F&J SPECIALTY PRODUCTS, INC.

The Nucleus of Quality Air Monitoring Programs

SUMMARY DESCRIPTION

Global Air Sampler
Data Acquisition Software Program
"GASdaq"

General Description

The Global Air Sampler data acquisition program GASdaq, is a sophisticated software program that compliments the F&J air sampling systems which contain Global Air Sampler (GAS) advanced-technology electronic hardware systems.

The GAS systems are designed for air sampling applications which have one or more of the following criteria requirements:

1) Remote and unattended sampling systems requiring data storage of all key parameters of the sample event and which can be downloaded to a cable connected PC device with the GASdaq software after the sample event

2) Air sampling systems which require that alarm notifications be transmitted immediately to specified individuals or locations by email, SMS messages or to a central server with optional F&J communications hardware

3) Air sampling systems requiring that data be transmitted from the field station to a central location on a near real-time basis including alarm notifications with optional F&J communications hardware.

The GAS electronics module can be setup and operated utilizing its on-board four button keypad and the 4 line by 24 character vacuum fluorescent display, or the GASdaq data acquisition software.

GAS systems can be integrated with an optional second air sampler (DFM Mode), an optional Weather Station (WS Mode) and optional F&J configured telecommunication system.

The following pages illustrate the various operator selectable features of the GAS systems via the GASdaq User Settings Screen and an example of the various GASdaq program screens viewable on a PC which is connected to the GAS system.

Rev: 12 November 2018

A. Standard Air Sampling Mode

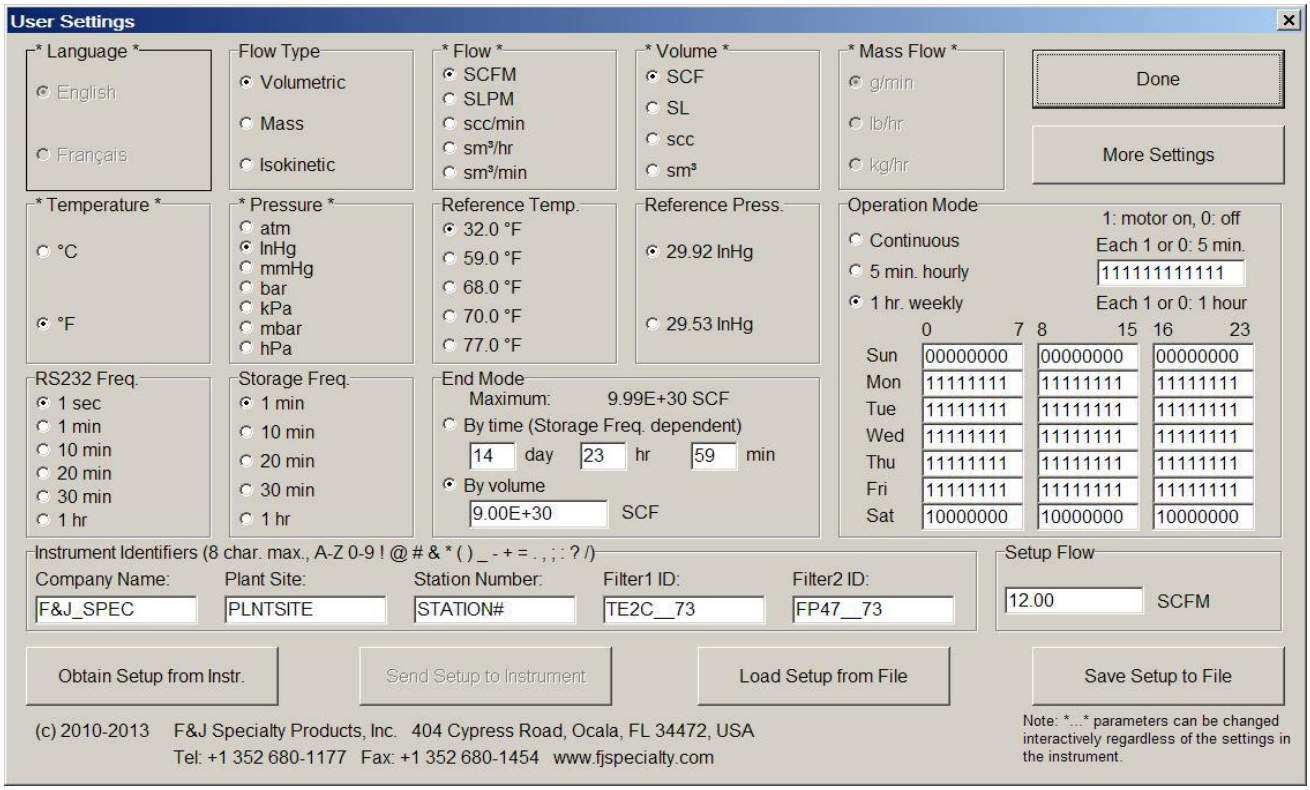
GASdaq: Data Acquisition Software

The GASdaq software enables the user to connect a PC to any F&J Global Air Sampler and easily setup, monitor, transmit, and download the sample data from the instrument after the sample event, or at operator selectable transmission frequencies during the sample event. Operator selectable features include the following:

1) Setup the air sampling instrument utilizing operator selectable radio button system

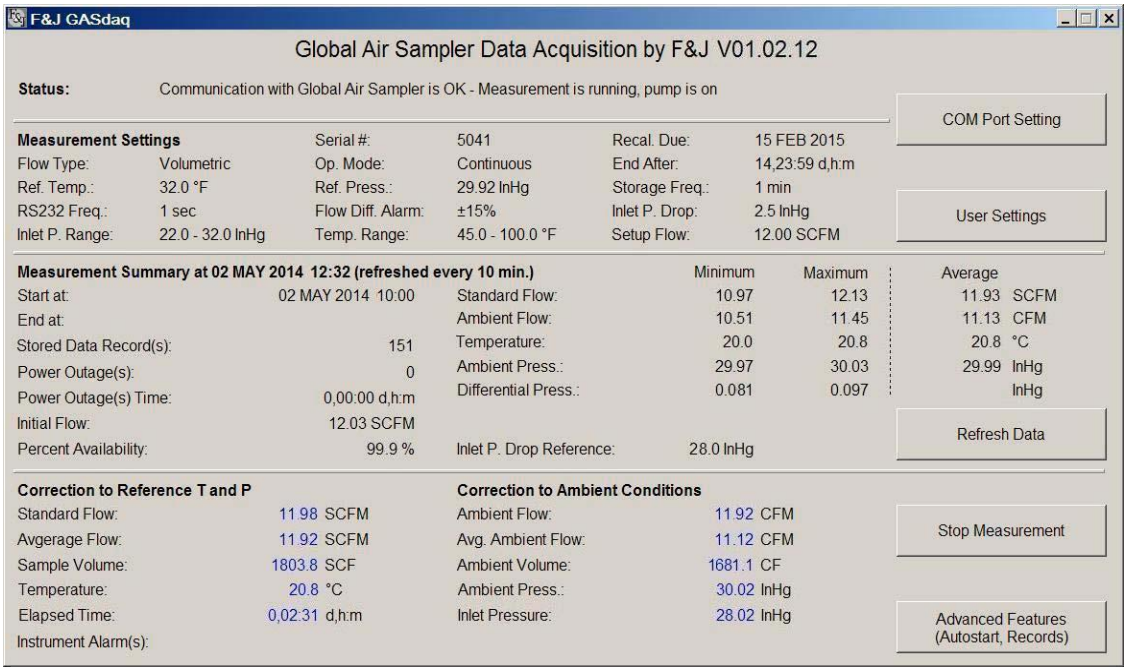
a) Engineering units for measured and calculated parameters
b) Reference temperature and pressure values for volumetric flow
c) Alarm settings for six different parameters
d) Operating modes
e) Data storage averaging frequencies
g) Data transmission frequencies

User Settings Screen

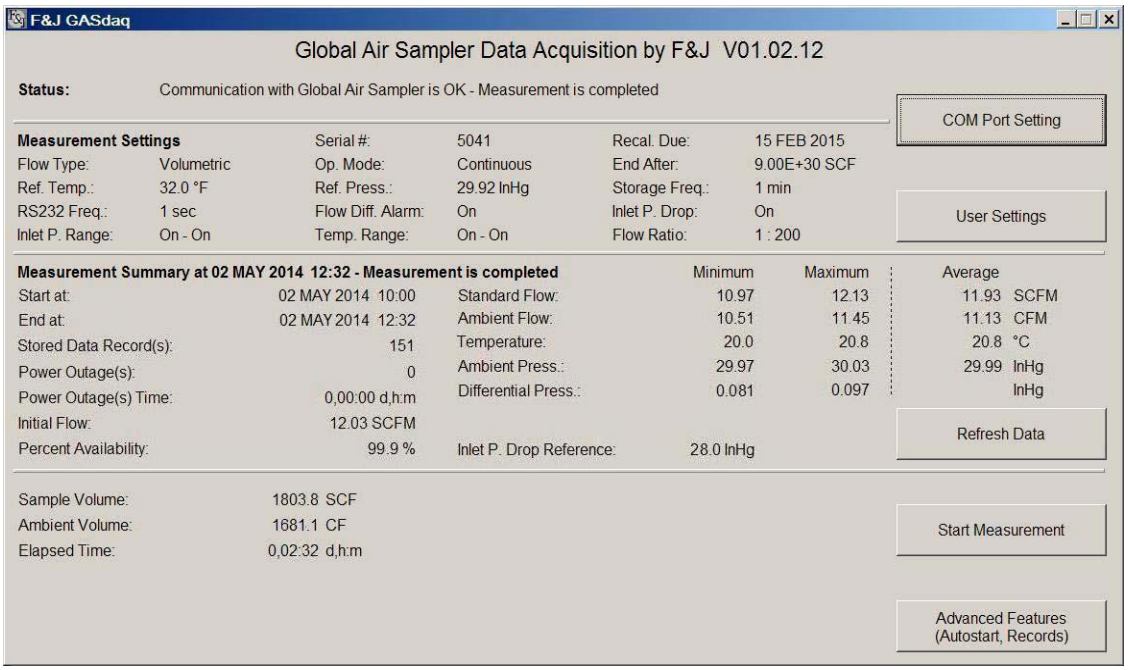


The following two screen displays represent the Main Data Screen viewable on the PC during the sample event (measurement in process) and the Main Data Screen after sample event has been terminated.

Main Screen during Operation



Main Screen after Termination of the Sample Event



The GASdaq software enables a user to view on the PC screen and print the following reports on a Windows printer:

1) Management Report and data charts for the sample event
2) Data records report
3) Alarm settings report

Management Report for GASdaq in Standard Air Sampling Mode

Management Report

IDENTIFICATION OF AIR SAMPLER

Serial Number:	5041	Company Name:	COMPNAME
Station Number:	STATION#	Plant Site:	PLNTSITE
Filter1 ID:	FILTER_1	Recalibration Due:	15 FEB 2014
Filter2 ID:	FILTER_2	Software Version:	V01.12c

SETUP PARAMETERS IN AIR SAMPLER

Flow Type:	Volumetric	Operation Mode:	Continuous
Flow Unit:	SCFM		
Volume Unit:	SCF		
Temperature Unit:	°C		
Pressure Unit:	InHg		
Reference Temp.:	20.0 °C		
Reference Press.:	29.92 InHg		
End After:	100000.0 SCF	RS-232 Freq.:	1 sec
Setup Flow:	5.00 SCFM	Storage Freq.:	1 min
Flow Diff. Alarm:	±15%	Inlet P. Drop:	3.6 InHg
Inlet P. Range:	26.6 - 30.2 InHg	Temp. Range:	12.8 - 37.2 °C

MEASUREMENT SUMMARY

Start at:	20 FEB 2013 00:17	Stored Data Record(s):		24786
		Power Outage(s):		2
Elapsed Time:	0,18:15 d,h:m	Power Outage(s) Time:		0,11:22 d,h:m
Sample Volume:	12385.0 SCF	Percent Availability:		29.5%
Ambient Volume:	12242.0 CF	Number of Alarms:		30
Initial Flow:	34.81 SCFM	Inlet P. Drop Reference:		30.0 InHg
	Minimum:	Maximum:	Average:	
Standard Flow:	0.00	82.65	29.97	SCFM
Ambient Flow:	0.00	81.77	29.63	CFM
Temperature:	13.9	21.3	18.6	°C
Ambient Press.:	29.87	30.09	30.01	InHg
Differential Press.:	-0.135	0.738		InHg

F&J GASdaq V01.02.04

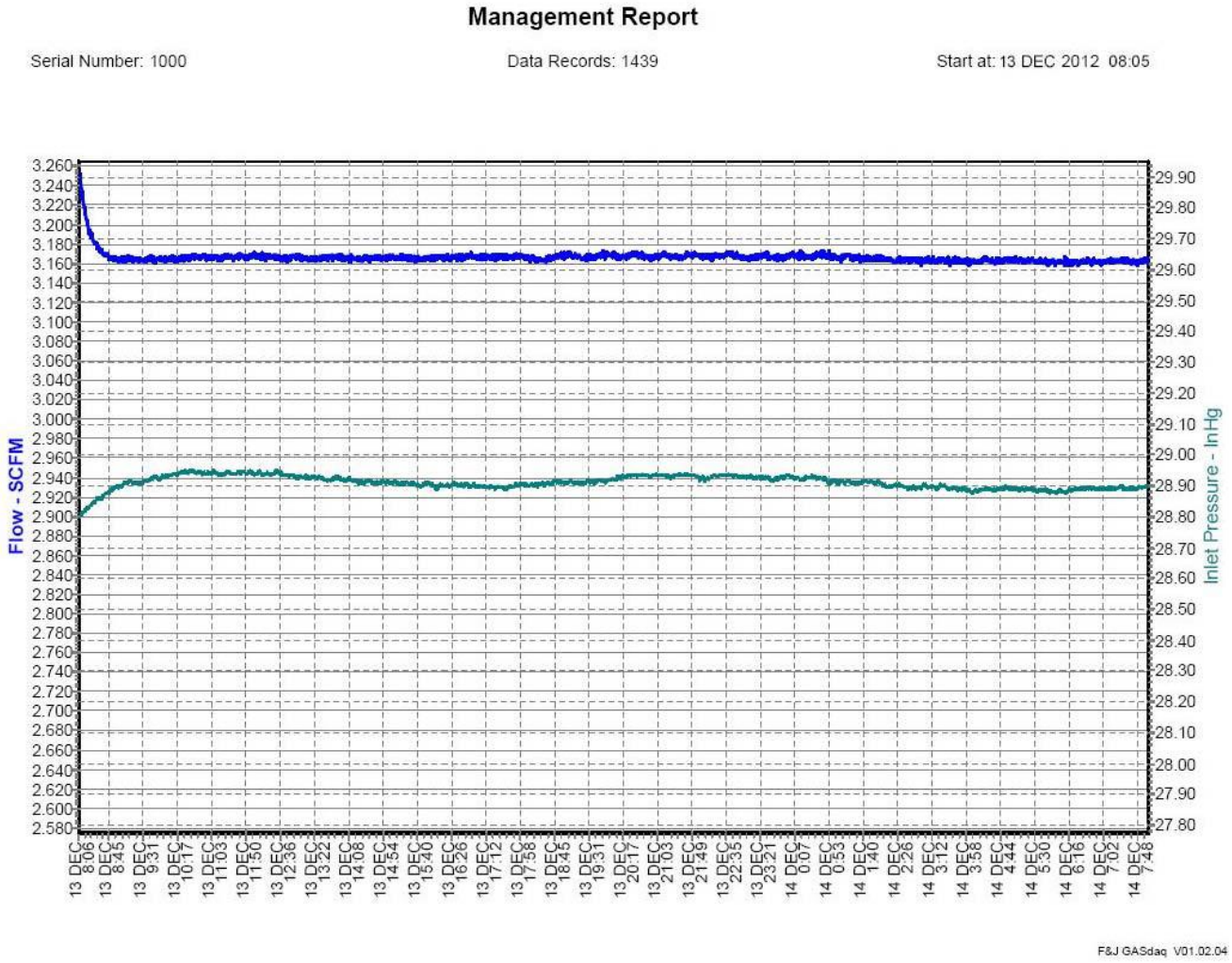
Comments:

Operator:
Date:

Approved by:
Date:

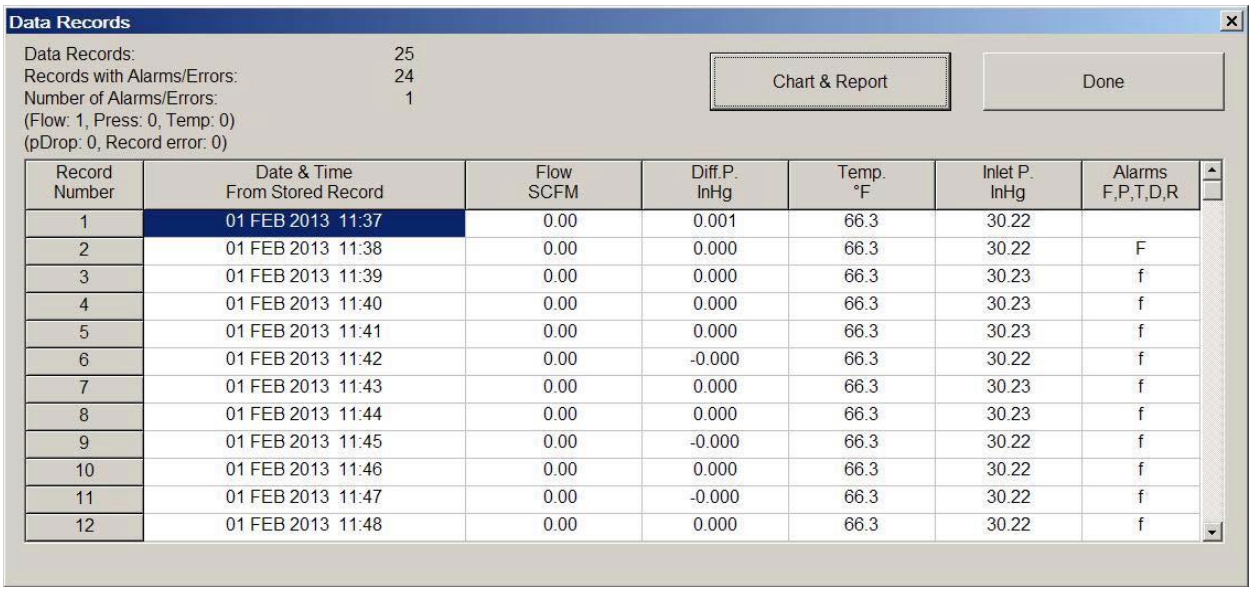
Management Report Chart

Charts are printed according to graph selection and current zoom / chart positioning. The engineering units can be changed in User Settings.



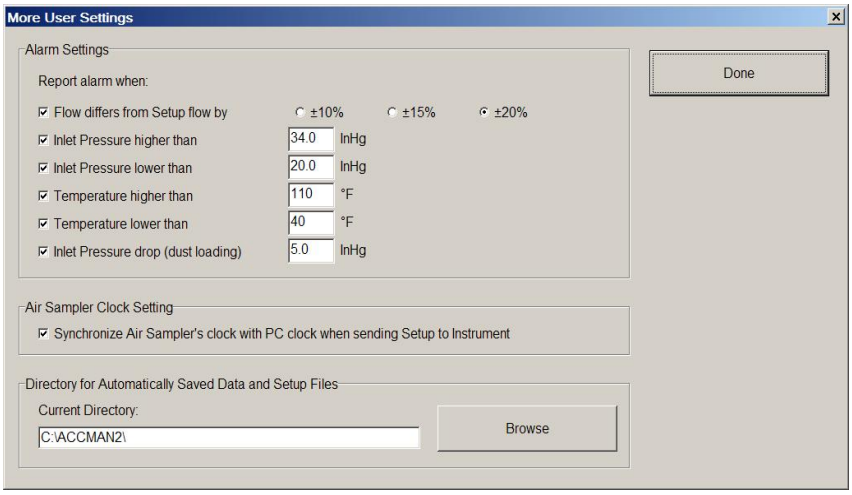
Depending on the alarms, errors, and instrument options the chart header may contain error-related information.

Data Records Table in Standard Air Sampling Mode



Record Number	Date & Time From Stored Record	Flow SCFM	Diff.P. InHg	Temp. °F	Inlet P. InHg	Alarms F,P,T,D,R
1	01 FEB 2013 11:37	0.00	0.001	66.3	30.22	
2	01 FEB 2013 11:38	0.00	0.000	66.3	30.22	F
3	01 FEB 2013 11:39	0.00	0.000	66.3	30.23	f
4	01 FEB 2013 11:40	0.00	0.000	66.3	30.23	f
5	01 FEB 2013 11:41	0.00	0.000	66.3	30.23	f
6	01 FEB 2013 11:42	0.00	-0.000	66.3	30.22	f
7	01 FEB 2013 11:43	0.00	0.000	66.3	30.23	f
8	01 FEB 2013 11:44	0.00	0.000	66.3	30.23	f
9	01 FEB 2013 11:45	0.00	-0.000	66.3	30.22	f
10	01 FEB 2013 11:46	0.00	0.000	66.3	30.22	f
11	01 FEB 2013 11:47	0.00	-0.000	66.3	30.22	f
12	01 FEB 2013 11:48	0.00	0.000	66.3	30.22	f

Alarms Settings in Standard Air Sampling Mode

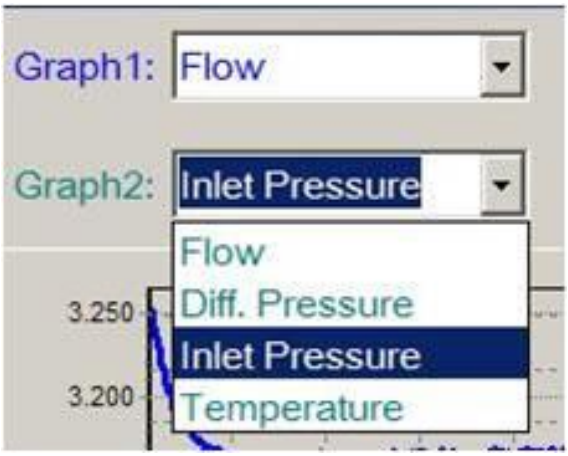


Operator selectable alarms are available for:

1. Flow deviation
2. High inlet pressure
3. Low inlet pressure
4. High temperature
5. Low temperature
6. Inlet pressure drop due to dust loading

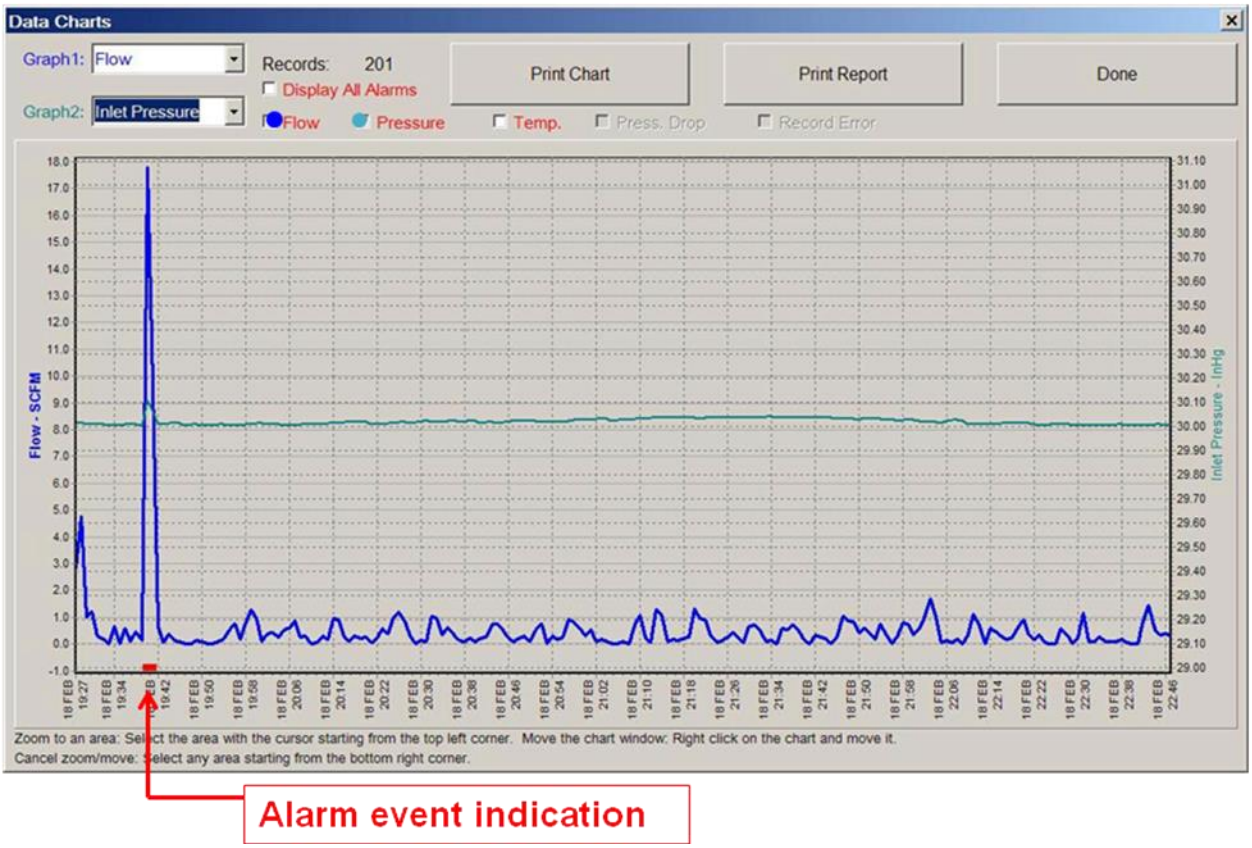
The GASdaq software enables a user to view and print data charts vs. time of two operator selectable measured parameters in still mode, moving chart mode, or in zoom mode. The data charts illustrate alarm events, if any.

Data Chart Selection Option



Data Chart

Data Chart with Alarm Event



F&J provides purchasers of GAS systems with the computer commands necessary to control the air sampler in the field via direct connection or remotely. The command set includes the following functions:

1) Start/stop
2) Send stored data since last transmission
3) Send data continuously at operator selectable frequency

The command set enables purchasers to create their own software programs to interact with GAS field air sampling instruments in lieu of the GASdaq software.

B. Second Air Sampler Integration (DFM Mode)

Any Global Air Sampler can accept the RS232 data input from either an independent F&J Digital Flow Meter (DFM) or another Global Air Sampler (GAS) air sampling system.

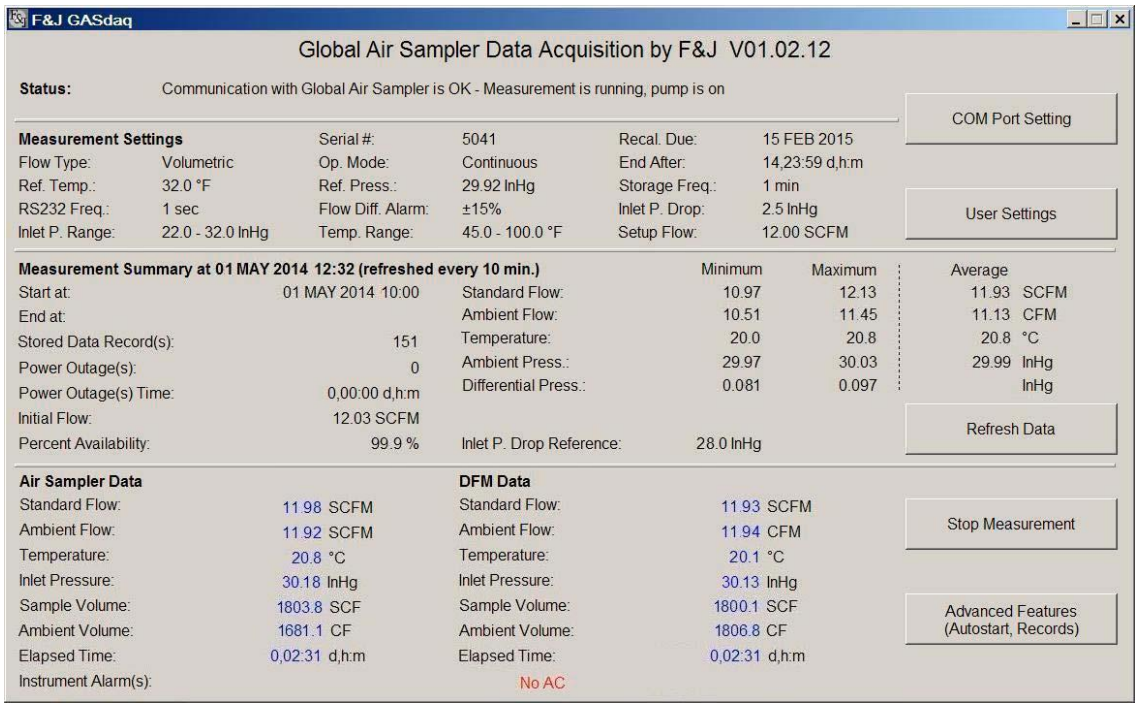
Typically this second air sampler will be utilized to collect another radioactive pollutant species on a different collection medium.

For example the UHV-600 Series air sampler utilizes the DFM system option with a TE3.2 TEDA impregnated charcoal cartridge and a FP102M2 pre-filter (part number DF-UHV-3.2) for purposes of radioiodine collection.

The output of the DF-UHV-3.2 DFM RS232 is routed to the inlet RS232 of the UHV-600 GAS electronic module. The DFM air sampling data is stored on the GAS electronics module for future transmission and reports using the GASdaq software.

Another application is for a REMP particulate iodine system to accept data from a tritium collection system located in the same ambient shelter.

Main Screen in DFM Mode (Measurement in process)



Termination Screen

After the termination of the measurement the final elapsed time and volume values are shown for both the Global Air Sampler and the DFM.

Sample Volume:	7532.6 SCF	Sample Volume:	7591.6 SCF
Ambient Volume:	5533.4 CF	Ambient Volume:	5580.8 CF
Elapsed Time:	0,17:03 d,h:m	Elapsed Time:	0,17:03 d,h:m

Data Record Table DFM Mode

In DFM data mode measured values from the Global Air Sampler and the DFM are displayed side by side in the data table. The communication error signals DFM connection or data transfer problems.

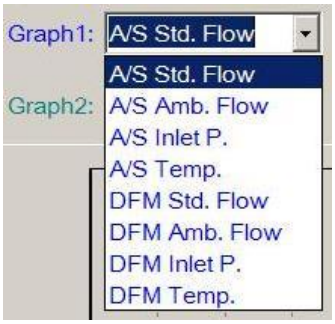
Data Records: 44
Records with Alarms/Errors: 3
Number of Alarms/Errors: 2
(Flow: 0, Press: 1, Temp: 1, pDrop: 0)
(AC loss: 0, Low batt.: 0, Comm.err: 0, Rec.err: 0)

Chart & Report | Done

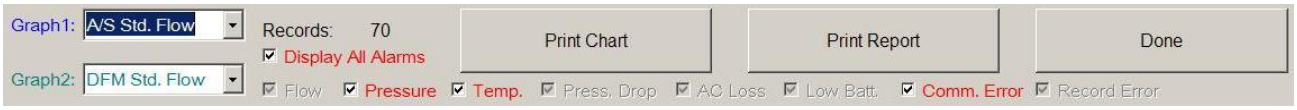
Record	Date & Time From Stored Record	A/S Std. Flow SCFM	A/S Amb. Flow CFM	A/S Temp. °F	A/S Inlet P. InHg	DFM Std. Flow SCFM	DFM Amb. Flow CFM	DFM Temp. °F	DFM Inlet P. InHg	Alarms F,P,T,D, A,L,C,R
1	18 JAN 2014 12:13	18.73	18.93	68.8	29.82	18.38	18.44	68.2	29.47	
2	18 JAN 2014 12:14	18.74	18.95	68.8	29.81	18.80	18.92	68.2	29.49	P,T

Data Charts in DFM Mode

In DFM data mode graph selection includes Global Air Sampler and DFM parameters.



Individual checkboxes are available for all alarms and errors.



Additional Field for DFM Mode Option

In DFM mode the elapsed time, ambient and standard volumes, and averaged flows are printed in the Measurement Summary data section as follows:

DFM Data			
Elapsed Time:	0,00:03 d,h:m		
Sample Volume:	75.9 SCF	Average Sample Flow:	23.60 SCFM
Ambient Volume:	55.8 CF	Average Ambient Flow:	17.35 CFM

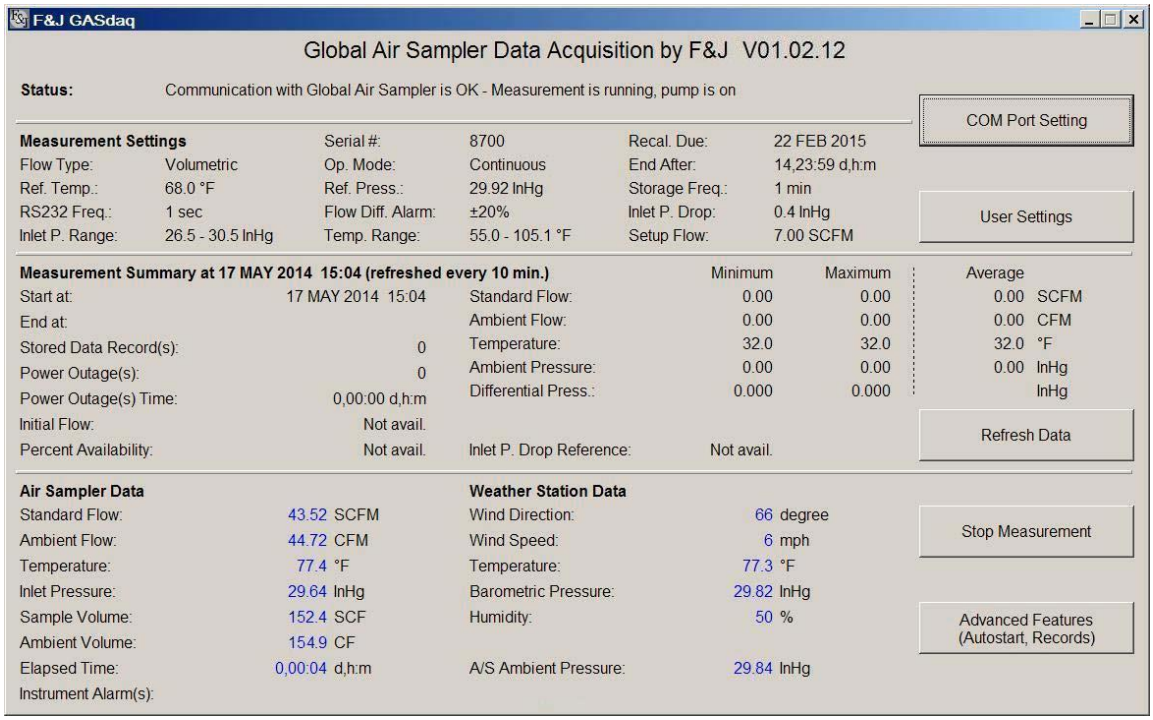
C. Weather Station Mode

The Global Air Sampler (GAS) electronics can be integrated with the WS100X Weather Station. The WS100X measures wind speed, wind direction, air temperature, barometric pressure and humidity. The weather station data is transmitted to the GAS electronics via the RS232 port via cable

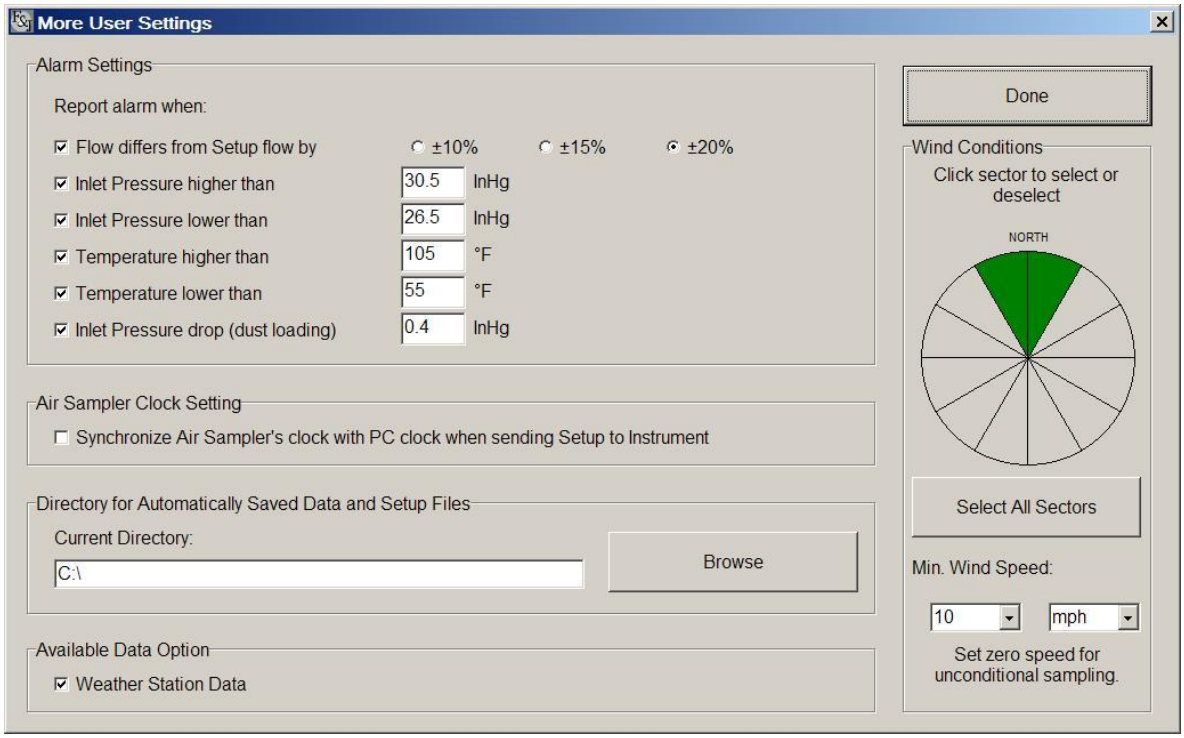
The GASdaq program allows user to select air sampler operation based on the conditional operator selectable criteria of wind speed and direction. This is referred to as a "conditional sampling" mode.

Alternatively, the operator can measure and report the weather station data continuously to the GAS electronic module for future transmission and reports using the GASdaq software.

Main Screen in Weather Station Mode (Measurement in process)



Alarm Settings Screen



Data Records in Weather Station Mode

In weather station mode measured values from the Global Air Sampler and the weather station are displayed side by side in the data table.

Record	Date & Time From Stored Record	A/S Std. Flow SLPM	A/S Temp. °C	A/S Inlet P. hPa	WS Wind Dir. degree	WS Wind Speed mph	WS Temp. °C	WS Barom P. hPa	WS Humidity %	Alarms Errors
1	22 MAY 2014 13:45	200.2	25.3	1005	271	8.6	20.6	1012	49	
2	22 MAY 2014 13:46	205.6	25.3	1005	296	7.5	20.9	1012	48	

Data Charts in Weather Station Mode

In weather station mode graph selection includes Global Air Sampler and weather station parameters.