



SIXNET AGA Gas Flow Demo Instructions

Overview

This demo helps you try out the SIXNET AGA Gas Flow application software on a trial basis. Run it as a simulation with test data in the convenience of your office, or connect it to a live application for up to one week. This software will run in any IPm or ST-GT-1210 controller or RTU. No licensing is required to run this demo. Please note that this demo will configure one gas run only, and is limited to one week of continuous operation. You will need to install the SIXNET I/O Tool Kit to run this software. No licensing is required for trial use of this software except if you wish to also use ISaGRAF and or Sixlog as well.

Installation of This Demo

1. Install the SIXNET I/O Tool Kit. The latest copy may be downloaded from www.sixnetio.com. Please note that licensing is required in order to use certain features of this software. Contact SIXNET if you wish to arrange a special time-limited demo license for this software.
2. Download the latest SIXNET AGA Files.exe. The files in this executable will be extracted as appropriate to your \sixnet tools\projects, \programs and \programs\ipm_firmware folders.
3. From the “Pre-configured Gas Flow Stations” list below, choose a type of AGA calculation to simulate. The station **AGA3_Dens_IPm** is recommended as a starting point.
4. Proceed with “Suggested Demo Simulations” on the next page.

Pre-configured Gas Flow Stations

For your convenience, a SIXNET I/O Tool Kit project file named ‘AGA_SIXNET_DEMO_SAMPLE.6pj has been supplied. This project file has six sample IPm stations, each pre-configured to run a particular type of AGA calculation. You may use one of these pre-configurations as is, modify them as you wish, or using them as examples, integrate your own gas flow configuration into an existing project file.

Station **AGA3_Dens_IPm** does AGA 3 (orifice plate) flow calculation with the density coming from an external density meter.

Station **AGA7_Dens_IPm** does AGA 7 (turbine meter) flow calculation with the density coming from an external density meter.

Station **AGA3_8_Fixed_IPm** does AGA3 (orifice plate) flow calculation with AGA8 density calculation using fixed gas composition parameters entered in the AGA configuration utility.

Station **AGA7_8_Fixed_IPm** does AGA 7 (turbine meter) flow calculation with AGA8 density calculation using fixed gas composition parameters entered in the AGA configuration utility.

Station **AGA3_8_Ext_IPm** does AGA3 (orifice plate) flow calculation with AGA8 density calculation using gas composition parameters from external registers.

Station **AGA7_8_Ext_IPm** does AGA 7 (turbine meter) flow calculation with AGA8 density calculation using gas composition parameters from external registers.

Suggested Demo Simulations:

This suggested procedure will help you quickly load this software and inject known data to demonstrate the software and verify its accuracy. It is recommended that you begin with the **AGA3_Dens_IPm** station which includes an AGA3 calculation based upon an external density measurement.

1. Run the SIXNET I/O Tool Kit. Open 'AGA_SIXNET_DEMO_SAMPLE.6pj'. Highlight the sample station with the type of calculation you wish to test. The station' **AGA3_Dens_IPm** is recommended.
2. Change the IP address, serial number (required) and station type (if necessary) to match your IPm-based controller.
3. Select Operations →Load →Load All Now (Predefined files) command. This will load the basic configuration, the pre-configured datalog files and AGA configuration into your IPm controller.
4. Select Operations →Load →Load Software. This will load the AGA runtime driver into your controller. Cycle power to the controller after this load is complete.
5. Open one or two Test I/O windows. After you enter the appropriate floating input values below, the calculated outputs will be visible in the floating output registers indicated.

Enter the following floating point input values in a Test I/O window. These are typical values for AGA3 with an external density meter:

FI0 = Gas flowing density in lbm/ft³, enter 0.31109

FI1 = Gas flowing temperature in deg. F, enter 50.00

FI2 = Gas flowing pressure in PSIA, enter 100.00

FI3 = Gas flowing differential pressure in inH₂O, enter 2.2484, 20.2360, 56.2110, 110.1736, 224.8440, 323.7754 or 440.6943

In floating point output registers you should obtain the following results, respectively:

FO0 = Gas Volumetric Flow in scf / hr @ standard conditions (60 F, 14.73 PSIA). You should see a value of 1.36298E+03, 4.06737E+03, 6.74645E+03, 9.38524E+03, 1.32336E+04, 1.57028E+04 or 1.80765E+04, depending on the value you entered in FI3.

FO1 = Gas Mass flow in lbm/hr. You should see 6.02575E+01, 1.79819E+02, 2.98261E+02, 4.14922E+02, 5.85056E+02, 6.94220E+02 or 7.99160E+02, depending on the value you entered in FI3.

FO2 = Total transferred gas volume during the contract period in scf. This value should increment in the corresponding volumetric flow value over time

FO3 = Total transferred gas mass during the contract period in lbm. This value should increment in the corresponding volumetric flow value over time

Note: The AGA calculation can be stopped, reset and restarted by toggling the Run_1_Control bit, which is discrete input 12 (X12) in this demo.

Demo Topics of Interest

1. Viewing the Supplied AGA Configuration Files

To view the supplied AGA configurations, run the SIXNET I/O Tool Kit. Open the project 'AGA_SIXNET_DEMO_SAMPLE.6pj'. From the Tools menu, select 'Configure IPm Gas Flow Computer'. Enter '1' for the User ID and click 'Accept'. A window will open with a tree list of the six stations. These stations should be displayed in blue. As you expand the tree, the various configuration settings will be displayed to the right of the tree.

2. AGA Runtime Driver for the IPm

The tarball (Linux self-installing) file SXIPMAGA-DEMO-1.2.0.tar.gz contains a demo version of the AGA runtime driver for your IPm-based controller. You can automate the inclusion of this driver into an IPm controller by adding the driver to the "User Software" list in the IPm's configuration window. Then to load the driver, select Operations → Load → Load Software. **This AGA demo runtime driver will run for one week and then shut down.** A reload of the driver will start it running for another one-week period.

3. Overview of the SIXNET AGA Demo Sample Project File

Each sample IPm station in the AGA_SIXNET_DEMO_SAMPLE.6pj file has the three required virtual "datalogging" modules that are used by the AGA runtime driver and also by the API121.1 datalog configurations. Even if the API121.1 datalog feature of the AGA software is not going to be used, the three virtual modules for datalogging must exist in the IPm controller configuration in order for the AGA runtime driver to be able to perform calculations.

Sample tag names have been configured as appropriate in each IPm station for the type of AGA calculation being performed. These tag names are a good starting point for an actual application and may be modified as desired. Also, the register assignments may be changed if desired, as long as the AGA configuration is also changed to use the new register locations.

Each sample station has its own AGA configuration file (.ini file). These configuration files may be copied to other projects by using the copy feature within the AGA configuration utility.

4. Configuration Components Needed in the IPm to Run AGA Calculations

Here is a summary of the required components for the AGA IPm Add-on. Note that these requirements are documented in more detail in the help file for the AGA configuration utility.

Virtual Modules for Inputs / Outputs

The type and number of registers will depend on the type of calculation. Generally speaking, a small number of floating point input and/or outputs, long input and/or outputs, discrete inputs and/or outputs and analog inputs and/or outputs will be needed in the configuration. The location (starting address and order) of the registers is generally flexible.

Virtual I/O Modules for Datalogging

Three virtual modules are required, even if the API121.1 datalogging feature is not being used. These virtual modules have fixed tag names and fixed register orders. The three modules may be found in each of the IPm stations in the supplied sample projects. You may use the Copy Station / Module feature of the SIXNET I/O Tool Kit to copy these modules to a different station in the same project file or in a different project file.

Datalogging

This datalogging feature requires a license for the Sixlog Datalogging feature set of the SIXNET I/O Tool Kit. The three required datalog configurations are fixed and may be found in each of the IPm stations in the supplied sample projects. You may use the Copy Datalog Configurations feature of the SIXNET I/O Tool Kit to copy them to a different station in the same project file or in a different project file.

5. Modifying this Demo to use Real I/O:

The assigned registers in the demo project are “virtual” registers. In an actual application, it is likely that you would configure Modbus I/O Transfers to read an external density meter or turbine meter (AGA7). If desirable, you can modify this demo to use Modbus I/O by adding your own Modbus I/O Transfers. (Please note that this would require that you own a license for the Scalable Control Systems (SCS) feature set of the SIXNET I/O Tool Kit.) Your I/O Transfers may place the Modbus values into the same virtual registers used in the demo project, or you can assign your own group of registers and change the AGA configuration accordingly.

6. Using the Licensed Version of the AGA Add-on Instead of the Demo Version:

When you purchase a license for the AGA Add-on software, a different version of the AGA runtime driver for the IPm will be supplied to you. Once you register the Add-on software, the licensed runtime driver will run continuously and the IPm will support up to five runs performing the same type of calculation.

The sample project file supplied in this demo will run with the licensed version of this software.

A sample project file, AGA_SIXNET_SAMPLE.6pj, will be provided with the licensed software. This project file is very similar to the AGA_SIXNET_DEMO_SAMPLE.6pj file provided in this demo. It is SIXNET’s suggestion that you choose the appropriate IPm station configuration in this sample project and copy it to your own project file as a starting point for your actual IPm application. Many of the assigned registers in the sample project are “virtual” registers. In an actual application, it is likely that you will configure Modbus I/O Transfers to read an external density meter or turbine meter (AGA7). You can configure your I/O Transfers to place the Modbus values into the same virtual registers used in the demo project, or you can assign your own group of registers and change the AGA configuration accordingly.

Suggested Software Licenses for AGA Gas Flow Applications

SXIPM-AGA3-#	AGA3 Runtime and Configuration software, with licenses for ‘#’ runtime licenses
SXTOOLS-3	I/O Tool Kit with SCS (I/O tag management and Sixlog datalogging capabilities)
ST-1131-##	ISaGRAF Workbench (development tools) for 256, 1K, or 4K external tags