

DynamicFB

Foundation Fieldbus Flow Computer



DynamicFB

The DynamicFB Module is compatible with any of our EChart Family Flow Computer products.

These flow computers comply with all the standards required for Oil and Gas measurement and can interface with a variety of primary elements such as Orifice Plate, Venturi, V-Cone, Ultrasonic, Coriolis, Turbine Meters, among others.

The module allows for the flow computer integration into a Fieldbus Foundation installation.

Background

Dynamic Flow Computers, Inc. has over 20 years of experience in the measurement and data acquisition for the Oil and Gas industry. We found our competitive advantage by designing innovative equipment to fulfill the needs of the oil and gas markets.



Our responsiveness to the market's needs is unmatched. Our devices are simple to use, but at the same time are able to perform the most complicated of jobs and under the harshest environments. The accuracy and reliability of our products is always set to the highest industry standards.

Dynamic products are designed to operate in various fields such as petrochemical and refining, wellhead, liquid pipeline and storage, gas pipeline, gathering and product loading.



As a solution provider, our engineers designed one of the first explosion proof liquid and gas flow computers to be placed on the meter run rather than the control room. These meter mounted computers not only reduced wiring costs dramatically but it also provided more accurate data while saving the field operators' time and effort in maintenance.

Dynamic Flow Computers has been a member of the Fieldbus Foundation since 2005 and has since then strived to provide a migration path for all its users into the growing Foundation installation base.

System Openness

In an effort to bring the advantages of Dynamic's Flow Computer into the growing Foundation Fieldbus installations, we have developed the DynamicFB module that features a H1 Foundation Fieldbus Protocol (31.25 Kbps) compliant with ITK 5.0.

This device is an approved Foundation™ product and as such complies or exceeds the requirements, among them, polarity insensitivity on the power system, 20mA current draw from the bus, more than 20MΩ impedance on the bus and instance able function blocks.

Power and Simplicity

Our goals as one of the first full flow computer with Foundation Fieldbus capabilities are several.

First we wanted our current flow computers to be retrofitted to take advantage of this new protocol.

Second, we want to keep all the powerful features available in our Modbus Flow computer line.

Third, we wanted to make the FF user able to configure the system as simply as possible.

We achieved all these goals by making the DynamicFB module which converts a regular Modbus flow computer into a 4-wire (Bus + Power) FF able flow computer.

The initial configuration is done through the local port with the same tools our users are used to and then after that the routine configuration can be done via the FF bus.

Adding a separate power supply allowed us to retain all the features such as Analog Inputs and Outputs, Modbus Master Capability and PID loop output that could be otherwise compromised by the power requirements of the FF bus.

Ruggedness and Quality



Our extensive experience in the Oil and Gas industry has helped us to develop products that withstand the roughness of the environment. Among the product ruggedness features we can mention an explosion proof all aluminum housing, 100% Industrial rating electronic components, epoxy resin cover for vital electronic parts.



In addition, all our units go to an extensive quality control that includes temperature testing at extreme condition, two-week burn in test, pre-assembly and post-assembly quality test and One (1) year warranty for every unit that we manufacture.

FF Values

The process variables available via Fieldbus Foundation are listed on Table 1 below.

Variable	Access	Units	
		Imperial	Metric
Differential Pressure	Read	Inch. H2O	mBar or KPA*
Temperature	Read	°F	°C
Pressure	Read	PSI	Bar or KPA or KG/CM2*
Gross Flow Rate	Read	MCF Per Day/Hour/Min*	KM3 or MCF*
Net Flow Rate	Read	MCF Per Day/Hour/Min*	KM3 or MCF*
Mass Flow Rate	Read	MLB Per Day/Hour/Min*	TON
Energy Flow Rate	Read	MMBTU	GJ
Cumulative Gross Volume	Read	MCF	KM3 or MCF*
Cumulative Net Volume	Read	MCF	KM3 or MCF*
Cumulative Mass Volume	Read	MLB	TON
Cumulative Energy Volume	Read	MMBTU	GJ
Daily Gross Volume	Read	MCF	KM3 or MCF*
Daily Net Volume	Read	MCF	KM3 or MCF*
Daily Mass Volume	Read	MLB	TON
Daily Energy Volume	Read	MMBTU	GJ
Analog Output (PID Output)	Read	milliamp	milliamp
Density	Read	LB/FT3	KG/M3
Base Density	Read	LB/FT3	KG/M3
SG	Read	Dimensionless	Dimensionless
Pipe ID	Read/Write	Inches	Millimeters
Orifice ID	Read/Write	Inches	Millimeters
K Factor	Read/Write	MCF/Pulse	Flow Unit/Pulse
Meter Factor	Read/Write	Dimensionless	Dimensionless
Heating Value	Read/Write	BTU/FT3	MJ/M3
Temperature Override	Read/Write	°F	°C
Pressure Override	Read/Write	PSI	Bar or KPA or KG/CM2*
Meter ID	Read/Write	Dimensionless	Dimensionless
Base Density	Read	LB/FT3	KG/M3

*The Units are determined by the Unit Selection Made on the Configuration.

Table 1. FF Process Variables

Technical Data Sheet**Foundation Fieldbus**

Protocol	Foundation Fieldbus H1
ITK	5.0
Baud Rate	31.25 Kbps
Polarity Sensitive	No
Connection	4-Wire Device: Bus + 24VDC Power
Current Draw from Bus	20mA quiescent / 30mA Start up
Current Draw from power supply	25mA
Device Resistance on Bus	Greater than 20 MOhms
Support for Backup LAS functionality	YES
Firmware Update via Fieldbus	NO (Via Local Port Only)
Available Device files	.sym, .ffo, .cff
Function Blocks	5 AI
Block Class	Enhanced
Block Execution Time	50mS
Resource Block	Enhanced
Link Objects	30
Total VCRs	20
Fixed VCRs for user configuration	19

Operating Conditions

Temperature	-40°F to 185°F
Humidity	100%
Housing	NEMA 4X CLASS 1 DIV. 1
Display	-20°C to 70°C Wide Angle
Magnetic Interference	Approved by CE for Electromagnetic interference. Noise filter on Fieldbus port according to FF Physical layer specs.
Electronic Components Protection	Conformal coating with high density epoxy.
Voltage Protection	Over voltage and reverse polarity protection.

Features

Display	PLASMA 8 LINES 16 CHARACTER AND GRAPHICS 64x128 PIXELS
Processor	32-BIT Motorola @ 16.7 MHz
ROM Memory	4 MB @ 70 NANO SECONDS
RAM Memory	2 MB @ 70 NANO SECONDS

Connection	4-Wire Device: Bus + 24VDC Power
Frequency Input	One (1) channel
Built-in Multivariable	Rosemount Multivariable Transmitter with direct SPI Connection. Max. Update Speed Every 109 mS. Temperat. Range: - 200 thru 1200 F Pressure Range: 0 thru 3626 PSIG DP Range: 0 thru 250 inches H2O OR 0 thru 1000 inches H2O Accuracy: 0.075% or 0.10 %
Analog Output	One (1) 16-bit Optically Isolated
Digital I/O	One (1) Digital Input Two (2) Digital Outputs (1/4 Amp)
Serial Communications	One (1) Serial port RS232/RS485
Communication Protocol	Foundation Fieldbus (Port 2) Modbus Protocol (Port 1)
PID Control Loop	Flow or Pressure Based

Gas Calculations

Volume Corrections	Pressure, Temperature and material expansion.
Flow Equations	AGA3, AGA7, AGA9, ISO5167, Verabar, Annubar, V-Cone
Primary Elements Supported	Orifice, V-Cone, Turbine, PD Meter, Ultrasonic, Coriolis, Verabar, Annubar.
Density Equations	AGA8, NBS Steam
Other Calculations	Steam Heating Value

Installation & Operation

Tubing Connections	Two (2) ¾ NPT Side Connections
Process Connections	½ NPT Female Ports
Wet Parts Materials	Stainless Steel 316 or Hasteloy
Calibration	Via Laptop with RS-232 Serial Port. Support Zero & Span and Zero Offset calibration.
Diagnostic	Via FF Function Blocks
System Units	DP : mBAR, KPa, inch H2O Temperature : °F , °C Pressure : BAR, KPa , kg/cm2, PSI Flow : MMSCFD, MMSCFH, MMSCFM, ksm3/day, ksm3/hour, ksm3/min Density : lb/feet3 , kg/m3