or special considerations, other than taking care not to physically crush them when working near them.

0–3000 psi pressure sensor.

30 foot LEMO cables

These 30 foot braided steel shielded cables have a LEMO connector on one end to plug directly into the sensor and 4 bare wire terminals on the other end to connect to the data logger.

Software

Data Logging Software

The data logging portion of this system is composed of two parts:

- WinDaq to communicate with the actual logger and perform the data translation
- GasMonitor, in-house .NET software that communicates with WinDaq to collect sensor data and then with Web services to store the data in a database

Data Logging Services

The *DataQ Instrument Hardware Manager* searches the network for available data loggers. If none are detected, verify that the DI-718 logger has power and is connected to the Ethernet. If the status light near the ethernet port is red (*Figure 7*), power cycle the device (unplug/plug in power). The data logger can only be attached to one instance of the DataQ hardware manager/WinDaq at a time, so typically one computer is designated as the data collection box.

To start software monitoring of gas pressure, follow these steps:

1. Start *DataQ Instrument Hardware Manager*.
2. Once a logger has been detected (*Figure 11*), select the **Start WinDaq** button.
3. WinDaq can be run in default mode (*Figure 12*).
4. An ISO of the WinDaq CD is located on the ship developer box under */Volumes/Ozymandias/ConfigurationManagement/software/WinDaq /windaq_april_15_2010.iso*

5. Close the *DataQ Instrument Hardware Manager* screen.
6. Once WinDaq is communicating with the data logger, start the *Gas Data Collector* software (**Figure 13**) ({*}{_}http://web.ship.iodp.tamu.edu/tasapps/gasmonitor_*).
7. This requires the .NET 3.5 run time and WinDaq to be installed. Source code is located at {*}{_}https://shiptest.ship.iodp.tamu.edu/svn/jr/NET/GasMonitorUploader_*)
8. Press **Start**, then minimize the application and leave running in the background.
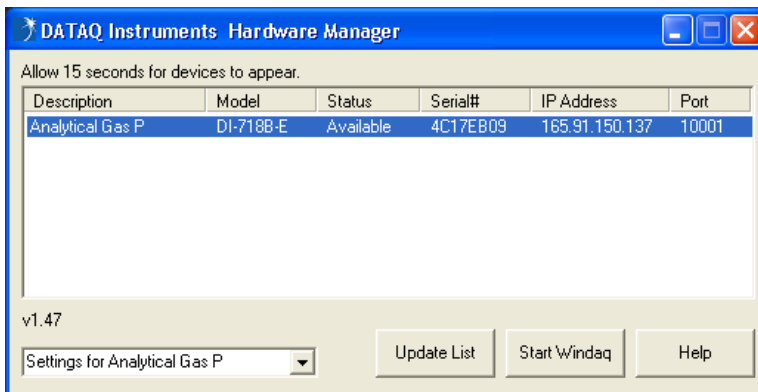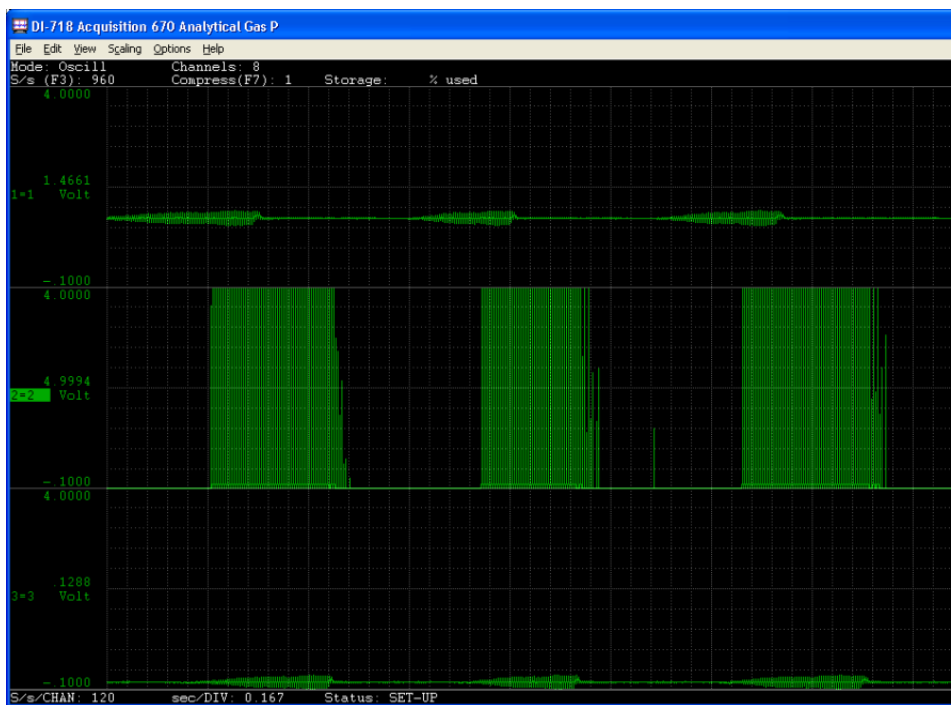

Figure 11. DataQ Instrument Hardware Manager.

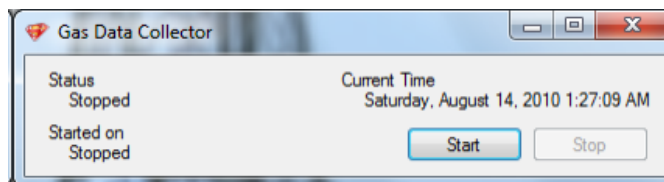**Figure 12. WinDaq showing 3 acquisition channels.**

Figure 13. Gas Data Collector.

Database/Webservices

The data back end consists 2 parts:

- A database table: LIMS.MONITOR (see below)
- A set of Web services: resteasy-monitor

Column Name	Data Type	Nullable
MONITOR_ID	NUMBER	No
TIMELOGGED	TIMESTAMP(6)	Yes
EXPEDITION	VARCHAR2(20 BYTE)	Yes
DATA_GROUP	VARCHAR2(100 BYTE)	Yes
DATA_DURATION	VARCHAR2(100 BYTE)	Yes
DATA_INSTRUMENT	VARCHAR2(100 BYTE)	Yes
DATA_SENSOR	VARCHAR2(100 BYTE)	Yes
DATA_LOCATION	VARCHAR2(100 BYTE)	Yes
DATA_COMMENTS	VARCHAR2(4000 BYTE)	Yes
DATA_NAME	VARCHAR2(50 BYTE)	Yes
DATA_VALUE	VARCHAR2(50 BYTE)	Yes
DATA_UNITS	VARCHAR2(20 BYTE)	Yes
DATA_LOGGED_BY	VARCHAR2(50 BYTE)	Yes

The database table creation script is included in the source code for the resteasy-monitor project, located at {*}{_}https://shiptest.ship.iodp.tamu.edu/svn/jr/java/resteasy-monitor._*
The database table exists in the LIMS tablespace, and the services use the LIMS account to read/write from the table. No special user authentication is currently required to write from/read to these services. One sequence, LIMS.MONITOR_SEQUENCE, and one trigger, LIMS.MONITOR_TRIGGER exist as part of this package for the sole purpose of incrementing a unique ID (LIMS.MONITOR.MONITOR_ID) on the table. The trigger also sets the timelogged field to the value of SYSDATE (current time in GMT per our configuration) when a new entry is created. A .NET client for the Web services is included in the in GasDataCollector software. The client is located at {*}{_}https://shiptest.ship.iodp.tamu.edu/svn/jr/NET/GasMonitorUploader/gasmon/_*_**MonitorService.cs.** A Silverlight client for the services is included in the GasStatus Web page, and can be found at {*}{_}https://shiptest.ship.iodp.tamu.edu/svn/jr/Silverlight/GasStatus/trunk/gasstatus/MonitorService.cs._*

Data Reporting Services

GasStatus is the only current data reporting service for the system. Data is reported in one of two ways:

- Overview/alarm display (*Figure 14*)
- Gas details display (*Figure 15*)

Overview/alarm display

This display allows the user to view the actual pressure of any configured analytical gas. The check box near the Alarm label enables or disables the alarm's audible alert. Use the entry field under the Alarm label to set the pressure at which, when both banks decrease below this value, an alarm condition will exist. If enabled, an audible alarm will sound and the color of the status circle will change from green to red.
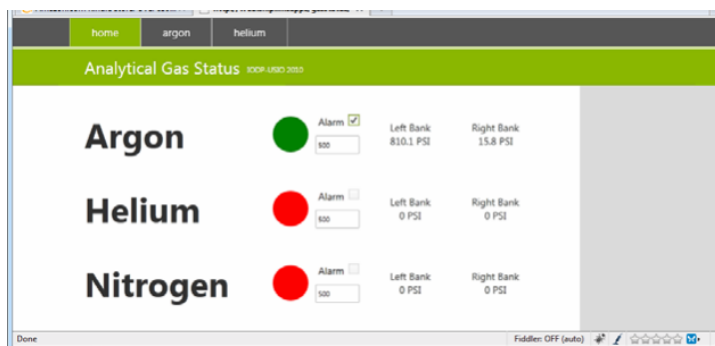
Figure 14. Overview/alarm display screen.

Gas details view

This view provides a detailed history of each gas bank. The current status is displayed for the selected gas, as well as a visual indicator (gauge). A history displays the history of gas pressures over time. Access the details view by clicking on the desired analytical gas in the top menu. This reporting page can be accessed at [{*}{_}http://web.ship.iodp.tamu.edu/tasapps/gasstatus._*

http://web.ship.iodp.tamu.edu/tasapps/gasstatus]The source code for this project is in version control located at {*}{_}https://shiptest.ship.iodp.tamu.edu/_*svn/jr/Silverlight/GasStatus

Figure 15. Gas details view.