Technical bulletin 195 RTD measurement performance specification deviation

	Totalflow products	Doc name:	Technical bulletin 195
File name:	2104787TBAA-TB195.docx	Document Title:	RTD measurement performance specification deviation
Distribution:	External public	Issued by department:	Totalflow customer service
Date:	2/25/2013	Language:	En
Revision:	Rev. AA	Creator name:	USJAEST
Page:	1/17	Contact:	+1 918.338.4888 or 800.442.3097 (opt. 2)
Status of document:	Released		

Proprietary information





1. Introduction

It has been discovered that not all of the released μ FLO^{G4} and XFC^{G4}6200/6201EX units meet the published temperature accuracy specifications over the full operating temperature range. Approximately one fourth of shipped μ FLO^{G4} units and one half of XFC^{G4}6200/6201EX units will register flowing temperature within our published specification: ±0.35°F over a normal operating range of -40°F to +140°F, (with field bias applied) excluding the uncertainty of the RTD element itself.

2. Description

The µFLO^{G4} and XFC^{G4}6200/6201EX units are designed to utilize a small electronic board (about the size of a stamp) that acts as an interface between the main electronics board and the internal pressure sensors and RTD input. Extensive testing has confirmed that there are two issues that adversely affect the RTD (temperature) measurement.

First, as shipped from the factory, a nominal ~2 degrees F bias may be needed on existing μ FLO^{G4} units and ~0.5 degrees F on XFC^{G4}6200/6201EX units when first commissioning the units. We recommend that, upon installation, the temperature reading be verified against a reference temperature and the RTD bias be adjusted to agree with the reference temperature.

Second, performance outside our published specification of: $\pm 0.35^{\circ}$ F over a full operating range of -40° F to $+140^{\circ}$ F may be observed on some units and conditions.

Both of these issues are being corrected for new factory units. Please refer to Section 5 Supplemental Information beginning on page 15 for additional Information.

3. Is your product impacted?

Units with software versions older than those listed in the following table will require updating.

Product Model	Software:	Versions to upgrade:	
	Operating System	2104464-006 or older	
μFLO ^{G4}	FLASH (US)	2104497-012 or older	
	FLASH (Selectable Units)	2104498-012 or older	
	Operating System (16 MB)	2104154-012 or older	
	Operating System (32 MB)	2104447-005 or older	
XFC 6200/6201EX	FLASH (US)	2104159-026 or older	
	FLASH (Selectable Units)	2104158-026 or older	

Table 3-1. Impacted products

3.1. Verifying software

1. Identify the WINCE Software Number and Flash, by connecting to the meter with PCCU. Go to the Entry Mode and choose the Registry tab. The example below shows where the Operating System and Flash part numbers are located.

tq. PCCU32 - [Entry]			
Operate View Window He	p		
🗑 🚟 🖫 💽 💽	ŭ n 1 5	Terminel 📷 🐼 Archive 과 🛄 🎆	Setup 🧇
	Station Satur	Applications Applicanting Descurses Sustanting of	equrity Lee Registry
Communications	Station Setu	Applications Applicensing Resources System Log S	
- Totalflow - USB		Description	
MMI Serial - COM0	0.9.10	Software Build Date/Time	07/22/2010 23:59:50
TF Remote - COM1			
Spare - COM2	0.0.0	Board Part #	2102838
Flow Measurement	0.0.1	Software Number	2102861-028
Setup	0.0.2	Software Description	Totalflow 32 Bit XFC
- Analysis Divital Outputs	0.0.18	WINCE OS Software Number	2104445-003
No Flow	╽┝───╉		
Adv Setup	0.12.0	Factory Configuration	29
Holding Registers		Available Applications	Revision
E. operations	0.12.1	System	2103280-003
	0.12.1	Communications	2404303 003
	0.12.2		2101303-003
	0.12.3	I/O Interface XSeries	2103134-002

3.2. Background on software

When the operating system is upgraded, a system cold start could result due to differences between the new OS and the previous OS. Using the procedure in this document will allow the customer to upload the tfData and restore it to the device after the OS has been replaced.

Note: It is highly recommended to collect all data and save the configuration before the following procedures.

4. Resolution

A retrofit kit is available that will correct these issues for any existing μ FLO^{G4} or XFC^{G4}6200/6201EX units. Three steps are required to properly implement the retrofit:

- 1. Update the OS (see table 4.1 for new versions)
- 2. Update the flash (see table 4.1 for new versions)
- 3. Insert the new cable with the resistor (Part number 2104738-001) using the following instructions depending upon the product model.



Note: ALL 3 STEPS MUST BE TAKEN in order to correct the issue. It's especially important to note that installing the new cable without updating the flash and the OS will cause the temperature readings to be more skewed, so do not do this.

Table 4-1. Upgrade versions

Product Model	Instructions	Software:	Versions to upgrade to:	
		Operating System	2104464-007 or newer	
µFLO ^{G4}	4.4	FLASH (US)	2104497-013 or newer	
		FLASH (Selectable Units)	2104498-013 or newer	
XFC ^{G4} 6200/6201EX	4.5	Operating System (16 MB)	2104154-013 or newer	
		Operating System (32 MB)	2104447-006 or newer	
		FLASH (US)	2104159-027 or newer	
		FLASH (Selectable Units)	2104158-027 or newer	

4.1. Uploading tfData using 32Bit Loader

NOTE: It is highly recommended to collect all data and save the configuration before the following procedure.

 Select your Device Type (FC for uFLO^{G4} or ExFC for EX6200/6201^{G4}), Update mode, and select "Upload tfCold/tfData" and click "Start". Follow the instructions on the screen, and the loader will save your data. When the Loader finishes, it will show "Operation Complete". If this method fails, a cold start may be necessary. (This may be due to excessive corruption in the unit).

PCCU32		3
Operate View Window Package Help	- 8	×
f 📅 🛅 💽 💽 🦄	🛃 🗛 Trainit 🌃 🔤 🕸 🕼 🖉	
Multiple File Package Select		
Package \\usbvo-s-file001\Groups\BVD-A	IPA-ALL\RandD\Testing\Mcv Testing\Beta\2104447(G4 EXFC32 OS)\110711_A\2104447-001EX' 🔻 📄	
◯ FC ◯ XFC ◉ ExFC ◯ XRC ◯ NGC	Windows CE	
🖲 Update 🔘 Reload	\\usbvo-s-hieU01\Groups\BVO-ATPA-ALL\DV&S\Staging\2104447-002(G4 ExFC32 OS)\1201 💌 📖	
Shutdown Flash		
☑ Upload tfCold/tfData	\\usbvo-s-rileUUT\taroups\BVU-ATPA-ALL\UV&S\Staging\Lompleted[Temporary save]\21044 ▼	
🔲 Download Windows CE	ISaGRAF Runtime	
Reset Device	▼	
Download Flash	Configuration Files	
Restore tfCold/tfData		
🗖 Start Flash		
04/26/12 14:53:12 Uploading \trackSecurity.log 04/26/12 14:53:12 Uploading \trackSecurity.log		
04/26/12 14:53:12 Oploading \trData\Comm-1\Comm 04/26/12 14:53:12 Uploading \tfData\System.log	icrg	
04/26/12 14:53:12 Uploading \tfData\Startup.log 04/26/12 14:53:12 Uploading \tfData\Suconvert\Uni	it_tab.ini	
04/26/12 14:53:12 Uploading \tfData\suconfig.ini 04/26/12 14:53:12 Uploading \tfData\System.cfg		
04/26/12 14:53:12 Uploading \tfData\appTable.cfg	-	
04/26/12 14:53:12 Operation Complete	=	
Connection Network - 169.254.	0.11 - Start Stop Close Help	
Ready	Not Connected to Device	

2. The device's data will be placed into a subdirectory of PCCU named 'Upload':

The other	1 Napitalipi		The specific sector			
Comput	eer ▶ Local Disk (C:) ▶ Totalflo	w ▶ PCCU ▶ Upload ▶	▼ 4 ₂	Search Upload	1	م
Organize 👻 👸 Oper	n 🛛 Include in library 👻 🛛 S	hare with 🔻 🛛 Burn	New folder			
🌗 Simulator (N	NGC)	Name	Date modified	Туре	Size	Attribut
ル spreadsh		Elash	4/26/2012 2:53 PM	File folder		D
StationLogs		tfData	4/26/2012 2:53 PM	File folder		D
J TFModbus		PartNumber	4/26/2012 2:53 PM	File	1 KB	A
📕 trends						
📕 Upload						
퉬 UploadFiles						
🌗 vasdir	-	•				

3. Please note the current Network configuration and IP address of the device. If you have a different IP than the default 169.254.0.11, it will need to be re-entered, after the OS is replaced.

4.2. Upgrade the OS and Flash

When the operating system is upgraded, a system cold start could result due to differences between the new OS and the previous OS. Using this procedure will allow the customer to upload the tfData and restore it to the device after the OS has been replaced.

 Using the 32 Bit Loader, verify correct device type is selected, select Reload and enter the new OS file in the Windows CE line and the updated Flash in the Flash line, and choose Start. (Follow the instructions on the screen). The Download will start and show a progress bar across the bottom of the screen.

C-VPCCU725\05\2102900-012D<	¢	
(CACCUTENDA ENGINE AND	RG	
FC & XFC EXFC XRC NGC	Windows CE	
	CVPCCU725VPackageRan42104445-003EX xtb:32VNk bin	
🔿 Update 👒 Reload		
Shutdown Elach	Flash	
Download Windows CF	C-VPCU725VPackageRais/2102861-043DCxdcVTotAllow exe	
Reset Device	The second s	
🕑 Download Flash	ISASKAP Kuntine	
Download ISaGRAF Runtime		
Delete tfData Directory	Configuration Files	
Delete troold Directory	CAPCO 1228/ParkaseBask2102880/05/do strATECode	
Start Flash		

2. If you are not utilizing IP connectivity for PCCU, skip to Step 6.

3. If you are utilizing IP connectivity for PCCU, in order to restore the IP address (after the OS and Flash are upgraded), connect to the device serially via the USB or MMI port and check or set the Network configuration.

TOTALFLOW	Communica	tion Setup Network	🦏 III) 🖏 ⊗
- Totalflow/TCP - Totalflow/USB		Description	Value
- Totalflow/COM0:	0.0.15	Network ID	G4-ExFC
E I/O Interface	0.9.7	Enable DHCP	lio
E SUAGA3-1	0.0.12	IP Address	(169.254.0.11)
E SUAGA7-1	0.0.13	DNS Server	0.0.0
Display	0.0.14	WINS Server	0.0.0
	0.0.17	Default Gateway	0.0.0.0
	0.0.16	Subnet Mask	255.255.0.0
	0.7.21	Network Adaptor	Enable
	- Demod] = v	

4. The device must be reset again before the IP address will take effect. You can do this from the top level Station Setup screen by selecting System Shutdown/then Reset, choose "yes" and send:

PCCU32 - [Entry]	-	-		x
Derate View Window Help			-	Б×
📶 🛅 🔂 💽 💽 🧤		🛃 🔜 🛅 🜃 🗇 🛄	sevup 🧇	
TOTALFLOW	tation Setu	UP Applications App Licensing Selectable Units	Setun Resources Systemion Securityion Registry	
- Communications - Totalflow/TCP		Populations Populations Science on the	Resources System cog Security cog Regsult	
Totalflow/USB		Description	Value	
Totalflow/COM0:		Security		
iii-I/O Interface	0.0.6	Security Code Level 1		
E- Flow Measurement	0.0.7	Security Code Level 2		
E SUAGA7-1	0.7.3	Security Switch Status	Off	
i∎- Display		Sleep Mode		
	0.10.2	Remote Comm Cutoff Voltage	11.90	
	0.10.3	Sleep Mode Entry Voltage	10.90	
	0.8.8	Sleep Mode Hold-off Time (sec)	120	
	0.9.11	Wake Up Time	02:00:00	
	0.7.14	Wake Up Time Mode	Time from Start of Sleep	
		Lithium Battery Status		
0.7		Lithium Battery Status	ок	
		Low Charger Alarm Enable		
	0.7.22	Low Charger Alarm	Enabled	
	0.7.0	Low Charger Alarm State	Not In Alarm	
		Backup		
	0.21.0	Update Cold Start Configuration	No Operation	
		System Startup/Shutdown		111
	0.9.5	Last System Boot Date/Time	04/26/2012 15:26:33	
	0.7.4	System Shutdown	No	
	0.7.5	System Shutdown / then Reset	No	
		LCD Display Date/Time Format		
	0.7.15	Date/Time Format	mmddyy hhmmss	
	0.7.16	Date Separator	Slash /	
	0.7.17	Time Separator	Colon hh:mm:ss	
			•	
	<u>R</u> e-read	Monitor	Erint Screen Save Send Gose Help X Help X	R.
Ready		#Po	olls: 10 #Errors: 0 Connected to 169.254.0.11 Login: TFlow	

- 5. Once the device has reset and network connectivity is established, close the screen.
- 6. Using the 32Bit Loader, select the Device Type and Reload Mode. Check the boxes for Shutdown Flash and Delete tfData Directory as shown below:

Nu PCCU32	And have been seen and the second sec	
Derate View Window Package Help		-
💼 🛅 🛅 💽 💽 🦌 🎄	5 🛃 🛅 🖼 🚳 🎲 🖃 🛄 🥸	-716
Multiple File Package Select		
C:\PCCU725\0S\0S Upgrades 9	+2012\New 16M OS\16M OS\2102900-015EX.xfc	- I [
◯ FC	Windows CE	
	C:\PCCU725\PackageRaw\2104445-003EX.xfc32\Nk.bin	•] [
🔘 Update 💿 Reload		
Shutdown Flash	Hash	
Download Windows CE	C:\PCCU725\PackageRaw\2102861-047EX.xfc\Totalflow.exe	▼] [
Reset Device	ISSPAC Bustime	
🗖 Download Flash	I SAURHF RUILLINE	
🔲 Download ISaGRAF Runtime		•
☑ Delete tfData Directory	Configuration Files	
Delete tricold Directory		- 1
Start Flash	Le. 4-ccb7254-ackagenaw/35059550.xic/1+c0lu/	• (

7. After selecting the above boxes, the following screen will appear:

Delete TfD	lata?
	This operation will will result in a Cold Start using the contents of TfCold. The contents of TfCold will be copied to TfData. Do you still want to Delete TfData?
	Yes No

- 8. Choose yes, then choose Start. (Follow the instructions on the screen).
- 9. When the data is deleted, the comment "Operation Complete" will appear.

4.3. Restoring tfData using 32Bit Loader

1. Verify that the proper device type is selected. Restore tfData on the device by selecting 'Update' mode. Check the boxes for Shutdown Flash, Restore tfCold/tfData, and Start Flash.

Multiple File Package Select	
C:\PCCU725\OS\OS Upgrades 9	-2012\New 16M OS\16M OS\2102900-015EX.xfc
⊙ FC ● XFC ○ ExFC ○ XRC ○ NGC	Windows CE
💿 Update 🛛 🔿 Reload	C:\PCCU725\PackageRaw\2104445-003EX.xfc32\Nk.bin
☑ Shutdown Flash □ Upload tfCold/tfData	Flash C:\PCCU725\PackageRaw\2102861-047EX.xfc\Totalflow.exe
Download Windows CE Reset Device	ISaGRAF Runtime
🗌 Download Flash 🕅 Download ISaGRAF Runtime	Configuration Files
✓ Restore tfCold/tfData ✓ Start Flash	C:\PCCU725\PackageRaw\95095-9950.xfc\TFCold\

2. The following screen will appear: Choose Yes, then choose Start.

Restore tfC	old/tfData
4	This operation is provided for those rare occasions when an update of the operating system requires a reformat of the file system(s). It is usually not required or recommended! Do you still wish to restore tfCold/tfData?
	Yes No

- 3. Once tfData is restored, close the 32Bit Loader and press the reset button on the board to start the unit.
- 4. Connect to the device using PCCU.

5. Choose 'Update Cold Start Configuration' from the top level 'Station Setup' Screen. Select 'Delete and Re-Create tfCold' option from the drop down box and Send.

Entry					
- TOTALFLOW	Station Set	ID Analizations Analization Dattern Teforms	For Description Contraction Constitution Desirbut		
- Communications	Station Sed	Applications App Licensing Battery Informa	tion Resources System Log Security Log Registry		
Totalflow/TCP		Description			
Totalflo - /COM0:	0.0.4	Station ID	TOTALFLOW		
TF Remote - COM1:	0.0.5	Location	2104492-002		
	0.9.0	Date/Time	08/30/2012 12:26:00		
Setup	0.9.0	Set Device with PCCU Date/Time	No		
- Analysis		Security			
Digital Outputs No Flow	0.0.6	Security Code Level 1			
Adv Setup	0.0.7	Security Code Level 2			
🛓 Display	0.7.3	Security Switch Status	Off		
		Sleep Mode			
	0.10.2	Remote Comm Cutoff Voltage	11.90		
	0.10.3	Sleep Mode Entry Voltage	10.90		
	0.8.8	Sleep Mode Hold-off Time (sec)	120		
	0.9.11	Wake Up Time	02:00:00		
	0.7.14	Wake Up Time Mode	Time from Start of Sleep		
		Lithium Battery Status			
	0.7.10	Lithium Battery Status	ОК		
		Low Charger Alarm Enable			
	0.7.22	Low Charger Alarm	Enabled		
	0.7.0	Low Charger Alarm State	In Alarm		
		Backup			
	0.21.0	Update Cold Start Configuration	Delete and Re-Create TfCold		
		System Startup/Shutdown			
	0.9.5	Last System Boot Date/Time	11/25/1934 08:05:04		
	0.7.4	System Shutdown	No		
	0.7.5	System Shutdown / then Reset	No		
		LCD Display Date/Time Format			
	0.7.15	Date/Time Format	mmddyy hhmmss		
	0.7.16	Date Separator	Slash /		
	0.7.17	Time Separator	Colon hh:mm:ss		

4.4. Installing the Cable in a μFLO^{G4}

1. Unplug all of the cables from the board except for the lithium battery (shown below). Keep the lithium battery plugged in throughout this process.



2. Remove the 3 screws and 1 hex nut shown below.



3. Remove the 6 hex nuts.

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4. Detach the Sensor cable from the board.



5. Attach the new cable between the existing sensor cable and the electronics board.



6. Tuck the cable into the hole. Make sure the EMI gasket is back in place within the ridges around the hole.



7. Reassemble.

4.5. Installing the Cable in a 6200/6201EX^{G4}

1. Unscrew the enclosure front cover.



2. Gently pull the face plate off the board.



3. Gently pull the board forward, taking care not to disconnect the lithium battery (circled below).



4. Disconnect the sensor cable from the electronics board



5. Insert the new cable between the existing sensor cable and the electronics board.



6. Reassemble the unit.

5. Supplemental Information

uFLO^{G4} and XFC^{G4} 6200/6201EX RTD Input Issue Notification

At ABB Totalflow, we continually strive to provide the best products at competitive prices. The new μ FLO^{G4} and XFC^{G4}6200/6201EX are examples. As we continue to implement new features and applications, we introduce and perform additional testing of our products. Ongoing testing has revealed that not all μ FLO^{G4} and XFC^{G4}6200/6201EX units will meet the published temperature accuracy specifications over the full temperature operating range. This notification is to inform you, our valuable customers, of this situation and provide a solution as needed.

Our testing indicates that a nominal ~2 degrees F bias may be needed on existing μ FLO^{G4} units and ~0.5 degrees F on XFC^{G4}6200/6201EX units when first commissioning the units. This is being corrected for all new production μ FLO^{G4} units. We recommend that, upon installation, the temperature reading be verified against a reference temperature and the RTD bias be adjusted to agree with the reference temperature.

Also, based on a random sampling and extensive laboratory controlled temperature testing of factory units, approximately one fourth of shipped μ FLO^{G4} units and one half of XFC^{G4}EX6200/6201 units will register flowing temperature within our published specification: ±0.35°F over a normal operating range of -40°F to +140°F, (with field bias applied) excluding the uncertainty of the RTD element itself.

Our testing also indicates that both ambient temperature changes and process temperature changes affect the RTD input, and thus the flowing temperature derived by the flow computer. As the ambient temperature decreases from the ambient temperature at which the temperature bias verification was performed, the uncertainty increases. An increase in the ambient temperature will have minimal affects. Based on exhaustive testing of random sampling of factory units, the following tables have been developed that represent the units with the greatest RTD input uncertainty. These values reflect uncertainties comparable to current competitors.

RTD Input Performance¹ for all shipped µFLO^{G4} units

Type: 4 wire, 100 ohm, Class B, platinum element with alpha of 0.00385

Sensing Range: -80°F to +750°F

Maximum RTD Input Uncertainty (^o F) after Temperature Bias at Process Temperature ¹ (including linearity, hysteresis, repeatability and ambient temperature effects)								
Operating Range	0°F to 140°F				-40°F to 140°F			
Ambient	0°F	35ºF	70⁰F	100ºF	0°F	35⁰F	70ºF	100ºF
Temperature at time								
of bias verification								
Process Range ^o F								
-80°F to -40°F	±0.54	±0.39	±0.53	±0.64	±0.54	±0.60	±0.75	±0.86
-40°F to 0°F	±0.62	±0.44	±0.54	±0.67	±0.62	±0.62	±0.78	±0.91
0°F to 40°F	±0.69	±0.49	±0.58	±0.72	±0.69	±0.67	±0.85	±0.99
40°F to 120°F	±0.75	±0.66	±0.86	±1.01	±0.76	±0.98	±1.17	±1.33
120°F to 185°F	±0.89	±0.64	±0.85	±1.03	±0.89	±0.97	±1.20	±1.39
Typical Process								
50°F to 80°F	±0.76	±0.54	±0.59	±0.75	±0.76	±0.69	±0.89	±1.04

¹ Performance does not include the uncertainty of the RTD element

RTD Input Performance¹ for all shipped XFC^{G4} EX6200/6201 units

Type: 4 wire, 100 ohm, Class B, platinum element with alpha of 0.00385

Sensing Range: -80°F to +750°F

Maximum RTD Input Uncertainty (^o F) after Temperature Bias at Process Temperature ¹ (including linearity, hysteresis, repeatability and ambient temperature effects)								
Operating Range	0°F to 140°F				-40°F to 140°F			
Ambient	0°F	35ºF	70ºF	100ºF	0ºF	35⁰F	70ºF	100ºF
Temperature at time								
of bias verification								
Process Range ⁰F								
-80°F to -40°F	±0.55	±0.39	±0.36	±0.47	±0.55	±0.43	±0.58	±0.69
-40°F to 0°F	±0.62	±0.45	±0.39	±0.52	±0.62	±0.47	±0.63	±0.76
0°F to 40°F	±0.69	±0.50	±0.43	±0.57	±0.69	±0.52	±0.70	±0.84
40°F to 120°F	±0.77	±0.55	±0.53	±0.68	±0.77	±0.65	±0.85	±1.00
120°F to 185°F	±0.90	±0.65	±0.58	±0.77	±0.90	±0.71	±0.94	±1.12
Typical Process								
50°F to 80°F	±0.77	±0.54	±0.46	±0.62	±0.77	±0.56	±0.76	±0.91

¹ Performance does not include the uncertainty of the RTD element

µFLO^{G4} and XFC^{G4} EX6200/6201

Design changes to correct the RTD input issue outlined above, will be implemented on all units shipped from the factory no later than February 1, 2013. A retrofit/upgrade solution will also be available by February 1, 2013 to all customers who may choose to upgrade existing units. The upgrade consists of a small adapter board/cable that connects between the existing cable from the sensor and the main electronics board as well as new software. This is a field installed solution and no data should be lost. Full instructions will accompany the upgrade components.

<u>RTD Input Specification for all new µFLO^{G4} and XFC^{G4} EX6200/6201 units AND existing units that</u> <u>have had the upgrade installed</u>

Type: 4 wire, 100 ohm, Class B, platinum element with alpha of 0.00385

Process Temperature Range: -80°F (-62°C) to +750°F (399°C)

Accuracy² (including linearity, hysteresis, and repeatability): $\pm 0.35^{\circ}$ F (0.195°C) within $\pm 250^{\circ}$ F (140°C) of the normal operating process temperature (not to exceed Process Temperature Range limits)

Ambient Temperature Effects: not to exceed ±0.20°F (±0.12°C) per 50°F (28°C) change in ambient temperature

² Accuracy specifications do not include the uncertainty of the RTD element

Conclusion

We sincerely regret any inconvenience this may cause and will provide the upgrade parts for all existing units. Please contact your local sales person, customer service, or our order entry group to obtain the upgrade. Please provide the number of units needed, shipping address, name of company and specific contact name when contacting ABB Totalflow. Depending on the number of units requested, a shipping schedule may need to be arranged.

Preferred Contact Method: Order Entry at 800-442-3097 and press 1

Barry Baker

Barry Balzer. Product Manager, Flow Computers

6. Additional Information

Totalflow product customer service 7051 Industrial Blvd. Bartlesville, OK 74006 Phone: +01 918 338 4888 (option 3) Toll Free: +01 800 442 3097 (US only)

www.abb.us/totalflow