

**IRGAS Script Editor
And
IRGAS Hardware Controller**

Software Operation Manual

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Introduction

The IRGAS multipoint gas analyzer, IRGAS-MPGA, is operated through the use of three software programs. The first of the three is the **IRGAS Script Editor**; this program is used to develop a script that will be executed by the IRGAS Hardware Control Software. A sample script has been provided as an example of what types of functions the script editor is capable of writing. After a script has been produced it can be save into a file which can be opened and executed in the IRGAS Hardware Control software.

The **IRGAS Hardware Control** software is the second of the three programs used to run the system. In this software the script is entered in order to run the remote manifold valves and other components in the system such as the Venturi cooler. It is not necessary to create a new script every time that the system is going to be operated; preexisting scripts can be used. The combination of the script editor and the hardware control allows the system to be automated.

Lastly, while the script is running in the IRGAS Hardware Control software, the **IRGAS** software should be running to collect the spectra from the system. The IRGAS software will not be discussed in this manual in detail, but a separate manual has been provided for this program. To access any of these programs go to the start menu on the controller, view programs, select IRGAS, inside this folder you should be able to find the IRGAS application, and if you go to tools option, you should be able to find the other two applications (i.e. IRGAS Script Editor and IRGAS Hardware Editor).

IRGAS Script Editor

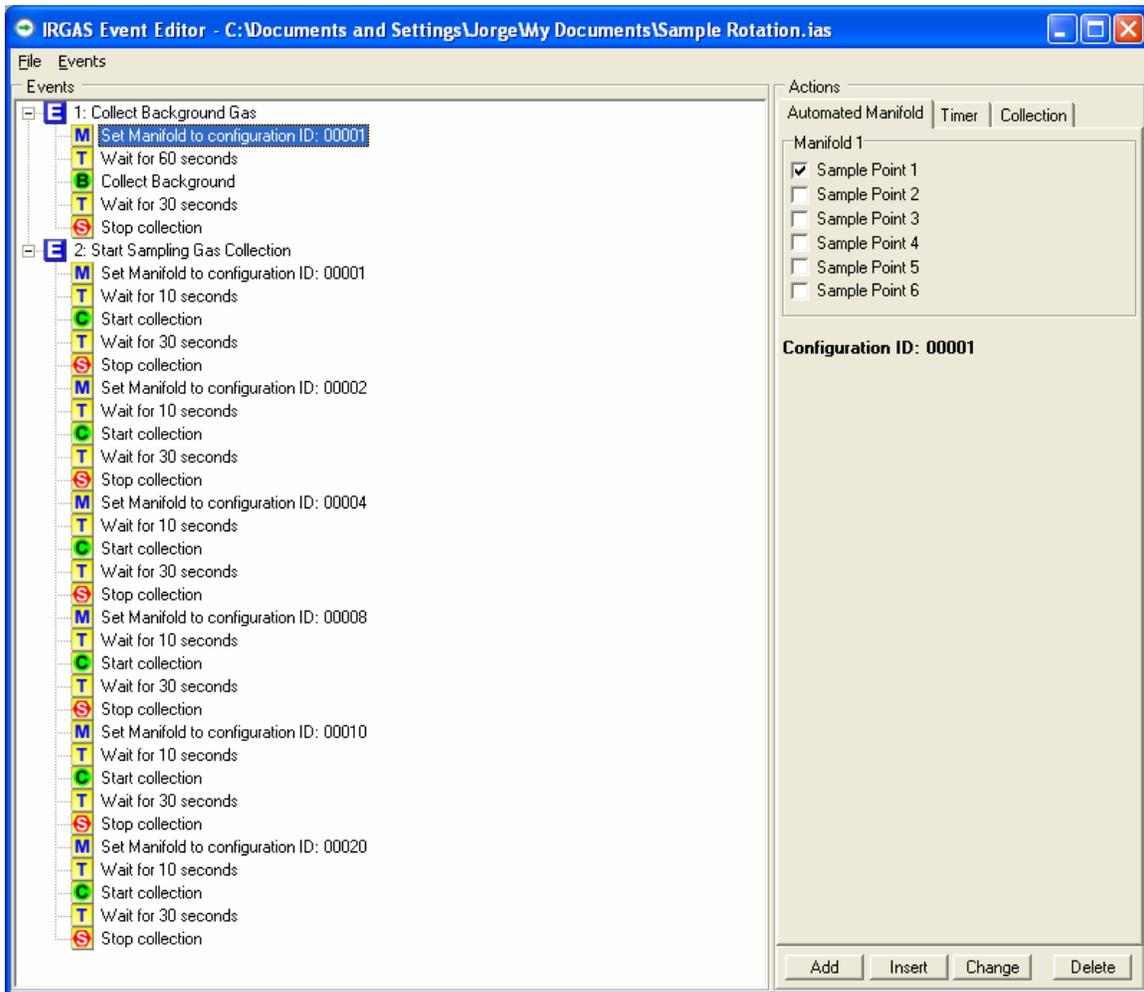


Figure 1 IRGAS Script Editor

As was mentioned previously the IRGAS Script Editor is a software program that allows the system user to write scripts that are placed in the IRGAS Hardware Control software. The script editor *does not* run the script, it only creates the script that is run in the IRGAS Hardware Control software. If a previously created script is going to be used, there is no need to open the IRGAS Script Editor. Instead the user can go directly to the IRGAS Hardware Control program and open the script there, and run it.

Creating a New Script

The first step in writing a new script is to add an event. In the script editor every set of instructions is placed under what is called an event. The event is a “folder”, it will contain all of the actions that pertain to a particular sequence in the script. There is no limitation as to how many events can be added to a script; add as many as is required.

To add an event, open the IRGAS Script Editor program and pull down the event menu. In the menu there are four options: Rename, Add Event, Insert Event, and Delete Event (see Figure 2) select the Add Event option, this should bring up an event, symbolized by an E, and labeled Event, Figure 3. Whenever add is selected whether it be for an event or for an action, the new command will be placed at the end of that individual sequence; if insert is selected then the command will go in between two events or actions that are selected when the option to insert was chosen.

The event can be labeled as the user deems fit; an example would be “set system into purge”. This label could signify that the system is going to be purged when the hardware controller was running this event in the script. To change the name of an event, choose the Rename option in the event pull down menu, this should allow for the user to change the label of the event that has been selected, refer to Figure 2.



Figure 2 Event menu



Figure 3 An event that has been add to the script

Within every Event there needs to be an “action” sequence in the script. The action is where the script is actually telling a component within the system to perform a particular task, such as opening and closing certain valves at specific times. There is an unlimited number of actions that can be placed under an event.

On the right hand side of the script editor screen there are three tabs: Automated Manifold, Timer, and Collection. These three tabs are the main actions that the script editor writes (see Figure 4).



Figure 4 Action tabs in the script editor software

In the Automated Manifold tab, there is a list of all the valves. Here the user can select which valves need to be opened and closed and if anything should be flowing into the system.

The Timer tab allows the user to enter a specific time for an event. A timer action permits the user to specify how long an event or action should take place before continuing to the next event or action. Lastly, the Collection tab is where the user can instruct the script to start collecting a background, sample collection or stop collecting.

The Collection Tab allows the control of the FTIR spectrometer during the gas sampling. IT allows to start and stop the collection of the spectra, and to collect a new background or reference spectrum.

Each of these actions have been given a different symbol that lets the user know when the action has been placed in an event. If an automated manifold action has been added to the sequence, there will be a M under the event. In the case where a timer action has been included in the list of commands then a T will be shown. If a collection action has been added to an event then either a B for background collection, C for start collection, or S for stop collection will appear.

In order to add one of these actions to an event, use the action tabs to choose an action and then press either the Add or Insert button. The names of the actions can not be changed, only the names of the events can be changed. Figure 5 is an example of what a possible script to run the system might consist of.

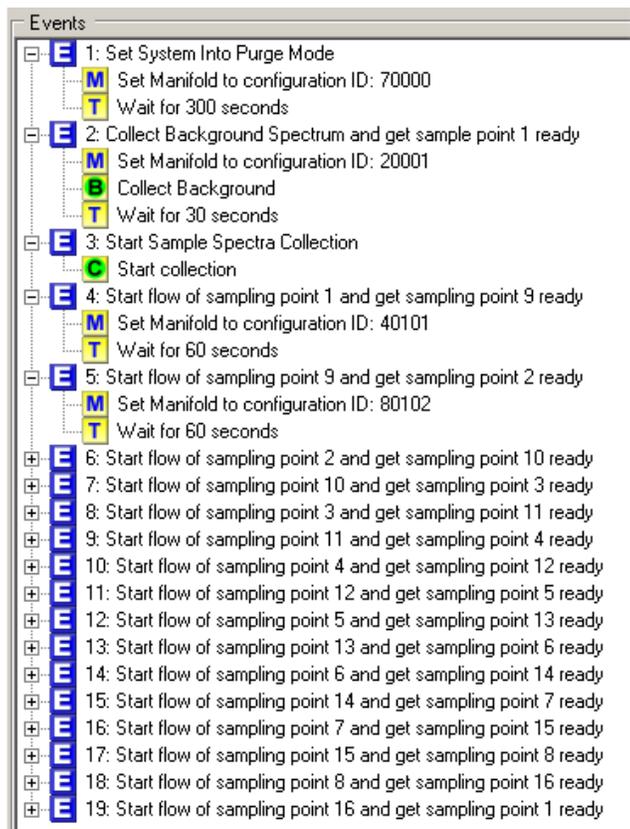


Figure 5 Sample script sequence

Changing a Preexisting Script

If there is a desire or need to edit a preexisting script, start the IRGAS Script Editor, and open the desired script. From this point the script can be edited as necessary, by renaming events or actions, adding or inserting new events or actions, and/or deleting events or actions. It is not necessary to delete and add a new action in order to change that action. To simply change an action the user can select the action that needs the change, make the change using the action tabs, and then press the change button.

After making changes to existing scripts, the user must use the “save as” option and save the script under a different name than the one that was changed. If not the software will not recognize the change and when the script is opened in the hardware controller the original script will appear.

IRGAS Hardware Controller Software

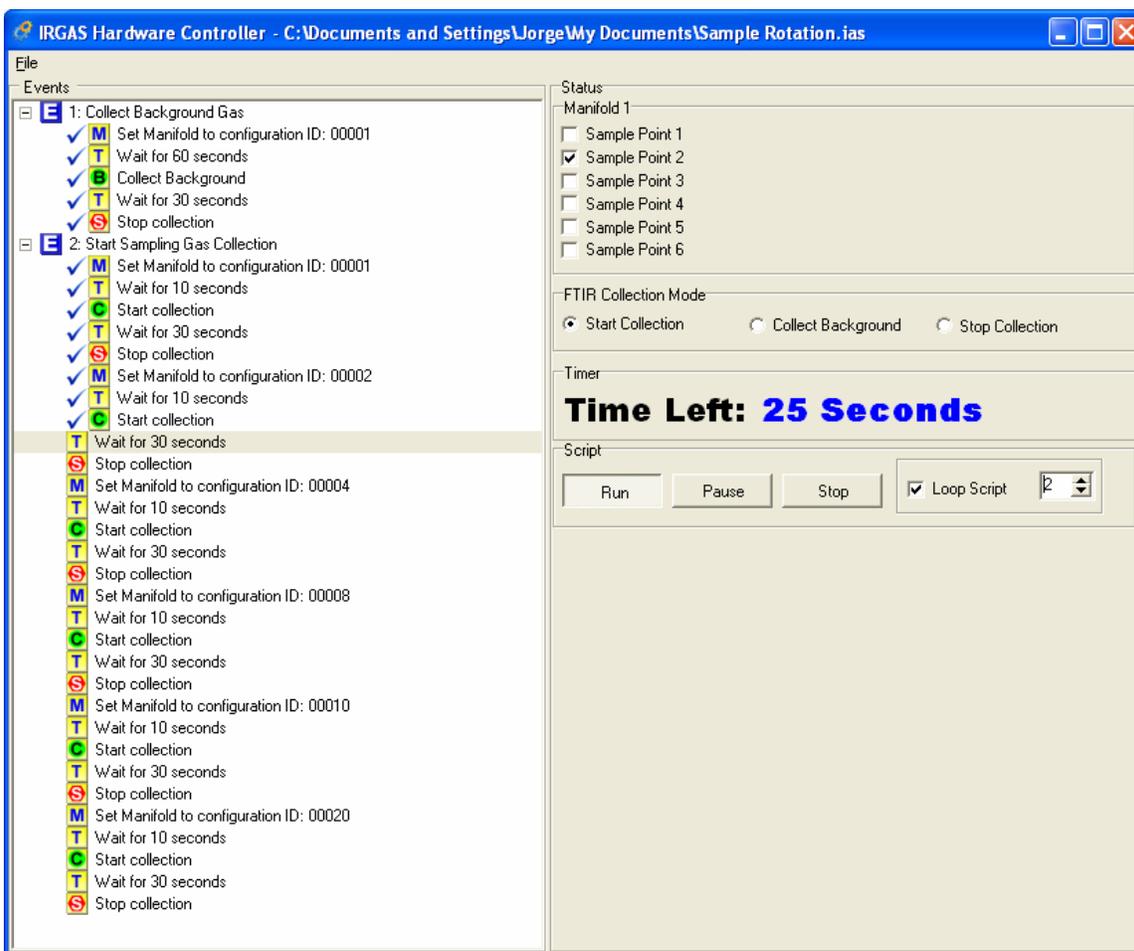


Figure 6 IRGAS Hardware Controller

The IRGAS Hardware Controller is a program designed to manage the scripts that have been created in the IRGAS Script Editor. To start the hardware controller the system must be completely connected as was presented in the CAGT IRGAS Unpacking and Installation Manual. Once the system and computer are connected and on and a script has been written through the script editor, the script can be opened and run in the hardware controller.

The hardware controller provides the user with a variety of information concerning the system's status. The user can see where in the script sequence the system is and how much time is left in a particular action. The hardware controller will also show the user the status of the valves (Open/Close), and if the FTIR spectrometer is currently collecting spectra.

The script editor and hardware controller are set-up in such a manner that the hardware controller can only operate the valves on the remote manifold and control the FTIR functions through a script. The valve control and FTIR functions must first be

written in a script in the script editor and can then be run in the hardware controller. In addition to this if a script is running and needs to be changed; the user must first make the changes in the script editor and then reopen the script in the hardware controller to run the changes.

Towards the bottom of the right hand side of the screen is the timer section. In this section there is a time left record, letting the user know that for a particular action there is a said amount of “time left” until the hardware controller runs the next portion of the script. The script will run from one event to the next until there are no events left in the sequence. However, there is a looping option in the hardware controller that allows the user to set the script to cycle continuously through all of the events until the script is stopped. To choose the looping option select the box that is located under the script section of the screen on the bottom right hand side. See **Error! Reference source not found.**



Figure 7 Time left record and looping option

Running a Script

To open a script go to file, open and select the desired script to open. Once the script is opened, it should appear on the left side of the screen, see Figure 8.

To start running a script after it has been opened, press the run button on the bottom right side of the screen. To show that a particular action in the script is running there will be a blue checkmark next to the action. To stop running a script the user must press the stop button. There is also an option to pause a script if the user sees fit, refer to Figure 9. To reiterate, if changes need to be made to a script whether it is currently running or not, the user must change the script in the script editor and then reopen the script in the hardware controller.

Once the script has started to run, it will run uninterrupted until it has reached the end of the script. If required, the script can be put into loop mode, where at the end of the script, the script will go back to the marked Event Number inside the loop box.

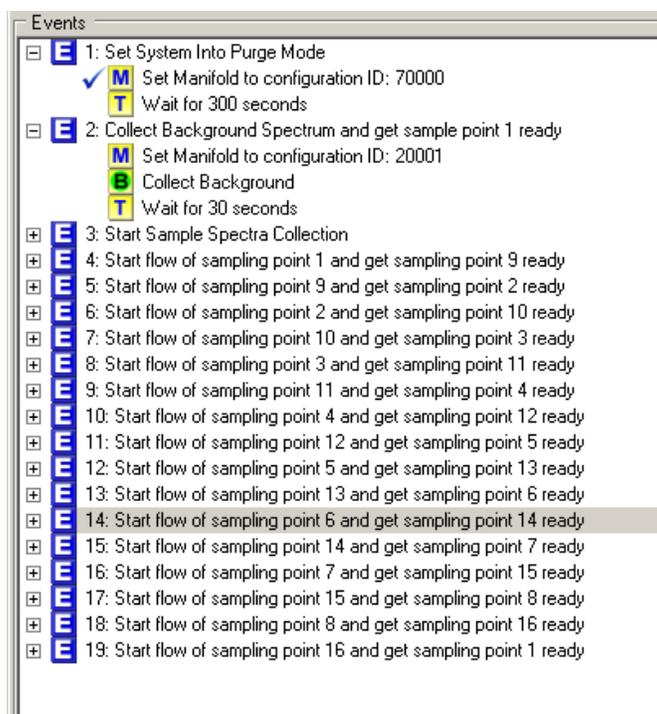


Figure 8 Opened script

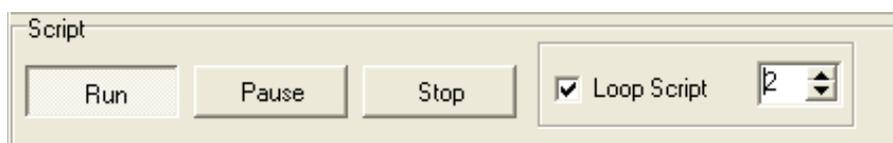


Figure 9 Script screen section

For the system, to be able to control the FTIR spectrometer, the IRGAS application must be running. For more details about the IRGAS application software, refer to its software manual included in the Instruction Manual Binder.

Appendix A PLC Registers

Registers Header

Reg		DEC	HEX
0	System ID	17248	4360
1	Version	256	0100
2	Number of Registers		
3	Register StartPoint		

Register Type Description

Register Type	Hex	Description
0	00	WatchDog
1	01	Mirror Position Set
2	02	Mirror Position Read
3	03	Pressure Set Point
4	04	Pressure Read
5	05	Temperature Set Point
6	06	Temperature Read
7	07	Valves Set
8	08	Valves Read
9	09	Analog Input
10	0A	Analog Output
11	0B	Alarm Set
12	0C	Alarm Read
13	0D	Digital Output
14	0E	Digital Input
15	0F	Spectrometer Control
16	10	Event Pointer
17	11	Gas Concentration

Register Configuration

Reg		Description	DEC	HEX
0	VW0	System ID	17248	4360
1	VW2	Version	256	100
2	VW4	Number of Registers	4	4
3	VW6	Registers Starting Position	20	14
4	VW8	Valve Group Set	1793	701
5	VW10	Spectrometer Control	3841	F01
6	VW12	Event Point	4097	1001
7	VW14	Gas Concentration	4353	1101
20	VW40	Valve Group (1-6)	0-64	
21	VW42	Spectrometer Control	0-4	
22	VW44	Event Point	0-32000	
23	VW46	Gas Concentration (1)	0-32000	

Appendix B Gas Exchange Response Time

Eagle C2 - Time required to Exchange 3 Times its Volume

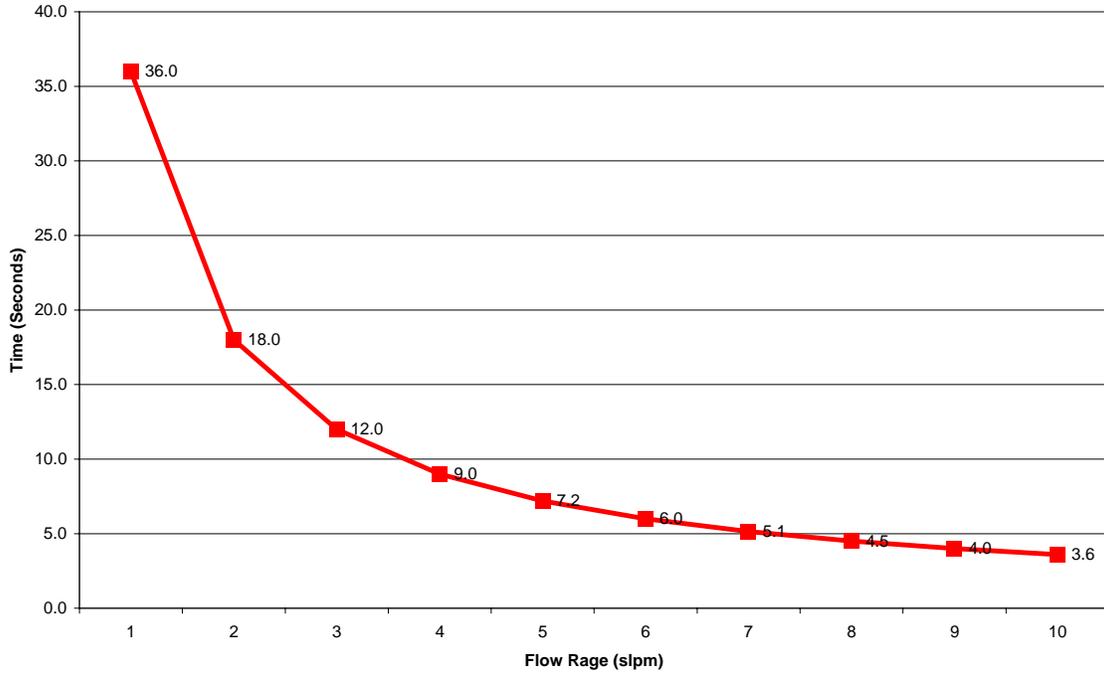


Figure 10 Gas Exchange Response Time

Appendix C Effects of Flow rate over Gas Cell Internal Pressure

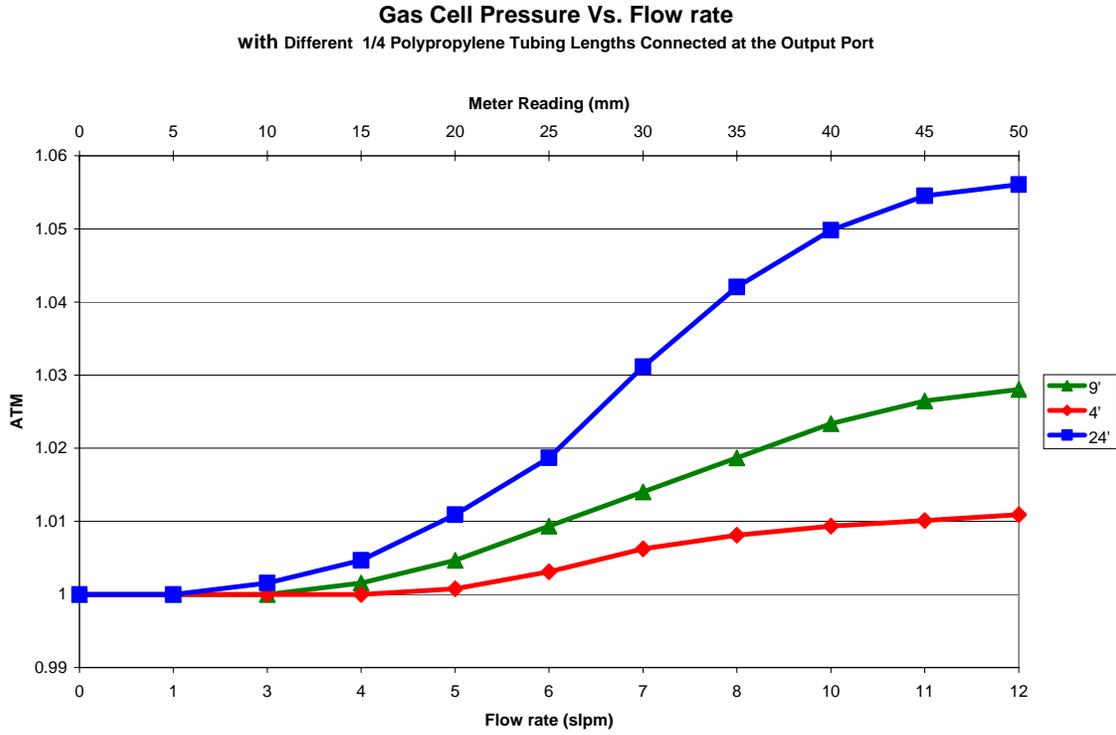


Figure 11 Gas Cell Pressure Vs. Flow Rate

Appendix D Electrical Diagram

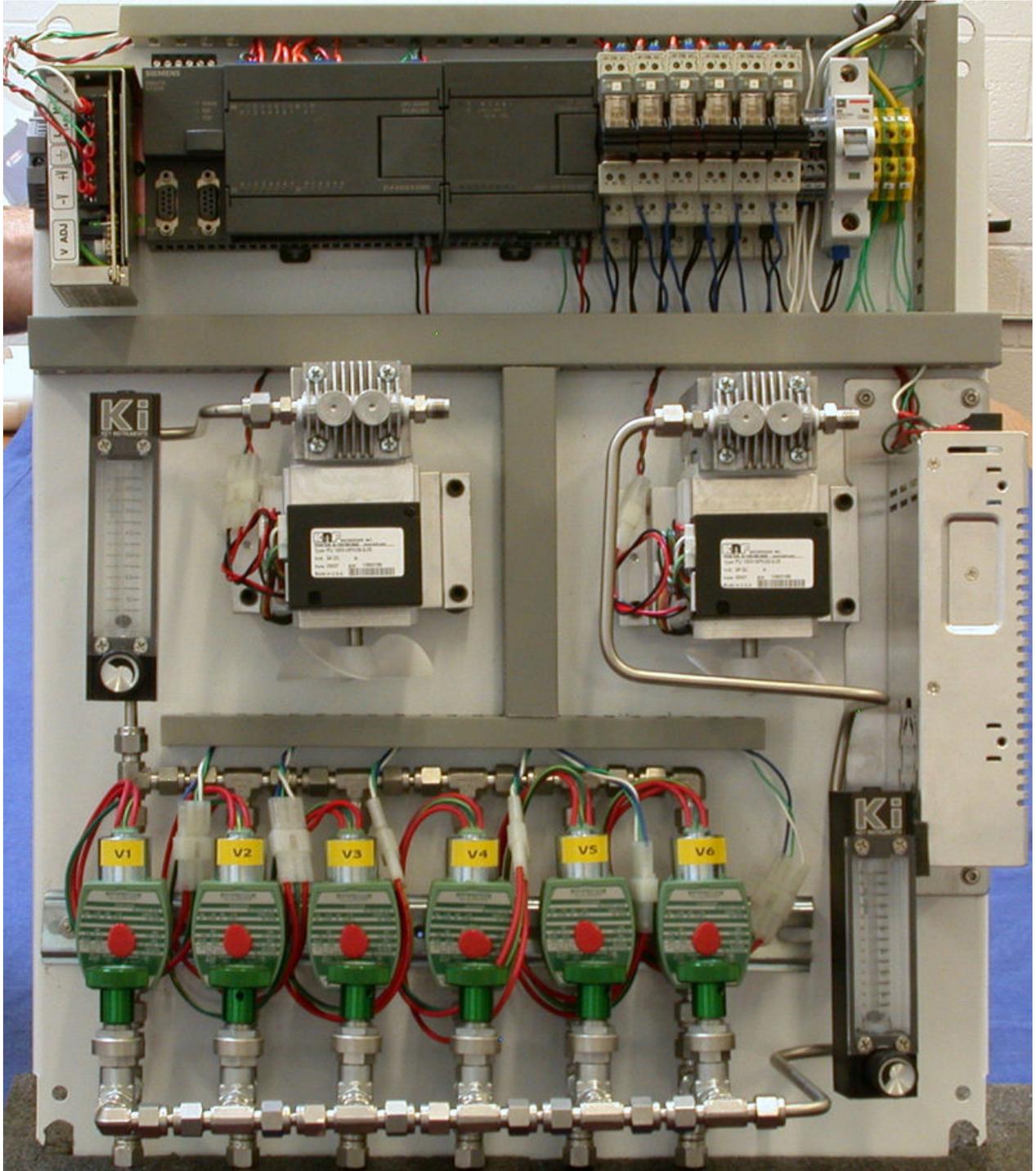


Figure 12 Automated 6-Point Sampling Manifold

Appendix E PLC Program