

## **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.

# 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

**User Settings**

\* Language \*  
 English  
 Français

Flow Type  
 Volumetric  
 Mass  
 Isokinetic

\* Flow \*  
 SCFM  
 SLPM  
 scc/min  
 sm<sup>3</sup>/hr  
 sm<sup>3</sup>/min

\* Volume \*  
 SCF  
 SL  
 scc  
 sm<sup>3</sup>

\* Mass Flow \*  
 g/min  
 lb/hr  
 kg/hr

\* Temperature \*  
 °C  
 °F

\* Pressure \*  
 atm  
 InHg  
 mmHg  
 bar  
 kPa  
 mbar  
 hPa

Reference Temp.  
 32.0 °F  
 59.0 °F  
 68.0 °F  
 70.0 °F  
 77.0 °F

Reference Press.  
 29.92 InHg  
 29.53 InHg

Operation Mode  
 Continuous  
 5 min. hourly  
 1 hr. weekly  
 1: motor on, 0: off  
 Each 1 or 0: 5 min.  
 Each 1 or 0: 1 hour

	0	7	8	15	16	23
Sun	00000000	00000000	00000000	00000000	00000000	00000000
Mon	11111111	11111111	11111111	11111111	11111111	11111111
Tue	11111111	11111111	11111111	11111111	11111111	11111111
Wed	11111111	11111111	11111111	11111111	11111111	11111111
Thu	11111111	11111111	11111111	11111111	11111111	11111111
Fri	11111111	11111111	11111111	11111111	11111111	11111111
Sat	10000000	10000000	10000000	10000000	10000000	10000000

RS232 Freq.  
 1 sec  
 1 min  
 10 min  
 20 min  
 30 min  
 1 hr

Storage Freq.  
 1 min  
 10 min  
 20 min  
 30 min  
 1 hr

End Mode  
 Maximum: 9.99E+30 SCF  
 By time (Storage Freq. dependent)  
 14 day 23 hr 59 min  
 By volume  
 9.00E+30 SCF

Instrument Identifiers (8 char. max., A-Z 0-9 ! @ # & \* ( ) \_ - + = . , ; : ? /)

Company Name: F&J\_SPEC Plant Site: PLNTSITE Station Number: STATION# Filter1 ID: TE2C\_73 Filter2 ID: FP47\_73

Setup Flow: 12.00 SCFM

Obtain Setup from Instr. Send Setup to Instrument Load Setup from File Save Setup to File

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Note: \*...\* parameters can be changed interactively regardless of the settings in the instrument.

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

**F&J GASdaq** Global Air Sampler Data Acquisition by F&J V01.02.12

**Status:** Communication with Global Air Sampler is OK - Measurement is running, pump is on

**Measurement Settings**

Serial #:	5041	Recal. Due:	15 FEB 2015
Flow Type:	Volumetric	Op. Mode:	Continuous
Ref. Temp.:	32.0 °F	Ref. Press.:	29.92 InHg
RS232 Freq.:	1 sec	Flow Diff. Alarm:	±15%
Inlet P. Range:	22.0 - 32.0 InHg	Temp. Range:	45.0 - 100.0 °F
		End After:	14,23:59 d,h,m
		Storage Freq.:	1 min
		Inlet P. Drop:	2.5 InHg
		Setup Flow:	12.00 SCFM

**Measurement Summary at 02 MAY 2014 12:32 (refreshed every 10 min.)**

	Minimum	Maximum	Average
Start at:	10.97	12.13	11.93 SCFM
End at:	10.51	11.45	11.13 CFM
Standard Flow:	20.0	20.8	20.8 °C
Ambient Flow:	29.97	30.03	29.99 InHg
Temperature:	0.081	0.097	InHg
Ambient Press.:			
Differential Press.:			
Stored Data Record(s):			
Power Outage(s):			
Power Outage(s) Time:			
Initial Flow:			
Percent Availability:			
Inlet P. Drop Reference:			

**Correction to Reference T and P**

Standard Flow:	11.98 SCFM
Average Flow:	11.92 SCFM
Sample Volume:	1803.8 SCF
Temperature:	20.8 °C
Elapsed Time:	0,02:31 d,h,m
Instrument Alarm(s):	

**Correction to Ambient Conditions**

Ambient Flow:	11.92 CFM
Avg. Ambient Flow:	11.12 CFM
Ambient Volume:	1681.1 CF
Ambient Press.:	30.02 InHg
Inlet Pressure:	28.02 InHg

Buttons: COM Port Setting, User Settings, Refresh Data, Stop Measurement, Advanced Features (Autostart, Records)

### Main Screen after Termination of the Sample Event

**F&J GASdaq** Global Air Sampler Data Acquisition by F&J V01.02.12

**Status:** Communication with Global Air Sampler is OK - Measurement is completed

**Measurement Settings**

Serial #:	5041	Recal. Due:	15 FEB 2015
Flow Type:	Volumetric	Op. Mode:	Continuous
Ref. Temp.:	32.0 °F	Ref. Press.:	29.92 InHg
RS232 Freq.:	1 sec	Flow Diff. Alarm:	On
Inlet P. Range:	On - On	Temp. Range:	On - On
		End After:	9,00E+30 SCF
		Storage Freq.:	1 min
		Inlet P. Drop:	On
		Flow Ratio:	1 : 200

**Measurement Summary at 02 MAY 2014 12:32 - Measurement is completed**

	Minimum	Maximum	Average
Start at:	10.97	12.13	11.93 SCFM
End at:	10.51	11.45	11.13 CFM
Standard Flow:	20.0	20.8	20.8 °C
Ambient Flow:	29.97	30.03	29.99 InHg
Temperature:	0.081	0.097	InHg
Ambient Press.:			
Differential Press.:			
Stored Data Record(s):			
Power Outage(s):			
Power Outage(s) Time:			
Initial Flow:			
Percent Availability:			
Inlet P. Drop Reference:			

**Correction to Reference T and P**

Sample Volume:	1803.8 SCF
Ambient Volume:	1681.1 CF
Elapsed Time:	0,02:32 d,h,m

Buttons: COM Port Setting, User Settings, Refresh Data, Start Measurement, Advanced Features (Autostart, Records)

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

<b>Management Report</b>			
<b>IDENTIFICATION OF AIR SAMPLER</b>			
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
<b>SETUP PARAMETERS IN AIR SAMPLER</b>			
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
<b>MEASUREMENT SUMMARY</b>			
Start at:	20 FEB 2013 00:17	Stored Data Record(s):	24786
Elapsed Time:	0,18:15 d,h:m	Power Outage(s):	2
Sample Volume:	12385.0 SCF	Power Outage(s) Time:	0,11:22 d,h:m
Ambient Volume:	12242.0 CF	Percent Availability:	29.5%
Initial Flow:	34.81 SCFM	Number of Alarms:	30
		Inlet P. Drop Reference:	30.0 InHg
	Minimum:	Maximum:	Average:
Standard Flow:	0.00	82.65	29.97
Ambient Flow:	0.00	81.77	29.63
Temperature:	13.9	21.3	18.6
Ambient Press.:	29.87	30.09	30.01
Differential Press.:	-0.135	0.738	InHg
F&J GASdaq V01.02.04			
Comments:			
Operator:		Approved by:	
Date:		Date:	

# Management Report Chart

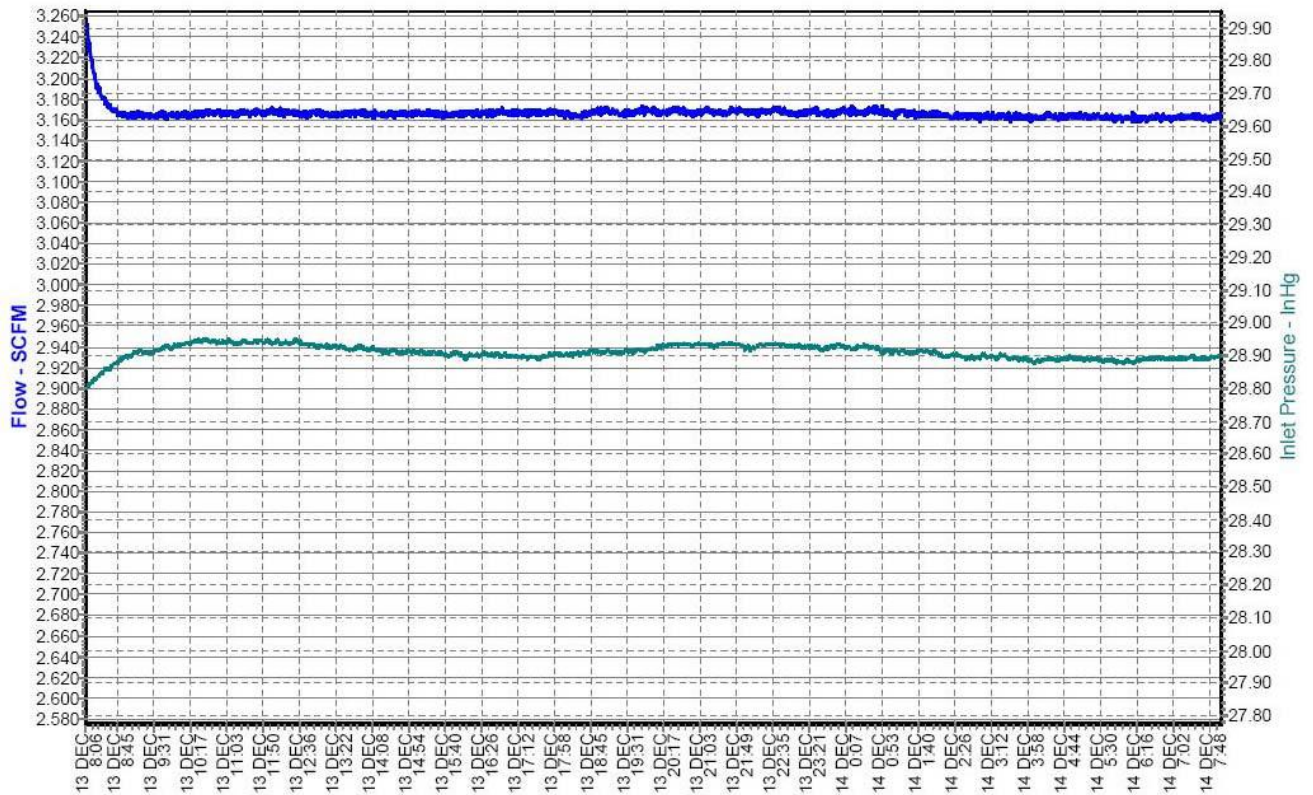
Charts are printed according to graph selection and current zoom / chart positioning. The engineering units can be changed in User Settings.

## Management Report

Serial Number: 1000

Data Records: 1439

Start at: 13 DEC 2012 08:05



F&J GASdaq V01.02.04

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

Serial Number: 8894

## Management Report

Start at: 18 DEC 2013 17:53

Data Records:	144	Records with Alarms/Errors:	3	Number of Alarms/Errors:	1
<input type="checkbox"/> Flow % Alarm:	0	<input checked="" type="checkbox"/> Pressure Alarm:	1	<input type="checkbox"/> Temperature Alarm:	0
<input type="checkbox"/> Pressure Drop Alarm:	0	<input type="checkbox"/> Data Record Error:	0		

NOTE: (x) marks alarm(s) depicted on the chart

## 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

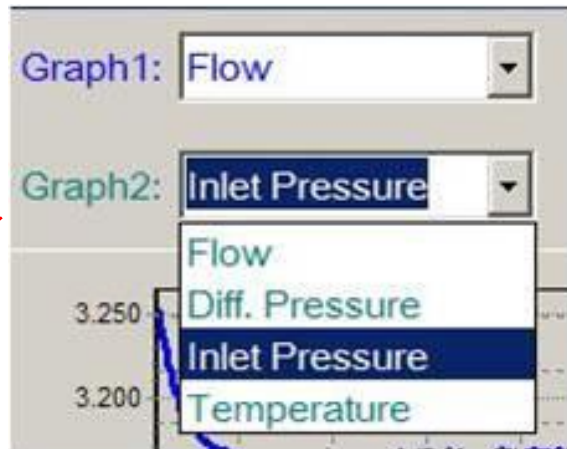
Alarm Settings	
Report alarm when:	
<input checked="" type="checkbox"/> Flow differs from Setup flow by	<input type="radio"/> ±10% <input type="radio"/> ±15% <input checked="" type="radio"/> ±20%
<input checked="" type="checkbox"/> Inlet Pressure higher than	34.0 InHg
<input checked="" type="checkbox"/> Inlet Pressure lower than	20.0 InHg
<input checked="" type="checkbox"/> Temperature higher than	110 °F
<input checked="" type="checkbox"/> Temperature lower than	40 °F
<input checked="" type="checkbox"/> Inlet Pressure drop (dust loading)	5.0 InHg
Air Sampler Clock Setting	
<input checked="" type="checkbox"/> Synchronize Air Sampler's clock with PC clock when sending Setup to Instrument	
Directory for Automatically Saved Data and Setup Files	
Current Directory:	C:\ACCMAN21
	Browse

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.

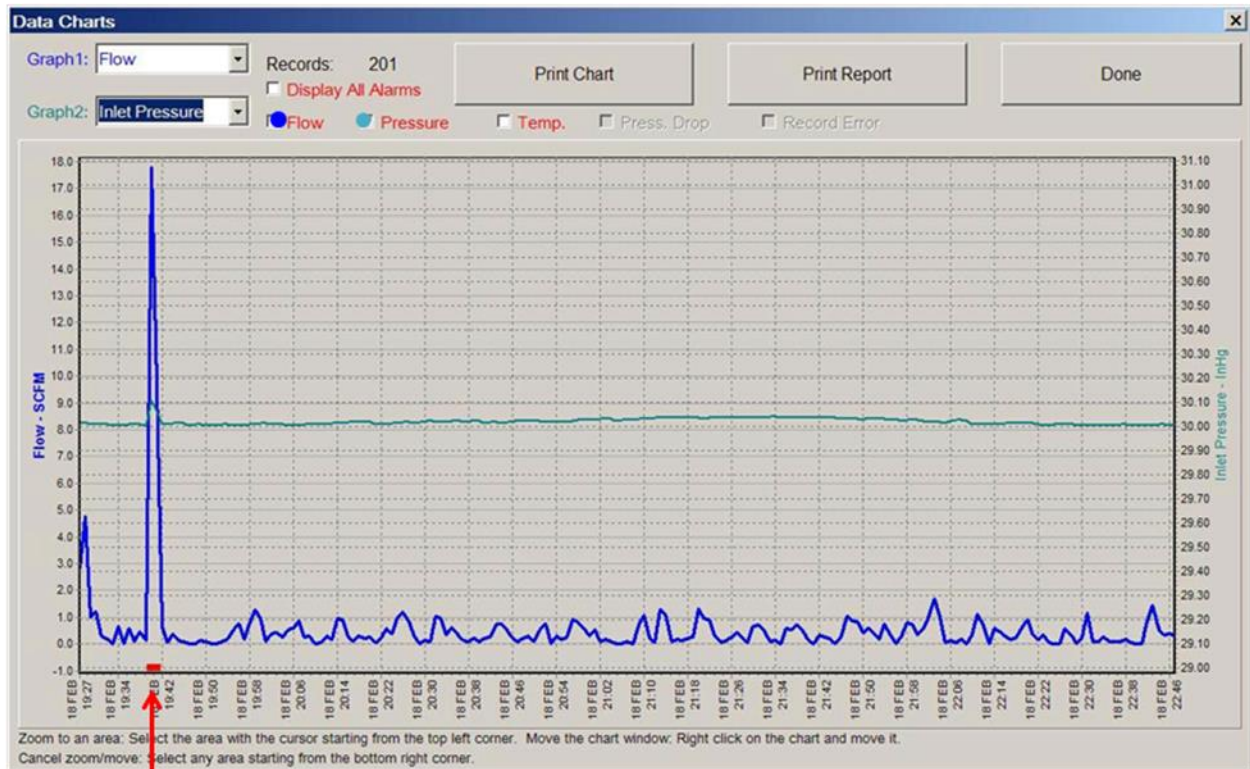
### Data Chart Selection Option



### Data Chart



## Data Chart with Alarm Event



**Alarm event indication**

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)

**Status:** Communication with Global Air Sampler is OK - Measurement is running, pump is on

**Measurement Settings**

Flow Type:	Volumetric	Serial #:	5041	Recal. Due:	15 FEB 2015
Ref. Temp.:	32.0 °F	Op. Mode:	Continuous	End After:	14,23:59 d,h:m
RS232 Freq.:	1 sec	Ref. Press.:	29.92 InHg	Storage Freq.:	1 min
Inlet P. Range:	22.0 - 32.0 InHg	Flow Diff. Alarm:	±15%	Inlet P. Drop:	2.5 InHg
		Temp. Range:	45.0 - 100.0 °F	Setup Flow:	12.00 SCFM

**Measurement Summary at 01 MAY 2014 12:32 (refreshed every 10 min.)**

	Minimum	Maximum	Average
Start at:	01 MAY 2014 10:00	Standard Flow:	10.97 12.13
End at:		Ambient Flow:	10.51 11.45
Stored Data Record(s):	151	Temperature:	20.0 20.8
Power Outage(s):	0	Ambient Press.:	29.97 30.03
Power Outage(s) Time:	0,00:00 d,h:m	Differential Press.:	0.081 0.097
Initial Flow:	12.03 SCFM		
Percent Availability:	99.9 %	Inlet P. Drop Reference:	28.0 InHg

**Air Sampler Data**

Standard Flow:	11.98 SCFM
Ambient Flow:	11.92 SCFM
Temperature:	20.8 °C
Inlet Pressure:	30.18 InHg
Sample Volume:	1803.8 SCF
Ambient Volume:	1681.1 CF
Elapsed Time:	0,02:31 d,h:m
Instrument Alarm(s):	No AC

**DFM Data**

Standard Flow:	11.93 SCFM
Ambient Flow:	11.94 CFM
Temperature:	20.1 °C
Inlet Pressure:	30.13 InHg
Sample Volume:	1800.1 SCF
Ambient Volume:	1806.8 CF
Elapsed Time:	0,02:31 d,h:m

Buttons: COM Port Setting, User Settings, Refresh Data, Stop Measurement, Advanced Features (Autostart, Records)

### 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

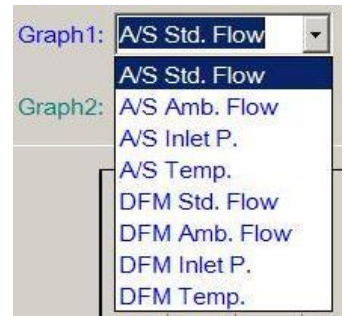
## Data Record Table DFM Mode

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.

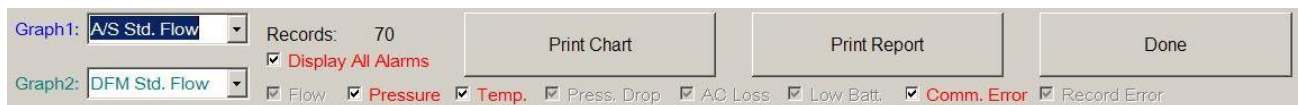
Data Records: 44		Records with Alarms/Errors: 3		Number of Alarms/Errors: 2		Chart & Report		Done		
(Flow: 0, Press: 1, Temp: 1, pDrop: 0) (AC loss: 0, Low batt.: 0, Comm.err: 0, Rec.err: 0)										
Record	Date & Time From Stored Record	A/S Std. Flow SCFM	A/S Amb. Flow CFM	A/S Temp. °F	A/S Inlet P. 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	Average Sample Flow:	23.60 SCFM
Sample Volume:	75.9 SCF	Average Ambient Flow:	17.35 CFM
Ambient Volume:	55.8 CF		

## 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)

The screenshot displays the 'Global Air Sampler Data Acquisition by F&J V01.02.12' window. The status bar indicates 'Communication with Global Air Sampler is OK - Measurement is running, pump is on'. The interface is divided into several sections: Measurement Settings, Measurement Summary, Air Sampler Data, and Weather Station Data. Each section contains specific numerical data and control buttons like 'COM Port Setting', 'User Settings', 'Refresh Data', 'Stop Measurement', and 'Advanced Features'.

Measurement Settings		Serial #:	8700	Recal. Due:	22 FEB 2015
Flow Type:	Volumetric	Op. Mode:	Continuous	End After:	14,23:59 d,h,m
Ref. Temp.:	68.0 °F	Ref. Press.:	29.92 InHg	Storage Freq.:	1 min
RS232 Freq.:	1 sec	Flow Diff. Alarm:	±20%	Inlet P. Drop:	0.4 InHg
Inlet P. Range:	26.5 - 30.5 InHg	Temp. Range:	55.0 - 105.1 °F	Setup Flow:	7.00 SCFM

Measurement Summary at 17 MAY 2014 15:04 (refreshed every 10 min.)			Minimum	Maximum	Average
Start at:	17 MAY 2014 15:04	Standard Flow:	0.00	0.00	0.00 SCFM
End at:		Ambient Flow:	0.00	0.00	0.00 CFM
Stored Data Record(s):	0	Temperature:	32.0	32.0	32.0 °F
Power Outage(s):	0	Ambient Pressure:	0.00	0.00	0.00 InHg
Power Outage(s) Time:	0,00:00 d,h,m	Differential Press.:	0.000	0.000	InHg
Initial Flow:	Not avail.	Inlet P. Drop Reference:	Not avail.		
Percent Availability:	Not avail.				

Air Sampler Data		Weather Station Data	
Standard Flow:	43.52 SCFM	Wind Direction:	66 degree
Ambient Flow:	44.72 CFM	Wind Speed:	6 mph
Temperature:	77.4 °F	Temperature:	77.3 °F
Inlet Pressure:	29.64 InHg	Barometric Pressure:	29.82 InHg
Sample Volume:	152.4 SCF	Humidity:	50 %
Ambient Volume:	154.9 CF	A/S Ambient Pressure:	29.84 InHg
Elapsed Time:	0,00:04 d,h,m		
Instrument Alarm(s):			

## 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.

