ABB Multivariable (XMV) with Totalflow XSeries Equipment

User's Setup Manual



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INTRODUCTION

This document describes the setup of an ABB Multivariable Transmitter (XMV) in Section I, the setup of the XSeries XFC or XRC flow computer in Section II, and the interconnection wiring in Section III.

I. XMV Setup

The ABB XMV measures Static Pressure, Differential Pressure and Process Temperature in a gas, vapor or liquid media. The XMV is a 2-wire RS 485 Modbus device with two additional wires required for power. It has a permissible terminal voltage range of 10.5 - 30 VDC. The current draw is 10 mA per XMV. The unit must be setup to operate with the XFC or XRC flow computers.

A. XMV Setup for Part# 1641020-xxx (with Display & Keys)

An optional "Push Button Key Unit" is located at the top of the XMV (see Figure 1–1). It is used to setup the configuration parameters in the XMV. To make the keys accessible, release the screw and flip protective cap aside. Pushing the key down with an instrument screwdriver activates the key. See the menu tree below in Table 1–1.

With the mode key "M", you can start the menu-controlled programming. To call the next menu item, press the "+" key. To call the previous menu item, press the "-" key. Submenu items / selection list are activated via the mode "M" key. A numerical value can be changed using the "+" key to increment the value by 1 and the "-" key to move the curser to the left. The mode "M" key is used to accept the changes. When setup is finished, go to the menu "Exit" screen and press the mode "M" key.



Figure 1–1 Push Button Key Menu

Enter program menu With Mode Key "M"				
Description	Typical Setting			
Exit	N/A			
View	Any (Not Used)			
Shift Zero	None (Not Used)			
Damping	0.125 Seconds			
Device Mode	Operate			
Baud Rate	9600			
Bus Address	1 (Set 1–8 as required)			
Resp-Delay	20 Ms			
Display	User Text [*]			
Exit	N/A			

Table 1–1 XMV Menu Tree

***Note:** Upon exit from the XMV setup mode, the display will show SP, DP, or Temperature from the XSeries if communications are operational OR the message "User-Text" will appear indicating the XMV is waiting on the XSeries to write the display data.

B. XMV Setup for Part# 1641021 (without Display & Keys)

An XMV without a display & keys may be setup using a PC running PCCU software with a RS485 communication link to the XMV. Use a RS-232 to RS-485 converter assembly Totalflow #2100241-002 and adapter cable #2100248-001 to make this connection. On the adapter cable, the "Bus –" (black alligator clip) connects to XMV "Com –" terminal and "Bus +" (red alligator clip) connects to XMV "Com +" terminal. The XMV must be powered up from an external power source during this setup sequence.

- 1) Open the "TFModbus" utility in PCCU (as shown in Figure 1–2).
- 2) Open "XmvSetup.ini".

Reported the second sec	
Operate View	Help
	TFModbus Configuration File
	Look in: TFModbus BTU16a.ini BTU16r.ini BTU16r.ini BTUANa.ini BTUDANa.ini BTUDAN.ini BTUMODa.ini BTUMODa.ini BTUMODr.ini BTUMODR.ini B
	File name: xmvSetup.ini Files of type: All Files (*.*) Cancel
Ready	Not Connected to Device Login: TFlow

Figure 1–2 TFModbus

- 3) The INI program will cycle through the Modbus addresses and baud rates until it communicates with the XMV (see Figure 1–3). The address search will stop when the XMV responds. The current Modbus address and baud rate of the XMV are displayed in the address search box.
 - En PCCU32 -X Image: State S Archiv f Tê Î 4 MB Address Search X Device: 247 Baud: 9600 Ok MEASURE SYSTEMS Login: user 8 bytes received. Not Connected to Device
- 4) Please note the device address of the XMV, then press 'OK'.

Figure 1–3 Device Address Search Screen

- 5) When the TFModbus screen appears (see Figure 1–4), select the device address tab with the Modbus address found in the address search. Modbus address 247 is the default and correlates to the "XMV Default" tab.
- 6) The process data from the XMV should now be displayed.



Figure 1–4 TFModbus Device Communication

- 7) If the address is correct and the response delay is 20 ms, no further action is needed for setup on this device.
- 8) If the address is correct, but the response delay is not 20 ms, select a different address tab, then reselect the original address tab so the response delay parameter will be updated to 20 ms in the XMVsetup.ini. Skip to step 10, otherwise continue to step 9.
- 9) If a different address is required, select the Tab with the required address. The Xmvsetup.ini will re-address the XMV to the address specified and set the response delay to 20 ms. The process data will be read and displayed from the XMV using the new address and setup parameters.
- 10) Power must be maintained for 60 seconds after selecting the new address tab for data to be saved in the XMV.
- 11) For setting up multiple XMVs, you will need to connect directly with each device and follow steps 1 through 10.

C. Adding a Display and Keys to an XMV

A display and keys may be added permanently to an XMV. They can also be added temporarily under power for XMV setup. The required parts are listed in Table 1-2.

Item	Part Number	Description
1	1801000-001	LCD Display
2	1801001-001	Mounting Screws for Display (2) required
3	1801002-001	LCD Glass Cover
4	1801003-001	Keys for programming

Table 1–2 XMV Display & Keys Parts List

If adding "keys" to an XMV that was shipped WITHOUT keys, a 3/32 inch hex wrench (not shipped with transmitter) is needed to remove the blank cover. Additionally, a #10 torque driver is needed to secure the keys properly to the transmitter base.

The 2.5 mm and 3 mm hex wrenches shipped with the XMV are used for the "Head Lock" and "Cover Lock".

D. Adjusting the XMV Static Pressure Response Time.

The standard response time for the XMV to fully reach the applied Static Pressure is 4 seconds. Refer to Totalflow Technical Bulletin #113 if the XMV Static Pressure response time needs to be adjusted.

II. XSeries Setup to support the ABB XMV

A. XSeries Configuration Files

Totalflow has standard configuration files (see Table 2–1) that have all the setup parameters and support files for use with the ABB XMV. Totalflow recommends using these released files when possible. If XMV support needs to be added to existing configuration files, reference Section 2B-2F below.

A few of the standard configuration files for use with the XSeries and ABB XMVs are shown below. Contact Totalflow for other available configurations.

Part Number	Description		
2100961-xxx	XFC with AGA3 support for 1-3 ABB XMVs		
2100922-xxx	XRC with AGA3 support for 1 ABB XMV		
2100962-xxx	XRC with AGA3 support for 1-4 ABB XMVs		
2101469-xxx	XRC with AGA3 support for 1-6 ABB XMVs with Station totals for pod applications		

Table 2–1 Standard Configuration Files

 All standard XMV configuration files are built to support the XMV with display. If the display is not used, the user should delete the "MVxxTXT.mrb" files in the Modbus folder under the XMV communications port. 2) If one of the multi-tube XMV configurations are used, the actual number of XMVs must be entered in the *Entry Mode/XMV Interface/Setup Tab*. The user should un-instantiate any unused measurement tubes by setting the application to "Spare" in *Entry Mode/Station ID/Application Tab*. The user should also delete the associated display group in "Save and Restore *R:Drive/Display Folder* to customize the configuration files for a specific configuration.

B. XMV Support Applications

To support an ABB XMV with an XSeries flow computer, the following applications are required (see Figure 2–1):

- 1) XMV Interface Application—typically instantiated at app# 8. See Section C.
- 2) Communications Application—typically COM 2 instantiated at app# 3. See Section D.
- 3) Measurement Tube Application—typically instantiated at app# 11-18 as required. See Section E.
- 4) Display Application—typically instantiated at app# 23 with a display group for each measurement tube. See Section F.

TOTALFLOW Communications Communications	Station Setup Applications Resources Pregistry COM2 App, see Sect. D			
Remote CCU-Com1	Application / Type Start Parameters	Revision 🔺		
XMV-COM2	0.3.1 Application 0 System	2100770-005		
⊕ I/O Subsystem	0.3.2 Application 1 Communications Port = COM0	2100859-004		
🖻 XMV Interface	0.3.3 Application 2 Communications Port = COM1	2100866-002		
-XMV 1	0.3.4 Application 3 Communications Port = COM2	2100861-002		
XMV 2	0.3.5 Application 4 Spare			
- Holding Registers	0.3.6 Application 5 Spare XMV App			
Operations	0.3.7 Application 6 Spare			
E-Measurement	0.3.8 Application 7 Subsystem See Sect. C	00771-002		
the AGA3-1	0.3.9 Application 8 XMV Interface NumXMV =2	2100788-006		
# AGA3-2	0.3.10 Application 9 Holding Registers	2100785-003		
III Non3 2	0.3.11 Application 10 Operations Dir = Operations	2100844-006		
Trand System	0.3.12 Application 11 AGA-3 Measurement Dir = AGA3-1	2100779-007		
Diaplay	0.3.13 Application 12 AGA-3 Measurement Dir = AGA3-2	2100779-007		
⊟-Display	0.3.14 Application 13 Spare			
	0.3.15 Application 14 Spare Measurement	Арр,		
	0.3.16 Application 15 Spare see Sect. E			
⊡ Display Group 3	0.3.17 Application 16 Valve Control			
	0.3.18 Application 17 Spare			
	0.3.19 Application 18 Spare			
	0.3.20 Application 19 Spare Display App,			
	0.3.21 Application 20 Spare			
	0.3.22 Application 21 Trend System Sec Occur	2100787-002		
	0.3.23 Application 22 Spare			
	U.3.24 Application 23 Display	2100777-003		
	Be-read Save Send C	<u>lose H</u> elp		

Figure 2–1 PCCU Applications Setup

C. XMV Interface

- 1) Enter the number of XMVs in the system under the *XMV Interface/Setup tab* as shown in Figure 2–2.
- 2) Enter the XMV setup parameters in *Entry mode/XMV Interface/XMV #/Setup Tab* as shown in Figure 2–3.

B-TOTALFLOW B-Communications B-I/O Subsystem	Setup			
B XMV Interface	Des	scription	Value	
- XMV 1	0.4.9 Device/Al	PP ID XN	/V Interface	
	8.0.0 Number o	if XMV 2		
⊞-Display				- I
	<u>R</u> e-read	S <u>a</u> ve	<u>S</u> end <u>C</u> los	se <u>H</u> elp



⊡- TOTALFLOW ⊕ Communications ⊕ I/O Subsystem	Values Setup	
XMV Interface	Description	Value
XMV 1	8.54.0 Modbus Address	1
····· XIVIV 2	8.55.0 Modbus Register	21
	8.12.0 Scan	Enabled
± Display	8.11.0 Factory Units	Metric
	Calibration	
	8.1.0 Differential Pressure	Factory
	8.1.1 Static Pressure	Factory
	Displays	
	8.56.0 Display Scroll	Enabled
	8.14.0 Number of Custom Displays	0
	XMV Output Units	
	8.48.0 Static Pressure Units	psia
	8.49.0 Differential Pressure Units	inh2o
	8.50.0 Temperature Units	Deg F
	Be-read Save g	jend <u>C</u> lose <u>H</u> elp
Ready	Connected to T	OTALFLOW Login: user //,

Figure 2–3 PCCU XMV1 Setup

D. XMV Communications Port Setup

1) Setup the Communication Port parameters (see Figures 2–4 and 2–5) in *Entry Mode/Communications/XMV-COM#*.

- TOTALFLOW - Communications - Local-COM0	Setup 🛛 🗚	dvanced Statistics	
Remote CCU-COM1		Description	Value
XMV-COM2	0.4.4	Port Name	XMV-COM2
	3.0.6	Protocol	Modbus Host (RTU)
H MY Interface	3.0.2	Baud Rate	9600
	3.0.12	Register Format	32 Bit
. Display	<u>R</u> e-re-	ad S <u>a</u> ve Ser	d <u>C</u> lose <u>H</u> elp

Figure 2–4 Setup Parameters

Communications Setup Advanced Statistics				
- Communications - Local-Com0 - Remote CCU-Com1 - XMV-COM2 - I/O Subsystem - XMV Interface - XMV 1 - XMV 2 - Holding Registers - Operations - Measurement - Valve Control - Trend System - Display	Setup Ad 3.0.1 3.0.3 3.0.4 3.0.5 3.1.1 3.1.2 3.1.3 3.0.17 3.0.13 3.3.0 3.0.15	Avanced Statistics Description Interface Data Bits Parity Stop Bits Xmit Key Delay (milliseconds) Unkey Delay (milliseconds) Timeout(milliseconds) Trailing Pad Retries Directory Switched V-Batt/Operate	Value Rs485 8 None 1 10 1 50 None 0 R:\COM-2\Modbus Enable	
	 <u></u> ∢	ad S <u>a</u> ve		

Figure 2–5 Setup Advanced Parameters

2) Setup the Communication Port MRB(s) (Modbus Request Block).

In step 1, a "Modbus" folder was created for the communications port. There are 2 supported types of MRBs. The user needs to determine which method is desired and create the required Modbus Request Block(s).

Legacy Method

The Legacy method uses 2 modbus blocks per XMV and is <u>supported by all</u> <u>versions of the XSeries Flash software</u>. There are two Modbus Request Blocks (MRB) that need to be created and stored in the Modbus folder for each XMV installed (See figures 2–6 through 2–11 as needed).

- ✓ Mv1.MRB (block one) is required for reading registers from the XMV and storing the raw values into the XMV application.
- Mv1Txt.MRB (block two) writes the SP, DP & Temperature data to the XMV display.

Mv1.MRB	Mv1Txt.MRB
File Edit View Help	File Edit View Help
Modbus Function Destination 4 - Read Input Registers I Slave Addresss 1 Starting Register 21 # Registers 3 Register Type Float Trigger I Type Trigger Register 8.13.0 Register 8.0.1	Modbus Function Source 16 - Write Multiple Registers I Slave Addresss 1 Starting Register 1001 # Registers 7 6 8.2.5 7 8.2.6 Trigger I Type Trigger Register 8.9.0 Register 0.0.0

Figure 2–6 XMV MRB Registers, Address 1

Mv2.MRB	Mv2Txt.MRB
File Edit View Help	File Edit View Help
Modbus Function Destination 4 - Read Input Registers Image: Constraint of the second	Modbus Function Source 16 - Write Multiple Registers Image: Source Slave Addresss 2 Starting Register 1001 # Registers 7 Register Type Image: Source Trigger 7 Type Trigger Register 8.9.1 Register 0.0.0

Figure 2–7 XMV MRB Registers, Address 2

Mv3.MRB	Mv3Txt.MRB
File Edit View Help	File Edit View Help
Modbus Function Destination	Modbus Function Source
4 - Read Input Registers 💌 Register	16 - Write Multiple Registers 💌 Register
Slave Addresss 3 Starting Register 21 # Registers 3 Register Type Float Trigger Image: Compare the second sec	Slave Addresss 3 Starting Register 1001 # Registers 7 6 8.2.16 4 8.2.17 5 8.2.18 6 8.2.19 7 8.2.20 Trigger 7 Register 8.9.2 Register 0.0.0



Mv4.MRB	Mv4Txt.MRB
File Edit View Help	File Edit View Help
Modbus Function Destination 4 - Read Input Registers I Slave Addresss 4 Starting Register 21 # Registers 3 Register Type Float Trigger Trigger Type Trigger Register 8.13.3 Register 8.0.4	Register No.0 Nordbus Function Source 16 - Write Multiple Registers I Slave Addresss 4 Starting Register 1001 # Registers 7 Register Type Int16 Trigger Register Type Trigger Register 8.9.3 Register 0.0.0



MV5.MRB	MV5Txt.MRB
Destination Register Induction Image: Induction Induction	Modbus Function Source 16 - Write Multiple Registers ▼ Slave Addresss 5 Starting Register 1001 # Registers 7 6 8.2.33 7 8.2.32 6 8.2.33 7 8.2.34 Trigger ▼ Register 8.9.4 Register 0.0.0

Figure 2–10 XMV MRB Registers, Address 5

Mv6,MRB	_ 🗆 🗙	Mv6Txt.MRB	_ 🗆 🗙
File Edit View Help		File Edit View Help	
Modbus Function	Destination	Modbus Function	Source
4 - Head input Registers Slave Addresss 6 Starting Register 21 # Registers 3 Register Type Float - Trigger Type Trigger Register 8.13.5 Response Status Register 8.0.6	Register 1 8.3.15 2 8.3.16 3 8.3.17	Slave Addresss 6 Starting Register 1001 # Registers 7 Register Type Int16 - Trigger _ Type Trigger Register 8.9.5 - Response Status 0.0.0	Register 1 8.2.35 2 8.2.36 3 8.2.37 4 8.2.38 5 8.2.39 6 8.2.40 7 8.2.41



Interface Controlled Method

The Interface Controlled Method uses one Modbus block and is <u>supported by all</u> <u>XSeries Flash software released after 4/21/2004 (XFC flash 2101050-011 and XRC flash 2101052-009 and later)</u>. Regardless of the number of XMVs used, this method requires one Modbus block (see Figure 2-12).

Modbus Eurotion			
Interface Contr	olled 🔻		Register
Slave Addresss			
#Registers			
Trigger	Float 		
Type Register	ster 🔽		
- Response Status		_	
Register	0.0.0		

Figure 2–12 XMV Interface Control Block

3) Once the method is determined, the required block(s) must be created.

Note: Instructions shown are for using PCCU 4.53 or later. If using PCCU4.52 or earlier, the blocks must be created and saved to the users PC hard drive and then downloaded using the "Save and Restore" utility to the Modbus folder under the XMV Com Port.

- A) Go to "File Utilities", then "Save and Restore" in the Operate Menu (see Figure 2–13).
- B) Under "R: Drive" in the tree view, select the XMV Com Port (see Figure 2-14).

PCCU32 - [Entry] Operate View Window I Open Configuration File Communications Laptop File Utilities Archive File Utilities	Help	
Setup	Description	Value
File Utilities Exit - Holding Registers - Operations B: Measurement B: Valve Control - Trend System B: Display	Display File Editor Trend File Editor Analysis File Editor AppTable File Editor Local Command File Editor Modbus Slave Register Editor Modbus Host Request Block Editor LevelMaster Request Block Editor Therms Master Request Block Editor Altronic DP Request Block Editor	VV-COM2 one
Save and Restore Utility	File Transfer	ted to TOTALFLOW Login: TFlow

Figure 2–13 Save and Restore File Utility

PCCU32 - [Save and	d Restore]		_ 🗆 ×
🔲 Operate View Wi	ndow Help		<u>_ 8 ×</u>
		J 🔟 😤	Setup
	File System Free Space:	356434	
⊡-S:	File Name	Size	Last Modified Attr
	Xmv_Ctl.mrb	20 0	7/14/03 16:18:52 a
COM-1			
E-COM-2			
Modbus			
IOS			
Holding			
AGA3-1			
-Valve			
Trend			
Display			
Operations			
AGA3-2	Save Station Files <u>R</u> estore Station Files		<u>C</u> lose <u>H</u> elp
, Ready	Connect	ed to TOTALFL	.OW Login: TFlow

Figure 2–14 Save and Restore Tree View

- C) Return to "File Utilities" in the Operate Menu and select "Modbus Host Request Block Editor" (see Figure 2–15).
- D) Create the required MRBs using figures 2–6 through 2–12.
- E) When finished with each MRB, press the "Send" button (see Figure 2–16) to load the MRB into the "R: Drive"

Note: If modifying an existing block, to create a new block, you will need to use the "File/Send As" feature to rename and save the block to the Modbus folder.

Note: Refer to Totalflow Technical Bulletin No. 118 or the PCCU Help files for more details on creating and using Modbus Blocks.

Bave and R	estore]	
Operate View Windo	w Help	_ B ×
File Operations	- 17 17 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
	File System Free S	Space: 356434
Archive File Utilities	File Name	Size Last Modified Attr
Setup	, mv_Ctl.mrb	20 07/14/03 16:18:52 a
File Utilities	Display File Editor Trend File Editor Analysis File Editor AppTable File Editor Local Command File Editor Modbus Slave Register Editor Modbus Host Request Block Editor LevelMaster Request Block Editor Altronic DP Request Block Editor Altronic DP Request Block Editor Serve Station Files Register Station Files	
Create/Edit Modbus Host Rec	quest Block Files	Connected to TOTALFLOW Login: TFlow

Figure 2–15 Modbus Host Request Block Editor

Modbus Request Block	
File Edit View Help	
Modbus Function	Destination
3 - Read Registers	Register
Slave Addresss 1	
Starting Register 7001	
#Registers 1	
Register Type Float 💌	
-Trigger	-
Type Interval 💌	
Interval 0:00:01	
– Response Status	
Register <u>I</u> 0.0.0	
	Send Cancel

Figure 2–16 MRB Entry Screen

E. Assigning XMVs to Measurement Tubes

The data inputs from the XMVs can be assigned to any measurement tube.

- 1) To assign the input, the user must note the App/Array/Register for the "Scaled Values" for each XMV (see Figure 2–17).
- 2) Next go to Calibration (see Figure 2–18):
- 3) Select the measurement tube to be configured from the tree view (see Figure 2–19).
- 4) Select the Setup Tab.
- 5) Enter the appropriate App/Array/Register for Static Pressure, Differential Pressure & Temperature from the XMV Scaled Values on the XMV/Values tab.

PCCU32 - [Entry]					_ D ×
Operate view vvindov	и нер			- 1	
			y 🔟 ぷ		
□ TOTALFLOW	Zeluee Ì c				
E Communications	values S	setup			
⊡-I/O Subsystem					
AMV Interface		Description	Value	Units	
-XMV 1	8.47.0	Description	XMV 1		
MV 2					
- Holding Registers	8.0.1	Status	Success		
Operations	8.57.0	Number of Polls	61749		
🖻 Measurement	8.58.0	Number of Errors	61750		
in AGA3-1	0.20		0.000	mbor	
in AGA3-2	0.3.0	Static Pressure	1 000	har	
🗄 Valve Control	832	Temperature	24.681		
- Trend System	0.0.2	Scaled Values			
🖻 Display	840	Differential Pressure		inh2o	
	841	Static Pressure	14.507	nsia	
	8.4.2	Temperature	76.426	dea F	
	<u>R</u> e-re	ad S <u>a</u> ve	<u>S</u> end	Close	Help
Ready			Connected to TC	TALFLOW Login	: TFlow

Figure 2–17 XMV Values Screen (APP/ARAY/REG)

PCCU32 - [Entry]		_ _ ×
🔲 Operate View Window He	₽ ₹	_ & ×

Figure 2–18 PCCU Menu Bar (Calibrate)

🔄 PCCU32 - [Calibrate	
🔲 Operate View Win	dow Help
ti e ti	
TOTALFLOW	Checks Calibration Setup Hold: Sp 0.00, Dp 0.00, Tf 0.00 Sp Dp TF Irend 0.000 0.000 0.000 V Update Registers Static Pressure 8.4.1 Diff. Pressure 8.4.0 Temperature 8.4.2 Static Pressure Device Temperature MID Installed Use Fixed IF Fixed TF 60.000 Close Help
Ready	Connected to TOTALFLOW Login: user

Figure 2–19 PCCU32 Calibrate Measurement Tubes

F. Displays for XMV

There are no actual displays in the XSeries for the XMV, rather the XMV is typically assigned to a measurement tube and the measurement tube has an associated display group. If a measurement tube has been added, then a display group for that tube needs to be added with the following procedure:

Enter the "Save and Restore" utility. Go to the Display folder on R: and double click on an existing display group for a measurement tube. Modify the group name, display names and display registers for the new measurement tube. Use the "File / Send As..." option to download the modified file with a new file name to the Display folder. Go to "Entry " mode and check displays.



III. XSeries to ABB XMV Wiring & Interconnect

Figure 3–1 Wiring & Interconnect XMV to XSeries, Pg. 1







Figure 3–3 Back view of the XMV

SUMMARY

At this point the XFC or XRC should be receiving data from the XMV. Data updates can be verified by viewing the data in "Entry / XMV Interface / XMV xx / Values Tab". The data should be reflecting process conditions and be updating every second.

Communications success can be monitored in "Entry / Communications / COMxx / Host Status". The "Number of Polls" should be incrementing without any change in the "Number of Errors". For easier viewing, all data fields on the "Host Status Tab" can be reset to "0" by writing a "0" in the fields and using the "Send" button.

The Measurement Tube using the XMV inputs should be now be calibrated.

Note: Be sure and save the system configuration to the S: drive using the "Save and Restore" utility.