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MVI69E-AFC

Enhanced Liquid and Gas Flow Computer for CompactLogix® Version 4.04

December 18, 2018

SETUP AND CONFIGURATION GUIDE

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ProSoft Technology, Inc.

+1 (661) 716-5100 +1 (661) 716-5101 (Fax) www.prosoft-technology.com support@prosoft-technology.com

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MVI69E-AFC Setup and Configuration Guide

December 18, 2018

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For professional users in the European Union

If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.



Warning - Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Important Installation Instructions

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501 to 4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV. 2.

WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES.

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

Class 2 Power

MVI (Multi Vendor Interface) Modules

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS. AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DÉCONNECTER L'ÉQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

Warnings

North America Warnings

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501 to 4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

- A Warning Explosion Hazard Substitution of components may impair suitability for Class I, Division 2.
- B Warning Explosion Hazard When in hazardous locations, turn off power before replacing or rewiring modules.
 C Warning Explosion Hazard Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Avertissement - Risque d'explosion - Avant de déconnecter l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.

D Suitable for use in Class I, Division 2 Groups A, B, C and D Hazardous Locations or Non-Hazardous Locations.

ATEX Warnings and Conditions of Safe Usage

Power, Input, and Output (I/O) wiring must be in accordance with the authority having jurisdiction.

- A Warning Explosion Hazard When in hazardous locations, turn off power before replacing or wiring modules.
- **B** Warning Explosion Hazard Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- **C** These products are intended to be mounted in an IP54 enclosure. The devices shall provide external means to prevent the rated voltage being exceeded by transient disturbances of more than 40%. This device must be used only with ATEX certified backplanes.
- D DO NOT OPEN WHEN ENERGIZED.

Battery Life Advisory

The MVI46, MVI56, MVI69E, MVI69, and MVI71 modules use a rechargeable Lithium Vanadium Pentoxide battery to back up the real-time clock and CMOS. The battery should last for the life of the module. The module must be powered for approximately twenty hours before the battery becomes fully charged. After it is fully charged, the battery provides backup power for the CMOS setup and the real-time clock for approximately 21 days. When the battery is fully discharged, the module will revert to the default BIOS and clock settings.

Note: The battery is not user replaceable.

Electrical Ratings

- Backplane Current Load: 800 mA @ 5.1 Vdc; 3 mA @ 24 Vdc
- Operating Temperature: 0°C to 60°C (32°F to 140°F)
- Storage Temperature: -40°C to 85°C (-40°F to 185°F)
- Shock: 30 g, operational; 50 g, non-operational; Vibration: 5 g from 10 Hz to 150 Hz
- Relative Humidity: 5% to 95% with no condensation
- All phase conductor sizes must be at least 1.3 mm(squared) and all earth ground conductors must be at least 4mm(squared).

Agency Approvals and Certifications

Please visit our website: www.prosoft-technology.com

Contents

	Your Feedback Please2					
	Important Insta	Ilation Instructions	2			
	MVI (Multi Ven	dor Interface) Modules	2			
	Warnings	·····	3			
	Battery Life Ad	visory	3			
1	Before Yo	u Begin	9			
	1.1	Pre-Configuration Processes	9			
	1.2	Module Pre-Configuration Requirements1	0			
	1.2.1	Downloading EAFC Manager1	0			
	1.2.2	Downloading AOIs To Your System1	0			
	1.3	Locating Information For Your Meter Type1	1			
	1.4	Configuration Aids1	3			
	1.5	Using the Modbus Dictionary1	4			
	1.5.1	Procedure1	6			
2	Creating a	n EAFC Manager Project1	9			
	2.1	Starting EAEC Manager 1	_			
	2.1	Starting EAFC Manager	9			
3	Configurir	ng Site Parameters2	1			
	3.1	Accessing Site Configuration Parameters2	1			
	3.1.1	Configuring Site Options	4			
	3.1.2	Configuring Pass-thru Options2	5			
	3.2	Viewing Site Configuration Status2	5			
	3.3	UDT Tag Prefix2	6			
	3.3.1	Exporting UDT Files	6			
	3.4	Configuring Communication Parameters2	8			
	3.4.1	Configuring Modbus TCP/IP	0			
	3.5	Configuring Whitelist Options	4			
	3.5.1	Advanced Tab	5			
	3.5.2	Conliguring Serial 1 and Serial 2	ð			
	3.0 3.7	Full Bulloll	1			
	3.7	Read Button	1			
	3.9	Write Button 4	2			
	3.10	Special wnd Button	2			
	3.11	Done Button	2			
	3.12	Remapping Button4	3			
	3.13	Accessing the Data4	3			
	3.14	Site Status4	3			
4	Configurir	ng Meter Parameters 4	5			
	4.1	Prerequisites4	5			
	4.2	What Parameters Do I Have to Configure?4	5			
	4.3	Configuring Meter and Stream Identification Parameters4	5			

	4.3.1	Setting End of Period Parameters	47
	4.3.2	Setting a Stream Name	48
	4.4	Configuring Meter Type, Product Group, Units, and Primary Input.	49
	4.4.1	Selecting and Configuring Meter Type, Product Group, Units and	
	Primary Inp	ut Parameters	50
	4.4.2	Product Group	51
	4.4.3	System of Units	51
5	Configurir	ng Common Parameters	53
	5.1	Selecting the Physical Device	54
	5.2	Specifying Reference Temperature and Pressure (Reference	
	Conditions)	55	
	5.3	Setting Accumulators and Flow Rates	56
	5.3.1	Flow Rate Period Unit	56
	5.3.2	Flow Rate Unit	57
	5.3.3	Accumulation Unit	58
	5.3.4	Accumulator Rollover	58
	5.4	Configuring Process Input Scaling	59
	5.4.1	Zero Scale	59
	5.4.2	Full Scale	59
	5.5	Enabling/Disabling the Meter (Control Opts)	60
	5.6	Backplane Return	60
	5.6.1	Process Inputs	60
	5.6.2	Component Analysis Function Block	60
	5.7	Configuring Calculation Options	62
	5.8	Configuring Resettable Accumulators	63
	5.8.1	Non-Resettable Accumulators	64
	5.8.2	Resettable Accumulators	65
	5.8.3	Net Accumulator Calculation	69
	5.8.4	Accumulator Totalizer and Residue	70
	5.9	Meter Factors	70
	5.10	Meter Alarm Control Options	71
	5.11	Setting Stream Options and Enabling/Disabling Meters	73

0	Configuring Differential Meter Parameters77						
7	Configuring Linear Meter Pulse Count Options						
8	Configuring Linear Meter Pulse Frequency Options						
9	Configuring Gas Parameters						
10	Configuring Liquid Parameters						
11	Configuring Density Units						
12	Configuring Primary Input Characteristics						
13	Configuring K-factor Characteristics97						
14	Configuring Meter Factors						
15	Installing the Module in the Rack103						
15.1 Module Initialization							
16	Connecting the MVI69E-AFC Module to the EAFC Manager						
	Downloading the Project to the Module						
17	Downloading the Project to the Module						
17 18	Downloading the Project to the Module						
17 18 18 18	Downloading the Project to the Module						
17 18 18 18 18 18 18	Downloading the Project to the Module 109 Creating an RSLogix Project and Importing the AOIs 111 3.1 Create your RSLogix Project 111 3.2 Importing the Meter-Specific and Main AOI Rungs 114 3.3 Configuring the AOIs 120 MVI69E-AFC Web Page 121						

	19.3.5 19.3.6 19.3.7	Meter Accumulators Meter Status Data Displays		
20	What's Next?			
21	Support	t, Service and Warranty	141	
2	21.1 21.2	Contacting Technical Support Warranty Information	141 143	
Ind	ex			

1 Before You Begin

1.1 Pre-Configuration Processes

This section describes the pre-configuration process. There are a small number of tasks to complete before configuring your MVI69E-AFC project. The following flow illustrates the full configuration process.



1.2 Module Pre-Configuration Requirements

Before you start to configure the MVI69E-AFC, you must:

- Download EAFC Manager software
- Download the MVI69E-AFC Add-On Instructions (AOIs)

1.2.1 Downloading EAFC Manager

The EAFC Manager can be downloaded to your PC from the ProSoft Technology website at www.prosoft-technology.com.

- 1 Navigate to the MVI69E-AFC webpage.
- 2 Click on the **DOWNLOADS** tab.
- **3** Click on the **PROSOFT EAFC MANAGER** link and follow the prompts to download and install the application.

Note: Leave this page open. You will also be downloading AOIs from this page as described in the next section.

1.2.2 Downloading AOIs To Your System

The AOIs can be downloaded to your PC from the ProSoft Technology website at www.prosoft-technology.com.

- 1 Navigate to the MVI69E-AFC webpage.
- 2 Click on the **DOWNLOADS** tab.
- 3 Select MVI69E-AFC ADD ON INSTRUCTIONS.

The AOIs are downloaded as a zip file.

The zip file contains the Main AOI as well as four additional AOIs that pertain to your meter application. The four additional AOIs include:

- Linear Gas (*MVI69E-AFC_AddOn_Rung_MeterLinearGas_vx_x.L5X*)
- Linear Liquid (MVI69E-AFC_AddOn_Rung_MeterLinearLiquid_vx_x.L5X)
- Differential Liquid (MVI69E-(AFC_AddOn_Rung_MeterDifferentialLiquid_vx_x.L5X)
- Differential Gas (*MVI69E-AFC_AddOn_Rung_MeterDifferentialGas*)vx_x.L5X)

Download the Main AOI and the AOI file that pertains to your meter type. For instance, if the MVI69E-AFC module is going to be used for Differential Gas meter runs, you only need the *MVI69E-AFC_MeterDifferentialGas_Vx_x.L5X* file. You will use these files when you set up your RSLogix project later in this guide.

1.3 Locating Information For Your Meter Type

MVI69E-AFC supports the following meters:

Meter Type	Configured As (Differential or Linear)
Turbine	Linear
Positive Displacement	Linear
Magnetic	Linear
Orifice	Differential
V-Cone	Differential. You must configure the meter as V-Cone type in the MVI69E-AFC Manager (Meter Configuration > Calculation Options)
Wedge	Differential. Refer to Wedge Meter Applications for information about using the wedge meters.
Vortex	Linear or Differential
Ultrasonic	Linear or Differential
Coriolis	Linear or Differential

Note: Due to the broad range of meters in the market today, refer to the manufacturer specification to evaluate the use of the module (even if listed here).

Note: For Vortex, Ultrasonic, or Coriolis meters, the selection depends on the output generated by the meter.

If the meter provides a pulse train representing the volume increment, the MVI69E-AFC should be configured as linear with the primary input set to *Pulse Count*.

If the meter provides instantaneous flow rate, the MVI69E-AFC should be configured as differential with the primary input set to *Flow Rate*.

What type of meter are you configuring?	What is the primary output from your flow meter and associated instrumentation?	Configure your meter type as	Configure your primary input as…	
Orifice Meter	Differential Pressure	Differential	Differential Pres	
V-Cone Meter	Differential Pressure	Differential	Differential Pres	
Wedge Meter	Differential Pressure	Differential	Differential Pres	
Coriolis Meter	Flow Rate	Differential	Flow Rate	
	Pulse Count and Pulse Frequency	Linear	Pulse Count	
	Pulse Frequency Only	Linear	Pulse Frequency	
Vortex Meter	Flow Rate	Differential	Flow Rate	
	Pulse Count and Pulse Frequency	Linear	Pulse Count	
	Pulse Frequency Only	Linear	Pulse Frequency	
Ultrasonic Meter	Flow Rate	Differential	Flow Rate	
	Pulse Count and Pulse Frequency	Linear	Pulse Count	
	Pulse Frequency Only	Linear	Pulse Frequency	
Turbine Meter	Pulse Count and Pulse Frequency	Linear	Pulse Count	
	Pulse Frequency	Linear	Pulse Frequency	
	Pulse Count	Linear	Pulse Count	
Positive Displacement	Same as Turbine			
Magnetic	Same as Turbine			

To locate configuration information about your meter, refer to the following table:

The following sections provide configuration steps based on:

- Meter Type
- Primary Meter Output
- What's being measured

Locate the configuration steps for your application and then use the links provided to jump to the sections of this manual that only apply to you.

1.4 Configuration Aids

This manual contains icons within each section. Each icon represents a relationship to the topic.

Accumulator		Alarm	(Back	\bigcirc
Calculate		Calibrate		Calibrate 2	
Ethernet		Event		Export	
Flow		Gas	\$	Liquid	
Login		Logout		Meter	0
Meter	$\textcircled{\ }$	Network	Ð	Delete Permission	0
Add Permission	C	Edit Permission	C	Generic Permission	0
Port		Pressure		Prover	
Pulse		Delete Role		Add Role	
Edit Role		Generic Role		Serial Connection	
Site		Stream	⋗	Temp	

User	Delete User	Add User	
Edit User	View	Delete View	
Add View	Edit View	Volume	0

The icons are used as visual cues to provide a hint of the type of information contained within a section.

1.5 Using the Modbus Dictionary

Important: Although this manual is continuously maintained to bring you the latest information, the Modbus Dictionary contains the latest information on registers and dictionary sections. It is recommended that you use the Modbus Dictionary to locate bank and register values to ensure that you are looking at the latest information.

The Modbus dictionary provides a means to locate data anywhere in the module. The dictionary allows you to select various data types from database regions. It then displays Modbus bank and register values.

🔅 Modbus Dictionary 💼 🗉 🎫							
Source Configuration							
Search							
Bank & Ben Datum Tupe Description							
H- 0	Unsigned int	Eiroware product code, group	ĥ.				
H- 0.	L Unsigned byte	Firmware product code, group: platform					
н- 0.	H Unsigned byte	Firmware product code, group; application class					
H- 1	Unsigned int	Firmware product code, item					
H- 1.	L Unsigned byte	Firmware product code, item: number of streams					
H- 1.	H Unsigned byte	Firmware product code, item: number of meters					
H- 2	Unsigned int	Firmware version number					
H- 2.	L Unsigned byte	Firmware version number: minor version number					
H- 2.	H Unsigned byte	Firmware version number: major version number					
H- 3	Unsigned int	Firmware revision number					
H- 4+	 Unsigned long 	Serial number					
H- 6.	L Bitmap	Site status (basic)					
H- 6.	H Bitmap	Extended site status					
H- 7.	L Unsigned byte	Zero (primary slave); Primary slave address (virtual slave)					
H- 10+	 Unsigned long 	Wallclock (Unix-epoch)					
H- 12	Unsigned int	Wallclock, year					
H- 13	Unsigned int	Wallclock, month					
H- 14	Unsigned int	Wallclock, day					
H- 15	Unsigned int	Wallclock, hour					
H- 16	Unsigned int	Wallclock, minute	Ŧ				
The minute of the hour at which hourly archive records are written. This value is meaningful only when meter control option "Enable per-meter end-of-hour" (register H-8043 bit 13) is set. Value must lie between 0 and 59. NOTE: This moment is relative to the module's wallclock, which is expected to be UTC time.							
Enable/dis	sable display of ir	ndividual bits.	se				

You can use the Modbus Dictionary locally or while EAFC manager is directly connected to the MVI69E-AFC module. From the *Source Configuration* section, select **LocaL** if you are just running Modbus Dictionary locally or select **ON-LINE** if connected to a module.

😥 Modbus Dictionary							
Source Configuration							
Ban	k & Reg	Datum Type	Description				
Н-	0	Unsigned int	Firmware pro				
H-	0.L	Unsigned byte	Firmware pro				
H-	0.H	Unsigned byte	Firmware pro				
H-	1	Unsianed int	Firmware pro				

The *Dictionary Section* drop-down list allows you to select different types of data from different sections of the module.

-	Mod	bus Dic	tionary		
- Source Configuration				<u>Z</u> i	ctionary Section Meter
	⊙ <u>L</u> o	cal C	<u>O</u> n-line	AI	I 🚽 📔 1 🚔
			4	AI	
	Bank	& Reg	Datum Type	Si	te Identification
	н-	0	Unsigned int	Si	te Operational
	H-	0.L	Unsigned by	N	etwork Configuration form
	н-	0.H	Unsigned byt	M	eter Configuration plication class
	н-	1	Unsigned int	M	eter Active Stream Configuration
	н-	1.L	Unsigned byte		Finnware product code, item. number of streams
	н-	1.H	Unsigned byte	Э	Firmware product code, item: number of meters
	н-	2	Unsigned int		Firmware version number
	H-	2.L	Unsigned byte	Э	Firmware version number: minor version number
					There are a set of the second set of the second second set of the second s

The *Meter* selection allows you to specify a specific meter in order to view only information pertaining to the selected meter.

		X
2i	etwork Configuration	<u>G</u> o
	Description	~
ī	Physical interface IP (host byte order)	
	Physical interface network prefix length	
	Keepalive idle time, s	
	Keepalive probe interval, s	
	Keepalive probe count	
-		

If selected, the **SHOW BITS** checkbox allows the bits to be displayed in the *Bank* & *Reg* column.

The Search box allows you to search for specific data. The search is applied to entries in the *Description* column and is case insensitive.

1.5.1 Procedure

Ensure that you have a suitable project loaded, especially its version. This ensures that dictionary items present for your module are available for display.

- 1 In EAFC Manager, select the PROJECT tab.
- 2 Select Modbus Dictionary, See Starting EAFC Manager for information on setting your module type.



- **3** Select the **SOURCE CONFIGURATION** (*Local* or *On-line*).
- 4 Select the **DICTIONARY SECTION** from the drop-down list.
- 5 Select the METER stream.
- 6 Check the **SHOW BITS** checkbox to enable the display of individual bits.

🔆 Modbus Di	ctionary			
- Source Config	guration <u>D</u> i	ctionary Section		
⊙ <u>L</u> ocal C	<u>O</u> n-line	leter Configuration		
Bank & Reg	Datum Type	Description		
H- 8003.4	Bit	Reset resettable accumulator 1		
H- 8003.5	Bit	Reset resettable accumulator 2		
H- 8003.6	Bit	Reset resettable accumulator 3		
H- 8003.7	Bit	Reset resettable accumulator 4		
H- 8003.8	Bit	Write daily archive		
H- 8003.9	Bit	Write hourly archive		
H- 8004	Bitmap	Process input calibration, auto		
H- 8004.0	Bit	Process input calibration, auto, differential pressure		
H- 8004.1	Bit	Process input calibration, auto, temperature		
H- 8004.2	Bit	Process input calibration, auto, pressure		
H- 8005	Bitmap	Process input calibration, manual		
H- 8005.0	Bit	Process input calibration, manual, differential pressure		
H- 8005.1	Bit	Process input calibration, manual, temperature		
H- 8005.2	Bit	Process input calibration, manual, pressure		
H- 8006	Unsigned int	Open archive record select (age), daily		
H- 8007	Unsigned int	Open archive record select (age), hourly		
H- 8009	Bitmap	Checksum alarms		
H- 8009.0	Bit	Checksum alarm: Meter configuration		
H- 8009.2	Bit	Checksum alarm: Meter accumulators		
H- 8009.4	Bit	Checksum alarm: Meter previous prove summary		

7 Click on the appropriate row.

Source Lonrig	uration U	ctionary Section Show bits
• Local •	<u>U</u> n-line	eter Configuration
Bank & Reg	Datum Type	Description
H- 8000.L	Unsigned byte	Meter number (1-based)
H- 8000.H	Bitmap	Meter status
H- 8001.L	Unsigned byte	Active stream number (0-based)
H- 8003	Bitmap	Meter signals
H- 8004	Bitmap	Process input calibration, auto
H- 8005	Bitmap	Process input calibration, manual
H- 8006	Unsigned int	Open archive record select (age), daily
H- 8007	Unsigned int	Open archive record select (age), hourly
H- 8009	Bitmap	Checksum alarms
H- 8020*	String (16 ch)	Meter tag
H- 8028	Bitmap	Gross meter characterization
H- 8029.L	Unsigned byte	Product group
H- 8030	Bitmap	Units: Primary input
H- 8031	Bitmap	Units: Mass
H- 8032	Bitmap	Units: Energy
H- 8033	Bitmap	Units: Volume
H- 8036	Unsigned int	End-of-day minute
H- 8037	Unsigned int	End-of-hour minute
H- 8041	Bitmap	Meter calculation options
H- 8043	Bitmap	Meter control options
Toggling the While a pro- the point ' talculation thanges in thanges in	nese bits sw ocess input 'Input scali ns, which al output affe tion mode no	itches process inputs into and out of calibration mode. is in calibration mode its latest live value is stored in ng, input frozen during calibration" and used for all lows the transmitter to be calibrated without the consequent cting measurement. When the process input is switched out rmal operation is resumed. Changes to calibration mode bits

8 Once a row is selected, additional information is displayed at the bottom of the window.

🔅 Modbus Die	tionary					
C Source Config	urationDi	ctionary Section				
	📀 Local O On-line Meter Configuration 🔍 1 🚔 🚬					
Bank & Beg	Datum Type	Description				
H- 8000.L	Unsigned byte	Meter number (1-based)				
H- 8000.H	Bitmap	Meter status				
H- 8001.L	Unsigned byte	Active stream number (0-based)				
H- 8003	Bitmap	Meter signals				
H= 8004	Bitmap	Process input calibration, auto				
H- 8005	Bitmap	Process input calibration, manual				
A- 8006	Unsigned int	Open archive record select (age), daily				
H- 8007	Unsigned int	Open archive record select (age), hourly				
H- 8009	Bitmap	Checksum alarms				
H- 8020*	String (16 ch)	Meter tag				
H- 8028	Bitmap	Gross meter characterization				
H- 8029.L	Unsigned byte	Product group				
H- 8030	Bitmap	Units: Primary input				
H- 8031	Bitmap	Units: Mass				
H- 8032	Bitmap	Units: Energy				
H- 8033	Bitmap	Units: Volume				
H- 8036	Unsigned int	End-of-day minute				
H- 8037	Unsigned int	End-of-hour minute				
H- 8041	Bitmap	Meter calculation options				
H- 8043	Bitmap	Meter control options				
foggling the While a protoche point ' calculation changes in of calibrat	hese bits sw ocess input "Input scali ns, which al output affe tion mode no	itches process inputs into and out of calibration mode. is in calibration mode its latest live value is stored in ng, input frozen during calibration" and used for all lows the transmitter to be calibrated without the consequent cting measurement. When the process input is switched out rmal operation is resumed. Changes to calibration mode bits				
Select (highlight) any row to show more detail in the lower box.						

9 Observe the *Bank and Reg* information in the first column. This column may contain a number of items with different representations.

Bank & Reg	Datum Type	Description	
H- 8000.L	Unsigned byte	Meter number (1-	
H- 8000.H	Bitmap	Meter status	
H- 8001.L	Unsigned byte	Active stream nur	
H- 8003	Bitmap	Meter signals	

In the first row, the first position indicates whether the register is a Holding Register (H-) or an Input Register (I-), the second position represents the register (8000). The third position indicates high order bytes (H), low order bytes (L), multiple registers (*), and a plus sign (+) indicates that there are two registers (used for 32-bit quantities, i.e., long integer and floating point elements).

If **SHOW BITS** is checked, a number in the third position is the bit number. For Datum Type "String", each register holds two characters.

2 Creating an EAFC Manager Project



2.1 Starting EAFC Manager

- 1 Click **START > PROGRAMS**.
- 2 From the Programs menu, choose **PROSOFT TECHNOLOGY**.
- 3 From the ProSoft Technology folder, choose **EAFC MANAGER**.

The EAFC Manager opens.



4 Select File > New > MVI69E-AFC > MVI69E-AFC, 12 meters (vx.xx). The EAFC Manager project must match the firmware running on the EAFC.

ا 🔅	EAFC Manager - [EAFC69-12(4):4.04] (new file)							
File	File Project On-line Communications Window Help							
	New	•	MVI56E-AFC					
	Load		MVI69E-AFC	•		MVI69E-AFC, 12 meters (v 4.04)		
	Save					15		
	Save As							
	Print Report							
	Reset							
	Exit							

From here, you'll begin configuring your module. Communications between the module EAFC Manager and the MVI69E-AFC module is not required during the configuration stage. However, you can establish communications at this point if you wish. Simply follow the instructions Chapter 19 "Installing the Module in the Rack" and Chapter 20 "Connecting the MVI69E-AFC Module to the EAFC Manager".

When you are ready to download the EAFC Manager project to the module, see Chapter 21 "<u>Downloading the Project to the Module</u>". For information on creating an RSLogix project and importing and using the AOIs, see Chapter 22 "<u>Create</u> <u>your RSLogix Project and Import the AOIs</u>".

3 Configuring Site Parameters



Configure the overall settings for the site. The *Site Configuration* dialog box is where you assign the settings that apply to the entire project.

- Project name
- Modbus slave addresses
- Memory allocation
- Port configuration and mapping
- Site options and status

You can also obtain the MVI69E-AFC firmware version from this window.

3.1 Accessing Site Configuration Parameters

From the *Project* menu, choose **SITE CONFIGURATION**.



🔅 Site Configuration 📃 🖃 💌						
Site name	Site name EAFC Flow Station					
MVI69E-AF	C	Proje	ect name	00000000	Serial number	
244	Primary Mod	lbus slave ac	ldress	4.04.000	Firmware version/revision number	
0	Virtual Modbus slave address			<none></none>	Configuration changed Ack Chg	
0	End-of-day i	ninute		0	PLC status	
0	End-of-hour	minute		0000h	Site status	
101.325	Barometric p	oressure (kPa	ia)	<none></none>	Active special-window sessions	
0000h	Site options				UDT tag prefix	
0	Pass-thru: Max PLC window size					
0	Pass-thru: Word region size			0	Pass-thru: Bit region size	
0	Pass-thru: V	/ord region a	ddress	0	Pass-thru: Bit region address	
Network	Serial 1	Serial <u>2</u>	Re <u>m</u> apping	1	Result	
Poll	Boad		Special und	1	unavailable	
<u></u> 01	<u>n</u> eau	<u>w</u> nte	<u>special Milu</u>			
Between 1 and 60 characters.						
Me <u>t</u> ers	Pro	<u>v</u> er			Done	

This action opens the *Site Configuration* dialog box.

Parameter	Description
Site Name	Enter a site name. This parameter identifies the site (1 to 64 characters). The default is "AFC Flow Station". Edit this if needed.
Project Name	This parameter allows an external application such as <i>EAFC</i> <i>Manager</i> to synchronize its database with the database resident in the module. Default is "MVI69E-AFC".
Primary and Virtual Modbus Slave Address	If you plan on setting these parameters, please refer to the <i>MVI69E-AFC Reference Guide</i> for additional details.
End of Day Minute	This parameter sets the minute of the day when the daily archives are created. The default value of 0 (zero) creates the daily archive at midnight. Valid values are between 0 and 1439. This moment is relative to the module's wallclock, which is expected to be UTC time.
	Important: The End of Period (End-of-day minute and End-of- hour minute) settings are global settings, unless these settings are set by meter on the Meter Configuration page. If these parameters are set per meter, and enabled under control options, the options specified per meter take precedence over the same settings on the Site Configuration page.

Parameter	Description
End of Hour Minute	This parameter sets the minute of the hour when the hourly archives are created. The default value of 0 (zero) creates hourly archives at the top of each hour. Valid values are between 0 and 59. This moment is relative to the module's wallclock, which is expected to be UTC time.
	Important: The End of Period (End-of-day minute and End-of- hour minute) settings are global settings, unless these settings are set by meter on the Meter Configuration page. If these parameters are set per meter, and enabled under control options, the options specified per meter take precedence over the same settings on the Site Configuration page.
Barometric Pressure	This parameter sets the barometric pressure used on the
Datometric riessure	module calculations. The module expects each meter's pressure input to be in gauge units. Because the AGA8, AGA3, and some API2540 calculations require the pressure of the fluid to be in absolute units, the module adds barometric pressure to the gauge pressure in order to obtain the absolute pressure.
	The calculation assumes that all meters measured by a single MVI69E-AFC are located at the same site and have the same barometric pressure.

3.1.1 Configuring Site Options

The *Site Options* dialog box opens when you click the **SITE OPTIONS** field in the *Site Configuration* dialog box. Not all options are available unless other parameters and options are selected during the configuration process.

Site Conf	iguration	🔅 Site Options 💽 💌	
Site Coni	iguration		
Site name	EAFC Flow	0 🗖	
MVI69E-AF	FC	🔟 🔲 Event log lockable	
244	Primary Modt	2 🔲 Barometric pressure in psia (else in kPaa)	on number
0	Virtual Modbu	3 🗖	Ack Chg
0	End-of-day m	4	
0	End-of-hour	5	
101.325	Barometric 🕻	Clink	sessions
0000h 🗕	00 ·	Cilck	
0	Pass-thru: Ma		
0	Pass-thru: W	8 🗖	e
0	Pass-thru: W	3 🗖	ldress
<u>N</u> etwork	Serial <u>1</u>	10 🗖	nk is
Poll	<u>R</u> ead	11 🗖	ilable
CEal			
t	to get 🛛 🥻		
Meters	Prov		Done
		Done	

Parameter	Description
Event log lockable	If clear, the event log behaves as a FIFO buffer; a new record overwrites the old one even if the overwritten event has never been downloaded, in which case, the event is permanently lost. If set, and the log is full with never downloaded events, then the log is locked. Controllable events (changes to most datum points) are not allowed to occur. Non-critical, non-controllable events (e.g. checksum alarms) are discarded and are permanently lost, and critical non-controllable events (e.g. PLC mode change) are written as usual and the overwritten, never downloaded events are permanently lost. A locked log must be downloaded to unlock it for normal behavior.
Barometric pressure in psia	If set, the barometric pressure will be expressed in psia units, otherwise it will use kPaa.

3.1.2 Configuring Pass-thru Options

The Pass-Thru feature can be used for delivering data written by Modbus packets directly to the PLC logic, bypassing the MVI69E-AFC's Modbus database. For details on configuring this option, please refer to the *MVI69E-AFC Reference Guide*.

The module supports the Modbus Pass-Thru feature for write commands. When the pass-thru region in the virtual slave is properly configured, all Modbus write commands pointing inside that area will be handled by ladder logic using the Modbus Pass-Thru function block.

🔅 Site Conf	iguration					
Site name EAFC Flow Station						
MVI69E-AI	FC	Proje	ect name	00000000	Serial number	
244	Primary Mod	dbus slave ac	ldress	4.04.000	Firmware version/revision number	
0	Virtual Mod	bus slave add	tress	<none></none>	Configuration changed Ack Chg	
0	End-of-day	minute		0	PLC status	
0	End-of-hour	minute		0000h	Site status	
101.325	Barometric pressure (kPaa)			<none></none>	Active special-window sessions	
0000h	Site options				UDT tag prefix	
Ø	Pass-thru: N	1ax PLC wind	low size			
0	Pass-thru: V	Vord region s	ize	0	Pass-thru: Bit region size	
e] Pass-thru: V	Vord region a	ddress	0	Pass-thru: Bit region address	
<u>N</u> etwork	Serial <u>1</u>	Serial <u>2</u>	Re <u>m</u> apping		Commlink is	
<u>P</u> oll	<u>R</u> ead	<u>W</u> rite	<u>Special wnd</u>		unavailable	
Click the b		anu kau ta	adit			

3.2 Viewing Site Configuration Status



This section of the *Site Configuration* screen is used to provide Site status information. Site status features are discussed in the *MVI69E-AFC Reference Guide*.

3.3 UDT Tag Prefix

Prefix for generated UDT names. UDT definition files generated for the AFC project, including those for backplane-return layouts and archive record layouts, may be imported into the RSLogix project. To avoid conflict with names of other types, tags, and files, especially those generated for other EAFC modules in the same rack, this optional prefix may be prepended to each generated name (after the leading "EAFC_").

If not specified, generated names are not prefixed. If specified, the prefix must be an alphanumeric string of not more than 3 characters, and it is prepended to each generated name with an underscore ("_") separator.



3.3.1 Exporting UDT Files

You can export UDT files through the Backplane Return window.

Important: The backplane return window exports Backplane Return UDTs. Archive record layout UDTs are exported from the Archive Configuration Window (after saving the project).

From the Meter Configuration page...

1 Select the meter number.



2 Click on the **BACKPLANE RETURN** button.

🔆 Meter Configuration			_ • • 🗙
Meter 1	Meter Tag M01	Accumulators and I	low Rates
Select Meter	Meter Type, Product Group, and Units	Volumes Er	nergy Mass
Meter number 🚺 📥	© Differential Gas	hour Flow ra	ate period unit
Meter Disabled	C Linear	cubic meters Flow r	ate unit
- Copy Config From	System of units	Cubic meters Accun	nulation unit
Meter number 1 📥	⊂ US ● SI	Accun	nulator rollover
	Primary Input		
Lopy	Oifferential Pres C Flow Rate		
	Physical Device		
Identification	Orifice plate (AGA 3 [2012])		
End of period			
End-of-day minute	Reference Conditions	Process Input	Analysis Config
End-of-hour minute	10 Reference temperature (°C)	Control Onto	Calculation Onto
- Sample rate alarming -	101.325 Reference pressure (kPaa)	<u>Control obts</u>	Calculation obts
1 Sample period limit	Differential Meter (Diff Pressure)	Archi <u>v</u> e Config	Rese <u>t</u> table Accum
	DP flow threshold (kPa)	Backplan	
	0 Override discharge coefficient		
	0 <u>r</u> ifice		

This opens the *Backplane Return* window.

斄 Backplane-Return Configuration	X
Configuration, Meter 1	Dictionary
Process Input Component Analysis	Select Dictionary Section
	All
Uts Heg Description	
U+ 1- 3U+ Meter alarms	Reg Description
2+ 1-318+ Non-resettable accumulator, het, totalizer (m3)	<empty></empty>
4+ 1-320+ Non-resettable accumulator, net, residue (m3)	H- 0 Meter status
8+ 1-292+ Flow rate, rist (m3/h)	H- 1 Active stream number (0-based)
10+ T=140+ AGA 9 Supercompressibility Epu	H- 3 Meter signals
12+ T-208+ C.prime	H- 4 Process input calibration, auto
	H- 5 Process input calibration, manual
	H- 6 Open archive record select (age), daily
	H- 7 Open archive record select (age), hourly
	H- 9 Checksum alarms
	H- 28 Gross meter characterization
	H- 29 Product group
	H- 30 Units: Primary input
	H- 31 Units: Mass
	H- 32 Units: Energy
	H- 33 Units: Volume
	H- 36 End-of-day minute
	H= 37 End-or-nour minute
	H- 39 Sample period limit
	H= 40+1 Merer calculation options
Export <u>U</u> DT	<== <u>I</u> nsert Item
Move Up Move Down <u>R</u> emove Item ==>	<u>D</u> K <u>Cancel</u>

- 3 From the *Dictionary* side of the page, select the UDT files.
- 4 Click the **INSERT ITEM** button to add the file to the *Process Input* side of the page.
- 5 Do the same from the *Component Analysis* tab.
- 6 Save the Project.
- 7 When you've finished adding the UDT files, click the **Export UDT** button. (This button will not appear unless the Project has been saved). The files are placed in a sub-directory of the directory that contains the project. The directory is named using the name of the project and extension **.PLC**.

3.4 Configuring Communication Parameters



🔅 Site Conf	iguration				
Site name	EAFC Flow S	tation			
MVI69E-AF	C	Projec	ct name	00000000	Serial number
244	Primary Modbus slave address		4.04.000	Firmware version/revision number	
0	Virtual Modbus	slave addre	ess	<none></none>	Configuration changed Ack Chg
0	End-of-day min	iute		0	PLC status
0	End-of-hour mir	nute		0000h	Site status
101.325	Barometric pressure (kPaa)		<none></none>	Active special-window sessions	
0000h	Site options			UDT tag prefix	
0	Pass-thru: Max	PLC windo	w size		
0	Pass-thru: Wor	rd region siz	e	0	Pass-thru: Bit region size
0	Pass-thru: Word region address		dress	0	Pass-thru: Bit region address
Network	Serial <u>1</u>	Serial 2	Re <u>m</u> apping		Result Commlink is
<u>P</u> oll	<u>R</u> ead	<u>₩</u> rite	<u>Special</u> wnd		unavailable
Between 1	and 60 chara	icters.			
Meters	Prove	:r			Done

	👺 AFC Network Configuration
	Server 1 Server 2 Server 3 Server 4 Advanced
	Enabling Server 1 Enabled
	192.168.0.251 / 24 IP / Mask bits 502 TCP port
	Settings
	AEC slave C Driver C Vitual 1 Reserved connections
	Disable pass-thru
	⊂ Whitelist
	Whitelist Disabled Enable
	# IP range low end / Mask Allow Deny IP range
	2 0.0.0 /0 C C C C C C C C C C C C C C C C C C
	4 0.0.0.0 / 0 C <empty></empty>
	5 0.0.0 / 0 C <empty></empty>
	6 0.0.0 / 0 • • • • • • • • • • • • • • • • •
	7 U.U.U /U C C Cempty
	OK Canad Daad White Apply Vority
erial 1 or Serial 2	OK Cancel Bead Write Apply Verify Use the Serial 1 or Serial 2 buttons to configure serial communications Use Serial 2 to set up a Modbus Master Serial 2 to set up a Modbus Master
erial 1 or Serial 2	Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master.
erial 1 or Serial 2	Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master.
erial 1 or Serial 2	Use the Serial 1 or Serial 2 buttons to configure serial communication settings. Use Serial 2 to set up a Modbus Master.
erial 1 or Serial 2	Use the Serial 1 or Serial 2 buttons to configure serial communication settings. Use Serial 2 to set up a Modbus Master.
erial 1 or Serial 2	Use the Serial 1 or Serial 2 buttons to configure serial communication Parameters Copy from Local 19200 Parity Parit
erial 1 or Serial 2	Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master.
erial 1 or Serial 2	OK Qancel Bead Write Apply Yenty Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master. Write Serial 2 to set up a Modbus Master. Communication Parameters Copy from Local 19200 Parity Obta Stop Mode Even Port Modem Delays CTS timeout (x5ms) 0
erial 1 or Serial 2	OK Qancel Bead Write Apply Yenty Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master. Write AFC Port 1 Configuration Communication Parameters Part Odd Part Obtata Stop Mode Even Odd Port Modem Delays Odd Odd Port Modem Delays Odd Odd Odd Delay before first data after CTS (x 5ms) O O
erial 1 or Serial 2	OK Qancel Bead Write Apply Verity Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master. Worky a Modbus Master. Image: Copy from Local 19200 Parity Data Stop Mode 0 Z Bits 2 Bits ASCI Port Modem Delays CTS timeout (x5ms) Delay before first data after CTS (x5ms) Delay after last data before RTS (x5ms)
rial 1 or Serial 2	OK Qancel Bead Write Apply Verity Use the Serial 1 or Serial 2 buttons to configure serial communisations. Use Serial 2 to set up a Modbus Master. Operation Image: Communication Parameters Parity None Copy from Local 19200 Parity None Copy from Local 19200 None None C 7 Bits 2 Bits C 2 Bits C ASCIL Port Modern Delays Image: CTS timeout (x 5ms) Image: CTS timeout (x 5ms) Image: CTS timeout (x 5ms) Delay after last data before RTS (x 5ms) Image: CTS timeout (x 5ms) Image: CTS timeout (x 5ms) Image: CTS timeout (x 5ms)
rial 1 or Serial 2	OK Qancel Bead Write Apply Verity Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master. Write Stop of Configuration Image: Communication Parameters Parity None Image: Copy from Local 19200 Parity None Image: Copy from Local 19200 </td
rial 1 or Serial 2	OK Qancel Bead Write Apply Verify Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master. Write Stop of Configuration Copy from Local 19200 Parity Odd Parity None Even Obtata Stop Mode Even Odd Port Modem Delays CTS timeout (x5ms) Odd Odd Port Options Port Options Modbus Master Idle timeout (m) Idle timeout (m) Idle timeout (m)
rial 1 or Serial 2	OK Qancel Bead Write Apply Verity Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master. Write Stop a Modbus Master. Communication Parameters Part Mode Part Part Odd 1920 Part None Port Mode 1920 None None Port Mode 1920 None None Copy from Local 1920 None None Port Mode 181 RTU Odd Port Mode Delays Odd Delay before first data after CTS (x 5ms) Delay before first data before RTS (x 5ms) Delay after last data before RTS (x 5ms) Delay after last data before RTS (x 5ms) Delay Modbus Master Idle timeout (m) Hide primary slave Swap Modbus words Swap Modbus words Swap Modbus words Swap Modbus words
rial 1 or Serial 2	OK Qancel Bead Write Apply Verity Use the Serial 1 or Serial 2 buttons to configure serial communications. Use Serial 2 to set up a Modbus Master. Image: Communication Parameters Parity P
rial 1 or Serial 2	OK Cancel Bead Write Apply Verify Use the Serial 1 or Serial 2 buttons to configure serial commutations. Use Serial 2 to set up a Modbus Master. Image: Communication Parameters Parity Parity None Parity None Parity None Parity None Parity None Parity None Parity

3.4.1 Configuring Modbus TCP/IP



You must configure the communication parameters for the Ethernet port using the EAFC Manager software (*Site Configuration*):

,0011011	Server 2	Server 3	Server 4	Advance
Enabling				
Server 1 E	nabled 🖂	Enable		
Network Interfe	ace			
192.168.0.251	/ <mark>24</mark> IP	/ Mask bits	50	2 TCP po
Settings				
Mode 🔎 En	d device 🛛 Ga	teway 🚺 🚺 Ma	aximum simultaneo	us connectior
AFC slave 🌀 i	Primary C Vir	tual 1 Re	eserved connectior	IS
E Suppupria	E Suce but		lo connection times	ut min
Swap words	E Swab by		ie-connection timec	iuç min
🔲 Disable pass	s-thru			
Whitelist				
Whitelist D	isabled	Enablo		
# IP renge lo	wand (Mack	Enable Ilow Domu	ID renge	
* IPrangelo	venu/Mask A	now Deny	range (empt/	
0.0.0.0			(ompty)	
2 0.0.0.0		• • •	<empty.< td=""><td><u> </u></td></empty.<>	<u> </u>
3 0.0.0.0		• • _	<empty:< td=""><td>·</td></empty:<>	·
. 0000		• • _	<empty3< td=""><td></td></empty3<>	
4 0.0.0.0				
5 0.0.0.0	/0	• • _	<empty:< td=""><td>•</td></empty:<>	•
5 0.0.0.0 6 0.0.0.0			<empty: <empty:< td=""><td>•</td></empty:<></empty: 	•
5 0.0.0.0 6 0.0.0.0 7 0.0.0.0			<empty3 <empty3 <empty3< td=""><td>•</td></empty3<></empty3 </empty3 	•
5 0.0.0 6 0.0.0 7 0.0.0 8 0.0.0			<empty3 <empty3 <empty3 <empty3< td=""><td>• • •</td></empty3<></empty3 </empty3 </empty3 	• • •
1 0.000 5 0.0.0.0 6 0.0.0.0 7 0.0.0.0 8 0.0.0.0			<empty: <empty: <empty: <empty:< td=""><td>• • •</td></empty:<></empty: </empty: </empty: 	• • •
5 0.0.0 6 0.0.0 7 0.0.0 8 0.0.0	/0 /0 /0 /0		<empty: <empty: <empty: <empty:< td=""><td>, , , , ,</td></empty:<></empty: </empty: </empty: 	, , , , ,
5 0.0.0 6 0.0.0 7 0.0.0 8 0.0.0 9	/ 0 / 0 / 0 / 0	C C C C Vanced options	<empty: <empty: <empty: <empty: Comr</empty: </empty: </empty: </empty: 	nlink is oper

Server Configuration

The server tabs allow you set different configurations for up to four servers.

AFC Network Configuration					
Server 1 Server 2 Serve	r 3 Server 4 Advanced				
Server 1 Enabled	Enabling Server 1 Enabled F Enable				
Network Interface					
192.168.0.251 / 24 IP / Masi	k bits 502 TCP port				
Settings					
Mode	0 Maximum simultaneous connections				
AFC slave Primary Virtual	1 Reserved connections				
Swap words Swap bytes	Idle-connection timeout, min				
j Disable pass-thru					
Whitelist					
Whitelist Disabled Enable					
# IP range low end / Mask Allow Den	y IP range				
1 0.0.0.0 /0 • •	<empty></empty>				
2 0.0.0.0 / 0 • • •	<empty></empty>				
3 0.0.0.0 / 0 • O	<empty></empty>				
4 0.0.0.0 / 0 • O	<empty></empty>				
5 0.0.0 /0 • •	<empty></empty>				
6 0.0.00 / 0 • O	<empty></empty>				
7 0.0.0 / 0 • •	<empty></empty>				
8 0.0.0.0 / 0 • C	<empty></empty>				
Select server to configure, or Advanced o	ptions. Commlink is open				
OK Cancel Read	Write Apply Verify				

The following process applies to each server.

Step	Task	Description/Example
1	Click on the tab of the server that you want to configure. Enable the server by clicking the <i>Enable</i> checkbox.	AFC Network Configuration Server 1 Server 2 Server 3 Server 4 Advanced Enabling Enable Click to enable Network Interface 0.0.0 / 0 IP / Mask bits Click to enable Settings Mode End device C ateway 0 Maximum simultaneous connections
2	Configure the network Interface.	This field indicates the IP address of the physical interface in dotted decimal format.

Step	Task	Description/Example
		AFC Network Configuration
		Server 1 Server 2 Server 3 Server 4 Advanced Enabling Server 1 Enabled Image: Ser
		Network Interface 192.168.0.251 / 24 IP / Mask bits 502 TCP port
		Mode Mode Maximum simultaneous connections
		The <i>Mask bits</i> indicate the network prefix length of the physical interface. This is a number between 1 and 31. <i>TCP port</i> is the Modbus TCP/IP port for the selected server. This the MBAP listener port, typically 502 (default). You can use a range between 1024 and 65535.
3	Set up Mode	Set the module as an End Device or a Gateway.
	and AFC Slave	AFC Network Configuration
		Server 1 Server 2 Server 3 Server 4 Advanced Enabling Server 1 Enabled Enable Network Interface 192.168.0.251 / 24 IP / Mask bits 502 TCP port Settings Mode End device Gateway 0 Maximum simultaneous connections AFC slave Primary Virtual 1 Reserved connections Swap words Swap bytes 0 Idle-connection timeout, min Disable pass-thru Whitelist Whitelist Enable
		If set to an <i>End Device</i> (has its own Modbus database), the unit code is ignored and is echoed verbatim in the response regardless of its value. If set to <i>Gateway</i> (protocol converter between the TCP network on one end, and a traditional serial Modbus network on the other end), the serial Modbus network is virtual consisting of the MVI69E-AFC's primary and virtual slaves (only), and the unit code must be the configured slave address of the targeted MVI69E-AFC slave.
4	AFC Slave	The effect of the AFC Slave option depends on Mode setting.
		If the device is set as <i>End Device</i> , then this option selects which of the two MVI69E-AEC slaves is to be the addressed and device
		If the device is set to <i>Gateway</i> , then this option changes to a checkbox that hides the primary slave. If not selected, both slaves are addressable, but if set, only the virtual slave is addressable. In either case, if a command addresses the virtual slave but the virtual slave does not exist, no response is issued.

Step	Task	Description/Example
		AFC Network Configuration
		Server 1 Server 2 Server 3 Server 4 Advanced Enabling Server 1 Enabled Image: Enable
		Network Interface 192.168.0.251 / 24 IP / Mask bits 502 TCP port
		Settings Mode End device Gateway Maximum simultaneous connections AFC slave Primary Virtual 1 Reserved connections Swap words Swap bytes 0 Idle-connection timeout, min Disable pass-thru Whitelist Whitelist Disabled Enable
5	Swap Words	If checked, swaps the Modbus words transferred through this port. This parameter is only accessible to those data points that hold 32-bit quantities (long integers, floats, totalizers).
6	Disable pass- thru	The Modbus Pass-thru feature allows you to configure a Modbus Pass-Thru region in the Virtual Slave (Project > Site Configuration). See the <i>MVI69E-AFC Reference Guide</i> for detailed information.
7	Maximum simultaneous connections	Set the maximum number of connections for this server. Eight (8) total connections are available and can be configured as required. For example, each server might represent a different network. Server 1 might have a single connection while server 2 may have 3, server 3 with 2, and server 4 with 2 for a total of 8.
8	Reserved connections	A "reserved connection" is one whose resources are always available for use by this server, whether or not such a connection is currently in use, so that regardless of activity on other servers, this number of connections to this server can always simultaneously exist. This setting must not exceed the maximum number of connections permitted for this server if that maximum is non-zero. The total number of reserved connections over all servers must not exceed the maximum number of connections permitted overall. Server #1 always has at least one reserved connection. Range 1 to 8, default 1 with corresponding for others as 0 to 8
9	Idle connection timeout, min.	Specify the number of minutes that a connection may be idle before being disconnected. A timeout of 0 means no timeout (the connection may remain idle indefinitely).

3.5 Configuring Whitelist Options

AFC Network Configurati	ion	
Enabling Server 1 Enable	id VEnable	Server 4 Auvariceu
Network Interface	4 IP / Mask k	bits 502 TCP port
Settings Mode © End devic AFC slave © Primary Swap words Disable pass-thru	ce C Gateway	Meximum simultaneous connections Reserved connections Idle-connection timeout, min
Whitelist Whitelist Disable # IP range low end 1 0.0.0.0 2 0.0.0.0 3 0.0.0.0 4 0.0.0.0 5 0.0.0.0 6 0.0.0.0 7 0.0.0.0	Imask Enable / Mask Allow Deny Imask Allow Deny Imask Imask Allow Imask Imask Imask Imask <td< th=""><th>IP range <empty> <empty></empty></empty></empty></empty></empty></empty></empty></empty></empty></empty></empty></empty></th></td<>	IP range <empty> <empty></empty></empty></empty></empty></empty></empty></empty></empty></empty></empty></empty></empty>
Select server to config	ure, or Advanced op	tions. Commlink is open Write Apply Yerify

Whitelist configuration is an ordered sequence of eight entries, each of which comprises:

- An IP range (network IP and mask length)
- A boolean "color" flag; White = Allow, Black = Deny.

An entry whose components are all zero (IP 0.0.0.0, prefix length is 0, color is "white") is empty. It is ignored during application of the whitelist and its position in the sequence is irrelevant. The relative positioning of non-empty entries is relevant however, as a later entry can override the effect of an earlier entry.

See the MVI69E-AFC Reference Guide for detailed information.

3.5.1 Advanced Tab

-Overall Setti	ngs	3617613	3617614	Auvance
12 Keepalive	idle time, sec	<mark>8</mark> Ma	ximum simultaneou	is connection:
1 Keepalive	probe interval, sec	5 Co	mplete-packet time	out, sec
3 Keepalive	probe count	0 Orp	phaned-connection	timeout, min
– G atoway —	192.168.0.250	J7 [24] TP addr	ess / Mask bits	
Galeway	192.168	8.0.1 Gate	way	

Overall Settings

Overall Settings 12 Keepalive idle time, sec 8 Maximum simultaneous connections 1 Keepalive probe interval, sec 5 Complete-packet timeout, sec 3 Keepalive probe count 0 Orphaned-connection timeout, min Web Interface 192.168.0.250 / 24 IP2.168.0.1 6 ateway	Server 1 Server 2	Server 3 Server 4 Advanced
12 Keepalive idle time, sec 8 Maximum simultaneous connections 1 Keepalive probe interval, sec 5 Complete-packet timeout, sec 3 Keepalive probe count 0 Orphaned-connection timeout, min Web Interface 192.168.0.250 / 24 IP address / Mask bits Gateway 192.168.0.1 Gateway	Overall Settings	
1 Keepalive probe interval, sec 5 Complete-packet timeout, sec 3 Keepalive probe count 0 Orphaned-connection timeout, min Web Interface 192.168.0.250 / 24 IP address / Mask bits Gateway 192.168.0.1 Gateway	12 Keepalive idle time, sec	8 Maximum simultaneous connections
Keepalive probe count O Drphaned-connection timeout, min Web Interface 192.168.0.250 / 24 IP address / Mask bits Gateway 192.168.0.1 Gateway	The second secon	5 Complete-packet timeout, sec
Web Interface 192.168.0.250 / [24] IP address / Mask bits Gateway 192.168.0.1 Gateway	3 Keepalive probe count	0 Orphaned-connection timeout, min
Gateway	Web Interface 192.168.0.250	/ 24 IP address / Mask bits
	Gateway 192.160	8.0.1 Gateway

Parameter	Description	
Keepalive idle time	This setting enables a network server to free up resources allocated to broken connections. The three settings are:	
	Idle time	
	Probe interval	
	Probe count	
	When a connection becomes idle (no requests to the server), it could be merely because the client has nothing to say or it could be due to a broken connection. "Keepalive" enables the server to reasonably determine which and act accordingly.	
	When a connection has been idle for the "idle time", the server sends up to "probe count" probes at the rate of the "probe interval" delay between each.	
	A "probe" is a TCP/IP packet that asks the client "Are you still there?". If the client answers any probe with "Yes, I'm still here", then the connection is good. The client is merely silent and the server resets "keepalive" logic for another cycle.	
	If the client does not answer any probe, then the server deems the connection to be broken and closes it to free up its resources for allocation.	

Parameter	Description
Keepalive probe interval	See above.
Keepalive probe count	See above.
Maximum simultaneous connections	The maximum concurrently active connections over all servers. This should be a number between 1 and 8. The default is 8.
Complete packet timeout	The timeout for receiving a complete packet. The timeout becomes effective upon receipt of the first octet of a packet's MBAP header and imposes a limit on the time that may elapse before receiving the last octet of that packet. If the timeout expires, the connection is shut down. Valid range is 1 through 60 with a default of 5 seconds.
Orphaned connection timeout	This timeout (in minutes) becomes active when a connection is orphaned by a sufficiently significant change to its parent server's configuration. This setting provides a window of time during which the connection remains alive so that the client can gracefully close it before establishing a replacement connection according to the network's updated requirements. Server changes causing orphanization include (but not limited to):
	Disabling the server
	Change of IP address
	 Change to whitelist the disallows the client's IP
	 Reduction or removal of access permitted, e.g. primary vs virtual slave.
	 Change of protocol; e.g., gateway vs end-device mode, swap options.
	Orphanization of a connection breaks the association between the connection and its parent server so that the connection no longer belongs to any server. Server settings in effect prior to orphanization become frozen for that orphan for the remainder of its limited life. A subsequent reconfiguration of this or any other server that reestablishes the frozen settings does not re- associate the connection with the server; the connection remains orphaned and its timeout remains active.
	Upon timeout expiry, the connection is shut down. A timeout of 0 causes an immediate shutdown. Changing this setting does not adjust timeouts in effect for already existing orphans. Valid values: 0 to 60. Default is 0.
Web Interface/Gateway

Server 1	Serve	er 2	Server 3	Server 4	Advance
Coverall 9	ettings ——				
12 Kee	palive idle time,	sec	8 Max	imum simultaneou	is connections
1 Kee	palive probe inte	erval, sec	5 Com	plete-packet time	out, sec
3 Kee	palive probe cou	unt	lan O 🚺	naned-connection	timeout. min
	· ·		·		_
Web Int	erface				
	192.16	3.0.250	P addre	ss / Mask bits	
Gateway	ı ———				
		192,168.0	0.1 Gatev	vav	

This IP address and Mask bits pertain to the address of the module itself. This is not a Modbus TCP/IP address used by the MVI69E-AFC application. The default web interface address is 192.168.0.250.

Once configured, click **READ** from the *Site* page to save changes.

3.5.2 Configuring Serial 1 and Serial 2



The module contains two serial port connections. Serial 2 may be used as a Modbus Master.

Serial Only

The module supports the following communication parameters for each communication port:

Parameter	Values
Baud Rate	9600, 19200, 28800, 38400, 57600, 115200, 230400
Data Bits	7 or 8
Stop Bits	1 or 2 Bits
Mode	RTU or ASCII
Parity	None, Even or Odd

Note: Do not configure a port for both RTU mode and 7 data bits as this combination is not supported by the Modbus protocol.

You must configure the communication parameters for each communication port using the MVI69E-AFC *Manager* software (Site Configuration):

1000	AFC Port 1 Configuration							
	Communication Parameters Copy from Local 19200							
	Data Stop Mode © None C 7 Bits © 1 Bit © RTU C Even © 8 Bits C 2 Bits C ASCII Odd							
	Port Modem Delays CTS timeout (x 5ms) 0 Delay before first data after CTS (x 5ms) 0 Delay after last data before RTS (x 5ms) 0							
	Port Options Modbus Master Idle timeout (m) Hide primary slave Swap Modbus bytes Swap Modbus words Disable pass-thru							
	Done							

Port Options

Modbus Master	England the Medhus Mesters						
	Enables the Modbus Master for the port (Serial 2). The Modbus Master command is generated from the processor using ladder logic (Modbus master block). After the Modbus Master transaction is completed the module is ready to receive another Modbus Master request from the ladder logic:						
	Processor MVI	-AFC					
		Modbus Slave					
	Modbus						
	Block	Modbus					
	The following Modbus function	ns are support for Modbus Master operation					
	Modbus Function Code	Description					
	1	Read Coil Status					
	2	Read Input Status					
	3	Read Holding Registers					
	4	Read Input Registers					
	15	Force (Write) Multiple Coils					
	16	Preset (Write) Multiple Registers					
	The module offers flexibility for Modbus Master operation, allowing ladde logic to select one of the following data types:						
	Bit (packed 16 to a v	word)					
	Word (16-bit registe	r)					
	Long (32-bit items a	s register pairs)					
	Long Remote (32-bi	t items as single registers)					
	registers (words). Each regis type implements each data u contains four bytes. The prop Modbus implementation.	ter contains two bytes. Long remote data nit as one 32-bit register. Each register er choice depends on the remote slave's					
Hide Primary Slave	When checked, protects the command from a Modbus ma remap the register from the F each register from write com Slaves Configuration section	Primary Modbus Slave from any read or wri aster device. In this case, you could also Primary Slave to the Virtual Slave protecting mands (refer to the Primary & Virtual Modbu).					
Swap Modbus Words	If checked, the words transfe swapped. This setting only ap point and long integer).	rred by a Modbus master device will be oplies to double-register data items (floating					

Option	Description
Disable Pass-thru	The Modbus pass-through feature allows you to configure a Modbus Pass-through region in the virtual slave (Project > Site Configuration).
	After the module receives a holding register write command (Modbus functions 6 or 16) or a bit write command (Modbus functions 5 or 15), it generates a pass-through block to be sent to the processor containing the Modbus command data. You can define a word pass-through region for words or bits.
	Note: You must enable the Virtual Slave by configuring a Modbus address greater than 0 (Project > Site Configuration).
	You can control which communication parts will support the pass-through (Project > Site Configuration > Port X button).
	This feature requires ladder logic to read the pass-through block from the module to the processor. Refer to the Ladder Logic section in the <i>MVI69E-AFC Reference Guide</i> for more information about the pass-through feature.

3.6 Poll Button

The function of the poll button is to update the display of site status (the blackbackground boxes in the upper right quadrant of Site Configuration).

3.7 Local Port Settings Dialog Box

This dialog is displayed whenever menu item *Communications/Local Port Settings* is clicked, or any other action that requires a connection to the module is invoked while such a connection is not yet present. Such "other actions" include the **READ**, **WRITE**, and **POLL** buttons of the *Site Configuration* pane, but also numerous other actions such a Read and Write of Meter Configuration, menu item *Project/Download Project*, and menu item *Communications/Login Module*.

If a connection is already present, this dialog is not automatically displayed upon any "other action" but only upon the *Local Port Settings* menu item. Similarly, if the connection exists but the operator has not logged in, while the "other action" requires login, the *Login Module* window is automatically displayed.

Both conditions are cascaded. For example, a Read when not connected displays first the *Local Port Settings* window to connect and then the *Login Module* window to log in.

Local Port Setting	IS	×
Transport TCP/IP	C Serial	
Select 1	Copy to L	ocal
Primary slave addres	s 2	44
Timeout (ms)	5	000
Server IP address Server TCP port	192.168.0.25	502
Commline	is open	
<u>O</u> K <u>C</u> a	ncel Co	<u>n</u> nect

Adjust the communication settings if necessary. Click **CONNECT** to save the settings and **OK** to connect.

3.8 Read Button

The **READ** button reads the current site configuration from the module to the local PC. Look at the result area (green rectangle) on the *Site Configuration* dialog box for the status of the read operation. When a "Success" indication shows in the result area, it indicates that the site configuration has been successfully read to the local PC.

3.9 Write Button

After you have completed the site configuration on the local PC *EAFC Manager* software, click the **WRITE** button to transfer the configuration to the module. When the *Result* area shows "Success", the site configuration has been successfully written to the module.

Click the **READ** button to read the current module site configuration. The configuration should match the last write operation data.

If the result area shows "Time out", verify the network connections.

3.10 Special wnd Button

This button displays the Special Windows dialog.

🔅 Site Conf	igur	ation					
Site name	EA	FC Flow Stat	ion				
MVI69E-AF	С		Project name	000000	00 s	erial number	
244] Prji	mary Modhus s	ave address	4.04.00	L F	irmware version.	drevision number
0	l v	🌾 Special-W	indows Configura	tion			📑 🛃 🛕 🗛 🗛
0	E					Virtual slave	
0	E			Timeout		location	
101.325	в		Event log download	60	sec	0	w sessions
0000h	s		Alarm log download	60	sec	0	ī 📕
0] P	Operator dal	iabase management	60	min	0	┤ ┃
0] P	орололон ос т.			1		size
0	P		ansmitter calibration	60	jmin	<u> </u>	address
Network			Enron access	60	sec		
<u>H</u> C(HOIK	-	A number b	etween 5 and 30	D, in seconds		Done	nink is tailable
<u>P</u> oll							
Configure s	spec	cial windows.					
Meters		Pro <u>v</u> er					Done

This dialog allows you to set times in minutes or seconds. The times represent times of no activity. For example, if you set Event log download to 60 seconds, and no download activity has occurred within that time period, the Event Log activity is abandoned and no data is logged or committed. The same holds true for the alarm log, transmitter calibration, and Enron access. You must enter the time interval and optionally the Virtual Slave location of the data. When you are satisfied with your settings, click **DONE**. You can come back at any time and change your settings.

If you want to access these special windows via the virtual slave, assign an address in the virtual slave to the special window in the Virtual slave location column. If the Virtual slave location is set to "0", the special window is unavailable in the virtual slave.

3.11 Done Button

This button stores your settings temporarily and closes the *Site Configuration* dialog box. Note that you must also save your project before closing EAFC Manager, otherwise your configuration will be discarded.

3.12 Remapping Button

Refer to the MVI69E-AFC Reference Guide.

3.13 Accessing the Data

Information on accessing data is discussed in the *MVI69E-AFC Reference Guide*.

3.14 Site Status

Site status information is discussed in the MVI69E-AFC Reference Guide.

4 Configuring Meter Parameters



4.1 Prerequisites

Ensure that all site information is configured as described in the previous chapters.

4.2 What Parameters Do I Have to Configure?

The *Meter Configuration* page allows you to configure your meter based on your application. Parameters on this page are based on information that you initially provide to EAFC Manager.

Configuring a Meter consists of the following steps:

- 1. Configure Meter Type, Product Group, Units, and Primary Input
- 2. Configure Meter Identification and Stream Identification Parameters
- 3. Configure Common Parameters
- 4. Configure Application-specific Parameters
- 5. Configure Analysis Parameters

4.3 Configuring Meter and Stream Identification Parameters

Identification Parameters identify the meter.

1 Select the Meter number.



 Meter Configuration 		
Meter 1	Meter Tag M01	Accumulators and Flow Rates
Select Meter Meter number Meter Disabled Copy Config From Meter number Copy	Meter Type, Product Group, and Units Device Gas ♥ Differential Linear System of units System of units ♥ US ♥ SI Primary Input ♥ Differential Pres Flow Rate	Volumes Energy Mass hour Flow rate period unit cubic meters Flow rate unit cubic meters Flow rate unit 10000000 Accumulation unit
Ide <u>n</u> tificat	Physical Device	
End of period	General type	ut Analysis Config
Sample rate alarming -	Manufacturer Model	<u>Ca</u> lculation Opts
Sample period limit	Serial number	turn
	Nominal K-factor	<u>C</u> ancel
Stream 1 Select Stream	Gas 1.3198 Isentropic exponent 0.6 Default relative density 1 Default Fnv	Differential Meter (Diff Pressure) 0.010268 Viscosity (cp) <u>Meter Factors</u>
Stream Enabled	0 Default heating value (MJ/kg)	<u>S</u> tream Opts Analy <u>s</u> is
Result Commlink is open	General descriptive information for the r	neter, for inclusion in proving reports.
	<u>S</u> ite	<u>R</u> ead <u>W</u> rite <u>D</u> one

2 Click the **IDENTIFICATION** button to display the *Meter Identification* dialog.

- **3** Add the following identifying parameters:
 - General Type
 - Manufacturer
 - Model
 - Serial Number
 - Size
 - Nominal K Factor
- 4 Click **OK** when complete. Repeat this for every configured meter.

4.3.1 Setting End of Period Parameters

These parameters set the End-of-day minute and End-of-hour minute.

End-of-Day Minute

This parameter sets the minute of the day when the daily archives are created. The default value of 0 (zero) creates the daily archive at midnight. Valid values are between 0 and 1439.

End-of-hour minute

This parameter sets the minute of the hour when the hourly archives are created. The default value of 0 (zero) creates hourly archives at the top of each hour. Valid values are between 0 and 59.

Setting Precedence

You can set the *End-of-day minute* and *End-of-hour minute* on the *Site* page as well. The parameters set on the site page represent a global setting and *End of Period* parameters set on the Meter Configuration are ignored. However, you can give the Meter setting precedence using the *Meter Control Options* dialog.

Mete	er 1	Meter Tag M01	Accu	umulators and f	Flow Rates
Select Mete	r —	Meter Type, Product Group, and Units	- (V	olumes 🎽 Er	nergy Mass
Meter number		C Linear Gas	hou cut	r Flow ra	ate period unit ate unit
	🔅 Meter Co	antrol Ontions	×	c meters Accun	nulation unit
Meter number	, meter ot			Accun	nulator rollover
Copy		larming: require manual acknowledge larming: disallow pre-acknowledge larming: acknowledge action is sealable			
Inciru	3 - A	larming: douter house douter to resume normal measurement			
End of per		anning. Maar dor to roodine honna medoarement			
U End-	5 🗖 D	isable pulse-count sample rate alarm		ess <u>I</u> nput	Analysis Config
U End-		isable purce count sample rate alorm		trol Opt	Calculation Onte
Sample rat	7 1			dor opes	<u><u>ca</u>iculation opts</u>
1 Sam				<u>v</u> e Config	Resettable Accum
	8 🗖			lane Return	
	9 🗖				
	10 🗆 T	reat analysis as process input			
	11				
Stro	12 🗆 E	nable per-meter end-of-day		ntial Meter (Diff Pressure)
5110	13 _ E	nable per-meter end-of-hour		8 Viscosity	/ (cp)
Stream numb	14 L 15 🗖 M	leter enable			Meter Factors
		г	_		
Stream			Done	am Opts	Analy <u>s</u> is
Ide <u>n</u> tina	auun	11			
- Dooult		Control options, 16 bits,			

- 1 Click on the **CONTROL OPTS** button.
- 2 Click on the *Enable per meter end-of-day* and *Enable per meter end-of-hour* check boxes.
- 3 Click DONE.

The settings in the *End of Period* section for the meter now take precedence over those set on the Site page.

Sample rate alarming – This is the longest period that can elapse between successive fresh samples of process input values without raising the "sample rate too low" alarm. This value is specified in seconds with a range of 0 through 30. Zero "0" means that the sample rate test is not performed and alarms are not raised. The complete implementation requires supporting logic in the PLC. The default for gas product is 1 second and for any liquid product is 5 seconds.

4.3.2 Setting a Stream Name

1 To set a *Stream Name*, click on the **IDENTIFICATION** button under the *Stream Enabled* indicator.



2 Enter a product description and click **OK**.

4.4 Configuring Meter Type, Product Group, Units, and Primary Input

These parameters must be configured before you configure any common or application detail parameters. What you select here affects the available parameters that must be configured for your application.

Meter Configuration		
Meter 1	Meter Tag M01	Accumulators and Flow Rates
Meter I Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy Identification	Weter Tag Wol Meter Type, Product Group, and Units Device © Linear System of units © US Primary Input © Pulse Count Pulse Frequency Physical Device Turbine	Volumes Energy Mass hour Flow rate period unit cubic meters Flow rate unit cubic meters Accumulation unit 100000000 Accumulator rollover K-factor Characteristics Gross volum Measured quantity pul/m3 Flow input unit
End of period Image: Image shows a straight of the straight of th	Reference Conditions 15 Reference temperature (°C) 101.325 Reference pressure (kPaa) Linear Meter (Pulse Count) 0 Frequency flow threshold (Hz) 16777216 Pulse input rollover 10000000 Master pulse-count rollover 0 Pulse flow thresh: count, time (s)	Process Input Analysis Config Control Opts Cglculation Opts Archive Config Resettable Accum Backplane Return Image: Config and Config
Stream 1 Steet Stream Stream number 1 Stream Enabled Identification	Gas 1.3198 0.6 Default relative density 1 Default Fpv 0 Default heating value (MJ/kg)	Linear Meter (Pulse Count) 1 K-factor (pul/m3) Meter Factors Stream Opts

EAFC Manager needs these parameters in order to hide or show parameters that pertain specifically to your meter and its primary output based on your meter and associated instrumentation.

For example, a meter that measures the flow of Crude oils requires that specific parameters be provided that may not be required of a meter that measures the flow of gas.

Parameters available to you are determined by these selections.

Based on the previous examples, you essentially have to answer 3 questions before you begin meter configuration:

- 1. What kind of meter are you configuring?
- 2. What is the primary output from your flow meter and associated instrumentation?
- 3. What are you measuring (Gas or Liquid)?

4.4.1 Selecting and Configuring Meter Type, Product Group, Units and Primary Input Parameters

The following table helps you determine what *Meter Type* and *Primary Input* parameters must be entered in EAFC Manager based on the kind of meter you are configuring and the primary output of the meter and associated instrumentation.

To use the following table:

- 1 Locate the type of meter you are using from Column 1.
- 2 Determine the primary output of your meter and associated instrumentation from Column 2.
- **3** Note your Meter Type from Column 3.
- 4 Note your Primary Input from Column 4.

Column 1	Column 2	Column 3	Column 4
What kind of meter are you configuring?	What is the primary output from your flow meter and associated instrumentation?	Configure your meter type as	Configure your primary input as
Orifice Meter	Differential Pressure	Differential	Differential Pres
V-Cone Meter	Differential Pressure	Differential	Differential Pres
Wedge Meter	Differential Pressure	Differential	Differential Pres
Coriolis Meter	Flow Rate	Differential	Flow Rate
	Pulse Count and Pulse Frequency	Linear	Pulse Count
	Pulse Frequency Only	Linear	Pulse Frequency
Vortex Meter	Flow Rate	Differential	Flow Rate
	Pulse Count and Pulse Frequency	Linear	Pulse Count
	Pulse Frequency Only	Linear	Pulse Frequency
Ultrasonic Meter	Flow Rate	Differential	Flow Rate
	Pulse Count and Pulse Frequency	Linear	Pulse Count
	Pulse Frequency Only	Linear	Pulse Frequency
Turbine Meter	Pulse Count and Pulse Frequency	Linear	Pulse Count
	Pulse Frequency	Linear	Pulse Frequency
	Pulse Count	Linear	Pulse Count
Positive Displacement	Same as Turbine		
Magnetic	Same as Turbine		

You will use the information from Columns 3 and 4 to select your first two parameters in EAFC Manager.

Columns 3 and 4 of this table have a direct relationship with the *Meter Configuration* page of EAFC Manager.

For example, if you are configuring a **Coriolis Meter** with a primary output of **Pulse Count and Pulse Frequency**, your settings in EAFC Manager for Meter Type and Primary Input would be **Linear** and **Pulse Count** as shown in the following example.

					Meter Configuration			
					Meter 1	Meter Tag M01	Accumulators and	Flow Rates
					Select Meter Meter number 1 + Meter Disabled Copy Config From Meter number 1 + Copy	Meter Type, Product Group, and Units Orecode Orecode Outperformed System of units Primacy leput Function Count Public Count Physical Device	Volumes E hour Flow 1000 cu feet Flow 1000 cu feet Accu 10000000 Accu K-factor Characteri Gross volum Measu pu(MCF Flow in	nergy Moss rate period unit rate unit mulation unit mulation rollover stics red quantity put unit
What time of mater	What is the asimon	Configure use	matar	Configure your primary	End of period 0 End-of-day minute 0 End-of-hour minute	Reference Conditions Beference temperature (°F)	Process Input	Analysis Config
are you configuring?	output from your flow meter and associated instrumentation?	as	meter	input as		Linear Meter (Pulse Count) Frequency flow threshold (Hz)	Archive Config	Resettable Accu
Orifice meter	Differential Pressure	Differential		Differential Pressure				
V-Cone Meter	Differential Pressure	Differential		Differential Pressure				
Wedge Meter	Differential Pressure	Differential		Differential Pressure				
Coriolis Meter	Flow Rate	Differential		Flow Rate				
	Pulse Count and Pulse Frequency	Linear —		Pulse Count				
	Pulse Frequency only	Linear		Pulse Frequency				
Vortex Meter	Flow Rate	Differential		Flow Rate				
	Pulse Count	Linear		Pulse Count				
	Pulse Frequency	Linear		Pulse Frequency				
Ultrasonic Meter	Flow Rate	Differential		Flow Rate				
	Pulse Count	Linear		Pulse Count				
	Pulse Frequency	Linear		Pulse Frequency				
Turbine Meter	Volume	Linear		Pulse Count				
	Elow Pato	Linear		Bulse Count				

It is important to note that the settings selected within the **Meter Type**, **Product Group** and **Units** section of the page, determine what configuration parameters are viewable on the EAFC Manager *Meter Configuration* page.

Once you've selected the correct *Meter Type* and *Primary Input* settings based on the table, you can select the *Product Group*, and *System of Units*.

4.4.2 Product Group

The *Product Group* represents what you are measuring (i.e., gas or liquid). The *Product Group* drop-down list allows you to select the appropriate *Product Group* for your application. Refer to the *MVI69E-AFC Reference Guide* for detailed information.

Note: The Product Injected Meter Type feature produces an Accumulation Overflow error. The associated flow calculations will be invalid.

4.4.3 System of Units

System of Units pertains to how measurements are displayed and are used for calculations.

- **US** Temperature in °F, Pressure in psi, Differential Pressure in hw@60°F.
- **SI** Temperature in °C, Pressure and Differential Pressure in kPa.

Once these parameters are configured, the parameters that you see on EAFC Manager are those that apply to your application. That is, what you see on the MVI69E-AFC Manager page is dependent on these parameter configuration settings.

Troubleshooting Tip: If the EAFC Manager displays an "Illegal Data Value" message, it typically indicates an invalid meter type or product group configuration. The module does not accept a configuration file that attempts to change a meter type or product group for a meter that is currently enabled. Disable all meters, change the meter types and product groups, and then enable the meters again.

5 Configuring Common Parameters



Common parameters are common to all applications. These parameters are always visible and should be configured.

Meter Configuration		
Meter 1	Meter Tag M01	Accumulators and Flow Rates
Select Meter	Meter Type, Product Group, and Units	Volumes Energy Mass
Meter number 1 🔶	C Differential Gas	hour Flow rate period unit
Meter Disabled	C Linear	cubic meters Accumulation unit
Copy Config From	System of units	100000000 Accumulator rollover
Meter number 1 🚔	Primary Input	
Сору	Pulse Count C Pulse Frequency	K-factor Characteristics
Ide <u>n</u> tification	Physical Device	pul/m3 Flow input unit
End of period		
End-of-day minute	Reference Conditions	Process Input Analysis Config
End-of-hour minute	15 Reference temperature (*C) 101 325 Deference menerature (*Dan)	Control Onts Calculation Onts
-Sample rate alarming -	Helefence pressure (KHaa)	
1 Sample period	Erequency flow threshold (Hz)	
	16777216 Pulse input rollover	Backplane Return
	100000000 Master pulse-count rollover	
	0 0 Pulse flow thrsh: count, time (s)	
Stream 1	Gas	Linear Meter (Pulse Count)
-Select Stream	1.3198 Isentropic exponent	1 K-factor (pul/m3)
Stream number 🛛 🔶	0.6 Default relative density 1 Default Fpv	Meter Factors
Stream Enabled	Default heating value (MJ/kg)	Stream Opts Analysis
Ide <u>n</u> tification		

Common parameters include:

- Physical Device
- Reference Conditions
- Accumulators and Flow Rates
- Process Input
- Control Options
- Backplane Return
- Calculation Options
- Resettable Accumulators
- Meter Factors
- Stream Options

5.1 Selecting the Physical Device

Select your device from the drop-down list. Selects here change calculation methods based on the meter.

Meter 1	Meter Tag M01	Accumulators and F	low Rates
Meter 1 Select Meter Meter number Meter Disabled Copy Config From Meter number Copy Idegtification End of period End-of-day minute Sample rate elarming- Sample period	Meter Tag M01 Meter Type, Product Group, and Units Device Device Gas System of units C US © SI Primary Input © Differential Pres C Flow Rate Physical Device Ontice plate (AGA 3 [2012)) Device Differential Motor (Diff Proceure) 0 DP flow threshold (kFe)	Accumulators and F Volumes Er Louis meters Louis meters Louis meters Louis meters Louis meters Louis meters Accur Process Input Control Opts Archive Config Backplane Return	Iow Hates lergy Mass ate period unit ate unit nulation unit nulator rollover Analysis Config Cglculation Opts Resettable Accur
Stream 1 Select Stream Stream number 1 \$	Default Fpv Default Fpv Default heating value (MJ/kg)	Differential Meter (1 0.010268 Viscosit Stream Opts	Diff Pressure) y (σp) <u>Meter Factors</u>

If you are using a differential gas type meter, measuring differential pressure, you have the option of selecting from the following standards:

- Orifice plate (AGA 3 [2012])
- Orifice plate (AGA 3 [1992])
- Orifice plate (ISO 5167-2)
- Nozzle, ISA 1932 (ISO 5167-3 type 1)
- Nozzle, long radius (ISO 5167-3 type 2)
- Nozzle, Venturi (ISO 5167-3 type 3)
- Venturi tube, cast (ISO 5167-4 type 1)
- Venturi tube, machined (ISO 5167-4 type 2)
- Venturi tube, rough (ISO 5167-4 type 3)
- V-cone [Rev 3.2]
- V-cone [Rev 2.5]
- Wafer-cone
- Wedge

The options in the drop-down list change depending on your selections to meter types. For example, if you select a Linear device type, the following physical device types are available:

Turbine	-
Turbine	
Positive displacement	
Coriolis	
Ultrasonic	
Vortex	

5.2 Specifying Reference Temperature and Pressure (Reference Conditions)



Meter 1	Meter Tag M01	Accumulators and F	low Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy Identification End of period 0 End-of-day minute 0 End-of-hour minute Sample rate alarming 1 Sample period	Meter Type, Product Group, and Units Device Gas C Differential Gus © Linear System of units C US © SI Primary Input ● Pulse Count Pulse Frequency Physical Device Inthine Turbine Image: Count Reference Conditions IS Reference conditions Reference temperature (*C) 101.325 Reference pressure (kPaa) Linear Meter (Pulse Count) Image: Count Pulse Frequency 0 Frequency flow threshold (Hz) 16777216 Pulse input rollover 100000000 Master pulse-count rollover 0 Image: Pulse flow thrsh: count time (s)	Volumes En hour Flow r cubic meters Flow r cubic meters Accun 10000000 Accun K-factor Characteris Gross volum Measure pul/m3 Flow inp Process Input Control Opts Archive Config Backplane Return	ergy Mass ate period unit ate unit nulation unit nulator rollover stics ad quantity uut unit Analysis Config Calculation Opts Resettable Accuu
Stream 1 - Select Stream Stream number 1 - Stream Enabled Identification	Gas 1.3198 Isentropic exponent 0.6 Default relative density 1 Default Fpv 0 Default heating value (MJ/kg)	Linear Meter (Pulse 1 K-factor Stream Opts	e Count) (pul/m3) Meter Factors Analy <u>s</u> is

Measurements of gas and liquids are calculated based on their characteristics at a specific temperature and atmospheric pressure. Specify the reference conditions in this area. The default values are 15°C/101.325 kPaa (SI) and 60°F/14.696psia (US), which are the standard API base conditions. If configured reference conditions are different from API base, the API calculations are done twice as necessary to correct from flowing conditions to API base and then decorrect from API base to your selected reference.

5.3 Setting Accumulators and Flow Rates

5.3.1 Flow Rate Period Unit



Click on the **FLOW RATE PERIOD UNIT** box to change the flow rate period.

Meter 1	Meter Tag M01		Accumula	ators and F	low Rates	
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy Identification	Meter Type, Produ Device © Differential C Linear System of units C US © SI Primary Input © Differential Pres Physical Dev Orifice plate (A	c Flow Rate	Volumi hour cubic me 1000000	Flow r Flow r Flow r Recur Accur Accur	ergy ate period u ate unit nulation unit nulator rollo	Mass nit ver
End of period D End-of-day minute D End-of-hour minute Sample rate alarming D Sample period	Reference Co 15 F 101.325 F Differential Me 0 C	 per second per minute per hour per day Done	Proces <u>C</u> ontro Archi <u>v</u> e <u>B</u> ackplar	s Input I Opts Config ne Return	Analys C <u>a</u> lcul Rese <u>t</u> ta	sis Config ation Opt
Stream 1	Gas		Differenti	al Meter (I	Diff Pressu	ire)

5.3.2 Flow Rate Unit



Click on the **FLOW RATE UNIT** box to change the flow rate unit.

Select Meter Meter number 1 🔶	Meter Type, Produ		- / *	
Meter number 1 🔶	Des de la	ict Group, and Units	Volumes Er	iergy Mass
	Device Differential	Gas 💌	hour Flow r	rate period unit rate unit
Meter Disabled	Volume Flow Rate Un	it	X ubic meters Accur	nulation unit
Copy Config From —			10000000 Accur	nulator rollover
Meter number 1	⊖ liters	O 0.001 US gallons		
Сору	 decaliters 	0.01 US gallons		
	C hectoliters	O.1 US gallons		
Ide <u>n</u> tification	cubic meters	 US gallons 		
End of period	O 10 cu meters	O 10 US gallons		
0 End-of-day minu	100 cu meters	100 US gallons	Process Input	Analysis Confic
0 End-of-hour minu	C 1000 cu meters	1000 US gallons	i loosoo jiipat	
	 cubic feet 	O.001 barrels	Control Opts	Calculation Opt
Sample rate alarmint	O 10 cu feet	0.01 barrels	Archive Config	Resettable Accu
Sample period	100 cu feet	O.1 barrels		1
	1000 cu feet	barrels	ackplane Return	
	10000 cu feet	10 barrels		
	100000 cu feet	100 barrels		
	C 1000000 cu feet	C 1000 barrels		
Stream 1		Done	ifferential Meter (Diff Pressure)
Select Stream —			Viscosi	у (cp)

5.3.3 Accumulation Unit



Click on the ACCUMULATOR UNIT box to change volume accumulator units.



5.3.4 Accumulator Rollover



This is the value when mass accumulators are reset to zero and it 1 greater than the highest value that the accumulator may hold.

A value of 1000000 specifies a 6-digit accumulator that rolls over to 0 from 999999. Any unsigned 32-bit value may be entered. A value of 0 indicates a free-running accumulator, which rolls over to 0 from 4294967295. The default value is 100000000 (8 zeros).

5.4 Configuring Process Input Scaling



Click the **PROCESS INPUT** button to configure the valid input ranges. If input data is not within the configured range, the MVI69E-AFC will flag an alarm on the *Meter Monitor* dialog box (refer to *Meter Monitor* section) and the alarm bit for the meter is set.

Meter Configuration							
Meter 1	Meter Tag	M01			Accumula	tors and F	low Rates
Select Meter Meter number	Meter Type Device © Differen © Linear	e, Product Gi Gas Itial	roup, and Units	•	Volume hour cubic me 1000000	Flow r Flow r ters Flow r ters Accun	ergy Mass ate period unit ate unit nulation unit gulater rollower
Meter number 1 🔶	Primary Inp	out	Flow Rate				
Ide <u>n</u> tification	Orifice plate	evice (AGA 3 [2012])	•			
Image: Construction of the second s	Reference	Conditions - Reference t Reference p	emperature (°C) pressure (kPaa)		Proces <u>C</u> ontro	s Input	Analysis Config Calculation Opts
Process Input Scaling							8
Differential pressure (kPa) 0 Temperature (*C) 15 Pressure (kPag) 0	Xmtr min 0 1 0 0 0	Xmtr max	Zero scale 0 15 0	Fu 0 15 0	Il scale 0 01 00 00	pts Ala h 0 hh 15 hh 0	rm, lo Alarm, hi 0 15 0 0
number between 0 and 250 kP mtr min <= Zero scale <= Alarm	°a. ⊨lo <= Alarm I	ni≮= Full sca	lle <= Xmtrmao	ι.		<u>M</u> VT Lir	nkage <u>D</u> one
Stream number	0.6 1 0	Default relat Default Fpv Default heat	ive density ing value (MJ/kg)	Stream	Onte	Meter Factors
Identification					<u>o</u> uean	i opis	Alialy <u>s</u> is

The entries available on this dialog box depend on the selected product group, device, and primary input:

Product Group	Input Variables
Gas	Temperature, Pressure, Flow Rate, Differential Pressure, Pulse Frequency
Liquid	Temperature, Pressure, Flow Rate, Differential Pressure, Pulse Frequency, Density, Water Content

5.4.1 Zero Scale

This value is the minimum valid value for the input variable.

5.4.2 Full Scale

This value is the maximum valid value for the input variable.

5.5 Enabling/Disabling the Meter (Control Opts)



When this option is selected, the meter will begin processing calculations. You must disable the meter by unchecking this box before you can change the meter type or product group. You should also disable any meter that is not being used to allow for best possible module performance. After enabling or disabling the meter, click **DONE**, and then click the **WRITE** button in the *Meter Configuration* area. To retrieve the status of a meter, click the **READ** button in the *Meter Configuration* area.

Note: The meter can also be enabled or disabled from ladder logic (refer to the MVI69E-AFC Setup and Configuration Guide).

5.6 Backplane Return

There is at least one backplane function block that is repeatedly and frequently delivered from the processor (PLC) to the module. This is the block delivers process inputs used for measurement.

5.6.1 Process Inputs

The backplane transfer protocol specifies that each function block output by the PLC to the module must elicit a corresponding input function block at the same location in the overblock with the same size. This returned block contains no data (contents are all zero).

In order to make use of the empty function block, functionality was developed to increase efficiency. The normally empty function block from the module to the PLC now contains selected values that would likely be required by the PLC program on a regular basis. This is done by mapping slots in the input function block to points in the Modbus address space. This process is known as Backplane Return.

5.6.2 Component Analysis Function Block

Another function block that delivers a new component analysis for a gas stream is similar. When required, it is delivered regularly and although output contents are relevant, there are no matching input contents that are meaningful for such an analysis.

The default configuration in the GUI shows the database points that were preselected from the process input return and the empty mapping for the analysis return.

This provides you with full functionality for the configuration of both backplane return blocks.

nfiguration, Meter 1		Dictionary
Process Input	Component Analysis	Select Dictionary Section
	,,	- All •
Ofs Reg Description		
0+ I- 30+ Meter alarms		Beal Description
2+ I-318+ Non-resettable accur	mulator, net, totalizer (m3)	
4+ I-320+ Non-resettable accur	mulator, net, residue (m3)	H- 0 Meter status
6+ I-292+ Flow rate, net (m3/h)		H- 1 Active stream number (0-based)
3+ I-294+ Flow rate, gross (m3/	'h)	H- 3 Meter signals
)+ I-140+ AGA 8, Supercompre	essibility, Fpv	H- 4 Process input calibration auto
2+ I-208+ C-prime		H= 5 Process input calibration, date
		H- 6 Open archive record select (age) daily
		H- 7 Open archive record select (age) hourly
		H- 9 Checksum alarms
		H- 28 Gross meter characterization
		H- 29 Product group
		H- 30 Units: Primary input
		H- 31 Units: Mass
		H- 32 Units: Energy
		H- 33 Units: Volume
		H- 36 End-of-day minute
		H- 37 End-of-hour minute
		H- 39 Sample period limit
		H40+ Meter calculation ontions
	4	
	Export <u>U</u> DT	<== <u>I</u> nsert Item

You can select desired values from the Modbus database which the module delivers to the PLC automatically and on a regular basis without having to create and issue a separate backplane transaction, such as Modbus Gateway in order to retrieve those values.

You have the responsibility to re-trigger the analysis function block when the previous one has completed. This makes the behavior semi-automatic (in contrast to Process Input behavior which is fully automatic.

Using the Window

Move files from the Dictionary side of the page to the Process Input or Component Analysis tabs.

- 1 Select the file.
- 2 Click on the *Process Input* or *Component Analysis* tabs.
- 3 Click the **Insert Item** button.
- 4 Use the **Move UP** or **Move Down** buttons to move the file up or down in the list.
- 5 Click OK.

If you are moving UDT files, move them from the *Dictionary* to the *Process Input* tab as described for any files.

Click the **UDT EXPORT** button to export the UDT files.

5.7 Configuring Calculation Options



Click on the **CALCULATION OPTS** button to access the *Meter Calculations Options* dialog. Details on each option can be found in the Modbus Dictionary.

Mata 1	Tog M01	-Accumulators and Flow Bates
Meter 1 Meter Select Meter Meter number 1 Meter Disabled	r Type, Product Group, and Units ice Gas Vifferential inear tem of units	Nour Flow rate period unit cubic meters Flow rate unit cubic meters Accumulation unit
Copy coning From	12 1 2 1 2	100000000 Accumulator rollover
Constraint of provide the second	16	tics ed quantity ut unit
Taps: comer Taps: radius Taps: radius Static pressure in absolute units	17 18 19 Separate on-error accum 20 Indicated volume (else gr	nulator ross)
I Ignore default flowing density	22	Resețtable Acc
Density correction Hydrometer correction Temperature correction	24	
Pressure correction Vapor pressure via TP-15 Density correction for pressure Calculate net heating value (else gross)	27 L 28 C Strict MPMS 11.2M 29 C 30 C	; Count) (pul/m3) <u>M</u> eter Factor
15 —	31	Analysis
Result Calcul	ation options, 32 bits.	3
Sit	e	Read Write Don

Options that to not apply to the current application are grayed out. See *Calculations Options* in the *MVI69E-AFC Reference Guide* for detailed information.

5.8 Configuring Resettable Accumulators



The module supports a total of 12 accumulators per meter channel divided into categories:

- Non-Resettable Accumulators (6)
- Resettable Accumulators (4)
- Archive Accumulators (2)

weter	Meter Tag	M01		Accumulate	ors and F	low Rates
-Select Meter	Meter Typ	e, Product Gr	oup, and Units	Volumes	; <u> </u> En	ergy Mass
Meter number 🛛 🔶	Device O Different O Lineer	ntial	-	hour cubic mete	Flow ra	ate period unit ate unit
Meter Disabled				cubic mete	rs Accum	nulation unit
-Copy Config From		units SI		10000000	Accum	ulator rollover
Meter number 🛛 🔶		01				
Сору	Primary In Different	put ntial Pres O F	Flow Rate			
Ide <u>n</u> tification	🔅 Resettable	Accumulator	Select	×		
-End of period	Index	Quantity	Units accumulated			
End of period D End-of-day minute	Index 1 Net	Quantity	Units accumulated Net volume (m3)			Analycis Config
End of period End-of-day minute End-of-hour minute	Index 1 Net 2 Gross	Quantity	Units accumulated Units accumulated Units accumulated Gross volume (m3)		put	Analysis Config
End of period C End-of-day minute End-of-hour minute	Index 1 Net 2 Gross 3 Gross	Quantity	Units accumulated Net volume (m3) Gross volume (m3) Gross standard vol	ıme (m3)	put ots	Analysis Config Calculation Opts
- End of period 0 End-of-day minute 0 End-of-hour minute - Sample rate alarming 1 Sample period	Index 1 Net 2 Gross 3 Gross 4 Mass	Quantity	Units accumulated Net volume (m3) Gross volume (m3) Gross standard volu Mass (kg)	ıme (m3)	put ots nfig	Analysis Config Calculation Opts Resetteble Accum
End of period End-of-day minute End-of-hour minute End-of-hour minute Sample rate alarming Sample period	Index 1 Net 2 Gross 3 Gross 4 Mass Choose the accumulated	Quantity	Units accumulated Net volume (m3) Gross volume (m3) Gross standard volu Mass (kg) Dptions	ume (m3) Done	put ots nfig .eturn	Analysis Config Calculation Opts Resettable Accur

Click the **RESETTABLE ACCUM** button.

The accumulator types are independent. For example, resetting a resettable accumulator does not affect the other accumulators.

For multiple-stream firmware, each stream also has a set of ten accumulators (six non-resettable, and four resettable). Increments are applied both to the meter accumulators and to the accumulators for the active stream.

5.8.1 Non-Resettable Accumulators



The non-resettable accumulators are only reset when the accumulator rollover value is reached. The accumulator rollover value, and the accumulator unit must be configured using the EAFC Manager.

The module supports six non-resettable accumulators in order to show the measure quantity to be totalized.

- Non-resettable accumulator mass
- Non-resettable accumulator energy (Gas applications)
- Non-resettable accumulator net
- Non-resettable accumulator gross
- Non-resettable accumulator gross standard (Liquid apps only). For Oilwater emulsion, this is a non-resettable accumulator for gross clean oil.
- Non-resettable accumulator water (Liquid apps only)

Refer to the *Modbus Dictionary* in EAFC Manager for more information about the Modbus addresses for these registers.

5.8.2 Resettable Accumulators



From the Resettable Accumulator Select dialog, click **OPTIONS**.

Meter 1	Meter Tag M01		Accumulato	rs and F	low Rates
Meter 1 Select Meter Meter number Meter Disabled Copy Config From Resettable Accumulator Accumulator 1 res Accumulator 1 res Accumulator 1 res Accumulator 2 res Accumulator 2 res Accumulator 2 res Accumulator 2 res	Meter Tag M01 Meter Type, Produc Device © Differential C Linear System of units C US © SI et upon end of day et upon end of day	t Group, and Units as v ow Rate Select Units accumulated Net volume (m3) Gross volume (m3) Gross standard vol Mass (kg)	Accumulato	put put fig eturn	Iow Hates ergy Mass ete period unit ete unit nulation unit nulator rollover Analysis Config Calculation Opt Resettable Accu
8 Accumulator 3 res 9 Accumulator 3 res 10 Image: Comparison of the second seco	et upon end of day et upon end of hour et upon event et upon end of day et upon end of hour et upon event	Orffice	Differential	Meter (I Viscosit Opts	Diff Pressure) y (cp) Meter Factor Analy <u>s</u> is

The resettable accumulators are referred to as:

- Resettable Accumulator 1
- Resettable Accumulator 2
- Resettable Accumulator 3
- Resettable Accumulator 4

Resettable Accumulators are configured from the *Resettable Accumulator Select* dialog box. To open this dialog box, click the **RESETTABLE ACCUM** button on the *Meter Configuration* dialog box.

Each Resettable Accumulator can be configured to represent a different quantity as follows:

Accumulator	Modbus address for accumulator select (Meter-relative)	Default Value
Resettable accumulator 1	126	Net (code 3)
Resettable accumulator 2	127	Gross (code 4)
Resettable accumulator 3	128	Gross Standard (code 5)
Resettable accumulator 4	129	Mass (code 1)

Valid Configuration Codes

The	valid	codes	are
THE	vanu	COUCS	arc

For example, moving a value of 4 to holding register 8126 will configure Meter 1's resettable accumulator 1 as "Gross Volume". Moving "0" to holding register 9128 configures Meter 2's Resettable Accumulator 3 to accumulate nothing (takes it out of service).

The resettable accumulators are reset when one of the following situations occur.

Resetting from EAFC Manager



You may reset any of the resettable accumulators using the EAFC Manager (Meter Monitor):

File Project On-line Communications Window	Help	
File Project On-line Communications Window Overall Monitor Meter Monitor Audit Scan Archive Event Log Alarm Log Transmitter Calibration Meter Proving Operator Database Checksum Alarms Network Status	Help Meter Monitor ite Name AFC Flow Station foter Tag M01 Scan counts (in Meter number 1 2	Accumulators, Meter ⊠ ✓ Meter ∑Stream Тotelizer Весеt Воздана Воздана Воздана Воздана Воздана Воздана Воздана Воздана Воздана Воздана Воздана Во
	protect time (sec) 4 0 Velocity of tapp Expansion fact Coefficient of d Coefficient of d O O Coefficient of d Coefficient o	(c) Gross (m3) U 0.0000000 F (d) Mass (kg) Commining is a constraint of the second sec

Resetting from Ladder Logic



The ladder logic may send a meter signals block to command one or more resettable accumulators to be reset. This feature is especially important for applications involving field installations that require shipping and/or receiving product batches of predetermined size. Refer to the *Ladder Logic* section for your module type for more information.

Resetting upon Archive Period End or Reset upon Event



Use EAFC Manager to configure the resettable accumulator to be reset when the archive period ends or when an event occurs. Refer to *Event Log* in the MVI69E-AFC *Reference Guide* for more information on configuring and monitoring events.

d.	Re	sett	able Accumulator Options	×
ſ				
	0		Accumulator 1 reset upon end of day	
	1		Accumulator 1 reset upon end of hour	
	2	\square		
	3	\Box	Accumulator 1 reset upon event	
	4	\Box	Accumulator 2 reset upon end of day	
	5	\square	Accumulator 2 reset upon end of hour	
	6	\square		
	7		Accumulator 2 reset upon event	
	8		Accumulator 3 reset upon end of day	
	9	\Box	Accumulator 3 reset upon end of hour	
	10	\square		
	11	\Box	Accumulator 3 reset upon event	
	12	\square	Accumulator 4 reset upon end of day	
	13	\Box	Accumulator 4 reset upon end of hour	
	14	\square		
	15		Accumulator 4 reset upon event	
				ne

Resetting when the Accumulator Rollover Value is reached



The resettable accumulator is reset when the accumulator rollover value is reached. You must configure the accumulator rollover value using the MVI69E-AFC Manager software (Meter Configuration).

Resetting a resettable accumulator resets that accumulator for both the meter and for all its streams.

Archive Accumulators

The archive accumulators are part of the current archive (archive 0) data. These accumulators are automatically reset when a new archive is generated. Refer to the Modbus Dictionary – *Meter Accumulator* section.

You may configure the accumulator quantity to be used for each archive accumulator using the EAFC Manager (Meter Configuration > Archive Config > Accumulator Select):



5.8.3 Net Accumulator Calculation



The Net Accumulator Calculation depends on the product group (gas or liquid). For gas applications, the Net Accumulator is calculated as follows:



For liquid applications (all except Emulsion), the Net Accumulator is calculated as follows:



For liquid applications (Oil-Water Emulsion), the net accumulator is calculated as follows, using API ch 20.1:



Temperature and Pressure

5.8.4 Accumulator Totalizer and Residue



The accumulators are expressed as the totalizer and residue parts. This implementation allows the accumulation of a wide range of increments, while keeping a high precision of fractional part with an approximately constant and small round off error.

The totalizer stores the integral part of an accumulator as a 32-bit unsigned integer. The residue is the fractional part (always less than 1.0) expressed as a 32-bit IEEE floating point.

The Total Accumulator value is given by the formula:

ACCUMULATOR = TOTALIZER + RESIDUE

Example:

If the meter monitor window shows the following values for the accumulators:



The total resettable accumulator 1 value (net) is 12.8031153.

5.9 Meter Factors

See Configuring Meter Factors.

5.10 Meter Alarm Control Options

Click **CONTROL OPTIONS** from the *Meter Configuration* page. Bits 0 through 4 allow you to set up alarm configurations.

1.0		Alarming: require manual acknowledge
1		Alarming: disallow pre-acknowledge
2		Alarming: acknowledge action is sealable
3		Alarming: must ack to resume normal measurement
5	Г	Disable pulse count sample rate alarm
6	_	produce poise count sample rate dialiti
7		
8		
9	\square	
10	${\Box}$	Treat analysis as process input
11	\square	
12		Enable per-meter end-of-day
13		Enable per-meter end-of-hour
14	\square	
10		Mater evel-

Alarming	Action
Alarming: require manual acknowledge	If set, then any alarm appearing in the Meter Alarms, registers (I-30 through I-37) must be manually acknowledged by writing a "1" bit to the corresponding bit in the "Acknowledgement Required" registers (meter relative), subject to further constraints configured by the other three "Alarming" meter control options (this register, bits 1, 2, and 3). If clear, then any alarm is deemed to be automatically acknowledged at the moment that it occurs: the "Acknowledged" record is written to the Alarm Log., and the following three meter control options have no effect. For more information, see the other three "Alarming" meter control alarms, the "Acknowledgement required" registers and the "Meter alarms" registers themselves.
Alarming: Disallow pre- acknowledge	If set, then the acknowledgement of any alarm requires the alarm condition to have been resolved and its corresponding bit in the "Meter alarms" registers to be clear. If clear, then alarm acknowledgement may be performed at any time after the "Acknowledgement required" bit has been raised, even if the alarm condition itself has not yet been resolved and the alarm bit is still set; in this case, the continuing presence of the alarm condition does not cause the "Acknowledgement required" bit to be re-raised, but after the alarm condition has been resolved (and its alarm bit cleared) a recurrence of the alarm will again raise the "Acknowledgement required" bit. If meter control option "Require manual acknowledge" is clear (this register bit 0), then this option is deemed to be clear and has no effect. For more information, see the other three "Alarming" meter control options (this register, bits 0, 2, and 3), the "Acknowledgement required" registers (meter relative), and the "Meter alarms" registers (meter relative).

Alarming	Action
Alarming: Acknowledge action is sealable	If set, then the acknowledgement of any alarm requires that the Weights & Measures switch be in the "unlocked" position. If clear, then alarm acknowledgement requires only that the acknowledging operator have the necessary permission ("Troubleshooting", permission bit 13). If meter control option "Require manual acknowledge" is clear (this register bit 0), then this option is deemed to be clear and has no effect. For more information, see the other three "Alarming" meter control options (this register, bits 0, 1, and 3), the "Acknowledgement required" registers (meter relative), and the "Meter alarms" registers (meter relative).
Alarming: Must Ack to resume normal measurement	If set, then any divergent measurement behavior that occurs consequent to an alarm (e.g. value subsitution, separate accumulation) persists until both the alarm condition has disappeared and the alarm has been acknowledged, at which time normal measurement is resumed. If clear, then normal measurement is resumed when the alarm condition has disappeared, regardless of whether or not the alarm has been acknowledged. This option causes value substitution persistence for only analog process input alarms; the clearing of a pulse count, calculation, or configuration alarm condition always allows resumption of normal counting and/or calculation even if that alarm has not yet been acknowledged. However, this option causes separate accumulation persistence for any alarm that affects calculated quantities, including pulse count failure and calculation alarms. If meter control option "Require manual acknowledge" is clear (this register bit 0), then this option is deemed to be clear and has no effect. For more information, see the other three "Alarming" meter control options (this register, bits 0, 1, and 2), the "Acknowledgement required" registers meter relative), and the "Meter alarms" registers (meter relative).
5.11 Setting Stream Options and Enabling/Disabling Meters



Meters are often used for the measurement of different products at different times. The reasons for doing so include cost and convenience (a pipeline may carry gasoline one day and fuel oil the next) and accounting (a plant may receive product from several different suppliers who must be paid).

Meter 1	Meter Tag M01	Accumulators and I	Flow Rates
elect Meter	-Meter Type, Product Group, and	Units Volumes E	nergy Mass
eter number 1 🔶	C Differential C Linear	hour Flow cubic meters Accur	rate period unit rate unit mulation unit
Co 🏇 Stream 1 Options			mulator rollover
0 ISO 6976 rel 1 ISO 6976 he 2 Override rel 2 Override te	lative density rating value lative density	K-factor Characteris Gross volum pul/m3 Flow inj	stics red quantity put unit
n 3 00000000000000000000000000000000000	ting value is volumetric	Process Input <u>C</u> ontrol Opts	Analysis Confi
a 7 🔽 Use meter f	actor to full precision (non-Standard)	Archive Config	Resettable Acc
8 Interpolate H 9 10 11 11 12 13 14 15 15 15 15 15 15 15	<factor (else="" factor)<="" meter="" td=""><td><u>B</u>ackplane Return</td><td></td></factor>	<u>B</u> ackplane Return	
12 □ □ 13 □ 3e 14 □ 3tre 15 ☑ Stream en	able	Linear Meter (Puls	e Count) r (pul/m3) <u>M</u> eter Factor:
	<u>D</u> o	ne <u>S</u> tream Opts	Analysis

A meter always has one active stream which corresponds to the particular product that flows though the meter at that moment.

The active stream may be switched to any enabled stream via a Modbus transaction. Enabling a stream allows it to become active and disabling it prevents it from becoming active. The currently active stream may not be disabled.

As the physical switching of a product stream through a meter is almost always accompanied by additional actions such as the swinging of valves, it is expected that the stream-switching transaction will be issued by the processor, hence to reduce the likelihood of unfortunate errors, the MVI69E-AFC *Manager* provides no specific method for issuing that transaction. Issuing a stream-switch transaction however, is like issuing any other Modbus transaction, which in this case writes the number of the new active stream to the "active stream number" Modbus register, hense in exceptional circumstances it can be issued from anywhere, such as by a SCADA system connected to one of the Modbus ports or by the MVI69E-AFC *Manager* itself via the Modbus Master window.

Parameters whose values may depend on the properties of the product being measured are configured for each stream separately. Such parameters include both those that describe the product directly (e.g. density, viscosity, analysis) and those that describe indirect effects of the product (e.g. meter factor). Measurement calculations always use the parameters for the active stream.

The output of each stream consists of a complete set of accumulators laid out like those of the meter itself. Computed increments are accumulated simultaneously in both the meter accumulators and those of the active stream.

Stream Option	Definition
ISO 6976 relative density	If selected, ISO 6976 is used instead of AGA 8 calculations for relative density.
ISO 6976 heating value	If selected, ISO 6976 is used instead of AGA 8 calculations for heating values.
Override relative density	Use the configured "Default relative density" (for the active stream – Register (meter relative)) for all volumetric calculations, instead of that calculated by AGA 8 at "AGA 8 Relative density at reference" (Register (meter relative)). The relative density actually used in calculations is found at
	the point "Relative density at reference" ((meter relative)).
Override heating value	Use the configured "Default heating value" (for the active stream, register H-8630) for all energy calculations, instead of the three calculated by AGA 8 starting at "AGA 8 Molar heating value" (meter relative). The heating values actually used in the calculations are found in the three points starting at "Molar heating value".
Default heating value is volumetric	If this option is set, then the point "Default heating value" is configured in volumetric units (energy per volume at reference conditions); if clear, then the point is considered in mass units (energy per mass).
Use meter factor to full precision (non-Standard)	If "Use meter factor to full precision" is clear, the Meter Factor is rounded to four decimal places before being used to calculate gross volume (gross = pulses / KF * MF). If the option is set, the MF is used as is without rounding. Rounding applies only to the meter factor; the K-factor is always used to its full precision.
Interpolate K-factor	This option bit swaps the roles of K-factor and meter factor, so that when this option is selected, the "K-factor" entry becomes "Meter factor" and the "Meter Factor Linearization" table becomes "K-factor Linearization".

Stream Option	Definition	
	The calculations described up to this point are those recommended by API and performed by the vast majority of users of linear meters. Some users, however, may prefer to keep the meter factor at exactly 1.0000 and periodically adjust the K-factor with a meter prove; and then the K-factor may depend on the flow rate.	
Stream Enable	Select (check) to enable the current stream. Unselect (uncheck) to disable the current stream. A disabled stream cannot be made active. When downloading the configuration to the module, this option is silently forced for the active stream.	

6 Configuring Differential Meter Parameters



If you select *Differential Meter* as the Meter Type, you will select either *Differential Pressure* or *Flow Rate* as the Primary input.

Meter Disabled	System of units C US © SI Primary Input © Differential Pres C Flow Rate	cubic meters Accum 100000000 Accum	ulation unit ulator rollover
Ide <u>n</u> tification	Physical Device Orifice plate (AGA 3 [2012])		
End of period 0 End-of-day minute 0 End-of-hour minute Sample rate alarming 1 Sample period	Reference Conditions 15 Reference temperature ("C) 101.325 Reference pressure (kPaa) Differential Meter (Diff Pressure) 0 0 DP flow threshold (kPa) 0 Override discharge coefficient Orifice 0	Process Input Control Opts Archive Config Backplane Return	Analysis Config Calculation Opts Resettable Accum
Stream 1	Gas	Differential Meter (D	Diff Pressure)

If you select *Differential Pressure* as the Primary Input, you must configure the following parameters:



Parameter	Description
DP Flow Threshold	If at any time the differential pressure input value is less than the DP Flow Threshold parameter, the module will treat the differential pressure as zero (no flow).
Override discharge coefficient	For an Orifice meter, AGA3 dictates the calculation of the "Coefficient of Discharge", a multiplicative factor used in calculating the flow rate. For a V-cone meter, there is no corresponding calculation, so the Coefficient of Discharge must be entered from the manufacturer's data sheet. The "V-Cone Discharge Coefficient" has no meaning unless the "V-Cone Device" option is selected (see Calculation Options button).
Viscosity	The viscosity of the fluid, used only in the calculation of the meter's coefficient of discharge. For this product group, the default value for this point is the viscosity recommended by AGA 3 for natural gas fluids, 0.010268. For liquid fluids, a more representative value should be chosen.
Meter Factors	Displays the Meter Factor Linearization Curve for this stream. Meter Configuration Meter Tag M01 Accumulators and Flow Rates Meter Tag M01 Volumes Energy Mess Meter Tag M01 Volumes Energy Mess Meter Tag Motor Flow rate unit Meter Tag Motor Flow rate unit Meter Disabled System of units Copy Config From No. Meter Factor Linearization Curve, Stream 1 No. Meter factor Flow rate Reset Meter Jacks as kg/h Image: Config Analysis Config Galculation Opts Resettable Accum
	Up to 5 pairs of (meter factor, mass flow rete) – - A I least one meter factor must be non-zero. - If the meter factor is such as flow rate usat also be zero. - Flow rates for non-zero meter factors must be all different. Interpolation of this table over mass flow rate yields the actual meter factor. Stream 1 Stream 1 Stream number 1 0 Default relative density Default Fipv

If you select *Flow Rate* as the primary input, you must configure the following parameter:



Meter 1	Meter Tag M01	Accumulators and F	low Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy	Meter Type, Product Group, and Units Device © Differential C Linear System of units C US © SI Primary Input C Differential Pres © Flow Rate	Volumes En hour Flow rn cubic meters Flow rn cubic meters Accum 100000000 Accum Primary Input Chara	ergy Mass ate period unit ate unit nulation unit nulator rollover cteristics
Ide <u>n</u> tification	Physical Device	Mass Measure kilograms Flow inp hour Flow rate	ed quantity ut unit e period
0 End-of-day minute 0 End-of-hour minute	Reference Conditions 15 Reference temperature (*C) 101.005 Reference temperature (*C)	Process Input	Analysis Config
Sample rate alarming – 1 Sample period	Differential Meter (Flow Rate) 0 FR flow threshold (kg/h)	Archive Config	Resettable Accur
	Gas	- Differential Meter (F	Flow Bate)

FR Flow Threshold – If at any time, the flow rate value is less than the FR Flow Threshold parameter, the module will treat the flow rate as zero (no flow).

7 Configuring Linear Meter Pulse Count Options



If you select *Linear Meter* with Pulse count as the main Input parameter, you must configure the following parameters:



Parameter	Description		
Frequency flow threshold	This is the threshold the configured thresh	value for pulse frequency. hold, it is deemed to be zero	If the received value is less than b.
Pulse input rollover	When the meter is set transferred from the p the number of pulses Counter module. This rollover to zero. It is e in the field by the pul will generate unexpe	elected as a Pulse Meter, o programmable logic control s transferred from the Pulse s parameter sets the value essential that this value ma lse meter or counter module ected values. Enter this value	ne of the input variables ler is Pulse Count value. This is Meter or the High Speed at which the pulse count will tch the actual pulse rollover used e, otherwise the flow calculation e as (maximum value)+1.
Master pulse- count rollover	This is a value that is will contain. Enter 0 f 4294967295.	s 1 greater than the highest for free-running counters w	value that master pulse counters hich rollover to 0 from
Pulse flow threshold; count, time (s)	The first field should The second field sho default is 0.	be 0 or a number between buld be 0 or a number betwe	2 and 20. The default is0. een 5 and 60 in seconds. The
K-factor (pul/m3)	A number between 0 of "Flow input unit" of screen example.).1 and 1.0e+8. The default f the "K-factor Characteristi	is 1.0. Units show is the setting cs" panel shown in the previous
	for this stream. See a	above. leter Tag M01 Meter Type, Product Group, and Units Device C Differential © Linear System of units C US © SI eter Factor Linearization Curve, Stream 1	Accumulators and Flow Rates Volumes Energy Mass hour Flow rate period unit cubic meters Flow rate unit cubic meters Accumulation unit 10000000 Accumulator rollover Fistics
	Identification 1 End of period 2 End-of-day minut 3	Meter factor Flow rate Rates as 0 0 0 Page Page Page Page Page Page Page Page	m3/h sured quantity
	0 End-of-hour minu 4 5 Sample rate alarming 1 Sample period	a number between 0.1 and 1.0e8.	Done Calculation Opts Resettable Accum
	Up to - At le - Flov Interp meter	5 pairs of (meter factor, gross volume flow rates to non-zero. e meter factor must be non-zero. e meter factor is zero, the flow rate must also be wrates for non-zero meter factors must be all d polation of this table over gross volume flow rat r factor.	e) – e zero. ifferent. e yields the actual
	Stream 1	Gas	Linear Meter (Pulse Count)
	Select Stream	1.3198 Isentropic exponent	K-factor (pul/m3)
	Stream number	Default relative density 1 Default Fpv 0 Default heating value (MJ/kg)	Stream Opts Analysis

8 Configuring Linear Meter Pulse Frequency Options



If you are configuring a *Linear Meter* with the main input as *Pulse Frequency*, you must configure the following parameters:

Meter 1	Meter Tag M01	Accumulators and F	low Rates
Select Meter Meter number Meter Disabled Copy Config From Meter number Copy Identification	Meter Type, Product Group, and Units C Differential C Linear System of units C US © SI Primay Input C Putse Count Physical Device Turbine	Volumes En hour Flow ra cubic meters Flow ra cubic meters Accum 10000000 Accum K-factor Characterini Gross volum pul/m3 Flow inpi	ergy Y Mass ste period unit ste unit uulation unit uulator rollover stics d quantity ut unit
End of period 0 End-of-day minute 0 End-of-hour minute Sample rate alarming 1 Sample period limit	Reference Conditions 15 Reference temperature (°C) 101.325 Reference pressure (kPaa) Linear Meter (Pulse Frequency) 0 0 Frequency flow threshold (Hz) 100000000 Master pulse-count rollover	Process Input Control Opts Archive Config Backplane Return	Analysis Config Calculation Opts Resettable Accu
Stream 1 Select Stream Stream number 1 Stream Enabled Identification	Gas 1.3198 Default relative density 1 Default Fpv 0 Default heating value (MJ/kg)	Linear Meter (Puls K-factor <u>S</u> tream Opts	e Frequency) (pul/m3) <u>M</u> eter Factors Analy <u>s</u> is

Parameter	Description
Frequency Flow Threshold	This is the threshold value for pulse frequency. Values can range between 0 and 1.0e+06 Hz. The default is 0.0.
Master pulse-count rollover	This is a value that is 1 greater than the highest value that master frequency counters will contain. Enter 0 for free-running counters which rollover to 0 from 4294967295.
K-factor (pul/m3)	This is the expected number of pulses expected per unit of fluid passing through a flow meter. Values can range between 0.1 and 1.0e+8. The default is 1.0. Units shown is the setting of <i>Flow input unit</i> of the <i>K</i> -factor Characteristics panel above.
Meter Factors	Click the Meter Factors button to display the <i>Meter Linearization Curve</i> setting for this stream.

9 Configuring Gas Parameters

	Maran Tana M01	-Accumulators and F	low Retor
Meter 1	Meter Lag Mul	Volumoo En	Nec Macc
Select Meter Meter number Copy Config From Meter number Copy Identification	Meter Type, Product Group, and Units Device C Differential Linear System of units C US C SI Primary Input Pulse Count C Pulse Frequency Physical Device Tracking	hour Flow re cubic meters Flow re cubic meters Accum 10000000 Accum K-factor Characteris Gross volum Measure pul/m3 Flow inpu	ate period unit ate unit ulation unit ulator rollover tics ed quantity ut unit
End of poriod			
End-of-day minute End-of-hour minute	Reference Conditions	Process Input	Analysis Config
	101.325 Reference pressure (kPaa)	Control Opts	Calculation Opts
Sample rate alarming –	Linear Meter (Pulse Count)	Archi⊻e Config	Resettable Accum
	16777216 Pulse input rollover 100000000 Master pulse-count rollover 0 0 Pulse flow thrsh: count time (s)		
01	Gas	-Linear Meter (Pulse	Count)
Stream 1	1.3198 Isentropic exponent	K-factor ((pul/m3)
Stream number	0.6 Default relative density		Meter Factors
Stream Enabled	Default heating value (MJ/kg)	<u>S</u> tream Opts	Analy <u>s</u> is
Ide <u>n</u> tification]	
Besult	- Select "Differential" for a differential-press	r ire meter, or if your prim	arv input is a flow
Commlink is unavailable	rate. Select "Linear" if your primary input is a pul	se count or pulse freque	ancy.

Parameter	Description
Isentropic exponent	The ratio of (specific heat and constant pressure) to (specific heat at constant volume).
Default relative density	Normally, the MVI69E-AFC uses the <i>Detail Characterization Method</i> of the AGA 8 standard to calculate the density of the gas from its composition as given by the molar analysis. The density is used in all subsequent calculations. When AGA 8 cannot be applied because no analysis is available (no components selected, or analysis is all zero), then this value supplies the density at reference conditions (relative to the density of air at reference conditions) to be submitted for the output of AGA 8.

Parameter	Description
	A user can override the default relative density value. In order to do so, you must enable the override. Click the Stream Options button to open the <i>Stream x Options</i> dialog.
	Stream 1 Options
	0 I 1 I 2 I 3 I Override heating value 4 5 I Default heating value is volumetric 6 7 I Use meter factor to full precision (non-Standard)
	8 Interpolate K-factor (else meter factor) 9 1 10 1 11 1 12 1 13 1 14 1 15 ✓ Stream enable
	Done
	Check the Override relative density box, then click Done . You can now change the default relative density value.
	1.3198 Isentropic exponent 0.6 Default relative density 1 Default Fpv 0 Default heating value (MJ/kg)
Default Fpv	Normally, the MVI69E-AFC uses the <i>Detail Characterization Method</i> of the AGA 8 standard to calculate the compressibilities of the gas from its composition as given by the molar analysis. The compressibilities are used in all subsequent calculations. When AGA 8 cannot be applied because no analysis is available (no components selected, or analysis is all zero), then this value supplies the supercompressibility (which combines the effects of the compressibility at both reference and operating conditions) to be substituted for the output of AGA 8.
Default heating value (MBTU/lb or MBTU/cf))	Typically, the AFC uses the <i>Detail Characterization Method</i> of the AGA 8 standard to calculate the heating value of the gas from its composition as given by the molar analysis. The heating value is used in all subsequent calculations. When AGA 8 cannot be applied because no analysis is available (no components selected, or analysis is all zero), then this value supplies the mass heating value to be substituted for the output of AGA 8. Units shown depend on the System of Units selected in the <i>Meter Type, Product Group</i> , and <i>Units</i> panel.
	A user can override the default heating value. In order to do so, you must enable the override. Click the Stream Options button to open the <i>Stream x Options</i> dialog.

Parameter	Description
	🔅 Stream 1 Options
	0 □ 1 □ 2 □ Override relative density 3 □ Override heating value 4 □ 5 □ Default heating value is volumetric 6 □
	7 🗌 Use meter factor to full precision (non-Standard)
	8 Interpolate K-factor (else meter factor) 9 10 10 11 11 12 12 13 13 14 14 15 V Stream enable
	Done
	Check the Override heating value box, then click Done . You can now change the default relative density value.
	If you check Default heating value is volumetric , the output value is indicated as volume versus mass.

10 Configuring Liquid Parameters

Meter Configuration				- • •
Meter 1	Meter Tag	M01	Accumulators and F	low Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy Identification End of period	Meter Type, Device C Differenti © Linear System of ur C US © S Primary Inpu @ Pulse Co Physical De Coriolis	Product Group, and Units Crude oils, JP4 Density units © kg/m3 C RelDen Tbse/60°F C API Gravity tt unt C Pulse Frequency vice	Volumes Enume hour Flow re cubic meters Flow re cubic meters Accurr 10000000 Accurr K-factor Characteris Gross volum pul/m3 Flow inp	ergy Mass ate period unit ate unit ulation unit ulator rollover tics d quantity ut unit
End-of-day minute End-of-hour minute End-of-hour minute Sample rate alarming Sample period	Reference C 15 101.325 Linear Meter 0 16777216 100000000 0	Conditions Reference temperature (*C) Reference pressure (kPaa) r (Pulse Count) Frequency flow threshold (Hz) Pulse input rollover Master pulse-count rollover Pulse flow thrsh: count, time (s)	Process Input Control Opts Archive Config Backplane Return	Calculation Opts Resettable Accum Densitometer
Stream 1 Select Stream Stream number 1 Stream Enabled Identification Result Commlink is unavailable	Iquid 0 0 1 1 1 Select the print May also select	Dflt reference density (kg/m3) Dflt vapor pressure (kPag) Default Ctl Default Cpl Shrinkage factor mary measurement device for ect among alternate measurem	Linear Meter (Pulse	Count) (pul/m3) Meter Factors
	<u>S</u> ite		Read	<u>W</u> rite <u>D</u> one

This area is visible when the product group is set to a liquid group. Enter the values for *Default Reference Density, Vapor Pressure, Default Ctl, Default Cpl* and *Shrinkage factor*.

Units shown depend on settings selected in the *Meter Type, Product Group*, and *Units* pane.

If the *Product Group* is set to **Special applications**, the **Thermal exp'n coef (/°C e-6)** parameter is visible.

Neter Configuration			
Meter 1	Meter Tag M01	-Accumulators and Flow I	Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy Identification	Meter Type, Product Group, and Veils Device C Differential Linear System of units C US SI Primary Input Primary Input Physical Device Turbine	Volumes Energy hour Flow rate products cubic meters Flow rate ur cubic meters Accumulation 100000000 Accumulation Gross volum Measured qu pul/m3 Flow input uni	Mass eriod unit nit on unit or rollover uantity it
End of period End-of-day minute End-of-hour minute End-of-hour minute Sample rate alarming Sample period	Image: Conditions 15 Reference temperature (°C) 101.325 Reference pressure (kPaa) Linear Meter (Pulse Count) 0 Frequency flow threshold (Hz) 16777216 Pulse input rollover 100000000 Master pulse-count rollover 0 0 Pulse flow thrsh: count, time (s)	Process Input Control Opts Control Opts Archive Config Backplane Return	Calculation Opts esettable Accum Densitometer
Stream 1 Stream number 1 Stream number 1 Stream Enabled Identification	Liquid Dflt reference density (kg/m3) Dflt vapor pressure (kPag) Default Ctl Default Ctl Shrinkage factor Thermal exp'n coef (/'Ct 6) Select the overall class of product that this	Linear Meter (Pulse Cou Linear Meter (Pulse Cou Stream Opts meter will measure.	unt) n3) Meter Factors
	Site	<u>R</u> ead <u>W</u> rit	te <u>D</u> one

If the *Product Group* is set to **Oil-wtr emulsions (Crd)**, **Oil-wtr emulsions** (NGL), all parameters are visible and **Water density @ 60°F (kg/m3)** is added. If the *Product Group* is set to **Produced/injected water**, the **Water Salinity (% mass)** parameter, along with the **Dflt reference density (°API)** are the only two parameters available.

	Dflt reference density (kg/m3)	-Linear Meter 1
ed		<u>S</u> tream Op
n	Water salinity (% mass)	
	Select the overall class of product that this r	neter will measu

Parameter	Low Limit	High Limit	Default	
Dflt Reference Density	0 kg/m ³	2000 kg/m ³	0	
	0 Rd60	2.0 Rd60		
	-60.75°API	320°API		
Default Vapor Pressure	0	100,000 kPa (14,000 psi)	0	
Default Ctl	0.5	2.0	1	
Default Cpl	0.5	2.0	1	
Shrinkage factor	0	1.0	1	
Water Salinity (% mass)	0	36.25	0	
Thermal exp'n coef (/°C e-6)	414	1674	0	

The following parameters describe all requirements for the calculations:

Tip: To see the limits and defaults for each parameter, view the blue text in the *Note* box when you click in the entry text box.

11 Configuring Density Units

🔅 Meter Configuration		
Meter 1	Meter Tag M01	Accumulators and Flow Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy	Meter Type, Product Group, and Units Device Offerential C Linear System of units O S C SI Primary Input C Differential Pres Flow Rate	Volumes Energy Mass hour Flow rate period unit US gallons Flow rate unit US gallons Accumulation unit 100000000 Accumulator rollover Primary Input Characteristics Image: Characteristics Image: Characteristics
Identification	Physical Device	Mass Measured quantity pounds Flow input unit hour Flow rate period
End of period Dend-of-day minute End-of-hour minute Sample rate alarming Sample period	Reference Conditions 60 Reference temperature ('F) 14.696 Reference pressure (psia) Differential Meter (Flow Rate) 0 FR flow threshold (lb/h)	Process Input Control Opts Calculation Opts Archive Config Resettable Accum Backplane Return Densitometer
Stream 1 Select Stream Stream number 1 Stream Enabled Identification	Liquid 0 Dftt reference density (kg/m3) 0 Dftt vepor pressure (psig) 1 Default Ctl 1 Default Cpl 1 Shrinkage factor	Differential Meter (Flow Rate) <u>M</u> eter Factors <u>S</u> tream Opts
Result Commlink is unavailable	Select the primary measurement device for t May also select among alternate measurem Site	this meter channel. ent standards. <u>R</u> ead <u>W</u> rite <u>D</u> one

Liquid density units may be expressed as:

- Density is in kg/m³
- Relative density Tbse/60°F
- API gravity

12 Configuring Primary Input Characteristics



Meter 1	Meter Tag M01	Accumulators and Flow Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1	Meter Type, Product Group, and Units Device Crude oils, JP4 © Differential Density units System of units C kg/m3 © US C SI C API Gravity	Volumes Energy Mass hour Flow rate period unit US gallons Flow rate unit US gallons Flow rate unit Accumulation unit 100000000
Сору	Primary Input C Differential Pres © Flow Rate	Primary Input Characteristics Mass Measured quantity
End of period	Coriolis	hour Flow rate period
End-of-hour minute	60 Reference temperature ("F)	Process Input Control Opts Calculation Opts

Parameter	Description
Primary Input Measured quantity	This value specifies the physical property of the fluid that is measured directly or indirectly by the primary input.
	 Mass Energy (heating value) Gross volume (volume at operating conditions)
	For some meter types (notably a traditional orifice) this value is fixed and cannot be changed. For a linear (pulse) meter it characterizes the K-factor. For a traditional pulse meter such as a turbine, this quantity is Gross Volume.
Flow input unit	This value specifies the engineering units base and scaling of the measured quantity selected for the primary input. For some meter types, for example a traditional orifice, this value is fixed and cannot be changed. For a linear (pulse) meter, it specifies K- Factor characteristics.
Flow Rate Period	This value specifies the time period to which the primary input flow rate is referenced.
	Second
	Minute
	Hour
	• Day
	For all meter types except flow rate integration, this value is fixed and cannot be changed.

13 Configuring K-factor Characteristics



Deter Configuration		
Meter 1	Meter Tag M01	Accumulators and Flow Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy Identification	Meter Type, Product Group, and Units Device Crude oils, JP4 Density units Gimear System of units GUS CAPI Gravity Primary Input Pulse Count Physical Device	Volumes Energy Mass hour Flow rate period unit US gallons Flow rate unit US gallons Accumulation unit 100000000 Accumulator rollover K-factor Characteristics Gross volum Measured quantity pul/USG Flow input unit
End of period C End-of-day minute End-of-hour minute	Reference Conditions 60 Reference temperature ("F) 14.696 Reference pressure (psia) Linear Meter (Pulse Frequency) 0 0 Frequency flow threshold (Hz)	Process Input Control Opts Calculation Opts Archive Config Resettable Accum

This area is visible when the meter type is Linear.

Click the *Measured quantity* and *Flow input unit* fields to choose the quantity type and Flow input unit for this meter.

The K-factor itself is entered as a stream parameter.

Meter Configuration				
Meter 1	Meter Tag M0	1	Accumulators and	Flow Rates
Select Meter Meter number 1 Meter Disabled Copy Config From Meter number 1 Copy	Meter Type, Pr Device C Differential Linear System of uni C US C S Primary Input C Pulse Cou	Gas	Volumes E hour Flow 1000 cu feet Flow 10000000 Acco K-factor Character iross volume Measi	Energy Mass vrate period unit vrate unit urrulation unit urrulator rollover istics ured quantity
Identification	Physical Dev Turbine	Gross volume	pul/MCF Flow in	nput unit
0 End-of-day minute 0 End-of-hour minute	60 Reference C	Terence temperature (+)	Process Input	Analysis Config
	14.73 Re	ference pressure (psia)	Control Opts	Calculation Opts

Meter 1 Meter 7	ag M01	Accumulators and I	Tow Rates
Select Meter	Type, Product Group, and Units	Volumes Er	nergy Mass rate period unit
• K-factor Flow Input Unit	Ifferential	1000 cu feet Flow I 1000 cu feet Accur 10000000 Accur	rate unit mulation unit mulator rollover
O pulses per liter	C pulses per 0.001 US gallon		
pulses per decaliter	○ pulses per 0.01 US gallon	K-factor Characteri	stics
C pulses per hectoliter	○ pulses per 0.1 US gallon	iross volume Measur	red quantity
 pulses per cubic meter 	🕥 pulses per US gallon 🛛	pul/MCF Flow inp	out unit
🔿 pulses per 10 cu meters	pulses per 10 US gallons		
🔿 pulses per 100 cu meters	 pulses per 100 US gallons 		1
🔿 pulses per 1000 cu meters	 pulses per 1000 US gallons 	Process Input	Analysis Conf
 pulses per cubic foot 	 pulses per 0.001 barrel 	Control Opts	Calculation Op
🔿 pulses per 10 cu feet	🔘 pulses per 0.01 barrel		
🔿 pulses per 100 cu feet	pulses per 0.1 barrel	Archive Config	Resettable Acc
pulses per 1000 cu feet	 pulses per barrel 		
🔿 pulses per 10000 cu feet	pulses per 10 barrels		
🔿 pulses per 100000 cu feet	pulses per 100 barrels		
O pulses per 1000000 cu feet	O pulses per 1000 barrels		
	Done	Linear Meter (Puls	e Frequency)
Stream number 1 🔶	Default relative density	,,	Meter Facto
	Default Fpv		

The K-factor units available for selection will depend on the selected measured quantity.

For a linear (pulse) meter:

gross volume = (pulses/K-factor) x meter factor

The K-factor is a factor that converts raw pulse count (from the Pulse Meter) to a volume and is expressed as *Pulses per unit volume*, such as "1000 pulses per gallon" or "3578.224 pulses per cubic meter". This number, found on the manufacturer's data sheet for the meter, is determined at the factory for the specific unit before shipping. So, dividing "pulses" by "pulses per gallon" gives you "gallons". API calls the value "*pulses / K-factor"* as "*indicated volume*".

14 Configuring Meter Factors



Select Meter Meter number 1 Meter Disabled Copy Config From	Meter Type, Pr Device O Differential C Linear	Crude oils, JP4	1 Units	Volumes Elow	Energy Mass rate period unit
Meter number 1 Meter Disabled Copy Config From	Device C Differential C Linear	Crude oils, JP4		our Flow	rate period unit
Meter number	System or units O SI Primary Input	C RelDen Tbs	e/60°F	000 cu feet Accu 00000000 Accu	rate unit umulation unit umulator rollover
Сору	C Pulse Count	Pulse Frequ	ency	actor Unaracte	ristics
	Meter Factor Lin	earization Curve, S	tream 1		ired quantity
Identification	No Meter facto	r Flow rate	Bates as MCE/h		iput unit
	1		naces as men m		
	2 0		Read	Write	1
	3 0		- Result		
	4 0				Calculation Opts
	5 0				Resettable Accu
	U or a number be	ween U.I and I.I	Je8.	Done	1
	Lin to 5 nairs of (met	er factor aross volu	me flow rate)		
Stream 1	- At least one meter l	factor must be non-ze	ero.		se Frequency)
Select Stream	 If the meter factor is Flow rates for non-z 	s zero, the flow rate r zero meter factors mu	nust also be zero. Ist be all different.		or (pul/MCF)
Stream number 🛛 1 🚔	Interpolation of this ta	able over gross volum	ie flow rate yields t	he actual 🔫	Meter Factors
		()			
Stream Enabled	U De	rault Cpi	5	<u>5</u> tream Opts	

Meters may begin to wear out over time and the actual measured volume (the "gross volume") will tend to drift from the nominal measured volume (the "indicated volume"). The factor that corrects "indicated" to "gross" is called the "meter factor", and is a number very close to 1. The procedure that is performed periodically to determine a (new) meter factor is called "proving". A pulse type meter is "proved" periodically to ensure that the meter performs as expected over a period of time.



A prover passes a known volume of product through the meter and compares the volume indicated by the meter against the fixed volume of the prover (measured with a high degree of precision). If the meter indicates the measured volume to be exactly the same as the known prover volume, the Meter Factor is said to be equal to 1.00000 (*Meter Factor = Prover Volume/Metered Volume*).

A meter's behavior may differ depending on the rate of flow through the meter. That is, the meter factor may depend on the flow rate at which the measurement is performed. The EAFC Manager accommodates this by allowing you to enter up to 5 factor-flowrate pairs (the "Meter Factor Linearization" table); the MVI69E-AFC determines the meter factor to be used by linear interpolation on this table from flow rate at operating conditions (Since flow rate depends on the meter factor according to API, but meter factor depends on flow rate according to the linearization table, the MVI69E-AFC performs a second iteration of the interpolation in order to obtain an accurate meter factor).

🔅 Meter Configurat	ion			
Meter 1	Meter Tag M01	Accum	ulators and F	low Rates
-Select Meter	Meter Type, Product Group,	and Units Volu	umes Ene	ergy Mass
Meter number 1	Gas	▼ hour 1000	Flow ra	ate period unit
Meter Disable	d C Linear	1000	cufeet Accum	ulation unit
Copy Config From	System of units	10000	00000 Accum	ulator rollover
Copy	Primary Input © Differential Pres C Flow P	ate		
Ide <u>n</u> tification	Physical Device	•		
End of period	ninute Reference Conditions	ature (°F)	cess <u>I</u> nput	Analysis Config
Me	ter Factor Linearization Curve, Stream 1		trol Opts	Calculation Opts
No.	Meter factor Flow rate Rates as	lb/h h	<u>v</u> e Config	Resettable Accum
1	1 0			
2	0 0 <u>R</u> ea	d <u>W</u> rite		
3	0 0 Result	0		
4	0 0	Success		
5	0 0			
Stre Read	the meter factor linearization curve for m 1 from the Module	<u>D</u> one	ntial Meter (C)iff Pressure)
-Select Str			Viscosity	/ (cp)
Stream num - At le	pairs of (meter factor, mass flow rate) – ast one meter factor must be non-zero. meter factor is zero, the flow rate must also be meter factor.	a zero		Meter Ferres
Stream - Flow	rates for non-zero meter factors must be all d	ifferent.		
interpo	plation of this table over mass flow rate yields	the actual meter factor. 🧗	am Upts	Analy <u>s</u> is

In the *Meter Factor Linearization Curve* dialog box, click the **READ** button to transfer the current Meter Factor Linearization configuration from the MVI69E-AFC to the local PC.

When the Meter Factor Linearization configuration is concluded, click the **WRITE** button to transfer it to the MVI69E-AFC.

The module will use the values you entered in the *Meter Factor Linearization Curve* dialog box and interpolate the values so it can use a specific meter factor depending on the current flow rate.

For example, if you enter four points (flow rate, meter factor) the module would interpolate the points as shown below:



In order for the module to accept the values you entered, the following conditions are required:

- All values are non-negative (≥ 0.0).
- At least one meter factor is non-zero.
- If a meter factor is zero, the corresponding flow rate is also zero.
- The flow rates corresponding to non-zero meter factors are all different.

You do not need to enter factor-flowrate pairs in any particular order, or even enter them all as a contiguous group, but you may enter each factor-flowrate pair into any of the five table entries and the MVI69E-AFC will sort it all out.

If you do not want to enter meter factor linearization data, then populate only one entry (e.g., the first) leaving the other four empty (all zero). In this case, the flow rate value does not matter and the single meter factor applies to all flow rates. The EAFC Manager's initial default table is populated in this way with a meter factor of 1.

15 Installing the Module in the Rack

If you have not already installed and configured your processor and power supply, please do so before installing the MVI69E-AFC. Refer to the processor documentation for installation instructions.

Warning: You must follow all safety instructions when installing this or any other electronic devices. Failure to follow safety procedures could result in damage to hardware or data, or even serious injury or death to personnel. Refer to the documentation for each device you plan to connect to verify that suitable safety procedures are in place before installing or servicing the device.

After you have checked the placement of the jumpers, insert the MVI69E-AFC into the rack. Use the same technique recommended by the processor manufacturer to remove and install MVI69E-AFC modules.

Warning: When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Verify that power is removed or the area is non-hazardous before proceeding. Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

Note: If you insert the module improperly, the system may stop working, or may behave unpredictably.

15.1 Module Initialization

When the module is powered up for the first time, both the **OK** and **ERR** NVRAM LEDs are illuminated. This indicates that the module is in the *Cold Start* state and is not yet ready to perform calculations. The following steps initialize the module:

- Configure Site Parameters
- Enable at least one meter
- Set the processor to RUN mode

After these three steps are accomplished, the state is changed from *Cold Start* to *Released*. This indicates that that module is ready to perform flow calculations. When in the *Released* state, the **OK** LED is ON and the **ERR** LED is off.

When the module is ready, you will use EAFC Manager to monitor meter operation, archives, and events.

16 Connecting the MVI69E-AFC Module to the EAFC Manager

There are two ways to connect EAFC Manager (running on a PC) to the MVI69E-AFC; Ethernet or Serial. The top port (eth0) is used to create Ethernet connections. Serial 1 and Serial 2 are both available for serial connections. You will need the correct cables to connect the MVI69E-AFC to the computer running EAFC Manager. The null-modem cable as well as any required adapter cables are included in the box with the module.

Ethernet Connection

Connect one end of an Ethernet cable to the Ethernet port on the module.



Connect the other end of the cable to the network. The PC running EAFC Manager must be on the same network.

Serial Connection

You can configure the module using serial connections or via an Ethernet connection. This section describes how to connect your PC to one of the serial ports on the module.

- 1 Connect the DB-9 adapter to a serial port of the MVI69E-AFC (P1 or P2). Refer to the port labels on the front of the module to find the correct port.
- 2 Connect the null-modem cable to the DB-9 adapter cable on the module, and to an available serial port on your computer.

Note: Some desktop and notebook computers are not equipped with a serial port. In this case, you may require a USB to Serial adapter cable, with drivers. Not all USB to Serial adapters will work correctly with this application. If you encounter problems, please contact ProSoft Technical Support for recommendations.



The null-modem cable that is supplied with the module uses the following cabling scheme:



3 Start EAFC Manager, and select the port settings at **COMMUNICATIONS / LOCAL PORT SETTINGS**. The default serial communication settings are shown in the following illustration.

🚸 Local Port	Settings	×		
C TCP/IP	€ Se	erial		
AFC Port	: C 3 Cop	oy to Local		
Primary slav Timeout (ms)	e address	244 5000		
Local				
Parity None	C Even	Odd		
Data C 7 Bits	Stop © 1 Bit C 2 Bits	-Mode RTU C ASCII		
<u>0</u> K	Cancel	Connect		

- 4 The EAFC *Manager* will establish communication with the module. Open the *Project* menu and then select **SITE CONFIGURATION** to open the *Site Configuration* dialog box.
- 5 On the *Site Configuration* dialog box, click the **READ** button. You should see the word "Success" in the *Result* area of the dialog box.
17 Downloading the Project to the Module

1 In EAFC Manager, click **PROJECT / DOWNLOAD PROJECT**.



This action opens the *Local Port Settings* window. If you are downloading via the network, click **TCP/IP**:

🔅 Local Port Settings
Transport TCP/IP O Serial
AFC Server Select 1 Copy to Local
Primary slave address 244 Timeout (ms) 5000
Server IP address 192.168.0.251
Server TCP port 502
Commlink is unavailable
<u>OK</u> <u>Cancel</u> Co <u>n</u> nect

If you are downloading through one of the serial ports, click SERIAL.

🚸 Local Port	Settings	×
Transport	€ S	erial
AFC Port © 1 © 2	© 3 Co	py to <u>L</u> ocal
Primary slave Timeout (ms)	address	244 5000
COM 1	▼ 193	200 🔻
Parity © None	C Even	O Odd
O 7 Bits	Stop 1 Bit	Mode
8 Bits	C 2 Bits	
<u>0</u> K	Cancel	Connect

- 2 Enter the port parameters to use, and then click **DONE**.
- 3 During the download operation, the following progress window is displayed:



4 When the file transfer is complete, the following window is displayed:



Troubleshooting Tip: If the EAFC Manager displays an "Illegal Data Value" message, it typically indicates an invalid meter type or product group configuration. The module does not accept a configuration file that attempts to change a meter type or product group for a meter that is currently enabled. Disable all meters, change the meter types and product groups, and then enable the meters again.

18 Creating an RSLogix Project and Importing the AOIs

18.1 Create your RSLogix Project

1 Create a new RSLogix/Studio 5000 project.

New Controller		×
Vendor:	Allen-Bradley	
Туре:	1769-L35E CompactLogix5335E Controller	OK
Revision:	20 💌	Cancel
	Redundancy Enabled	Help
Name:	MyController	
Description:	A	
Chassis Type:	<none></none>	
Slot:	0 🚔 Safety Partner Slot: <none></none>	
Create In:	C:\RSLogix 5000\Projects	Browse
Security Authority:	No Protection	
	Use only the selected Security Authority for Authentication and	
	Authonization	

- 2 In the Controller Organization window, expand the I/O Configuration folder.
- 3 Right-click on the **CompactBus Local** icon to open a shortcut menu.
- 4 On the shortcut menu, choose **New MODULE...**



5 In the *Select Module Type* dialog box, select **1769-MODULE**. Click the **CREATE** button.



6 Enter the *Name* and select the *Slot* location of the module. In addition, enter the following values:

Parameter	Value
Name	MVI69E_AFC
Comm Format	Data-INT
Input Assembly Instance	101
Input Size	248
Output Assembly Instance	100
Output Size	247
Configuration Assembly Instance	102
Configuration Size	0

🔜 Module Prop	erties Report: Local:1 (1769-MODU	LE 1.1)			×
General* Cor	inection				
Туре:	1769-MODULE Generic 1769 Module				
Parent:	Local	Connection Pa	arameters Assembly Instance:	Size:	
Name:	MVI69E_AFC	Input:	101	248 💉 (16-bit)	
Description:	MVI69E-AFC Module	Output:	100	247 🔺 (16-bit)	
		Configuration:	102	0 📑 (16-bit)	
Comm Format:	Data - INT 🔽				
Slot:	1 .				
Status: Offline	OK	Cancel	Apply	, Help	

7 Click on the *Connection* tab to adjust the *Requested Packet Interval (RPI)* setting for your application. 5ms is the recommended default RPI time, do not use an RPI setting below 5ms. Click **OK**.

Module Properties: Local:1 (M¥I69 1.001)	
General Connection* Vendor	
Requested Packet Interval (RPI): 5.0 ms (1.0 - 750.0)	
☐ Inhibit Module	
Major Fault On Controller If Connection Fails While in Run Mode	
Module Fault	
Status: Offline OK Cancel Apply H	Help

8 The MVI69E-AFC module is now visible in the I/O Configuration folder.



18.2 Importing the Meter-Specific and Main AOI Rungs

You can import multiple meter-specifc Add-On rungs in a routine. These rungs must precede the Main AOI69EAFC instruction. The meter-specific AOIs can all be on a single rung, but the main AOI instruction must be on a separate rung.

1 Expand the *Tasks* folder, and double-click the **MAINPROGRAM** icon.



2 Click the right mouse button to open a shortcut menu, and then choose **IMPORT RUNGS**. This action opens the *Import Rung* dialog box.

0		e e	
	¥	Cut Rupa	Chrl+X
		Copy Rung	Ctrl+C
(En	B	Paste	Ctrl+V
		Delete Rung	Del
		Add Rung	Ctrl+R
		Edit Rung	Enter
		Edit <u>R</u> ung Comment	Ctrl+D
		Import Rungs	
		Export Rungs	

3 In the *Import Rung* dialog box, select the meter type specific rung that you will use in your project, and then click **IMPORT**. The meter-specific AOI must be imported before the Main AOI.

🕌 Import Rungs	;				x
Look in:	MVI69E-AFC	•	G 🤣 📂 🛄-		
Recent Places	Name MVI69EAFC_/ MVI69EAFC_/ MVI69EAFC_/ MVI69EAFC_/ MVI69EAFC_/	Addon_Rung_DifferentialGas_v1_1.LS Addon_Rung_DifferentialLquid_v1_1. Addon_Rung_LinearGas_v1_1.LSX Addon_Rung_Main_v1_1.LSX	Date modified 12/18/2018 9:52 12/18/2018 9:52 12/18/2018 9:53 12/18/2018 9:53 12/18/2018 9:53 12/18/2018 9:53	Type Logix Design Logix Design Logix Design Logix Design Logix Design	Size • 574 KB 563 KB 563 KB 564 KB 543 KB
	File name:	MVI69EAFC_AddOn_Rung_Differen	tialGas_v1_1	-	Import
	Files of type:	RSLogix 5000 XML Files (*.L5X)		~	Cancel
	Files containing:	H Rungs		~	Help
	Into:	MainRoutine (MainProgram)		~	
	🔲 Overwrite Sele	cted Rungs			1.

4 When the following window opens, select the *Tags* section as shown below:

Import Configuration						×
문 또 Find: Find Within: Final Name	Find/Replace					
Import Content:						
🚑 MainTask	Configure Tag References	_		_		
MainProgram	Import Name	Operation 📘	Final Name 🛛 🗠	🚰 Alias For	Data Type	Description
Beferences	AFC 1	Create 🗋	AFC		AFCEModuleDef	
	AFCMeter01DifferentialGas	Create 🗋	AFCMeter01DifferentialGas		AFCEMeterDifferentialGas	
Add-On Instruction:	ADI69EAFCMeter01DifferentialGas	Create 🗋	A0169EAFCMeter01DifferentialGas		A0169EAFCMeterDifferentialGas	
2 Data Types	Local:1:1	Use Existing 🛛 🥫	Local:1:I		PS:MVI69_MODULE_60:I:0	
Errors/warnings						
	[1]					•
				Г	OK Cancel	Help
Ready						

Edit the default AOI rung. The 4 tags are as follows:

- **AFC** This tag must match the tag of the MAIN AOI that you will import <u>last</u>. This is the main tag for all of the functions of the module. This will contain a Data Type of *AFCEModuleDef*, and will import all of the User Defined Data Types required for the communication between the module and the CompactLogix processor.
- **AFCMeterX** This is the tag that contains all information pertaining to a particular meter run. The User Defined Data Type is dependent on the type of meter you are importing (shown above is differential gas).
- AOI69EAFCMeterX... This is a unique tag for each meter run in your project. It is required for the operation of the AOI, and contains the enabled in, enabled out, and meter number parameters.
- Local:1:I This tag will reflect the slot number that the module resides in your CompactLogix rack (in this sample, slot 1). If your module is in slot 4 instead, you will change this tag to Local:4:I.
- **5** Once the meter AOI is imported, you must update the *Meter Number* parameter, which can only be done after the AOI is imported. Each meter must have unique meter numbers.
- 6 Click OK.
- 7 Repeat the steps above for additional meter-specific AOI's.

8 When finished importing the necessary meter-specific rungs for your project, import the **MAIN MVI69E-AFC Add-On Instruction**. Right-click on the rung below the last meter-specific AOI. Click on **IMPORT RUNGS**.



9 Select the MVI69EAFC_AddOn_Rung_Main_v1_x file and click IMPORT.

👪 Import Rung	s			×
Look in:	MVI69E-AFC	•) 🗊 📂 🖽 -	
Recent Places Desktop Libraries Computer	Name MVI69EAFC_ MVI69EAFC_ MVI69EAFC_ MVI69EAFC_ MVI69EAFC_ MVI69EAFC_	AddOn_Rung_DifferentialGas_v1_1.L5X AddOn_Rung_DifferentialLiquid_v1_1.L5X AddOn_Rung_LinearGas_v1_1.L5X AddOn_Rung_LinearLiquid_v1_1.L5X AddOn_Rung_Main_v1_1.L5X	▼ Date modified ▼ 12/18/2018 9:52 12/18/2018 9:53 12/18/2018 9:52 12/18/2018 9:53 12/18/2018 9:53 12/18/2018 9:53	Type Logix Design Logix Design Logix Design Logix Design Logix Design
Network	•			Þ
	File name:	MVI69EAFC_AddOn_Rung_Main_v1_1	1 💌	Import
	Files of type:	RSLogix 5000 XML Files (*.L5X)	v	Cancel
	Files containing:	H Rungs	7	Help
	Into:	MainRoutine (MainProgram)	~	
	🔲 Overwrite Sele	cted Rungs		1.

10 Select the *Tags* section to display the following menu:

Import Configuration									×
Eind: Find: Find Within: Final Name	•	A A Fir	nd/Replace			Ĵ			
Import Content:	Config	ue Tag Refere	000						
Main Lask	Configu	lie Tay neielei	nces				Ia 1.4	In	
🔓 🥻 MainRoutine (Rungs)		Import Name	Uperation	Final Name 4	Alias For	Data Type	Description	External Access	Constant
References		APL	Use Existing	AFL ACCOLATE		AFLEMODUR		Read/Write	
- 2 Iags		AUI63EAFC	Lieate Liea Euisting	AUI63EAFC		DC-MM/CS MODULE CO-1-0	-	Read/Write	
	- Fi	Local:1:0	Use Existing	Cocal:1:0		PS:MVI69_MODULE_60:0:0		Read Aufrite	
Errors/Warnings		Local I.O	Ose Existing	Cocal 1.0		1.2.944102_00000055		Tiodd/ Write	
	٩								
XX							OK	Cancel	Help
Ready									

The tags shown here are as follows:

- **AFC** This should match the tag name used when importing the meter specific Add-On Instructions. It will be of data type *AFCEModuleDef*.
- **AOI69EAFC** This tag contains the enable in and enable out bits needed for the main Add-On Instruction.
- Local:1:I This will represent the slot of the module (in this case slot 1). If your module is located in another slot in the CompactLogix chassis, edit in the *Final Name* column to reflect your application.
- Local:1:O Again slot dependent. Edit to reflect the location of the module in your CompactLogix application.

11 When the import is complete, the Add-On Instructions appear similar to the following example:



The procedure has imported User-Defined data types that will be used by the sample program.



The procedure imports the controller tags that will be used by the sample program.

Controller Organizer 🗾 🔫 🛠	[] 9	icope: 🕅 MyController 🔍 Show: All Ta]S	• 7	Enter N.	ame Filter
Controller Tags		Name II A	Value 🗲	Force Mask 🔶	Style	Data Type 🔺
Power-Up Handler			{}	{}		AFCEModuleDe
📄 🖶 Tasks 🚽			{}	{}		AFCEMeterDiffe
🖻 🧔 MainTask			{}	{}		A0169EAFC
- MainProgram			{}	{}		A0169EAFCMet
MainRoutine		⊞-Local:1:I	{}	{}		PS:MVI69_MOD
Unscheduled Programs / Phases		⊞-Local:1:0	{}	{}		PS:MVI69_MOD
📩 🚔 Mation Cround						

12 The import procedure is now complete. Save your project.

Note: An example containing all meter runs and meter types is provided as a .ACD file. This utilizes additional processor memory when not using all meter types, so while it is not recommended to use this as a base, it is available as a sample from our website.

18.3 Configuring the AOIs

Now that all of the AOI's are in the project, you may now configure the ladder for the rest of your application. Below is a partial screen shot of the sample .ACD file:



19 MVI69E-AFC Web Page

The MVI69E-AFC web page is accessible through any browser simply by typing the module's IP address.

From this page, you can view general information about the module as well as upgrade the firmware.

To access this webpage, ensure that you use the **Web Interface** IP address configured under **Site Configuration > Network > Advanced**.

AFC Network Configuration
Server 1 Server 2 Server 3 Server 4 Advanced
Overall Settings Ø 12 Keepalive idle time, sec Ø 1 Keepalive probe interval, sec 5 3 Keepalive probe count 0 0 Orphaned-connection timeout min
Gateway
Select server to configure, or Advanced options.
Select server to conligure, or Advanced options.
<u>O</u> K <u>Cancel</u> <u>Read</u> <u>Write</u> Apply ⊻erify

		RESOURCES
Module Name	MVI69E-AFC	ProSoft
Ethernet Address (MAC)	00:0D:8D:03:21:C1	Technology
IP Address	192.168.0.250	
Product Revision	App 4.04.000 #012 Base 1.01 #001 OS 2.6.33.7 #16	
Firmware Version Date	App 2018-09-12 Base 2018-07-26	
Serial Number	000231C1	X
W&M Lock	Unlocked !	1
Status	Running	
Uptime	6 days 08:40:25	
	Module Name Ethernet Address (MAC) IP Address Product Revision Firmware Version Date Serial Number W&M Lock Status Uptime	Module Name MVI69E-AFC Ethernet Address (MAC) 00:0D:8D:03:21:C1 IP Address 192.168.0.250 Product Revision App 4.04.000 #012 Base 1.01 #001 OS 2.6.33.7 #16 Firmware Version Date App 2018-09-12 Base 2018-07-26 Serial Number 000231C1 W&M Lock Unlocked ! Status Running Uptime 6 days 08:40:25

ProSoft Technology, Inc. December 18, 2018

19.1 Firmware Upgrade Link

Click on the *Firmware Upgrade* link to upgrade firmware if instructed to do so from the support group.

19.2 Component Integrity Link

Click on the Component Integrity link to view the following information:

- **Software Component** The Software Component column displays the list of legally relevant software identifiers. On the right side of the table, a vertical scroll is provided to scan this listing.
- Last Scan The Last Scan column displays the timestamp (UTC) of the last scan of the software component by the hash checking process.
- **Result** The Result column displays the outcome of the last scan of the software component by the hash checking process.



19.2.1 Software Component Detail Information

Hover or click on the relevant software component identifier in the table to view the software component detail information.

Upgrade	MVI69E-AFC Compo	onent Integrity		
Component	Software Component	Last Scan	Result	RESOURCES
Integrity	/etc/init.d/S45-wmlkmonitor	2018-11-15 04:18:54	OK 🔺	
Monitor	/etc/init.d/S50-hashverify	2018-11-15 04:18:54	ОК	ProSoft
	/etc/init.d/S70-prosoft	2018-11-15 04:18:54	ок	Technology
	/usr/sbin/statwo	2018-11-15 04:18:54	ок	
Technical Support	/usr/sbin/hashchek	2018-11-15 04:18:54	ок	
rechnical Support	/usr/www/cgi-bin/webservice	2018-11-15 04:18:54	ок 🖕	
	Description: The program that m Measures switch set SHA-256: b388891c62b327dac 2c6793ec4e6f Processed: 2018-11-15 04:22:5 Threshold: 2018-11-15 04:17:5 Scan Age: 00 00:04:01	onitors the status of the We ting. 5542427a5563a298ed7befc 55 55	ights & 3fc5a5afd4d7f	

The software component detail information displays the following information:

Parameter	Description
Full Path	The complete legally relevant software component identifier.
Description	The legal description of the software component identifier.
SHA-256	The SHA-256 hash code of the legally relevant software as calculated during the firmware-image build process
Processed	The operating system timestamp (UTC) when the hash code results were processed. The processed timestamp is based upon the viewing device date and time running the web browser software.
Threshold	The page processed timestamp minus 5 minutes.
Age	The page processed timestamp minus the last scan timestamp.

19.2.2 Component Integrity Page Operation

The ProSoft MVI69E-AFC hash checking is performed by an internal process which scans each legally relevant software component once every 4 minutes and 30 seconds. The outcome of this scan is stored in a result file. The hash checking process runs continuously and is independent of all other processes that run on the module.

Each minute, or on manual refresh, the component integrity web page performs a web service transaction which reads the result from the internal hash checking process.

The ProSoft MVI69E-AFC legally relevant software identifiers are unique for each legally relevant software component. The table however, is limited in width. When the legally relevant software identifier is too long to display in the software component column, the legally relevant software identifier in the table is shortened to fit the table column width. When this occurs, the legally relevant software component identifier is prefized with ".." characters. The full legally relevant software component identifier is always displayed in the detail information section.

On each process interval, if the age of the software component last scan timestamp is older than 5 minutes, the last scan timestamp is displayed in red.

Result Code	Result Code Description
ОК	The software component was successfully processed by the internal hash checking process, and the calculated hash code by the hash checking process matched the calculated hash code during the firmware-image build process.
Mismatch	The software component was successfully processed by the internal hash checking process, but the calculated hash code by the hash checking process did not match the calculated hash code during the firmware-image build process.
Missing	The software component was not found and therefore could not be scanned.
Err <nn></nn>	An error occurred when the internal hash checking process attempted to scan the software component, so the hash code could not be calculated. <nn> is the error code reported by the operating system function call that failed for use by ProSoft Technical Support.</nn>

The following table details the displayed software component scan result codes:

19.2.3 Verification

The ProSoft MVI69E-AFC Enhanced Liquid & Gas Flow Computer for CompactLogix® module consists of two firmware images; the "base" firmwareimage which supplies an environment and component files that have more general utility that what is needed for measurement and flow computation, and the "application" firmware-image that adjusts/enhances the "base" environment and components the directly implement the measurement and flow computation. Both firmware images are required for full implementation of the ProSoft MVI69E-AFC Enhanced Liquid & Gas Flow Computer for CompactLogix® module. Both firmware images contain legally relevant software components.

The ProSoft MVI69E-AFC Enhanced Liquid & Gas Flow Computer for CompactLogix® module legally relevant software documentation contains the following information for each legally relevant software component within each firmware-image:

Legally relevant software component identifier

Legal description

Calculated SHA-256 hash code during the firmware-image build process

The ProSoft MVI69E-AFC Enhanced Liquid & Gas Flow Computer for CompactLogix® module legally relevant software documentation is provided for full manual verification of all legally relevant software components.

19.3 Monitor

Click on the *Monitor* link from the web page to display information about what is going on inside the module.

Upgrade	MVI69E-AFC Monite	or	
Component	EAFC	Flow Station	RESOURCE
Integrity	METERS		
Monitor	Site Status		ProSoft
	Project: MVI69E-AFC	EAFC Checksum Watchdog W&M released alarm active unlocked	PLC Technology
	Site Configuration - Overview		*
Technical Support	Site Information		
llement of point	Project	MVI69E-AFC	
Homepage	Serial number	000231C1	
	Firmware version	4.04.000	
	EAFC status	EAFC released	Pro
	Checksum alarm	Inactive	
	Watchdog status	Active	
	W&M Lock status	Unlocked	
	PLC status	PLC online	
	Measurement configuration changed	Active	
	Power up	Inactive	
	Cold start	2018-11-08 19:30:32	
	•	20	18-11-15
	c N	ET VOLUME	

Information is viewable for each of the 12 available meters. Click on the appropriate meter for data that pertains to that meter.

Upgrade	MVI69E-AFC Monit	or	
Component	EAFC	Flow Station	RESOURCES
Integrity	01 02 03 04 05	METERS	2
Monitor	Site Status	• • •	ProSoft Technology
	Project: MVI69E-AFC	EAFC Checksum Watchdog W&M released alarm active unlocked	online rectifiology
	Site Configuration - Overview		
Technical Support	Site Information		
Hemenado	Project	MVI69E-AFC	
nomepage	Serial number	000231C1	
	Firmware version	4.04.000	
	EAFC status	EAFC released	Pros
	Checksum alarm	Inactive	
	Watchdog status	Active	
	W&M Lock status	Unlocked	
	PLC status	PLC online	
	Measurement configuration changed	Active	
	Power up	Inactive	
	Cold start	2018-11-08 19:30:32	· · · · · · · · · · · · · · · · · · ·
	•	2	018-11-15
	c N	IET VOLUME	2 E E E E E E E E E E E E E E E E E E E
	000000000		inR4

If you hover or click over a meter, links appear under the appropriate headings.

FUNCTIONS	Gas and	Oil Flow	Comput	er for Comp	actLogix
Ungrade	MVI69E-A	FC Monito	r		
 Component Integrity 	EAFC Flow Station				RESOURCES
Monitor		METER	NUMBER 01		ProSoft
	Site Configuration	Meter Calculations	Meter Accumulators	Alarm Indications	rechnology
	Overview	Reference conditions	Quantity rollover	Checksum alarms	
Technical Support	Meter Configuration	Process Inputs	Resettable	Meter alarms	
Homenage	Overview	Heating value	Non-resettable	Meter error alarms	
• Homepuge	Physical device	Flow Calculations		Process input detail alarms	
	Identification	Flow Rates			
	Process Input scaling				ProSoft
	Stream Configuration				
	Overview				
	Identification				
	Analysis				

Click on any of the links under the appropriate heading.

19.3.1 Site Configuration

Site Configuration Overview

Click on the Overview link to display the following information:

Upgrade	MVI69E-AFC Monit	or	
▶ Component	EAFC	Flow Station	RESOURCES
Integrity	< <u>01</u> 02 03 04 05	METERS 5 06 07 08 09 10 11 12) DesCaft
Monitor	Site Status Project: MVI69E-AFC	EAFC Checksum Watchdog W&M PLC released alarm active unlocked online	Technology
	Site Configuration - Overview		A
Technical Support	Site Information		
Homenage	Project	MVI69E-AFC	
Homepage	Serial number	000231C1	T
	Firmware version	4.04.000	
	EAFC status	EAFC released	Pros
	Checksum alarm	Inactive	
	Watchdog status	Active	
	W&M Lock status	Unlocked	
	PLC status	PLC online	
	Measurement configuration changed	Active	10 Marca
	Power up	Inactive	
	Cold start	2018-11-08 19:30:32	▼ () s(<u>)</u>
	•	2018-11- 04:29:	-15 03
	6	ENERGY	> 1
	0000005808	0112162 × 10 ⁰ C1	- inf

Site status LED indicators are displayed just under the meter selection links.

Upgrade	MVI69E-AFC Monitor		
Component	EAFC Flow Station		RESOURCES
Integrity	<u>01</u> 02 03 04 05	METERS 06 07 08 09 10 11 12) DroCoft
Monitor	Site Status Project: MVI69E-AFC	EAFC Checksum Watchdog W&M PLC eleased alarm active unlocked online	Technology
	Site Configuration - Overview		
Technical Support	Site Information		
Homonago	Project	MVI69E-AFC	
nomepage	Serial number	000231C1	7
	Firmware version	4.04.000	N
	EAFC status	EAFC released	ProSol
	Checksum alarm	Inactive	
	Watchdog status	Active	
	W&M Lock status	Unlocked	
	PLC status	PLC online	
	Measurement configuration changed	Active	
	Power up	Inactive	
	Cold start	2018-11-08 19:30:32	· • • • • • • • • • • • • • • • • • • •
	•	2018-11-1 04:29:0	.5 13 1
	¢	ENERGY	3

These alarms are displayed on the Site Header, Meter Header, and alarm indication sections

Site Header	Value	Text	LED Color
EAFC released status	False	EAFC released	Red
	True		Green
	Error		Black
Checksum alarm	False	Checksum alarm	Green
	True		Red
	Error		Black
Watchdog status	False	Watchdog inactive	Red
	True	Watchdog active	Green
	Error	Watchdog status	Black
W&M lock switch	False	W&M unlocked	Red
	True	W&M locked	Green
	Error	W&M status	Black
PLC offline status	False	PLC online	Green
	True	PLC offline	Red
	Error	PLC status	Black

Site Header LEDs

Site Information is located directly below the Site Status LEDs:

Parameter	Description
Project	Displays the current project name
Serial Number	Displays the serial number of the device
Firmware version	Displays the current firmware version on the module.
EAFC status	
Checksum alarm	Displays active or inactive.
Watchdog status	
W&M Lock status	
PLC Status	Indicates the state of the PLC
Measurement configuration changed	
Power Up	Indicates whether or not the module is powered up.
Cold Start	
Warm Start	
Accuracy class	
Climatic and Mechanical class	

19.3.2 Meter Configuration

Upgrade	MVI69E-AFC Monitor				
Component	EAFC Flow Station				RESOURCE
Integrity	¢	Mi 01 02 03 04 05 0	ETERS 06 07 08 09 10 11 12	5	D
Monitor	Meter 01 Status Host Tag: M01	Active Stream 01 Meter Stream 01 V	Meter Checksum Meter enabled alarm alarm	Process Product	Technology
	Meter Configuration - O	verview			
• Technical Support	Meter Information	1			
Homonago	Meter number		1		
nomepage	Meter tag		M01		T
	Product group		Gas		
	Device type		Differential		Pro
	Primary input		Differential pressure		
	Measurement System	Π	SI		
	Calculation Method		AGA-3 2012		A
	Alarming: Require m	anual acknowledge	Disabled		- 1 B
	Alarming: Disallow p	re-acknowledge	Disabled		
	Alarming: Acknowles	ige action is sealable	Disabled		
	Alarming: Must ackr	owledge to resume norr	nal Disabled	•	S
	2018-11-15 04:32:21				
	¢	NET	VOLUME	3	

Selecting Meter Streams

You can select specific streams per meter from any of the meter pages. Simply select the appropriate meter stream from the drop-down list as shown.

Upgrade	MVI69E-AFC Monitor				
Component	EAFC Flow Station				RESOURCE
Integrity	c	M 01 02 03 04 05 0	ETERS 06 07 08 09 10 11 12	3	D
Monitor	Meter 01 Status Host Tag: M01	Active Stream 01 Meter Stream 01 ▼ Meter Stream 01	Meter Checksum Meter enabled alarm alarm	Process Product input flow	Technology
• Technical Support	Meter Configuration - Ov Meter Information	Meter Stream 02 Meter Stream 03 Meter Stream 04	1		
Homepage	Meter tag M01			-	
	Product group		Gas		
	Device type		Differential		
	Primary input		Differential pressure		
	Measurement System SI				
	Calculation Method		AGA-3 2012		7
	Alarming: Require m	anual acknowledge	Disabled		
	Alarming: Disallow p	re-acknowledge	Disabled		
	Alarming: Acknowled	dge action is sealable	Disabled		
	Alarming: Must ackn	owledge to resume norr	nal Disabled	•	
	2018-11-15				
	(MASS)				

Meter Configuration Links

Meter Configuration contains the following links:

- Overview
- Physical Device
- Identification
- Process Input Scaling

Click on any of the links for meter configuration information.

<u>Overview</u>

The Meter Configuration page displays the following information:

Meter Configuration - Overview		
Meter Information		
Meter number	1	
Meter tag	M01	
Product group	Gas	
Device type	Differential	
Primary input	Differential pressure	
Measurement System	SI	
Calculation Method	AGA-3 2012	

Physical Device

The Physical Device page displays the following information:

Meter Configuration - Physical Device

Metering device characteristics				
hysical device Orifice plate (AGA 3 [2012])				
Orifice plate diameter	0 mm			
Orifice plate temperature	20 °C	293.1500 °K		
Orifice plate material	0.0000167000/°C	[Stainless Steel]		
Meter tube diameter	0 mm			
Meter tube temperature	20 °C	293.1500 °K		
Meter tube material	0.0000112000/°C	[Carbon Steel]		
Low flow threshold	0 kPa			

Identification

The Identification page displays the following data:

Meter Configuration - Identification

Meter nameplate information	
Meter general type	
Meter manufacturer	
Meter model	
Meter serial number	
Meter size	
Nominal K-factor	

Process Input Scaling

The Process Input Scaling page displays the following data:

Process Input	Transmitter Minimum	Transmitter Maximum	Calibration Low	Calibration High	Alarm Low Limit	Alarm High Limit
Diff press (kPa)	0	0	0	0	0	0
Temperature (°C)	15	15	15	15	15	15
Temperature (°K)	288.1500	288.1500	288.1500	288.1500		288.1500
Pressure (kPaq)	0	0	0	0	0	0
Pressure (barq)	1.0132	1.0132	1.0132	1.0132	1.0132	1.0132

19.3.3 Stream Configuration

Stream Configuration contains the following links:

- Overview
- Identification
- Analysis

Click on any of the links for Stream Configuration data.

<u>Overview</u>

Meter Stream Configuration - Overview

Meter stream 1 characteristic	5	
Meter active stream number	1	(Site stream number 1)
Meter displayed stream numb	er1	(Site stream number 1)
Isentropic exponent	1.3198	
Default relative density	0.60000002	
Default heating value	0 MJ/kg	
Default Fpv	1	
Viscosity	0.010268 centipoise	

Identification

Meter Stream Configuration - Identification

<u>Analysis</u>

Meter Stream Configuration - Analysis

C1	0	co	0	C8	0
Nz	0	Οz	0	C9	0
COz	0	i-C4	0	C10	0
C2	0	n-04	0	He	0
СЗ	0	i-C5	0	Ar	0
H _z O	0	n-C5	0	neo-C5	
H _z s	0	C6	0	$\cup_{\mathbf{x}}$	
Hz	0	C7	0	Uy	

19.3.4 Meter Calculations

Meter Calculations provide the following data:

- Reference Conditions
- Process Inputs
- Heating value
- Flow Calculations
- Flow Rates

Click on any of the links for Meter Calculation information.

Reference Conditions

Meter Calculations - Reference conditions

15 °C
288. 1 500 °K
101.325 kPaa
2.0265 barg
101.325 kPaa
1.0132 bara

Process Inputs

Meter Calculations - Process Inputs

Process Input	Last Raw	Scaled Average
Differential pressure	0	0 kPa
Temperature	0	0 °C
		273.1500 °K
Pressure (downstream)	0	0 kPag
		1.0132 barg

<u>Heating Value</u>

Meter Calculations - Heating Value

Analysis Characterization - Heating Value	
Meter active stream number	1 (Site stream number 1)
Relative density calculation method	AGA-8 / ISO 12213
Relative density @ reference	0.6000002
Gas density @ reference	0.73524779
Default relative density @ reference	0.6000002
Heating value calculation method	AGA-8 / ISO 12213
Default heating value	0 MJ/kg
Molar heating value	0 MJ/kmol
Mass heating value	0 MJ/kg
Volumetric heating value	0 MJ/m ³
Wobbe index	0

Flow Calculations

Meter Calculations - Flow Calculations

Flow Calculations	
Meter active stream number	1 (Site stream number 1)
Temperature, absolute	0 °C
	273.1500 °K
Pressure, absolute	0 kPaa
	0.0000 bara
Compressibility @ reference	1
Molar density @ reference	0
Compressibility, flowing	0
Molar density, flowing	0
Supercompressibility	0
Extension	0
Beta ratio	0

Flow Rates

Meter Calculations - Flow Rates

Quantity	Flow Rate - Meter is currently disabled
Gross volume flow rate	-1 m ³ /h
Net volume flow rate	-1 m ³ /h
Energy flow rate	-1 GJ/h
Mass flow rate	-1 kg/h

19.3.5 Meter Accumulators

Meter Accumulators provide the following data:

- Quantity Rollover
- Resettable
- Non-Resettable

Click any link for detailed information.

Quantity Rollover

Meter Accumulators - Rollover

Quantity Type	Accumulator Rollover	
Volume	10000000 × 10 ^D m ³	
Energy	100000000 × 10 ^D GJ	
Mass	100000000 × 10 ^D kg	

Resettable

Meter Accumulators - Resettable

Quantity	Accumulator	Reset Options
I	000000000.000000 × 10 ^D	
¹ Net Volume	m3	
	000000000.000000 × 10 ^D	
² Gross Volume	m ³	END OF END OF UPON DAY HOUR EVENT
¹ Gross Standard Volume		
	000000000.000000 × 10 ^D	
⁴ Mass	kg	

Contract Period	Contract Period End	Time Remaining
Hour	1970-01-01 00:00:00	00:00:00
Day	1970-01-01 00:00:00	00:00:00

Non-Resettable

Meter Non-Resettable Accumulators

Quantity	Accumulator
	$000000000.000000 \times 10^{D} m^{3}$
Net Volume	$000000000.000000 \times 10^{D} m^{3}$
Energy	000000000.000000 × 10 ^D GJ
Mass	000000000.000000 × 10 ^D kg

Quantity	🗶 (In Error) Alarm Accumulator

19.3.6 Meter Status

The meter status area provides alarm information for the selected meter and stream.

Upgrade	MVI69E-AFC Monitor		
Component Integrity	EAFC Flow Mete	Station RS 07 08 09 10 11 12	RESOURCES
Monitor	Meter 01 Status Active Stream 01 Host Tag: M01 Meter Stream 01 ▼ Aster Continuation - Overview	Meter Checksum Meter Process Product nabled alarm alarm input flow	ProSoft Technology
Technical Support	Meter Information		
	Meter number	1	
Homepage	Meter tag	M01	
	Product group	Gas	
	Device type	Differential	Pros
	Primary input	Differential pressure	
	Measurement System	SI	
	Calculation Method	AGA-3 2012	
	Alarming: Require manual acknowledge	Disabled	
	Alarming: Disallow pre-acknowledge	Disabled	
	Alarming: Acknowledge action is sealable	Disabled	
	Alarming: Must acknowledge to resume normal	Disabled	
		2018-11-1 04:36:0	
	NET VOL	LUME	3

In this example, the Active Stream indicates the active stream for Meter 1. You can change the meter stream by selecting the requested stream from the Meter Stream dropdown.

• Firmware Upgrade	MVI69E-AFC Monitor		
Component	EAFC Flov	w Station	RESOURCES
Integrity	MET	ERS	
integrity	<u>01</u> 02 03 04 05 06	07 08 09 10 11 12	ProSoft
Monitor	Meter 01 Status Active Stream 01 Host Tag: M01 Meter Stream 01 ▼ Meter Stream 01	Meter Checksum Meter Process Product enabled alarm alarm input flow	Technology
Technical Support	Meter Configuration - Overvi Meter Stream 02 Meter Information Meter Stream 04 Meter Stream 04		
Homepage	Meter tap		
	Product proup	Gas	1
	Device type	Differential	
	Primary input	Differential pressure	- The second sec
	Measurement System	SI	
	Calculation Method	AGA-3 2012	
	Alarming: Require manual acknowledge	Disabled	
	Alarming: Disallow pre-acknowledge	Disabled	2
	Alarming: Acknowledge action is sealable	Disabled	
	Alarming: Must acknowledge to resume norma	I Disabled	4 1 1
		2018-11-15	
	C ENE	04:37:25 RGY	
	-	0	

Meter enable

Displays meter enable/disable state.

Checksum Alarms

Click to display details on the following:

• Alarm Indicators – Checksum Alarms

Alarm Indications - Checksum Alarms

Checksum Alarm	Status
Meter configuration	×
Meter accumulators	1
Meter previous prove summary	¥
Meter user-specified archivables	¥
Meter archive accumulators	¥
Meter archive status	1
Meter archive detail (daily)	<i>s</i>
Meter archive detail (hourly)	V

Meter alarm

• Alarm Indicators – Meter Alarms

Alarm Indications - Meter Alarms

Meter Alarm	Status
Differential pressure input failure	¥
Differential pressure input out of range	¥
Differential pressure input outside threshold limits	s.
Temperature input failure	¥
Temperature input out of range	1
Temperature input outside threshold limits	1
Pressure input failure	1
Pressure input out of range	1
mana and an and a state of a final second	1

• Alarm Indicators – Meter Errors

Alarm Indications - Meter Errors

Meter Error	Status
Compressibility calculation error	1
Accumulator overflow	1
Static pressure exception	1
Analysis/heating value characterization error	1
Orifice characterization error	\$

Process Input

• Alarm Indicators – Process Input Detail Alarms

⊨Narm Indications - Process Input Detail Alarms

Process Input Detail Alarm	Status
Differential pressure transmitter failure	1
Differential pressure sample rate too low	1
Differential pressure range limit exceeded, lo (backplane)	1
Differential pressure range limit exceeded, hi (backplane)	1
Differential pressure invalid input format	1
Differential pressure range limit exceeded, lo (local)	1
Differential pressure range limit exceeded, hi (local)	1
Differential pressure alarm threshold exceeded, lo	1

19.3.7 Data Displays

In addition to the information provided above, the web page displays current data along the bottom of the page.

Firmware Upgrade	MVI69E-AFC Monitor		
Component	EAFC Flow Station		RESOURCES
Integrity	(<u>01</u> 02 03 04 05 06		
Monitor	Meter 01 Status Active Stream 01 Host Tag: M01 Meter Stream 01 V	Meter Checksum Meter Process Product	Technology
	Meter Configuration - Overview		
Technical Support	Meter Information		
Homenade	Meter number	1	
Filomepage	Meter tag	M01	T
	Product group	Gas	
	Device type	Differential	ProSoft
	Primary input	Differential pressure	The second se
	Measurement System	SI	
	Calculation Method	AGA-3 2012	
	Alarming: Require manual acknowledge	Disabled	
	Alarming: Disallow pre-acknowledge	Disabled	
	Alarming: Acknowledge action is sealable	Disabled	
	Alarming: Must acknowledge to resume norma	Disabled	
		2018-11-1 04:39:45	a and a second
	C NET VC	DLUME 3	
	0000261492 65	$20200 \times 10^{0} \text{ m}^{3}$	inRAx

This information displayed automatically changes every few seconds and displays:

- Gross Volume
- Net Volume
- Energy
- Mass

20 What's Next?

Congratulations! Your MVI69E-AFC is now configured and running. There are a number of features and customizations that you can set up and use. The *MVI69E-AFC Reference Guide* contains a wealth of information that will help you get the most out of your module.



The MVI69E-AFC Reference Guide contains information on how to:

- Configure primary and virtual Modbus slave addresses
- Disable pass-thru mode
- Configure whitelist options
- Access data
- Read site configuration status
- Configure parameters common to all modules
- Use the Modbus Dictionary
- Configure archives
- Set up and view events
- Set up and view alarms
- Perform transmitter calibrations and view results
- Perform diagnostics and troubleshooting
- Perform meter proving

In addition, the MVI69E-AFC Reference Guide provides further information on:

- Modbus communication
- Modbus database information
- Modbus communication parameters
- Modbus transaction sequencing and constraints
- Product groups
- Calculation results
- Molar Analysis
- Measurement standards
- Metering according to meter type
- Enron Modbus Implementation
- Function Block Interface
- Cable connections

21 Support, Service and Warranty

21.1 Contacting Technical Support

ProSoft Technology, Inc. is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

- 1 Product Version Number
- 2 System architecture
- 3 Network details

If the issue is hardware related, we will also need information regarding:

- 1 Module configuration and associated ladder files, if any
- 2 Module operation and any unusual behavior
- 3 Configuration/Debug status information
- 4 LED patterns
- **5** Details about the serial, Ethernet or Fieldbus devices interfaced to the module, if any.

Note: For technical support calls within the United States, ProSoft's 24/7 after-hours phone support is available for urgent plant-down issues. Detailed contact information for all our worldwide locations is available on the following page.

Asia Pacific	Europe / Middle East / Africa
Regional Office	Regional Office
Phone: +603.7724.2080	Phone: +33.(0)5.34.36.87.20
asiapc@prosoft-technology.com	europe@prosoft-technology.com
Languages spoken: Bahasa, Chinese, English,	Languages spoken: French, English
Japanese, Korean	REGIONAL TECH SUPPORT
REGIONAL TECH SUPPORT	support.emea@prosoft-technology.com
support.ap@prosoft-technology.com	
	Middle East & Africa
North Asia (China, Hong Kong)	Phone: +971.4.214.6911
Phone: +86.21.5187.7337	mea@prosoft-technology.com
china@prosoft-technology.com	Languages spoken: Hindi, English
Languages spoken: Chinese, English	REGIONAL TECH SUPPORT
REGIONAL TECH SUPPORT	support.emea@prosoft-technology.com
support.ap@prosoft-technology.com	
	North western Europe (UK, IE, IS, DK, NO, SE)
Southwest Asia (India, Pakistan)	Phone: +44.(0)7415.864.902
Phone: +91.98.1063.7873	nweurope@prosoft-technology.com
ndia@prosoft-technology.com	Language spoken: English
Languages spoken: English, Hindi, Urdu	Orantard & Frantzin Francis - Finland
	Central & Eastern Europe, Finland
Australasia (Australia, New Zealand)	Phone: +48.22.250.2546
Phone: +603.7724.2080	centraleurope@prosoft-technology.com
pacific@prosoft-technology.com	Languages spoken: Polish, English, Russia & CIS
Language spoken: English	Phone: +7.499.704.53.46
	russia@prosoit-technology.com
Southeast Asia (Singapore, Indonesia,	Languages spoken. Russian, English
Philippines)	Austria Germany Switzerland
Phone: +603.7724.2080	Phono: 122 (0)5 24 26 97 20
seasia@prosoft-technology.com	rione. +33.(0)3.34.30.87.20
Languages spoken: Englisn, Banasa, Tamil	Language spoken: English German
Northanat & Couthanat Asia	Language spoken. English, German
Northeast & Southeast Asia (Janan Taiwan Thailand Viotnam Malaysia)	BeNel ux, France, North Africa
Dhono: 1602 7724 2080	Phone: +33(0)5 34 36 87 27
TIUIE. TUUS.1124.2000	france@prosoft-technology.com
anguages spoken: English Chinese Japanese	Languages spoken: French, English
Languages spoken. English, Chinese, Japanese	
Korea	Mediterranean Countries
Phone: +603 7724 2080	Phone: +39.342.8651.595
korea@prosoft-technology.com	italy@prosoft-technology.com
anguages spoken: English Korean	Languages spoken: Italian, English, Spanish

Latin America	North America
Regional Office Phone: +52.222.264.1814 support.la@prosoft-technology.com Languages spoken: Spanish, English REGIONAL TECH SUPPORT support.la@prosoft-technology.com	Regional Office Phone: +1.661.716.5100 info@prosoft-technology.com Languages spoken: English, Spanish REGIONAL TECH SUPPORT support@prosoft-technology.com
Brazil Phone: +55.11.5084.5178 brasil@prosoft-technology.com Languages spoken: Portuguese, English REGIONAL TECH SUPPORT support.la@prosoft-technology.com	
Mexico Phone: +52.222.264.1814 mexico@prosoft-technology.com Languages spoken: Spanish, English REGIONAL TECH SUPPORT support.la@prosoft-technology.com	
Andean Countries, Central America & Caribbean Phone: +507.6427.48.38 andean@prosoft-technology.com Languages spoken: Spanish, English	
Southern Cone (Argentina, Bolivia, Chile, Paraguay & Uruguay) Phone: +54.911.4565.8119 scone@prosoft-technology.com Languages spoken: Spanish, English	

21.2 Warranty Information

For complete details regarding ProSoft Technology's TERMS & CONDITIONS OF SALE, WARRANTY, SUPPORT, SERVICE, and RETURN MATERIAL AUTHORIZATION INSTRUCTIONS, please see the documents at: www.prosoft-technology/legal

Documentation is subject to change without notice.
Index

Α

Accessing the Data • 43 Accumulator Totalizer and Residue • 70 AFC Port 1 and 2 Configuration • 38

В

Battery Life Advisory • 3

С

Communication Parameters (MVIxxE-AFC Modules) • 30 Connect the AFC Module to the AFC Manager • 105 Contacting Technical Support • 141

Creating Your Application • 21

D

Done Button • 42 Downloading the Project to the Module • 109

Ε

End-of-Day Minute • 47 Example • 70

F

Full Scale • 59

Import the MAIN AOI into your RSLogix Project • 111 Important Installation Instructions • 2 Install the Module in the Rack • 103

L

Local Port Settings Dialog Box • 41

Μ

Meter Configuration • 45 Module Initialization • 103 MVI (Multi Vendor Interface) Modules • 2

Ν

Net Accumulator Calculation • 69

Ρ

Pinouts • 2, 3 Poll Button • 40 Port Options • 39

R

Read Button • 41

ProSoft Technology, Inc. December 18, 2018 Remapping Button • 43 Reset from AFC Manager • 66 Reset from Ladder Logic • 67 Reset Upon Archive Period End or Reset Upon Event • 67 Reset When the Accumulator Rollover Value is Reached • 68

S

Site Configuration Buttons • 28 Site Information • 25 Site Status • 43 Starting AFC Manager • 19 Support, Service & Warranty • 141

W

Warnings • 3 Warranty Information • 143 White List Options • 34 Write Button • 42

Υ

Your Feedback Please • 2

Ζ

Zero Scale • 59