



RealFLO™ Multi-run Gas Flow Computer Software

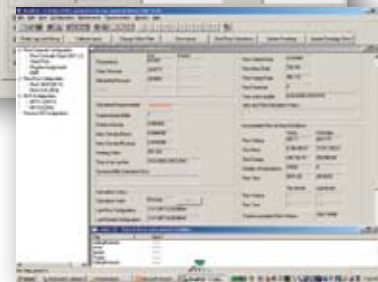
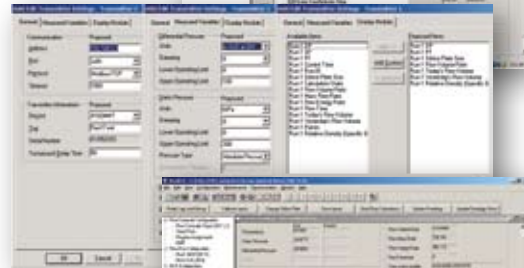
Weatherford's RealFLO multi-run gas flow computer (GFC) software converts any SP series controller into a full function GFC, while retaining the controller's inherent logic programmability. The result is a versatile GFC that is well suited to a wide variety of oil and natural gas applications. Any application requiring gas flow measurement, a programmable logic controller (PLC) for local control and a remote terminal unit (RTU) for communication is a candidate for automation with RealFLO software.

Overview

The program provides AGA-3 orifice plate, V Cone and AGA-7 turbine meter flow measurements with AGA-8 or NX-19 gas density calculations. In meeting the requirements of API 21.1, custody transfer, the software provides 35 days of hourly and daily averages, 700 user changes and events as well as 300 process alarms. No additional logic programming is required to use the software; it is complete and ready for configuration and use.

Software configuration is provided by an intuitive, windows-based program that executes on Windows® 98/ME/NT/2000/XP operating systems. Users who wish to integrate SP series controllers into existing SCADA systems will benefit because they use Modbus® native communication protocols. Custom protocols can also be added by implementing the C and C++ toolkits.

With SP32 series PLCs for example, 10baseT Ethernet can be used for high-speed remote configuration and data collection via wireless Ethernet radios. Any human machine interface (HMI) software package, distributed control system (DCS) or supervisory control and data acquisition (SCADA) master that uses Modbus protocol can be used as the front-end. Any host computer can read historical data logs and reconfigure RealFLO software through the SCADA communication system. The program integrates seamlessly into existing SCADA systems.



An intuitive windows-based program takes the user through multiple views. This allows historical data comparison with event logs and ease of configuration of the meter runs.

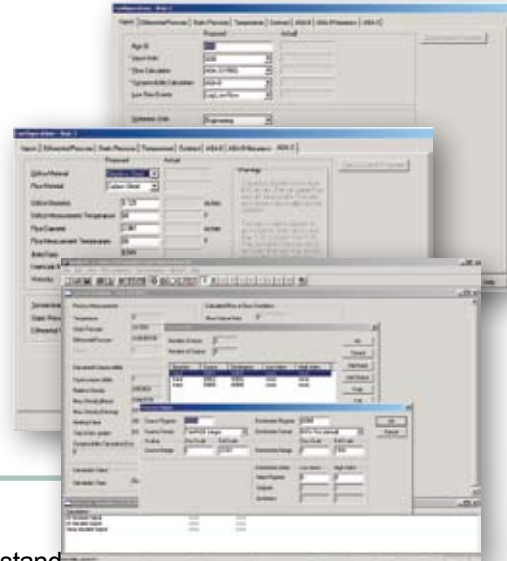
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Modbus is a registered trademark of Modbus Organization, Inc.



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Applications

- Gas well measurement and control
- Separator measurement and control
- Flow measurement
- Industrial energy consumption measurement
- Pipeline balancing
- Pipeline transmission station automation
- Coal bed methane
- Point of delivery (POD) automation
- Well head measurement and automation



Features, Benefits and Advantages

Modbus Protocol Interface

The software is completely configurable and accessible using standard Modbus protocol commands generated by the RealFLO configuration utility or any other host computer equipped with Modbus. Configuration and historical data retrieval can be done locally or through the SCADA network. Gas composition can be changed from the SCADA master. Field technicians do not need laptop computers or flow computer training when changing orifice plates.

Standard EFM Modbus Interface

Standard electronic flow measurement (EFM) interface is used with Enron Modbus SCADA systems. This standard interface allows SP series GFCs to be integrated into existing EFM SCADA networks. The unique architecture provides two simultaneous methods of communication with one SS 4203 GFC, even if only one communication port is used. The first method of communication accesses data through a uniquely addressed standard EFM Modbus interface. The second accesses data through the usual Modbus addressed RTU/PLC interface. Flow measurement data is obtained by addressing the EFM Modbus interface while the Modbus protocol interface is used for monitoring and programming ladder logic programs online, collecting logged data and downloading custom C programs.

An intuitive configuration of the meter run parameters can easily be loaded into the GFC via the "write button" command.





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Features, Benefits and Advantages (continued)

Programmable for Control

RealFLO executable code is a software extension in SP series PLCs. This means that the controller's relay ladder logic, multitasking C/C++ programmability or IEC 61131 and programmability remains available for sequencing and feedback control applications. You can use the SS 4203 GFC to measure gas flow while relay ladder logic, proportional-integral-derivative (PID) controllers, and C/C++ programs can be used to control the process, switch meter runs, etc. RealFLO software combines the functions of a PLC, a multi-run flow computer and an RTU, in a compact, cost-effective package.

Universal Primary Variable Interface

The program is compatible with 4 to 20 mA/1 to 5 Vdc transmitters plus single or multivariable transmitters (MVT) using HART, Modbus and Ethernet. If you choose to use an SS 4102 MVT or other Modbus-based MVT, the software allows you to completely configure and calibrate the transmitter from within the RealFLO configuration utility.

Versatile Communications

All components support radio, Ethernet, dial-up modem and dedicated modem communications. This versatility allows users to configure the SS 4203 GFC, download new C programs and monitor and change logic programs remotely over the communications network. Future upgrades to the controller firmware and AGA standards can be remotely implemented.

Input/Output Expandable to Over 650 Points

The software uses the powerful SP series controllers as its hardware platform. With standard input/output (I/O) counts from as small as four points, these PLC/RTU controllers can be expanded to more than 650 I/O points, simply by plugging in more I/O modules. You can use the same hardware for all your oil and gas automation needs.





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GFC Components

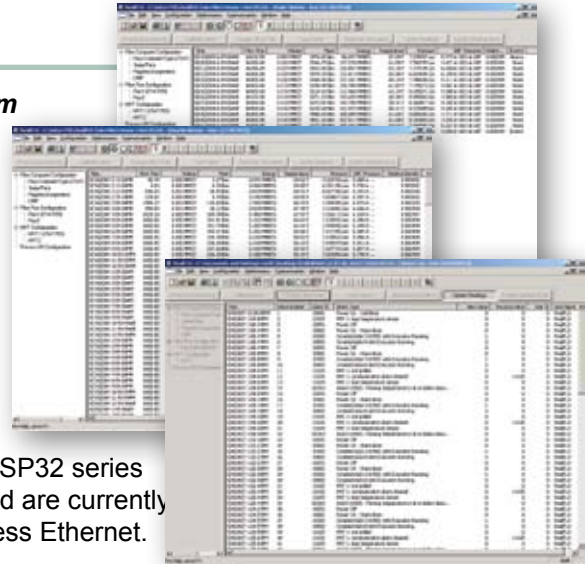
SP Series PLC or SS 4203 GFC Hardware Platform

RealFLO GFC software runs in all SP series controllers. Each is ideally suited to support EFM applications.

- SP32 series PLCs are high powered ten run flow computers used wherever wells are either close together, or where many runs are measured together such as at headers, gas plants, transmission stations or coal bed methane pods. The PLCs are the processor-only version and are suited for locations where local PLC control of I/O is not required. With Ethernet capability, the SP32 series PLCs are ideal candidates for LAN applications and are currently installed in several production fields that use wireless Ethernet.
- The SP350 is a well-rounded PLC with the same on board I/O complement as the SP32 series PLCs. The SP350 PLC accommodates two gas flow runs and has the same expansion capability as SP32 series PLCs.
- SP P-series PLCs offer flexible options for those applications which require a mix of analog and digital I/O coupled with multiple communication ports.
- SPLP series PLCs are ideal for applications that require low power along with a mix of analog and digital I/O and multiple communication ports.
- The SP100 PLC is a one run flow computer that is ideally suited for EFM applications requiring small amounts of I/O while maintaining custody transfer gas measurement data.
- The highly integrated SS 4203 GFC incorporates a multivariable sensor and a complete PLC. It can be used in a wide range of process control applications including well optimization, pressure control, odorant injection and more. Coupled with a second multivariable transmitter, it can be used as a two run GFC.

RealFLO Executable Code

The executable code is an executable C or C++ program. It is provided by Weatherford and is written to SP series controllers with the RealFLO configuration utility.



Alarm and event logs record process and configuration changes. Hourly and daily historical logs provide AGA flow data for up to 35 days. Configuration and logged data may be exported and kept digitally or printed as desired.





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GFC Components (continued)

RealFLO Configuration Utility

The configuration utility operates on a PC running Microsoft® Windows, and is used to download and configure the SS 4203 GFC. The configuration utility was designed in consultation with end users and consulting engineers to make commissioning a flow computer as intuitive and efficient as possible. It allows online or off-line configuration of the gas flow run operating parameters. History and event data may be uploaded from the SS 4203 GFC into CSV files and subsequently exported into CFX format for import into Flow-Cal's® EGM software for further use and analysis with any spreadsheet or database gas measurement software. This utility offers a user-friendly environment that is intuitive for any user familiar with Windows. It also provides all the tools necessary to confirm correct operation of the SCADA system interface to the flow computations during system startup and configuration.

The configuration utility can also configure SP series controller's operational parameters, including communication-port settings, I/O register assignment, real-time clock and DNP settings. It provides a utility to automatically scale any SP series PLC process I/O.

Custom register views can be created to display any combination of flow computer and controller I/O database registers thereby facilitating process data monitoring.

Modbus MVT Integration

The RealFLO configuration utility allows users to completely configure and calibrate any SS 4102 (or similarly mapped) MVT from within the GFC itself. This feature greatly simplifies installation and maintenance when multiple transmitters are connected to one SP series PLC. It also allows for remote re-spanning of ranges for optimal measurement without a site visit.

Automatic Audit Trail and Log Retrieval

The configuration utility's unique scripting capability allows users to automatically retrieve all the data required by API 21.1 audit trail requirements. Scripts may be launched from an HMI or Windows scheduler with data being saved in RealFLO binary format as well as standard CSV or CFX files.



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GFC Components (continued)

Custom C/C++ Enhancements and User Defined Events

C Function libraries are provided to allow users to extend the application for custom protocol drivers, enhanced data acquisition for pilot projects or automatic configuration of flow computer parameters on power up. With the versatility provided by C/C++, the user can add virtually any function.

TelePACE™ relay ladder logic and C/C++ programs can store custom events in the event log, along with previous and new values. This capability is particularly valuable to record special events that are not normally part of the GFC operations.

Examples could include communication error events and process alarm conditions. User defined events are allocated to a specific numeric range to prevent tampering of flow computer events.

Specifications

General	
Flow calculations	AGA-3 (1992/2000); AGA-7; V-Cone
Density calculations	AGA-8 (1992); NX-19
Measurement update	Once-per-second; up to ten gas flow runs
AGA-3, 7 calculation update	Once-per-second
Alarm and event log	300/700 (per API 21.1 and Measurement Canada)
History	35 days hourly and daily
Passwords	Four levels with log of user ID during access
SP Series PLC Hardware	
Maximum I/O	Expandable to more than 650 I/O points
PID controller blocks	32, single or cascaded
Communications	Radio, leased line, phone, cellular, microwave, Ethernet or satellite
Protocols	Modbus RTU/ASCII standard Modbus TCP with 3232DNP-3, Enron Modbus DF1 optional Custom protocols possible
Multivariable transmitter	Seamless integration of SS 4102 or any similarly mapped Modbus-based MVT Configuration Calibration
PC Requirements to Run RealFLO Configuration Software	
Operating system	Windows 98/ME/NT/2000/XP
Memory	Minimum 8 Mb
Hard disk space	2.5 Mb
Pointing device	Mouse or compatible

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