Analyzer Control System (ACS) - A Software Package for Mass Spectrometer System Operation, Trouble Shooting and Prototyping

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Development Goals

- · Simplified, Standardized System Control
- "Universal" Vacuum System Control S/W
- · Searching for Collaborators / Additional Applications
- Interested in Future Commercialization & Licensing

Applications

- Mass Spectrometer Systems
- Pressure and Flow Control Systems
- Leak Integrity Testing
- Instrumentation Development
- Rapid Prototyping
- Field Applications

Hardware Support

Mass Analyzers

- SRS RGA 100, 200, 300
- MKS µVision (Future)

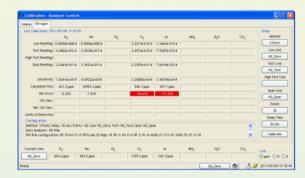
• Pfeiffer (HiPace 10 & 80)

Turbo Pumps

- Alcatel (30+, 31+)
- System Controllers
- MKS 146C
- Granville-Phillips

Data Acquisition

• LabJack (U12)

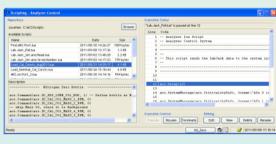


Calibration for Nitrogen background or Helium background is accomplished using the "Automatic Calibration" page.
Calculations and conversion of signal to concentration is performed automatically.

Line	H ₂	He	N ₂	02	Ar	NH ₃	HJO	cos	Vendor	Cyfinder
N2_Zero	0.0 ppm	0.0 ppm	1000000.0	0.0 ppm	0.0 ppm	0.0 ppm	0.0 ppm	0.0 ppm	w	33333
N2_Test	601.3 ppm	12085.0 ppm	983900.0 ppm	604.2 ppm	121.5 ppm	0.0 ppm	0.0 ppm	0.0 ppm	w	333333
N2_Span	5038.0 ppm	15000.0 ppm	969000.0 ppm	5038.0 ppm	1011.0 ppm	0.0 ppm	0.0 ppm	0.0 ppm	w	3333333
N2_High	9894.0 ppm	20537.0 ppm	855000.0 ppm	10391.0 ppm	4818.0 ppm	0.0 ppm	0.0 ppm	0.0 ppm	w	33333
Califor 5										
Cal line 8										

Up to 8 calibration bottles can be defined for use during calibration and/or validation.

Scripting and Automation



Scripting increases the capabilities of the system, while improving operational consistency, and reducing complexity.

Current Capabilities

- Uses Windows-based system (XP & later)
- Selected Ion Monitoring of 8 Gases
- Full Scan Mode
- Remote Control
- Scripting for Automation
- Internal Calibration Routine

Calibration and Validation



Recently developed for rapid response to customer request. The KID system was fabricated in less than a month, and no software development was required due to the seamless integration of ACS.

Traceability



Choose from any system data on the Recording page

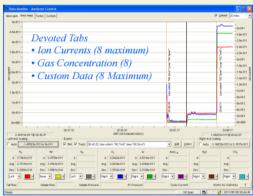
4	A	8	С	D	E		G	H	Q	R
1	System	Analyzer Version	Analyzer Contr	rol System 2.4						
2	Connected to	localhost								
3	Created on host	HGDL-DEV1								
4	Start time	9/8/2011 16:58								
5	Stop time	9/8/2011 17:11								
6	Mass_1	Mass_1	Mass_1_PPM	Mass_1_PPM	Mass_2	Mass_2	Mass_2_PPM	Mass_2_PPM	LINE_SELECT	UNE_SELECT
7	9/8/2011 16:58	1.35E-12	9/8/2011 16:58	1.326+04	9/8/2011 16:58	1.996-12	9/8/2011 17:10	1.425+04	9/8/2011 16:59	16
	9/8/2011 16:58	1.40E-12	9/8/2011 16:58	1.306+04	9/8/2011 16:58	1.94E-12	9/8/2011 17:10	1.41E+04	9/8/2011 16:59	0
9	9/8/2011 16:58	1.35E-12	9/8/2011 16:58	1.326+04	9/8/2011 16:58	1.95E-12	9/8/2011 17:10	1.425+04	9/8/2011 17:00	16
10	9/8/2011 16:58	1.356-12	9/8/2011 16:58	1.326+04	9/8/2011 16:58	0.006+00	9/8/2011 17:10	1.425+04	9/8/2011 17:05	1
11	9/8/2011 16:59	0.000+000	9/8/2011 16:59	1.95€+04	9/8/2011 16:59	0.006+00	9/8/2011 17:10	1.415+04	9/8/2011 17:07	16
12	9/8/2011 16:59	0.000+00	9/8/2011 16:59	1.956+04	9/8/2011 16:59	0.000 +00	9/8/2011 17:10	1.396+04	9/8/2011 17:08	2
13	9/8/2011 16:59	0.000+00	9/8/2011 16:59	1.950+04	9/8/2011 16:59	0.000 +00	9/8/2011 17:10	1.34E+04	9/8/2011 17:10	16
14	9/8/2011 16:59	0.000+00	9/8/2011 16:59	1.955+04	9/8/2011 16:59	0.000 +00	9/8/2011 17:10	1.37E+04	9/8/2011 17:10	0
	0/0/2011 16:40	0.005+00	A IN COMMAND A SAME	1.055.04	07073011 15:50		A444444 4744	1.305-01		

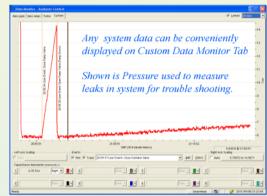


At the completion of all calibrations, a Calibration Report is generated in both HTML and comma delimited formats.

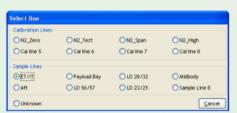
All raw data is included along with a variety of calculated parameters.

Real-Time Monitoring





System Control and Awareness



The Line Selection dialog is currently for identification of the line that is being monitored/controlled for the recording file. The system supports manual valves at this time. Future version will allow mapping of LabJack digital lines to enable automatic line selection.



Basic system status is readily available from the status bar at the bottom of all windows.



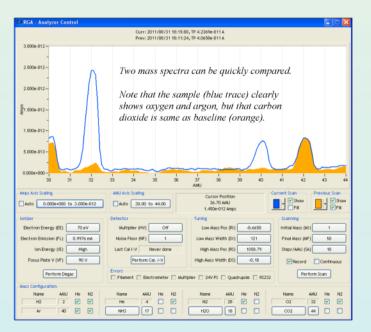
The System Page provide detailed overview of – Valves, Flow Meters, Pressure Sensors, Turbo Status



The Main Page provides system messages and general control of communications.

MKS - Analyzar Co	ntrol					
Current Line I	t ₂ He	N ₁ O ₂	Ar	NH ₁ H ₂ O	CO ₂ Un	
E7.11T					O	ppm ON ®
Channel Configuration					Respe	
	Channel 1	Channel 2	Channel 3	Charmel 4	Active Recipe	1
305	1	2	3	4	Control Chan	1
Type	Linear Capacitance	Mass Flow Controller	Mazz Flow Controller	Aless Flow Controller	Set Punt	258.80 Torr
CLN / AFC Range	1080.08 Terr	1,000 sigm	10.000 sigm	1.000 ri.pm	Lead	2500
CLN Resolution	-1				Gen	180
MPC Operating Hode		Set point	Retto	Set perint	Control	
AMPC Set Point		0.100 sigm	0.180 stpm	0.100 rt.pm	ifode	Auto
Power	on	orr	On	oer	Palarity	Direct
Status	On	Manually off	On	Manually off	Integral	0.3 900
Reading	250.10 Terr		1.177 slpm		Base	0.00N
Williage	2.50 V		0.59 Y		Start	0.00%

An alternative to utilizing analog inputs from LabJack, the MKS 146C is a convenient method to control system flow rates, pressures and other process control equipment.



RS-232

USB

USB

The RGA page provides for complete control of all parameters. This includes tuning parameters. Currently available only for the SRS RGA, support for the MKS µVision is underway.