USE OF FOUNDATION™ FIELDBUS PROTOCOL and PROFIBUS PA WITH PASSIVE SONAR PROCESS FLOW MONITORING TRANSMITTERS

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Table of Contents

List of Figures

List of Tables

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1 USE OF FOUNDATION FIELDBUS AND PROFIBUS PA WITH PASSIVE SONAR PROCESS FLOW MONITORING SYSTEMS

1.1 Introduction

This document is intended as an overview of configuration and use of FOUNDATION Fieldbus and Profibus PA on the passive sonar process flow monitoring system transmitter.

National Instruments Configurator will be used to demonstrate the functionality available using FOUNDATION Fieldbus protocol, but other Fieldbus configuration tools may also be used. Refer to Appendix A for example.

Siemens SIMATIC PDM will be used to demonstrate the functionality available using Profibus PA protocol, but other Profibus configuration tools may also be used. Refer to Appendix B for example.

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2 FOUNDATION FIELDBUS and PROFIBUS PA BLOCK DEFINITIONS

2.1 Resource Blocks

Resource blocks contain the hardware specific characteristics associated with a device; they have no input or output parameters. The algorithm within a resource block monitors and controls the general operation of the physical device hardware. The execution of this algorithm is dependent on the characteristics of the physical device, as defined by the manufacturer. As a result of this activity, the algorithm may cause the generation of events. There is only one resource block defined for a device. For example, when the mode of a resource block is "out of service," it impacts all of the other blocks.

2.2 Transducer Blocks

Transducer blocks connect function blocks to local input/output functions. They read sensor hardware and write to effector (actuator) hardware. This permits the transducer block to execute as frequently as necessary to obtain good data from sensors and ensure proper writes to the actuator without burdening the function blocks that use the data. The transducer block also isolates the function block from the vendor specific characteristics of the physical I/O.

2.3 Analog Input Blocks

The Analog Input (AI) function block processes field device measurements and makes them available to other function blocks. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement. The measuring device may have several measurements or derived values available in different channels. Use the channel number to define the variable that the AI block processes. The AI block supports alarming, signal scaling, signal filtering, signal status calculation, mode control, and simulation. In Automatic mode, the block's output parameter (OUT) reflects the process variable (PV) value and status. In Manual mode, OUT may be set manually. The Manual mode is reflected on the output status. A discrete output (OUT_D) is provided to indicate whether a selected alarm condition is active. Alarm detection is based on the OUT value and user specified alarm limits.

2.4 Analog Output Blocks

The Analog Output (AO) function block assigns an output value to a field device through a specified I/O channel. The block supports mode control, signal status calculation, and simulation.

2.5 PID Block

A Proportional/Integral/Derivative (PID) Function Block is not available.

3 CONFIGURATION & CONNECTION

3.1 Configuration

There are no configuration settings necessary on the passive sonar transmitter for FOUNDATION Fieldbus or Profibus PA. The protocol itself enables devices to be automatically assigned addresses, etc. The transmitter firmware forces communication to be set to the required baud rate to work with the Softing FBK Fieldbus or Profibus interface hardware. Loading an INI file cannot change these settings.

3.2 Connection

If so equipped, the transmitter hardware includes a two-conductor connector designated for Fieldbus / Profibus. The connections are not polarity sensitive.

Fieldbus / Profibus terminals

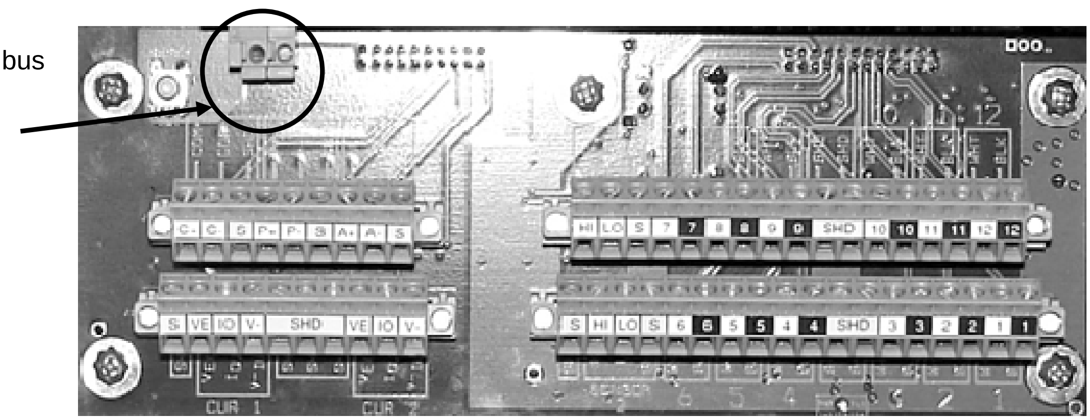

Figure 1 Fieldbus / Profibus Terminals on Connector Board

Transmitters that support Fieldbus / Profibus will not support RS-232/RS-485 communications or Modbus on the COM+/COM- terminal connections as these signals are used for the Fieldbus interface and are not available as an external communications interface.

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4 MAKING CHANGES to TRANSMITTER USING A FIELDBUS HOST

To change the configuration to the transmitter using a Fieldbus or Profibus Host, perform the following steps:

- Place the Transducer Block Out Of Service (OOS)
- Write any changes to the variables in the Transducer Block
- Place the Transducer Block to Auto Mode

When transmitter is placed into Auto Mode, it will validate any changes made. Invalid changes will be returned to their previous value.

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5 INPUT, OUTPUT AND TRANSDUCER BLOCKS

5.1 Analog Input Blocks

The following table lists the analog input blocks.

Channel	Analog Input Block	Data Type
1	FLOW_RATE	Float
2	GVF	Float
3	SOS	Float
4	SENSORHEAD_TEMPERATURE	Float
5	TOTAL_FLOW	Float
6	OUTPUT_1	Float
7	OUTPUT_2	Float
8	OUTPUT_3	Float
9	OUTPUT_4	Float

Table 1 Analog Input Blocks

5.2 Analog Output Blocks

The following table lists the analog output blocks.

Channel	Analog Output Block	Data Type
10	PRESSURE_INPUT	Float
11	TEMPERATURE_INPUT	Float
12	INPUT_1	Float
13	INPUT_2	Float
14	INPUT_3	Float

Table 2 Analog Output Blocks

5.3 Transducer Block

Table 3 on the following pages list all transducer block variables.

Table 3 Transducer Block Configurations

Parameter / Structure Name	Data Type	Access	Help
CONTROL			
WRITE_CONTROL	Unsigned16	R/W	Controls ability to write and commit changes to transmitter configuration.
RESET_TOTALIZER	Unsigned16	R/W	Resets all totalizers to zero.
CLEAR_ALARM	Unsigned16	R/W	Clear any existing alarms.
CLEAR_DATA_HISTORY	Unsigned16	R/W	Clears the data history memory.
DEVICE_INFO			
PSN_TRANSMITTER_S/N	Octet String	R	Transmitter Serial Number
PSN_MODEL_NUMBER	Octet String	R	Transmitter Model Number
PSN_SOFTWARE_REVISION	Octet String	R	Transmitter Software Revision
PSN_ALCHEMY_SOFTWARE_REVISION	Octet String	R	Alchemy Software Revision
PSN_SENSORHEAD_S/N	Octet String	R	Sensor head Serial Number
PSN_PREAMP_SOFTWARE_REVISION	Octet String	R	Preamp Software Revision
PSN_PREAMP_SERIAL_NUMBER	Octet String	R	Preamp Serial Number
PIPE_INFORMATION			
PIPE_DIAMETER_INPUT_MODE	Unsigned Char	R/W	Selects method used to set pipe dimensions.
PIPE_DIAMETER_UNITS	Unsigned Char	R/W	Selects units used for 'Pipe ID'.
PIPE_ID	Float	R/W	Pipe Inside Diameter Measurement. Will only be applied if 'Inside Diameter' is selected for 'Pipe Diameter Input Mode'.
PIPE_OD	Float	R/W	Pipe Outside Diameter Measurement. Will only be applied if 'Outside Diameter / Wall Thickness' is selected for 'Pipe Diameter Input Mode'.
PIPE_OD_WALL_UNITS	Unsigned Char	R/W	Selects units used for 'Pipe OD' and 'Pipe Wall Thickness'. Will only be applied if 'Outside Diameter / Wall Thickness' is selected for 'Pipe Diameter Input Mode'.

Table 3   Transducer Block Configurations (Page 2)

PIPE_WALL_THICKNESS	Float	R/W	Pipe wall thickness measurement in selected units.
PIPE_SIZE	Unsigned Char	R/W	Selects pipe size. Will only be applied if 'Size / Schedule' is selected for 'Pipe Diameter Input Mode'.
PIPE_SCHEDULE	Unsigned Char	R/W	Selects pipe schedule. Will only be applied if 'Size / Schedule' is selected for 'Pipe Diameter Input Mode'.
SOS_PIPE_WALL_THICKNESS_UNITS	Unsigned Char	R/W	Selects units used for 'SOS Pipe Wall Thickness'.
SOS_PIPE_WALL_THICKNESS	Float	R/W	SOS pipe wall thickness measurement in units selected by 'SOS Pipe Wall Thickness Units'.
SOS_PIPE_MODULUS_SELECTION	Unsigned Char	R/W	Selects either a pre-defined modulus* or the option to enter a custom value. Select 'Custom' to enter a value in 'SOS Pipe Modulus'.
SOS_PIPE_MODULUS	Float	R/W	SOS pipe modulus value.
FLUID_PROPERTIES			
FLOW_VISCOSITY	Float	R/W	Viscosity in Pascal seconds of the fluid at the operating conditions. Used for Reynolds correction.
SOS_GAS_CONSTANT_SELECTION	Unsigned Char	R/W	Selects use of pre-defined SOS Gas Constant or a custom value* entered in 'SOS Gas Constant'.
SOS_SPECFIC_GRAVITY_SELECTION	Unsigned Char	R/W	Selects use of pre-defined SOS Specific Gravity or a custom value* entered in 'SOS Specific Gravity'.
SOS_LIQUID_SOUND_SPEED_SELECTION	Unsigned Char	R/W	Selects use of pre-defined SOS Liquid Sound Speed or a custom value* entered in 'SOS Liquid Sound Speed'
SOS_GAS_CONSTANT	Float	R/W	Gas constant value used in GVF calculation.
SOS_SPECIFIC_GRAVITY	Float	R/W	This parameter (internally multiplied by 1000 kg/m^3) is used to set the 'SOS Liquid Density'. For example* Specific Gravity = 1.1 equates to density of 1.1 * 1000 kg/m^3
SOS_LIQUID_SOUND_SPEED	Float	R/W	Pure phase liquid SOS for process fluid in ft/sec. Used for GVF calculation. Default setting is for water* and is close enough for most fluid/gas applications.
SOS_POLYTROPIC_EXPONENT	Float	R/W	Polytrophic exponent in GVF calculations.
SOS_LIQUID_DENSITY	Float	R	Calculated from 'SOS Specific Gravity'.

Table 3 Transducer Block Configurations (Page 3)

ENVIRONMENT			
SOS_TEMPERATURE_INPUT_SELECTION	Unsigned Char	R/W	Selects the source of the temperature used in GVF calculations. 'Fixed' uses 'SOS Process Temperature'* 'Sensor 1' uses the 4-20mA input channel 1* 'Sensor 2' uses 4-20mA input channel 2* Protocol uses values written to Fieldbus AO Channel 11.
SOS_PRESSURE_INPUT_SELECTION	Unsigned Char	R/W	Selects the source of the pressure used in GVF calculations. 'Fixed' uses 'SOS Process Pressure'* 'Sensor 1' uses the 4-20mA input channel 1* 'Sensor 2' uses 4-20mA input channel 2* Protocol uses values written to Fieldbus AO Channel 10.
SOS_TEMPERATURE_UNITS	Unsigned Char	R/W	Selects units used for input of 'SOS Process Temperature'.
SOS_PRESSURE_UNITS	Unsigned Char	R/W	Selects units used for input of 'SOS Process Pressure'.
SOS_PROCESS_TEMPERATURE	Float	R/W	Constant temperature for GVF calculations when 'Fixed' is selected for 'SOS Temperature Input Selection'. In configured units.
SOS_PROCESS_PRESSURE	Float	R/W	Constant pressure for GVF calculations when 'Fixed' is selected for 'SOS Pressure Input Selection'. In configured units.
ALTITUDE_UNITS	Unsigned Char	R/W	Selects units used for entry of 'Altitude'.
ALTITUDE	Float	R/W	Altitude correction applied to SOS pressure. In configured units.
DISPLAY			
FLOW_VOLUME_UNITS	Unsigned Char	R/W	Selects units used to display and log flow volume.
FLOW_TIME_UNITS	Unsigned Char	R/W	Selects units used to display and log flow time.
FLOW_LOW_CUTOFF_PCT	Float	R/W	Low flow cutoff as a % of flow measurement range (defined by 'Flow Min' and 'Flow Max'). Will not display or output flow reading if flow rate is below this setting.

Table 3 Transducer Block Configurations (Page 4)

FLOW_HIGH_CUTOFF_PCT	Float	R/W	High flow cutoff as a % of flow measurement range (defined by Flow Min and Flow Max). Will not display or output flow reading if flow rate is above this setting.
FLOW_CUSTOM_BASE_VOLUME_UNIT	Unsigned Char	R/W	Selects volume units used in calculation of a custom unit.
FLOW_CUSTOM_BASE_TIME_UNIT	Unsigned Char	R/W	Selects time units used in calculation of a custom unit.
FLOW_CUSTOM_VOLUME_UNIT_LABEL	Octet String	R/W	Three character string used for display and logging of a custom flow volume unit.
FLOW_CUSTOM_TIME_UNIT_LABEL	Octet String	R/W	Two character string used for display and logging of a custom flow time unit.
FLOW_CUSTOM_VOLUME_UNIT_MULTIPLIER	Float	R/W	Scale applied to 'Flow Custom Base Volume Unit' for calculation of a custom volume unit.
FLOW_CUSTOM_TIME_UNIT_MULTIPLIER	Float	R/W	Scale applied to 'Flow Custom Base Time Unit' for calculation of a custom time unit.
FLOW_QUALITY_DELTA	Float	R/W	Delta change from minimum quality at minimum flow (MIN_QUALITY) to minimum quality at max flow (MIN_QUALITY+ 'Flow Quality Delta'). Zero (0) indicates no variable quality.
GVF_DECIMAL_PLACES	Unsigned Char	R/W	Sets the number of decimal places used to display GVF on the front panel.
SOS_MEASUREMENT_UNITS	Unsigned Char	R/W	Selects units used for display and log of SOS.
SOS_QUALITY_DELTA	Float	R/W	Delta change from SOS minimum quality at minimum SOS (SOS_MIN_QUALITY) to minimum quality at max SOS (SOS_MIN_QUALITY+ 'SOS Quality Delta'). Zero (0) indicates no variable quality.
SYSTEM			
SYSTEM_CONFIG_MODE	Unsigned Long	R/W	Sets operating mode of the transmitter. VF Mode = 0* SOS Mode = 1* Both Mode = 2.

Table 3   Transducer Block Configurations (Page 5)

UPDATE_RATE	Unsigned Long	R/W	Sets transmitter update rate. Defines time units in number of blocks. This parameter will set the update rate in seconds (nominally). Actual update rate (in seconds) can be calculated by taking (BLOCK_SIZE / SAMPLE_FREQ) * UPDATE_RATE (VF mode) or (BLOCK_SIZE / SOS_SAMPLE_FREQ) * UPDATE_RATE (SOS mode).
SENSORS_IN_USE	Unsigned Long	R/W	Sets number of sensors. Always leave set to 8. Do not use this parameter to disable a sensor* use NUM_SENSORS_USED parameter to set which sensors to use in calculations.
TRANSMITTER_GAIN	Float	R/W	Set gain stage before A/D converter in transmitter. This is NOT sensor head gain (preamp gain). It is normally not a parameter which is modified. Use with caution. Choose one of the following values: 1.0* 5.0* 20.0* 24.0* 48.0* 52.0* 67.0* 71.0* 202.0* 207.0* 221.0* 225.0* 250.0* 254.0* 269.0* 272.0
SPL_THRESHOLD	Float	R/W	This value is the threshold that the Average SPL must break in order for any SOS or VF calculations to be performed. A quality of -2 is reported if this threshold is not met. Set this value to 0 to disable SPL.
WRITE_PROTECT	Unsigned Char	R/W	Enable or disable modifications to the transmitter FLASH memory. When modifying this* change only this for proper operation.
IDLE_TIMEOUT	Short	R/W	If the transmitter is in idle mode* and no communications are detected on a serial or Ethernet port for this time period* transmitter will automatically go to run mode. A setting of 0 disables this.
ETHERNET_IDLE_TIMEOUT	Short	R/W	If no communications are detected on the Ethernet port for this time period* transmitter will automatically close the connection. A setting of 0 disables this timeout.
SYSTEM_DYNAMIC			
SPL_AVERAGE	Float	R	The average SPL measurement from all active sensors.

Table 3 Transducer Block Configurations (Page 6)

SPL_STD_DEV	Float	R	The standard deviation of the SPL measurements from all active sensors.
PREAMP			
PREAMP_GAIN	Unsigned Char	R/W	Gain selection for the preamp. Set a value 0 thru 3 to choose gain listed by 'Preamp Gain 0'* 'Preamp Gain 1'* 'Preamp Gain 2' or 'Preamp Gain 3'
PREAMP_AUTO_GAIN_MODE	Unsigned Long	R/W	Preamp Auto Gain Mode
PREAMP_CHARGE_GAIN	Float	R	Charge gain as read from the preamp.
PREAMP_GAIN_0	Float	R	Preamp Gain 0 as read from the preamp.
PREAMP_GAIN_1	Float	R	Preamp Gain 1 as read from the preamp.
PREAMP_GAIN_2	Float	R	Preamp Gain 2 as read from the preamp.
PREAMP_GAIN_3	Float	R	Preamp Gain 3 as read from the preamp.
FLOW_ALGORITHM			
FLOW_SAMPLE_FREQ	Float	R/W	Set A/D sample frequency in samples per second. Enter one of the following: 3906.25* 2055.921.
FLOW_CHANNEL_SKEW	Float	R/W	Flow Channel Skew
FLOW_FREQ_MIN	Float	R/W	Set minimum frequency for k-w processing. Normally set by DSP. User modified if using single or fixed modes or auto mode with VF_OP_MODE_SETTINGS set to 1 (FIXED_FREQUENCY). Go to Idle mode* then set this parameter* then select single/fixed.
FLOW_FREQ_MAX	Float	R/W	Set maximum frequency for k-w processing. Normally set by DSP. User modified if using single or fixed modes or auto mode with VF_OP_MODE_SETTINGS set to 1 (FIXED_FREQUENCY). Go to Idle mode* then set this parameter* then select single/fixed.
FLOW_RATE_MIN	Float	R/W	Minimum valid flow rate reading in configured display units.
FLOW_RATE_MAX	Float	R/W	Maximum valid flow rate reading in configured display units.
FLOW_MIN_QUALITY	Float	R/W	Minimum quality threshold for VF display and output.

Table 3 Transducer Block Configurations (Page 7)

FLOW_NYQUIST_HIGH	Float	R/W	Define high end of frequency range to use for determining flow velocity. Defined by: FREQUENCY_MAX = (Measured Velocity * VF_NYQUIST_HIGH) / Sensor Spacing. Example: (10 ft/sec*0.7) / 0.2 = 35Hz
FLOW_NYQUIST_LOW	Float	R/W	Define low end of frequency range to use for determining flow velocity. Defined by: FREQUENCY_MIN = (Measured Velocity * VF_NYQUIST_LOW) / Sensor Spacing. Example: (10 ft/sec*0.3) / 0.2 = 15Hz
FLOW_CENTROID_WIDTH	Float	R/W	Define width of peak to use in calculation of flow rate.
FLOW_VEL_SEARCH_LIMIT_LOW	Float	R/W	Define low end of velocity search range to use for determining flow velocity. Defined by: Velocity_Min = (FREQ_MAX * Sensor Spacing) / VF_SEARCH_LIMIT_LOW. Example: at 10ft/sec* (10 ft/sec*0.7) / 0.2 = 35Hz then (35Hz * 0.2) / 0.9 = 7.78 ft/sec. This defines the start ft/sec search point for the actual flow velocity peak. Must be set greater than value set for VF_NYQUIST_HIGH.
FLOW_VEL_SEARCH_LIMIT_HIGH	Float	R/W	Define high end of velocity search range to use for determining flow velocity. Defined by: Velocity_Max = (FREQ_MIN * Sensor Spacing) / VF_SEARCH_LIMIT_HIGH. Example: at 10ft/sec* (10 ft/sec*0.3) / 0.2 = 15Hz then (15Hz * 0.2) / 0.15 = 20 ft/sec. This defines the start ft/sec search point for the actual flow velocity peak. Must be set less than value for VF_NYQUIST_LOW.
FLOW_NYQUIST_INITIAL_VALUE	Float	R/W	This parameter selects the k value (from k-w) where the algorithm initially searches for the flow rate.
FLOW_DECIMATION	Unsigned Long	R/W	Flow Decimation
FLOW_WINDOW_TYPE	Unsigned Long	R/W	Algorithms always use Hanning window. Windows raw data samples of NFFT size* then zero pads* then computes FFT.
FLOW_DETREND	Unsigned Long	R/W	Enable/disable detrend of time series data of NFFT size before windowing and zero padding. 0 - Do not detrend time series data* 1 - Detrend time series data.

Table 3 Transducer Block Configurations (Page 8)

FLOW_NORMALIZATION	Unsigned Long	R/W	Enable/disable normalization of sensor data. 0 - No normalization* 1 - Normalize data. Normalization performed in frequency domain.
FLOW_DIFFERENCING	Unsigned Long	R/W	Enable/disable differencing of sensors. 0 - No differencing* 1 - difference sensors using first order differencing. (i.e. Ch1=S1-S2* Ch2=S2-S3...Ch7=S7-S8). 2 - second order differencing (i.e. Ch1=S1-2*S2+S3* Ch2=S2-2*S3+S4...) Calculation performed in frequency domain.
FLOW_DIRECTION	Unsigned Long	R/W	Define flow direction.
FLOW_WINDOW_SIZE_MULTIPLIER	Unsigned Long	R/W	Default values are normally OK. Define target number of passes through array per calculation for volumetric flow. Use with caution.
FLOW_PEAK_SEARCH_MODE	Unsigned Long	R/W	0 - Velocity search limits set to FLOW_MIN and FLOW_MAX* 1 - Velocity search limits defined by VF_SEARCH_LIMIT_LOW and VF_SEARCH_LIMIT_HIGH.
FLOW_OPERATING_MODE	Unsigned Long	R/W	Determines which VF parameters to fix or calculate during a VF calculation and whether or not to use Linear/Log KW diff. Bit Mapped Values: 0: Dynamic frequency adjust in auto run mode (original calculation) 1: Fixed frequency in auto run mode 2: Fixed blocks in auto run mode 4: Dynamic Nyquist calculation enable 8: Reserved for future use 16: Linear KW diff enable 32: Log KW diff enable
FLOW_QUALITY_MODE	Unsigned Long	R/W	0 selects original VF quality calculation* 1 selects new VF quality calculation.
FLOW_ALGORITHM_DYNAMIC			
FLOW_DATA_LENGTH	Unsigned Long	R/W	Define number of blocks used for calculations.
FLOW_WINDOW_SIZE	Unsigned Long	R/W	Number of points used in FFT. Actual FFT size is next 2^n higher value. Value of NFFT is zero padded to next larger 2^n FFT size. This value is normally set by the DSP.

Table 3   Transducer Block Configurations (Page 9)

FLOW_WINDOW_OVERLAP	Unsigned Long	R/W	Define overlap of FFT windows. This value is normally set by DSP to half of NFFT.
FLOW_WINDOW_AVERAGES	Unsigned Long	R/W	Default values are normally OK. In general* for slower flow rates* use more FFT averages* for faster flow rates* use fewer FFT averages. This parameter affects the number of blocks used (there is a 20 block maximum due to DSP memory limitations). Use with caution.
FLOW_CALIBRATION			
FLOW_CAL_COEFF_C0	Float	R/W	Volumetric flow calibration coefficient C0.
FLOW_CAL_COEFF_C1	Float	R/W	Volumetric flow calibration coefficient C1.
FLOW_CAL_COEFF_C2	Float	R/W	Volumetric flow calibration coefficient C2.
SOS_ALGORITHM			
SOS_SAMPLE_FREQ	Float	R/W	Set sample frequency for SOS mode. This parameter must be set for SOS* and overrides the SAMPLE_FREQ setting if running in SOS mode. Enter one of the following: 3906.25* 2055.921.
SOS_FREQ_MIN	Float	R/W	Minimum frequency to use for SOS calculation. Typically in the 100 to 500hz range. Depends upon the data quality as seen on the k-w plot. SOS_FREQ_MIN and SOS_FREQ_MAX set the frequency range over which the SOS calculation will be performed. The larger this range* the longer the calculations will take.
SOS_FREQ_MAX	Float	R/W	Maximum frequency to use for SOS calculation. Typically in the 800 to 1500hz range. Depends upon the data quality as seen on the k-w plot. SOS_FREQ_MIN and SOS_FREQ_MAX set the frequency range over which the SOS calculation will be performed. The larger this range* the longer the calculations will take.

Table 3 Transducer Block Configurations (Page 10)

SOS_MIN	Float	R/W	Minimum SOS value to search for. If too much energy (such as from a high velocity vortical ridge) causes the algorithms to calculate a sound speed below that of the main SOS ridge* this parameter may need to be increased. Care must be taken not to set this higher than the expected minimum SOS for the application.
SOS_MAX	Float	R/W	Maximum SOS value to search for. If too much energy along the 0 k value on the k-w plot and algorithms are calculating SOS_MAX* even when SOS ridge indicates an SOS below this value* may need to decrease this parameter. Care must be taken not to set this lower than the expected maximum SOS for the application.
SOS_MIN_QUALITY	Float	R/W	Minimum quality threshold for SOS/GVF display and output.
SOS_CENTROID_WIDTH	Float	R/W	Define width of peak to use in calculation of SOS.
SOS_FREQUENCY_THRESHOLD	Float	R/W	This value selects the threshold that the second derivative of a power array (generated at a specific frequency over all k-space values) must break in order for the specific frequency point to be considered a valid frequency point.
SOS_MIN_K	Float	R/W	This value sets the lower limit in k-space that is used in the SOS auto frequency determination code. This value is equal to the first k-space bin after 0: PI/deltaX/50 (there are 50 bins from 0 to PI/deltaX).
SOS_MAX_K	Float	R/W	This value sets the upper limit in k-space that is used in the SOS auto frequency determination code. This value is equal to the last k-space bin: PI/deltaX.
SOS_SEARCH_LIMIT	Float	R/W	This value is the +/- percentage of the estimated SOS value (calculated using the auto frequency calculation code) that determines the lower (Estimated SOS * 0.5) and upper (Estimated SOS * 1.5) SOS search limits.
SOS_LAMBDA_DIAM	Float	R/W	Used to calculate the SOS dynamic frequency maximum used when calculating SOS.SOS Max Freq = (Max SOS search)/(Lambda Diameter * (Pipe Diameter/12)).

Table 3   Transducer Block Configurations (Page 11)

SOS_TOTAL_DATA	Unsigned Long	R/W	Calculates SOS Samples from this value and SOS Sample Frequency: SOS Samples = SOS Total Data * SOS Sample Freq.
SOS_WINDOW_SIZE	Unsigned Long	R/W	Number of FFT points to use in SOS calculation. Usually set to 1/8 or 1/4 of the sample frequency
SOS_WINDOW_OVERLAP	Unsigned Long	R/W	Number of sample point overlap between successive FFTs. Recommended to set this to 50% of SOS_FFT_POINTS.
SOS_SUB_ARRAY_SIZE	Unsigned Long	R/W	SOS Sub Array Size
SOS_NORMALIZATION	Unsigned Long	R/W	0 selects NO normalization in the frequency domain. 1 selects normalization in the frequency domain.
SOS_DIFFERENCING	Unsigned Long	R/W	0 selects NO differencing in the frequency domain. 1 selects 1st order differencing in the frequency domain. 2 selects 2nd order differencing in the frequency domain.
SOS_OPERATING_MODE	Unsigned Long	R/W	Determines which ridge to use for SOS calculation. Also determines which SOS parameter to leave fixed or calculate and whether or not to use Linear/Log KW diff. Bit Mapped Values: 0: Use right and left ridge averaged 1: Use right ridge only 2: Use left ridge only 4: Enable SOS auto frequency calculation 8: Enable SOS power weighting to auto frequency calculation 16: Linear KW diff enable 32: Log KW diff enable.
SOS_SELECTION_THRESHOLD	Unsigned Long	R/W	SOS Selection Threshold
SOS_MIN_FREQ_POINTS_(AUTO_FREQ)	Unsigned Long	R/W	This value selects the minimum number of frequency points that will be used in the SOS calculation. If this number is not met then the calculation is not performed and an error is reported.
SOS_ALGORITHM_DYNAMIC			
SOS_VALID_FREQ_PTS_RIGHT	Unsigned Long	R	The number of frequency points used from the right ridge of the k-w plot.
SOS_VALID_FREQ_PTS_LEFT	Unsigned Long	R	The number of frequency points used from the left ridge of the k-w plot.

Table 3 Transducer Block Configurations (Page 12)

ANALOG_SECTION			
ANALOG_SENSOR_INPUT_UNITS_1	Unsigned Char	R/W	Selects units used in translating the mA measured on Sensor 1 input to units used internally.
ANALOG_SENSOR_INPUT_UNITS_2	Unsigned Char	R/W	Selects units used in translating the mA measured on Sensor 2 input to units used internally.
ANALOG_SENSOR_INPUT_SCALE_1	Float	R/W	Sets multiplier used to scale the sensor input 1 value.
ANALOG_SENSOR_INPUT_SCALE_2	Float	R/W	Sets multiplier used to scale the sensor input 2 value.
ANALOG_SENSOR_INPUT_OFFSET_1	Float	R/W	Sets offset applied to the input sensor input 1 value.
ANALOG_SENSOR_INPUT_OFFSET_2	Float	R/W	Sets offset applied to the input sensor input 2 value.
ANALOG_SENSOR_1_1ST_ORDER_DAMPING_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables 1st order damping filter for sensor input 1.
ANALOG_SENSOR_2_1ST_ORDER_DAMPING_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables 1st order damping filter for sensor input 2.
ANALOG_SENSOR_1_DAMPING_TAU	Float	R/W	Damping time in seconds for the damping filter for sensor input 1.
ANALOG_SENSOR_2_DAMPING_TAU	Float	R/W	Damping time in seconds for the damping filter for sensor input 2.
INPUT_UNITS			
PRESSURE_INPUT_UNITS	Unsigned Char	R/W	Selects units for pressure read from Fieldbus AO Channel 10.
TEMPERATURE_INPUT_UNITS	Unsigned Char	R/W	Selects units for temperature read from Fieldbus AO Channel 11.
INPUT_1_UNITS	Unsigned Char	R/W	Selects units for input 1 read from Fieldbus AO Channel 12.
INPUT_2_UNITS	Unsigned Char	R/W	Selects units for input 2 read from Fieldbus AO Channel 13.
INPUT_3_UNITS	Unsigned Char	R/W	Selects units for input 3 read from Fieldbus AO Channel 14.
FLOW_NR_FILTER			
FILTER_FLOW_NR_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables the flow noise reduction filter.

Table 3 Transducer Block Configurations (Page 13)

FILTER_FLOW_NR_FILTER_MAGNITUDE_SELECTION	Unsigned Char	R/W	Selects flow noise reduction filter magnitude.
FLOW_DAMPING_FILTER			
FILTER_FLOW_1ST_ORDER_DAMPING_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables flow 1st order damping filter.
FILTER_FLOW_DAMPING_TAU	Float	R/W	Sets tau value for flow 1st order damping filter.
FLOW_SPIKE_FILTER			
FILTER_FLOW_SPIKE_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables flow spike filter.
FILTER_FLOW_SPIKE_FILTER_NO_FLOW_LENGTH	Unsigned Char	R/W	Defines the required number of consecutive measurements with good quality before a measurement is deemed valid and displayed.
FILTER_FLOW_SPIKE_FILTER_LENGTH	Unsigned Char	R/W	This parameter is used when the device is 'Holding' a previous measurement due to a new measurement with bad quality. The definition of this parameter is the required number of consecutive measurements with bad quality before the device enters the 'No Flow' state and displays dashes.
FILTER_FLOW_SPIKE_FILTER_UP_COUNT	Unsigned Char	R/W	Each time a measurement with bad quality is made 'Up Count' is added to the quality counter. If the counter becomes less than or equal to zero then the present measurement is displayed. If the quality counter becomes greater than or equal to ('Filter Length' x 'Up Count') then the device is forced into a 'No Flow' condition and displays dashes.
FILTER_FLOW_SPIKE_FILTER_DOWN_COUNT	Unsigned Char	R/W	Each time a measurement with good quality is made 'Down Count' is subtracted from the quality counter. If the quality counter becomes less than or equal to zero then the present measurement is displayed. If the quality counter becomes greater than or equal to ('Filter Length' x 'Up Count') then the device is forced into a 'No Flow' condition and displays dashes.

Table 3 Transducer Block Configurations (Page 14)

FILTER_FLOW_SPIKE_FILTER_PERCENTAGE	Float	R/W	After 'Percent Len' measurements with good quality have been displayed a new measurement with good quality is deemed valid and displayed when the difference between the maximum and minimum of the present measurement and ('Percent Len' - 1) previous consecutive measurements is less than the measurement range (default of 27fps for Flow) times ('Percent' / 100).
FILTER_FLOW_SPIKE_FILTER_FILT_PCT_WINDOW_LEN	Unsigned Char	R/W	After 'Percent Len' measurements with good quality have been displayed a new measurement with good quality is deemed valid and displayed when the difference between the maximum and minimum of the present measurement and ('Percent Len' - 1) previous consecutive measurements is less than the measurement range (default of 27fps for Flow) times ('Percent' / 100).
GVF_NR_FILTER			
FILTER_GVF_NR_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables the GVF noise reduction filter.
FILTER_GVF_NR_FILTER_MAGNITUDE_SELECTION	Unsigned Char	R/W	Selects GVF noise reduction filter magnitude.
GVF_DAMPING_FILTER			
FILTER_GVF_1ST_ORDER_DAMPING_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables GVF 1st order damping filter.
FILTER_GVF_DAMPING_TAU	Float	R/W	Sets tau value for GVF 1st order damping filter.
GVF_SPIKE_FILTER			
FILTER_GVF_SPIKE_FILTER_ENABLE	Unsigned Char	R/W	Enables or disables GVF spike filter.
FILTER_GVF_SPIKE_FILTER_NO_FLOW_LENGTH	Unsigned Char	R/W	Defines the required number of consecutive measurements with good quality before a measurement is deemed valid and displayed.

Table 3 Transducer Block Configurations (Page 15)

FILTER_GVF_SPIKE_FILTER_LENGTH	Unsigned Char	R/W	This parameter is used when the device is 'Holding' a previous measurement due to a new measurement with bad quality. The definition of this parameter is the required number of consecutive measurements with bad quality before the device enters the 'No Flow' state and displays dashes.
FILTER_GVF_SPIKE_FILTER_UP_COUNT	Unsigned Char	R/W	Each time a measurement with bad quality is made 'Up Count' is added to an entity called the quality counter. If the quality counter becomes less than or equal to zero then the present measurement is displayed. If the quality counter becomes greater than or equal to ('Filter Length' x 'Up Count') then the device is forced into a 'No Flow' condition and displays dashes.
FILTER_GVF_SPIKE_FILTER_DOWN_COUNT	Unsigned Char	R/W	Each time a measurement with good quality is made 'Down Count' is subtracted from the quality counter. If the quality counter becomes less than or equal to zero then the present measurement is displayed. If the quality counter becomes greater than or equal to ('Filter Length' x 'Up Count') then the device is forced into a 'No Flow' condition and displays dashes.
FILTER_GVF_SPIKE_FILTER_PERCENTAGE	Float	R/W	After 'Percent Len' measurements with good quality have been displayed a new measurement with good quality is deemed valid and displayed when the difference between the maximum and minimum of the present measurement and ('Percent Len' - 1) previous consecutive measurements is less than the measurement range (default of 27fps for Flow) times ('Percent' / 100).
FILTER_GVF_SPIKE_FILTER_FILT_PCT_WINDOW_LEN	Unsigned Char	R/W	After 'Percent Len' measurements with good quality have been displayed a new measurement with good quality is deemed valid and displayed when the difference between the maximum and minimum of the present measurement and ('Percent Len' - 1) previous consecutive measurements is less than the measurement range (default of 27fps for Flow) times ('Percent' / 100).

Table 3 Transducer Block Configurations (Page 16)

SENSOR			
SENSORHEAD_SERIAL_NUMBER	Octet String	R/W	Sensor head Serial Number
SENSOR_THRESHOLD_MAX	Long	R/W	Sets maximum threshold for sensor health diagnostics (in A/D counts).
SENSOR_THRESHOLD_MIN	Long	R/W	Sets minimum threshold for sensor health diagnostics (in A/D counts).
SENSOR_SPACING			
SENSOR_1_LOCATION	Float	R/W	Starting point for sensor 1. Typically 0.
SENSOR_SPACING_1_2	Float	R/W	Distance in feet between sensor 1 and sensor 2.
SENSOR_SPACING_1_3	Float	R/W	Distance in feet between sensor 1 and sensor 3.
SENSOR_SPACING_1_4	Float	R/W	Distance in feet between sensor 1 and sensor 4.
SENSOR_SPACING_1_5	Float	R/W	Distance in feet between sensor 1 and sensor 5.
SENSOR_SPACING_1_6	Float	R/W	Distance in feet between sensor 1 and sensor 6.
SENSOR_SPACING_1_7	Float	R/W	Distance in feet between sensor 1 and sensor 7.
SENSOR_SPACING_1_8	Float	R/W	Distance in feet between sensor 1 and sensor 8.
SENSOR_SCALE_FACTOR			
SENSOR_SCALE_FACTOR_1	Float	R/W	Scaling factor in volts per PSI for sensor 1.
SENSOR_SCALE_FACTOR_2	Float	R/W	Scaling factor in volts per PSI for sensor 2.
SENSOR_SCALE_FACTOR_3	Float	R/W	Scaling factor in volts per PSI for sensor 3.
SENSOR_SCALE_FACTOR_4	Float	R/W	Scaling factor in volts per PSI for sensor 4.
SENSOR_SCALE_FACTOR_5	Float	R/W	Scaling factor in volts per PSI for sensor 5.
SENSOR_SCALE_FACTOR_6	Float	R/W	Scaling factor in volts per PSI for sensor 6.
SENSOR_SCALE_FACTOR_7	Float	R/W	Scaling factor in volts per PSI for sensor 7.
SENSOR_SCALE_FACTOR_8	Float	R/W	Scaling factor in volts per PSI for sensor 8.
MEASURED_VALUES			
FLOW_QUALITY	Float	R	Measured flow quality.
FLOW_RATE_UNFILTERED	Float	R	Measured flow rate in ft/s without any filtering applied.
PRESSURE	Float	R	Pressure as used in calculation of GVF in configured units.

Table 3 Transducer Block Configurations (Page 17)

TEMPERATURE	Float	R	Temperature as used in calculation of GVF in configured units.
SOS_QUALITY	Float	R	Measured SOS quality.
SOS_UNFILTERED	Float	R	Measured SOS in ft/s without any filtering applied.
SOS_FLOW_RATE	Float	R	Measured SOS flow rate.
SOS_FLOW_QUAL	Float	R	Measured SOS flow quality.
TLF	Float	R	Measured True Liquid Flow in configured flow units.
TOTAL_TLF	Float	R	Measured total TLF.
TLF_UNFILTERED	Float	R	Measured TLF in ft/s without any filtering applied.
ANALOG_4_20MA_INPUT_1	Float	R	Measured analog input 1 in mA.
ANALOG_4_20MA_INPUT_2	Float	R	Measured analog input 2 in mA.
TOTAL_FLOW_FRACTION	Float	R	Floating point fraction to be added to 'Total Flow Carry' * 100 to calculate full resolution total flow.
TOTAL_TLF_FRACTION	Float	R	Floating point fraction to be added to 'Total TLF Carry' * 100 to calculate full resolution total TLF.
TOTAL_FLOW_CARRY	Unsigned Long	R	Signed long portion (* 100) to be added to 'Total Flow Fraction' to calculate full resolution total flow.
TOTAL_TLF_CARRY	Unsigned Long	R	Signed long portion (* 100) to be added to 'Total TLF Fraction' to calculate full resolution total TLF.
SYSTEM_STATUS	Unsigned Long	R	Refer to manual for description of individual bits.
SENSOR_MAX_MIN			
SENSOR_1_MAX	Long	R	Sensor 1 maximum in A/D bins.
SENSOR_2_MAX	Long	R	Sensor 2 maximum in A/D bins.
SENSOR_3_MAX	Long	R	Sensor 3 maximum in A/D bins.
SENSOR_4_MAX	Long	R	Sensor 4 maximum in A/D bins.
SENSOR_5_MAX	Long	R	Sensor 5 maximum in A/D bins.
SENSOR_6_MAX	Long	R	Sensor 6 maximum in A/D bins.
SENSOR_7_MAX	Long	R	Sensor 7 maximum in A/D bins.
SENSOR_8_MAX	Long	R	Sensor 8 maximum in A/D bins.
SENSOR_1_MIN	Long	R	Sensor 1 minimum in A/D bins.
SENSOR_2_MIN	Long	R	Sensor 2 minimum in A/D bins.

Table 3 Transducer Block Configurations (Page 18)

SENSOR_3_MIN	Long	R	Sensor 3 minimum in A/D bins.
SENSOR_4_MIN	Long	R	Sensor 4 minimum in A/D bins.
SENSOR_5_MIN	Long	R	Sensor 5 minimum in A/D bins.
SENSOR_6_MIN	Long	R	Sensor 6 minimum in A/D bins.
SENSOR_7_MIN	Long	R	Sensor 7 minimum in A/D bins.
SENSOR_8_MIN	Long	R	Sensor 8 minimum in A/D bins.
SENSOR_ALPHA			
SENSOR_ALPHA_1	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
SENSOR_ALPHA_2	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
SENSOR_ALPHA_3	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
SENSOR_ALPHA_4	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
SENSOR_ALPHA_5	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
SENSOR_ALPHA_6	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
SENSOR_ALPHA_7	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
SENSOR_ALPHA_8	Float	R	Relative scale factor between signal magnitudes acquired from each sensor.
FIELDBUS_INFO			
FIRMWARE_REVISION	Octet String	R	Softing FBK firmware revision
PD_TAG	Octet String	R	Fieldbus Physical Device Tag
DEVICE_ID	Octet String	R	Fieldbus device ID
NODE_ADDRESS	Unsigned Char	R	Fieldbus node address
BLOCK_MODE_RB	Unsigned Char	R	Resource Block Mode
BLOCK_MODE_TB	Unsigned Char	R	Transducer Block Mode

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Appendix A EXAMPLE OF USING FOUNDATION FIELDBUS HOST

A1 Connection Setup

The following hardware was used for this example of a connection setup:

- Softing FG-100 FF/HSE Linking Device
- Relcom FCS-PH-PL Fieldbus Power Hub
- 24V Bench power supply
- Transmitter with Fieldbus

The hardware was connected as follows:

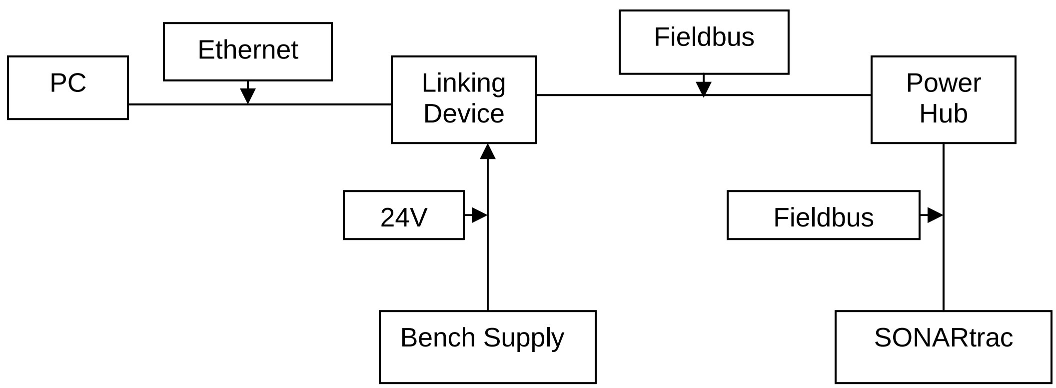

Figure 2 Example Connection Setup

A2 Using National Instruments Configurator

Tools provided by National Instruments (NI) allow a user to import ‘DDL’ (Device Description Language) files to the Configurator program to define how a device will appear. These are very similar to HART DDL files. **Note**: This document is not intended as a tutorial on the NI Configurator; please reference the NI manual for that program.

Prior to running Configurator, you must first run the ‘Interface Configuration Utility’ provided with Configurator. This allows you to import the required files, and only needs to be done once. You may then run Configurator.

Prior to connecting the transmitter to the Fieldbus, the Configurator will show a screen similar to the following:

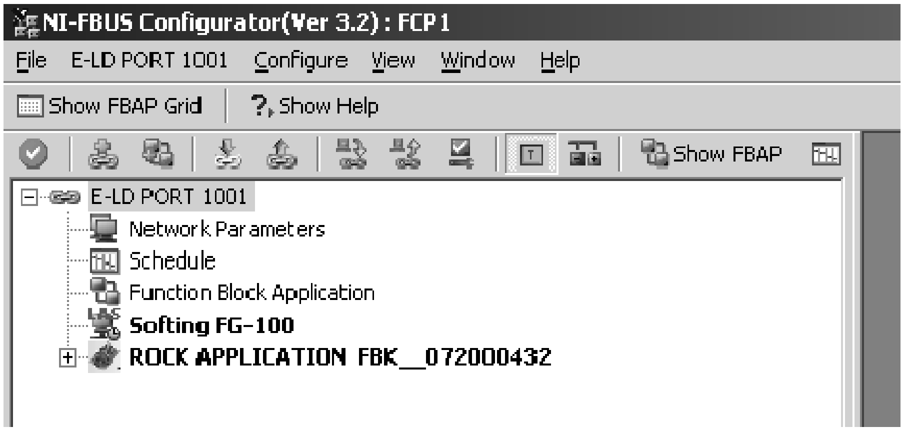

Figure 3 NI-FBUS Configurator

Once connected, a process will start where an address will be assigned to the transmitter. This may take few minutes. An hourglass will appear on the device icon while this is being done:

Figure 4 SONAR Icon With Hourglass

The display on the transmitter will display an ‘F’ to indicate it is connected to a Fieldbus network:

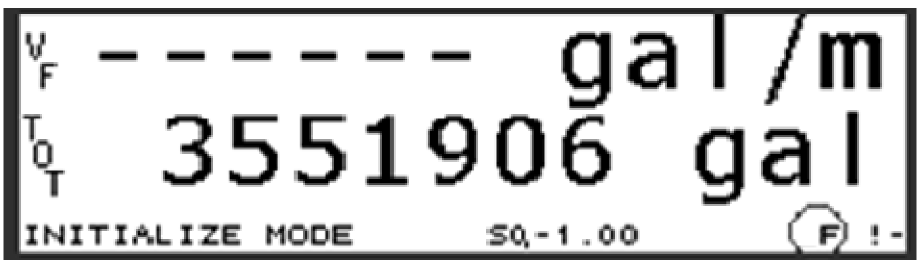

Figure 5 Fieldbus Connection Indicated on Transmitter Display

Once the connection process is completed, the hourglass will be removed:

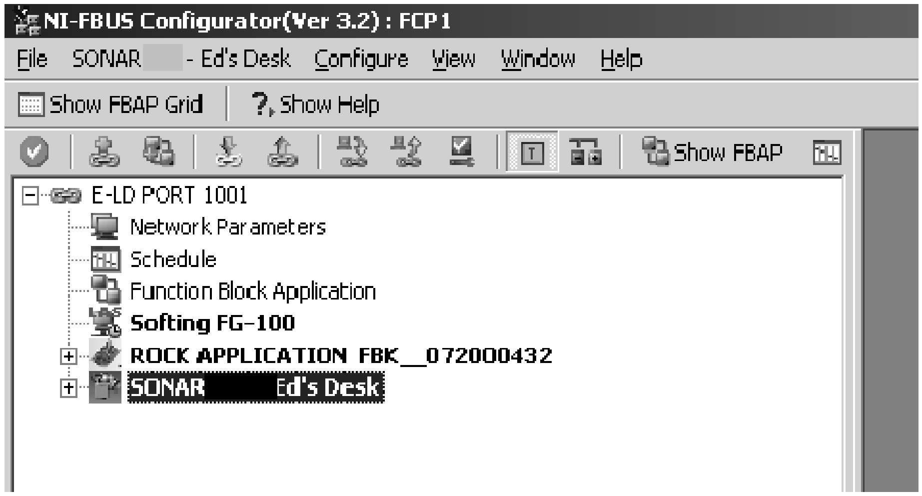

Figure 6 NI-FBUS Configurator Display Example

Opening the SONAR object by clicking on the '+' sign will open up all the included 'Function Blocks' available:

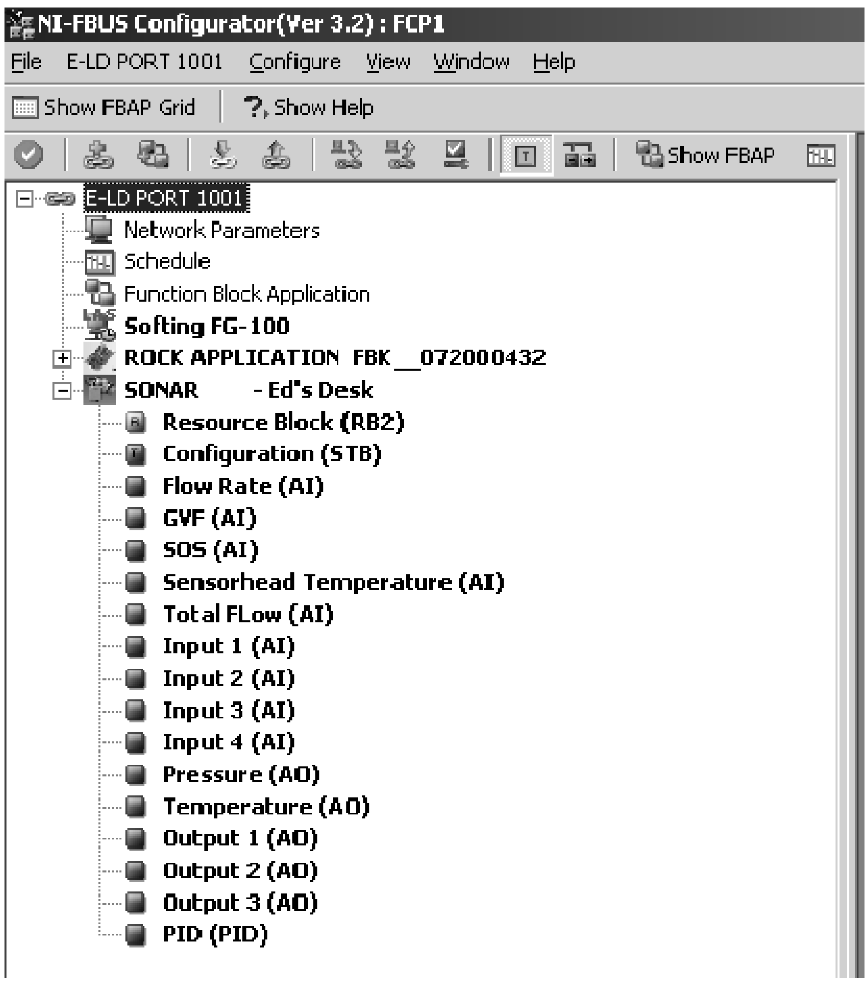

Figure 7 Opening Function Blocks Example

Note: For this example descriptive names have been given to the device. By default, the Function Blocks will be given generic names.

On the setup an image to be displayed has been assigned and the manufacturer info file ("mfr_info.txt", part of the Configurator program), which includes information about SONARtrac and CiDRA has been modified. Double-clicking on the SONARtrac icon brings up the following dialog box:

Figure 8 Dialog Box Example

The dialog box includes a picture the user may change, a link to the CiDRA website and a description of the device. The files necessary for this can be found as part of the Fieldbus DDL files.

A3 Changing Settings With Configurator

Double-clicking on the 'Configuration (STB)' or 'Transducer Block' brings up the following dialog:

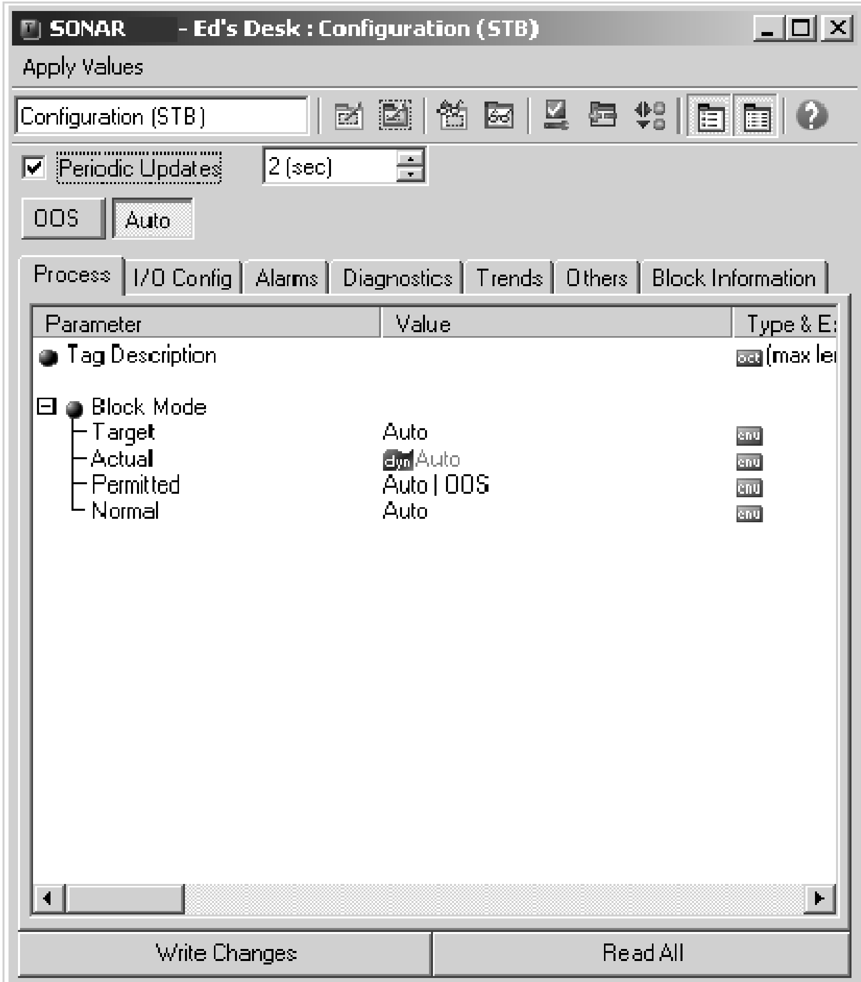

Figure 9 Configuration (STB) Example

Clicking on the 'Others' tab and expanding the window will list all the available settings for the transmitter shown on the following page. The full list is found in Section 5.

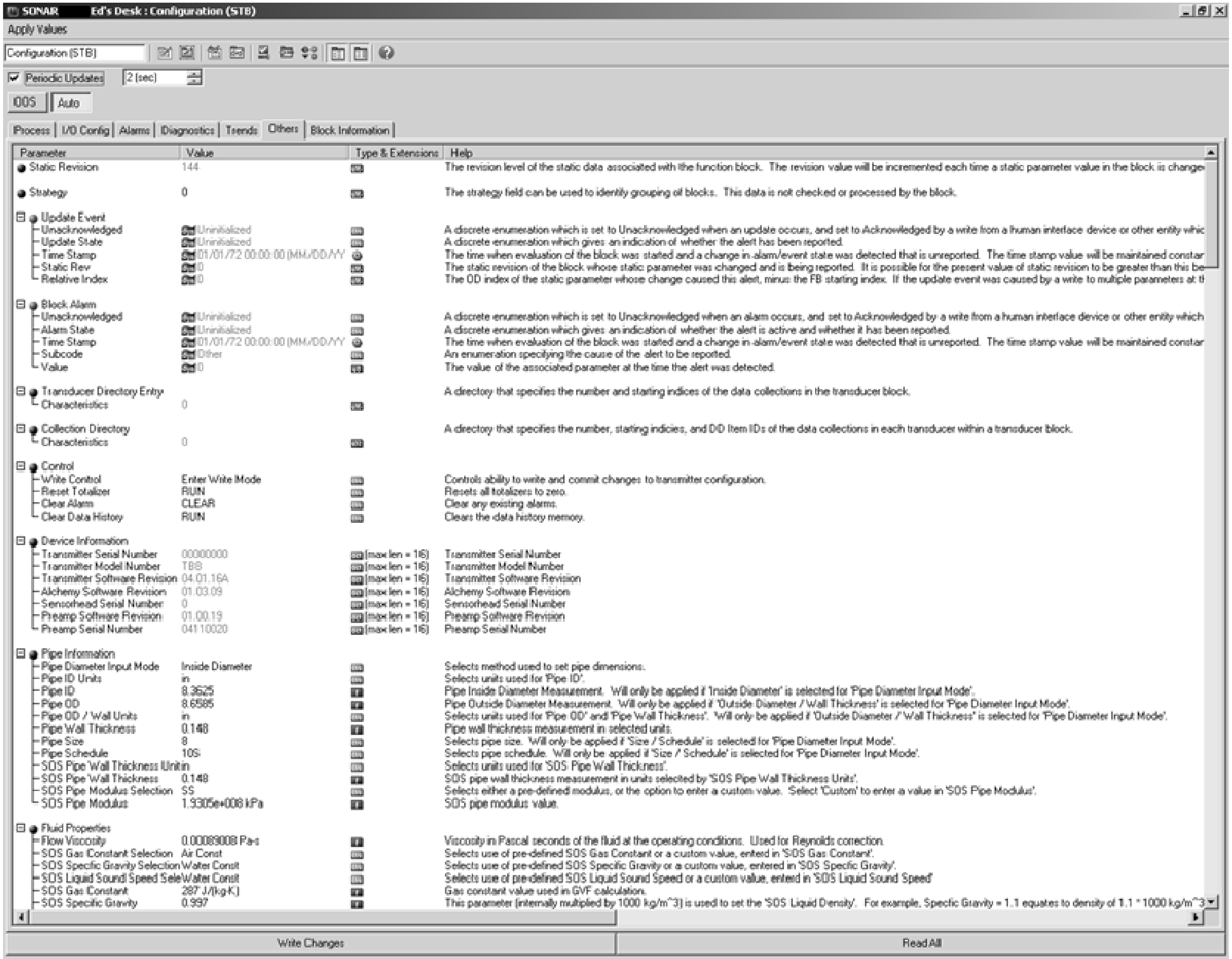

Figure 10 Partial List of Available Settings

The top-left of the window shows the current state of the Transducer Block – OOS (Out Of Service) or Auto:

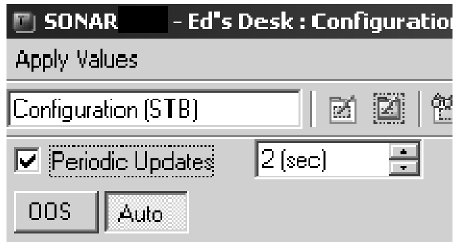

Figure 11 Transducer Block State

'**Auto**' indicates the device is running normally.

The bulk of the window lists the parameters, grouped by function, their current value, the type and help text, as read out of the DDL file. Values in gray are read-only.

To change a setting, you must first click on the 'OOS' button. The transmitter display will indicate it is OOS by changing the 'F' indication to a reverse 'F':

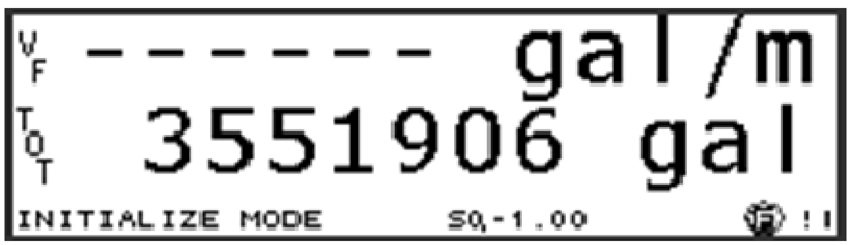

Figure 12 Reverse 'F' Indicator

The user may then select one or more settings to change by clicking on them, changing a value, and then clicking the ‘Write Changes’ button when done.

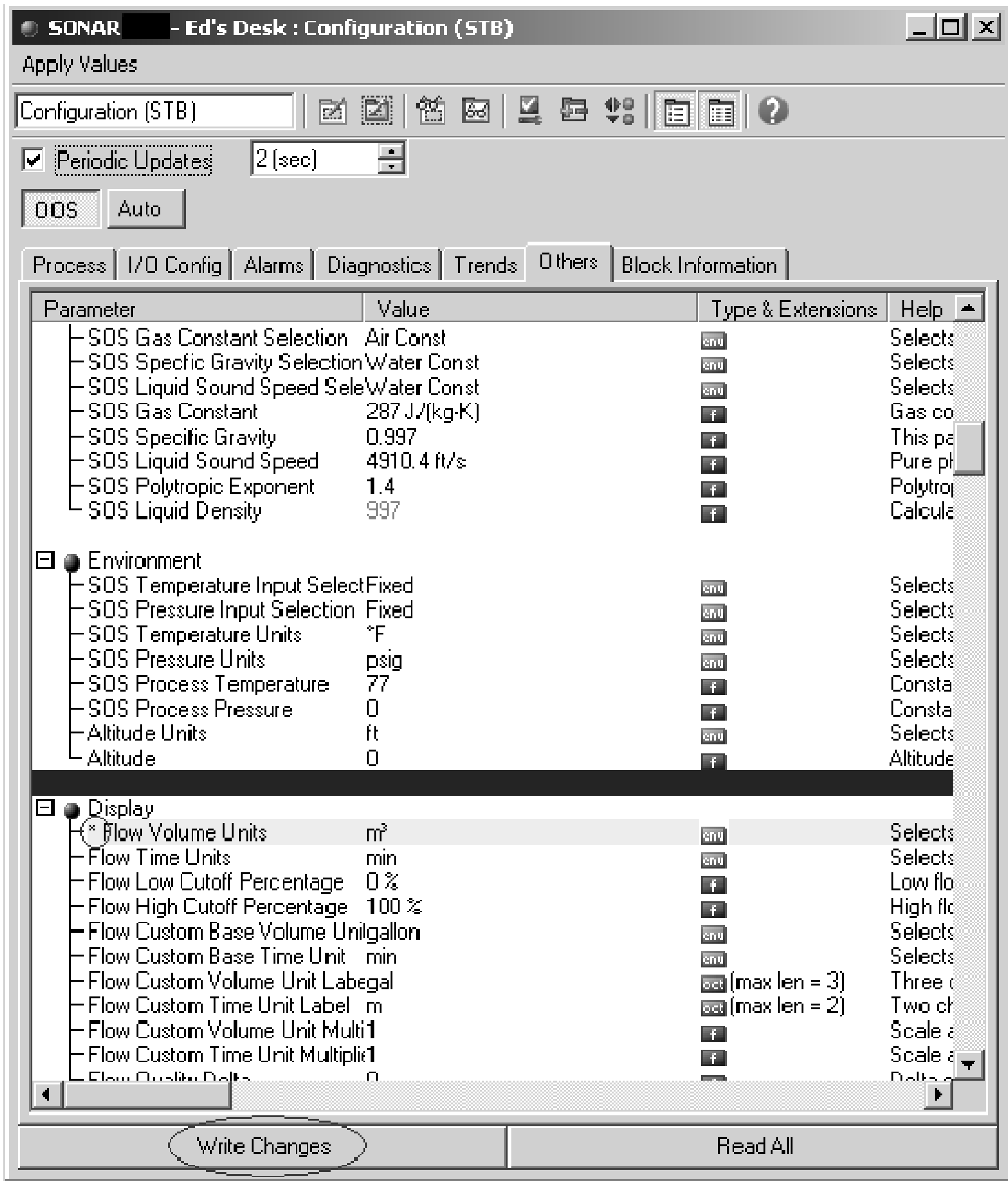

Figure 13 Selecting Settings, Changing Values and Writing Changes

The asterisk next to the setting indicates it will be modified. If you select more than one thing to change, the modified parameters will be highlighted in yellow.

Once the changes are written, the asterisk and yellow highlight will be removed.

It is important to note that 'written' simply indicates that changes have been sent and acknowledged by the transmitter, but <u>NOT</u> written to FLASH yet.

A3.1 Changes to FLASH

To write the changes to FLASH, click the 'Auto' button. All changes must be accepted before hitting the 'Auto' button, or changes will not be written, and Configurator will indicate an error has occurred.

When the 'Auto' button is clicked, the transmitter validates all changes made and will modify anything that is invalid back to its previous value. The only way this is indicated is that Configurator will show the previous value.

No error messages are displayed. The user must confirm that changes were accepted by inspecting what Configurator shows after returning to 'Auto' state and the device is given time to update the Configurator display.

A3.2 Undoing Changes

To undo changes without saving them, click the 'Auto' button, then the 'Read All' button. Configurator will remove the asterisk and refresh the value that was changed.

A4 Creating a Function Block Application (FBAP) to Transmitter

This example requires the addition of another Softing FBK board running their ‘Rock’ application, and will have the Rock send pressure values to the transmitter. Simply connect the Rock device to the Fieldbus power hub.

Using Configurator:

- Click the “Show FBAP” button
- Drag “Analog Input” from Rock to FBAP
- Drag “Analog Output 1” from SONARtrac to FBAP
- Select wiring tool and wire OUT from Rock AI to CAS IN on SONARtrac AO as shown:

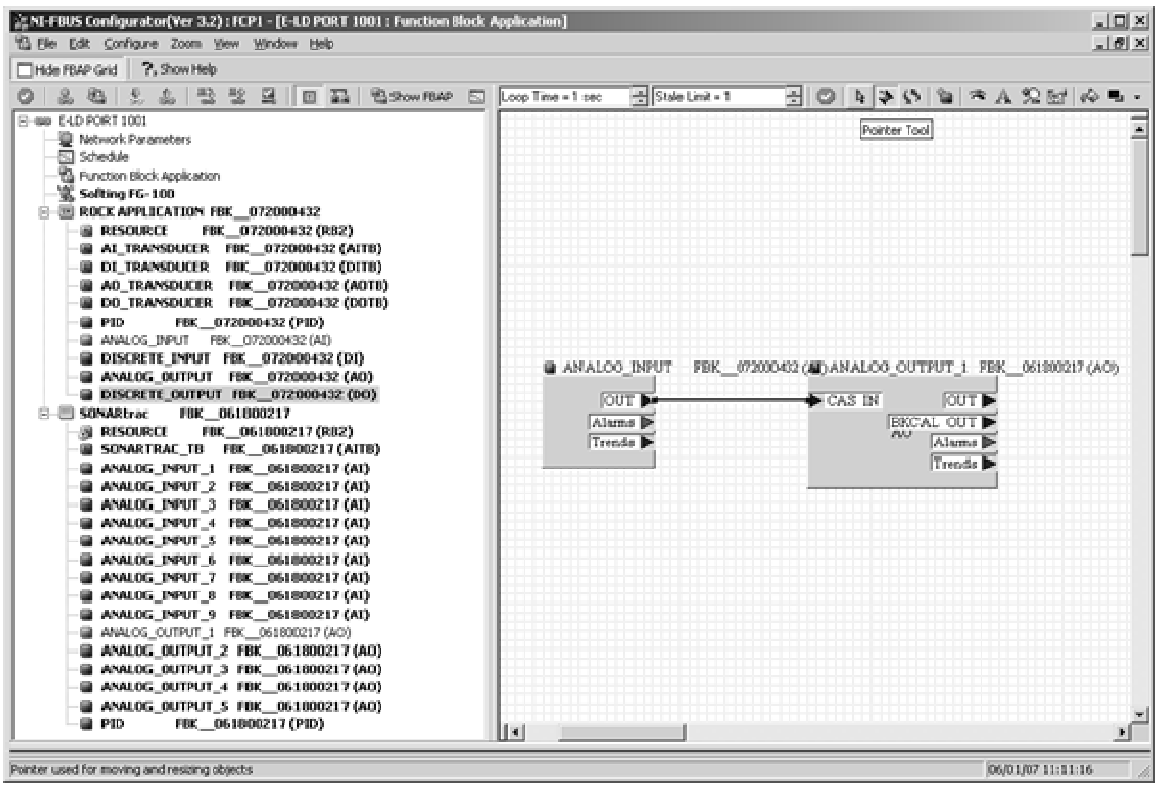

Figure 14 Creating a Function Block Application (FBAP) to Transmitter

Double click the AI block in the FBAP window

(If TARGET>MODE_BLK is not OOS, click auto, then OOS quickly to change TARGET in MODE_BLK to OOS)

- On the Process Tab, set CHANNEL to 0x0002
- On the Scaling Tab, set L_TYPE to Indirect
- Click the Write Changes button
- Click Auto button
- Close AI window

Double click the SONARtrac AO block in the FBAP window

- On the Process Tab, set CHANNEL to 10 (0x000a)
- On the Options tab, set SHED_OPT to “normal shed normal return” (sic)
- Click Write Changes button
- Click Auto button
- Close AO window

A5 Download the Configuration

- Click ‘Configure’ on main menu
- Select ’Download Configuration…’
- Check the ‘Clear Device’ checkbox
- Click the ‘Download’ button

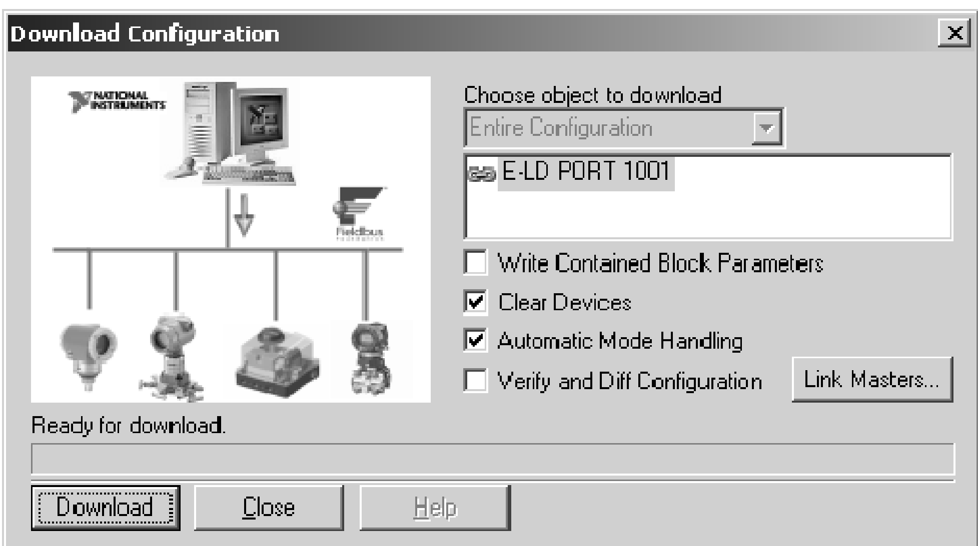

Figure 15 Download Configuration

The ‘Pressure Input Select’ in the transmitter must be configured using Configurator, the transmitter front panel, or INI editor for the transmitter to use the pressure input. The pressure can also be displayed on the transmitter front panel if desired.

When completed, verify the transmitter is receiving pressure from the Rock device – the pressure value ramps from 0 to 100.

The user can also disconnect and re-power the setup to see that the transmitter is still receiving pressure, as this is now saved in the FLASH of the Fieldbus devices.

Note that this configuration is specific to the two Fieldbus devices (transmitter and Rock device) downloaded to. If you change to a different transmitter, for example, you must download a new FBAP to the Rock and that transmitter.

Appendix B EXAMPLE OF USING PROFIBUS HOST

B1 Connection Setup

Note: The default address is 126. User should change address from 126 to an unused address following connection to the Profibus Network.

The following hardware were used for this example

- Siemens CP 5611 Profibus interface card
- Siemens FDC 157 DP/PA Coupler
- Bench power supply
- Passive sonar transmitter with Fieldbus / Profibus

The connection used was:

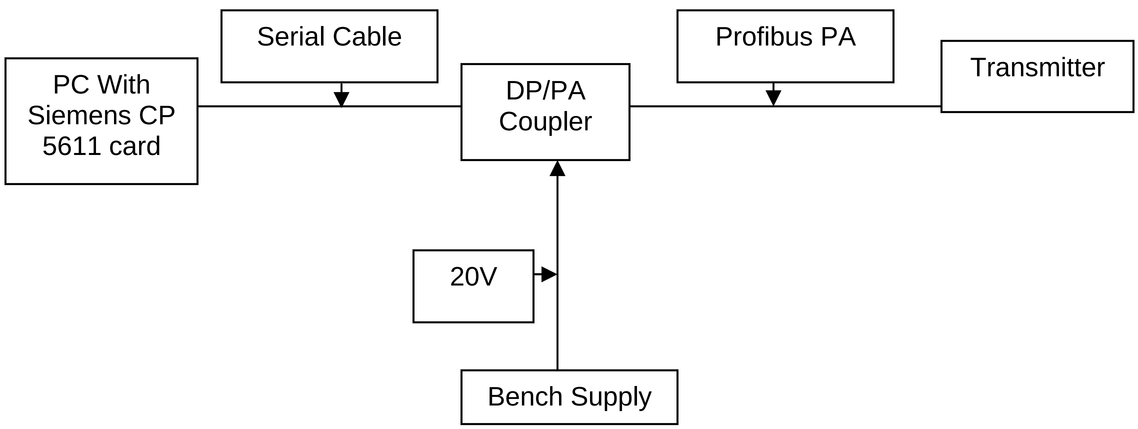

Figure 16 Example Connection Setup

B2 Making Changes to Transmitter Using a Profibus Host

To change the configuration of transmitter using a Profibus Host, perform the following steps:

- Place the Transducer Block Out Of Service (OOS)
- Write any changes to the variables
- Place the Transducer Block to Auto Mode

When the transmitter is placed into Auto Mode, it will validate any changes made. Invalid changes will be returned to their previous value.

B3 Using SIMATIC Manager / PDM

Note: This document is not intended as a tutorial on SIMATIC; reference the Siemens manual for that program.

Tools provided by Siemens allow a user to import 'EDDL' (Enhanced Device Description Language) files to the SIMATIC program to define how a device will appear.

The user must run 'Manage Device Catalog…'. This allows the user to import the required files, and only need to be done once.

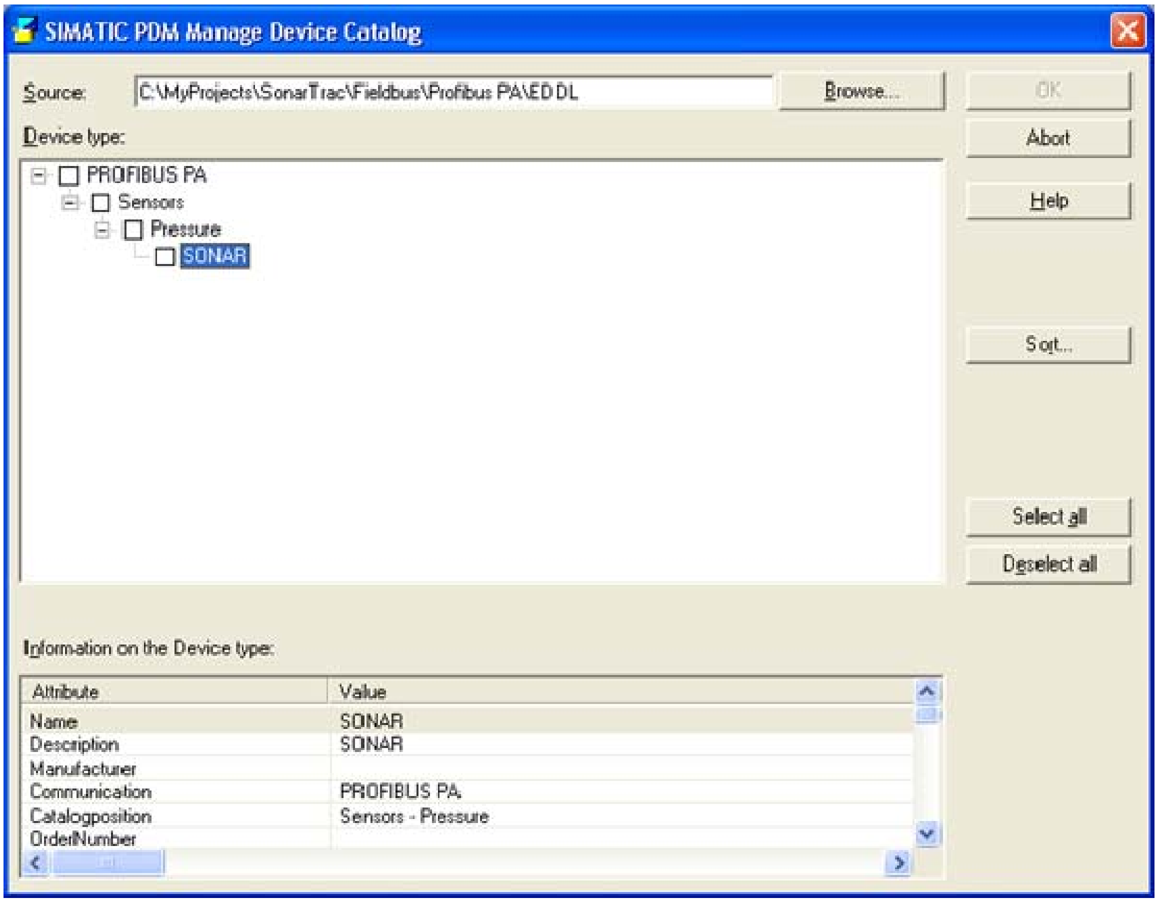

Figure 17 Using SIMATIC Manager / PDM

Setup the communication to the DP/PA coupler using the 'Set PG/PC Interface' option. The following are the settings for the Coupler used in this example:

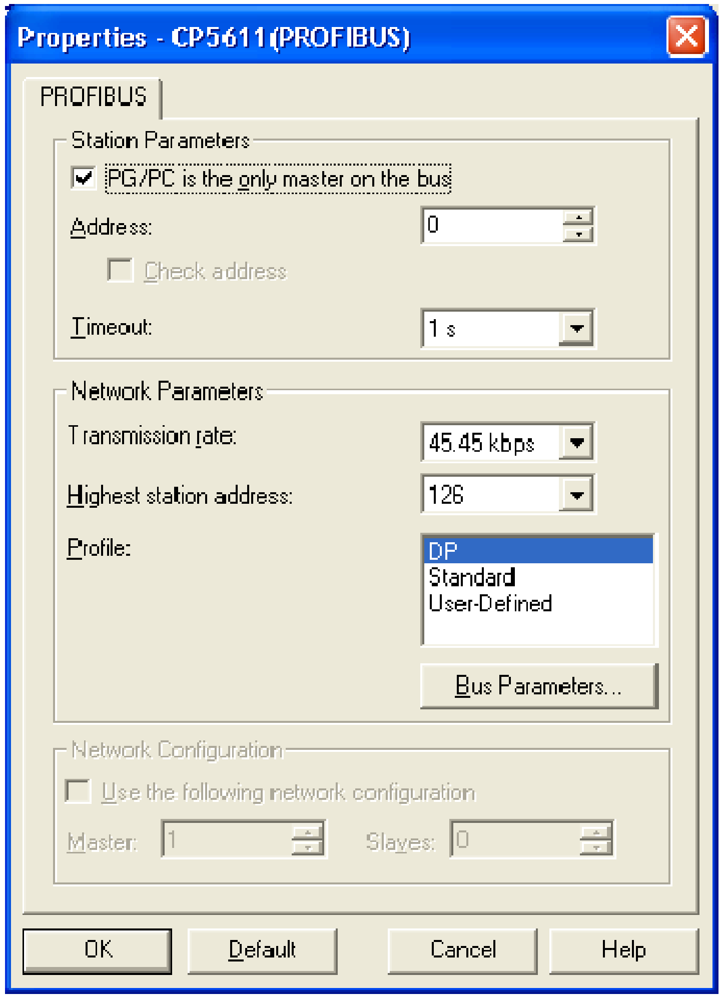

Figure 18 Communications Setup

Create a new project in SIMATIC Manager, or add the device to an existing project:

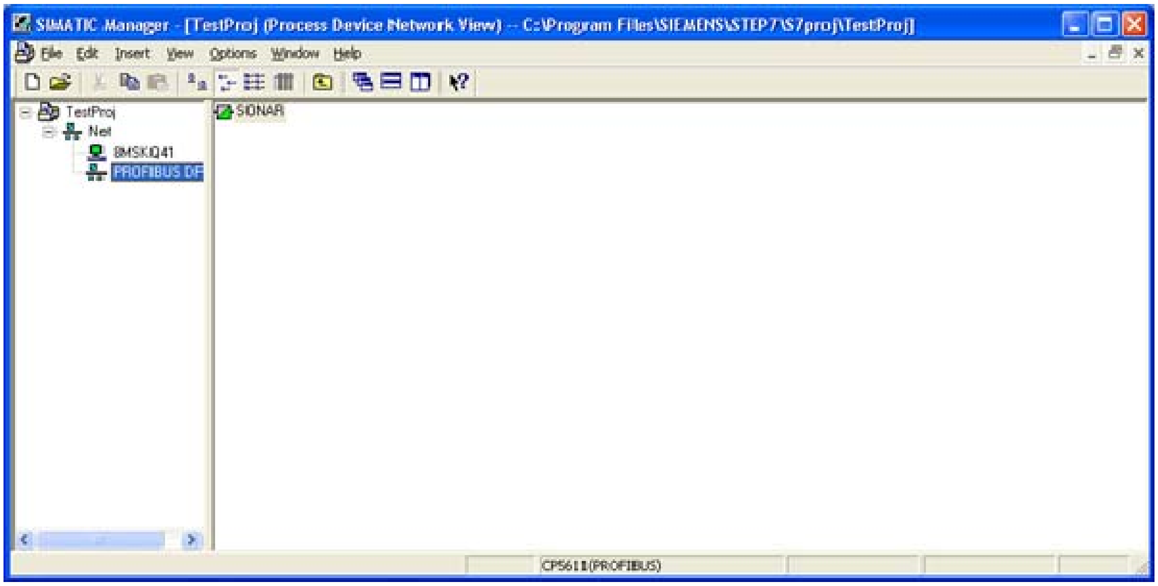

Figure 19 Setting up Project

Opening the device will launch SIMATIC PDM which will then allow modifying and displaying all the variables available in the transmitter.

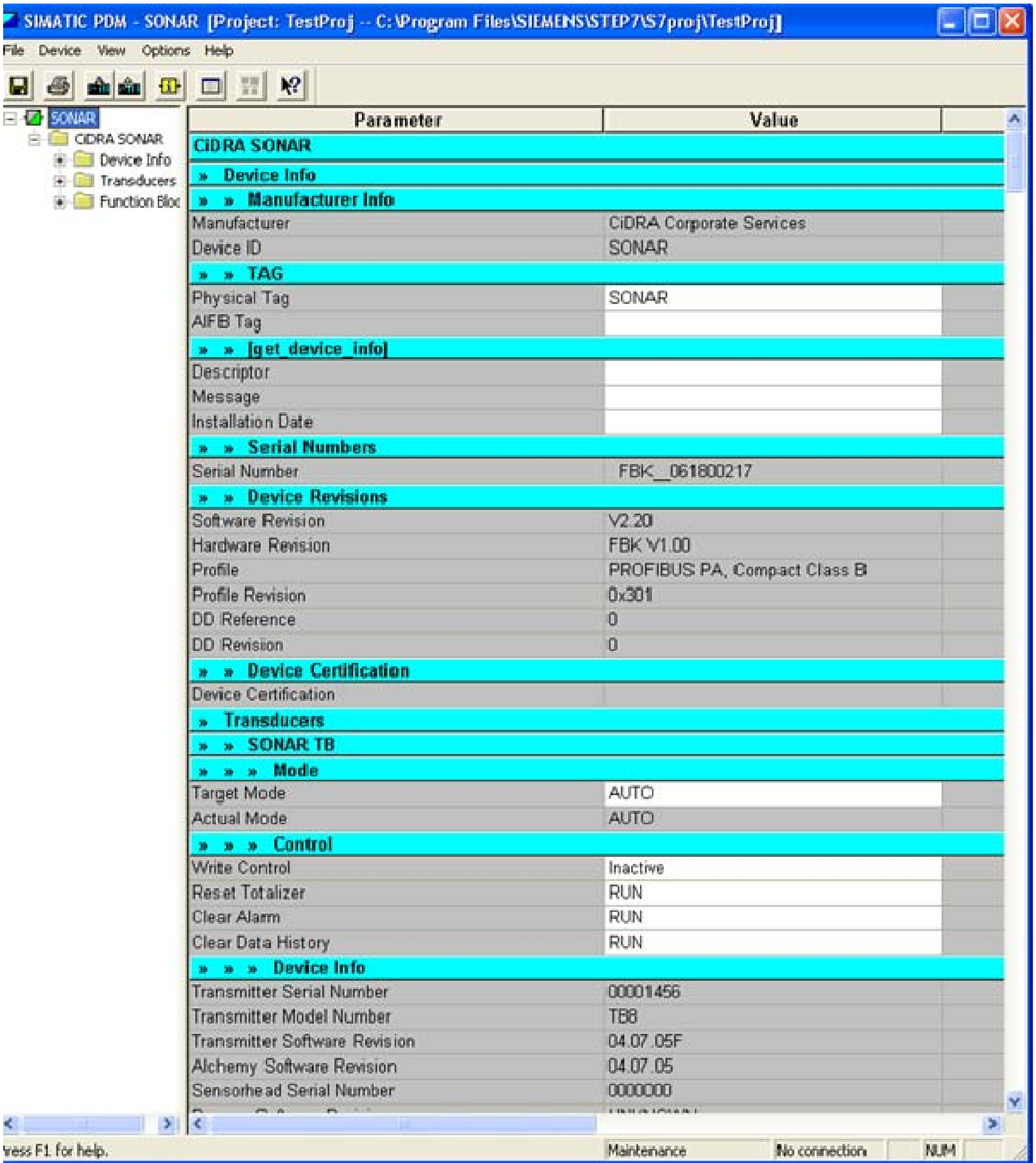

Figure 20 Transmitter Variables

Update the information by clicking on 'Upload to PG/PC'. Data will be read from the transmitter. The 'PA' LED will flicker on the DP/PA coupler.

B4 Changing Transmitter Settings with SIMATIC

To modify settings, you must first change the 'Target Mode' to 'OOS':

Figure 21 Changing Target Mode to 'OOS'

Select OOS from the drop down and click the 'Download to Device' button to update the Target Mode. The 'P' indicator on the transmitter will change to reverse to indicate 'write mode' is enabled. Click the 'Upload to PG/PC' button again to update the 'Actual Mode'.

Note: ***Failing to 'Upload' after making changes may cause errors 'Downloading' to the device due to a mismatch between the device and SIMATIC.***

Now the user can change any transmitter settings by either typing in new values or selecting options from a dropdown.

B5 Saving Changes to FLASH

When all changes are complete, click 'Download to Device', 'Upload to PG/PC', then set 'Target mode' to 'Auto', and 'Download' again. The reverse 'P' will change and the changes will be set in the meter.

When 'Target Mode' to 'Auto' is set, the transmitter validates all changes made and will modify anything that is invalid back to its previous value. If a value is invalid, the user may receive an error from SIMATIC. Perform an 'Upload to PG/PC' to read back what is currently set in the transmitter.

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