Instruction

PC50 Intelligent Field Device Tool

Operation Using FoxComTM Communication Protocol



by Schneider Electric

MI 020-504 – February 2016

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Preface

This manual explains how to operate, calibrate, and configure devices having a FoxCom[™] communication protocol with the PC50 Field Device Tool software package.

Chapter 1 provides information that is common to using the PC50 Field Device Tool with various transmitters with FoxCom communication protocol. This is followed by chapters on each Foxboro Intelligent Device. These chapters show an example of the device's data screen, gives an explanation of the device's status/diagnostic error messages with recommended actions, and explains how to calibrate and configure the device.

Therefore, to use this manual, refer to Chapter 1, "Common Information" for information that is common to all devices and to the appropriate chapter shown in the table below for procedures on how to communicate with your specific Foxboro Intelligent Device.

Device	Chapter
I/A Series [®] Pressure Transmitters	2
RTT20 (TI20) Temperature Transmitters	3
IMT25/IMT25L Magnetic Flow Transmitters	4
IMT96 Magnetic Flow Transmitters	5
83 Series Vortex Flowmeters	6
870ITEC Electrodeless Conductivity Transmitters	7
870ITPH pH/ORP/ISE Transmitters	8
870ITCR Conductivity/Resistivity Transmitters	9
SRD991, SRD960, SRD970, and NAF LinkIT Intelligent Positioners	10

1. Common Information

This chapter provides information that is common to using the PC50 Field Device Tool (FDT) with various transmitters with FoxCom[™] communication protocol.

Right Click Menus

In addition to accessing functions by left-clicking on drop-down menus, many functions can be also accessed by conventional right-click techniques.

Diagnosis

The Diagnosis function interrogates the connected device and displays Pass-Fail status messages on the Primary and Secondary Status Fields and an alphanumeric indication of any diagnostic errors. The function is accessed via the Device > Diagnosis menu. While the content of the screens differ from product to product, they are basically the same. A sample Diagnosis screen is shown in Figure 1. Explanation of and recommended action for status error messages for each product is given in the chapter specific to that product.

Status: 💙 Mode	: ONLINE		Diagnostic Error:	None	
Primary Status Fields		-00-	C Secondary Status Fields-		-
Device Busy	PASS		Device Busy	PASS	1
Init Required	PASS		Bad Message Received	PASS	
			Electronics Error	PASS	
Diagnostic Error	PASS		Sensor1 Out of Range	PASS	
Secondary Status Error	PASS		Temp Sen1 Out of Rng	PASS	 Image: A start of the start of
			Temp Sen2 Out of Rng	PASS	Ø

Figure 1. Sample Diagnosis Screen

Selecting the Codes button at the bottom of the display causes the various diagnostic codes to be displayed in decimal and hex form with no text translation. A sample Diagnostic Codes screen is shown in Figure 2. Selecting the Reason button gives the reason in text (not just code). Explanation of and recommended action for diagnostic error messages for each product is given in the chapter specific to that product.

gnostic Codes		
- Diagnostic Codes	— Decimal —	Hex —
Status Code (1 and 2):	0	0x0000
Diagnostic Code:	0	0x0000
Reason Code:	0	0x0000
Extended Status Code:	0	0x0000000

Figure 2. Sample Diagnostic Codes Screen

Trend Viewer

The Trend viewer screen displays the measurement over time. The measurement data is dynamically retrieved from the device and displayed. The trend viewer function is accessed as follows: Device > Measured value. The scales can be manipulated by using the dialog box which appears when double clicking on a scale.



Figure 3. Sample Trend Viewer Screen

Load

The Load button is used to retrieve the stored trending database. You are asked for the path and filename to retrieve the old trending data. The file must be written using the Save button.

Save

The Save button is used to store the measured trending data collected since the trend function was displayed. You are asked for the path and filename to store the trending database. This file could be displayed at later time by using the Load button.

Print

The Print button is used to print the displayed portion of the trending view. Before this step, it is possible to choose the portion of the trend data which you want to display and print by using the functions to Manipulate the Scales or to Manipulate the Trend as explained in "Trend Viewer" on page 18.

Export

The Export button is used to store the measured trending data collected since the Trend function was displayed. You are asked for the path and filename to store the trending database. The default filename is composed of the Tag Number + _TRD.txt. However, you can choose any other name.

The trend file has a header part and the trend data part with the curve values. The header part contains information such as the tagname, number of curves as well as ranges and descriptions of the curves. The trend data part lists in each line the measured values for each curve. Each measurement shows the sequence number, date (Month/Day/Year) and time (Hour:Minutes:Seconds.Milliseconds) of measurement and the values for each curve. To import the trend data into other programs, select the appropriate ASCII import function within the other program.

Example for Microsoft Excel

In Microsoft Excel, choose File > Open. For the file type, select Text Files to list all files and select the desired file with the ending _TRD.txt. The Excel Import Assistant will guide you through the definition of the import format:

Start the import with the headings for the curves (line number 13).

The fields are separated by tabs.

Select General for all columns.

Import the file.

It is now possible to use the Excel functions and store this file in the Excel format.

The imported information will be displayed in several columns. For each measurement you have a row. The first column contains the measurement number followed by the date and time. Beginning with the fourth column the measured curve values are displayed.

Example for Microsoft Access

In Microsoft Access, open your database. Choose File > External Data > Import. For the file type, select Text File and select the desired file with the ending _TRD.txt. The Access Import Assistant guides you through the definition of the import format:

The fields are separated by tabs.

Import the file.

The imported information is displayed in several columns. For each measurement you have a row. The first column contains the measurement number followed by the date and time. Beginning with the fourth column, the measured curve values are displayed.

Clear

The Clear button is used to delete all the collected trending data until this point and start trending with new data. The previously collected trending data is lost unless it is stored for later use by using the Save button.

Set mA Function

When Output is configured 4-20 mA, certain devices can be set to output a mA value to test or adjust other devices in the loop. The Set mA function is accessed via Device > Simulation. To set the mA output, first select the measurement type and then enter the desired output value. The Set mA screen (Figure 4) shows the allowable output range and units.

Т	est Output
	Select the analog output being overriden. Enter an override value. Press <u>A</u> pply.
	Press Continue when done testing.
[Set Output Value:
	Measurement Type: Measurement
	Output Value: 0 bar <u>Apply</u>
	Range: 0.00 to 2.09 bar
	Cancel Continue <u>H</u> elp

Figure 4. Sample Set mA or Set Digital Output Screen

Set Digital Output Function

When a device is configured for FoxCom Digital Output, certain devices can be set to output a digital value to test I/A Series system wiring and displays. (I/A Series Version 4.0 or later is required.) Both Measurement #1 and Measurement #2 outputs can be set. The Set Digital Output function is accessed via Device > Simulation. First, select the measurement type and then enter the desired output value. A sample Set Digital Output screen is shown in Figure 4.

Mode Change Function

The mode change function allows you to change to any one of the following modes:

- Offline Enables you to force the device DTM offline
- Online Enables you to force the device DTM online

The mode change function is accessible via Device > Additional functions > Commands.

Display Raw Input Function

This function reads the raw inputs for certain devices. The Display Raw Input function is accessed via Device > Additional Functions > Commands. The inputs displayed for various devices are shown in Table 1.

Device Type	Display
I/A Series Pressure	mV Input 1 (pressure input) mV Input 3 (temperature input)
83	Shedding Frequency Upper Range Frequency
IMT25	Electrode Voltage (Positive) Electrode Voltage (Negative) Coil Current (Positive) Coil Current (Negative)
IMT96	FlowB ADC counts compensated for offsets Voltage reference in ADC counts for offsets Actual gain calculation Zero flow offset

Table 1. Raw Inputs Displayed for Various Devices

Configuration Function

Saving Configuration Changes

When you connect to a device, the data presented is that in the local database of your computer, not necessarily that in your device. Therefore, if you want to make changes to your device database, first upload the data from your device to your computer (Load from Device). After making changes, if you Save, you are saving the new data in your local database only. If you Save and Download, you are saving the data both to your local database and your device.

Use of the Save and Download command before Load from Device command downloads a database that may be completely different than that in the device, potentially causing a process upset.

Therefore, when changing the configuration of a device, perform the following steps:

- 1. Connect to the device (Device > Connect).
- 2. Upload data from the device by using the Device > Load from Device command or the Load from Device icon.
- 3. Make your changes.
- 4. Save your changes and download them to your device by:
 - a. Clicking on the Save and Download button on one of the configuration screens or
 - b. Using File > Save (or Save As) and then Device > Store to Device (or the Store to Device icon).

Entering Tag Numbers

The tag number is the means of identifying a particular instrument. When entering a tag number, do **not** use special characters such as >, <, -, +, :, ;, or *.

Print

Various reports can be printed. To select the report, follow the path Device > Additional functions > Print and then select the report from the choices presented. Then click on the Print button to send this report to a printer.

When not connected to a device, the printout is the offline parameterization database.

2. I/A Series Pressure Transmitters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with I/A Series Pressure Transmitters with FoxCom[™] communication protocol. Additional information about the transmitters and FoxCom communication is contained in documents listed in Table 2.

Table 2.	Reference	Documents
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Document	Description
FoxCom Communication	
B0193XX	Checklist for FoxCom Measurement Integration
Transmitter Information	
MI IDP10-D	IDP10-D Differential Pressure Transmitters
MI IAP10-D/IGP10-D	IAP10-D Absolute Pressure Transmitters and IGP10-D Gauge Pressure Transmitters
MI IAP20-D/IGP20-D	IAP20-D Absolute Pressure Transmitters and IGP20-D Gauge Pressure Transmitters
MI IDP25-D/IDP50-D	IDP25-D and IDP50-D Differential Pressure Transmitters
MI IGP25-D/IGP50-D	IGP25-D and IGP50-D Gauge Pressure Transmitters

Measure Screen

The Measure screen contains identification information and live measurements. A sample screen is shown in Figure 5.

Tag Number : - Tag Name : Owner Tag Nam Location : Instr Location	ne	Device Type Device Name	: IDP10-B (Rev: 3.13) : DevNam
Measurement #1 Measurement #2	:	0.00 Not Active	inH2O
Device Temperature	:	27.4	С
		81.3	F
mA Equivalent	:	In digital	mA

Figure 5. Sample I/A Series Pressure Transmitter Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 3 and of diagnostic error messages in Table 4.

Status Error Messages

Message	Explanation	Recommended Action				
Primary Status Fig	Primary Status Fields					
Device Busy Transmitter is busy. If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.						
Init Required	Transmitter is re- initializing on reset.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.				
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Error Messages to determine problem and corrective action.				
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.				
Secondary Status	Fields					
Device Busy Transmitter is busy. If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.						
Bad Message Received	Transmitter received a bad message.	Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.				
Sensor1 Out of Rng	Sensor input out of range.	Message disappears when input returns to within acceptable limits.				
Temp Sen1 Out of Rng	Transmitter temperature out of range.	Transmitter can be configured to continue operating and use a default temperature for measurement compensation. Message disappears when temperature returns to within acceptable limits.				
Temp Sen2 Out of Rng	Transmitter temperature out of range.	Transmitter can be configured to continue operating and use a default temperature for measurement compensation. Message disappears when temperature returns to within acceptable limits.				

Table 3.	Transmitter	Status	Error	Messages
				A

Diagnostic Error Messages

Before following the recommended actions listed below, try to clear the error message by turning off and reapplying power to the transmitter.

Code	Error Message	Recommended Action
01	CPU Instruct Error	Replace module.
02	ROM Checksum Error	Replace module.
03	EEPROM Chksum Err	Make a change to the transmitter database and download to the transmitter. If this does not clear the problem, replace module.
04	RAM Error	Replace module.
05	Power Supply Fail	Replace module.
06	Battery Failure	Replace module.
07	Input Range Error	See status to indicate which input is out of range and make necessary correction.
08	Output I/O Error	Replace module.
09	Communication Err	Replace module.
0A	Math Error	Check transmitter database and correct any problems. If problem persists, replace module.
0B	RealTime Clock Err	Replace module.
0C	Input 1 = 0	Sensor input bad; check sensor.
0D	Wrong MCU	Replace module.
0E	Device Failure	Replace module.
20	Input 1 > Up Limit	Sensor input too high, check sensor. ^(a)
2F	Offline Cfg w/Err	Replace module.

(a) Error message disappears when cause of error returns to within acceptable limits.

Calibration

You can perform the following calibration procedures on an I/A Series Pressure Transmitter using the PC50 Field Device Tool:

- Point Calibration
- Re-Range
- ♦ Re-Zero
- mA Calibration
- Restore Default.

The Re-Zero and Point Calibration procedures adjust the transmitter output. The Re-Zero procedure zeros the transmitter at the Lower Range Value (LRV). The 1-Point Calibration procedure allows you to establish a calibration point that may or may not be the Lower Range Value (LRV). The 2-Point Calibration procedure allows you to specify lower and upper calibration points that may or may not be the Lower Range (LRV) and Upper Range Value (URV).

Each transmitter is calibrated at the factory to a specified range. If the new range is the same as the factory range, you should perform only a Re-Zero or a 1-Point Calibration procedure. If the new range changes the span by less than a 2-to-1 ratio, you should perform a Re-Range. If you make a large change in range (turndown ratio greater than 2), you may need to perform a 2-Point Calibration to obtain optimum accuracy.

For all calibration procedures, calibration points are read from the transmitter at the start of the procedure. Also note that if the transmitter is configured for a square root output, the PC50 Field Device Tool places it in linear mode during calibration and resets it to Square Root mode at the end of the procedure.

- NOTE -

Transmitters must be calibrated using forward action (increasing input increases output). If your transmitter has reverse output action (increasing input decreases output), calibrate it so that calibrated LRV = desired URV and calibrated URV = desired LRV. Then, after calibration, change the LRV and URV back to the correct values.

The calibration procedures are accessed as follows:

```
Device > Additional functions > Adjust set value
```

Re-Zero

This function enables you to rezero and rerange your device at the Lower Range Value (LRV). The procedure follows:

- 1. Select Re-Zero from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. If your device is configured for Square Root mode, select Continue to change to Linear mode for Calibration. The configuration is automatically placed back in Square Root mode when leaving Calibration. If your device is configured for Linear mode, ignore this step.
- 4. If your LRV was not zero, you are prompted to change the value if you wish and then Continue. If your LRV was zero, ignore this step.
- 5. When the displayed measurement is stable, select Continue. The average of the last five readings is shown. Select Continue again to accept this value.
- 6. Enter the operator's initials and select Continue. The current calibration date is automatically displayed. See Figure 6.
- 7. Follow the prompt to put the device back into Automatic mode. Select Continue to resume dynamic measurements.

Pressure Point Calibration					
Press CONTINUE when displayed measure is stable. The value is being updated 5 times a second.					
Calibration Type C 1 Point C 2 Point Pressure(s) to Calibrate to: Lower: 0 inH20 Upper: 100 inH20 Range: -250.00 to 270.00 inH20					
Online Measurement Measurement 1: 0 inH20 Calibrator's Initials: PLB Calibrated: 1/23/2003					
Cancel Continue <u>H</u> elp					

Figure 6. Sample I/A Series Pressure Transmitter Re-Zero or Point Calibration Screen

Point Calibration

This function enables you set the Lower Range Value and Upper Range Value and to calibrate the device using points that may or may not be these values. The procedure follows:

- 1. Select Point from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. If your device is configured for Square Root mode, select Continue to change to Linear mode for Calibration. The configuration is automatically placed back in Square Root mode when leaving Calibration. If your device is configured for Linear mode, ignore this step.
- 4. Referring to Figure 6, select 1-Point or 2-Point Calibration and Continue.
- 5. Enter your desired Lower Calibration Point, apply the lower calibration point pressure to the device, and select Continue.
- 6. When the displayed measurement is stable, select Continue. The average of the last five readings is shown. Select Continue again to accept this value.
- 7. If you selected a 2-Point Calibration, enter your desired Upper Calibration Point, apply the upper calibration point pressure to the device, and select Continue.
- 8. When the displayed measurement is stable, select Continue. The average of the last five readings is shown. Select Continue again to accept this value.

- 9. Enter the calibrator's initials and select Continue. The current calibration date is automatically displayed.
- 10. Follow the prompt to put the device back into Automatic mode. Select Continue to resume dynamic measurements.

Re-Range

This function enables you to rerange your device without applying calibration pressure. The procedure follows:

- 1. Select Re-Range from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Enter your desired Lower Range Value (LRV) and Upper Range Value (URV) in either units shown and select Continue.
- 4. Follow the prompt to put the device back into Automatic mode. Select Continue to resume dynamic measurements.

Device Rerange					
CAUTION- The device's output w cause a process upse Press Continue when	vill be modified during this et. the loop is in manual mod	procedure. Leaving de, or Cancel to abo	g the external cont rt.	rol loop in automatic	may
Lower Range Value :	0.00000 inH2	<u>0.0000</u>) InH20	= 0.00000	 InH20
Upper Range Value :	100.00000 inH2	- J - = 100.000	000 InH20	= 100.00000	
Upper Range Limit :	200.00000 inH2	200.000	00 InH20	1	
	Cancel	Continue	<u>H</u> elp		

Figure 7. Sample I/A Series Pressure Transmitter Re-Range Screen

Restore Default

This function enables you to restore all calibration parameters to their factory default settings.

- 1. Select Restore Default from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. To reconfirm that you want to restore all calibration parameters to their default settings, select Continue.
- 4. Follow the prompt to put the device back into Automatic mode. Select Continue to resume dynamic measurements

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

- NOTE

Before performing a mA Calibration, perform the Point Calibration procedure described on page 27. A mA calibration may no longer be necessary.

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 2. Select mA from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Select 4 mA Output.

mA Calibration					
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.					
Calibrate:					
<u>4</u> mA Output	Step Size: 0	m	A		
C 20mA Output	Cumulative	0	mA		
			Apply		
Cancel	Continue	<u>H</u> el	lp		

Figure 8. Sample I/A Series Pressure Transmitter mA Calibration Screen

- 5. Set the Step Size from the menu (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5) and select Apply.
- 6. Repeat Step 5 until you are satisfied with the output on the meter. The cumulative change is shown on the screen display.
- 7. Select 20 mA Output.
- 8. Repeat Steps 5 and 6. When finished, select Continue.
- 9. The screen then displays the adjustments. To accept this change and save the calibration to the transmitter, select Continue.
- 10. Follow the prompt to put the device back into Automatic mode. Select Continue to resume dynamic measurements.

Configuration

Identifier Tab Screen

Identi	fier Transmitter Par	ameter Configuration		
	Device :	IDP10-B	Date of Manufacture :	1/13/2003
	Serial Number :	01300202	Last Calibration :	1/23/2003
	Firmware Version :	D		
	Tag Number :	·	Device Name : DevN	am
	Tag Name :	Owner Tag Name	Location : Instr L	ocation
Save Save and Download Cancel				

Figure 9. Sample I/A Series Pressure Transmitter Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the database filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Transmitter Parameter Configuration Tab Screen

Identifier Transmitter Parameter Configuration	on		
Measurement #1		-Measurement #2-	
🗖 Square root mode	Swap	🔲 Square root mo	de 🔲 Turn Off
Units: bar Custom	Measures 1 and 2:	Units: inH20	Custom
Lower Range Value : 0.00000		Lower Range Value	e: 0.00000
Upper Range Value : 2.08859	<>	Upper Range Value	840.00189
Upper Range Limit : 2.08859		Upper Range Limit	: 840.00000
Sqroot Low Flow Mode External Z	Zero – –	Output Mode	mA Output Fail Safe
C Active C Enabl	le 🔤	Digital	Own Scale
C 10% of Flow Cut Off C Disab	le	🔿 4-20 mA	O Up Scale
Output Damping : 25 sec.	г	Temperature Fail Stra	itegy
		💿 Fail 🛛 🔿	Continue
Save Save and Download	Cancel		

Figure 10. Sample I/A Series Pressure Transmitter Parameter Configuration Tab Screen

Field	Entry	
Measurement #1		
Square Root Mode	= Square Root; Blank = Linear.	
Units	Select from menu of pressure units or select Custom to enter user- configured units.	
Lower Range Value	Enter value at which transmitter outputs 4 mA. Must be 0 if M1 or M2 is in Square Root mode.	
Upper Range Value	Enter value at which transmitter outputs 20 mA.	
Upper Range Limit	Shows value of Upper Range Limit of transmitter.	
Measurement #2	Similar to Measurement #1.	
Turn off	Enable or Disable Measurement #2.	
Sqroot Low Flow Mode	Select Active or 10% of Flow Cut Off.	
External Zero	Select Enable or Disable.	
Output Mode	Select Digital or 4-20 mA.	
mA Output Fail Safe	Select Down Scale or Up Scale.	
Output Damping	Select one of nine choices from No Damping to 32 seconds.	
Temperature Fail Strategy	Select Fail or Continue.	

3. RTT20/TI20 Temperature Transmitters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with RTT20 and TI20 Temperature Transmitters with FoxCom communication protocol. Additional information about the transmitters and FoxCom communication is contained in the following documents.

- ♦ B0193XX Checklist for FoxCom Measurement Integration
- MI 020-453 Installation, Configuration, Operation, Calibration, and Maintenance.

- NOTE -

The RTT20 and the TI20 transmitters are identical with respect to the FoxCom protocol. All references to RTT20 also apply to the TI20 transmitter.

Measure Screen

	oxcom) # Measure	_	미꾀
Tag Number: TT101 Tag Name : Process Te Location : M+IBooth	Device Type : mp Device Name:	RTT20 DevNam	
Measurement 1:	1685.25	Ohms	
Device Temperatu	re: 79.72 26.51	°F °C	
mA Equivalent	21.00	mA	
			_

Figure 11. Sample RTT20 Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 5.

Message	Explanation	Recommended Action	
Primary Status Fields			
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Init Required	Transmitter is re- initializing on reset.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Codes to determine problem and corrective action	
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.	
Secondary Status F	ields		
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Bad Message Sent	Transmitter sent a bad message.	Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Bad Message Received	Transmitter received a bad message.	Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Sensor #1 Failed	Sensor #1 malfunction.	Check and/or replace Sensor #1 and associated sensor wiring.	
Sensor #2 Failed	Sensor #2 malfunction.	Check and/or replace Sensor #2 and associated sensor wiring.	
Electronics Fail	Internal RTT20 tests have failed.	Replace electronics.	

Calibration

You can perform the following calibration procedures on an RTT20 Transmitter using the PC50 Field Device Tool:

- N-Point Calibration
- ♦ Custom Input Curve
- ♦ ReRange
- ◆ mA Calibration
- Restore Factory

The calibration procedures are accessed as follows:

```
Device > Additional functions > Adjust set value
```

Except the path for Restore Factory is:

```
Device > Additional functions > Commands
```

N-Point Calibration

This function enables you to perform a 1-, 2-, 3-, or 5-Point Calibration. The differences are explained below.

1-Point Calibration

The RTT20 permits you to select any temperature within the configured range that is of particular interest to you. You are not required to use the LRV as the calibration point. The net effect is that a constant offset is utilized over the entire sensor curve. To view or change the value entered, see the note in "Custom Input Curve" on page 37.

2-Point Calibration

The RTT20 permits you to select any two temperatures in the region of interest within the configured range of the transmitter. You are not required to use the LRV and URV as the calibration points. The temperatures must be increasing in value. The resulting offsets are then straightline calculated to the LRV and URV. Picture an offset line defining the correction to the standard, starting from the LRV, passing through the two calibration points, and continuing to the URV. To view or change any value entered, see the note in "Custom Input Curve" on page 37.

3- and 5- Point Calibration

The RTT20 permits you to select any three (or five) temperatures in the region of interest within the configured range of the transmitter. The temperature must be increasing in value. The resulting offsets are then straightline calculated to the LRV and URV. Picture an offset line defining the correction to the standard, starting from the LRV, passing through the three (or five) calibration points, and continuing to the URV. To view or change any values entered, see note in "Custom Input Curve" on page 37.

N-Point Calibration Procedure

- 1. Select N-Point Calibration from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Select 1-, 2-, 3-, or 5-Point Calibration. Enter the desired reading you want to see reported for each calibration point, enter the calibrator's initials, and select Continue.

```
- NOTE
```

On 3-point and 5-point calibrations, the end points are fixed. Therefore, you only need to enter the mid point values.

👱 <0,TT101 >RTT20 (Foxcom) # N-Point Calibration 📃 🗖 🗙
N-Point Calibration
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.
Points Points Range: Desired Reading 1.
2. 3. 4. 5.
Cancel Continue <u>H</u> elp

Figure 12. Sample RTT20 N-Point Calibration Screen

- 4. Select **Continue** when you are ready to set input for Calibration Point 1.
- 5. Select **Continue** again when ready to set input to desired reading.
- 6. When the displayed measurement is stable for Calibration Point 1, select Continue again.
- 7. Repeat Steps 4 through 6 for each point.
- 8. Select **Continue** to save the calibration to the transmitter. The current calibration date is automatically displayed.
- 9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.
Custom Input Curve

The Custom Input Curve screen functions a little differently. If the **Points** field is 0, then the transmitter is using the factory installed calibration. If the number of points is 2 to 22, the transmitter uses the calibration data entered into the custom curve table.

- NOTE

Since it is not possible to leave the input calibration values in memory when performing a Custom Input Curve calibration, it is **strongly recommended** that the transmitter database be stored to a file prior to making drastic changes in the calibration data.

The procedure to input a custom curve is as follows:

- 1. Select Custom Input Curve from Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Select the number of points you want in your custom curve (2 22).

<0,TT101	>RTT20 (Foxc	om) # Custom Inj	out Curve		
Custom Curve]				
CAUTION- The device's cause a pro Press Contin	' s output will be modi cess upset. jue when the device	ified during this proce e is in manual mode,	edure. Leaving or Cancel to a) the control loop in a	utomatic may
0 <u>-</u> F	Points in the Custom	Calibration Curve	C	alibrator's Initials:	
Measuri 1. 0	ed Desired	Measured 9. 0	Desired 0	Measured	Desired 0
2. 0	0	10.	0	18.	
3.	0	11. 0	0	19.	0
4.	0	12. 0	0	20.	0
5. 0	0	13. 0	0	21. 0	0
6. 0	0	14.	0	22. 0	0
7. 0		15. 0	0	In Degrees:	
8. 0	Ju	16. Ju	0	Calibrated:	
	Cance	Continu	le	<u>H</u> elp	

Figure 13. Sample RTT20 Custom Input Curve Screen

If all the Measured/Desired fields are "0", then the number of points must be "0" prior to exiting the Custom Input Curve screen. If the number of points is not zero (2-22) and no measured/desired data is entered into the fields on the Custom Input Curve screen, the transmitter drives its output to whatever "0" means for that sensor. The transmitter does not respond to any change in input in this condition.

— NOTE -

The calibration data from any of the above calibration options is stored in the custom curve memory locations. Therefore, if you wish to view or change a specific data point, you can enter the custom curve selection and view, edit, or clear all values.

- 4. In the Measured column, enter the values the RTT20 displays now; in the Desired column, enter the values you want displayed. For example, if a Measured value was 100.00 but you wanted 100.25, enter 100.00 as the Measured number and 100.25 as the Desired number.
- 5. Enter the calibrator's initials and select Continue. The current calibration date is automatically displayed.
- 6. Select Continue to save the custom curve to the RTT20 transmitter.
- 7. Follow the prompt to put the device back into Automatic mode. Press **Continue** to resume dynamic measurements.

ReRange

This function enables you to rerange your device without applying inputs representing temperatures. The procedure to do this is as follows:

- 1. Select ReRange from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Enter your desired Lower Range Value (LRV) and Upper Range Value (URV) and select Continue.

Device Rerange CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.		
Range Settings		
Lower Range Value (4mA):		
Upper Range Value (20mA):		
Range Limits:		
Cancel Continue <u>H</u> elp		

Figure 14. Sample RTT20 ReRange Screen

- 4. Select Continue to save the new custom curve to the RTT20 transmitter.
- 5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Factory

This function restores the mA calibration factory settings. The procedure to do this is as follows:

- 1. Select Restore Factory from the Commands menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. To reconfirm that you want to restore the mA calibration factory settings, select **Continue**. The Factory Calibration is restored and the calibration date automatically changes.

🛃 <0,TT101 >RTT20 (Foxcom) # Restore Factory 📃 🗖	×
Restore Factory Calibration	,]
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.	
Calibrator's Initials:	
Calibrated:	
Cancel Continue <u>H</u> elp	

Figure 15. Sample RTT20 Restore Factory Calibration Screen

- 4. Enter the calibrator's initials and select Continue.
- 5. Follow the prompt to put the transmitter back into Automatic mode. Select Continue to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Measure screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

- NOTE

Before performing a mA Calibration, perform the N-Point Calibration procedure described on page 35. A mA calibration may no longer be necessary.

The procedure to perform a mA Calibration is as follows:

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 2. Select mA Calibration from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Select 4 mA Output.

mA Calibration			
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.			
Calibrate:			
	Step Size: 0	m4	λ
C 20mA Output	Cumulative	0	mΑ
		Ŀ	≥pply
Cancel	Continue	<u>H</u> elp	

Figure 16. Sample RTT20 mA Calibration Screen (FoxCom Device)

- 5. Set Step Size from menu (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5), and select Apply.
- 6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen.
- 7. Select 20 mA Output.
- 8. Repeat Steps 4 and 5. When finished, select Continue.
- 9. The screen then displays the adjustments. To accept this change, select Continue.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

<u> </u>	TT101 >RTT20) (Foxcom) # Parame	eter	<u>- 🗆 ×</u>
Identi	ifier Input Optior	ns Display		
	Device :	RTT20	Date of Manufacture : 1/24/2000	
	Serial Number :	016	Last Calibration : 6/4/2002	
	Firmware Version :	3.00		
	Tag Number :	TT101	Device Name : DevNam	
	Tag Name :	Process Temp	Location : M+I Booth	
	ave Save ar	Download Can	cei	

Figure 17. Sample RTT20 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the default transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Input Tab Screen

📭 <0,TT101 >RTT20 (Foxcom) # Parameter
Identifier Input Options Display
Sensor Configuration Sensor Type Input Config: PT100 DIN 751 ThermoCouple Wire Type: Linearization: Normal
C Special Input 2 Wire Dual Calculation:
Measurement
Lower Range Value: 0.00 Lower Range Limit: -200.00
Upper Range Value: 100.00 Upper Range Limit: 850.00
Measurement Units: C Secondary Measurement Units: C
Cold Junction
Cold Junction Configuration: Internal Sensor
Save Save and Download Cancel

Figure 18. Sample RTT20 Input Tab Screen

Field	Entry
Sensor Type	Select RTD Sensor, ThermoCouple, or Special Input.
Input Config.	Select from menu of input types.
Wire Type	For RTDs, select from menu of wire types.
Linearization	Select Normal or Dewpoint.
2-Wire Dual Calculation	For 2-Wire Dual RTD, select Redundant, Average, or Difference.
Measurement	
Lower Range Limit	Shows value of Lower Range Limit of transmitter.
Upper Range Limit	Shows value of Upper Range Limit of transmitter.
Lower Range Value	Enter value at which transmitter outputs 4 mA.
Upper Range Value	Enter value at which transmitter outputs 20 mA.
Measurement Units	Select from menu of units.
Secondary Measurement Units	Select from menu of units.
Cold Junction	
Cold Junction Configuration	For thermocouples, select Internal Sensor, External Sensor, Fixed Value, or Disabled.

Options Tab Screen

	com) # Parameter		
Identifier Input Options Dis	play		
Output Mode Analog (4-20) Digital	Analog Output Failsafe ✓ Failsafe On Range: ○ 3.6 - 3.8 (Downscale) ○ 20.75 - 23.0 (Upscale) ✓alue: 21.0000		
 Fault Detection On Damping: 0.0 seconds Sensor Validation: 0.5000 Intelligent Smoothing: 10.000 	Power Supply Frequency 50 Hz © 50 Hz © 60 Hz O High Speed		
Save Save and Download Cancel			

Figure 19. Sample RTT20 Options Tab Screen

Field	Entry
Output Mode	Select Analog (4 - 20 mA) or Digital.
Fault Detection On	= On; Blank = Off.
Analog Output Failsafe	
Failsafe On	= Failsafe On; Blank = Failsafe Off.
Range	If Failsafe is On, select 3.6-3.8 (Downscale) or 20.75-23.0 (Upscale).
Value	Enter value within range selected.
Damping	Select one of nine choices from No Damping to 32 seconds.
Sensor Validation	Enter value between 0.25 and 10 seconds.
Intelligent Smoothing	Enter value between 0 and 30 seconds.
Power Supply	
Frequency	Select 50 or 60 Hz.
Filter	Select Standard or High Speed.

Display Tab Screen

 <0,TT101 >I 	RTT20 (Foxcom) #	Parameter		<u>- 🗆 ×</u>
Identifier Input	Options Display			1
Display				
Type of Displ	ay Installed: Three I	Line		
Pushbutto	on Enable	Top Line Display:	EGU 💌	
Language:	English 💌	Bottom Line Label:	FOXBORO	
Save	ave and Download	Cancel		

Figure 20. Sample RTT20 Display Tab Screen

Field	Entry
Type of Display Installed	Shows None, One Line or Three Line indicator installed.
Pushbutton Enable	= Enabled; Blank = Disabled.
Language	Select English, French, German, or Spanish.
Top Line Display	Select from menu (EGU, Percent of Range, mA, EGU and Percent, or EGU and mA).
Bottom Line Label	If three-line display, enter maximum of seven characters.

4. IMT25 and IMT25L Magnetic Flow Transmitters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with IMT25 Magnetic Flow Transmitters with FoxCom communication protocol. Additional information about these transmitters and FoxCom communication is contained in the following documents.

- B0193XXChecklist for FoxCom Measurement Integration
- MI 021-390Operation, Calibration, and Configuration

Measure Screen

<0,Tag Numbe	r >II	МТ25 (Гохс	om) # Me	easure	<u>_ 0 ×</u>
Tag Number	:	Tag Number	r	Device Type :	IMT25 (Rev: 2.02)
Tag Name	:	Matt		Device Name :	Device
Location	:	N04-3B		Model Code :	IMT25-PDADB10N-A
Raw Flow	:	0.0	GPM	Forward Total :	OFF
Percent Range	:	0.0000	%	Reverse Total :	OFF
Pulse Total	:	Not Active	%Pulse	Net Total :	OFF
mA Equivalent	:	In digital	mΑ	Grand Total :	OFF

Figure 21. Sample IMT25 Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 6.

Message	Explanation	Recommended Action			
Primary Status Fields					
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.			
Init Required	Initializing is required.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.			
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Codes to determine problem and corrective action.			
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.			
Secondary Status Fi	elds				
Signal Lock Off	External contact is off.	Set by user; no action required.			
Error in Startup	Transmitter cannot exit its boot code.	Cycle power. If the problem persists, service is required.			
Empty Tube Error	Pipe is empty.	See "Empty Pipe Detection" in MI 021-390.			
Electrode Error	Unreliable measure- ment of electrode voltage.	See Extended Status - Hardware below.			
Coil Error	Unreliable measure- ment of coil current.	See Extended Status - Hardware below.			
Extended Status - Ha	ardware				
Coils					
Coil Low	Transmitter unable to	Check coil wiring at flowtube and transmitter.			
Coil High	generate a reliable	Service is required.			
Coil Unstable	current.	Cycle power. If the problem persists, service is required.			
Positive Coil Needed		Check wiring and flowtube coil.			
Negative Coil Needed					
Empty Pipe					
Unable to Calibrate	Unable to calibrate.	Verify that piping is full. Check flowtube and transmitter wiring.			
EPD Calibration Failed	Error during calibration.	Verify that EPD parameter is turned on.			
Electrodes					
Electrode Low	Transmitter unable to	Check signal wiring between flowtube and transmitter. Also see			
Electrode High	generate a reliable	MI 021-391.			
Electrode Unstable	electrode voltage.				
Positive Electrode Needed					
Negative Electrode Needed					
Setup	•				
MultiRange Setup	Setup needed.	Check that Configuration and Contact Inputs 1 and 2 are set up properly.			

Table 6. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Extended Status - Pr	rocess	
Process Problems		
Signal Lock	Signal lock is on.	Check that Contact Inputs 1 and 2 are activated by an external set of contacts or switch.
Pulses Lag Total	Totalizer putting out pulses at the maximum rate but falling behind the actual total.	Reconfigure totalizer display so that each pulse represents a larger volume.
Total Rollover	Total exceeds limit of configured format.	Reconfigure total format if necessary and reset totals.
A to D Calibration Failed	Electronics problem.	Service is required.
Alarms	·	
High Flow	Flow above configured high flow rate.	Make process change or reconfigure alarm setpoint.
Low Flow	Flow below configured low flow rate.	
High Forward Total 1	Total above configured High Fwd Tot 1.	Make process change or reconfigure Tot Alm Setpt and reset totals.
High Forward Total 2	Total above configured High Fwd Tot 2.	
Empty Pipe	Transmitter thinks pipe is insufficiently full to make measurements.	Make process change or, if not empty, check wiring and recalibrate.

Table 6. Transmitter Status Error Messages (Continued)

Calibration

You can perform the following calibration procedures on an IMT25 transmitter using the PC50 Field Device Tool:

- ♦ mA Output
- Reset Totals
- ♦ Empty Pipe.

The calibration procedures are accessed as follows:

Device > Additional functions > Adjust set value

Empty Pipe

The empty pipe detector can be used to force the transmitter outputs to stay at zero when the flowtube is empty. The empty pipe circuit must be calibrated to the fluid in the flowtube. The flowtube must be full of process fluid (flowing or still) to use this calibration procedure. The calibration procedure leaves the empty pipe detector in the ON condition. The detector can be turned off in the Configuration menu.

- 1. Select Empty Pipe from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.

- 3. Fill the flowtube and then select **Continue** to start the Empty Pipe Calibration process.
- 4. Wait while the device is calibrating.
- 5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Output

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

The procedure to perform a mA Output Calibration on a FoxCom device is:

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 2. Select mA Output from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Select 4 mA Output.
- 5. Set the Step Size (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5), and select Apply.
- 6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
- 7. Select 20 mA Output.
- 8. Repeat Steps 4 and 5. When finished, select Continue.
- 9. The screen then displays the adjustments. To accept this change, select Continue.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

<0,Tag Number >IM	IT25 (Foxcom) # m	A Output	_ 🗆	×		
mA Calibration						
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.						
Calibrate:						
€ <u>4</u> mA Output	Step Size: 0	mA				
C 20mA Output	Cumulative	0	mA			
		App	ly			
Cancel	[Continue]	<u>H</u> elp				

Figure 22. Sample IMT25 mA Calibration Screen

Reset Totals

This procedure resets the transmitter totals. The Net, Forward and Reverse Totals are reset as a group. The Grand Total is individually reset.

- 1. Select Reset Totals from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Select the device total(s) to reset to zero. You can select Net, Forward, and Reverse Totals or Grand Total. Then select Continue.

😦 <0,Tag Number 🛛 >IMT25 (Foxcom) # Reset Totals 💦 📃 🗖	IX
Zero Total Calibration	
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.	
☐ Net, Forward, and Reverse Totals ☐ Grand Total	
Cancel Continue <u>H</u> elp	

Figure 23. Sample IMT25 Reset Totals Screen

4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

- NOTE ·

For IMT25L devices, some configuration parameters do not apply.

Identifier Tab Screen

	g Number >IMT	25 (Foxcom) # Paran	neter	
Identifier	Flow Alarms	Contacts Options D	isplay / Totalizer	
D)evice :	IMT25	Date of Manufacture : 1/15/1998	
s	Serial Number :	0000000	Last Calibration : 1/15/1998	
F	Firmware Version :	2.02		
Т	ag Number :	Tag Number	Device Name : Device	
Т	ag Name :	Matt	Location : N04-3B	
Save	Save and	Download Cance	1	

Figure 24. Sample IMT25 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Flow Tab Screen

🕞 <0,Tag Number >IMT25 (Foxcom) # Parameter	
Identifier Flow Alarms Contacts Options Display / Totalizer	
Flow Settings Engineering Units: GPM Custom Flow Rate Format: #######	-
Flow Direction: Positive Meter Factor: 12	
Analog and Pulse Rate Output Damping: 0.500 Sec	
Output Mode	
Digital UniDir UniDir	аРМ
C Analog (4-20mA): UniDir Upper Range Value 2: 200.00000	GPM
Upper Range Value 3: 300.00000 (GPM
Pulse Output Mode: Off Rate Max Frequency: 2000	Hz
Upper Range Value: 100.00000 GPM Total Max Frequency: 10	- Hz
Save Save and Download Cancel	

Figure 25. Sample IMT25 Flow Tab Screen

Field	Entry
Flow Settings	
Engineering Units	Select from menu of choices or Custom.
Flow Direction	Select Positive, Reverse, BiDir Positive, or BiDir Reverse.
Analog and Pulse Rate Output Damp	Enter damping response time from 0.0 to 99.9 seconds.
Flow Rate Format	Select from menu of eight choices.
Meter Factor	Enter "IMT25 Cal Fact" or "Cal Fact*" factor. See MI 021-390.
Output Mode	
Digital	Select UniDirectional or BiDirectional flow.
Analog	Select UniDirectional, Unidirectional Multi-Range, BiDirectional Dual Range, or BiDirectional Split Range.
Upper Range Values	Enter Upper Range Values in units shown.
Pulse Output	
Mode	Select Off, Pulse Rate, or Pulse Total.
Upper Range Value	If Pulse Rate mode, enter Pulse Out URV between minimum and maximum URV of the flowtube (not greater than 999999).
Rate Max Frequency	If Pulse Rate mode, select Rate Max Frequency of 1000, 2000, 5000, or 10000 Hz.
Total Max Frequency	If Pulse Total mode, select Total Max Frequency of 10 or 100 Hz.

Alarms Tab Screen

<0,Tag Number >IMT2	25 (Foxcom) # Paran	neter		
Identifier Flow Alarms	Contacts Options D	isplay / Totalizer		
For All Alarms				
Alarming Enabled		🔲 Blink On Alarm		
Clear Alarms Automatic	sally	Rate Output Response:	No Effect 🗾	
Alarm Display Definition—		1		1
High Flow Rate	Set Point: 100.0	GPM Deadbar	nd: J ^{1.0} GPM	
Low Flow Rate	Set Point: 1.0	GPM Deadbar	nd: 0.5 GPM	
High Forward Total 1	Set Point: 100000.0		T 0 40	
High Forward Total 2	Set Point: 1000000		Tum Un All	
Empty Pipe			Turn Off All	
Save Save and	Download Cance	:I		

Figure 26. Sample IMT25 Alarms Tab Screen

Field	Entry
For All Alarms	
Alarming Enabled	= On; Blank = Off.
Clear Alarms Automatically	= Auto; Blank = Manual.
Blink On Alarm	= Blink; Blank = Don't Blink.
Rate Output Response	Select No effect, Go Downscale, or Go Upscale.
Alarm Display Definition	
High Flow Rate	$\sqrt{1}$ = On; Blank = Off. If On, enter Set Point and Deadband.
Low Flow Rate	$\sqrt{1}$ = On; Blank = Off. If On, enter Set Point and Deadband.
High Forward Total 1	= On; Blank = Off. If On, enter Set Point.
High Forward Total 2	= On; Blank = Off. If On, enter Set Point.
Empty Pipe	= On; Blank = Off.
Turn On All	Turns all alarms on.
Turn Off All	Turns all alarms off.

Contacts Tab Screen

👡 <0,Tag Number 🕞	MT25 (Foxcom) # Paramet	er		<u> </u>			
Identifier Flow Ala	Identifier Flow Alarms Contacts Options Display / Totalizer						
Contacts Contact 1 Function:	Off	Contact 1 Operation:	Normally Open 💌				
Contact 2 Function:	Off	Contact 2 Operation:	Normally Open 💌				
Relay 1 Relay Function:	Off	Relay Operation:	Normally Open 🔽				
Relay Alarm:	High Rate	Suppress Relay	O Yes 💿 No				
Relay 2							
Relay Function:	Off	Relay Operation:	Normally Open 💌				
Relay Alarm:	Low Rate	Suppress Relay	🔿 Yes 💿 No				
Save Save	and Download Cancel]					

Figure 27. Sample IMT25 Contacts Tab Screen

Field	Entry	
Contacts		
Contact 1 Function	Select Off, Ack Alarm, Reset Net Total, Reset Gr Total, Reset All Total, Multi-range, or Signal Lock.	
Contact 1 Operation	If Contact 1 Function is not Off, select Normally Open or Normally Closed.	
Contact 2 Function	Similar to Contact 1 Function.	
Contact 2 Operation	Similar to Contact 1 Operation.	
Relay 1		
Relay Function	Select Off, Alarm, Alarm & Diag, Diagnostics, Flow Direction, or Test Mode.	
Relay Alarm	If Relay Function is not Off, select High Rate, Low Rate, High Forward Total 1, High Forward Total 2, Empty Pipe, or Any Alarm.	
Relay Operation	If Relay Function is not Off, select Normally Open or Normally Closed.	
Suppress Relay	If Relay Function is not Off, select Yes to suppress reactivation of an alarm or No for no suppression.	
Relay 2 (Similar to Relay 1)		

Options Tab Screen

nee <0,Tag Number >IMT25 (Foxcom) # Parameter	- D ×
Identifier Flow Alarms Contacts Options Display / Totalizer	
Tube Identification	
Model Code: TUBEMS Serial Number: TUBES/N	
Diagnostics	
Rate Response Diagnostics: Go Downscale 💌 🔽 Blink On Diagnostic Error	
Functional Security at the Device Keypad	
Enable Passcode 1 to Protect: Setup Passcode 1: 800	
Enable Passcode 2 to Protect: Totals Reset Passcode 2: 800	
Noise Reduction Line Frequency: 60 Hz	
Empty Pipe Detection Empty Pipe Effect: No Eff To Output	
Save Save and Download Cancel	

Figure 28. Sample IMT25 Options Tab Screen

Field	Entry
Tube Identification	
Model Code	Enter model code of flowtube.
Serial Number	Enter serial number of flowtube.
Diagnostics	
Rate Response Diagnostics	Select Go Downscale or Go Upscale.
Blink On Diagnostic Error	= Blink; Blank = Don't Blink.
Functional Security at the IMT25	Keypad (not applicable to HART device)
Enable Passcode 1	= Enable; Blank = Disable. If enabled, select Setup, Totals Reset, Setup & Totals, Test Mode, Test Mode & Setup, Test Mode and Totals, or Test Mode, Setup & Totals. Then enter 4 digit passcode.
Enable Passcode 2	Similar to Enable Passcode 1.
Noise Reduction	= On; Blank = Off.
Empty Pipe Detection	= On; Blank = Off.
Line Frequency	Select 50 Hz or 60 Hz.
Empty Pipe Effect	Select No Effect or Auto Signal Lock.

Display/Totalizer Tab Screen

ng <0,Tag Number >IMT25 (Foxcom) # 1	Parameter	- 🗆 🗙
Identifier Flow Alarms Contacts Option	ns Display / Totalizer	
Display Preferences		
Dual Display On	Default Display On Power Up: Rate EGU	
Display Line 1: Rate EGU 💌	Flow Display Damping: 0.5 Sec	
Display Line 2: Rate EGU		
- Totals-		
Totals On: 🔲 Reset all totals, do not a	ccumulate or display them.	
Totalizer Units: Gal 💌 Custom	Format for Grand Total : 🛛 🗰 🗐	
Format for Forwa	ard, Reverse, and Net Totals: 🛛 🗮 📰 💌	
Total Flow Needed to Trigger a Pulse:	1.00 Gal	
Save Save and Download	Cancel	

Figure 29. Sample IMT25 Display/Totalizer Tab Screen

Field	Entry
Display Preferences	
Dual Display On	= On; Blank = Off.
Display Line 1	If Dual Display On is checked ($$), select from menu of six choices.
Display Line 2	If Dual Display On is checked ($$), select from menu of six choices.
Default Display	Select from menu of seven choices.
Flow Display Damping	Enter damping response time for local display between 0.00 and 99.9 seconds.
Totals	
Total On	= On; Blank = Off.
Totalizer Units	If Totalizer On is checked ($$), select Gal, Lit, or Custom.
Format for Grand Total	If Totalizer On is checked ($$), select from menu of eight choices.
Format for Forward, Reverse, and Net Totals	If Totalizer On is checked ($$), select from menu of eight choices.

5. IMT96 Magnetic Flow Transmitters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with IMT96 Magnetic Flow Transmitters with FoxCom communication protocol. Additional information about these transmitters and FoxCom communication is contained in the following documents.

- B0193XXChecklist for FoxCom Measurement Integration
- MI 021-403Operation, Calibration, and Configuration.

Measure Screen

<0,Matt's Dem	io >)	ІМТ96 (Гохс	om) # M	easure	
Tag Number	:	Matt's Demo)	Device Type :	IMT96 (Rev: 2.01)
Tag Name	:	Great Northe	ern	Device Name :	DevNam
Location	:	Mlkt		Model Code :	IMT96-PEADB10Z-A
Raw Flow	:	174.9	GPM	Forward Total :	OFF
Percent Range	:	87.3906	%	Reverse Total :	OFF
Pulse Total	:	Not Active	%Pulse	Net Total :	OFF
mA Equivalent	:	******	mΑ	Grand Total :	OFF

Figure 30. Sample IMT96 Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 7.

Message	Explanation	Recommended Action				
Primary Status F	Primary Status Fields					
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.				
Init Required	Initializing is required.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.				
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Codes to determine problem and corrective action.				
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.				
Secondary Statu	s Fields					
Signal Lock Off	External contact is off.	Set by user; no action required.				
Startup Test	Transmitter cannot exit its boot code.	Cycle power. If the problem persists, service is required.				
Electrode Test	Unreliable measure- ment of electrode voltage.	See Extended Status - Hardware below.				
Coil Test	Unreliable measure- ment of coil current.	See Extended Status - Hardware below.				
Extended Status	- Hardware					
Coils						
Low Coil Current Test	Transmitter unable to generate a reliable	Check coil wiring at flowtube and transmitter.				
High Coil Current Test	measurement of coil current.	Service is required.				
Positive Coil Test		Check wiring and flowtube coil.				
Negative Coil Test						
Electrodes		•				
Electrode in Range Test	Transmitter unable to generate a reliable	Check signal wiring between flowtube and transmitter. Also see MI 020-391.				
Positive Electrode Test	measurement of electrode voltage.					
Negative Electrode Test						
Setup		•				
MultiRange Setup	Setup needed.	Check that Configuration and Contact Inputs 1 and 2 are set up properly.				
Extended Status	- Process					
Process Proble	ems					
Signal Lock Test	Signal lock is on.	Check that Contact Inputs 1 and 2 are activated by an external set of contacts or switch.				

Table 7. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Pulses Lag Total Test	Totalizer putting out pulses at the maximum rate but falling behind the actual total.	Reconfigure totalizer display so that each pulse represents a larger volume.
Total Rollover Test	Total exceeds limit of configured format.	Reconfigure total format if necessary and reset totals.
A to D Calibration Test	Electronics problem.	Service is required.
Alarms		
High Flow	Flow above configured high flow rate.	Make process change or reconfigure alarm setpoint.
Low Flow	Flow below configured low flow rate.	
High Forward Total 1	Total above configured High Fwd Tot 1.	Make process change or reconfigure Tot Alm Setpt and reset totals.
High Forward Total 2	Total above configured High Fwd Tot 2.	

Table 7. Transmitter Status Error Messages (Continued)

Calibration

You can perform the following calibration procedures on an IMT96 transmitter using the PC50 Field Device Tool:

- ♦ Zero Flow Calibration
- Restore Zero Flow Default.
- Reset Totals
- ♦ mA Output

The calibration procedures are accessed as follows:

Device > Additional functions > Adjust set value

Zero Flow Calibration

This procedure causes the device to rezero the measurement when zero flow is in the flowtube.

- 1. Select Zero Flow Calibration from the Adjust set value menu or the Zero Flow icon from the device toolbar.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Select Continue when zero flow is present in the flowtube.
- 4. Wait while the device is zeroing.
- 5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Zero Flow Default

This procedure restores the factory zero setting.

- 1. Select Restore Zero Flow Default from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Wait while the factory zero setting is restored.
- 4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Reset Totals

This procedure resets the transmitter totals. The Net, Forward and Reverse Totals are reset as a group. The Grand Total is individually reset.

- 1. Select Reset Totals from the Adjust set value menu or the Reset Totals icon from the device toolbar.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Select the device total(s) to reset to zero. You can select Net, Forward, and Reverse Totals or Grand Total. Then select Continue.

- 22	<0,Matt's Demo >IMT96 (Foxcom) # Reset Totals	(
[Zero Total Calibration				
	CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.				
	Net, Forward, and Reverse Totals 🗖 Grand Total				
	Cancel Continue <u>H</u> elp				

Figure 31. Sample IMT96 Reset Totals Screen

4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Output

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

The procedure to perform a mA Output Calibration is:

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 2. Select mA Output from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Select 4 mA Output.
- 5. Set the Step Size (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5), and select Apply.
- 6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
- 7. Select 20 mA Output.
- 8. Repeat Steps 4 and 5. When finished, select Continue.
- 9. The screen then displays the adjustments. To accept this change, select Continue.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

	<0,Matt's Demo >IMT96 (Foxcom) #	f mA Output			
ſ	mA Calibration				
	CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.				
	Calibrate:				
	💿 4mA. Output Step Size: 🛛	mA			
	C 20mA Output Cumulative	0 mA			
		Apply			
	Cancel [Continue]	Help			

Figure 32. Sample IMT96 mA Calibration Screen

Configuration

Identifier Tab Screen

<u> </u>	Matt's Demo >IM	T96 (Foxcom) # Para	meter	
Identi	ifier Flow Alarms	Contacts Options [Display / Totalizer	
	Device :	IMT96	Date of Manufacture : 4/6/1999	
	Serial Number :	99111312	Last Calibration : 4/6/1999	
	Firmware Version :	2.01		
	Tag Number :	Matt's Demo	Device Name : DevNam	
	Tag Name :	Great Northern	Location : Mikt	
S	ave Save and	d Download Cance	el	

Figure 33. Sample IMT96 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Flow Tab Screen

📭 <0,Matt's Demo >IMT96 (Foxcom) # Parameter	
Identifier Flow Alarms Contacts Options Display / Totalizer	
Flow Settings	
Flow Direction: Positive Meter Factor: 11.0846	
Analog and Pulse Rate Output Damping: 3.000 Sec	
Output Mode	
C Digital UniDir UniDir UniDir C Digital UniDir C Digital UniDir C Digital C DiDigital C Digital C DiDigital C Didital C Digital C Digital C Digit	
C Analog (4-20mA): UniDir UniDir Upper Range Value 2: [200.00000 GPM Upper Range Value 3: [300.00000 GPM	
Pulse Output	
Mode: Off Rate Max Frequency: 2000 Hz	
Upper Range Value: 100.00000 GPM Total Max Frequency: 10 💌 Hz	
Save Save and Download Cancel	

Figure 34. Sample IMT96 Flow Tab Screen

Field	Entry	
Flow Settings		
Engineering Units	Select from menu of choices or Custom.	
Flow Direction	Select Positive, Reverse, BiDir Positive, or BiDir Reverse.	
Analog and Pulse Rate Output Damp.	Enter damping response time from 0.0 to 99.9 seconds.	
Flow Rate Format	Select from menu of eight choices.	
Meter Factor	Enter the "IMT96 Cal Fact" factor or see MI 021-412.	
Output Mode		
Digital	Select UniDirectional or BiDirectional flow.	
Analog	Select UniDirectional, Unidirectional Multi-Range, BiDirectional Dual Range, or BiDirectional Split Range.	
Upper Range Values	Enter Upper Range Values in units shown.	
Pulse Output		
Mode	Select Off, Pulse Rate, or Pulse Total.	
Upper Range Value	If Pulse Rate Mode, enter Pulse Out URV between minimum and maximum URV of the flowtube (not greater than 999999).	
Rate Max Frequency	If Pulse Rate Mode, select Rate Max Frequency of 1000, 2000, 5000, or 10000 Hz.	
Total Max Frequency	If Pulse Total Mode, select Total Max Frequency of 10 or 100 Hz.	

Alarms Tab Screen

<0,Matt's Demo >IMT9	16 (Foxcom) # Para	meter				_ 🗆 🗙
Identifier Flow Alarms	Contacts Options I	Display / To	talizer			_
For All Alarms						
🗖 Alarming Enabled		🔲 Blink C	In Alarm			
Clear Alarms Automatic	ally	Rate Outp	ut Response:	No Effect	~	
Alarm Display Definition		-				
High Flow Rate	Set Point: 100.0	GPM	Deadband	: [1.0	GPM	
Low Flow Rate	Set Point: 0.0	GPM	Deadband	: 0.5	GPM	
High Forward Total 1	Set Point: 100000.0	1		-		
High Forward Total 2	Set Point: 1000000	Ī		_	umonAii	
					Furn Off All	
Save Save and D)ownload Canc	el				

Figure 35. Sample IMT96 Alarms Tab Screen

Field	Entry
For All Alarms	
Alarming Enabled	= On; Blank = Off.
Clear Alarms Automatically	= Auto; Blank = Manual.
Blink On Alarm	= Blink; Blank = Don't Blink.
Rate Output Response	Select No effect, Go Downscale, or Go Upscale.
Alarm Display Definition	
High Flow Rate	= On; Blank = Off. If On, enter Set Point and Deadband.
Low Flow Rate	$\sqrt{1}$ = On; Blank = Off. If On, enter Set Point and Deadband.
High Forward Total 1	= On; Blank = Off. If On, enter Set Point.
High Forward Total 2	$\sqrt{1}$ = On; Blank = Off. If On, enter Set Point.
Turn On All	Turns all alarms on.
Turn Off All	Turns all alarms off.

Contacts Tab Screen

	<0,Matt's Demo >I	IMT96 (Foxcom) # Paramet	ter		<u> </u>
lo	Jentifier Flow Alar	rms Contacts Options Displ	ay / Totalizer		
ſ	- Contacts				
	Contact 1 Function:	Off	Contact 1 Operation:	Normally Open 💌	
	Contact 2 Function:	Off	Contact 2 Operation:	Normally Open 💌	
	- Relay 1				
	Relay Function:	Off	Relay Operation:	Normally Open 💌	
	Relay Alarm:	Low Rate	Suppress Relay	O Yes 💿 No	
[- Relay 2				
	Relay Function:	Off	Relay Operation:	Normally Open 💌	
	Relay Alarm:	Low Rate	Suppress Relay	O Yes 💿 No	
	Save Save	and Download Cancel			

Figure 36. Sample IMT96 Contacts Tab Screen

Field	Entry
Contacts	
Contact 1 Function	Select Off, Ack Alarm, Reset Net Total, Reset Gr Total, Reset All Total, Multi-range, or Signal Lock.
Contact 1 Operation	If Contact 1 Function is not off, select Normally Open or Normally Closed.
Contact 2 Function	Similar to Contact 1 Function.
Contact 2 Operation	Similar to Contact 1 Operation
Relay 1	
Relay Function	Select Off, Alarm, Alarm & Diag, Diagnostics, Flow Direction, or Test Mode.
Relay Alarm	lf Relay Function is not off, select High Rate, Low Rate, High Forward Total 1, High Forward Total 2, or Any Alarm.
Relay Operation	If Relay Function is not off, select Normally Open or Normally Closed.
Suppress Relay	If Relay Function is not off, select Yes to suppress reactivation of an alarm or No for no suppression.
Relay 2 (Similar to Relay 1)	

Options Tab Screen

📭 <0,Matt's Demo >IMT96 (Foxcom) # Parameter	- 🗆 🗵
Identifier Flow Alarms Contacts Options Display / Totalizer	
Tube Identification	
Model Code: TUBEMS Serial Number: TUBES/N	
Diagnostics Bate Besponse Diagnostics: Go Downscale V Blink On Diagnostic Error	
Functional Security at the Device Keypad	
Enable Passcode 1 to Protect: Setup Passcode 1: 0	
Enable Passcode 2 to Protect: Totals Reset Passcode 2: 0	
✓ Noise Reduction Line Frequency: 60 ✓ Hz	
Save Save and Download Cancel	

Figure 37. Sample IMT96 Options Tab Screen

Field	Entry	
Tube Identification		
Model Code	Enter model code of flowtube.	
Serial Number	Enter serial number of flowtube.	
Diagnostics		
Rate Response Diagnostics	Select Go Downscale or Go Upscale.	
Blink On Diagnostic Error $$ = Blink; Blank = Don't Blink.		
Functional Security at the IMT96	Keypad	
Enable Passcode 1	= Enable; Blank = Disable. If Enabled, select Setup, Totals Reset, Setup & Totals, Test Mode, Test Mode & Setup, Test Mode and Totals, or Test Mode, Setup & Totals. Then enter 4 digit passcode.	
Enable Passcode 2	Similar to Enable Passcode 1.	
Noise Reduction	= On; Blank = Off.	
Line Frequency	Select 50 Hz or 60 Hz.	

Display/Totalizer Tab Screen

👡 <0,Matt's Demo >IMT96 (Foxcom) # Parameter	
Identifier Flow Alarms Contacts Options Display / Totalizer	
Display Preferences Dual Display On Default Display On Power Up: Bate EGU	
Display Line 1: Rate EGU 🔽 Flow Display Damping: 7.0 Sec	
Display Line 2: Rate EGU	
Totals	
Totals On: 🔲 Reset all totals, do not accumulate or display them.	
Totalizer Units: Gal 💌 Custom Format for Grand Total : ###################################	
Format for Forward, Reverse, and Net Totals: ####################################	
Total Flow Needed to Trigger a Pulse: 1.00 Gal	
Save Save and Download Cancel	

Figure 38. Sample IMT96 Display/Totalizer Tab Screen

Field	Entry		
Display Preferences			
Dual Display On	= On; Blank = Off.		
Display Line 1	If Dual Display On is checked ($$), select from menu of six choices.		
Display Line 2	If Dual Display On is checked ($$), select from menu of six choices.		
Default Display	Select from menu of seven choices.		
Flow Display Damping	Enter damping response time for local display between 0.00 and 99.9 seconds.		
Totals			
Total On	= On; Blank = Off.		
Totalizer Units	If Totalizer On is checked ($$), select Gal, Lit, or Custom.		
Format for Grand Total	If Totalizer On is checked ($$), select from menu of eight choices.		
Format for Forward, Reverse, and Net Totals	If Totalizer On is checked ($$), select from menu of eight choices.		

6.83 Series Vortex Flowmeters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with 83 Series Vortex Flowmeters with FoxCom communication protocol. Additional information about these transmitters and FoxCom communication is contained in the following documents.

- B0193XXChecklist for FoxCom Measurement Integration
- MI 019-19483F and 83W Installation, Configuration, Troubleshooting and Maintenance.
- MI 019-19583S Installation, Configuration, Troubleshooting and Maintenance.

Measure Screen

<mark>_</mark> <0,TAGNUM>Vortex (Foxc	om) # I	Measure	
Tag Number : TAGNUM		Device Type :	VORTEX
Tag Name : 2"		Device Name :	FT001
Location : D0922 B52-	АА	Model Code :	83W-D02SIKFTJZ-
Flow Measurement	:	0.00	USgpm
Total Measurement	:	0.54	USgal
Device Temperature	:	22.82	С
		73.08	F
mA Equivalent	:	4.00	mA

Figure 39. Sample Vortex Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 8 and of diagnostic error messages in Table 9.

Status Error Messages

Message	Explanation	Recommended Action			
Primary Status Fiel	Primary Status Fields				
Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, cycle power and if necessary replace the electronic module.			
Init Required	Transmitter is re- initializing on reset.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, cycle power and if necessary replace the electronic module.			
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Error Messages to determine problem and corrective action.			
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.			
Secondary Status F	Secondary Status Fields				
Device Busy	Set if EEPROM write is in progress and pending.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, cycle power and if necessary replace the electronic module.			
Bad Message Received	Transmitter received a bad message.	Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, cycle power and if necessary replace the electronic module.			
Electronics Error	Electronics cannot calculate correct flow.	Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, cycle power and if necessary replace the electronic module.			
Sensor Output High					
Temp Out of Range	Transmitter temperature is less than -40°C or higher than 80°C.	Check ambient and process temperature.			
Diagnostic Error Messages

Code	Error Message	Recommended Action
02	ROM Checksum Error	Replace electronic module.
03	EEPROM Chksum Err	If this does not clear problem, replace electronic module.
04	RAM Error	Replace electronic module.
0A	Flowrate Math Error	Check transmitter database and correct any problems. If problem persists, replace electronic module.
0C	Sensor Elec Failure	Cycle power. If problem persists, replace electronic module.
0E	Core Failure	Cycle power. If problem persists, replace electronic module.
2F	Offline Cfg Write Error	Take transmitter off-line, modify a parameter or mode, change parameter or mode back to previous value and place transmitter on- line.
10	Core Failure	Cycle power. If problem persists, replace electronic module.
28	Xmtr Temp Low	Check process temperature.
29	Xmtr Temp High	Check process temperature.

Table 9. Diagnostic Error Messages

Calibration

You can perform the following calibration procedures on a Vortex Flowmeter using the PC50 Field Device Tool:

- Set Low Flow Cut-In
- ♦ Re-Range
- ♦ Zero Total
- mA Calibration.

The calibration procedures are accessed as follows:

Device > Additional functions > Adjust set value

Set Low Flow Cut-In

This function permits you to set the low flow cut-in level for the transmitter. You can also set a manual low flow cut-in level. To execute the operation, use the following procedure:

- 1. Select Low Flow Cut-In from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual control mode and select Continue.
- 3. For a FoxCom device, select the desired Low Flow Cut-In value or select Automatic to set low flow cut-in to lowest setting with no false signal detected under no flow conditions. Select Continue when done. For a HART device, select Increment or Decrement to obtain the desired Low Flow

Cut-In value or select Automatic to set low flow cut-in to lowest setting with no false signal detected under **no flow** conditions. Select Continue when done.

- NOTE

Before selecting Automatic, it is important that flow be stopped.

🚤 <0,TAGNUM>Vortex (Foxcom) # Set Low Flow Cutin 📃 🔲 🗙			
Low Flow Cut-In Selection			
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.			
Low Flow Cut-In: Automatic			
Cancel Continue <u>H</u> elp			

Figure 40. Sample Vortex Low Flow Cut-In Screen

- 4. Wait while the new Low Flow Cut-In value is set.
- 5. Follow the prompt to put the device back into Automatic control mode. Select **Continue** to resume dynamic measurements.

Re-Range

This function permits you to change the Flow Upper Range Value (URV).

- 1. Select ReRange from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual control mode and select Continue.
- 3. To re-range to another input span, enter the desired upper range value and select Continue.
- 4. Select Continue again to save the new range to the device.
- 5. Follow the prompt to put the device back into Automatic control mode. Select Continue to resume dynamic measurements.

💶 <0,TAGNUM>Vortex (Foxcom) # Re-Range
Device Rerange
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.
Range Settings
Upper Range Value:
Valid URV Range:
Cancel Continue <u>H</u> elp

Figure 41. Sample Vortex Re-Range Screen

Zero Total

This function permits you to reset the transmitter total to zero. The procedure follows:

- 1. Select Zero Total from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual control mode and select Continue.
- 3. Select Continue again to reset the transmitter total measurement to zero.
- 4. Follow the prompt to put the device back into Automatic control mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

The procedure to perform a mA Calibration is:

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 1. Select mA Calibration from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual control mode and select Continue.
- 3. Select 4 mA Output.
- 4. Set the Step Size from the menu (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5), and select Apply.
- 5. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
- 6. Select 20 mA Output.
- 7. Repeat Steps 4 and 5. When finished, select Continue.
- 8. The screen then displays the adjustment. To accept this change, select Continue.
- 9. Follow the prompt to put the device back into Automatic control mode. Select **Continue** to resume dynamic measurement.

😦 <0,TAGNUM>¥ortex (Foxcom) # mA Calibration			
mA Calibration		1	
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.			
Calibrate:			
€ <u>4</u> mA Output	Step Size: 0 mA		
C 20mA Output	Cumulative 0 mA		
	Apply		
Cancel	<u>Continue</u> <u>H</u> elp		

Figure 42. Sample Vortex mA Calibration Screen

Configuration

Identifier Tab Screen

	🖕 <0,TAGNUM>Vortex (Foxcom) # Parameter				
Identifi	ier Flow Parameter	s Options and Piping			
[Davias		Data of Manufacture :	2,20,4000	
	Device :	VUNIEA	Date of Manufacture .	3/20/1336	
	Serial Number :		Last Calibration :	5/31/1988	
	Firmware Version :	2.01			
ſ					
	Tag Number :	TAGNUM	Device Name : FT001		
	Tag Name :	2"	Location : D0922	2 B52-AA	
L					
Save Save and Download Cancel					

Figure 43. Sample Vortex Flowmeter Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name Enter maximum of 14 characters. Optional, used for reference only.	
Device Name	Enter maximum of 6 characters with a FoxCom device. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only with FoxCom device.

Flow Parameters Tab Screen

Identifier Flow Parameters Options and Piping			
Flow Meter Model: 3W-D02SIKFTJZ-T Reference K-Factor : 258.00 p/ft3			
Meter Serial Number:			
Measurement			
Fluid Type : Liquid Heasurement Units : USgpm Cus	stom		
Upper Range Limit : 232.7 USgpm Upper Range Value : 15.58 USg	gpm		
Low Flow Correct : Off US	gpm		
Flowing Parameters			
Temperature : 70.0000 *F Viscosity : 0.9753 C cstoke			
Density : 62.30 lb/ft3 Base Density : 1.000E-004 lb/ft3 © En	ase Iglish		
K-Factor : 34.490 USgal Added K Bias : 0.00 % C Me	etric		
Save and Download Cancel			

Figure 44. Sample Vortex Flow Parameters Tab Screen

Field	Entry
Flow Meter (Sensor) Model	Enter Model Number.
Reference K-Factor	Enter Reference K-Factor.
Meter Serial Number	Shows Serial Number (if HART device).
Measurement	
Fluid Type	Select Liquid, Gas, or Steam.
Upper Range Limit	Shows value of Upper Range Limit of the flowmeter.
Low Flow Correct	Specify On or Off.
Measurement Units	Select from menu of flow units or select Custom to enter user-configured units.
Upper Range Value	Enter Upper Range Value in measurement units shown.
Low Flow Cut-In	Select from menu of values.
Flowing Parameters	
Temperature	Enter temperature in units shown.
Density	Enter density in units shown. Defaults are Liquid: 62.30, Gas: 0.5858, and Steam: 0.2992 lb/ft ³ .
K-Factor	Shows K-Factor in units shown.
Viscosity	If liquid, enter viscosity.
Base Density	If gas, enter value in same units as Density (above).
Added K Bias	Enter value in percent.
Units Base	Select English or Metric.

Options and Piping Tab Screen

📷 <0,TAGNUM>Vortex (Foxcom) # Parameter	_ 🗆 🗙		
Identifier Flow Parameters Options and Piping			
Piping Upstream Distance : 30.0 Pipe diameter Mating : Straight Image: Straight Image: Straight			
Options Signal Conditioning Failsafe ○ Off ○ On ○ Off ○ On ○ Downscale ○ Upscale □ Damping : □ Damping : □ Damping : □ Damping : □ Damping :			
Scaled Pulse Output : URV 100 Hz Velse Resolution : 1.0			
Save Save and Download Cancel			

Figure 45. Sample Vortex Options and Piping Tab Screen

Field	Entry		
Piping			
Mating	Select Schedule 10, Schedule 40, Schedule 80, PN16, PN40, PN64, or PN100.		
Configuration	Select from menu of piping configurations.		
Upstream Distance	If Configuration is not Straight, enter distance in pipe diameters.		
Options			
Noise Rejection	Select On or Off.		
Signal Conditioning	Select On or Off.		
Failsafe	If Output Mode is Analog, select Downscale or Upscale.		
Damping	Select one of nine choices from No Damping through 32 seconds.		
Scaled Pulse Output	Select Off or URV 100 Hz.		
Output Mode (FoxCom)	Select Digital or 4-20 mA.		
Output Mode (HART)	Select Analog (4-20 mA) or Multidrop.		
Polling Address	If Multidrop, select number from 0 through 15.		
Pulse Resolution	Select 0.01, 0.1, 1.0, 10.0, 100.0, or 1000.0.		

7. 870ITEC Transmitters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with 870ITEC Electrochemical Transmitters with FoxCom communication protocol. Additional information about these transmitters and FoxCom communication is contained in the following documents.

- B0193XXChecklist for FoxCom Measurement Integration
- MI 611-212Installation, Operation, Configuration, and Maintenance.

Measure Screen

Tag Number : Al Robbins	Device Type : 870EC
Location : LAB DTM	Model Code : MSCODE
Primary Measurement:	0.30 mS
Solution Temperature:	51.02 C
Absolute Measurement:	0.30 mS/cm
mA Equivalent:	6.40 mA

Figure 46. Sample 870ITEC Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 10

Message	Explanation	Recommended Action	
Primary Status Fields	}	·	-
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Init Required	Transmitter is re- initializing on reset.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.	
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.	
Secondary Status Fie	lds	•	1
Measurement Error	Unstable process measurement.	Check sensor connection. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Bad Message Received	Transmitter received a bad message.	Select TDevice > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Stability Error	Raw measurement has been unstable.	Check wiring. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Probe Error	Problem with the sensor.	Replace sensor.	1
Temp Comp Error	Problem in temperature measurement.	Check ATC connection. Verify process temperature. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.	
Amplifier Error	Not Applicable	Not Applicable	
Extended Status - Ha	rdware ^(a)		
ATC Open	Resistance of temperature	Replace temperature compensator.	
ATC Short	compensation is greater or less than expected resistance of device configured.		
Leak Error	Solution leakage into sensor.	Replace sensor.	1
App1 Cal Req	Application 1 calibration required.	Calibrate.	
App2 Cal Req	Application 2 calibration required.	Calibrate.	
App3 Cal Req	Application 3 calibration required.	Calibrate.	
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact Global Customer Support.	
Cal Slope Error	Not Applicable.	Not Applicable.	1

Table 10. Transmitter Status Error Messages

Message	Explanation	Recommended Action
RTD Cal Tolerance	RTD calibration is not within tolerance.	Recalibrate the RTD. If problem persists, contact Global Customer Support.
Therm Cal Tolerance	Thermistor calibration is not within tolerance.	Recalibrate the thermistor. If problem persists, contact Global Customer Support.
Tune Stability	Calibration measurement not stabilized.	Check stability configuration or replace sensor.
Amp Failure	Not Applicable.	Not Applicable.
Extended Status - Proces	ss ^(a)	
mA Under Range	Measurement under or	Reconfigure range or correct process error.
mA Over Range	over configured range.	
Comp Under Range	Measurement under or	Reconfigure compensation or correct process error.
Comp Over Range	over compensation range.	
Disp Under Range	Primary measurement	Check sensor connection. Select Device >
Disp Over Range	is too low or too high.	Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Unstable Temp	Unstable temperature measurement.	Check ATC connection. Verify process temperature. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Unstable Meas	Unstable process measurement.	Check measurement sensor connection. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.

Table 10.	Transmitter	Status	Error	Messages	(Continued)
-----------	-------------	--------	-------	----------	-------------

(a) Static Display

Calibration

You can perform the following calibration procedures on an 870ITEC Transmitter using the PC50 Field Device Tool:

- Bench Calibration
- ◆ Solution 1-Point Offset
- Solution 1-Point Span
- ♦ Solution 2-Point
- ♦ Temperature Sensor
- mA Calibration.

The calibration procedures are accessed as follows:

Device > Additional functions > Adjust set value

Bench Calibration

- 1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 91.
- 2. Select Bench Calibration from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration			
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.			
Calibrate:			
Application Number: Application 1			
Low Calibration Point: 0			
High Calibration Point: 0			
Calibrator's Initials: Calibrated Date:			
Cancel Continue <u>H</u> elp			

Figure 47. Sample 870ITEC Bench Calibration Screen

- 4. Enter the high and low solution values and the calibrator's initials, and select Continue.
- 5. Place the clean dry sensor in air and select Continue.
- 6. Wait while the device is calibrating.
- 7. Run a wire through the sensor bore and connect to a decade resistance box. Adjust the box to a resistance equal to the high calibration point (see MI 611-212 for calculation of this resistance) and select Continue.
- 8. Wait while the device is calibrating. The current calibration date is automatically updated.
- 9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 1-Point Offset

This option permits you to set a 1-point offset for up to three applications and is normally used to correct for zero shift. This should be used only if you have previously performed a 2-point calibration.

- 1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 91.
- 2. Select Solution 1-Point Offset from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration			
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.			
Calibrate:			
Application Number: Application 1			
Solution Value: 0			
Calibrator's Initials: Calibrated Date:			
Cancel Continue <u>H</u> elp			

Figure 48. Sample 870ITEC Solution 1-Point Offset Screen

- 4. Enter the solution value and the calibrator's initials, and select Continue.
- 5. Immerse the sensor in the solution and select Continue.
- 6. Wait while the device is calibrating (this can take a while). The current calibration date is automatically updated.
- 7. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 1-Point Span

This option permits you to set a calibration point (1-point span) for up to three applications. This is usually done to correct for a cell factor change due to installation. It should be used only if you have previously performed a 2-point calibration.

- 1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 91.
- 2. Select Solution 1-Point Span from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration				
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.				
Calibrate:				
Application Number: Application 1				
Solution Value: 0				
Calibrator's Initials: Calibrated Date:				
Cancel Continue <u>H</u> elp				

Figure 49. Sample 870ITEC Solution 1-Point Span Screen

- 4. Enter the solution value and the calibrator's initials, and select Continue.
- 5. Immerse the sensor in the solution and select Continue.
- 6. Wait while the device is calibrating (this can take a while). The current calibration date is automatically updated.
- 7. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 2-Point

This option permits you to perform a 2-point calibration for up to three applications.

- 1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 91.
- 2. Select Solution 2-Point from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.			
Calibrate:			
Application Number: Application 1			
Low Calibration Point: 0			
High Calibration Point:			
Calibrator's Initials: Calibrated Date:			
Cancel Continue <u>H</u> elp			

Figure 50. Sample 870ITEC Solution 2-Point Calibration Screen

- 4. Enter the low and high solution values and the calibrator's initials, and select Continue.
- 5. Immerse the sensor in the low calibration solution and select Continue.
- 6. Wait while the device is calibrating (this can take a while).
- 7. Immerse the sensor in the high calibration solution and select Continue.
- 8. Wait while the device is calibrating (this can take a while). The current calibration date is automatically updated.
- 9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Temperature Sensor Calibration

This option permits you to calibrate the temperature sensor to the known temperature of a solution.

- 1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 91.
- 2. Select Temperature Sensor from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration			
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.			
Calibrate:			
Application Number: Application 1			
Solution Temperature: 0			
Calibrator's Initials: Calibrated Date:			
Cancel Continue <u>H</u> elp			

Figure 51. Sample 870ITEC Temperature Calibration

- 4. Enter the solution temperature and the calibrator's initials, and select Continue.
- 5. Immerse the sensor in the solution and select Continue.
- 6. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

The procedure to perform a mA Calibration is:

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 2. Select mA Calibration from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Select 4 mA Output.

mA Calibration CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.				
Calibrate:				
💿 <u>4</u> mA Output	Step Size: 0	m/	4	
C 20mA Output	Cumulative	0	mA	
		l	Apply	
Cancel	Continue	<u>H</u> el	>	

Figure 52. Sample 870ITEC mA Calibration Screen

- 5. Set the Step Size from the menu (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5), and select Apply.
- 6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown in the screen.
- 7. Select 20 mA Output.
- 8. Repeat Steps 4 and 5.
- 9. The screen then displays the adjustments. To accept this change, select Continue.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

	= <0,TAG_NUMBER >870ITEC (Foxcom) # Parameter				
Identi	fier Sensor Mea	surement Misc App	1]		
	1				
	Device :	870EC	Date of Manufacture : 12/20/2002		
	Serial Number :		Last Calibration :		
	Firmware Version	: 1.32			
	Tag Number :	TAG_NUMBER	Device Name : DevNam		
	Tag Name :	TAG_NAME	Location : LOCATION		
L					
Sa	ave Save ar	nd Download Can	cel		

Figure 53. Sample 870ITEC Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Sensor Tab Screen

ne <0,TAG_NUMBER >870ITEC (Foxcom) # Parameter	- D ×
Identifier Sensor Measurement Misc App 1	
Sensor Configuration Applications:	
Application Select: 1 Cell Factor: 2.15	
Outputs mA Output Mode © Digital © 4-20 mA Damping: 5 sec	
Save Save and Download Cancel	

Figure 54. Sample 870ITEC Sensor Tab Screen

Field	Entry		
Sensor Configuration			
Applications	Number of applications to be configured. Select 1, 2, or 3 applications.		
Application Select	Select 1, 2, 3 or AUTO.		
Sensor Type	Select type of sensor from menu of choices.		
Cell Factor	If sensor type is OTHER, specify cell factor between 00.00 and 99.99.		
Outputs			
mA Output Mode	Select Digital or 4-20 mA.		
Damping	Select damping response time of 1, 5, 10, 20, 40, or 120 seconds.		

Measurement Tab Screen

Identifier Sensor Measurement Misc App 1				
Temperature Units © Celsius © Fahrenheit Mode Manual Temperature: © Automatic Manual Temperature Sensor: 100K ohm				
Measurement Stabilitity Measurement Stabilitity Active Stability Time: Stability Variant: Stability Variant:				
Save and Download Cancel				

Figure 55. Sample 870ITEC Measurement Tab Screen

Field	Entry	
Temperature		
Units	Select Celsius or Fahrenheit.	
Mode	Select Automatic (follows RTD) or Manual (fixed point).	
Failure Value	If Mode is Automatic, enter temperature in case RTD fails.	
Manual Temperature	If Mode is Manual, enter temperature.	
Temperature Sensor	Select 2-wire 100 Ω , 2-wire 1000 Ω , 3-wire 100 Ω , or 3-wire 1000 Ω RTD, or 100 k Ω . thermistor.	
Measurement Stability		
Measurement Stability Active	= Instrument Stability Measurement Feature On; Blank = Instrument Stability Measurement Feature Off.	
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.	
Stability Variant	If on, enter variant between 1 and 9.	
Temperature Stability		
Temperature Stability Active	= Instrument Stability Temperature Feature On; Blank = Instrument Stability Temperature Feature Off.	
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.	
Stability Variant	If on, enter variant between 1 and 9.	

Misc Tab Screen

💶 <0,TAG_NUMBER >870ITEC (Foxcom) # Parameter				
Identifier Sensor Measurement Misc Ap Diagnostics Leakage Enable All ATC Short Disable All	Dep 1 Local Display Passcodes Major: 0800			
 ATC Open Compensation Range mA Range Measurement Range 	Minor: 0800 Display Timeout: 600 sec			
Save Save and Download Cancel				

Figure 56. Sample 870ITEC Misc Tab Screen

Field	Entry	
Diagnostics		
Leakage	= Enable error messages; Blank = Disable error messages.	
ATC Short		
ATC Open		
Compensation Range		
mA Range		
Measurement Range		
Enable All	Enables all messages listed above.	
Disable All	Disables all messages listed above.	
Local Display		
Major Passcode	Enter 4-digit passcode.	
Minor Passcode	Enter 4-digit passcode.	
Display Timeout	Enter timeout between 0 and 999 seconds.	

Application Tab Screen

Identifier Sensor Measurement Misc App 1				
Display □ Custom Units Primary Units: mS/cm ▼ Table				
Temp Compensation: NaCl 0-25	% 🔽	Table		
Primary Scale: 2000 mS	▼	Full Scale Limit: 2000		
Full Scale:	0.9999	Secondary Display:		
Temp Linear %:	1.0000	Temperature 💌		
mA Output	Failsafe	Application Switch Triggers		
Output: Measurement Max: 2000 mS/cm	Mode: Off	Low: 0.0000 mS/cm		
Min: 0.0000 mS/cm Value: 3.8000 High: 2000.0000 mS/cm				
Last Calibration Date: January 1, 1996				
Save Save and Download Cancel				

Figure 57. Sample 870ITEC App1 Tab Screen

Field	Entry	
Display		
Custom Units	$\sqrt{-1}$ = Custom; Blank = Not Custom	
Primary Units	If not Custom, select µS/cm, mS/cm, or %. If Custom, select %, g/1, ppm, oz/ga1, ppt, S/m, or NONE and see Figure 58.	
Temp Compensation	Select from menu of choices. If Custom, see Figure 59.	
Primary Scale	Select from menu of choices.	
Full Scale	Enter value up to full scale limit.	
Temp Linear %	Enter value from 0 to 100,	
Secondary Display	Select Temp, Absolute, or mA.	
mA Output		
Output	If Analog Output Mode on sensor screen, specify Absolute, Measurement, or Temperature.	
Max.	Enter 20 mA range value.	
Min.	Enter 4 mA range value.	
Failsafe		
Mode	Specify OFF, ON, or PULSE	
Value	If on, enter dc mA output between 3.8 and 20.5 mA.	
Application Switch Triggers	Enter value of Low and High triggers.	

Custom Chemi	cal Compen	sation			x
Numb	er of Points:	2	Absolute	e Scale: 🛛 .9999 💌	
Units:	:]	uS 💌	Custom	Scale: .9999 💌	
Absolute	New	Absolute	New	Absolute	New
1. 0	0	8. 0	0	15. 0	0
2. 0	0	9. 0	0	16. 0	0
3. 0	0	10. 0	0	17. 0	0
4. 0	0	11. 0	0	18. 0	0
5. 0	0	12. 🛛	0	19. 0	0
6. 0	0	13. 0	0	20. 0	0
7. 0	0	14. 🛛	0	21. 0	0
		ОК	Can	cel	

Figure 58. Custom Chemical Compensation Screen

Custom Temperature Compensation					x
Reference Temperature: D C Units: mS Number of Points: 2					
Temp - C	Value	Temp - C	Value	Temp - C	Value
1. 0	0	8. 0	0	15. 0	0
2. 0	0	9. 0	0	16. 0	0
3. 0	0	10. 🛛	0	17. 0	0
4. 0	0	11. 0	0	18. 0	0
5. 0	0	12. 0	0	19. 0	0
6. 0	0	13. 🛛	0	20. 0	0
7. 0	0	14. 0	0	21. 0	0
		ОК	Cance		

Figure 59. Custom Temperature Compensation Screen

8. 870ITPH pH/ORP/ISE Transmitters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with 870ITPH pH/ORP/ISE Transmitters with FoxCom communication protocol. Additional information about these transmitters and FoxCom communication is contained in the following documents.

- B0193XXChecklist for FoxCom Measurement Integration
- MI 611-211Installation, Operation, Configuration, and Maintenance.

Measure Screen

Tag Number : Tag Number	Device Type : 870PH
Tag Name : Tag Name	Device Name : 870PH
Location : LAB-A	Model Code : 870ITPH-FYFNZ
Dimen Menuneaut	0.00 -44
Frimary Measuremenc	0.00 pH
Solution Temperature:	0.00 C
Absolute Measurement:	3.00 mV
mA Equivalent:	4.00 mA

Figure 60. Sample 870ITPH Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 11.

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Init Required	Transmitter is re- initializing on reset.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields	5	
Measurement Error	Unstable process measurement.	Check sensor connection. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Bad Message Received	Transmitter received a bad message.	Select Test > Go On-Line. If this does not clear problem, contact Global Customer Support.
Stability Error	Raw measurement has been unstable.	Check wiring. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Probe Error	Indicates an error with the probe.	If Coat error, clean probe. If Lowslope error, replace buffer solution (if contaminated). For other problems, replace probe.
Temp Comp Error	Problem in temperature measurement.	Check ATC connection. Verify process temperature. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Amplifier Error	Out of range error.	Check probe. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Extended Status - Hardv	vare ^(a)	•
ATC Open	Resistance of temperature compensation is less than expected resistance of device configured.	Replace temperature compensator.
ATC Short	Resistance of temperature compensation is greater than expected resistance of device configured.	Replace temperature compensator.
Coat Error	Reference junction resistance in relation to solution ground is less than user set limit.	Clean electrode.

Message	Explanation	Recommended Action
Glass Res Error	Resistance of glass electrode in relation to solution ground is less than user set limit.	Replace electrode.
Aging Error	Aging glass electrode.	Check value of slope. See MI 611-211.
Leak Error	Resistance between solution ground and the RTD is greater than infinite.	Replace sensor.
Amp Failure	Out of range error.	Check sensor. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Slope Error	Nernst slope of sensor is less than user set limit.	Replace electrode or solution.
Cal Slope Error	A slope error has occurred as the result of the previous calibration.	Check sensor and recalibrate transmitter. If the problem persists, contact Global Customer Support.
Extended Status - Pro	cess ^(a)	
mA Under Range	Measurement outside	Reconfigure range or correct process error.
mA Over Range	configured range.	
Cal Required	Calibration required.	Calibrate.
Comp Under Range	Measurement outside compensation curve.	Reconfigure compensation or correct process error.
Comp Over Range		
No A2D Interrupts	A/D hardware not responding.	Check PWA 0connections. If problem persists, contact Global Customer Support.
Unstable Temp	Unstable temperature measurement.	Check ATC connection. Verify process temperature. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Unstable Meas	Unstable process measurement.	Check measurement sensor connection. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Disp Under Range	Primary measurement	Check sensor connection. Select Device > Additional
Disp Over Range	is too low or too high.	Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact Global Customer Support.
RTD Cal Tolerance	RTD calibration is not within tolerance.	Recalibrate the RTD. If problem persists, contact Global Customer Support.
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact Global Customer Support.

(a) Static Display

Calibration

You can perform the following calibration procedures on an 870ITPH Transmitter using the PC50 Field Device Tool:

- One Point Manual Calibration
- One Point Absolute Calibration
- Two Point Manual Calibration
- mA Calibration.
- Automatic Calibration
- ♦ Temperature Sensor

The calibration procedures are accessed as follows:

Device > Additional functions > Adjust set value

One Point Manual Calibration

This option permits you to set a calibration point (one point offset), using a known reference solution (buffer).

- 1. Select One Point Manual from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.

CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.		
Calibrate:		
Solution Value:	0	
Calibrator's Initials:	Calibrated Date:	
Cancel	Continue Help	

Figure 61. Sample 870ITPH One Point Manual Calibration Screen

- 3. Enter the solution value and the calibrator's initials and select Continue.
- 4. Immerse the sensor in the solution and select Continue.
- 5. Wait while the device is calibrating. The current calibration date is automatically updated.
- 6. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

One Point Absolute Calibration

This option permits you to set a 1-point absolute calibration point.

- 1. Select One Point Absolute from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.

👡 <0,TAG_NUMBER>870ITpH (Foxcom) # One Point Absolut 💶 🔲 🛙	×
870IT Calibration	
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.	
Calibrate:	
Calibrator's Initials: Calibrated Date:	
Cancel Continue <u>H</u> elp	

Figure 62. Sample 870ITPH One Point Absolute Calibration Screen

- 3. Enter the calibrator's initials and select Continue.
- 4. Immerse the sensor in the solution and select Continue.
- 5. Wait while the device is calibrating. The current calibration date is automatically updated.
- 6. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Two Point Manual Calibration

This option permits you to set span and offset, using two known reference solutions (buffers).

- 1. Select Two Point Manual from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.

870IT Calibration		
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.		
Calibrate:		
Low Calibration Point: 0		
High Calibration Point: 0		
Calibrator's Initials: Calibrated Date:		
Cancel Continue <u>H</u> elp		

Figure 63. Sample 870ITPH Two Point Manual Calibration Screen

- 3. Enter the high and low solution values and the calibrator's initials and select Continue.
- 4. Immerse the sensor in the low solution and select Continue.
- 5. Wait while the device is calibrating.
- 6. Immerse the sensor in the high solution and select Continue.
- 7. Wait while the device is calibrating. The current calibration date is automatically updated.
- 8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

The procedure to perform a mA Output Calibration is:

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 2. Select mA Output from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Select 4 mA Output.
- 5. Set the Step Size (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5), and select Apply.
- 6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
- 7. Select 20 mA Output.
- 8. Repeat Steps 4 and 5. When finished, select Continue.
- 9. The screen then displays the adjustments. To accept this change, select Continue.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

	<0,TAG_NUMBER>87	/0ITpH (Foxcom) #	mA Calibration	<u>_ </u>
1	mA Calibration			
	CAUTION- The device's output wil the control loop in autor Press Continue when the abort.	I be modified during thi matic may cause a pro ne device is in manual	s procedure. Leavir cess upset. mode, or Cancel to	ng
	Calibrate:			
	💿 <u>4</u> mA. Output	Step Size: 0	mA	
	C 20mA Output	Cumulative	0 mA	
			Apply	
	Cancel	Continue	<u>H</u> elp	

Figure 64. Sample 870ITPH mA Calibration Screen

Automatic Calibration

This option provides a buffer-recognition mechanism that locks in the buffer value representing millivolts and temperature being reported from the sensor, using known reference solutions. The algorithm checks each buffer starting with Buffer 1 and selects the first one for which this pH is within 0.5 pH of the average pH for the buffer. If not within 0.5 pH of any buffer table, no buffer is selected.

The type of buffer is selected in the Configuration Sensor Tab Screen (see page 108).

- 1. Select Automatic Calibration from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.
- 3. Enter the calibrator's initials and select Continue.
- 4. Immerse the sensor in the low solution and select Continue.
- 5. Wait while the device is calibrating.
- 6. Immerse the sensor in the high solution and select Continue.
- 7. Wait while the device is calibrating. The current calibration date is automatically updated.
- 8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Temperature Sensor

This option permits you to calibrate the temperature sensor to the known temperature of a solution.

- 1. Select Temperature Sensor from the Adjust set value menu.
- 2. Follow the prompt to put the device in Manual mode and select Continue.

870IT Calibration		
CAUTION- The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset. Press Continue when the device is in manual mode, or Cancel to abort.		
Calibrate:		
Solution Temperature: 0		
Calibrator's Initials: Calibrated Date:		
Cancel Continue <u>H</u> elp		

Figure 65. Sample 870ITPH Temperature Calibration Screen

- 3. Enter the solution temperature and the calibrator's initials and select Continue.
- 4. Immerse the sensor in the solution and select Continue.
- 5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

Device :	870PH	Date of Manufacture : 12/13/2002
Serial Number :		Last Calibration : 12/13/2002
Firmware Version :	1.32	
Tag Number :	TAG_NUMBER	Device Name : DevNam
Tag Name :	TAG_NAME	Location : LOCATION

Figure 66. Sample 870ITPH Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Sensor Tab Screen

Identifier Sensor Output Measurement I	Diagnostic
Sensor Type Oph OISE OORP	Resolution Scale:
Electrode: Glass • Other	Temp Compensation: Standard Custom
Buffers:	Chem Compensation:
Save Save and Download Cancel	

Figure 67. Sample 870ITPH Sensor Tab Screen

Field	Entry				
Sensor					
Туре	Select pH, ISE, or ORP.				
Electrode	If pH, select Glass, Antimony, or Other. If ISE, select Positive or Negative.				
Buffers	If pH, select American, NIST, European, or Special (see Figure 68). This parameter is used with Automatic Calibration.				
Resolution Scale	If pH, select 0.1 pH or 0.01 pH.				
Temp. Compensation	If pH, select Standard, Ammonia, or Custom (see Figure 69). If ISE, select Standard or Custom.				
Chem. Compensation	If ISE, select Standard or Custom (see Figure 70).				
Custom Buffers			×		
-------------------	----------------------------	-----------	----------	--	--
Buffer 1 Buffer 2	Buffer 1 Buffer 2 Buffer 3				
Number of Poir	its: 🗵 🛨				
Temp - C	pH Value	Temp - C	pH Value		
1. 0	0	7. JO	0		
2. 0	0	8. 0	0		
3. 0	0	9. 0	0		
4. 0	0	10. 0	0		
5. 0	0	11. 0	0		
6. 0	0				
		OK Cancel	Apply		

Figure 68. Custom Buffers Screen

Custom Temperature Compensation					
Reference Ten	nperature: 🚺	C Number of P	'oints: 2	•	
Temp - C	pH Value	Temp - C	pH Value	Temp - C	pH Value
1. 0	0	8. 0	0	15. 0	0
2. 0	0	9. 0	0	16. 0	0
3. 0	0	10. 0	0	17. 0	0
4. 0	0	11. 🛛	0	18.	0
5. 0	0	12. 0	0	19. 0	0
6. 0	0	13. 0	0	20. 0	0
7. 0	0	14. 0	0	21. 0	0
		OK	Cance	el	

Figure 69. Custom Temperature Compensation Screen

Custom Chemical Compensation						
Number of Poir	nts: 🗵 🚊	Absolute & Cus	tom Values in	Units: PPM		
Absolute	Custom	Absolute	Custom	Absolute	Custom	
1. 0	0	8. 0	0	15. 0	0	
2. 0	0	9. 0	0	16. 0	0	
3. 0	0	10. 0	0	17. 0	0	
4. 0	0	11. 0	0	18. 0	0	
5. 0	0	12. 0	0	19. 0	0	
6. 0	0	13. 0	0	20. 0	0	
7. 0	0	14.	0	21. 0	0	
		ОК	Canc	el		

Figure 70. Custom Chemical Compensation Screen

Output Tab Screen

Identifier Sensor Output Measurement	Diagnostic			
Mode				
💿 Digital 🔿 4-20 mA	mA Output:	Primary Meas 💌		
Failsafe Mode: Off	Output Max Value:	14 pH		
Failsafe Value: 3.8 mA	Output Min Value:	D pH		
Local Display				
Major Passcode: 0800	Secondary Meas:	Temperature 💌		
Minor Passcode: 0800	Damping:	5 sec 💌		
Display Timeout: 600 sec	AC Frequency:	60 Hz		
Save and Download	Cancel			

Figure 71. Sample 870ITPH Output Tab Screen

Field	Entry
mA Output	
Mode	Select Digital or 4-20 mA.
Failsafe Mode	If 4-20 mA Mode, specify OFF, ON, or PULSE.
Failsafe Value	If ON, enter dc mA output between 3.8 and 20.5 mA.
mA Output	If 4-20 mA Mode, specify Absolute, Measurement, or Temperature.
Output Max Value	If 4-20 mA Mode, enter 20 mA range value.
Output Min Value	If 4-20 mA Mode, enter 4 mA range value.
Local Display	
Major Passcode	Enter 4-digit passcode.
Minor Passcode	Enter 4-digit passcode.
Display Timeout	Enter timeout between 0 and 999 seconds.
Secondary Meas	Select Temperature, Absolute, or mA.
Damping	Select damping response time of 1, 5, 10, 20, 40, or 120 seconds.
AC Frequency	Select 50 or 60 Hz.

Measurement Tab Screen

Identifier Sensor Output Measureme	ent Diagnostic	
Temperature		
Celsius C Fahrenheit	Failure Value: 0 C	
Mode	Manual Temperature: 0 C	
Automatic O Manual	Temperature Sensor: 1000 ohm 3 wire 💌	
Stability Indicators		
Measurement Stability	Temperature Stability	
Stability Time: 5 sec 💌	Stability Time: 5 sec 💌	
Stability Variant: 9 🛨	Stability Variant: 9	
Save Save and Download	Cancel	

Figure 72. Sample 870ITPH Measurement Tab Screen

Field	Entry	
Temperature		
Units	Select Celsius or Fahrenheit.	
Mode	Select Automatic or Manual.	
Failure Value	If Mode is Automatic, enter temperature in case RTD fails.	
Manual Temperature	If Mode is Manual, enter temperature.	
Temperature Sensor	Select 100 ohm 2-wire, 100 ohm 3-wire, 1000 ohm 2-wire, 1000 ohm 3-wire, or Balco 3K.	
Stability Indicators		
Measurement Stability	= Instrument Stability Measurement Feature On; Blank = Instrument Stability Measurement Feature Off	
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.	
Stability Variant	If on, enter variant between 1 and 9.	
Temperature Stability	= Instrument Stability Temperature Feature On; Blank = Instrument Stability Temperature Feature Off	
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.	
Stability Variant	If on, enter variant between 1 and 9.	

Diagnostic Tab Screen

Ide	entifier Sensor (Dutput Measure	ment Diagnostic		
[- Diagnostics				
	🗖 Leakage	ATC Short	🗖 Aging	🔲 Measurement Range	
	Pre-Amp	T ATC Open	🔲 4-20 mA Range	Compensation Range	
	🗖 Glass	Glass Limit:	0 kohm 💌	Glass Cutoff: 0 C	
	🗖 Coat	Coat Limit:	100 kohm 💌	Enable All Disable All	
	🗖 Low Slope	Low Slope Limit	: 0 %		
Save Save and Download Cancel					

Figure 73. Sample 870ITPH Diagnostic Tab Screen

Field	Entry
Diagnostics	
Leakage	= Enable error messages; Blank = Disable error messages
Pre-Amp	
Glass	
Coat	
Low Slope	
ATC Short	
ATC Open	
Aging	
4-20 mA Range	
Measurement Range	
Compensation Range	
Enable All	Enables all messages listed above.
Disable All	Disables all messages listed above.
Glass Limit	Select from menu of values between 0 and 1100 k Ω .
Glass Cutoff	Enter value between 0 and 100 degrees.
Coat Limit	Select from menu of values between 0 and 100 k Ω .
Low Slope Limit	Enter value between 0 and 100%.

9.870ITCR Conductivity/Resistivity Transmitters

This chapter provides information that is exclusive to using the PC50 Field Device Tool with 870ITCR Conductivity/Resistivity Transmitters with FoxCom communication protocol. Additional information about these transmitters and FoxCom communication is contained in the following documents.

- B0193XXChecklist for FoxCom Measurement Integration
- MI 611-216Installation, Operation, Configuration, and Maintenance.

Measure Screen

Tag Number : TagNum	Device Type : 870CR
Tag Name : TagName	Device Name : 870-CR
Location : DTM LAB	Model Code : 870ITCR-FYFNZ-7
L	
D: 4	0.00 01
Primary Measurement:	0.00 us/cm
Solution Temperature:	0.00 C
Absolute Measurement:	0.00 mS/cm
mA Equivalent:	4.01 mA

Figure 74. Sample 870ITCR Measure Screen

Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 12.

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Init Required	Transmitter is reinitializing on reset.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Measurement Error	Unstable process measurement.	Check sensor connection. Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Device Busy	Transmitter is busy.	If problem persists, select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Bad Message Received	Transmitter received a bad message.	Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Stability Error	Raw measurement has been unstable.	Check wiring. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Probe Error	Problem with the sensor.	Replace sensor.
Temp Comp Error	Problem in temperature measurement.	Check ATC connection. Verify process temperature. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Amplifier Error	Not Applicable.	Not Applicable.
Extended Status - Hardwa	re ^(a)	
ATC Open ATC Short	Resistance of temperature compensation is greater or less than expected resistance of device configured.	Replace temperature compensator.
Leak Error	Solution leakage into sensor.	Replace sensor.
App1 Cal Req	Application 1 calibration required.	Calibrate.
App2 Cal Req	Application 2 calibration required.	Calibrate.

Table 12. Transmitter Status Error Messages

Message	Explanation	Recommended Action
App3 Cal Req	Application 3 calibration required.	Calibrate.
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact Global Customer Support.
Cal Slope Error	Not Applicable.	Not Applicable.
RTD Cal Tolerance	RTD calibration is not within tolerance.	Recalibrate the RTD. If problem persists, contact Global Customer Support.
Therm Cal Tolerance	Thermistor calibration is not within tolerance.	Recalibrate the thermistor. If problem persists, contact Global Customer Support.
Tune Stability	Calibration measurement not stabilized.	Check stability configuration or replace sensor.
Amp Failure	Not Applicable.	Not Applicable.
Extended Status - Proc	ess ^(a)	
mA Under Range	Measurement under or	Reconfigure range or correct process error.
mA Over Range	over configured range.	
Comp Under Range	Measurement under or	Reconfigure compensation or correct process error.
Comp Over Range	over compensation range.	
Disp Under Range	Primary measurement	Check sensor connection. Select Device >
Disp Over Range	is too low or too high.	Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Unstable Temp	Unstable temperature measurement.	Check ATC connection. Verify process temperature. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.
Unstable Meas	Unstable process measurement.	Check measurement sensor connection. Select Device > Additional Functions > Commands > Mode Change > On-Line. If this does not clear problem, contact Global Customer Support.

Table 12.	Transmitter	Status Error	Messages	(Continued)
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(a) Static Display

Calibration

You can perform the following calibration procedures on an 870ITCR Transmitter using the PC50 Field Device Tool:

- Solution 1-Point Offset
- ♦ Solution 1-Point Span
- Solution 2-Point
- Bench Calibration
- ♦ Calibration Pure H2O
- ♦ Temperature Sensor
- mA Calibration.

The calibration procedures are accessed as follows:

Device > Additional functions > Adjust set value

Solution 1-Point Offset

This option permits you to set a 1-point offset for up to three applications and is normally used to correct for zero shift. This should be used only if you have previously performed a 2-point calibration.

- 1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 125.
- 2. Select Solution 1-Point Offset from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration		
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.		
Calibrate:		
Application Number: Application 1		
Solution Value: 0		
Calibrator's Initials: Calibrated Date:		
Cancel Continue <u>H</u> elp		
Solution Value: 0 Calibrator's Initials: Calibrated Date: Cancel Continue <u>H</u> elp		

Figure 75. Sample 870ITCR Solution 1-Point Offset Screen

- 4. Enter the solution value and the calibrator's initials, and select Continue.
- 5. Wait while the device is reinitializing.
- 6. Immerse the sensor in the solution and select Continue.
- 7. Wait while the device is calibrating. The current calibration date is automatically updated.
- 8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 1-Point Span

This option permits you to set a calibration point (1-point span) for up to three applications. This is usually done to correct for a cell factor change due to installation. It should be used only if you have previously performed a 2-point calibration. The point selected should be at the high end of the measurement range.

- 1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 125.
- 2. Select Solution 1-Point Span from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration		
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.		
Calibrate:		
Application Number: Application 1		
Solution Value: 0		
Calibrator's Initials: Calibrated Date:		
Cancel Continue <u>H</u> elp		

Figure 76. Sample 870ITCR Solution 1-Point Span Screen

- 4. Enter the solution value and the calibrator's initials, and select Continue.
- 5. Wait while the device is reinitializing.
- 6. Immerse the sensor in the solution and select Continue.
- 7. Wait while the device is calibrating. The current calibration date is automatically updated.
- 8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 2-Point

This option permits you to perform a 2-point calibration for up to three applications.

- 1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 125.
- 2. Select Solution 2-Point from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration		
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.		
Calibrate:		
Application Number: Application 1		
Low Calibration Point: 0		
High Calibration Point: 0		
Calibrator's Initials: Calibrated Date:		
Cancel Continue <u>H</u> elp		

Figure 77. Sample 870ITCR Solution 2-Point Calibration Screen

- 4. Enter the low and high solution values and the calibrator's initials, and select Continue.
- 5. Wait while the device is reinitializing.
- 6. Immerse the sensor in the low calibration solution and select Continue.
- 7. Wait while the device is calibrating.
- 8. Immerse the sensor in the high calibration solution and select Continue.
- 9. Wait while the device is calibrating. The current calibration date is automatically updated.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Bench Calibration

You can perform a bench calibration for either conductivity or resistivity measurements by connecting your own discrete components to the transmitter.

- 1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 125.
- 2. Select Bench Calibration from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Enter the calibrator's initials, and select Continue.
- 5. Wait while the device is reinitializing.
- 6. Follow the prompt to connect Resistor 1 between terminals 1B and 1E and select Continue.
- 7. Wait while the device is calibrating.
- 8. Follow the prompt to connect Resistor 2 or the specified capacitor in place of Resistor 1 and select Continue.
- 9. Wait while the device is calibrating. The current calibration date is automatically updated.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Calibration Pure H2O

If you are measuring purity of water by checking the conductivity in μ S/cm or resistivity in M Ω •cm with an 871CR-A or 871CR-B sensor, you can use this calibration.

- 1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 125.
- 2. Select Calibration Pure H20 from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Enter the temperature cell factor (tCF) and cell factor (CF) found on your sensor. Also enter the calibrator's initials and select Continue.
- 5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Temperature Sensor

This option permits you to calibrate the temperature sensor to the known temperature of a solution.

- 1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 125.
- 2. Select Temperature Sensor from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.

870 Calibration		
CAUTION- The device's output will be modified during this procedure. Leaving the external control loop in automatic may cause a process upset. Press Continue when the loop is in manual mode, or Cancel to abort.		
Calibrate:		
Application Number: Application 1		
Solution Temperature: 0		
Calibrator's Initials: Calibrated Date:		
Cancel Continue <u>H</u> elp		

Figure 78. Sample 870ITCR Temperature Calibration

- 4. Enter the solution temperature and the calibrator's initials, and select Continue.
- 5. Immerse the sensor in the solution and select Continue.
- 6. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

The procedure to perform a mA Output Calibration is:

- 1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
- 2. Select mA Output from the Adjust set value menu.
- 3. Follow the prompt to put the device in Manual mode and select Continue.
- 4. Select 4 mA Output.
- 5. Set the Step Size (-0.5, -0.05, -0.005, 0.005, 0.05, 0.5), and select Apply.
- 6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
- 7. Select 20 mA Output.
- 8. Repeat Steps 4 and 5. When finished, select Continue.
- 9. The screen then displays the adjustments. To accept this change, select Continue.
- 10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

mA Calibration CAUTION- The device's output will the external control loop Press Continue when th abort.	be modified during th in automatic may cau e loop is in manual mo	s procedur use a proce ode, or Can	e. Leaving sss upset. icel to
Calibrate:			
<u> 4</u> mA Output	Step Size: 0	m	Δ
C 20mA Output	Cumulative	0	mA
			Apply
Cancel	Continue	<u>H</u> el	p

Figure 79. Sample 870ITCR mA Calibration Screen

Configuration

Identifier Tab Screen

<pre><0,TAG_NU</pre>	MBER >87	70ITCR (Foxcom) # P	arameter		_ 🗆 🗵
Identifier Ser	nsor Measu	urement Misc App 1			
Device	•:		Date of Manuf	acture :	
Serial I	Number :		Last Calibration	n:	
Firmwa	re Version :				
Tag N	umber :	TAG_NUMBER	Device Name	: DevNam	
Tag N	ame :	TAG_NAME	Location :	LOCATION	
L					
Save	Save and	Download Canc	el		

Figure 80. Sample 870ITCR Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Sensor Tab Screen

🛌 <0,TAG_NUMBER >870ITCR (Foxcom) # Parameter		<u> </u>
Identifier Sensor Measurement Misc	App 1		
Sensor Configuration			
Applications: 1	Probe Type	2 Electrode 💌	
	Cell Constant	•	
Application Select: 1	Cell Factor:	0.1	
- Outputs			
mA Output Mode			
💿 Digital 🔿 4-20 mA	Damping:	5 sec 💌	
	Concert 1		
Save Save and Download	Lancel		

Figure 81. Sample 870ITCR Sensor Tab Screen

Field	Entry
Sensor Configuration	
Applications	Number of applications to be configured. Select 1, 2, or 3 applications.
Application Select	Select 1, 2, 3, or AUTO.
Probe Type	Specify 2 Electrode.
Cell Constant	Specify 0.1, 10, or Other.
Cell Factor	If sensor type is Other, specify cell factor between 00.00 and 99.99.
Outputs	
mA Output Mode	Select Digital or 4-20 mA.
Damping	Select damping response time of 1, 5, 10, 20, 40, or 120 seconds.

Measurement Tab Screen

<pre><0,TAG_NUMBER >870ITCR (Foxcor</pre>	m) # Parameter	
Identifier Sensor Measurement Misc	App 1	
Temperature Units		
Celsius C Fahrenheit	Failure Value: U C	
Mode	Manual Temperature: 0 C	
 Automatic Manual 	Temperature Sensor: 1000 ohm 3 wire 💌	
Measurement Stabilitity	Temperature Stabilitity	
Measurement Stabilitity Active	Temperature Stabilitity Active	
Stability Time: 5 🚊 sec	Stability Time: 5 🚍 sec	
Stability Variant: 1 🚊 sec	Stability Variant: 1 🚊 sec	
Save Save and Download	Cancel	

Figure 82. Sample 870ITCR Measurement Tab Screen

Field	Entry
Temperature	
Units	Select Celsius or Fahrenheit
Mode	Select Automatic (follows RTD) or Manual (fixed point).
Failure Value	If Mode is Automatic, enter temperature in case RTD fails.
Manual Temperature	If Mode is Manual, enter temperature.
Temperature Sensor	Select 2-wire 100 Ω , 2-wire 1000 Ω , 3-wire 100 Ω , or 3-wire 1000 Ω RTD, or 100 k Ω . thermistor.
Measurement Stability	
Measurement Stability Active	= Instrument Stability Measurement Feature On; Blank = Instrument Stability Measurement Feature Off
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.
Stability Variant	If on, enter variant between 1 and 9.
Temperature Stability	
Temperature Stability Active	= Instrument Stability Temperature Feature On; Blank = Instrument Stability Temperature Feature Off
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.
Stability Variant	If on, enter variant between 1 and 9.

Misc Tab Screen

<pre><0,TAG_NUMBER >870ITCR (Foxcom) # Parameter</pre>				
Identifier Sensor Measurement Misc App 1				
Diagnostics Leakage ATC Short Disable All ATC Open Compensation Range mA Range Measurement Range Display Timeout: 600 sec				
Save Save and Download Cancel				

Figure 83. Sample 870ITCR Misc Tab Screen

Field	Entry
Diagnostics	
Leakage	= Enable error messages; Blank = Disable error messages
ATC Short	
ATC Open	
Compensation Range	
mA Range	
Measurement Range	
Enable All	Enables all messages listed above.
Disable All	Disables all messages listed above.
Local Display	
Major Passcode	Enter 4-digit passcode.
Minor Passcode	Enter 4-digit passcode.
Display Timeout	Enter timeout between 0 and 999 seconds.

Application Tab Screen

<pre><0,TAG_NUMBER >870ITCF</pre>	t (Foxcom) # Paramet	er	
Identifier Sensor Measurement	Misc App 1		
Display			
Custom Units Primary	Units:	I able	
Temp Compensation: Absolute	•	Table	
Primary Scale:	7	Full Scale Limit: 999.9	
Full Scale:	999.9000	Secondary Display:	
Temp Linear %:	1.0000	Temperature 💌	
mA Output	- Failsafe	Application Switch Triggers	
Output: Measurement	Mode: Off	Low: 0.0000 Kohms	
Max: 0.0000 Kohms	Value: 3.8000	High: 0.9999 Kohms	
 Last Calibr	ation Date: January 1, 199	6	
Save Save and Down	oad Cancel		

Figure 84. Sample 870ITCR App1 Tab Screen

Field	Entry
Display	
Custom Units	= Custom; Blank = Not Custom
Primary Units	If not Custom, select from menu of choices. If Custom, select %, g/1, ppm, oz/ga1, ppt, or None and see Figure 85.
Temp Compensation	Select from menu of choices. If Custom, see Figure 86.
Primary Scale	Select from menu of choices.
Full Scale	Enter value up to full scale limit.
Temp Linear %	Enter value from 0 to 100,
Secondary Display	Select Temp, Absolute, or mA.
mA Output	
Output	If Analog Output Mode on sensor screen, specify Absolute, Measurement, or Temperature.
Max.	Enter 20 mA range value.
Min.	Enter 4 mA range value.
Failsafe	
Mode	Specify Off, On, or Pulse
Value	If on, enter dc mA output between 3.8 and 20.5 mA.
Application Switch Triggers	Enter value of Low and High triggers.

Custom Chemi	cal Compen	sation			2	×
Numb	per of Points:		Absolute	e Scale: .9999 💌		
Units:		Mohms 💌	Lustom	Scale: .9999 ▼		
Absolute	New	Absolute	New	Absolute	New	
1. 0	0	8. 0	0	15. 0	0	
2. 0	0	9. 0	0	16. 0	0	
3. 0.0	0.0	10. 0	0	17. 0	0	
4. 0	0	11. 0	0	18. 0	0	
5. 0	0	12. 🛛	0	19. 0	0	
6. 0	0	13. 0	0	20. 0	0	
7. 0	0	14. 0	0	21. 0	0	
		ОК	Can	cel		

Figure 85. Custom Chemical Compensation Screen

Custom Tempe	Custom Temperature Compensation					
Reference Temperature: 0 C Units: uS/cm 💌						
Temp - C	Value	Temp - C	Value	Temp - C	Value	
1. 0	0	8. 0	0	15. 0	0	
2. 0	0	9. 0	0	16. 0	0	
3. 0	0	10. 0	0	17. 0	0	
4. 0	0	11. 0	0	18. 0	0	
5. 0	0	12. 0	0	19. 0	0	
6. 0	0	13. 0	0	20. 0	0	
7. 0	0	14. 0	0	21. 0	0	
		ОК	Cano	el		

Figure 86. Custom Temperature Compensation Screen

10. Intelligent Positioners (SRD991, SRD960, SRD970, NAF-LinkIT)

This chapter provides information that is exclusive to using the PC50 Field Device Tool with SRD991, SRD960, SRD970, and NAF-LinkIT Intelligent Positioners with FoxCom communication protocol. The configurations of the different intelligent positioner models are very similar to each other. The following description shows the configuration of the intelligent positioners using the SRD991 as an example. If there are differences between the models, they are outlined in the description.

Additional information about these positioners and FoxCom communication is contained in the following documents.

- B0193XXChecklist for FoxCom Measurement Integration
- MI EVE0105Installation, Operation, Configuration, and Maintenance.

Measure Screen

<0, >5RD	991 (FoxCom) # Me	asurement		_ 🗆
Tag Number:			Device:	SRD991	
Tag Name:			Device Name:	DevNam	
Location:	Instr Location				
Setpoint:	Online 0.00	%	Internal Temp:	24.08	°C
Position:	75.90	%	Cycle Count:	66	Cycles
Stem Setpt:	0.00	%	Travel Sum:	23	Strokes
Control Diff:	-75.89	%	Air Supply:	0.00	Bar
Travel Position:	-19.04	Deg.	Output Press.:	0.00	Bar
	8.80	mΔ			

Figure 87. Sample SRD991 Device Data Screen

Status Error Messages

The Diagnosis function is described in Chapter 1 of this document. A sample diagnosis screen is shown in Figure 1. Explanation and recommended action of status error messages is given in Table 13.

Message	Explanation	Recommended Action
Temp. High	Temperature above allowed limit.	Operation outside temperature limit may damage positioner components and violate electrical safety certification
Temp. Low	Temperature below allowed limit.	requirements. Stop operating positioner.
Invalid Configuration	Invalid configuration.	Correct configuration, perform Restore Factory Settings, rerun Autostart procedure.
Travel Sum Limit	Travel sum has exceeded limit configured.	Check valve performance and conduct maintenance if necessary.
Cycle Count Limit	Cycle count has exceeded limit configured.	Check valve performance and conduct maintenance if necessary.
Input Loop Trim	Input signal requires calibration.	Perform Analog Setpoint Calibration procedure.
Feedback Trim	Feedback unit requires calibration.	Perform Angle Calibration procedure.
No Autostart Done	No Autostart was done or Autostart was run and did not complete successfully.	Ensure proper mounting of positioner and adequate supply pressure. Refer to on-line Help for other potential causes. Rerun Autostart Calibration procedure.
Position High Alarm	Position above High Alarm Set Point.	Monitor situation or correct cause.
Position Low Alarm	Position below Low Alarm Set Point.	Monitor situation or correct cause.
Position High High Alarm	Position above High High Alarm Set Point.	Monitor situation or correct cause.
Position Low Low Alarm	Position below Low Low Alarm Set Point.	Monitor situation or correct cause.
Control Diff OOL	Difference between set point requested and current position exceeds allowed limit for a user specified time.	Check to ensure that there is adequate supply pressure. Verify tuning parameters. Refer to troubleshooting section of MI EVE 0105A.
Binary Input	The Binary Input signal 1 or 2 is active.	Monitor situation or correct cause.
Air Supply Pressure Alarm	The air supply pressure fell below the configured lower limit.	Check to ensure that there is adequate supply pressure.
Output Pressure Alarm	The positioner cannot regulate the output pressure.	Check the pneumatics.
RAM	Error writing positioner memory.	Replace failed item or positioner.
EEPROM	Error writing positioner EEPROM.	Replace failed item or positioner.
ROM	Error writing positioner ROM.	Replace failed item or positioner.
AD Converter	Converter function not controllable.	Replace failed item or positioner.
Actuator OOR	Position is not within permissible range (-5%+105%).	Check mechanics of actuator and valve. Perform Endpoints calibration.

Table 13. Field Device Status Error Messages

Message	Explanation	Recommended Action
Current Loop I/P Motor	Connection of I/P converter to electronic board failed.	Replace failed item or positioner.
Potentiometer	Connection of potentiometer to electronic board failed.	Replace failed item or positioner.
Option Board	Option board was not configured or failed.	Check configuration or replace failed option board.

Table 13. Field Device Status Error Messages (Continued)

Calibration

You can perform the following calibration procedures on your intelligent positioner using PC50 Field Device Tool software:

- ♦ Autostart
- Endpoints
- Analog Setpoint (only allowed at workshop security level)
- Angle (only allowed at workshop security level)
- Temperature (only allowed at workshop security level)
- Position Feedback (only allowed at workshop security level)
- Air Supply Pressure (only allowed at workshop security level)
- Output Pressure (only allowed at workshop security level)
- Restore Valve Specific Parameter (only allowed at workshop security level)
- Restore Factory Settings (only allowed at workshop security level).

The calibration procedures are accessed as follows:

```
Device > Additional functions > Adjust set value
```

Autostart Calibration

This function determines valve travel limits, zero, span, and tuning parameters. It does this in four stages:

- Determining the limits of actuator travel.
- A series of ramps to determine the control system parameters
- A series of steps to determine the control parameters
- Determining the positioning speeds.

In performing this function, the valve is stroked several times and ramps are applied to the input signal. If the process cannot be disturbed, then Autostart should not be executed.

The procedure to perform an Autostart calibration is:

- 1. Select Autostart from the Adjust set value menu.
- 2. Acknowledge the warning.
- 3. Enter the calibration data or suitable message upon successful completion.

If Autostart is not successful, it may terminate before reaching the last step. This means that the positioner is not properly calibrated. To check whether Autostart has been successfully completed or not, select Valve Status from Test in the device top level menu. Potential reasons for Autostart not completing include:

- Positioner mounting problem. Feedback lever or coupling is in the wrong orientation. Refer to Section 1 of MI EVE 0105A on "getting started".
- Inadequate supply pressure.
- Large actuator. Use Endpoint Calibration and tune manually. Employ boosters to increase output capacity.
- Hardware problem.

Endpoints Calibration

Endpoints calibration automatically detects the valve end points. It does this by using only the first of the four Autostart steps. This process determines the valve mechanical travel stops, zero and span, but not the tuning set. Accordingly, it requires much less time than a full Autostart calibration. If the tuning parameters are available for the control valve from previous testing or existing data, then performing Endpoints calibration and manually entering the tuning set shortens the positioner setup time significantly.

The procedure to perform an Endpoints calibration is:

- 1. Select Endpoints from the Adjust set value menu.
- 2. Acknowledge the warning.
- 3. Enter the calibration data or suitable message upon successful completion.

Analog Setpoint Calibration

Analog setpoint calibration enables you to calibrate the upper and lower limits of the current input (4 mA and 20 mA) if the positioner is being used in analog mode. Using the positioner in the analog mode requires jumper selection on the printed wiring board. Refer to MI EVE 0105A for the correct jumper location.

When in analog mode, the positioner cannot be connected to a voltage source. To do so causes permanent damage to the instrument.

This function is only allowed at workshop security level.

The procedure to perform an Analog Setpoint calibration is:

- 1. Take the positioner out of the process loop and connect it to a current source.
- 2. Select Analog Setpoint from the Adjust set value menu.
- 3. Set input current to 4 mA.
- 4. Acknowledge by entering this value (4 mA) in the edit box on the display.
- 5. Set the input current to 20 mA.
- 6. Acknowledge by entering this value (20 mA) in the edit box on the display.
- 7. The screen responds with the message that the Analog Setpoint Calibration has finished.

Angle Calibration

Angle calibration is needed whenever the printed wiring board or the potentiometer is replaced. This operation is typically done on the bench and may require special tools and removal of the positioner from the valve. Refer to MI EVE 0105A for more information.

- NOTE

This function is only allowed at workshop security level.

The procedure to perform an Angle calibration is:

- 1. Select Angle from the Adjust set value menu.
- 2. The feedback lever is rotated to the lower angle value (typically 45° down from horizontal).
- 3. Acknowledge by entering the lower angle value into the edit box on the display.
- 4. The feedback lever is rotated to the upper angle value (typically 45° up from horizontal).
- 5. Acknowledge by entering the upper angle value into the edit box on the display.
- 6. The screen responds with a message that the Angle Calibration has finished.

Temperature Calibration

Temperature calibration is needed whenever the printed wiring board is replaced. The function calibrates the temperature of the internal electronics module. It is intended to be performed on the bench. A temperature probe and other special tools are required. Refer to MI EVE 0105A for more information.

- NOTE

This function is only allowed at workshop security level.

The procedure to perform a Temperature Calibration is:

- 1. Select Temp from the Adjust set value menu.
- 2. After selecting **Continue** to proceed, measure the electronics temperature with a probe.
- 3. Enter this value in the edit box on the display and select Continue.

The temperature calibration is finished.

Position Feedback Calibration

This function performs calibration of the output of the position feedback option board. This is typically done on the bench and may require special tools and special electrical connections. This function is accessed by selecting Pos Feedback from the Adjust set value menu. Refer to MI EVE 0105A for more information.

— NOTE -

This function is only allowed at workshop security level.

Air Supply Pressure Calibration

Air Supply Pressure Calibration is needed whenever the printed wiring board is replaced. This operation is typically done on the bench and may require special tools. Refer to MI EVE 0105A for more information.

This function is only allowed at workshop security level.

The procedure to perform an Air Supply Pressure Calibration is:

- 1. Select Air Supply from the Adjust set value menu.
- 2. Regulate the air supply to the LOW supply pressure value.
- 3. Enter this value in the edit box on the display and select Continue.
- 4. Regulate the air supply to the HIGH supply pressure value.
- 5. Enter this value in the edit box on the display and select Continue.

The Air Supply Pressure Calibration is finished.

Output Pressure Calibration

Output Pressure Calibration is needed whenever the printed wiring board is replaced. This operation is typically done on the bench and may require special tools. Refer to MI EVE 0105A for more information.

— NOTE -

This function is only allowed at workshop security level.

The procedure to perform an output pressure calibration is:

- 1. Select Output Pressure from the Adjust set value menu.
- 2. Using the pushbuttons, set the setpoint to 0%.
- 3. Check the pressure gauge attached to the output port of the positioner. Enter this value in the edit box on the display and select Continue.
- 4. Using the pushbuttons, set the setpoint to 100%.
- 5. Check the pressure gauge attached to the output port of the positioner. Enter this value in the edit box on the display and select Continue.

The Output Pressure Calibration is finished.

Restore Valve-Specific Parameter

This function allows writing of valve specific parameters into the positioner. By reading the data file of one positioner mounted to a valve and writing these values into a new positioner, the new positioner is adopted to that valve without performing an Autostart Calibration. However, due to mechanical tolerances in mounting, the adoption is not optimal. Therefore, performing a new Autostart Calibration or Endpoint Calibration is required as soon as possible. This function is accessed by selecting Restore Valve-Specific Parameter from the Adjust set value menu.

Restore Factory Settings

This function resets all calibration and configuration data back to the calibration and configuration data existing at time of delivery from the factory. The valve's current database is overwritten. This function is useful, for example, when a positioner is taken from one valve and mounted to another valve. This function is accessed by selecting **Restore Factory** from the **Adjust set value** menu.

- NOTE -

This function is only allowed at workshop security level.

Mode Change

You can perform the following mode changes on the positioners: On-Line, Off-line, Local Mode, Factory, and Calibrate. Use the following path to access this function:

```
Device > Additional functions > Commands > Mode Change
```

On-Line

This function sets the device into the on-line mode where normal control is performed. The positioner allows a digital or analog setpoint depending on the configuration of the set-point source.

Off-Line

This function sets the device into the off-line mode where normal control is **not** performed. The pneumatic output is frozen to the last value of the pneumatic output before performing this function.

Local Mode

This function sets the device into the local mode. Local mode is similar to on-line mode where normal control is performed. However, the positioner does not follow the digital or analog setpoint from the I/A Series system. It follows the digital setpoint from the Field Device Tool.

I

Calibrate

This function sets the device into calibrate mode.

Factory

This function is for use by Global Customer Support personnel only.

Reset Status

This function resets all current and historical status fields including the Diagnostic Status fields. It is accessed via the following path:

```
Device > Additional functions > Commands > Reset Status
```

- NOTE -

If an underlying problem has not been corrected, the failure bits will be reasserted almost immediately.

Reset Counters

This function resets the Cycle Count and Travel Sum parameters. his causes the device to be taken off-line for a short period which can cause a process upset. It is accessed via the following path:

```
Device > Additional functions > Commands > Reset Counters
```

Reset Device

This function causes the positioner to be rebooted. It is accessed via the following path:

```
Device > Additional functions > Commands > Reset Device
```

The device behaves as if the power supply were switched off and on. This can cause a process upset.

Write Protect

This function enables or disables write protection for valve parameters. If Write Protect is enabled, the positioner is write protected and inadvertent changing of positioner configuration data is prevented. This function is accessed via the following path:

```
Device > Additional functions > Commands > Write Protect
```

Configuration

Identifier Tab Screen

<0,	>SRD991	(FoxCom) # Par	ameter	<u>- 🗆 ×</u>
Identi	ifier Parameters	Configuration Ch	aracterization Travel Alarms Tuning Options	
	Device :	SRD991	Date of Manufacture : 5/16/1997	
	Serial Number :	35330	Last Calibration : 2/3/2000	
	Firmware Version	n: 8.252		
	Tag Number :		Device Name : DevNam	
	Tag Name :		Location : Instr Location	
Sa	ave Save a	nd Download	Cancel	

Figure 88. Sample SRD991 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the positioner configuration filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter DevNam.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Parameters Tab Screen

<mark>📭</mark> <0, >SRD991 (FoxCom)	# Parameter	<u>- </u>
Identifier Parameters Configuration	on Characterization Travel Alarms Tuning Options	
Messages	Model Code	-
Message 1: Message 1	Instrument: BFMS	
Message 2: Message 2	Serial Number	
Message 3: Message 3	Actuator: ACT SERIAL NUM	-
Information	Valve: VALVE SER NUM	-
Calibration: Message 5		
Maintenance: Message 4		
Fab. Number: 71/140892		
HW Rev: 0		
Save Save and Downloa	d Cancel	

Figure 89. Sample SRD991 Parameters Tab Screen

Field	Entry
Messages 1, 2, and 3	Enter up to three messages, each up to 14 characters long.
Model Code	
Instrument	Displays the factory entered positioner model code.
Information	
Calibration	Enter calibration info message (14 characters maximum).
Maintenance	Enter maintenance message (14 characters maximum).
Fab. Number	Displays a factory entered identification number.
HW Rev.	Displays the factory entered hardware revision level.
Serial Number	
Actuator	Enter actuator serial number.
Valve	Enter valve serial number.

Configuration Tab Screen

	991 (FoxCom) # Parameter			_ 🗆 🗙
Identifier Paramete	ers Configuration Characteriza	tion Travel	Alarms Tuning 0	ptions
Type :	Globe	Setpoint	Digital	•
Power Up :	Online 💌	High :	20.0000 mA	
Actuator Action :	Single	Low :	4.0000 mA	
Spring Type :	Closes	Fail Safe		
Valve Stem Movement :	Linear/Left Mounted	Config :	Hold	•
Control Action :	Direct Acting	Setpoint:	0.0000]%
	C Reverse Acting	Timeout :	30.0000	Sec.
Save Sav	ve and Download Cancel			

Figure 90. Sample SRD991 Configuration Tab Screen

Field	Entry
Туре	Select Globe, Rotary Plug, Butterfly, Ball, or Diaphragm.
Power Up	Specify whether you want the valve to start in Fail-safe mode or fully On-line.
Actuator Action	Select Single or Double.
Spring Type	Specify whether the valve Closes or Opens with a spring or None if no spring exists.
Valve Stem Movement	Specify Linear/Left Mounted, Linear/Right Mounted, Rotary/Counterclockwise, or Rotary/Clockwise.
Control Action	Specify Direct or Reverse Acting.
Setpoint	
Source	Select Analog, Analog High (4800 Baud), or Digital.
High	If Analog, enter value at high end of mA range (20 mA max).
Low	If Analog, enter value at low end of mA range (4 mA min).
Fail-Safe	
Config.	Fail-safe occurs when no setpoint command is seen in the timeout specified below. Select the fail-safe condition: De-Energize (positioner exhausts all air in the actuator) Hold (last valve position) Fallback (send to position specified in next field).
Position	If Fallback, enter position in percent.
Timeout	Enter Timeout in seconds (0 means none).

Characterization Tab Screen

	oxCom) # Parameter			<u>- </u>
Identifier Parameters Co	nfiguration Characterization	Travel Alarms	Tuning Options	
Characterization: Lin Custom Curve X-Value 0.0000 100.0000	vear ▼ Y-Value 0.0000 100.0000	Current Number F X-Value: Y-Value:	Pair of Values: 2	*
Save Save and	Download Cancel			

Figure 91. Sample SRD991 Characterization Tab Screen

Characterization: Select Linear, Equal Percentage (1:50), Quick Open (50:1), or Custom.

Custom Curve: Allows you to enter a custom curve consisting of up to 22 points (X/Y pairs).

To add a new pair of values, select Custom, enter the X- and Y-Values and press Add. The input value pair is sorted in increasing order of the X-Values.

To modify a value pair, select the X-Value in the list box, modify the values displayed in the edit boxes, and press Modify.

To delete a value pair, select the X-Value in the list box and press Delete.

A custom curve which is stored in the device can be activated by selecting Custom or deactivated by switching to Linear, Equal Percentage (1:50) or Quick Open (50:1).

Travel Tab Screen

na <0, >5RD991 (FoxCom) # Parameter	
Identifier Parameters Configuration Characterization	Travel Alarms Tuning Options
Response Time	Travel Stops
Measured T63 Time 0-100 % 1.0000 Sec	Lower: 0.0000 %
Measured T63 Time 100-0 % 1.0000 Sec	Upper: 100.0000 %
Cutoff Cutoff Deadband: 0.0050 % Cutoff 0%: 2.0000 % Cutoff 100%: 100.0000 %	Travel Position Units mm Inches Degrees
Save Save and Download Cancel	Stroke : 32.0000 Deg.

Figure 92. Sample SRD991 Travel Tab Screen

Field	Entry
Response Time [Limit]	
Measured T63 Time 0-100%	Displays the time it took for the valve to travel 63% of its full stroke in the increasing direction during Autostart.
Measured T63 Time 100-0%	Displays the time it took for the valve to travel 63% of its full stroke in the decreasing direction during Autostart.
Cutoff	
Cutoff Deadband	Enter the amount of hysteresis in percent of travel required above the cutoff value before the valve can reopen again. For example, with 2% cutoff, 0.5% cutoff hysteresis allows the valve to reopen at 2.5%.
Cutoff %	Enter the value in percent of travel below which the valve is fully closed. For example, when set at 2%, any signal below 2% is treated as 0%.
Cutoff 100%	Enter the value in percent of travel above which the valve is fully open.
Travel Stops	
Lower	Enter lower travel stop in percent of total stroke.
Upper	Enter upper travel stop in percent of total stroke.
Travel Position Units	Select mm, Inches, or Degrees
Stroke	Enter the stroke in the units specified.

Alarms Tab Screen

👡 <0, >SRD991 (FoxCom) # Paramete	ir 📃 🗆 🗙
Identifier Parameters Configuration Characteri	zation Travel Alarms Tuning Options
Position High High Alarm : 110 🕺	Temperature Units O Fahrenheit
High Alarm : 110 🕺	Temperature
Low Alarm : 10 %	Lower Limit : -20 C
Low Low Alarm : 10 %	Upper Limit : 80 C
Alarm Deadband : 1 %	Travel Sum
Control Difference	Deadband : 1 %
Limit : 5 %	Full Strokes Limit: 90000000 Full Strokes
Time : 60 Sec.	Cycle Count Limit : 90000000 Cycles
Save Save and Download Cance	el

Figure 93. Sample SRD991 Alarms Tab Screen

Field	Entry
Position	Allows setting position limits at which alarms are triggered.
High High Alarm	Enter high high (full) alarm position in percent of stroke.
High Alarm	Enter high (warning) alarm position in percent of stroke.
Low Alarm	Enter low (warning) alarm position in percent of stroke.
Low Low Alarm	Enter low low (full) alarm position in percent of stroke.
Alarm Deadband	Enter alarm deadband in percent of travel.
Control Difference	Allows setting an alarm when the actual position varies from the setpoint by a specified amount for a specified time.
Limit	Enter the amount in percent of travel.
Time	Enter the time in seconds.
Temperature Units	Select Celsius or Fahrenheit.
Temperature	Displays temperature limits of the positioner in units specified on the Units Tab screen.
Lower Limit	
Upper Limit	
Travel Sum	Allows setting alarms on total stroke for maintenance purposes.
Deadband	Enter deadband in percent of stroke. Small movements below this value are not included in the travel sum.
Full Strokes Limit	Enter the alarm condition in number of full strokes. Partial movement larger than the deadband value are included in this total (for example, four 1/4 strokes are counted as one full stroke).
Cycle Count Limit	Enter the alarm condition in number of cycles. Each cycle is a change in value direction, any movement up or down, which exceeds sensitivity of the device.
Tuning Tab Screen

	991 (FoxCom) # Para	ameter			_ 🗆 ×
Identifier Paramete	ers Configuration Cha	aracterizatio	n Travel Alar	ms Tuning Op	tions
-Increasing Po	sition		-Decreasing Pos	sition	
Proportiona Gain	2.0000		Proportional Gain:	15.0000	
Integral	: 2.7000 S	Sec.	Integral :	7.5000	Sec.
Derivative	: 0.0000 S	Sec.	Derivative :	0.0000	Sec.
- Travel Time L	imits				
Increasing :	0.4000 S	Sec.	Control Gap :	0.1000	%
Decreasing :	0.4000 S	Sec.		<u>S</u> et Setpoint	
Save Sar	ve and Download	Cancel			

Figure 94. Sample SRD991 Tuning Tab Screen

Field	Entry				
Increasing Position					
Proportional	Enter proportional gain value.				
Integral	Enter reset time in seconds.				
Derivative	Enter derivative time in seconds.				
Decreasing Position					
Proportional	Enter proportional gain value.				
Integral	Enter reset time in seconds.				
Derivative	Enter derivative time in seconds.				
Travel Time Limits					
Increasing	Entering values higher than the defaults slows down response. Trave				
Decreasing	time limits are used to modify control valve dynamics.				
Control Gap	Control gap defines the sensitivity of the positioner so that no corrective action is taken if the control difference is less than the defined limit.				

Pressure Tab Screen

🚤 <0, >SRD991 (FoxCom) # Parameter 📃 🔲							
Identifier	Parameters	Configuration	Characterizatio	on Travel	Alarms		
T	Tuning 0;		ions	Pressu	re		
Output 1 Pressure Units			Air Supply Press. Units				
O psig			O psig				
O kPa			O kPa				
💿 bar			• bar				
(Positioni	ng) Output 1 Pressi	ure Scaling	Air Supply Pressur	e Scaling			
	Low: 0.0000	bar	Low:	0.0000	bar		
F	ligh: 6.0000	bar	High:	6.0000	- bar		
	,		Lower Limit:	0.5000	bar		
Save Save and Download Cancel							

Figure 95. Sample SRD991 Pressure Tab Screen

Field	Entry			
Output 1 Pressure Units	Select psig, kPa, or bar.			
Air Supply Pressure Units	Select psig, kPa, or bar.			
(Positioning) Output Pressure Scaling				
Low	Enter low limit for output pressure sensor. Default is 0 psig.			
High	Enter high limit for output pressure sensor. Default is 87 psig (6 bars).			
Air Supply (Pressure) Scaling				
Low	Enter low limit for supply pressure sensor. Default is 0 psig.			
High	Enter high limit for supply pressure sensor. Default is 87 psig (6 bars).			
Lower Limit	Enter the value for supply pressure below which an alarm is triggered.			

Options Tab Screen

😋 <0, >SRD991 (FoxCom) # Parameter	
Identifier Parameters Configuration Characterization Travel Alarms Tuning Options	
Option Board Internal Pressure Sensors	
No External Option	
C External Position Transmission	
C External Binary Input	
External Binary Output	
C External Analog Sensor	
Save and Download Cancel	

Figure 96. Sample SRD991 Options Tab Screen

Field	Entry
Option Board	Select from the following: No External Option External Position Transmission External Binary Input External Binary Output External Analog Sensor
Internal Pressure Sensors	Select or deselect internal pressure sensors.

Bin In Tab Screen

👡 <0, >SRD991 (FoxCom) # Parameter				
Identifier Parameters Configuration Characterization Travel Alarms Tuning Options	Bin. In			
Configure Binary Input Signals Input 1 active:				
NOTE: If both inputs are enabled AND both of them are active, then the positioner will hold last value.				
Save Save and Download Cancel				

Figure 97. Sample SRD991 Bin In Tab Screen

The Binary Input option features two independent binary inputs with internal supply for connection of sensors. A connected switch is loaded with 3.5 V and 0.15 mA.

Using the Bin In Tab screen, you can configure an active signal to activate an alarm or force the actuator to go to 0% or 100%.

Bin Out Tab Screen

🚤 <0, >SRD991 (FoxCom) # Parameter							
Identifier	Parameters	Configuration		Characteriza	ition	Travel	Alarms
T	uning		Options			Bin, Uut	
Binary Output 1			[- Binary Outp	ut 2		_
	utput active> HIG	H Current		O Output	active -	-> HIGH Curre	nt
0 0	utput active> LOV	V Current		Output	active -	-> LOW Curre	nt
Set Output Signal active for				Set Output	t Signal -	active for	
Пн	iHi Alarm			🔽 HiHi Al	larm		
🗖 Hi Alarm				💌 Hi Aları	m		
🗖 Lo Alarm				🔲 Lo Alar	rm		
🗖 LoLo Alarm				🔽 LoLo A	Marm		
Save	Save and Downl	oad C	ancel				

Figure 98. Sample SRD991 Bin Out Tab Screen

The Binary Output option enables you to define which alarm activates the binary input.

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Invensys Systems, Inc. 38 Neponset Avenue Foxboro, MA 02035 United States of America http://www.fielddevices.foxboro.com



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