



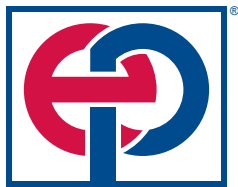
VistaFlo™ Electronic Flow Measurement (EFM) Solution

Single and multi-run flow measurement solution for natural gas, custody transfer and liquid metering.



Weatherford®

VistaFlo EFM Solution



Production Optimization

Weatherford International's production optimization group, eProduction Solutions (eP), provides solutions to increase production and lower lifting costs in green and brown fields. We deliver agile, well-supported products and services that foster innovative optimizing approaches for flowing wells and all forms of artificial lift. The software, hardware and completions solutions help you work better, smarter and faster.

Overview

The *VistaFlo* EFM family of hardware and software technologies is used for determining the flow of natural gas or fluids for well testing and custody transfer. The technology is field proven with over 130,000 units installed worldwide. With a warranty that is one of the best in the industry and a global support structure, *VistaFlo* customers have peace of mind that they have quality equipment and local service available to fit their needs. Tight coupling between hardware design, assembly, test and quality control results in extremely high reliability and customer loyalty. Continuous investment in new technology and the union of products into comprehensive production solutions enables Weatherford to provide customers with a single source for production optimization needs.

Features

High Accuracy

Components have been rigorously tested in laboratory and field conditions. They have proven themselves with accuracy and drift levels second to none. For example, the 4102 multi-variable transmitter (MVT) has an accuracy of $\pm 0.05\%$ of span and long term drift stability of $\pm 0.05\%$ of the upper range limit (URL) per year over five years.

32-bit Processing

Speed added from redesigning the tools in a 32-bit format provides faster processing time and ultimately allows the instrument to be more robust. Since the individual processes occur faster, there is more time for additional scans or features.

Scalable from Simple to Complex Configurations

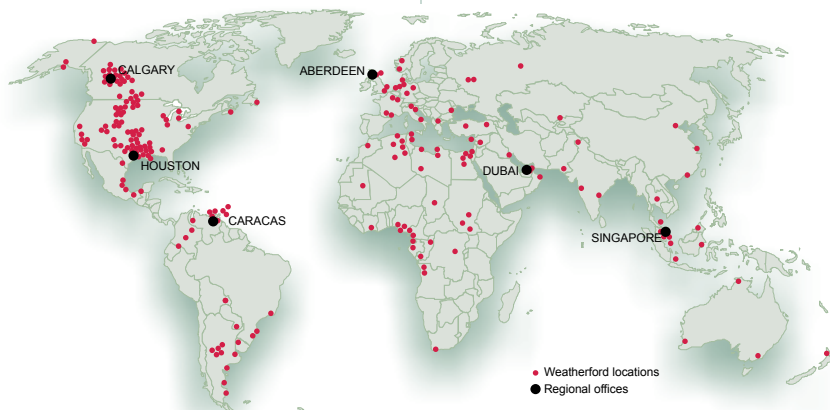
Because of the number of different products available from Weatherford, a solution that accurately meets your needs is to be expected. A small system can be integrated initially and expanded to a complex solution to accommodate growth in the field's infrastructure.

Integrated with Field Optimization Software

Data retrieved from EFM systems can be incorporated into Weatherford's **LOWIS™** life of well information software. This provides real-time monitoring and predictive analysis of the wells.

Low Power (Solar) Applications

The units require little electricity to function and can be powered by moderate solar panels or Weatherford's GT-400 gas turbine generator, which converts energy from the natural flow of gas lines to as much as 400 Watts of reliable electricity.



Hardware and Software Components

Weatherford's EFM solution includes a full range of hardware and software products to meet your application requirements. The components can be tailored to your specific EFM needs.

Hardware

VistaFlo hardware products include SP series programmable logic controllers (PLCs), SS 4203 gas flow computer (GFC), SS 4102 Modbus® multivariable transmitter and the Vision™ series of panel mounted keypad/displays.

- SP32 series PLCs are high performance 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 input/output (I/O) is not required. With Ethernet capability, the PLCs are ideal candidates for LAN applications and are currently installed in several production fields that use wireless Ethernet.
- SP350 series are well-rounded PLCs with the same on board I/O complement as the bigger SP32 series PLCs. The PLCs accommodate two- or four-run custody transfer options and have the same expansion capability as SP32 series PLCs.
- SP P series PLCs are flexible controllers complete with integrated power supply, analog and digital I/O and serial communications. As the flagship of Weatherford's SP series of PLCs, these controllers offer flexible options for those applications that require a mix of analog and digital I/O coupled with multiple communication ports.
- The SPLP model PLC is a low power controller complete with integrated power supply, analog and digital I/O, serial communications and turbine flow meter counter inputs. The controller is 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 cost-effective, 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 SS 4203 GFC is a highly integrated gas flow computer that incorporates a multivariable sensor and a complete PLC. The GFC runs in all SP series controllers. 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, the GFC can be used as a two-run gas flow computer.



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- Weatherford's SS 4102 multivariable transmitter offers precise measurements of temperature and process and differential pressures. As a fully digital transmitter, the product offers a built-in choice of Modbus[®] protocol over serial and/or Ethernet communications along with an optional proportional-integral-derivative (PID) controller and analog output. With this choice, the unit can be used in a wide variety of installations including low power transmitters in remote locations or as an addressed device offering control and measurement in an extended Ethernet network.
- For at-the-well readout and control, Weatherford offers two versions of its Vision keypad/displays.
 - The Vision 10 unit displays two lines of 16 characters each. It has six programmable function keys and two programmable LED indicators.
 - The Vision 50 unit has all the same features as the Vision 10 model, however it displays four lines of 20 characters each, has 20 programmable function keys and 8 programmable LED indicators. In addition, there are 32 alarms available on this unit.

Software

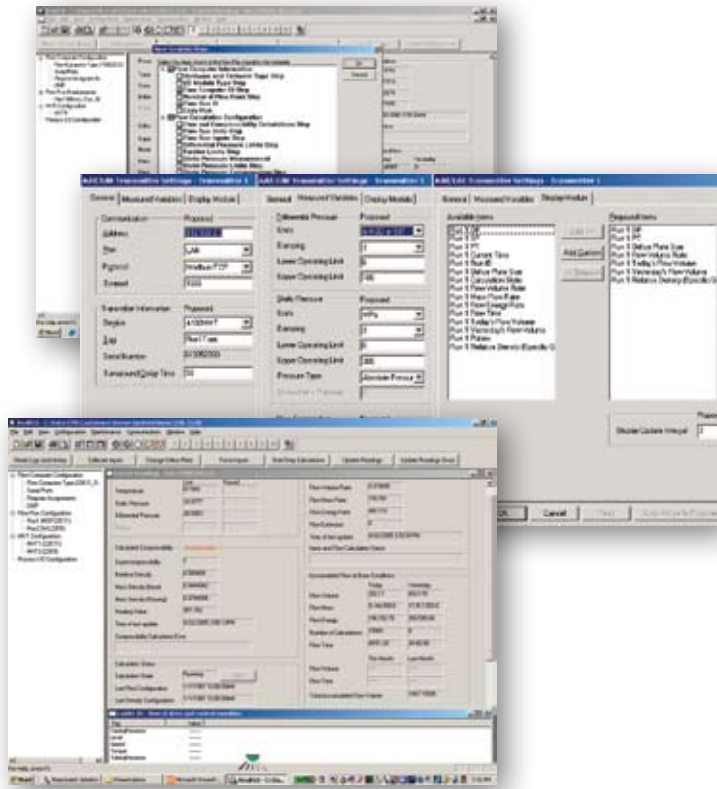
Weatherford's *VistaFlo* EFM software solution includes RealFLO™ GFC, TelePACE™ ladder logic editor (LLE) and IEC 61131-3 software.

RealFLO GFC Software

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

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





RealFLO GFC software can be used in a wide range of 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

The software's extensive features include:

- Modbus protocol interface
- Standard EFM Modbus interface
- Programmable control
- Universal primary variable interface
- Versatile communications
- Expandable I/O to over 650 points



VistaFlo EFM Solution



Components of the software include:

- RealFLO executable code, an executable C or C++ program. It is provided by Weatherford and is written to the SP series controller with the configuration utility.
- The RealFLO configuration utility operates on a PC running 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 as efficient as possible. It allows online or off-line configuration of gas flow run operating parameters. 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 the correct operation of the SCADA system interface to the flow computations during system startup and configuration.

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

TelePACE Ladder Logic Editor

TelePACE LLE is a user-friendly, flexible environment for developing, debugging and downloading ladder logic code to SP series EFM controllers. It allows both online and off-line code development and provides local and remote access to your process by using Intranet and Internet technologies. The software also provides controller diagnostic and configuration tools as well as custom functions for SCADA-specific applications.

In addition, the editor allows engineers and electricians to quickly and efficiently develop analog and digital control sequences, configure PID process control, create data logs, calculate flow totals and perform communication functions. TelePACE LLE features include:

- An easy-to-use programming environment
- A comprehensive list of SCADA-specific functions
- Online editing and monitoring
- Off-line development and editing
- A variety of communications media and protocols supported
- C/C++ programs that run concurrently with TelePACE LLE applications



Summary

The *VistaFlo* solution delivers an abundance of technical advantages including:

- Supports up to ten concurrent custody transfer flow runs
- GFC software resides in the SP series PLC operating concurrently with user-written logic applications
- Capable of complete RealFLO software configuration of the SS 4203 GFC and SS 4102 transmitter from the PC
- Local and remote EFM data collection
- Data can be exported to .CSV, PDAs, Excel® or other .CSV compatible applications
- Data can be exported to .CFX format for use in a Flo-Cal measurement system
- Supports all maintenance functions like orifice plate changes and sensor verification and calibration
- Complies with API 21.1 for audit trail requirements
- Integrates into the comprehensive Weatherford production optimization offering

The *VistaFlo* EFM solution provides the accuracy, reliability and expandability needed to meet the requirements for simple to complex flow measurement systems. Whether you require a single component or a turn-key solution, the *VistaFlo* product line provides a modern state-of-the-art system. Because the solution is combined with Weatherford's experience and global support, you are assured that results will meet your current needs and grow with you into the future.





Weatherford[®]

Weatherford International Ltd.
515 Post Oak Blvd., Suite 600
Houston, Texas 77027 USA
Tel: 281-348-1000
info@ep-weatherford.com
ep-weatherford.com



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