



# Detcon Model 700

## Foundation Fieldbus Bridge



## Operator's Installation and Instruction Manual

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# 1.0 Description

The Foundation Fieldbus Bridge is a bi-directional digital communication interface that provides data communication between the Model 700 sensors and Foundation Fieldbus enabled devices. The open, nonproprietary Foundation Fieldbus architecture provides a communications protocol for control and instrumentation systems in which each device has its' own "intelligence" and communicates via an all-digital, serial, two-way communications system.



**Figure 1** Foundation Fieldbus Bridge PCA

The Foundation Fieldbus Bridge supports the Foundation H1 protocol. The H1 protocol runs at 31.25kbts/s and is intended to operate over twisted pair instrument cable. The Foundation Fieldbus Bridge communicates with the Model 700 sensors via its Modbus™ interface and transfers that information to the Foundation Fieldbus. This enables a Foundation Fieldbus master to read four primary variables from the 700 series sensor. These variables include:

- Measured gas concentration
- Sensor fault status
- Input voltage
- Temperature

## 2.0 Installation

The Foundation Fieldbus Bridge replaces the Transient Protection Assembly in the conduit the Model 700 sensor is attached to. The conduit and the Model 700 sensor should be mounted as prescribed in the sensor's manual. For units that have been ordered with the Foundation Fieldbus Bridge installed, the section on installing the FF Bridge PCA can be skipped.

### 2.1 Installation of Foundation Fieldbus Bridge PCA

The FF Bridge PCA replaces the Transient Protection Assembly (TPA) in the conduit attached to the Model 700 sensor. The sensor is wired to the FF Bridge PCA the same way as it is on the TPA, so no re-wiring of the sensor connector is necessary.

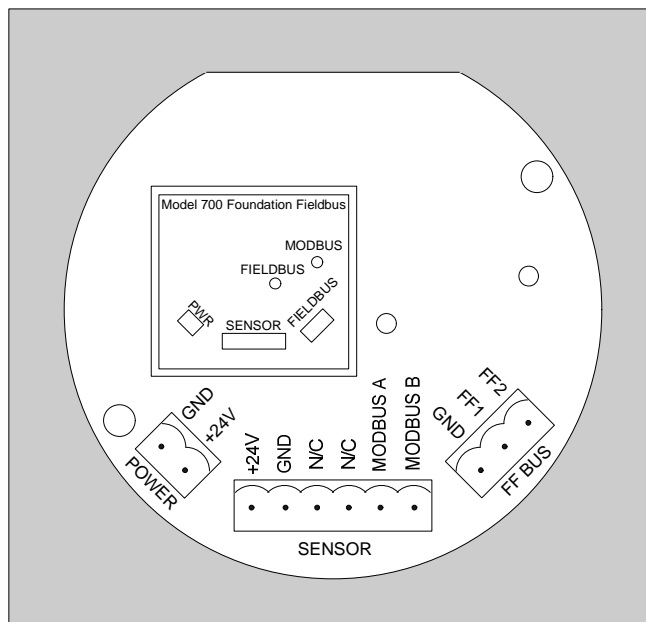


Figure 2 Foundation Fieldbus Bridge Connections

1. Remove the power/mA output connector from the TPA if power is applied.
2. Remove the connector from the Transient Protection PCA that connects to the Model 700 sensor.
3. Remove the hardware holding the Transient Protection PCA and remove the TPA from the conduit.
4. Install the Foundation Fieldbus Bridge PCA in the conduit, using the same hardware used with the TPA.
5. Plug the sensor's connector into the connector on the FF Bridge PCA, labeled "SENSOR".
6. Wire the power and Fieldbus connections as described below.

### 2.2 Connecting the Foundation Fieldbus Bridge

The Foundation Fieldbus Bridge has separate connections for power and Fieldbus. Refer to Figure 2. Connect 24VDC to the pin labeled "+24V" on the "Power" connector. Connect the 24V Return to the same connector at the pin labeled "GND". The Foundation Fieldbus is connected to the connector labeled "FF BUS". The FF power+signal is connected to pin "FF1". The FF ground+signal is connected to the "FF2" pin, and the FF EMC ground is connected to the "GND" pin.

If not already plugged in, plug the connector from the Model 700 sensor into the connector labeled "SENSOR" on the FF Bridge PCA.

## 3.0 Operation

When power is applied to the Foundation Fieldbus Bridge with the Model 700 sensor attached, the FF Bridge will go through a boot up sequence that will last for approximately 10 seconds. After the boot up sequence the FF Bridge will enter normal operation, and communication with the Host will begin. A green LED Labeled “Fieldbus” on the FF Bridge will illuminate when the FF Bridge is communicating with the Foundation Fieldbus Host.

A green/yellow LED labeled “Modbus” will illuminate green each time the FF Bridge polls the Model 700 sensor over the Modbus. The “Modbus” LED will illuminate yellow each time the Model 700 sensor responds to a poll from the FF Bridge.

### 3.1 Function Block Model

The Foundation Fieldbus Bridge function block model includes a resource block (RB), a transducer block (TB) and four analog input blocks (AI). The resource block defines parameters that apply to the entire device. These include the manufacturer ID, device type, and software revision.

The transducer block contains four primary variables that indicate the status of the Model 700 sensor (see Section 3.2). It also contains all of the parameters required to establish Modbus communication with the Model 700 sensor. All of these parameters are set by the Detcon factory and do not need to be configured by the user. The Modbus parameters are write-protected to prevent accidental changes to the settings.

A screen shot of the Modbus settings is shown in Figure 3. This screen shot is taken from the National Instruments NI-FBUS Configurator application. The format of these settings may vary depending on the application used to view them. The value of the settings should always be as shown in Figure 3.

**The Modbus address on the Model 700 sensor must be set to ‘1’ for the Foundation Fieldbus Bridge to operate correctly.** The Model 700 sensor address will be set to ‘1’ by the Detcon factory when it is shipped with a Foundation Fieldbus Bridge installed. If the Foundation Fieldbus Bridge is being installed in a previously purchased Model 700 sensor, the user will need to ensure that its Modbus address is set to ‘1’. Refer to the manual for the Model 700 sensor for instructions on setting the sensor’s Modbus address.

The four Analog Inputs Blocks (AI) in the Foundation Fieldbus Bridge take each primary variable and make it available to other function blocks as its output. The functionality in AI blocks is not currently used and these blocks are not configured prior to shipment from the Detcon factory. Please contact Detcon Technical Support if the AI blocks are needed for your application.

FINTFF\_4AI\_MODBUS : FINT\_TB (TB)

Apply Values

FINT\_TB (TB)

Periodic Updates 2 (sec)

OOS Auto

Process | I/O Config | Alarms | Diagnostics | Trends | Others

Parameter	Value	Type & Extensions	Help
<b>MODBUS_CDM_SETUP</b>			
MODBUS_REG_SETUP_1			
-MODBUS_ADDRESS	1	int	Modbus instrument address
-PV_REG_FUNCTION_CODE	PV Read function code 3	int	Modbus function code for the dynamic variable registers
-PV_REG_ADDRESS	2	int	Primary variable Modbus register address
-PV_TYPE_BYTEORDER	Unsigned short integer, Byte order 1-1	int	Gives the choice of data type and byte ordering
-PV_SCALING_FACTOR	1	float	Scaling factor
-MODBUS_REGS_START_ADD	1	int	The start address for the Modbus setup registers
-MODBUS_REGS_BYTE_ORD	Byte order 1-0	int	Gives the choice of the Modbus setup registers ordering
-NUM_OF_MODBUS_REGS	10	int	Numbers of consecutive Modbus setup registers
MODBUS_REG_SETUP_2			
-MODBUS_ADDRESS	1	int	Modbus instrument address
-PV_REG_FUNCTION_CODE	PV Read function code 3	int	Modbus function code for the dynamic variable registers
-PV_REG_ADDRESS	5	int	Primary variable Modbus register address
-PV_TYPE_BYTEORDER	Unsigned short integer, Byte order 1-1	int	Gives the choice of data type and byte ordering
-PV_SCALING_FACTOR	1	float	Scaling factor
-MODBUS_REGS_START_ADD	1	int	The start address for the Modbus setup registers
-MODBUS_REGS_BYTE_ORD	Byte order 1-0	int	Gives the choice of the Modbus setup registers ordering
-NUM_OF_MODBUS_REGS	10	int	Numbers of consecutive Modbus setup registers
MODBUS_REG_SETUP_3			
-MODBUS_ADDRESS	1	int	Modbus instrument address
-PV_REG_FUNCTION_CODE	PV Read function code 3	int	Modbus function code for the dynamic variable registers
-PV_REG_ADDRESS	9	int	Primary variable Modbus register address
-PV_TYPE_BYTEORDER	Unsigned short integer, Byte order 1-1	int	Gives the choice of data type and byte ordering
-PV_SCALING_FACTOR	0.01	float	Scaling factor
-MODBUS_REGS_START_ADD	1	int	The start address for the Modbus setup registers
-MODBUS_REGS_BYTE_ORD	Byte order 1-0	int	Gives the choice of the Modbus setup registers ordering
-NUM_OF_MODBUS_REGS	10	int	Numbers of consecutive Modbus setup registers
MODBUS_REG_SETUP_4			
-MODBUS_ADDRESS	1	int	Modbus instrument address
-PV_REG_FUNCTION_CODE	PV Read function code 3	int	Modbus function code for the dynamic variable registers
-PV_REG_ADDRESS	10	int	Primary variable Modbus register address
-PV_TYPE_BYTEORDER	Unsigned short integer, Byte order 1-1	int	Gives the choice of data type and byte ordering
-PV_SCALING_FACTOR	1	float	Scaling factor
-MODBUS_REGS_START_ADD	10	int	The start address for the Modbus setup registers
-MODBUS_REGS_BYTE_ORD	Byte order 1-0	int	Gives the choice of the Modbus setup registers ordering
-NUM_OF_MODBUS_REGS	10	int	Numbers of consecutive Modbus setup registers

Write Changes

start NI-FBUS Configurator...

Figure 3 Modbus Settings in NI-FBUS Configurator



### 3.2 Primary Variables

The transducer block (TB) in the Foundation Fieldbus Bridge includes four primary variables that indicate the status of the sensor. These variables are described in the table in Figure 4.

Name	Description	Units	Meaning
PV_1	Gas Concentration	%LEL, ppm, or ppb <sup>1</sup>	Concentration level measured by the Model 700 sensor
PV_2	Fault Status <sup>2,3</sup>	Unitless	1 Global Fault 2 Auto Span Fault 4 Temperature Fault 8 4-20mA Fault 16 Input Voltage Fault 32 Memory Fault 64 Processor Fault 128 Clearing Fault 256 Stability Fault 512 Range Fault 1024 Sensor Fault 2048 Zero Fault 4096 Sensor Fault 2 8192 Reserved 16384 In Calibration 32576 Reserved
PV_3	Input Voltage	Volts (DC)	Voltage level of the power input to the sensor
PV_4	Temperature	°C	Temperature measured by the Model 700 sensor

**Figure 4** Foundation Fieldbus Bridge Primary Variables

<sup>1</sup> Units depend on type of Model 700 attached to the Foundation Fieldbus Bridge

<sup>2</sup> See appropriate Model 700 instruction manual for a description of each fault

<sup>3</sup> If more than one fault is present, values are added together (e.g. if a global fault and zero fault are both present, the PV would be equal to '2049')

## 4.0 Specifications

### Input Power

10 to 30VDC (Nominal 24VDC)

### Power Consumption (per channel)

100mA Maximum (Including Sensor)

3W Maximum (Including Sensor)

### Operating Temperature

-40°C to +85°C

Humidity: 10 to 95% Non-condensing

### Outputs

Foundation Fieldbus H1 (31.25 kbits/sec)

### Foundation Fieldbus ITK Version

5.0

### Manufacturer ID

0xA000

### Device Type

0x0005

### Warranty

One year

Five year fixed fee service policy

## 5.0 Warranty

All warranties are FOB the Detcon factory. Should any product fail to perform in accordance with published specifications within the warranty period, return it freight pre-paid to Detcon Inc., 3200 Research Forest Drive Suite A-1, The Woodlands, Texas 77381 for necessary repairs.

Detcon Inc., as manufacturer, warrants each new Foundation Fieldbus Bridge PCA to be free from defects in material and workmanship under intended normal use for a period of one year. The warranty period begins on the date of shipment to the original purchaser and ends one year thereafter.

# Appendix A

## Revision History

Revision	Date	Changes made	Approval
0.0	6/2/2010	Release	LBU

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