Instruction

MI 021-399
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I/A Series® Model IMT25 Magnetic Flow Transmitter with FOUNDATION Fieldbus Communication

Operation, Configuration, and Calibration from a Fieldbus Host

Invensys®
FOXBORO®

Contents

Tables

1. Introduction

Description

An I/A Series Model IMT25-...F Magnetic Flow Transmitter is used with an 8000A Wafer Body Magnetic Flowtube or with a 2800, 8300, 9100A, 9200A, or 9300A Flanged Magnetic Flowtube. The transmitter converts the low level, high impedance signal from the flowtube to a FOUNDATION fieldbus or pulse output proportional to flow rate.

An IMT25...-F transmitter can be operated, configured, and calibrated remotely from a FOUNDATION fieldbus host or locally from the transmitter optional keypad/display. If you change a parameter in the Transducer Block from the local keypad/display, you may also have to make the same change in any associated blocks from the fieldbus host before you place the transmitter on-line.

This document describes operation, configuration, and calibration of an IMT25...-F Transmitter from a fieldbus host. For operation, calibration, and configuration from the local keypad/display, refer to MI 021-390.

FOUNDATION Fieldbus

A condensed functional description of the FOUNDATION fieldbus can be found in MI 014-900. For more detailed information on the specifications and operating characteristics of a fieldbus system, refer to the document titled *Technical Overview FD-043*, published by the Fieldbus Foundation. This document can be obtained via the Internet from www.fieldbus.org or by calling 512-794-8890.

FOUNDATION Fieldbus Host Software

Software for controlling a FOUNDATION fieldbus system from a host is available from a number of suppliers. An example of such an application package is the NI-FBUS system offered by National Instruments, Inc. Detailed information related to screens, menus, and commands for operating your FOUNDATION fieldbus system can be found in the technical manual supplied with your specific software package. Such information, therefore, is not included in this document.

Device Revision and DD Revision Level

The device firmware version and DD version revision levels can be found in the Resource Block under the **DEV_REV** and **DD_REV** parameters respectively.

Reference Documents

Table 1. Reference Documents

Document	Description
Invensys Foxboro Documents	
DP 021-365	IMT25 I/A Series Magnetic Flow Transmitter, Dimensions
MI 020-360	Wiring Guidelines for Foundation Fieldbus Transmitters
MI 021-120	2800 Series Flowtubes (1/10 to12 in)
MI 021-137	2800 Series Flowtubes (14 to 36 in) - Installation
MI 021-141	2800 Series Sanitary Flowtubes (1/2 to 3 in) - Installation
MI 021-380	8000A Series Flowtubes, Ceramic Lined, Installation
MI 021-381	8300 Series Flowtubes, Installation
MI 021-386	9300A Series Flowtubes, Flanged, Installation
MI 021-387	IMT25 Transmitter, Installation
MI 021-391	IMT25 Transmitter, System Maintenance
MI 021-392	IMTSIM Magnetic Flowtube Simulator
MI 021-413	9100A and 9200A Series Flanged Flowtubes, Installation
PL 008-745	IMT25 Magnetic Flow Transmitter Parts List
TI 27-71f	Magnetic Flowtubes, Material Selection Guide
TI 027-072	Electrical Conductivity of Process Liquids
B0400FD	I/A Series Foundation Fieldbus H1 Communication Interface FBM220/221
Fieldbus Foundation Documents	
FD-043 Rev.2.0	Technical Overview — FOUNDATION fieldbus
AG-140 Rev. 1.0	Application Guide — Wiring and Installation, 31.25 kbit/s, Voltage Mode, Wire Medium
AG-163 Rev. 1.0	Application Guide — FOUNDATION fieldbus Intrinsically Safe Systems

2. Operation

Operation from Fieldbus Host

The screens, menus, and commands for operating your transmitter from a fieldbus are determined by the software application package supplied with the host. The National Instruments NI-FBUS is a typical example of such a software package. For detailed information on recommended operating procedures, refer to the instruction manual supplied with the host software.

Operation from the Optional Keypad/Display

Refer to MI 021-390.

3. Configuration from a Fieldbus Host

Configuration Options

The IMT25 I/A Series Intelligent Magnetic Flow Transmitter with FOUNDATION fieldbus communication can be configured from a FOUNDATION fieldbus host or from the optional local keypad/display.

Parameters in all types of FOUNDATION fieldbus function blocks (Analog Input, Resource, and Transducer Blocks) can be configured and modified from a fieldbus host. Those in the Transducer Block can also be configured or modified from the local display.

⚠ CAUTION

If you change the upper range value or engineering units in the Transducer Block without making a corresponding change in connected Analog Input Blocks from a fieldbus host, a mismatch error occurs and the Analog Input Block reverts Out of Service mode.

Transducer Block parameters are identified with symbolic names. However, the parameters can be identified with descriptive labels that are defined in the DD. If you use the National Instruments Configurator these labels may not appear initially but can be accessed. To do this, select **View/Preferences** from the National Instruments Configurator's menu bar, then pick the **Block View** tab. Click on the **Use Descriptive Labels on Parameters** box to select this option and click the **Apply** button. When you exit the Configurator and are asked whether you want to save your changes, select **Yes**. Future Configurator sessions should then default to using descriptive labels to display parameter names.

Table 2 lists the descriptive labels and the corresponding symbolic names for the parameters in the Transducer Block. In some cases the two values are the same.

Table 2. Presentation of Transducer Block Parameters

Descriptive Label	Symbolic Name
ST_REV	ST_REV
TAG_DESC	TAG_DESC
STRATEGY	STRATEGY
ALERT_KEY	ALERT_KEY
MODE_BLKMODE_BLK	MODE_BLK
BLOCK_ERR	BLOCK_ERR
UPDATE_EVT	UPDATE_EVT
BLOCK_ALM	BLOCK_ALM
Transducer Directory Entry	TRANSDUCER_DIRECTORY

Table 2. Presentation of Transducer Block Parameters (Continued)

Descriptive Label		Symbolic Name	
Transducer Type		TRANSDUCER_TYPE	
Transducer Error		XD_ERROR	
Collection Directory		COLLECTION_DIRECTORY	
Primary Value Type		PRIMARY_VALUE_TYPE	
Primary Value		PRIMARY_VALUE	
Primary Value Range	EU at 100%	PRIMARY_VALUE_ RANGE	EU_100
	EU at 0%		EU_0
	Units Index		UNITS_INDEX
	Decimal		DECIMAL
Sensor Type		SENSOR_TYPE	
Sensor Range	EU at 100%	SENSOR_RANGE	EU_100
	EU at 0%		EU_0
	Units Index		UNITS_INDEX
	Decimal		DECIMAL
Sensor Serial Number		SENSOR_SN	
Linearization Type		LIN_TYPE	
Net Total Value		SECONDARY_VALUE	
Net Total Value Range	EU at 100%	SECONDARY_ VALUE_ RANGE	EU_100
	EU at 0%		EU_0
	Units Index		UNITS_INDEX
	Decimal		DECIMAL
Grand Total Value		GRAND_TOTAL_VALUE	
Grand Total Value Range	EU at 100%	GRAND_TOTAL_ VALUE_ RANGE	EU_100
	EU at 0%		EU_0
	Units Index		UNITS_INDEX
	Decimal		DECIMAL
Forward Total Value		FWD_TOTAL_VALUE	
Forward Total Value Range	EU at 100%	FWD_TOTAL_ VALUE_ RANGE	EU_100
	EU at 0%		EU_0
	Units Index		UNITS_INDEX
	Decimal		DECIMAL
Reverse Total Value		REV_TOTAL_VALUE	
Reverse Total Value Range	EU at 100%	REV_TOTAL_ VALUE_ RANGE	EU_100
	EU at 0%		EU_0
	Units Index		UNITS_INDEX
	Decimal		DECIMAL

Table 2. Presentation of Transducer Block Parameters (Continued)

Descriptive Label		Symbolic Name	
Flowmeter Info	Transmitter Model Code	FLOWMETER_INFO	TX_COD
	Transmitter Serial Number		TX_SER
	Line Frequency		MAINS
Flowtube Info	Meter Factor	FLOWTUBE_INFO	MF_USE
	Tube Model Code		FT_COD
	Flowtube Direction		FT_DIR
Noise Reduction		NOISE_REDUCTION	
Totalizer Info	Totalizer Enable Setting	TOTALIZER_INFO	M2_ON
	Flow Mode		M0_MOD
	Net Total Format		M2_FMT
	Grand Total Format		M3_FMT
	Totalizer Reset		FBRTOT
Pulse Output Info	Pulse Mode	PULSE_OUTPUT_INFO	M7_MOD
	Maximum Total Pulse Rate		M7_TMX
	Rate Pulse URV		M7_URV
	Maximum Rate Pulse Frequency		M7_RMX
	AutoZeroLock Effect		EP_EFF
	Alarm Effect		AL_OUT
	Diagnostic Effect		RNGFL
Contact Input Info	Contact Input 1 Function	CONTACT_INPUT_INFO	CI1FNC
	Contact Input 1 Operation		CI1OPR
	Contact Input 2 Function		CI2FNC
	Contact Input 2 Operation		CI2OPR
Relay Output Info	Relay Output 1 Function	RELAY_OUTPUT_INFO	CO1FNC
	Relay Output 1 Operation		CO1OPR
	Relay Output 1 Alarm		CO1ALM
	Relay Output 1 Suppress		CO1SUP
	Relay Output 2 Function		CO2FNC
	Relay Output 2 Operation		CO2OPR
	Relay Output 2 Alarm		CO2ALM
	Relay Output 2 Suppress		CO2SUP

Table 2. Presentation of Transducer Block Parameters (Continued)

Descriptive Label		Symbolic Name	
Alarm Info	Alarm Enable	ALARMING_INFO	AL_ON
	High Rate Alarm Enable		AL_HON
	Low Rate Alarm Enable		AL_LON
	Total 1 Alarm Enable		ALT1ON
	Total 2 Alarm Enable		ALT2ON
	AutoZeroLock Enable		ALEPON
	High Flow Rate Alarm Setpoint		AL_HSP
	High Flow Rate Alarm Dead Band		AL_HDB
	Low Flow Rate Alarm Setpoint		AL_LSP
	Low Flow Rate Alarm Dead Band		AL_LDB
	Total 1 Alarm Setpoint		ALT1SP
	Total 2 Alarm Setpoint		ALT2SP
	Alarm Clearing		AL_ACK
AutoZeroLock Info	AZL Status	AZL_INFO	EP_STA
	AZL Detector Enable		EP_ON
	AZL Event Count		AZL_COUNT
	AZL Reset Count Control		AZL_RESET_COUNT
	AZL Calibration Status		AZL_CAL_STATUS
	AZL Calibration Control		AZL_CAL_CONTROL
Display Info	Default Display	DISPLAY_INFO	DS_DFT
	Dual Display		DS_DON
	Dual Display: Line 1		DS_LN1
	Dual Display: Line 2		DS_LN2
	Alarm Display		AL_DIS
	Diagnostic Display		DG_DIS
	Display Damping		M1DAMP
Software Revisions	Sensor Software Revision	REV_INFO	SENSOR_SW_REV
	Comms Software Revision		COMMS_SW_REV
Diagnostic Sub-Reason		REASON	
Target Error		TRS_TARGET_ERROR	
FACTORY_DIAGNOSTIC_2		FACTORY_DIAGNOSTIC_2	
FACTORY_DIAGNOSTIC_3		FACTORY_DIAGNOSTIC_3	

Configuration Procedure Using a Fieldbus Host

NOTE

These instructions assume the following:

1. You are using the National Instruments Fieldbus Configurator Software (NI-FBUS).
2. You are familiar with the NI software and have loaded the DDs.
3. The NI-FBUS software is running Online and is connected to a functional transmitter.
4. If you cannot find any parameter, do a right mouse click anywhere on the block window and select **Customize Parameters**. Check the box for the parameter you need. When you click again on the window, that parameter is added to that window. When you go to close out that window, you are prompted to save your customization. Click on **Yes**.
5. The following procedure covers 98% of all typical installations. For complex or advanced situations, you have to reconfigure other parameters for their application.
6. The FoxCAE Configurator in a I/A Series system is similar to the National Configurator software. If you are attaching the flowmeter to an I/A Series system, please refer to B0400FD for specific details on parameter configuration limitations.

1. Connect the fieldbus wiring to the output terminals. The transmitter is polarity independent, so it cannot be wired backwards (no plus/minus labels). Also, power the transmitter with 120 V ac. If flowtube is not integrally attached, attach the wires from the flowtube to the transmitter.

2. The **DEV_TAG** parameter has been factory defaulted to a unique value. You can reconfigure this tag, but it must be unique. Right click on the device and select **Set Tag**. Type in a new tag name/number. Make sure the **Set to OOS** block is checked. Click on **OK**.

3. The factory default for the **Device Address** parameter has been factory defaulted to a number, such as **34(0x22)**. You can reconfigure this address, but it must be a unique value on the H1 wiring segment. Right click on the device and select **Set Address**. Use the Up and Down arrows to select a new address or type in a unique value. Make sure the **Set to OOS** block is checked. Click on **OK**.

⚠ CAUTION

The address of multiple flowmeters from Invensys Foxboro and or other manufacturers could possibly be identical. Care must be taken to make sure the address is not duplicated in another fieldbus device.

4. If you do not see the Transducer Block on the NI-FBUS screen, click on the Show/Hide Transducers & Device IDs icon on the menu bar. The icon has a capital letter **T** with a red **X**. The factory default for the **BLOCK_TAG** parameter in the Transducer Block has been assigned a unique value. You can reconfigure this tag, but it must be unique. Right click on the Transducer Block and select **Set Tag**. Type in a

new name/number. Make sure the **Set to OOS** block is checked. Click on **OK**.

5. The factory default for the **BLOCK_TAG** parameter in the Resource Block has been assigned a unique tag. You can reconfigure this tag, but it must be unique. Right click on the Resource Block and select **Set Tag**. Type in a new name/number. Make sure the **Set to OOS** block is checked. Click on **OK**.
6. The factory default for the **BLOCK_TAG** parameter in the two Analog Input Blocks (AI#1 and AI#2) has been assigned a unique tag. You can reconfigure this tag, but it must be unique. Right click on the AI#1 Block and select **Set Tag**. Type in a new tag identification. Make sure the **Set to OOS** block is checked. Click on **OK**. Repeat for AI#2. AI#1 is usually assigned to the flow rate measurement and AI#2, if used, must be assigned to one of the totalized flow values.
7. Open the Resource Block. Click on the **OOS** box to put the transmitter Out Of Service. Make sure that the **MODE_BLK • ACTUAL** status reads **OOS**. Ignore this step if the **ACTUAL** mode reads **OOS**.
8. Review the **ALARM_SUM • DISABLED** parameter. There are a wide variety of selections in the drop down box, such as **Disc Alm Disabled**, **HiHi Alm Disabled**, and so forth. The factory default is that all alarms have a check mark, which disables all fieldbus alarms. If the host control system supports fieldbus alarms, set the appropriate alarm limits to make them active.
9. The factory default for the **MODE_BLK • NORMAL** parameter is **Auto**. If for some reason you want the transmitter to start in the Out Of Service mode or other selection when power is first applied, set the parameter to the desired action.
10. Click on the **Write Changes** button at the bottom of the page to download the changes to the transmitter.
11. Open the Transducer Block. Click on the **OOS** box to put the transmitter Out Of Service. Make sure that the **MODE_BLK • ACTUAL** value reads **OOS**. Ignore this step if the **ACTUAL** mode reads **OOS**.
12. Make sure that the **LIN_TYPE** is set to Linear with Input.
13. Make sure that the **SENSOR_TYPE** is set to Electromagnetic.
14. Set the **PRIMARY_VALUE_RANGE** sub-parameters as follows:
    - **UNITS_INDEX** select the desired units from the drop down list.
    - **EU_100** type in the 100% value of the desired flow rate
15. The **SECONDARY_VALUE_RANGE • UNITS_INDEX** is for totalization purposes. Set the EGU to the desired selection. For example, if the primary units in the previous step were set for GPM, then the secondary units should be set for gallons. Once the information has been written to the transmitter, the EGU will also automatically change for the:
    - **GRAND_TOTAL_VALUE_RANGE • UNITS_INDEX**
    - **FWD_TOTAL_VALUE_RANGE • UNITS_INDEX**
    - **REV_TOTAL_VALUE_RANGE • UNITS_INDEX**

16. Set the **FLOWMETER_INFO • MAINS** parameter to 50 or 60 Hz, depending upon the ac power being supplied to the transmitter.

17. Set the **FLOWTUBE_INFO • MF_USE** parameter to the "IMT25 Cal Fact" value stamped on the flowtube data label. If the flowtube data label only indicates a "Cal Factor" for the models listed below, that value must be multiplied by the appropriate factor from Table 3.

Table 3. Meter Factor Multipliers

(Do not use for flowtubes that have an "IMT25 Cal Fact" listing)

8300 Flowtubes				8000A and 9300A Tubes				
Line Size (in)	Model Code		Multiply by Factor	Line Size (in)	Model Code			Multiply by Factor
				0.062	801SA			1.0034
				0.125	801EA			1.0033
				0.25	801QA			1.0011
0.5	830H		0.9938	0.5	800HA	800H	930HA	1.0032
1	8301		0.9967	1	8001A	8001	9301A	1.0011
1.5	831H		0.9960	1.5	801HA	801H	931HA	0.9976
2	8302		0.9964	2	8002A	8002	9302A	0.9985
3	8303		0.9974	3	8003A	8003	9303A	0.9996
4	8304		0.9961	4	8004A	8004	9304A	0.9981
6	8306	8006	0.9947	6	8006A	8006	9306A	1.0001
8	8308	8008	0.9946					
10	8310	8010	0.9941					
12	8312	8012	0.9948					
14	8314		0.9945					
16	8316		0.9943					
18	8318		0.9950					
20	8320		0.9954					
24	8324		0.9962					

Example:

A (3-inch) 8303-... tube with only "Cal Factor" listed:

i.e., Cal Factor = 7.2911
8303 "Multiply By Factor" = 0.9974
Equivalent "IMT25 Cal Fact" = 7.2911 * 0.9974 = 7.2721

18. Set the **FLOWTUBE_INFO • FT_DIR** to one of the following:

- **UNIDIR POSITIVE** (normal forward flow in one direction)
- **UNIDIR REVERSE** (flow in one direction but opposite arrow on tube)
- **BIDIR POSITIVE** (flow in both directions with **FWD_TOTAL** parameters indicating flow in the same direction as the arrow on the tube)
- **BIDIR REVERSE** (flow in both directions with **FWD_TOTAL** parameters indicating flow in the opposite direction as the arrow on the tube)

— NOTE

If the normal forward flow is opposite the arrow on the flow tube, and the flowtube wiring is reversed from standard, do not use either of the **REVERSE** modes.

19. Set the **NOISE_REDUCTION** to **ON** or **OFF**. When set to **ON**, the **PV_FTIME** parameter in the AI block controls the amount of noise reduction on the fieldbus output of the AI block.
20. Set the **TOTALIZER_INFO** parameters as follows:
    - **M2_ON** - set to **ON** if totalization of flow is required. If set to **OFF**, you still have to configure **M0_MOD** parameter below.
    - **M0_MOD** - set to either **UNIDIRECTIONAL** or **BIDIRECTIONAL** based upon the selection in step #18.
    - **M2_FMT** - the number of # selected and location of decimal point sets the display format for the Net Total and also determines the flow quantity per Total Pulse.
    - **M3_FMT** - the number of # selected and location of decimal point sets the display format for the Grand Total.
    - **FBRTOT** – this parameter is used for resetting the selected totalized value. After making a selection and writing the changes to the transmitter, the total specified is set to zero, and the parameter automatically switches back to Not Executed.

Table 4. Total Names Description

Total Names	Flow Direction			
	Unidir Positive	Unidir Reverse	Bidir Positive	Bidir Reverse
Fwd Total	OK	Not Valid	OK (value will be equal to total flow in same direction as arrow on flowtube)	OK (value will be equal to total flow in opposite direction as arrow on flowtube)
Rev Total	Not Valid	OK	OK (value will be equal to total flow in opposite direction as arrow on flowtube)	OK (value will be equal to total flow in same direction as arrow on flowtube)
Net Total	OK (equal to Fwd Total)	(Not Valid)	OK (equal to Fwd Total)	OK (value equal to Rev Total minus Fwd Total)
Grand Total	OK	OK	OK (value equal to Fwd Total plus Rev Total)	OK (value equal to Rev Total plus Fwd Total)

21. Set the **PULSE_OUTPUT_INFO** parameters as follows:
    - **M7_MOD** - set to **RATE** or **TOTAL** if pulse output is required. If set to **OFF**, skip to next step.
    - **M7_TMX** - set to 10 or 100 Hz which sets the maximum permitted pulse rate when configured for Pulse Total mode.

- **M7_URV** - type in the value of the maximum flow rate which yields the maximum pulse rate (usually the same as the value entered into the **PRIMARY_VALUE_RANGE • EU_100** parameter).
- **M7_RMX** – select 1, 2, 5 or 10 kHz for the pulse rate at maximum flow (URV).
- **EP_EFF** – if you want the AutoZeroLock detector to also affect the pulse output, set to **AUTO SIGNAL LOCK**.
- **AL_OUT** – if you want the alarms to impact on the pulse output, select either **GO DOWNSCALE** or **GO UPSCALE**. If alarms are not set or you want no impact on pulse, set for **NO EFFECT**.
- **RNGFL** – select either **GO DOWNSCALE** or **GO UPSCALE** for impact of diagnostic conditions on the pulse output. If you select **GO UPSCALE**, the pulse output will go to the maximum value (**M7_RMX** value of 1, 2, 5 or 10 kHz) plus an additional 10% to 15% during fail-safe conditions. The pulse output will go to zero pulses during a fail-safe condition with this parameter set to **GO DOWNSCALE**.

22. Select the functions and inactive state of the **CONTACT_INPUT_INFO** parameters as follows:
    - **CI1FNC** – set contact input channel #1 for OFF, Ack Alarms, Reset Net Total, Reset Grand Total, Reset All Totals or Signal Lock (Signal Lock = flow rate value will go to zero and the total stops counting)
    - **CI1OPR** – set for normally open or closed for the inactive state of the contact switch. For example, if set for normally open, when the switch is closed, the function is implemented.
    - **CI2FNC**– set contact input channel #2 for OFF, Ack Alarms, Reset Net Total, Reset Grand Total, Reset All Totals or Signal Lock (Signal Lock = flow rate value will go to zero and the total stops counting)
    - **CI2OPR** – set for normally open or closed for the inactive state of the contact switch. For example, if set for normally open, when the switch is closed, the function is implemented.
23. Select the functions and inactive state of the RELAY_OUTPUT_INFO parameters as follows:
    - **CO1FNC** – set contact output channel #1 for OFF, Alarms, Alarms + Diag or Diag
    - **CO1OPR** - set for normally open or closed for the inactive state
    - **CO1ALM** – specify the alarm conditions which will activate the relay output signal
    - **CO1SUP** – select ON or OFF. The ON selection specifies that an ACK deactivates the relay output while the alarm condition still exists
    - **CO2FNC** - set contact output channel #2 for OFF, Alarms, Alarms + Diag or Diag
    - **CO2OPR** - set for normally open or closed for the inactive state
    - **CO2ALM** - specify the alarm conditions which will activate the relay output signal
    - **CO2SUP** - select ON or OFF. The ON selection specifies that an ACK deactivates the relay output while the alarm condition still exists.

— NOTE

If the **RELAY_OUTPUT_INFO • CO1FNC** and **RELAY_OUTPUT_INFO • CO2FNC** parameters are set for **OFF**, you can skip the next step

24. Select the functions and alarming values in the **ALARMING_INFO** parameters as follows:
    - **AL_ON** – set for Enabled or Disabled for the alarming
    - **AL_HON** – set for Enabled or Disabled for the high flow rate alarm
    - **AL_LON** – set for Enabled or Disabled for the low flow rate alarm
    - **ALT1ON** – set for Enabled or Disabled for the Fwd Total alarm for Relay Output #1
    - **ALT2ON** – set for Enabled or Disabled for the Fwd Total alarm for Relay Output #2
    - **ALEPON** – set for Enabled or Disabled to specify whether the Auto Zero Lock detector generates an alarm when it is triggered.
    - **AL_HSP** – type in the EGU value for the High Flow Rate alarm
    - **AL_HDB** – type in the EGU for the deadband for the High Flow Rate alarm
    - **AL_LSP** - type in the EGU value for the Low Flow Rate alarm
    - **AL_LBD** - type in the EGU value for the deadband for the Low Flow Rate alarm
    - **ALT1SP** - type in the value for the Fwd Total alarm for Relay Output #1. If it is set to something above 1e+008, which is the limits of the integral indicator, there will never be an alarm.
    - **ALT2SP** - type in the value for the Fwd Total alarm for Relay Output #2. If it is set to something above 1e+008, which is the limits of the integral indicator, there will never be an alarm.
    - **AL_ACK** – select Manual Ack Only or Auto Ack. Auto Ack will automatically clear the alarm when the alarm condition no longer exists.

— NOTE

The values of **AL_HSP**, **AL_HDB**, **AL_LSP**, **AL_LDB** must be in the same EGUs as the primary value. Those of **ALT1SP** and **ALT2SP** must be in the same EGUs as the secondary value.

25. The Auto Zero Lock (Empty Pipe Detection) function (when **AZL_INFO / EP_ON** is configured **ON** and **PULSE_OUTPUT_INFO / EP_EFF** is configured **AUTO SIGNAL LOCK**), drives the pulse output and FOUNDATION Fieldbus digital output signals to zero flow rate when the flowtube electrodes become uncovered by the conductive liquid. Set the **AZL_INFO** parameters as follows:
    - **EP_ON** – select ON or OFF
    - **AZL_RESET_COUNT** – default is Not Executing. Select **Reset AZL Count** if you want to reset the AZL Count value back to zero. After this parameter is written to the transmitter, the selection will automatically switch back to **Not Executing**.
    - **AZL CAL CONTROL** - default is Not Executing. Select **Calibrate Auto Zero Lock** if you want to recalibrate the function.

⚠ CAUTION

Flowtube must be entirely filled with liquid before writing this information to the transmitter. After this parameter is written to the transmitter, the selection will automatically switch back to Not Executing.

26. If the transmitter has an optional LCD indicator, set the **DISPLAY_INFO** parameters as follows:

    - **DS_DFT** – select Rate EGU, Rate % Range, Fwd Total, Rev Total, Net Total, Grand Total, or Dual Display and that selection will be displayed on the Indicator.

NOTE

If you want **both** the flow rate and one of the Total values displayed on the indicator, select Dual Display

    - **DS_DON** – select **ON** if the above selection is Dual Display. For any other selection other than Dual Display, select OFF.
    - **DS_LN1** – when Dual Display is selected for the **DS_DFT** parameter, select the value to be displayed on the top line of the indicator
    - **DS_LN2** - when Dual Display is selected for the **DS_DFT** parameter, select the value to be displayed on the second line of the indicator
    - **AL_DIS** - If you want the indicator to blink when an Alarm is active, select Blink.
    - **DG_DIS** - If you want the indicator to blink when a Diagnostic message is active, select Blink.
    - **M1DAMP** – Type in the damping value of the flow rate measurement displayed on the indicator. Default is 3. Increase this value only if last digit of flow rate being displayed bounces up and then down again. Range is from 0 to 99. This parameter only affects the integral display and has no damping effect on the fieldbus output.

27. If any of the totalization values below are not zero and you wish to zero the totalizer:

    - SECONDARY_VALUE • VALUE
    - GRAND_TOTAL_VALUE • VALUE
    - FWD_TOTAL VALUE • VALUE
    - REV_TOTAL_VALUE • VALUE

    go to the **TOT_INFO • FBRTOT** and select Reset All Totals. When the information is download to the transmitter, the totalizer(s) will be reset to zero, and this parameter will automatically be set back to Not Executing

28. The factory default for the **MODE_BLK • NORMAL** parameter is **Auto**. If for some reason you want the transmitter to start in the Out Of Service mode, or other selection when power is first applied, set the parameter to the desired action.

29. Click on the **Write Changes** button at the bottom of the page to download the changes to the transmitter.

30. Open Analog Input Block #1 and click on the **OOS** box to put the transmitter Out Of Service. Make sure that the **MODE_BLK • ACTUAL** value reads **OOS**. Ignore this step if the **ACTUAL** mode reads **OOS**.

31. Set the **CHANNEL** parameter to one of the selections in the pull-down list.

32. **L_TYPE** determines whether the selected value from the Transducer Block is passed directly through the AI Block, or if the value is rescaled based upon the 0% and 100% values entered in the **OUT_SCALE** parameter in the next step. Direct should be used in all applications.

— NOTE

The value shown on the local display is the output from the Transducer Block. Therefore, if you have any scaling using the **L_TYPE** parameter, the value on the transmitter local display does not agree with the output value of the AI Block.

33. If the **L_TYPE** in the previous step was set for **Direct**, skip this step. If the **L_TYPE** was **Indirect** (not recommended by Foxboro), set the **OUT_SCALE** sub-parameters to the desired values for proper scaling.

— NOTE

If the **L_TYPE** was set to Direct in step #32, the values entered in the **OUT_SCALE** parameters (previous step) are not used. But for ease of troubleshooting, most users will set the **OUT_SCALE** parameters to the same values used in the **XD_SCALE** parameters.

34. Set the **XD_SCALE** parameters to the same values used in the **PRIMARY_VALUE_RANGE** parameters in the Transducer Block. The AI Block compares the values in the **XD_SCALE** with the values entered in the Transducer Block. If they do not match, a transducer mismatch error does not allow the AI Block to be set to **Auto** mode.

For example:

Sub-Parameter		Primary Value Range
XD_SCALE (this step)		
EU_100	3250 was selected, for example	Must be set to 3250
EU_0	Value set at 0 (Read Only)	Must be set to 0 (zero)
UNITS_INDEX	“GPM” was selected, for example	Must select GPM

35. Adjust the **PV_FTIME** value (damping default is 3, range is 0 to 99.9) if the **NOISE_REDUCTION** parameter in the Transducer Block was set to ON and this AI Block Channel has been set to Flow Rate.

36. Set the **STATUS_OPTS** parameter to the desired option by adding a check mark in the box. Refer to Table 5 for a description of the options. **Propagate Fail Forward** is a typical configuration and is the factory default.

Table 5. Options for Block Processing of Status

Option	Description
Propagate Fail Forward	If the status of XDUCER_VAL (associated with CHANNEL) is a Sensor Failure, Device Failure, or Bad, propagate this status to OUT without generating an alarm.
Uncertain if Limited	Set the status of OUT to uncertain if the measured value is limited.
BAD if Limited	Set the status of OUT to BAD if the sensor is at high or low limit.
Uncertain if Man Mode	Set the status of OUT to uncertain if the actual mode of the block is Man.

37. The factory default for the **MODE_BLK • NORMAL** parameter is **Auto**. If for some reason you want the flowmeter to start in the Out Of Service mode, or other selection when power is first applied, set the parameter to the desired action.

38. Review the **ALARM_SUM • DISABLED** parameter. There are a wide variety of selections in the drop down box, such as **Disc Alm Disabled**, **HiHi Alm Disabled**, and so forth. The factory default is that all alarms have a check mark, which disables all Fieldbus Alarms. If the host control system supports Fieldbus Alarms, set the appropriate alarm limits to make them active.

— NOTE

These are fieldbus alarms and are not associated with the internal alarms inside the transmitter.

39. Click on the **Write Changes** button at the bottom of the page to download the changes to the transmitter.

40. Open Analog Input Block #2 and click on the **OOS** box to put the transmitter Out Of Service. Make sure that the **MODE_BLK • ACTUAL** value reads **OOS**. Ignore this step if the **ACTUAL** mode reads **OOS**.

41. Set the **CHANNEL** parameter to one of the selections in the pull-down list.

42. **L_TYPE** determines whether the selected value from the Transducer Block is passed directly through the AI Block, or if the value is rescaled based upon the 0% and 100% values entered in the **OUT_SCALE** parameter in the next step. Direct should be used in all applications.

— NOTE

The value shown on the local display is the output from the Transducer Block. Therefore, if you have any scaling using the **L_TYPE** parameter, the value on the transmitter local display does not agree with the output value of the AI Block.

43. If the **L_TYPE** in the previous step was set for **Direct**, skip this step. If the **L_TYPE** was **Indirect** (not recommended by Foxboro), set the **OUT_SCALE** sub-parameters to the desired values for proper scaling.

— NOTE

If the **L_TYPE** was set to Direct in step #42, the values entered in the **OUT_SCALE** parameters are not used. But for ease of troubleshooting, most users will set the **OUT_SCALE** parameters to the same values used in the **XD_SCALE** parameters.

44. Set the **XD_SCALE** parameters to the same values used in the **SECONDARY_VALUE_RANGE** parameters in the Transducer Block. The AI Block compares the values in the **XD_SCALE** with the values entered in the Transducer Block. If they do not match, a transducer mismatch error does not allow the AI Block to be set to **Auto** mode.

    For example:

Sub-Parameter		Secondary_Value_Range
XD_SCALE (this step)		
EU_100	Value set at 1e+008 (Read Only)	Must be set to 1e+008
EU_0	Value set at 0 (Read Only)	Must be set to 0 (zero)
UNITS_INDEX	"Gallon" was selected, for example	Must select Gallon

45. Set the **STATUS_OPTS** parameter to the desired option by adding a check mark in the box. Refer to Table 6 for a description of the options. **Propagate Fail Forward** is a typical configuration and is the factory default.

Table 6. Options for Block Processing of Status

Option	Description
Propagate Fail Forward	If the status of XDUCER_VAL (associated with CHANNEL) is a Sensor Failure, Device Failure, or Bad, propagate this status to OUT without generating an alarm.
Uncertain if Limited	Set the status of OUT to uncertain if the measured value is limited.
BAD if Limited	Set the status of OUT to BAD if the sensor is at high or low limit.
Uncertain if Man Mode	Set the status of OUT to uncertain if the actual mode of the block is Man.

46. The factory default for the **MODE_BLK • NORMAL** parameter is **Auto**. If for some reason you want the flowmeter to start in the Out Of Service mode, or other selection when power is first applied, set the parameter to the desired action.

47. Review the **ALARM_SUM • DISABLED** parameter. There are a wide variety of selections in the drop down box, such as **Disc Alm Disabled**, **HiHi Alm Disabled**, and so forth. The factory default is that all alarms have a check mark, which disables all Fieldbus Alarms. If the host control system supports Fieldbus Alarms, set the appropriate alarm limits to make them active.

— NOTE

These are fieldbus alarms and are not associated with the internal alarms inside the transmitter.

48. Click on the **Write Changes** button at the bottom of the page to download the changes to the transmitter.

49. Open the Resource Block and click on the **Auto** button. The **MODE_BLK • ACTUAL** should change to **Auto**.

    If the mode does not change to **Auto**, go to the **TARGET_ERROR** parameter to see what is wrong. An explanation of the **TARGET_ERROR** is described in MI 021-391. Fix the problem and make sure that the **MODE_BLK • ACTUAL** value reads **Auto**. Close the Resource Block window.

50. Open the Transducer Block and click on the **Auto** button. The **MODE_BLK • ACTUAL** should change to **Auto**.

    If the mode does not switch to **Auto**, go to the **TRS_TARGET_ERROR** parameter to see what is wrong. An explanation of the **TRS_TARGET_ERROR** is described in MI 021-391. Fix the problem and make sure that the **MODE_BLK • ACTUAL** value reads **Auto** after clicking on the **Auto** button. Close the Transducer Block window.

51. Open AI #1 Block and click on the **Auto** button. The **MODE_BLK • ACTUAL** should change to **Auto**, and the **OUT** value should display a good value that matches the value from the Transducer Block assigned to this AI Block.

    If the mode does not switch to **Auto**, go to the **TARGET_ERROR** parameter to see what is wrong. An explanation of the **TARGET_ERROR** is described in MI 021-391. Fix the problem and make sure that the **MODE_BLK • ACTUAL** value reads **Auto**.

    If the **OUT** value is not correct you may have to schedule the device with your configurator software in the next step.

52. Repeat previous step for AI #2 Block.

    If the **OUT** value is not correct in either of the AI Blocks, you may have to schedule the device with your configurator software as follows:

    - Double click on the Function Block Application to open a new window
    - Drag each of the AI Blocks to the middle window. You can now configure the outputs of the AI Blocks and assign them if necessary.
    - Click on the Download Project icon and answer questions.
    - Check the **OUT** value of the AI Blocks. If good, proceed to next step.

53. The basic configuration of the transmitter is now complete. Please go to the next section to review or change the "Optional Parameters" which do not need to be configured for proper operations. Some of these parameters are only used for storing information. The data is not checked or processed by any of the blocks.

Optional Parameter Configuration

1. Open the Transducer Block. Click on the **OOS** box to put the block Out Of Service. Make sure that the **MODE_BLK • ACTUAL** value reads **OOS**. Ignore this step if the **ACTUAL** mode reads **OOS**.

2. There are some parameters to identify the flowtube. Review or change any information in the following parameters:
   - **SENSOR_SN**
   - **FLOWTUBE_INFO • FT_COD**
3. The **STRATEGY** parameter (default = 0) can be set to a number between 0 and 32767 for identifying grouping of blocks.
4. The **ALERT_KEY** parameter (default = 0) can be set to any number between 1 and 255 to be used by the host system as an identification number for sorting alarms, and so forth.
5. The parameter **TAG_DESC** can be used for identification of the application. For example – "Cracker #3 INPUT". Type in the information desired.
6. Click on the **Write Changes** button at the bottom of the page to download the changes to the valve positioner. Now click on the **Auto** button. The **MODE_BLK • ACTUAL** should change to **Auto**. Make sure that the **MODE_BLK • ACTUAL** value reads **Auto**. If the block does not change to **Auto**, refer to MI 021-391. Fix the problem and close the Transducer Block window.
7. Open the Resource Block. Click on the **OOS** box to put the block Out Of Service. Make sure that the **MODE_BLK • ACTUAL** value reads **OOS**. Ignore this step if the **ACTUAL** mode reads **OOS**.
8. The parameter **TAG_DESC** can be used for identification of the application. For example – "Flow for Controlling Drum #2". Type in the information desired.
9. The **STRATEGY** parameter (default = 0) can be set to a number between 0 and 32767 for identifying grouping of blocks.
10. The **ALERT_KEY** parameter (default = 0) can be set to any number between 1 and 255 to be used by the host system as an identification number for sorting alarms, and so forth.
11. Click on the **Write Changes** button at the bottom of the page to download the changes to the valve positioner. Now click on the **Auto** button. The **MODE_BLK • ACTUAL** should change to **Auto**. If the block does not change to **Auto**, refer to MI 021-391. Fix the problem and close the Resource Block window.
12. Open the Analog Input Block #1. Click on the **OOS** box to put the block Out Of Service. Make sure that the **MODE_BLK • ACTUAL** value reads **OOS**. Ignore this step if the **ACTUAL** mode reads **OOS**.
13. The parameter **TAG_DESC** can be used for identification of the application. For example – "Valve for Controlling Drum #2 Level". Type in the information desired.
14. The **STRATEGY** parameter (default = 0) can be set to a number between 0 and 32767 for identifying grouping of blocks.
15. The **ALERT_KEY** parameter (default = 0) can be set to any number between 1 and 255 to be used by the host system as an identification number for sorting alarms, and so forth.
16. Click on the **Write Changes** button at the bottom of the page to download the changes to the valve positioner. Now click on the **Auto** button. The **MODE_BLK •**

ACTUAL should change to **Auto**. If the block does not change to **Auto**, refer to MI 021-391. Fix the problem, set block to **Auto**, and close the Analog Input Block window.

17. Repeat steps #12 to #16 for AI#2
18. If necessary, adjust the execution times of the primary Link Active Scheduler (LAS). Also, define the links between the blocks on the wiring segment. Refer to the host configurator software for details. Configuration is complete.

Application Specific Configurations

Table 7 shows typical sensor configuration parameters for various applications. Assumptions:

1. The **DEV_TAG** parameter has been assigned a unique device ID.
2. The **DEV_ADDRESS** parameter has been assigned a unique address
3. The **BLOCK_TAG** parameter in the Resource Block has been assigned a unique number.
4. The **BLOCK_TAG** parameter in the Transducer Block has been assigned a unique number.
5. The **BLOCK_TAG** parameters in both Analog Input Blocks have been assigned a unique number.

Table 7. Application Specific Configurations

Information explaining the application. Based upon the user requirements at right determine the "Parameter Selections" for the "Fieldbus Parameter Names" listed below.		**Application Parameters**	**User Requirements**		
		Flow Rate assigned to AI #1	0 to 50 GPM	0 to 125 L/min	0 to 250 m3/h
		Total Type assigned to AI #2	Net Total	Grand Total	Grand Total
		Flow direction in line with arrow on flowtube	Yes	Yes	Both directions
		Display what?	Just Flow Rate	Rate & Net Tot	Rate & Grand Total
		Pulse Output = Flow/Total and URV?	No	Flow - 2 kHz	Total - 5 kHz
		Fail-safe Pulse output with alarm?	No	Yes	No
		Fail-safe Pulse output with diagnostic?	No	Downscale	Upscale
		Contact Inputs #1 being used? For what?	No	Yes Ack Alarm	Yes Ack Alarm
		Contact Inputs #2 being used? For what?	No	No	Yes – Reset Grand Tot
		Relay Output #1 being used? For what?	No	Yes	Yes
		If alarms, which one?	No	High Rate	Any Alarm
		Relay Output #2 being used? For what?	No	Yes Alarms	Yes – Alarms & Diag
		If alarms, which one?	No	AZL Detection	AZL Detection
		Transmitter Alarming?	No	Yes - All	Yes - All
		Transmitter alarming values	No	At configured values	At 10% of config values
		Auto Zero Lock?	No	Yes	Yes
		Integral display – show what on first line?	Flow Rate in EGU	Flow Rate in EGU	Flow Rate in %
		Integral display – show what on 2nd line?	Nothing	Net Total	Grand Total
Block	**Tab**	**Fieldbus Parameter Name**	**Parameter Selection**		
TB	Others	LIN_TYPE	Linear with Input	Linear with Input	Linear with Input
		SENSOR_TYPE	Electro-magnetic	Electro-magnetic	Electro-magnetic
		PRIMARY_VALUE_RANGE • EU_100	50	125	250

Table 7. Application Specific Configurations (Continued)

		PRIMARY _VALUE_RANGE • UNITS_INDEX	GPM	L/min	m3/h
		SECONDARY_VALUE_RANGE•UNITS_INDEX	Gallon	L	m3
		GRAND_TOTAL_VALUE_RANGE •UNITS_INDEX	Gallon	L	m3
		FLOWMETER_INFO • MAINS	60 Hz	60 Hz	50 Hz
		FLOWTUBE_INFO • MF_USE	Type “IMT25 Cal Fact” from dataplate	Type “IMT25 Cal Fact” from dataplate	Type “IMT25 Cal Fact” from dataplate
		FLOWTUBE_INFO • FT_DIR	UNIDIR POSITIVE	UNIDIR POSITIVE	BIDIR POSITIVE
		NOISE_REDUCTION	ON	ON	ON
		TOTALIZER_INFO M2_ON M0_MOD M2_FMT M3_FMT FBRTOT	 OFF UNIDIR Not Req’d Not Req’d Not Req’d	 ON UNIDIR #######. #########. Reset All Totals	 ON BIDIR #######. #########. Reset All Totals
		PULSE_OUTPUT_INFO M7_MOD M7_TMX M7_URV M7_RMX EP_EFF AL_OUT RNGFL	 OFF Not Req’d Not Req’d Not Req’d Not Req’d Not Req’d Not Req’d	 RATE Not Req’d 125 L/min 2 kHz AutoZeroLock Go Downscale Go Downscale	 TOTAL 100 Hz Not Req'd 5 kHz AutoZeroLock No Effect Go Upscale
		CONTACT_INPUT_INFO CI1FNC CI1OPR CI2FNC CI2OPR	 OFF Not Req’d OFF Not Req’d	 Ack Alarms Norm Open OFF Not Req’d	 Ack Alarms Norm Open Reset Grd Tot Norm Open
		RELAY_OUTPUT_INFO CO1FNC CO1OPR CO1ALM CO1SUP CO2FNC CO2OPR CO2ALM CO2SUP	 OFF Not Req’d Not Req’d Not Req’d OFF Not Req’d Not Req’d Not Req’d	 Alarms Norm Open High Rate Off Alarms Norm Open High Fwd Total 2 Off	 Alarm & Diag Norm Open Any Alarm Off Alarm & Diag Norm Open AZL Detect Off

Table 7. Application Specific Configurations (Continued)

		ALARMING_INFO			
		AL_ON	Disable	Enable	Enable
		AL_HON	Disable	Enable	Enable
		AL_LON	Disable	Enable	Enable
		ALT1ON	Disable	Enable	Enable
		ALT2ON	Disable	Enable	Enable
		ALEPON	Disable	Enable	Enable
		AL_HSP	Not Req'd	125	225
		AL_HDB	Not Req'd	1	2
		AL_LSP	Not Req'd	0	25
		AL_LBD	Not Req'd	1	2
		ALT1SP	Not Req'd	200,000	180,000
		ALT2SP	Not Req'd	200,000	180,000
		AL_ACK	Auto Ack	Auto Ack	Auto Ack
		AZL_INFO • EP_ON	OFF	ON	ON
		DISPLAY_INFO			
		DS_DFT	Rate EGU	Dual Display	Dual Display
		DS_DON	Off	On	On
		DS_LN1	Rate EGU	Rate EGU	Rate % Range
		DS_LN2	Not Req'd	Net Total	Grand Total
		AL_DIS	Don't Blink	Blink	Blink
		DG_DIS	Don't Blink	Blink	Blink
		M1DAMP	3	3	3
AI #1	Process	CHANNEL	Flow Rate	Flow Rate	Flow Rate
	Scaling	L_TYPE	Direct	Direct	Direct
		XD_SCALE • EU_100	50	125	250
		XD_SCALE • EU_0	0	0	0
		XD_SCALE • UNITS_INDEX	GPM	L/min	m3/h
	Tuning	PV_FTIME	3	3	3
AI #2	Process	CHANNEL	Net Total	Grand Total	Grand Total
	Scaling	L_TYPE	Direct	Direct	Direct
		XD_SCALE • EU_100	1e+008	1e+008	1e+008
		XD_SCALE • EU_0	0	0	0
		XD_SCALE • UNITS_INDEX	Gallon	L	m3

Reranging by Editing the Transducer Block Parameters

— NOTE

There is a difference between calibration and reranging the transmitter as follows:

To calibrate a transmitter, you need accurate calibration equipment to adjust the output based upon an accurate flow rate through the flowtube. This can be done at various flow labs, including Foxboro. The IMTSIM tool can be used to check the accuracy of the calibration, but should **not** be used as the input for a recalibration.

To rerange a transmitter, you do not need any calibration equipment. You only need to reassign the URV by typing numbers into the configurator software or using the local display pushbuttons.

1. Open the Transducer Block. Click on the **OOS** box to put the transmitter Out Of Service. Make sure that the **MODE_BLK • ACTUAL** status reads **OOS**. Ignore this step if **MODE_BLK • ACTUAL** reads **OOS**.
2. Set the **PRIMARY_VALUE_RANGE • EU_100** sub-parameter to the new 100% value of the calibrated range desired.
3. Click on the **Write Changes** button at the bottom of the page to download the changes to the transmitter.
4. Open Analog Input Block #1 and click on the **OOS** box to put the transmitter Out Of Service. Make sure that the **MODE_BLK • ACTUAL** value reads **OOS**.
5. Set the **XD_SCALE • EU100** parameter to the same value used in the Transducer Block. The AI Block compares the values in the **XD_SCALE** with the values entered in the Transducer Block. If they do not match, a transducer mismatch error will not allow the AI Block to be set to Auto mode in the following step.
6. Click on the **Write Changes** button at the bottom of the page to download the changes to the transmitter.
7. Set the Target mode in the Transducer Block to **Auto**. Make sure that the **MODE_BLK • ACTUAL** status reads **Auto**. Once in the **Auto** mode, the **PRIMARY_VALUE and SECONDARY_VALUE** should display the appropriate values. If not, refer to MI 021-391. If the block does not change to **Auto**, go to the **TARGET_ERROR** parameter to see what is wrong. An explanation of the **TARGET_ERROR** is described in MI 021-391. Fix the problem and close the Transducer Block window.
8. Set the Target mode in the AI block associated with flow rate to **Auto**. The **MODE_BLK • ACTUAL** should change to **Auto**, and the **OUT** value should display a good value that matches the value from the Transducer Block assigned to this AI Block.
9. If the **OUT** value is not correct you may have to schedule the device with your configurator software as follows:
   - Double click on the Function Block Application to open a new window

- Individually drag each of the AI Blocks to the middle window. You can now configure the outputs of the AI Blocks and assign them if necessary.
- Click on the Download Project icon and answer questions.
- Check the **OUT** value of the AI Blocks. If good, configuration completed.

10. If the AI Block does not change to **Auto**, go to the **TARGET_ERROR** parameter of the Transducer Block. An explanation of the **TARGET_ERROR** is described in MI 021-391. Fix the problem and make sure that the **MODE_BLK • ACTUAL** value reads **Auto**. Close out the configured AI Block window.

Performing an Auto Zero Lock Calibration

The Auto Zero Lock (Empty Pipe Detection) function, when configured, drives the pulse output and FOUNDATION Fieldbus digital output signals to zero flow rate when the flowtube electrodes become uncovered by the conductive liquid.

1. Set the Transducer Block to Out Of Service (**OOS**)
2. Make sure that the **AZL_INFO • EP_ON** parameter is set to **On**.
3. Set the **AZL_INFO • AZL CAL CONTROL** to **Calibrate AZL Detector**.

⚠ CAUTION

The flowtube must be entirely filled with liquid before writing this information to the transmitter. There can be flow through the flowtube, but the flowtube **must** be full. After this parameter is written to the transmitter, the selection will automatically switch back to **Not Executing**.

4. Click on **Write Changes** button.
5. Set Transducer Block to **Auto** mode.

Lists of Parameters

Table 8 defines the user-configurable parameters. A complete list of parameters is in "List of Parameters" on page 41. A glossary of parameter terms is included on page 33.

Table 8. List of Parameters

PARAMETER NAME	CAPABILITY	FACTORY DEFAULT	DESCRIPTION & COMMENTS
NETWORK CONFIGURATION			
DEV_TAG	32 Characters, maximum	Unique Device ID	Device Tag Description
DEV_ADD	Any whole number between 17 and 35	Any number in range	Logical address of the device but **must** be a unique number on that wiring segment.
RESOURCE BLOCK			
BLOCK_TAG	32 characters, maximum	FOX_RES_(Dev ID)	(Dev ID) is a unique serial number. This field must be unique to a wiring segment or to an I/A Series system installation.

Table 8. List of Parameters (Continued)

PARAMETER NAME	CAPABILITY	FACTORY DEFAULT	DESCRIPTION & COMMENTS
TAG_DESC	32 characters maximum	(blank)	User description of the block application.
STRATEGY	0 TO 65,535	0	User assigned to identify grouping of blocks.
ALERT_KEY	0 TO 255	0	The identification number of the plant unit. This information can be used by the host for sorting alarms.
MODE_BLK • Target	Auto, Man or OOS	Auto	Target mode for operations. Block initiates in AUTO mode.
GRANT_DENY	Program, Tune, Alarm, Local	0 (none selected)	Options for controlling access of host computers and local control panels to operating, buning and alarming.
RESTART	Run, Defaults, Resource, Processor	Run	Allows a manual restart to be initiated
FEATURE_SEL	Reports	0 (none selected)	Selection of Resource Block options listed in FEATURES
CYCLE_SEL	Scheduled, Manuf Specific	Manuf Specific	Used to select the block execution method
SHED_RCAS		640000 1/32 ms	Time duration at which to give up on computer writes to function block Rcas locations
SHED_ROUT		640000 1/32 ms	Time duration at which to give up on computer writes to function block Rout locations
SET_FSTATE	Set, Off	Off	Allows the faultstate condition to be manually initiated by selecting Set
CLR_FSTATE	Clear, Off	Off	Writing a Clear to this parameter clears the device fault state if the condition has cleared
LIM_NOTIFY	0 to MAX_NOTIFY	10	Maximum number of unconfirmed alert notify messges allowed.
CONFIRM_TIME		640000 1/32 ms	The minimum time between retries of alert reports
WRITE_LOCK	Locked, Not Locked	Not Locked	Locked setting prevents writing changes if FEATURE_SEL is set to Soft W Lock
ALARM_SUM • Disabled	Enable, Disable	all alarms disabled	The disabled state of each alarm.
ACK_OPTION	Enable Disable	all alarms auto ack'd	Selection of whether alarms associated with the function block are automatically acknowledged
WRITE_PRI	0 to 15	0	Priority of the alarm generated by clearing the write block
TRANSDUCER BLOCK			
BLOCK_TAG	32 characters, maximum	FOX_TRS_(Dev ID)	(Dev ID) is a unique serial number. This field must be unique to a wiring segment or to an I/A Series system installation.
TAG_DESC	32 characters, maximum	(blank)	User description of the block application
STRATEGY	0 to 65,535	0	User-assigned to identify grouping of blocks.
ALERT_KEY	0 to 255	0	The identification number of the plant unit. This information may be used in the host for sorting alarms
MODE_BLK - Target	Auto, Man, or OOS	Auto	Target mode for operations. Block initiates in AUto mode

Table 8. List of Parameters (Continued)

PARAMETER NAME	CAPABILITY	FACTORY DEFAULT	DESCRIPTION & COMMENTS
PRIMARY_VALUE_RANGE			The range, units, and precision of the primary (flow rate) value
EU_100		100	The high range value
EU_0		0	The low range value
Units_Index		GPM	Engineering units
Decimal		5	The number of digits to right of decimal point.
SECONDARY_VALUE_RANGE			The range, units, and precision of the secondary (net total) value
EU_100		1e+008	The high range value
EU_0		0	The low range value
Units_Index		gallon	Engineering units
Decimal		5	The number of digits to right of decimal point.
GRAND_TOTAL_VALUE_ RANGE			The range, units and precision of the grand total
EU_100		1e+008	The high range value
EU_0		0	The low range value
Units_Index		gallon	Engineering units
Decimal		5	The number of digits to right of decimal point
FWD_TOTAL_VALUE_RANGE			The range, units and precision of the forward total
EU_100		1e+008	The high range value
EU_0		0	The low range value
Units_Index		gallon	Engineering units
Decimal		5	The number of digits to right of decimal point.
REV_TOTAL_VALUE_RANGE			The range, units and precision of the reverse total
EU_100		1e+008	The high range value
EU_0		0	The low range value
Units_Index		gallon	Engineering units
Decimal		5	The number of digits to right of decimal point.
FLOWMETER_INFO - MAINS		60 Hz	Power line mains frequency
FLOWTUBE_INFO			
MF_USE		12	Calibration factor
FT_COD		TUBEMSCODE	Flowtube model code
FT_DIR	Unidir Positive, BiDir Positive, Unidir Revese, BiDir Reverse	Unidir Positive	Flow direction
NOISE_REDUCTION	On, Off	On	Noise reduction, on or off
TOTALIZER_INFO			
M2_ON	On, Off	Off	Totalizer enable, on or off
M0_MOD	Unidirectional, Bidirectional, Not Executed	Unidirectional	Configured mode for totalizing flow
M2_FMT		#######.	Net total display format
M3_FMT		#########.	Grand total display format

Table 8. List of Parameters (Continued)

PARAMETER NAME	CAPABILITY	FACTORY DEFAULT	DESCRIPTION & COMMENTS
FBRTOT	Teset Net/Rev/Fwd Totals, Reset Greand total, Reset All Totals, Not Executed	Not Executed	Resets totalizer value
PULSE_OUTPUT_INFO			
M7_MOD	Off, Rate, Total	Off	Pulse output mode, off, rate, or total
M7_TMX	10 Hz, 100 Hz	10 Hz	Maximum pulse rate for Pulse Total mode
M7_URV		100	Flow rate at maximum pulse rate
M7_RMX	1, 2, 5, or 10 kHz	2 kHz	Pulse rate for full scale flow
EP_EFF	None, AutoZeroLock	None	Effect of AutoZeroLock on rate pulse output
AL_OUT		No Effect	Effect of alarms on rate pulse output
RNGFL	Go Upscale, Go Downscale	Go Downscale	Effect of diagnostic conditions on rate pulse output.
CONTACT_INPUT_INFO			
CI1FNC	Off, Ack alarms, Reset Net Total, Reset Grand Total, Reset All Totals, Signal Lock	Off	Contact Input 1 function
CI1OPR	Normally Open, Normally Closed	Normally Open	Contact Input 1 operation
CI2FNC	Off, Ack alarms, Reset Net Total, Reset Grand Total, Reset All Totals, Signal Lock	Off	Contact Input 2 function
CI2OPR	Normally Open, Normally Closed	Normally Open	Contact Input 2 operation
RELAY_OUTPUT_INFO			
CO1FNC	Off, Alarms, Diags, Alarms+Diags	Off	Relay Output 1 function
CO1OPR	Normally Open, Normally Closed	Normally Open	Relay Output 1 operation
CO1ALM	High Rate, Low Rate, High Fwd Total 1, High Fwd Total 2, AZL Detect, Any Alarm	High Rate	Effect of alarm on Relay Output 1
CO1SUP	On, Off	Off	On pecifies that an ACK deactivates relay while alarm condition still exists
CO2FNC	Off, Alarms, Diags, Alarms+Diags	Off	Relay Output 2 function
CO2OPR	Normally Open, Normally Closed	Normally Open	Relay Output 2 operation
CO2ALM	High Rate, Low Rate, High Fwd Total 1, High Fwd Total 2, AZL Detect, Any Alarm	Low Rate	Effect of alarm on Relay Output 2
CO2SUP	On, Off	Off	On pecifies that an ACK deactivates relay while alarm condition still exists
ALARMING_INFO			
AL_ON	Enabled, Disabled	Disabled	Alarming enabled or disabled
AL_HON	Enabled, Disabled	Disabled	High flow rate alarming enabled or disabled
AL_LON	Enabled, Disabled	Disabled	Low flow rate alarming enabled or disabled
ALT1ON	Enabled, Disabled	Disabled	Total setpoint alarming enabled or disabled

Table 8. List of Parameters (Continued)

PARAMETER NAME	CAPABILITY	FACTORY DEFAULT	DESCRIPTION & COMMENTS
ALT2ON	Enabled, Disabled	Disabled	Total setpoint alarming enabled or disabled
ALEPON	Enabled, Disabled	Disabled	AutoZeroLock can trigger an alarm
AL_HSP		100	Setpoint for high flow rate alarm
AL_HDB		1	Deadband for high flow rate alarm
AL_LSP		1	Setpoint for low flow rate alarm
ALTLDB		0.5	Deadband for low flow rate alarm
ALT1SP		100000	Total setpoint for alarm
ALT2SP		1E+006	Total setppoint for alarm
AL_ACK	Auto Ack, Manual Ack Only	Auto Ack	Alarmsautomatically cleared when alarm condition no longer present
AZL_INFO			
EP_ON	On, Off	Off	AutoZeroLock enabled or disabled
AZL_RESET_COUNT	Reset AZL Count, Not executed	Not Executed	Resets AZL count
AZL_CAL_CONTROL	Calibrate AZL Dectector, Not executed	Not Executed	Indicates an AZL calibration sequence
DISPLAY_INFO			
DS_DFT	Rate EGU, Rate % Range, Fwd Total, Rev Total, Net Total, Grand Total, Dual Display	Rate EGU	Default display format
DS_DON	On, Off	Off	Dual display on or off
DS_LN1	Rate EGU, Rate % Range, Fwd Total, Rev Total, Net Total, Grand Total	Rate EGU	Dual display line 1 format
DS_LN2	Rate EGU, Rate % Range, Fwd Total, Rev Total, Net Total, Grand Total	Rate EGU	Dual display line 2 format
AL_DIS	Blink, Don't Blink	Don't Blink	Whether display blinks for alarms
DG_DIS	Blink, Don't Blink	Blink	Whether display blinks for diagnostic conditions
M1DAMP		3	Damping value for flow rate on local display
ANALOG INPUT BLOCK			
BLOCK_TAG	32 characters, maximum	FOX_AI1_(Dev ID) FOX_AI2_(Dev ID)	(Dev ID) is a unique serial number.
TAG_DESC	32 characters, maximum	blank	Used to described the intended application of the block
STRATEGY	0 to 65,535	0	Used to identify groupings of blocks. This is a way to label blocks with a commonality, such as boiler temperature
ALERT_KEY	0 to 255	0	Used by the host for sorting alarms, etc.
MODE_BLK - TARGET	Auto, Man, or OOS	Auto	The Target mode for operations and Block initiates in Auto mode
OUT • Value		actual value	The primary analog value calculated by the transmitter or entered by the user
SIMULATE			Allows the transducer analog input or output to the block to manually supplied when simulate is enabled

Table 8. List of Parameters (Continued)

PARAMETER NAME	CAPABILITY	FACTORY DEFAULT	DESCRIPTION & COMMENTS
Simulate Status			
Quality	Bad, Uncertain, Good_NonCascade, Good_Cascade	Good_Cascaade	Quality of the measurement
Substatus	NonSpecific, ConfigurationError, NotConnected, DeviceFailure, SensorFailure, NoComm_w/oUsableValue, NoComm_WithUsable Value	NonSpecific	Substatus
Limits	NotLimited, LowLimited, HighLimited, Constant	NotLimited	Limits
Simulate_Value	any value	0	Used for the transducer value when simulation is enabled
Enable_Disable	Disabled, Active	Disabled	Enable/disable simulation
XD_SCALE			The range, units, and precision of the value obtained from the transducer for the specified channel
EU_100		100	Value in engineering units for range at 100%
EU_0		0	Value in engineering units for range at 0%
UNITS_INDEX		GPM	Engineering units
DECIMAL		4	The number of digits to the right of the decimal point
OUT_SCALE			The range, units and precision of the OUT parameter and parameters which have the same scaling as OUT
EU_100		100	Value in engineering units for range at 100%
EU_0		0	Value in engineering units for range at 0%
UNITS_INDEX		GPM	
DECIMAL		4	The number of digits displayed to the right of the decimal point
GRANT/DENY			
GRANT	Program, Tune, Alarm, or Local	0 (none selected)	Options for control access of host computer
DENY	Program, Tune, Alarm, or Local	0 (none selected)	Options for control access of host computer
IO_OPTS		0 (none selected)	Option which the user may select to alter input and output block processing
STATUS_OPTS		0 (none selected)	Options which the user may select in the block processing of status
CHANNEL	Flow Rate, Net Total, Grand Total, Forward Total, Reverse Total	Flow Rate	The logical hardware channel connected to this I/O block.
L_TYPE	Direct, Indirect , or Ind_Sqr_Root	Direct	Transducer block values passed to the AI Block are used directly (DIRECT), or must be confered linearly (INDIRECT), or with square root (IND_SQR_ROOT).
LOW_CUT	Non-negative	0	Used in square root processing

Table 8. List of Parameters (Continued)

PARAMETER NAME	CAPABILITY	FACTORY DEFAULT	DESCRIPTION & COMMENTS
PV_FTIME	0 to 32.0 seconds	0	Process Variable filter time. Time constant of a single exponential filter for the measurement, in seconds.
ALARM_SUM • Disabled		no alarms disabled	The disabled state of each alarm
ACK_OPTION		all alarms auto ack'd	Selection of which alarms are automatically ack'd
ALARM_HYS	0 to 50%	0.5	% by which the PV must return within alarm limits
HI_HI_PRI	0 to 15	0	Priority of the High-High alarm
HI_HI_LIM	PV_SCALE, +INF	1.#INF	The setting for High-High alarm in engineering units
HI_PRI	0 to 15	0	Priority of the High alarm
HI_LIM	PV_SCALE, +INF	1.#INF	The setting for High alarm in engineering units
LO_PRI	0 to 15	0	Priority of the Low alarm
LO_LIM	-INF, PV_SCALE	1.#INF	The setting for Low alarm in engineering units
LO_LO_PRI	0 to 15	0	Priority of the Low-Low alarm
LO_LO_LIM	-INF, PV_SCALE	1.#INF	The setting for Low-Low alarm in engineering units

Glossary

Parameter Name	Description
ACK_OPTION	**Acknowledge Option.** Selects whether alarms associated with the function block are automatically acknowledged.
ALARM_HYS	**Alarm Hysteresis.** Amount in % by which the PV must return within the alarm limits before the alarm condition clears. This parameter is expressed as a percent of the PV span.
ALARM_SUM	**Alarm Summary.** Summarizes the status of up to 16 process alarms. For each alarm, all current states, unacknowledged states, unreported states, and disabled states are maintained.
ALARMING_INFO	**Alarming Information.** Enables or disables alarming and configures specific alarm conditions.
ALERT_KEY	**Alert Key.** The alert parameter has a user assigned value with that may be used in sorting alarms or events generated by the block.
AZL_INFO	**AutoZeroLock Information.** Enables or disables the AutoZeroLock detector, allows calibration of the detector, displays and clears the cumulative AZL count.
BLOCK_ALM	**Block Alarm.** The block alarm is used for all configuration, hardware, connection failure, or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active sets the Active status in the Status attribute. As soon as the unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
BLOCK_ERR	**Block Error parameter.** This parameter reflects the error status associated with the hardware or software components associated with a block. Since it is a bit string, multiple errors may be shown.
CHANNEL	**Channel Variable.** The number of the logical hardware channel that is connected to the AI function block. This information defines the transducer to be used going from the physical world.
CLR_FSTATE	**Clear Fault State**. Writing a clear to this parameter clears the device faultstate state if the field condition, if any, has cleared.

COLLECTION_DIRECTORY

Collection Directory. A directory that specifies the number, starting indices, and DD item IDs of the data collections in each transducer within a transducer block.

CONFIRM_TIME **Confirmation Time**. The minimum time between retries of alert reports.

CONTACT_INPUT_INFO

Contact Input Information. Specifies the function and operation of each contact input.

CYCLE_SEL **Cycle Select**. Used to select the block execution method for this resource.

CYCLE_TYPE **Cycle Type**. Identifies the block execution methods available for this resource.

DD_RESOURCE **Device Description Resource**. String identifying the tag of the resource that contains the Device Description.

DD_REV **Device Description Revision**. Revision number associated with the resource that contains the Device Description.

DEV_REV **Device Revision**. Revision number associated with the resource.

DEV_TYPE **Device Type**. Model number associated with the resource.

DISPLAY_INFO **Display Information.** Determines the contents and operation of the local display.

DOWNLOAD PARAMETER

Download. Download/upload parameter reserved for Foxboro use.

FACTORY_DIAGNOSTIC_1

Diagnostic 1. Diagnostic parameter reserved for Foxboro use.

FACTORY_DIAGNOSTIC_2

Diagnostic 2. Diagnostic parameter reserved for Foxboro use.

FACTORY_DIAGNOSTIC_3

Diagnostic 3. Diagnostic parameter reserved for Foxboro use.

FAULT_STATE **Fault State**. Condition set by loss of communication to an output block, failure promoted to an output block or a physical contact. When faultstate condition is set, output function blocks perform their FSTATE actions.

FBRTOT **Field Bus Reset Totalizer**. Used to reset totalizer value.

FEATURES **Features**. Used to show supported resource block options.

FEATURE_SEL **Feature Select**. Used to select Resource Block options.

FIELD_VAL **Field Value.** Raw value of the field device in percent of the XD_SCALE range, with a status reflecting the transducer condition, before signal characterization (L_TYPE) or filtering (PV_FTIME). Transducer scaling (XD_SCALE) is applied to the value from the channel to produce the FIELD_VAL in percent.

FLOWMETER_INFO

Flowmeter Information. Transmitter model code, serial number and power line mains frequency.

FLOWTUBE_INFO

Flowtube Information. Calibration factor, flowtube model code, and flow direction.

FWD_TOTAL _VALUE

Forward Value. Forward total value.

FWD_TOTAL_VALUE_RANGE

Forward Total Value Range. The high and low range limit values, the engineering units, and the number of decimals to the right of the decimal point to display the forward total value.

FREE_SPACE **Free Space**. Percent of memory available for further configuration.

FREE_TIME **Free Time.** Percent of the block processing time that is free to process additional blocks.

GRAND_TOTAL _VALUE

Grand Total Value. Grand total value.

GRAND_TOTAL_VALUE_RANGE

Grand Total Value Range. The high and low range limit values, the engineering units, and the number of decimals to the right of the decimal point to display the grand total value.

GRANT_DENY **Grant/Deny Options** for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block.

HARD_TYPES **Hardware Types**. The types of hardware available as channel numbers.

HI_HI_PRI **High - High Priority.** Priority of the High-High alarm.

HI_HI_LIM **High - High Limit.** The setting, in engineering units, for High-High alarm.

HI_PRI **High Priority.** Priority of the High alarm.

HI_LIM	**High Limit.** The setting, in engineering units, for High alarm.
HI_HI_ALM	**High - High Alarm.** The status for High-High alarm and its associated time stamp.
HI_ALM	**High Alarm.** The status and time stamp associated with the high deviation alarm.
IO_OPTS	**Input/Output Options.** Options which the user may select to alter input and output block processing.
L_TYPE	**Link Type.** Determines if the values passed by the transducer block to the AI block may be used directly (Direct) or if the value is in different units and must be converted linearly (Indirect), or with square root (Ind Sqr Root), using the input range defined by the transducer and the associated output range.
LIM_NOTIFY	**Notify Limit**. Maximum number of unconfirmed alert notify messages allowed.
LIN_TYPE	**Linearization Type.** Used to describe the behavior of the sensor output.
LOW_CUT	**Low Cutoff.** Low limit used in square root processing. A value of zero percent of scale is used in block processing if the transducer value falls below this limit, in % of scale. This feature is used to eliminate noise from a sensor near zero.
LO_PRI	**Low Priority.** Priority of the Low alarm.
LO_LIM	**Low Limit.** The setting, in engineering units, for Low alarm.
LO_LO_PRI	**Low – Low Priority.** Priority of the Low-Low alarm.
LO_LO_LIM	**Low - Low Limit.** The setting, in engineering units, for Low-Low alarm.
LO_ALM	**Low Alarm.** The status of the low alarm and its associated time stamp.
LO_LO_ALM	**Low – Low Alarm.** The status for Low-Low alarm and its associated time stamp.
MANUFAC_ID	**Manufacturer identification number.** Used by an interface device to locate the DD file for the resource.
MAX_NOTIFY	**Maximum Notify**. Maximum number of unconfirmed alert notify messages possible.
MEMORY_SIZE	**Memory Size**. Memory available in the resource.
MIN_CYCLE_T	**Minimum Cycle**. Time duration of the shortest cycle interval of which the resource is capable.

MODE_BLK **Block Mode.** The actual, target, permitted and normal modes for AI block.

NOISE_REDUCTION

Noise Reduction. Specifies whether noise reduction is applied to measurement values.

NV_CYCLE_T **Non Volatile Cycle Time**. Interval between writing copies of nonvolatile parameters to nonvolatile memory.

OUT_SCALE **Output Scale Values.** The high and low scale values, engineering units code, and number of digits to the right of the decimal point to be used in displaying the OUT parameter and parameters which have the same scaling as OUT.

OUT **Primary Output Parameter.** The primary analog value calculated as a result of executing the function block.

PRIMARY_VALUE **Primary Value**. Primary (flow rate) measurement quality and value.

PRIMARY_VALUE_RANGE

Primary Value Range. The high and low range limit values, the engineering units, and the number of decimals to the right of the decimal point to display the primary (flow rate) value.

PRIMARY_VALUE_TYPE

Primary Value Type. The type of measurement represented by the primary value.

PULSE_OUTPUT_INFO

Pulse Output Information. Pulse Output mode status, maximum pulse rate for Pulse Total mode, flow rate for full scale flow, and effect of AutoZeroLock, alarms, and diagnostic conditions on pulse rate output.

PV **Process Variable.** The value of the variable being measured. Used for control or calculation purposes. The process variable parameter reflects the value and status of the primary input value or calculated value on which the algorithm bases the output calculation. The units of the input must match the process variable units.

PV_FTIME **Process Variable Filter Time.** Time constant of a single exponential filter for the PV, in seconds.

REASON **Reason.** The reason for the last device reset.

RELAY_OUTPUT_INFO

Relay Output Information. Specifies the function and operation of each relay output.

RESTART **Restart**. Allows manual restart to be initiated.

REV_INFO **Revision Information.** Identifies the revision level of the flowmeter's application and communication code.

REV_TOTAL _VALUE

Reverse Total Value. Reverse total value.

REV_TOTAL_VALUE_RANGE

Reverse Total Value Range. The high and low range limit values, the engineering units, and the number of decimals to the right of the decimal point to display the reverse total value.

RS_STATE State of the function block application state machine.

SECONDARY _VALUE

Secondary Value. Net total value.

SECONDARY_VALUE_RANGE

Secondary Value Range. The high and low range limit values, the engineering units, and the number of decimals to the right of the decimal point to display the secondary (net total) value.

SENSOR_RANGE **Sensor Range**. The high and low range limit values, the units, and the number of decimals to the right of the decimal point to display the values.

SENSOR_SN **Sensor Serial Number** with sensor ID (10 bytes)

CORTYP (1 byte) CORNUM (2 bytes), CORMFG(2 bytes), SENTYP (1 byte), SUBTYP (1 byte), and blanks(15).

SENSOR_TYPE **Sensor Type**. Type of sensor.

SET_FSTATE **Set Faultstate**. Allows the faultstate condition to be manually initiated by selecting Set.

SHED_RCAS **Shed RCAS**. Time duration at which to give up on computer writes to function block RCAS locations.

SHED_ROUT **Shed Rout**. Time duration at which to give up on computer writes to function block ROUT locations.

SIMULATE **Simulate Variable.** Allows the transducer analog input to the block to be manually supplied when **simulate** is enabled. When **simulate** is disabled, the simulate value and status track the actual value and status.

STATUS_OPTS **Status Options Parameter.** Options that the user may select in the block processing of status.

ST_REV **Static Revision.** The revision level of the static data associated with the function block. The revision value is incremented each time a static parameter value in the block is changed.

STRATEGY **Strategy.** Can be used to identify grouping of blocks. This data is not checked or processed by the block.

TAG_DESC **Tag Description.** Used by higher level devices to describe the intended application of the block. This parameter is not checked or processed by the block.

TARGET_ERROR

Target Error. A structured parameter that gives detailed information as to why the current block is unable to reach the requested AUTO mode.

TEST_RW **Test Read/Write.** Read/Write test parameter - used only for conformance testing.

TOTALIZER_INFO

Totalizer Information. Totalizer status, mode, net total display format, and grand total display format.

TRANSDUCER_DIRECTORY

Transducer Directory. A directory that specifies the number and starting indices of the data collections in the transducer block.

TRANSDUCER_TYPE

Transducer Type. Identifies the transducer that follows.

TRS_TARGET_ERROR

TRS Target Error. Identifies the reason for the target error.

UPDATE_EVT **Update Event.** Used to report a change in the static data of the block.

WRITE_ALM **Write Alarm**. This alert is generated if the write lock parameter is cleared.

WRITE_LOCK **Write Lock**. If set, no writes from anywhere are allowed, except to clear WRITE_LOCK.

WRITE_PRI **Write Priority**. Priority of the alarm generated by clearing the write lock.

XD_ERROR **XD Error**. Transducer Error defined in FF transducer specification.

XD_SCALE **Transducer Scale Values.** The high and low scale values, engineering units code, and number of digits to the right of the decimal point used with the value obtained from the transducer for a specified channel.

Appendix A. List of Parameters

Standard fieldbus parameters that can be configured from a fieldbus host for the Analog Input blocks, Resource block, and Transducer block are listed in Table 9. A glossary of parameter terms is included in the "Glossary" on page 33.

Table 9. Fieldbus Parameters

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
	NETWORK CONFIGURATION			
	DEV_TAG	R/W	Unique Device ID	
	DEV_ADD	R/W	Unique to a segment	
	RESOURCE BLOCK			
	BLOCK_TAG	R/W	FOX_RES-(Dev_ID)	Unique Block ID
1	ST_REV	RO	current rev	Static Data revision
2	TAG_DESC	R/W	(blank)	User description of the block application
3	STRATEGY	R/W	0	To ID groups of blocks
4	ALERT_KEY	R/W	0	ID number of plant unit
5	MODE_BLK			
	Target	R/W	Auto	Mode requested by operator
	Actual	RO	actual mode	The current mode of the block
	Permitted	R/W	Auto, Man, OOS	Modes allowed for this block
	Normal	R/W	Auto	Mode of block during normal operations
6	BLOCK_ERR	RO	0	Error status of the hardware or software
7	RS_STATE	RO	Online	State of the function block application
8	TEST_RW	R/W		Test parameter used only for conformance testing
9	DD_RESOURCE	RO		Tag of the resource identifying the DD
10	MANUFAC_ID	RO	Foxboro	Manufacturer ID number
11	DEV_TYPE	RO		Manufacturer Model number
12	DEV_REV	RO	current device rev	Device revision number
13	DD_REV	RO	current DD rev	DD Revision
14	GRANT_DENY			Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters.
	Grant	R/W	0 (none selected)	
	Deny	R/W	0 (none selected)	
15	HARD_TYPES	RO	Scalar Input	Type of hardware avail as channel numbers
16	RESTART	R/W	Run	Defines the type of restart to be initiated
17	FEATURES	RO	Reports	Shows supported Resource Block options
18	FEATURE_SEL	R/W	0 (none selected)	Used to select Resource Block options
19	CYCLE_TYPE	RO	Scheduled, Manuf Specific	Block execution methods available
20	CYCLE_SEL	R/W	Manuf Specific	Used to select Cycle Type
21	MIN_CYCLE_T	RO	6400 millisecond	Duration of the shortest cycle interval

Table 9. Fieldbus Parameters (Continued)

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
22	MEMORY_SIZE	RO	0	Available configuration memory in the empty resource
23	NV_CYCLE_T	RO	38400000 ms	Interval between writes to nonvolatile memory
24	FREE_SPACE	RO	0	% of memory available for further configuration
25	FREE_TIME	RO	0	% of block processing time available
26	SHED_RCAS	R/W	640000 ms	Timeout for write attempts to RCas locations
27	SHED_ROUT	R/W	640000 ms	Timeout for write attempts to ROut locations
28	FAULT_STATE	RO	Clear	When active, causes all output function flocks in the resource to go to the condition chosen by the fault state Type I/O option
29	SET_FSTATE	R/W	Off	Allows faultstate conditions to be manually set
30	CLR_FSTATE	R/W	Off	Allows faultstate conditions to be cleared
31	MAX_NOTIFY	RO	10	Max number of unconfirmed alert notify messages possible
32	LIM_NOTIFY	R/W	10	Max number of unconfirmed alert notify messages allowed
33	CONFIRM_TIME	R/W	640000 ms	Minimum time between retries of alert reports
34	WRITE_LOCK	R/W	Not Locked	If locked, no writes are allowed
35	UPDATE_EVT	RO		Generated by any change to static data
36	BLOCK_ALM	RO		For all config, H/W, connection failure or system problems
37	ALARM_SUM			The current alert status
	Current	RO	0	The active state of each alarm
	Unacknowledged	RO	0	The unacknowledged state of each alarm
	Unreported	RO	0	The unreported state of each alarm
	Disabled	R/W	all alarms disabled	The disabled state of each alarm
38	ACK_OPTION	R/W	all alarms auto ack'd	Selection of which alarms are automatically acknowledged
39	WRITE_PRI	R/W	0	Priority of alarm generated by clearing write lock
40	WRITE_ALM	RO		Alert generated if the write lock parameter is cleared
41	ITK_VER	RO	current version	Revision to which the DD has been tested
42	FACTORY_DIAGNOSTIC_1	RO		Diagnostic parameter reserved for Foxboro use.
43	DOWNLOAD_PARAMETER	RO		Download/Upload parameter reserved for Foxboro use
44	TARGET_ERROR			Detailed error information
	Description	RO		Target error reason
	Parameter_Number	RO		Parameter number in error condition
	TRANSDUCER BLOCK			
	BLOCK_TAG	R/W	FOX_IMT25_TRS-(Dev_ID)	Unique Block ID
1	ST_REV	RO	0	Static data revision
2	TAG_DESC	R/W	(blank)	User description of the block application
3	STRATEGY	R/W	0	To ID groups of blocks
4	ALERT_KEY	R/W	0	ID number of plant unit

Table 9. Fieldbus Parameters (Continued)

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
5	MODE_BLK			
	Target	R/W	Auto	Mode requested by operator
	Actual	RO	Actual Mode	The current mode of the block
	Permitted	R/W	Auto, Man, or OOS	Modes allowed for this block
	Normal	R/W	Auto	Mode of block during normal operations
6	BLOCK_ERR	RO	0	Error status of the hardware or software
7	UPDATE_EVT	RO		Generated by any change to static data
8	BLOCK_ALM	RO		For all config, H/W, connection failures
9	TRANSDUCER_ DIRECTORY	RO		Dir that specifies the number & start of data collection
10	TRANSDUCER_TYPE	R0	Std Flow w/Calibraton	Identifies the transducer
11	XD_ERROR	RO		Transducer block alarm subcode
12	COLLECTION_ DIRECTORY	RO		Directory that specifies the number & start of each transducer
13	PRIMARY_VALUE_TYPE	RO	volumetric flow	Type of measurement of the primary value
14	PRIMARY_VALUE			
	Value	RO	actual value	Numerical quantity calculated by the transmitter
	Status	RO	actual status	Set by transmitter - status of measurement value
15	PRIMARY_VALUE_RANGE			The range, units, and precision of the flow rate measurement
	EU_at_100%	R/W	100	The engineering units value at 100% of range
	EU_at_0%	R/W	0	The engineering units value at 0% of range
	Units_Index	R/W	GPM	Engineering units for the primary value
	Decimal	R/W	5	The number of digits to the right of the decimal point
16	SENSOR_TYPE	RO	Electromagnetic	The type of sensor
17	SENSOR_RANGE			The range, units, and precision of the sensor
	EU_at_100%	RO	600	The engineering units value at 100% of range
	EU_at_0%	RO	-600	The engineering units value at 0% of range
	Units_Index	RO	mV	Engineering units for the primary value
	Decimal	RO	5	The number of digits to the right of the decimal point
18	SENSOR_SN	RO	TUBESERNUM012345	The sensor serial number
19	LIN_TYPE	R/W	linear with input	The linearization type used to describe the behavior of the sensor output
20	SECONDARY_VALUE			
	Value	RO	actual value	Numerical quantity calculated by the transmitter
	Status	RO	actual status	Set by transmitter - status of measurement value
21	SECONDARY_VALUE_ RANGE			The range, units, and precision of the net total measurment
	EU_at_100%	R/W	1e+008	The engineering units value at 100% of range
	EU_at_0%	R/W	0	The engineering units value at 0% of range
	Units_Index	R/W	gallon	Engineering units for the primary value
	Decimal	R/W	5	The number of digits to the right of the decimal point

Table 9. Fieldbus Parameters (Continued)

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
22	GRAND_TOTAL_VALUE			
	Value	RO	actual value	Numerical quantity calculated by the transmitter
	Status	RO	actual status	Set by transmitter - status of measurement value
23	GRAND_TOTAL_VALUE_ RANGE			The range, units, and precision of the grand total
	EU_at_100%	R/W	1e+008	The engineering units value at 100% of range
	EU_at_0%	R/W	0	The engineering units value at 0% of range
	Units_Index	R/W	gallon	Engineering units for the primary value
	Decimal	R/W	5	The number of digits to the right of the decimal point
24	FWD_TOTAL_VALUE			
	Value	RO	actual value	Numerical quantity calculated by the transmitter
	Status	RO	actual status	Set by transmitter - status of measurement value
25	FWD_TOTAL_VALUE_ RANGE			The range, units, and precision of the forward total
	EU_at_100%	R/W	1e+008	The engineering units value at 100% of range
	EU_at_0%	R/W	0	The engineering units value at 0% of range
	Units_Index	R/W	gallon	Engineering units for the primary value
	Decimal	R/W	5	The number of digits to the right of the decimal point
26	REV_TOTAL_VALUE			
	Value	RO	actual value	Numerical quantity calculated by the transmitter
	Status	RO	actual status	Set by transmitter - status of measurement value
27	REV_TOTAL_VALUE_ RANGE			The range, units, and precision of the reverse total
	EU_at_100%	R/W	1e+008	The engineering units value at 100% of range
	EU_at_0%	R/W	0	The engineering units value at 0% of range
	Units_Index	R/W	gallon	Engineering units for the primary value
	Decimal	R/W	5	The number of digits to the right of the decimal point
28	FLOWMETER_INFO			
	TX_COD	RO	actual model code	Transmitter model code
	TX_SER	RO	actual serial number	Transmitter serial number
	MAINS	R/W	60 Hz	Power line mains frequency
29	FLOWTUBE_INFO			
	MF_USE	R/W	12	Calibration factor
	FT_COD	R/W	TUBEMSCODE	Flowtube model code
	FT_DIR	R/W	Unidir Positive	Flow direction
30	NOISE_REDUCTION	R/W	On	Noise reduction, on or off
31	TOTALIZER_INFO			
	M2_ON	R/W	Off	Totalizer enable, on or off
	M0_MOD	R/W	Unidirectional	Configured mode for totalizing flow
	M2_FMT	R/W	#######.	Net total display format
	M3_FMT	R/W	#########.	Grand total display format
	FBRTOT	R/W	Not Executed	Resets selected totalizer value

Table 9. Fieldbus Parameters (Continued)

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
32	PULSE_OUTPUT_INFO			
	M7_MOD	R/W	Off	Pulse output mode, off, rate, or total
	M7_TMX	R/W	10 Hz	Maximum pulse rate for Pulse Total mode
	M7_URV	R/W	100	Flow rate at maximum pulse rate
	M7_RMX	R/W	2 kHz	Pulse rate for full scale flow
	EP_EFF	R/W	None	Effect of AutoZeroLock on rate pulse output
	AL_OUT	R/W	No Effect	Effect of alarms on rate pulse output
	RNGFL	R/W	Go Downscale	Effect of diagnostic conditions on rate pulse output.
33	CONTACT_INPUT_INFO			
	CI1FNC	R/W	Off	Contact Input 1 function
	CI1OPR	R/W	Normally Open	Contact Input 1 operation
	CI2FNC	R/W	Off	Contact Input 2 function
	CI2OPR	R/W	Normally Open	Contact Input 2 operation
34	RELAY_OUTPUT_INFO			
	CO1FNC	R/W	Off	Relay Output 1 function
	CO1OPR	R/W	Normally Open	Relay Output 1 operation
	CO1ALM	R/W	High Rate	Effect of alarm on Relay Output 1
	CO1SUP	R/W	Off	On specifies that an ACK deactivates relay while alarm condition still exists
	CO2FNC	R/W	Off	Relay Output 2 function
	CO2OPR	R/W	Normally Open	Relay Output 2 operation
	CO2ALM	R/W	Low Rate	Effect of alarm on Relay Output 2
	CO2SUP	R/W	Off	On specifies that an ACK deactivates relay while alarm condition still exists
35	ALARMING_INFO			
	AL_ON	R/W	Disabled	Alarming enabled or disabled
	AL_HON	R/W	Disabled	High flow rate alarming enabled or disabled
	AL_LON	R/W	Disabled	Low flow rate alarming enabled or disabled
	ALT1ON	R/W	Disabled	Total 1 setpoint alarming enabled or disabled
	ALT2ON	R/W	Disabled	Total 2 setpoint alarming enabled or disabled
	ALEPON	R/W	Disabled	AutoZeroLock can trigger an alarm
	AL_HSP	R/W	100	Setpoint for high flow rate alarm
	AL_HDB	R/W	1	Deadband for high flow rate alarm
	AL_LSP	R/W	1	Setpoint for low flow rate alarm
	ALTLDB	R/W	0.5	Deadband for low flow rate alarm
	ALT1SP	R/W	100000	Total 1 setpoint for alarm
	ALT2SP	R/W	1e+006	Total 2 setppoint for alarm
	AL_ACK	R/W	Auto Ack	Alarmsautomatically cleared when alarm condition no longer present

Table 9. Fieldbus Parameters (Continued)

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
36	AZL_INFO			
	EP_STA	RO	Off	AutoZeroLock status
	EP_ON	R/W	Off	AutoZeroLock enabled or disabled
	AZL_COUNT	RO	0	Cumulative count of AZL events since last reset
	AZL_RESET_COUNT	R/W	Not Executed	Resets AZL count
	AZL_CAL_STATUS	RO	Not Calibrating	Status of AZL calibration sequence
	AZL_CAL_CONTROL	R/W	Not Executed	Indicates an AZL calibration sequence
37	DISPLAY_INFO			
	DS_DFT	R/W	Rate EGU	Default display format
	DS_DON	R/W	Off	Dual display on or off
	DS_LN1	R/W	Rate EGU	Dual display line 1 format
	DS_LN2	R/W	Rate EGU	Dual display line 2 format
	AL_DIS	R/W	Don't Blink	Whether display blinks for alarms
	DG_DIS	R/W	Blink	Whether display blinks for diagnostic conditions
	M1DAMP	R/W	3	Damping value for flow rate on local display
38	REV_INFO			
	SENSOR_SW_REV	RO	current rev	Revision level of sensor code
	COMMS_SW_REV	RO	current rev	Revision level of communication code
39	REASON	RO		Reason for last device reset (encoded value)
40	TRS_TARGET_ERROR			
	Description	RO		Target error reason
	Parameter_Number	RO		Parameter number in error condition
41	FACTORY_DIAGNOSTIC_2	RO		Diagnostic parameter reserved for Foxboro use.
42	FACTORY_DIAGNOSTIC_3	RO		Diagnostic parameter reserved for Foxboro use.
	ANALOG INPUT BLOCKS*			
	BLOCK_TAG	R/W	FOX_AI1_(Dev_ID) FOX_AI2_(Dev_ID)	Unique Block ID
1	ST_REV	RO	current rev	Static data revision
2	TAG_DESC	R/W	(blank)	User description of the block application
3	STRATEGY	R/W	0	To ID groups of blocks
4	ALERT_KEY	R/W	0	ID number of plant unit
5	MODE_BLK			
	Target	R/W	Auto	Mode requested by operator
	Actual	RO	aActual mode	The current mode of the block
	Permitted	R/W	Auto, Man, or OOS	Modes allowed for this block
	Normal	R/W	Auto	Mode of block during normal operations
6	BLOCK_ERR	RO	0	Error status of the hardware or software
7	PV	RO	actual value and status	The process value and status for this block

Table 9. Fieldbus Parameters (Continued)

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
8	OUT			
	Value	R/W	actual value	The primary analog value calculated by the transmitter or entered by the user
	Status	RO	actual status	Set by transmitter - status of measurement value
9	SIMULATE			Simulates the transducer value input to this block
	Simulate Status			
	Quality	R/W	actual quality	Quality of the measurement
	Substatus	R/W	actual substatus	Substatus
	Limits	R/W	actual limits	Limits
	Simulate Value	R/W	0	Used for the transducer value when simulation is enabled
	Transducer Status	RO	actual status	Set by transmitter - status of the transducer
	Transducer Value	RO	actual value	Current value supplied by the transducer
	Enable/Disable	R/W	Disabled	Enable/disable simulation
10	XD_SCALE			The range, units and precision of XD_SCALE
	EU_at_100%	R/W	100	The engineering units value at 100% of range
	EU_at_0%	R/W	0	The engineering units value at 0% of range
	Units_Index	R/W	GPM	Engineering units for the transducer value
	Decimal	R/W	4	The number of digits to the right of the decimal point
11	OUT_SCALE			The range, units and precision of OUT_SCALE
	EU_at_100%	R/W	100	The engineering units value at 100% of range
	EU_at_0%	R/W	0	The engineering units value at 0% of range
	Units_Index	R/W	GPM	Engineering units for the output value
	Decimal	R/W	4	The number of digits to the right of the decimal point
12	GRANT_DENY			Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters.
	Grant	R/W	0 (none selected)	
	Deny	R/W	0 (none selected)	
13	IO_OPTS	R/W	0 (none selected)	Options to alter input and output block processing
14	STATUS_OPTS	R/W	0 (none selected)	Options for block processing of status
15	CHANNEL	R/W	Flow Rate	The logical channel connected to this block
16	L_TYPE	R/W		Determines if value is to be used directly or converted Direct should be used in all applications of this product
17	LOW_CUT	R/W	0	Used in square root processing
18	PV_FTIME	R/W	3	Time constant of a single exponwential filter for the pV in seconds
19	FIELD_VAL	RO	actual value and status	Raw value of the field device in % of PV range and status of the transducer condition before signal characterization or filtering
20	UPDATE_EVT	RO		Generated by any change to static data
21	BLOCK_ALM	RO		For all config, H/W, connection failures, system problems

Table 9. Fieldbus Parameters (Continued)

Rel Index	Parameter Name	RO or R/W	Default Value	Comments
22	ALARM_SUM			The current alert status
	Current	RO	0	The active state of each alarm
	Unacknowledged	RO	0	The unacknowledged state of each alarm
	Unreported	RO	0	The unreported state of each alarm
	Disabled	R/W	no alarms disabled	The disabled state of each alarm
23	ACK_OPTION	R/W	all alarms auto ack'd	Selection of which alarms are automatically ack'd
24	ALARM_HYS	R/W	0.5%	Amount the PV must return within alarm limits before the alarm condition clears
25	HI_HI_PRI	R/W	0	Priority of the High-High alarm
26	HI_HI_LIM	R/W	1.#INF	The setting for High-High alarm in engineering units
27	HI_PRI	R/W	0	Priority of the High alarm
28	HI_LIM	R/W	1.#INF	The setting for High alarm in engineering units
29	LO_PRI	R/W	0	Priority of the Low alarm
30	LO_LIM	R/W	-1.#INF	The setting for Low alarm in engineering units
31	LO_LO_PRI	R/W	0	Priority of the Low-Low alarm
32	LO_LO_LIM	R/W	-1.#INF	The setting for Low-Low alarm in engineering units
33	HI_HI_ALM	RO	current status	The status of the High-High alarm
34	HI_ALM	RO	current status	The status of the High alarm
35	LO_ALM	RO	current status	The status of the Low alarm
36	LO_LO_ALM	RO	current status	The status of the Low-Low alarm
37	TARGET_ERROR			Detail error information for this AI block
	Description	RO		Target error reason
	Parameter_Number	RO		Number of the effected parameter

Index

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Vertical lines to the right of text or illustrations indicate areas changed at last isue date.

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