

# IRGAS100 Configuration Manager V2.0



## User's guide

Revision A May 2009



# TABLE OF CONTENTS

<b>TABLE OF FIGURES</b>	<b>3</b>
<b>1.0 Introduction</b>	<b>4</b>
<b>2.0 SPGAS Configuration Screen</b>	<b>5</b>
<b>2.1 System Info</b>	<b>5</b>
<b>2.2 Quantification</b>	<b>5</b>
<b>2.3 File Paths</b>	<b>5</b>
<b>Quantification log</b>	<b>5</b>
<b>Spectral Records</b>	<b>6</b>
<b>System Log</b>	<b>7</b>
<b>2.4 Miscellaneous</b>	<b>7</b>
<b>Days to keep stored spectral records</b>	<b>7</b>
<b>Points to display in concentration monitors</b>	<b>8</b>
<b>3.0 Data Handling Configuration Screen</b>	<b>9</b>
<b>4.0 SpectraStream™ Configuration Screen</b>	<b>10</b>
<b>5.0 Spectrometer Configuration Screen</b>	<b>12</b>
<b>6.0 Bomem Config Configuration Screen (WorkIR Only)</b>	<b>13</b>
<b>7.0 PLC Configuration Screen (Option)</b>	<b>14</b>
<b>8.0 Analog Input Configuration Screen</b>	<b>15</b>
<b>9.0 Input Alarms Configuration Screen</b>	<b>16</b>
<b>10.0 Temperature Limit Configuration Screen</b>	<b>17</b>
<b>11.0 Digital Outputs Configuration Screen</b>	<b>18</b>
<b>12.0 Pressure &amp; Temperature Configuration Screen</b>	<b>19</b>
<b>13.0 Predefined Log Lines</b>	<b>20</b>
<b>14.0 Gas Concentration Output Configuration Screen</b>	<b>21</b>
<b>15.0 Reference Material</b>	<b>22</b>

# TABLE OF FIGURES

Figure 1 SPGAS configuration screen .....	8
Figure 2 Data Handling configuration screen.....	9
Figure 3 SpectraStream configuration screen.....	11
Figure 4 Spectrometer Configuration Screen .....	12
Figure 5 Bomem Config Configuration Screen.....	13
Figure 6 PLC Configuration Screen .....	14
Figure 7 Analog Input Configuration Screen .....	15
Figure 8 Input Alarms Configuration Screen .....	16
Figure 9 Temp. Limit Configuration Screen .....	17
Figure 10 Digital Outputs Configuration Screen .....	18
Figure 11 Pressure & Temperature Configuration Screen .....	19
Figure 12 Predefined Log Lines Configuration Screen.....	20
Figure 13 Gas Concentration Output Configuration Screen.....	21

# 1.0 Introduction

The IRGAS100 SPGAS™ (Specialty Gas Analysis Software) software application is designed for the automatic collection and quantification analysis of spectra collected with a FTIR spectrometer. All possible configuration parameters have been removed from it to prevent an accidental modification of its operating parameters by the operator of the IRGAS100.

The IRGAS100 Configuration Manager is designed for stand-alone applications where all functional parameters of the IRGAS100 can be accessed and modified. Also, as a stand-alone application, the use of this application can be restricted by the operating system to be available only to specific users.

The modifications of the operational parameters of the IRGAS100 are not dynamic, they are static. This means that after some modifications have been applied to the IRGAS100 configuration, the IRGAS100 needs to be restarted for these changes to take effect.

The default values of these parameters may vary depending on your specific system configuration. There is a default configuration file that has been shipped with your system. If one or some of the parameters gets modified by accident and its default value has been forgotten, there is a file stored in your system that can be used to restore your system to its as-shipped configuration.

The name of the file is IRGAS100 (SNXXXXXX).reg where XXXXX gets substituted by your system serial number.

The default location of the file is at:

‘C:\program files\CIC Photonics\IRGAS’

If the configuration of the system needs to be restored to its as shipped configuration, just locate the file and double click on it.

## **2.0 SPGAS Configuration Screen**

The SPGAS Configuration screen allows you to review and set general parameters of the IRGAS100 (See Figure 1).

### **2.1 System Info**

The system information section displays your unique station ID number and the serial number of your system.

### **2.2 Quantification**

The Quantification section allows you to specify the units in which the concentration will be reported, and the IRGAS calibration file that the system is going to use as reference during the quantification analysis.

The system can report concentration in either parts per million (ppm), parts per billion (ppb), or percent levels (%).

The IRGAS calibration file is a vital file for the proper functioning of the system. It contains (1) all the standard calibrated absorption spectra of the gases that are being analyzed, (2) which spectral regions to use during the quantification analysis, and (3) deviation of Beer's Law correction parameters if the system is dealing with high concentration of gases being analyzed.

### **2.3 File Paths**

The file paths specify where the data produced by the system are stored.

#### **Quantification log**

The Quantification log path specifies the file directory or folder where the estimated concentration and standard error of the gases included in the IRGAS calibration file gets stored. Since the system was designed to be able to run 24 hours a day, seven days a week, the quantification analysis produced per day gets stored inside one ASCII file (text file). The automatic generated file gets named using the following name convention:

*'Quan YY-MM-DD'* where *YY* represents the year, *MM* the month and *DD* the day where these data was collected.

The purpose of this convention is to facilitate the location and sorting of quantification log files by the creation date base on the name of the file.

Note: Sometimes while copying a file from one PC to another, the file may lose its original creation date. For this reason the creation data were included as part of the name of the file.

These quantification log files are further organized into subdirectories or folders, which store the quantification log files corresponding to the month and year on which they were created. The name convention of these folders is:

*'YY-MM'* where *YY* represents the year and *MM* represents the month.

These folders are created automatically by the system and require not user intervention; they can be deleted or renamed at any time during the operation of the system.

## **Spectral Records**

The Spectral records path specifies where all the background and single-beam spectra and absorption spectra are recorded. Every single spectrum collected by the system is recorded into a Galactic SPC file format. The names of these files follow this name convention:

Background Single-beam Spectra:

*'Bkg YY-MM-DD HH-mm-SS.spc'*

Sample Single-beam Spectra:

*'Smp YY-MM-DD HH-mm-SS.spc'*

Absorption spectra:

*'Abs YY-MM-DD HH-mm-SS.spc'*

where *YY* represents the year, *MM* the month, *DD* the day, *HH* the hour, *mm* the minutes, and *SS* the seconds at which this spectrum was collected.

Since the system collects one of this files every few seconds (thousands of files are generated per day), the system must provide further organization for the storage of these files and prevent the cluttering of folders in which they are stored.

The system facilitates the spectral data extraction for post analysis by grouping complete spectral sets in blocks of half-an-hour inside compressed zip files. These zip files follow approximately the same name convention as the .spc files, except that they do not include the “seconds” in the name of the file; the “minutes” value reflects only the minute interval in blocks of half-an-hour.

The zip files are further organized into one subfolder per day following this folder name convention:

‘YY-MM-SS’

## **System Log**

The system log path specifies where the log records created by the system get stored

## **2.4 Miscellaneous**

### **Days to keep stored spectral records**

The system is capable of generating an incredible number of spectral records that can in a matter of months use up all the space available on your computer hard disk. The system has a built-in self-cleaning mechanism, which deletes all the folders and their contents inside the *spectral records path*. These folders have to follow the folder name convention “YY-MM-DD” and be older than the specified number of days according to the actual date of the computer. These folders are only deleted when the IRGAS100 application is running.

Note: Do not store important information in these folders because it may get deleted once the age of the folder expires. If you want to keep these records for traceability purposes, perform regular backups of these folders. Finally, to prevent the system

to delete a specific folder, just rename the folder to a name that does not follow the folder naming convention.

## Points to display in concentration monitors

The concentrations monitored in the IRGAS100 system reflect the concentration of the analyzed gases over a period of time. The number of data points that can be displayed at any given time is reflected by this parameter.

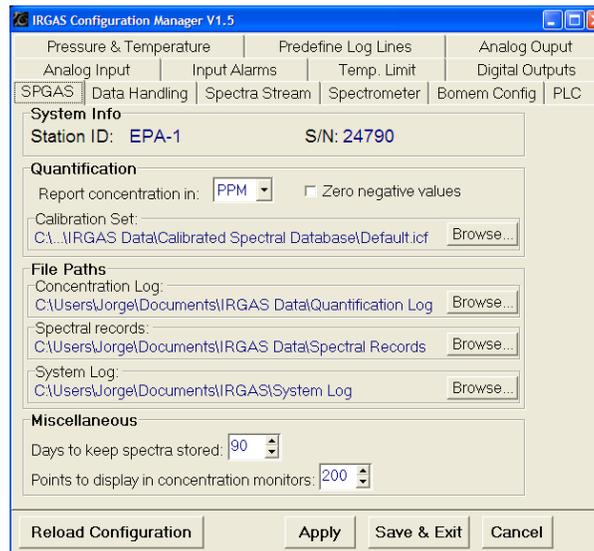
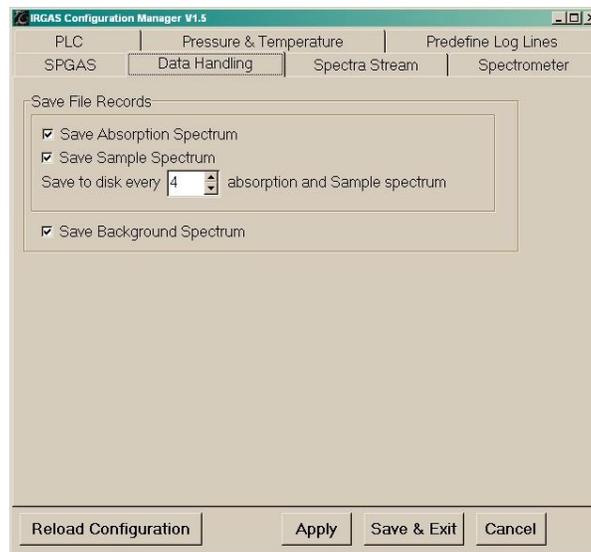


Figure 1 SPGAS configuration screen

### 3.0 Data Handling Configuration Screen

While the SPGAS configuration screen allows one to determine where to save data, the data handling configuration screen allows the user to choose what data is saved and how often it is saved. The user can save any of the following data files: absorption spectrum, sample spectrum (single beam format), and background spectrum (single beam format). The data files chosen to be saved will be saved in the location indicated on the SPGAS configuration screen.



**Figure 2 Data Handling configuration screen**

## 4.0 SpectraStream™ Configuration Screen

Depending on your gas analysis application, your system may come with a light version or full-featured version of SpectraStream. The full-featured SpectraStream offers automatic background collection, spectrometer drift reduction, and faster response time by providing quantification analysis at every scan of the instrument. The light version only provides the fast response time feature.

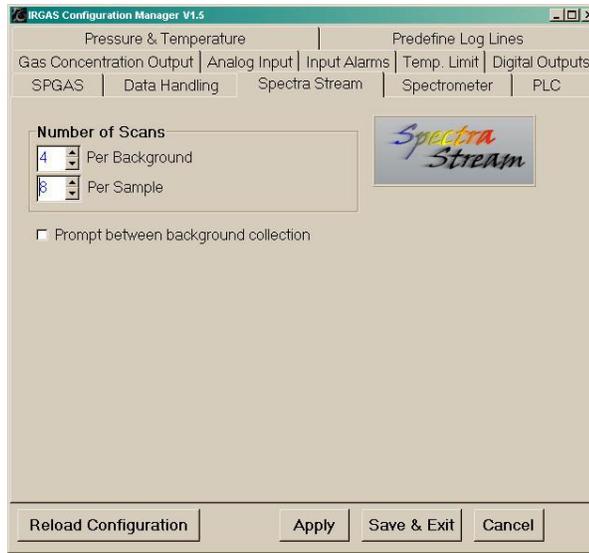
The use of the full-featured SpectraStream requires the installation of special hardware into your gas cell. If your equipment does not have a full-featured SpectraStream technology installed on it, the manual background collection options must be on at all times.

The *Prompt between background collection* option only works when using the manual background collection, and its only purpose is to remind the operator to set into the system the background collection conditions required to collect background or reference conditions.

The number of scans parameter defines the desired number of scans required to produce either a sample or background single-beam spectrum. The signal to noise ratio of the instrument increases as the number of scans used to produce a single-beam spectrum increases; but the time required to collect a spectrum will also increase. The *number of scans* section in this screen sets these parameters.

SpectraStream produces a faster response time than conventional methods by providing a running average of all the spectra that are collected by the system.

Figure 3 shows the SpectraStream set-up for manual background collection.



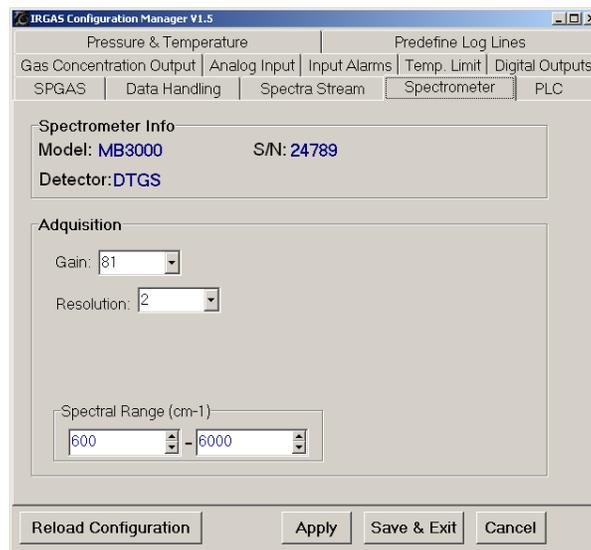
**Figure 3 SpectraStream configuration screen**

## 5.0 Spectrometer Configuration Screen

The spectrometer configuration screen offers the general configuration for the spectrometer installed in your system. These parameters match the requirements for your gas analysis requirements (see Figure 3). For more information about these parameters, please refer to the reference material in the last section of this manual.

Also included on this tab are the resolution and gain parameters for the spectrometer. With the MB3000 the resolution and gain cannot be set on the spectrometer itself it has to be set in the Configuration Manager on this screen. The gain should be as close as possible to 100 without going over 100.

Please do not move any of these parameters. Unpredicted results may occur if any of these parameters is modified.



**Figure 4 Spectrometer Configuration Screen**

## 6.0 Bomem Config Configuration Screen (WorkIR Only)

The Bomem Config configuration screen offers specific configuration parameter for the spectrometer installed in your system and has all the internal operation parameters of the spectrometer already set. These parameters are factory set and match the requirements for your gas analysis requirements (see Figure 4).

For more information about these parameters, please refer to the reference material in the last section of this manual.

The screenshot shows the 'Bomem Config' window within the 'IRGAS Configuration Manager V1.5'. The window has a menu bar with options: Analog Input, Input Alarms, Temp. Limit, Digital Outputs, Pressure & Temperature, Predefine Log Lines, Analog Output, SPGAS, Data Handling, Spectra Stream, Spectrometer, Bomem Config (highlighted), and PLC. Below the menu bar, there are two main sections: 'Initialization' and 'Acquisition'. The 'Initialization' section includes: Buffer Size (2048), Laser Wavenumber (15799.7), Timeout (60), and Spectral Region (Mid-IR (double interferogram)). The 'Acquisition' section includes: Data type (Interferogram), Phase Correction Points (512), and a 'Collection' sub-section with Wait (sec.) (0), Scans (1), Runs (1), Delay (sec.) (0), and a 'Fast Mode' checkbox. At the bottom of the window are buttons for 'Reload Configuration', 'Apply', 'Save & Exit', and 'Cancel'.

**Figure 5 Bomem Config Configuration Screen**

## 7.0 PLC Configuration Screen (Option)

All the IRGAS system automated functions, digital and analog IOs are performed through the use of a PLC (Programmable Logic Controller) using the Modbus protocol. All the digital and analogical inputs and outputs are dictated by the capabilities of the PLC included with your system.

In order for this screen to work properly and provide the user with the information needed, the PLC *must* be connected. Once the PLC is connected the user will be able to get parameters from the read configuration button directly from the PLC. The parameters read from the PLC will appear in the table below the button, with the first column being the registry number corresponding to the description in column two and finally having the number of ports for the function in the third column. This parameters represent the functions included in your PLC configuration.

The poll interval window shows how often the values are refreshed from the PLC, and the silence interval window is the maximum between bits of spacing between characters. The serial port window indicates what port needs to be used to communicate to the PLC. Lastly, the Time Out Interval window lets the PC know how long to wait for a response from the PLC. The MODBUS RTU Address window has a default of 1 because the PLC has a default address of 1.

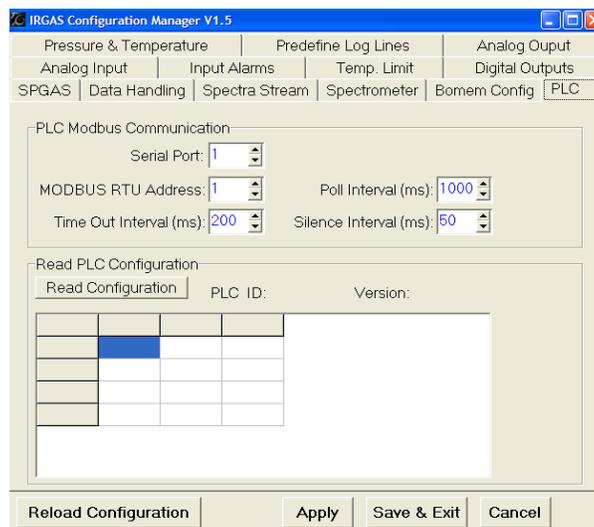


Figure 6 PLC Configuration Screen

## 8.0 Analog Input Configuration Screen (Auxiliary Instrument Option Only)

This screen in the Configuration Manager allows the user to determine what analog input port and what name is given to auxiliary instruments connected to the system. The auxiliary instruments parameters are then entered into the respective spaces. The names chosen in this screen are the names the user will see in the IRGAS100 software to report the concentration estimated by the instrument.

The *Active* check box allows to turn on or off the output of the analog output port been configured.

The *Zero* and *Span* value represent the unit size of the PLC to map the range of the analog output. i.e. if the output range is 0-10VDC, 0 correspond to 0VDC and 32000 will correspond to 10VDC.

The *Minimum Range* and the *Maximum Range* are analogous to the zero and the span of the input signal from the instrument providing the concentration. These values should match the ones used by analytical instrument to which they are connected to.

IRGAS Configuration Manager V1.5

Pressure & Temperature | Predefine Log Lines

SPGAS | Data Handling | Spectra Stream | Spectrometer | PLC

Gas Concentration Output | Analog Input | Input Alarms | Temp. Limit | Digital Outputs

Concentration - Analog Input

Port: 0 Instrument Name: H2

Active

Input Signal

Zero: 0 Concentration Offset (ppm): 0

Span: 32000 Minimum Range (ppm): 0

Maximum Range (ppm): 32000

Reload Configuration Apply Save & Exit Cancel

**Figure 7 Analog Input Configuration Screen**

## 9.0 Input Alarms Configuration Screen (Auxiliary Instrument Option Only)

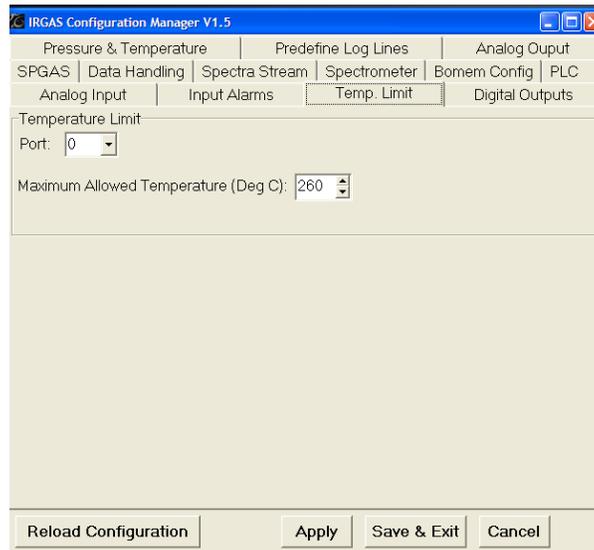
The input alarm configuration screen permits the user to connect the alarms from the auxiliary instruments added in the Analog Input screen to the IRGAS Hardware Controller. The description given to the alarms in this screen are the same descriptions of the alarms that will appear in the hardware controller.

Description	
Alarm 0:	Ext. Alarm 0
Alarm 1:	Ext. Alarm 1
Alarm 2:	Ext. Alarm 2
Alarm 3:	Ext. Alarm 3
Alarm 4:	Ext. Alarm 4
Alarm 5:	Ext. Alarm 5
Alarm 6:	Ext. Alarm 6
Alarm 7:	Ext. Alarm 7
Alarm 8:	Ext. Alarm 8
Alarm 9:	Ext. Alarm 9
Alarm 10:	Ext. Alarm 10
Alarm 11:	Ext. Alarm 11
Alarm 12:	Ext. Alarm 12
Alarm 13:	Ext. Alarm 13

**Figure 8 Input Alarms Configuration Screen**

## 10.0 Temperature Limit Configuration Screen (Option)

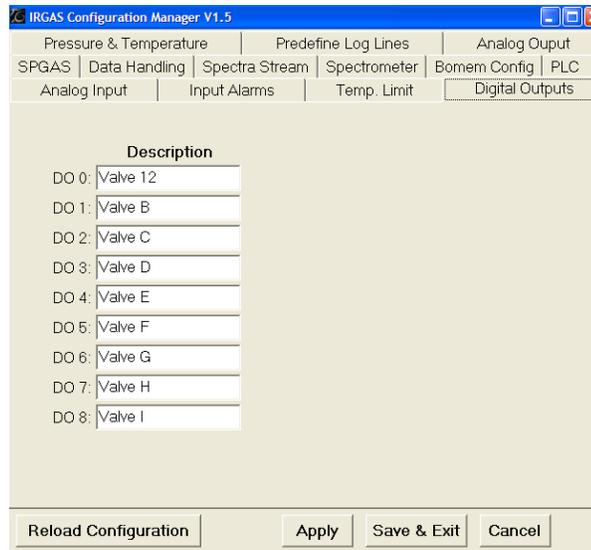
In this screen the user can determine the limit alarm port and the maximum temperature for the system. **This function represent a build in system safeguard, which will prevent to overrun the system designed temperature. The temperature value is preset for the intended use of the system and shouldn't be adjusted.**



**Figure 9 Temp. Limit Configuration Screen**

# 11.0 Digital Outputs Configuration Screen (Hardware Controller Option Only)

The digital output screen lets the user control a piece of hardware on or added to the system using a digital output. The description entered into the screen will also appear in the IRGAS Hardware Controller software.



**Figure 10 Digital Outputs Configuration Screen**

# 12.0 Pressure & Temperature Configuration Screen

The pressure and temperature configurations can be entered in this screen depending on the parameters of the pressure and temperature transducers being used. The desired temperature and pressure port can also be identified in this screen.

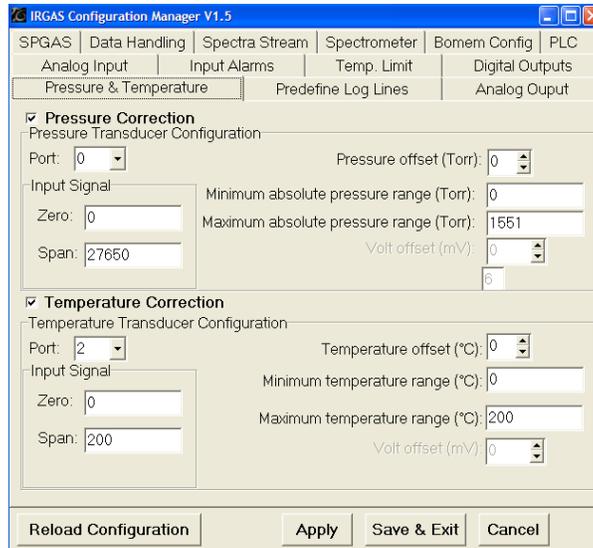


Figure 11 Pressure & Temperature Configuration Screen

## 13.0 Predefined Log Lines

The IRGAS system allows the operator of the system to keep log records during the operation of the system. Particular notes about the test being performed can be stored in this log. These log records are kept in the same folder as the quantification log; therefore, an individual log record is generated each day.

Sometimes these logs have repetitive phrases where only a small portion of the text changes to reflect the name of the test, a change in collection conditions, etc.

The predefined log lines screen allows the user to define up to 20 predefined log lines commonly used by the type of application where the system is used.

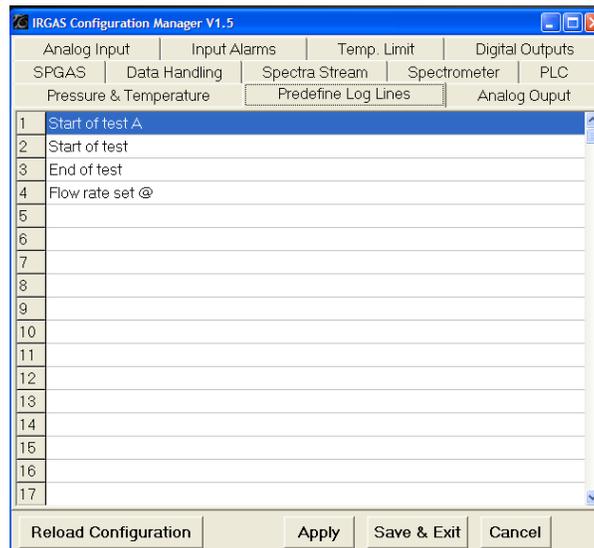


Figure 12 Predefined Log Lines Configuration Screen

## 14.0 Gas Concentration Output Configuration Screen (Option)

The IRGAS system can output the estimated concentration of the gases being measured as an analog output. In this screen one can chose between different output signal to use, depending on the user's preferences, and its corresponding parameters.

The *Active* check box allows to turn on or off the output of the analog output port been configured.

The *Zero* and *Span* value represent the unit size of the PLC to map the range of the analog output. i.e. if the output range is 0-10VDC, 0 correspond to 0VDC and 32000 will correspond to 10VDC.

The *Output SpectralSet* represents the element number from the IRGAS calibration file that will be reported through the analog output port. 0 correspond to the first element, 1 to the second, etc.

The *Minimum Range* and the *Maximum Range* are analogous to the zero and the span for the output signal, but correspond of how the calculated concentration is mapped through the analog output port.

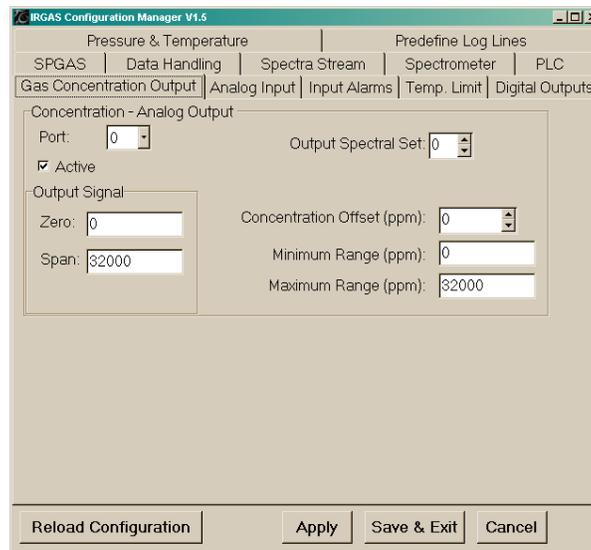


Figure 13 Gas Concentration Output Configuration Screen

## 15.0 Reference Material

- IRGAS-100 LPA Users manual
- FTIR Spectroscopy by Jorge E. Perez and Richard T. Meyer (included into your documentation)
- Fourier Transform Infrared Spectroscopy, Peter R. Griffith/James A. de Haseth