Rosemount™ 8732EM EtherNet/IP™ Module

EMERSON
Process Management

Contents

Appendix A: Connector Pin Assignments

Appendix B: Device Profile

Appendix C: Specifications

Section 1   Introduction

1.1   About the Rosemount™ 8732EM EtherNet/IP™ Module

The Rosemount 8732EM EtherNet/IP™ Module is a customization of the Anybus®
Communicator™ from HMS Industrial Networks. The Ethernet module enables integration
of industrial devices into the Ethernet network with no loss of functionality, control, or
reliability. The Ethernet module can be used for new or retrofit installations.

This manual contains only the information required to install, configure, and use the
Ethernet module. Other OEM features are still enabled on the device, but are not
documented here. For information on other features of the device, see the Anybus
Communicator User Manual manual, available on the HMS web site.

1.1.1   Functional overview

The Rosemount 8732EM EtherNet/IP Module acts as a gateway between the serial output of
a Rosemount 8732EM Modbus® Magnetic Flowmeter Transmitter and an Ethernet network.

The Ethernet module is a Modbus master and an Ethernet slave. On the Modbus side, it polls
the transmitter for a standard set of process variables and stores the data locally. See
Section B.3 for a list of available data. On the Ethernet side, it receives requests for data and
responds with the current values. Figure 1-1 illustrates the Ethernet module in operation.

■   The Ethernet module is installed with a Rosemount 8732EM Modbus Transmitter.

■   The web browser is used for transmitter configuration and administration, via a
     connection to the Rosemount web pages on the Ethernet module.

Figure 1-1 EtherNet/IP Module with Rosemount 8732EM Modbus Transmitter
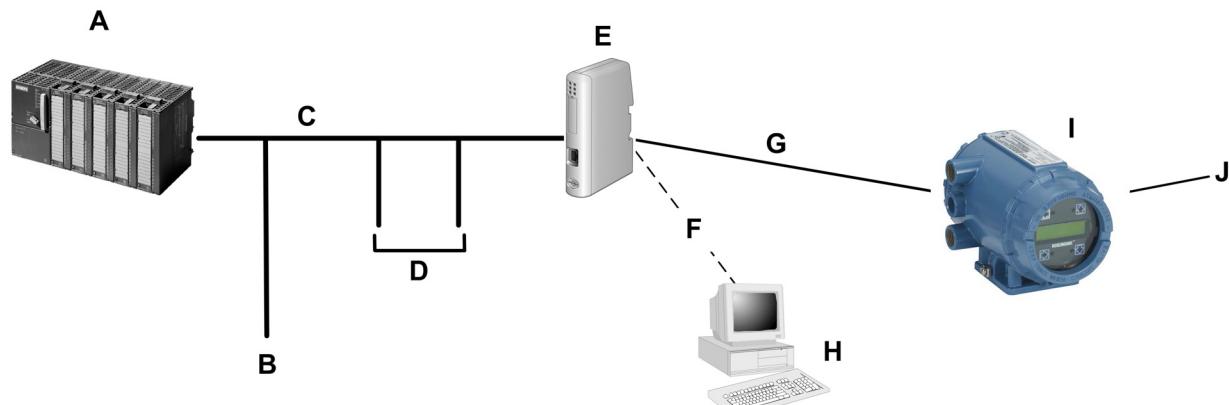
A. PLC	F. Configuration loop (with configuration cable)
B. Web browser	G. Modbus/RS-485
C. Ethernet	H. PC with Ethernet config tool
D. Other devices (SCADA, PC, Inverter)	I. Rosemount 8732EM Transmitter
E. EtherNet/IP Module	J. To sensor

1.1.2   Communications

The following communications methods and protocols are supported:

- Ethernet module to Rosemount transmitter: Modbus RTU on RS-485
- Ethernet module to Ethernet network:
  - EtherNet/IP group 2 and 3 servers
  - Web server
  - 10/100 Mbit/sec, twisted pair

1.1.3   External view of device

Figure 1-2. External View of Device
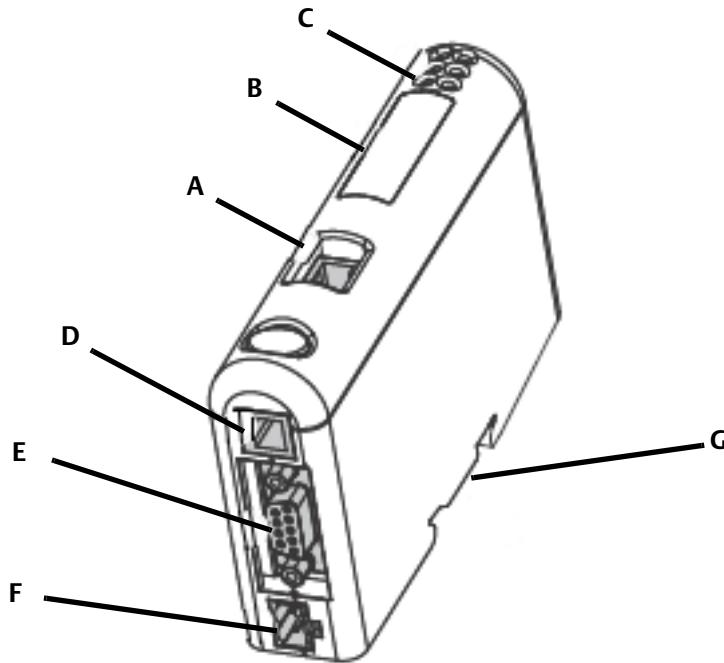
A. Ethernet connector	E. Modbus serial connector (transmitter)
B. Configuration switches	F. Power connector
C. Status LEDs	G. DIN rail connector
D. PC connector (configuration)	

1.1.4   Default web pages

The Ethernet module is preloaded with the Rosemount 8732EM web pages. These pages allow the user to view process data and alerts, configure the most commonly used parameters on the transmitter, perform maintenance procedures, and download support files from the device.

Section 2   Installation

2.1   Components

Ensure all required components are present:

■   Rosemount™ 8732EM EtherNet/IP™ Module

■   Power connector

■   Rosemount 8732EM EtherNet/IP Resource CD

-        Rosemount 8732EM EtherNet/IP Module User Manual

-        EDS file

■   Modbus® serial cable and connector (included)

■   Ethernet cable and connector (not included)

2.2   Device installation

1.   Mount the transmitter.

2.   Wire the transmitter to the sensor and to a power source.

3.   After the transmitter has been powered up:

a.   Set the Modbus address on the transmitter to 1.
b.   Configure its RS-485 terminals as follows:

■   Modbus RTU

■   38400 baud

■   0-1-2-3 Float byte sequence order

■   2 stop bits

■   No parity

4.   Mount the Ethernet module on the DIN rail.

Snap on   Snap off
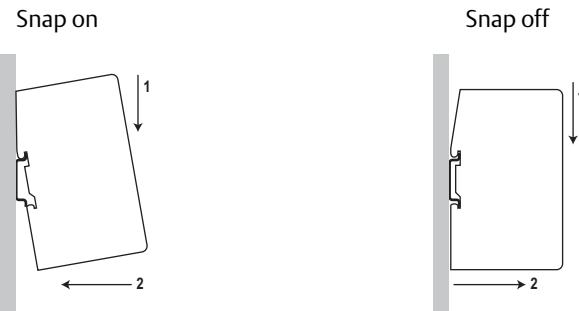
5.   Wire the Ethernet module to power (24 VDC) as shown in Figure 2-1.

Figure 2-1. Ethernet Module Power Connection

A

B
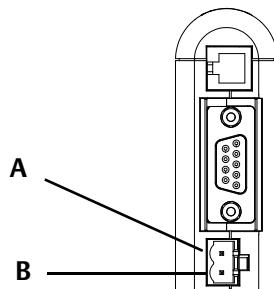
A.   +24 VDC
B.   Ground

6.   Install the Modbus serial cable between the Ethernet module and the RS-485 terminals on the transmitter.

EtherNet/IP Module
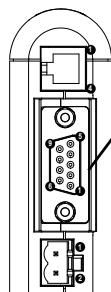
Modbus serial connector
1) Not used
2) Not used
3) Not used
4) Not used
5) Not used
6) Not used
7) Not used
8) RS-485/A
9) RS-485/B

Transmitter	Modbus terminals	
	RS-485/A	**RS-485/B**
8732EM	2	1

7.   Set the configuration dip switches on the Ethernet module as follows:

■   Switches 1–7: **Off**

■   Switch 8: **On**

This sets the IP addess to 192.168.0.1.

8. Power up the Ethernet module. At this point, the module will attempt to make a Modbus connection to the transmitter. If the Subnet Status LED (LED 5) is green, continue. If it is not green, see Section 5.1.

9. Set the network settings for the Ethernet module.

   a. Change Ethernet address setting for your PC so that it is on the same subnet as the device. When prompted, enter the following:
      - IP address: 192.168.0.x, where x is something other than 1
      - Subnet mask: 255.255.255.0

   b. Disable the popup blocker on your web browser.
   c. Use a crossover cable (or a standard cable with a switch) and your web browser to connect to the device, using the IP address assigned in Step 7: 192.168.0.1 .
   d. At the login screen, enter **admin**. Ignore the auto-configuration popup window.
   e. On the *Network Settings* page, change the settings as required, and close the web browser.
   f. At the Ethernet module, set all dip switches to **Off**.
   g. Cycle power to the Ethernet module.

10. Connect the Ethernet module to the Ethernet network as shown in Figure 2-2.

Figure 2-2. Ethernet Connector
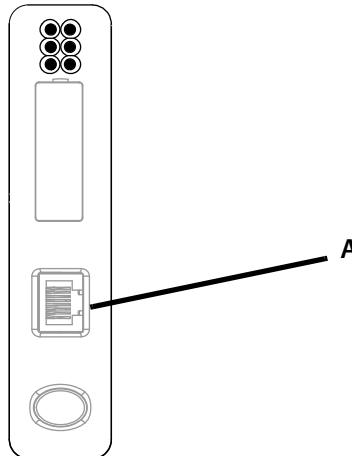
A. Ethernet connector pins:
   Pin 1—TD+
   Pin 2—TD–
   Pin 3—RD+
   Pin 4—NC
   Pin 5—NC
   Pin 6—RD–
   Pin 7—NC
   Pin 8—NC

11. Wait for the auto-configuration process to complete.

Important

For initial startup, the auto-configuration process is required to ensure device memory is completely set up.

---

12.   Add the Ethernet module to the Ethernet network control system. The EDS file is available on the Resource CD, the Ethernet module (download from Administration page), and the Rosemount web site.

For more information on transmitter installation and wiring, see the transmitter installation manual. For information on configuring the RS-485 terminals and making an RS-485 connection, see the transmitter configuration manual.

2.3   Final steps

1.   From a browser, access the login screen and enter **admin**. Ignore the auto-configuration popup window.

2.   Use the *Device Configuration* page to configure the Ethernet module.

Section 3 Basic Network Configuration

3.1 TCP/IP settings

To participate on the Ethernet network, the Rosemount™ 8732EM EtherNet/IP™ Module needs a valid TCP/IP configuration.

The Ethernet module can retrieve the TCP/IP settings from a DHCP or BootP server. If no such server is found, the Ethernet module uses the settings from the system file *ethcfg.cfg*. If this file is not found, or the settings are invalid, the Ethernet module will halt and report an error on the status LED. However, the network configuration may still be accessed via the Ethenet Config Tool.

You can define the TCP/IP settings for the Ethernet module in four ways:

- Rosemount Network Configuration web page (recommended)
- Configuration switches on the device
- Ethernet Config Tool
- System file *ethcfg.cfg* on the device

Rosemount web page

The *Network Configuration* page, in the Rosemount web pages, allows setting of the IP address, gateway address, and subnet address. Connecting to the Ethernet module using a crossover cable and the default IP address allows setting all three parameters. The changes take effect at the next connection.

Configuration switches
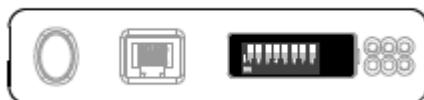
If the configuration switches on the Ethernet module are set to any non-zero value, the device is locked to the following network settings:

Table 3-1 Network settings, locked

Parameter	Value
IP address	192.168.0.*x* where *x* is determined by the switches

Table 3-1 Network settings, locked

Parameter	Value
Gateway	192.168.0.255
Subnet	255.255.255.0
DHCP	OFF

To set the IP address, see the following table.

Table 3-2 Network settings using switches

Switch								IP address
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	192.168.0.1
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	192.168.0.2
OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	192.168.0.3
ON	ON	ON	ON	ON	ON	ON	OFF	192.168.0.254
ON	ON	ON	ON	ON	ON	ON	ON	Invalid

Ethernet Config Tool

See the Anybus® Communicator™ manual for instructions.

Important
If you change the network settings using the Ethernet Config Tool, you will not be able to use the Rosemount web pages to change network settings in the future. All future changes to network settings must be performed using the Ethernet Config Tool.

ethcfg.cfg file

To set the network settings using the *ethcfg.cfg* file:

1.   Set all configuration switches on the device to OFF.

2.   Make a connection to the device from the Ethernet Config Tool and disable **TCP/IP Settings** (Fieldbus parameter section). Alternatively, you can access the TCP/IP parameters using the TCP/IP Interface Object.

3.   From the FTP server, access and edit *ethcfg.cfg* as desired.

In this scenario, if no *ethcfg.cfg* file is found, the Ethernet module will attempt to retrieve the settings via DHCP for 30 seconds. If the attempt fails, the Ethernet module will halt and indicate an error via the LEDs.

See the Anybus Communicator manual for more information.

3.1.1   IP access control

You can limit the set of IP addresses that are allowed to connect to the Ethernet module. This information is stored in the system file *\ip_accs.cfg*.

Sample file:

```
[Web]
xxx.xxx.xxx.xxx    (All nodes listed can access the EtherNet/IP Module
web                        server)
...
[FTP]
xxx.xxx.xxx.xxx    (All nodes listed can access the EtherNet/IP Module
FTP                        server)
...
[EtherNet/IP]
xxx.xxx.xxx.xxx    (All nodes listed can access the EtherNet/IP Module
via                        EtherNet/IP)
...
[All]
xxx.xxx.xxx.xxx    (Fallback setting; used when one or more of the
above                        keys is omitted)
...
```

3.2   Modbus® serial network settings

The required parameters for the Modbus serial network for use with the Ethernet module are listed in the following table.

Note
The Rosemount 8732EM Modbus® Transmitter default parameters for Modbus serial network communication are different than those listed below. Transmitter configuration may be required to match the parameters in Table 3-3.

Table 3-3 Required parameters for Modbus serial network

Parameter	Required setting
Baud	38400
Float byte sequence order	0-1-2-3
Data bits	8 (Modbus RTU)
Parity	None
Physical layer	RS485
Start bits	1
Stop bits[1]	2

1.   For baud rates of 38400 and above, 2 stop bits are required.

These must match the RS-485 parameters configured in the transmitter. To change them in the Ethernet module, you must use the Ethernet Config Tool. See the Anybus Communicator manual for more information.

Section 4   Rosemount™ Web Server

4.1   Overview

The configuration and administration functions of the Rosemount 8732EM EtherNet/IP™ Module are implemented as web pages on the device. Users use their web browsers to connect to the web server. They are automatically directed to the Rosemount web pages.

4.2   General access information

4.2.1   Ports

The web server communicates through port 80.

4.2.2   Users

Two users are predefined for the Rosemount web pages. You can change the passwords, but you cannot add or delete users.

Username	Default password	Description
admin	admin	Complete access to all functions on the Rosemount web pages
operator	operator	Read-only access to the Rosemount web pages

4.3   Rosemount web pages

When the user connects to the Ethernet module, he is prompted for a user name and password, then taken to the Ethernet module home page.

4.3.1   Home page

Figure 4-2. EtherNet/IP Module Home Page
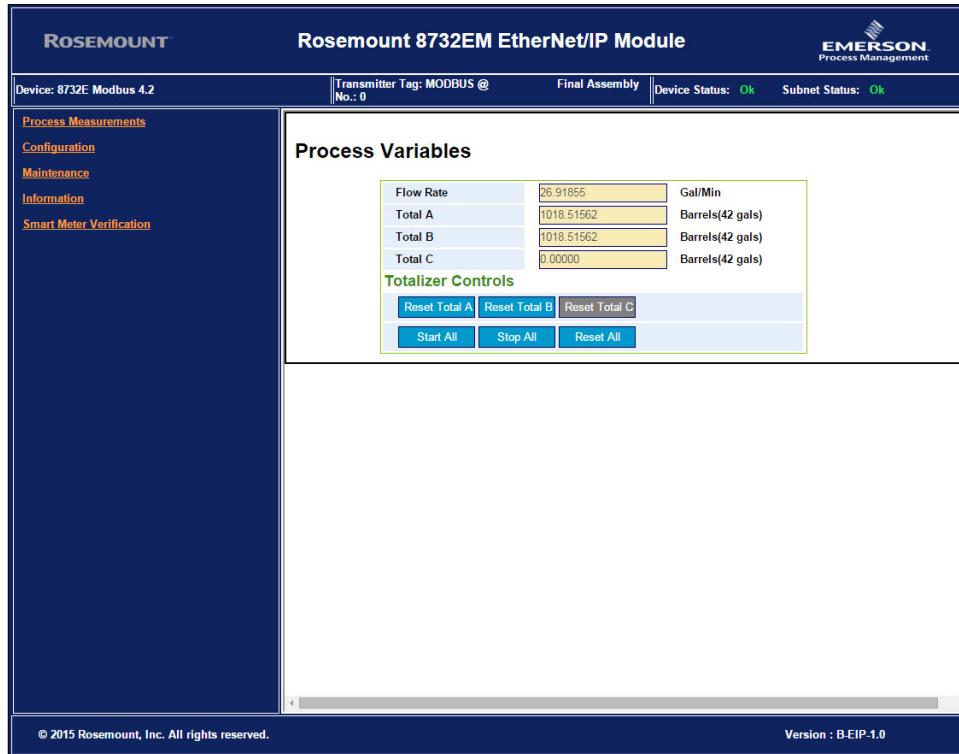
On this page, current data for the most commonly used process variables is displayed. Tabs provide access to other web pages:

- Administration page: Allows the admin user to change passwords and perform downloads from the Ethernet module (the EDS file).

- Network Configuration page: Allows the user to view or configure Ethernet module network settings

- All other pages: Various transmitter tasks, including viewing process data, configuration, calibration, stopping and starting totalizers, and Smart Meter Verification. For more information about any of these tasks, see your transmitter's configuration manual.

Note
If the Ethernet module loses communication with the Rosemount device, all process variables are shown as 0.0f. Also, an explicit read to 0xB0-0x01-0x1D returns a value of 0.

Section 5 Troubleshooting

5.1 LED display indicators

LED display number/name			Status	Meaning
Ethernet	1	Module Status	Off	No power applied to the module.
			Solid green	The module is operating correctly.
			Flashing green	Standby; the module has not been initialized.
			Flashing red	Minor fault. The module may or may not be able to recover.
			Solid red	Major fault. No recovery is possible. The module must be returned to Rosemount™ for repair. See the manual for the return policy.
			Flashing green/red	Self-test
	2	Network Status	Off	The module has no power or no IP address has been assigned.
			Solid green	The module has at least one established Ethernet connection.
			Flashing green	There are no Ethernet connections established to the module.
			Flashing red	One or more of the connections to this module has timed out.
			Solid red	The module has detected that its IP address is already in use.
			Flashing green/red	Self-test
N/A	3	Link	Off	The module does not sense a link.
			Solid Green	The module is connected to an Ethernet network.
N/A	4	Activity	Flashing green	Packet is received or transmitted.

LED display number/name			Status	Meaning
Modbus Serial	5	Subnet Status	Off	Power off.
			Flashing green	Running correctly, but one or more transaction errors has occurred.
			Solid Green	Running.
			Solid Red	Transaction error/timeout or network stopped. Check the Modbus serial network wiring and configuration, especially the baud.
			Flashing red	Missed transactions.
	6	Device Status	Off	Power off.
			Flashing red/green	Configuration missing or invalid.
			Solid Red	Contact Rosemount customer service.
			Flashing red	Contact Rosemount customer service.
			Solid Green	Initializing
			Flashing green	Configuration OK.

5.2 Common problems

Symptom	Resolution
Problem during configuration upload/download.	Serial communication failed. Try again.
The Config Line LED turns red in the Ethernet Config Tool.	Serial communication failed. Try again.
The serial port seems to be available, but it is not possible to connect to the Ethernet module.	• The serial port may be in use by another application. Exit the Ethernet module Configuration Tool and close all other applications, including the ones in the system tray. Try again. • Select another serial port. Try again.
Poor performance	• In the Ethernet Config Tool, right-click Sub-Network in the Navigation window and select Sub-Network Status to see status / diagnostic information about the Moldbus serial network. If the Ethernet module reports a large number of re-transmissions, check your cabling and/or try a lower baud rate setting for the Modbus serial network (if possible). • Is the Sub-Net Monitor in the Ethernet Config Tool active? The sub-network monitor has a negative influence on the overall performance of the gateway, and should be used only when necessary. • Is the Node Monitor in the Ethernet Config Tool active? The node monitor has a negative influence on the overall performance of the gateway, and should be used only when necessary.
No Modbus serial network functionality	• Use the Data logger functionality of the Ethernet Config Tool to record the serial data communication on the sub-network. • If no data is being transmitted, use the Ethernet Config Tool to check the configuration. • If no data is being received, check the cables and connections. Also verify that the transmitted data is correct.
Process variables displayed or reported as 0	• Verify the Modbus connection between the Ethernet module and the device.

5.3 Customer Service

Location		Telephone number
U.S.A.		800-522-6277 (toll free)
Canada and Latin America		+1 303-527-5200 (U.S.A.)
Asia	Japan	3 5769-6803
	All other locations	+65 6777-8211 (Singapore)
Europe	U.K.	0870 240 1978 (toll-free)
	All other locations	+31 (0) 318 495 555 (The Netherlands)
Email: flow.support@emerson.com		

5.4 Return policy

5.4.1 Requirements

Emerson Process Management procedures must be followed when returning equipment. These procedures ensure legal compliance with government transportation agencies and help provide a safe working environment for Emerson employees. Failure to follow Emerson Process Management procedures will result in your equipment being refused delivery.

Information on return procedures and forms is available from the Rosemount Customer Service department.

5.4.2 New and unused equipment

Only equipment that has not been removed from the original shipping package will be considered new and unused. New and unused equipment requires a completed Return Materials Authorization form.

5.4.3 Used equipment

To expedite the return process outside the United States, contact the nearest Rosemount representative. Within the United States and Canada, call the North American Response Center using the 800-654-RSMT (7768) toll-free number. The Response Center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product, model, and serial numbers and will provide a Return Material Authorization (RMA) number. The center will also ask for the name of the process material to which the product was last exposed.

Mishandling products exposed to a hazardous substance may result in death or serious injury. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods. The North American Response Center will detail the additional information and procedures necessary to return goods exposed to hazardous substances.

Appendix A   Connector Pin Assignments

A.1   Ethernet connector

Pin	Signal
Housing	**Cable shield**
1	TD+
2	TD–
3	RD+
4	NC
5	NC
6	RD–
7	NC
8	NC
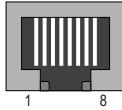
A.2   Power connector

Pin	Description
1	+24 VDC
2	Ground

■   Use 60/75 or 75 x C copper (CU) wire only.

■   The terminal tightening torque must be between 5 and 7 lbs-in (0.5 to 0.8 Nm).

A.3 Ethernet Config Tool connection

A.3.1 Configuration cable
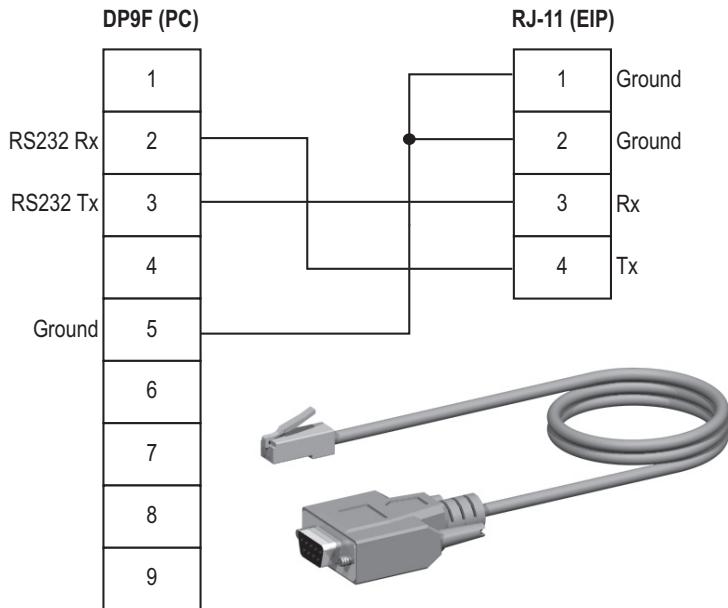
A.3.2 RJ-11 (EtherNet/IP™ Module)

Pin	Description
1	Ground
2	Ground
3	RS-232 Rx (Input)
4	RS-232 Tx (Output)
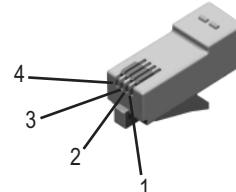
A.3.3 DBF9 (PC)

Pin	Description
1	Unused
2	RS-232 Rx (Input)
3	RS-232 Tx (Output)
4	Unused
5	Signal ground
6–9	Unused
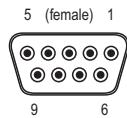
A.4 Modbus® serial network interface

The Modbus serial network is based on an RS-485 physical layer.

A.4.1 Bias resistors

When idle, RS-485 enters an indeterminate state, which may cause the serial receivers to pick up noise from the serial lines and interpret this as data. To prevent this, the serial lines should be forced into a known state using pull-up and pull-down resistors, commonly known as bias resistors.

The bias resistors forms a voltage divider, forcing the voltage between the differential pair to be higher than the threshold for the serial receivers, typically >200 mV. Note that bias resistors shall only be installed on one node. Installing bias resistors on several nodes may compromise the signal quality on the network and cause transmission problems.

A.4.2 Termination

To avoid reflections on the serial lines, it is important to properly terminate the sub-network by placing termination resistors between the serial receivers near the end nodes.

Additionally, if the distance from the Ethernet module to the transmitter is greater than 100 feet, Rosemount™ recommends adding the termination resistors.

The resistor value should ideally match the characteristic impedance of the cable, typically 100 to 120 ohms.

A.4.3 Pin assignments (EtherNet/IP Module)

Pin	Description
1	Unused
2	Unused
3	Unused
4	Unused
5	Ground
6	Unused
7	Unused
8	RS-485/A (Tx+)
9	RS-485/B (Tx−)
(housing)	Cable shield
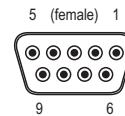
A.5 Typical connection
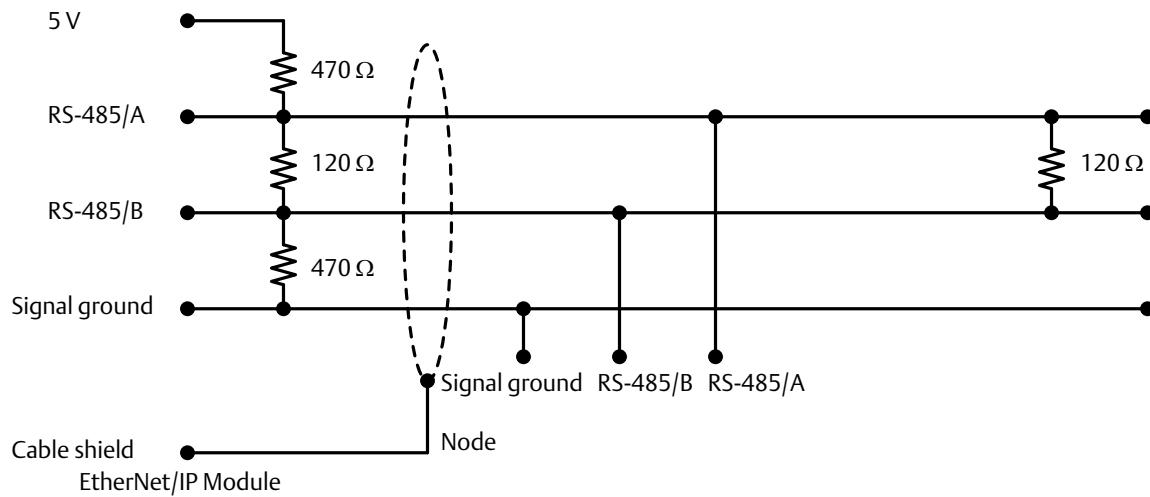
Appendix B   Device Profile

B.1   Object classes

Table B-1 lists and describes all object classes supported by the Ethernet module.

Table B-1. Object Classes and Descriptions

Object	Class ID	Optional/ required	Description
Identity	0x01	Required	Contains information that uniquely describes the device
Message Router	0x02	Required	Tracks the accessibility of the object classes and instances
Assembly	0x04	Required	Contains a list of attributes that data can be written to (sink) or read from (source)
Port	0xF4	Required	
TCP/IP Interface	0xF5	Required	Groups settings related to TCP/IP.
Ethernet Link	0xF6	Required	Groups diagnostic information for the Ethernet interface
Diagnostic	0xAA	Optional	Groups diagnostic information for the fieldbus interface
Parameter Data Input Mapping	0xBO	Optional	Used for acyclic access to input data
Parameter Data Output Mapping	0xB1	Optional	Used for acyclic acces to output data

B.2   Object details

B.2.1   Identity Object, Class 01h

This object provides identification of and general information about the device. It contains informational attributes that uniquely describe the device.

Example: The use of attributes Vendor ID, Device Type, Product Code, and Serial Number together uniquely identify this device.

Supported services

Class services:

- Get Attribute All
- Get Attribute Single

Instance services:

- Get Attribute All
- Get Attribute Single
- Reset

Class attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Revision 1

Instance attributes

#	Access	Name	Type	Value	Description
1	Get	Vendor ID	UINT	Default: 0392h	Rosemount Inc
2	Get	Device Type	UINT	Default: 000Ch	Communication Adapter
3	Get	Product Code	UINT	Default: 0002h	2 = 8732EM EtherNet/IP™ Module
4	Get	Revision	Struct of:		
			USINT		Major fieldbus version
			USINT		Minor fieldbus version
5	Get	Status	WORD		Device status; see following table
6	Get	Serial Number	UDINT	Serial number	(set at production)
7	Get	Product Name	SHORT_STRING	"8732EM EtherNet/IP Module"	Name of product

Device status

Bit(s)	Name		
0	Module Owned		
1	(reserved)		
2	Configured		
3	(reserved)		
4... 7	Extended Device Status:		
	Value:	Meaning:	
	0000b	Unknown	
	0010b	Faulted I/O Connection	
	0011b	No I/O connection established	
	0100b	Non-volatile configuration bad	
	0110b	Connection in Run mode	
	0111b	Connection in Idle mode	
	(other)	(reserved)	
8	Set for minor recoverable faults		
9	Set for minor unrecoverable faults		
10	Set for major recoverable faults		
11	Set for major unrecoverable faults		
12... 15	(reserved)		

Reset service

When the Identity Object receives a Reset request, it:

■ Determines if it can provide the type of reset requested

■ Responds to the request

■ Attempts to perform the type of reset requested

B.2.2 Message Router, Class 02h

The Message Router Object provides a messaging connection point through which a Client may address a service to any object class or instance residing in the physical device.

B.2.3 Assembly Object, Class 04h

The Assembly Object binds attributes of multiple objects, which allows data to or from each object to be sent or received over a single connection. Assembly objects can be used to bind input data or output data. The terms "input" and "output" are defined from the network's point of view. An input produces data on the network and an output consumes data from the network.

This object provides access to the I/O Data in the Input and Output Data areas in the Ethernet module.

Supported services

Class services:

■ Get Attribute Single

Instance services:

■ Get Attribute Single

■ Set Attribute Single

Class attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0002h	Revision 2
2	Get	Max Instance	UINT	-	The highest initiated instance number

Instance attributes - Instance/Connection Point 64h

This instance corresponds to I/O Data (Input) in the Rosemount™ 8732EM EtherNet/IP Module. The Ethernet module supports two different configurations. Specific input assembly attributes depend on the configuration in use.

Configuration	Input assembly attributes
Basic	See Section B.3.1

Note
The default input data size is non-zero. The actual size depends on the configuration in use. If the I/O input data size is set to 0, this instance will NOT be initialized.

#	Access	Name	Type	Value	Description
3	Get	Data	Array of BYTE	-	Data produced by the Ethernet module

Instance attributes - Instance/Connection Point 96h

This instance corresponds to I/O Data (Output) in the Ethernet module. The Ethernet module supports two different configurations. Specific input assembly attributes depend on the configuration in use.

Configuration	Output assembly attributes
Basic	See Section B.3.2

Note
The default output data size is non-zero. The actual size depends on the configuration in use. If the I/O output data size is set to 0, this instance will NOT be initialized.

#	Access	Name	Type	Value	Description
3	Set	Data	Array of BYTE	-	Data consumed by the Ethernet module

Note
Rockwell Automation PLCs have the first four bytes consumed by a device defined as status information. This behavior is specific to devices from Rockwell Automation and is not defined in the Ethernet specification. However, since all known PLCs are implemented this way, the Ethernet module adopts this behavior and strips off the corresponding four bytes from the consumed data.

B.2.4 Port Object, Class F4h

Supported services

Class services:

- Get Attribute Single
- Get Attribute All

Instance services:

- Get Attribute Single
- Get Attribute All

Class attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Revision 1
2	Get	Max Instance	UINT	0002h	2 is the highest instance number
3	Get	No. of instances	UINT	0001h	1 instance is implemented
8	Get	Entry Port	UINT	0002h	Returns the instance of the Port object that describes the port.
9	Get	All Ports	Array of STRUCT	0000h 0000h	Array of structure containing attributes 1 and 2 from each instance. Instance 1 is at byte offset 4. Instance 2 is at byte offset 8, etc. The 4 bytes at offset 0 shall be 0. (Default)
			{UINT; UINT;}	0000h 0000h	
				0004h 0002h	

Instance attributes, Instance 02h

#	Access	Name	Type	Value	Comments
1	Get	Port Type	UINT	0000h	TCP/IP
2	Get	Port Number	UINT	0002h	Port 2
3	Get	Port Object	Struct of:		
		Path Size	UINT	0002h	-
		Path	Padded EPATH	20 F5 24 01h	TCP class, Instance 1
4	Get	Port Name	SHORT_STRING	"TCP/IP"	Name of port
8	Get	Node Address	Padded EPATH	-	-

B.2.5   TCP/IP Interface Object, Class F5h

This object groups TCP/IP-related settings.

Supported services

Class services:

- Get Attribute All
- Get Attribute Single

Instance services:

- Get Attribute All
- Get Attribute Single
- Set Attribute Single

Class attributes

#	Access	Name	Type	Value	Comments
1	Get	Revision	UINT	0001h	Revision 1
2	Get	Max Instance	UINT	0001h	1 is the highest instance number
3	Get	No. of instances	UINT	0001h	1 instance is implemented

Instance attributes

#	Access	Name	Type	Value	Comments
1	Get	Status	DWORD	00000001h	Attribute #5 contains valid information.
2	Get	Configuration Capability	DWORD	00000016h	Attribute #5 is settable. Capable of obtaining network configuration via DHCP.
3	Get/Set	Configuration Control	DWORD		0: Configuration from non-volatile memory 2: Configuration from DHCP

#	Access	Name	Type	Value	Comments
4	Get	Port Object	Struct of:		
		Path Size	UINT	0002h	2 words
		Path	Padded EPATH	20 F6 24 01h	Path to Ethernet Class, Instance 1
5	Get/Set	Interface Configuration	Struct of:		
		IP Address	UDINT		IP address
		Subnet Mask	UDINT		Subnet mask
		Gateway Address	UDINT		Gateway Address
		Name Server 1	UDINT		Primary DNS
		Name Server 2	UDINT		Secondary DNS
		Domain Name	STRING		Default domain name
6	Get/Set	Host Name	STRING		Host name

B.2.6   Ethernet Link Object, Class F6h

This object groups diagnostic information for the Ethernet interface.

Supported services

Class services:

- Get Attribute All
- Get Attribute Single

Instance services:

- Get Attribute All
- Get Attribute Single

Class attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Revision 1
2	Get	Max Instance	UINT	0001h	1 is the highest instance number
3	Get	No. of instances	UINT	0001h	1 instance is implemented

Instance attributes

#	Access	Name	Type	Value	Comments
1	Get	Interface Speed	UDINT	10 or 100	Actual Ethernet interface speed
2	Get	Interface Flags	DWORD		
3	Get	Physical Address	Array of 6 USINTS	(MAC ID)	Physical network address

B.2.7   Diagnostic Object, Class AAh

This object groups diagnostic information for the fieldbus interface.

Supported services

Class services:

■   Get Attribute All

Instance services:

■   Get Attribute Single

Class attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Revision 1

Instance attributes

#	Access	Name	Type	Description
01h	Get	Module serial number	UDINT	Serial number
02h	Get	Vendor ID	UINT	Manufacturer Vendor ID
03h	Get	Fieldbus Type	UINT	Fieldbus Type
04h	Get	Module Software version	UINT	Module software version
0Ah	Get	Module Type	UINT	Module Type
0Fh	Get	IN cyclic I/O length	UINT	Size of I/O Input area (in bytes)
11h	Get	IN total length	UINT	Total number of IN bytes supported
12h	Get	OUT cyclic I/O length	UINT	Size of I/O Output area (in bytes)
14h	Get	OUT total length	UINT	Total number of OUT bytes supported

B.2.8   Parameter Data Input Mapping Object, Class B0h

This object can be used to access Input Data acyclically, and is set up dynamically based on the Parameter Data Mailbox initialization (see Section B.3.3).

Supported services

Class services:

■   Get Attribute All

Instance services:

■   Get Attribute Single

Class attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Revision 1

Instance attributes, Instance 01h

Each attribute corresponds to a block of Input Data.

#	Access	Name	Type	Description
01h	Get	Data	Array of USINT	Mapped block of Input Data
02h	Get	Data	Array of USINT	Mapped block of Input Data
...				
32h	Get	Data	Array of USINT	Mapped block of Input Data

The specific parameters in the block depend on the configuration in use.

Configuration	Input parameters (explicit data)
Basic	See Section B.3.3

B.2.9 Parameter Data Output Mapping Object, Class B1h

This object can be used to access Output Data acyclically, and is set up dynamically (see Section B.3.4).

Supported services

Class services:

- Get Attribute All

Instance services:

- Get Attribute Single
- Set Attribute Single

Class attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Revision 1

Instance attributes, Instance 01h

#	Access	Name	Type	Description
01h	Get/Set	Data	Array of USINT	Mapped block of Output Data
02h	Get/Set	Data	Array of USINT	Mapped block of Output Data
...				
32h	Get/Set	Data	Array of USINT	Mapped block of Output Data

The specific parameters in the block depend on the configuration in use.

Configuration	Output parameters (explicit data)
Basic	See Section B.3.4

B.3   I/O data

B.3.1   Input assembly

Bytes	Access	Name	Type	Notes
0-3	Get	Flow Rate	Float	
4–7	Get	Total A	Float	$0–2^{35}$
8–11	Get	Total B	Float	$0–2^{35}$
12–15	Get	Total C	Float	$0–2^{35}$
16-19	Get	Electronics Temperature	Float	
20-23	Get	Line Noise	Float	
24-27	Get	5 Hz SNR	Float	
28-31	Get	37 Hz SNR	Float	
32-35	Get	Signal Power	Float	
36-39	Get	Empty Pipe Value	Float	
40-43	Get	Electrode Coating Value	Float	
44-47	Get	Internal Flow Simulator Test Deviation (Continuous)	Float	
48-51	Get	Electrode Resistance Value (Continuous)	Float	
52-55	Get	Coil Resistance Value (Continuous)	Float	
56-59	Get	Coil Inductance Value (Continuous)	Float	
60-63	Get	Coil Inductance Deviation (Continuous)	Float	
64-67	Get	Pulse Output	Float	0-11000
68-71	Get	Internal Flow Simulator Value (SMART™ Meter Verification) (Do not use)	Float	
72-75	Get	Coil Current	Float	
76-77	Get	Status Register0	U16	Table B-37
78-79	Get	Status Register1	U16	Table B-38
80-81	Get	Status Register2	U16	Table B-39
82-83	Get	Status Register3	U16	

B.3.2   Output assembly

Bytes	Access	Name	Type	Notes
0	Get/Set	Start/Stop All Totals	Byte	0: Stop 1: Start
1	Get/Set	Reset All Totals	Byte	0: No Action 1: Reset
2	Get/Set	Reset Total A	Byte	0: No Action 1: Reset
3	Get/Set	Reset Total B	Byte	0: No Action 1: Reset
4	Get/Set	Reset Total C	Byte	0: No Action 1: Reset

B.3.3   Input parameters—explicit data

To update any of these attribute values, the associated trigger byte must be toggled before reading the attribute value (executing the Get service). See Section B.3.4 for more information on trigger bytes.

For all input parameters in Table B-2, the class is B0h and the instance is 01h.

Table B-2. Input Parameters—Explicit Data

Attribute	Access	Name	Type	Trigger byte write attribute	Description
01h	Get	Software Revision	U16	110h	
02h	Get	Internal Flow Simulator Test Deviation (Continuous) UOM	U8	111h	57: %
	Get	Coil Inductance Deviation (Continuous) UOM	U8		57: %
	Get	Coil Inductance Value (Continuous) UOM	U8		245: mH
	Get	Coil Resistance Value (Continuous) UOM	U8		37: Ohms
	Get	Electrode Resistance Value (Continuous) UOM	U8		163: kOhms
	Get	Electrode Coating Value UOM	U8		163: kOhms
	Get	Empty Pipe Value UOM	U8		251: None
	Get	Electronics Temperature UOM	U8		32: Degrees C 33: Degrees F
	Get	Density Unit	U8		92: kgs/m^3 94: lbs/ft^3
	Get	Meter Verification Result	U8		Table B-10
	Get	Sensor Calibration Test Result	U8		Table B-10
	Get	Coil Circuit Test Result	U8		Table B-10
	Get	Electrode Circuit Test Result	U8		Table B-10
	Get	Calibration Test Result	U8		Table B-10
	Get	Test Limit	U8		1-10 0: Equivalent to not run
	Get	Test Condition	U8		Table B-11
	Get	Pulse Scaling UOM	U8		0.0001 - 3,401,574.912

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
03h	Get	Flow Rate UOM	U8	112h	Table B-12
	Get/Set	Total A UOM	U8		Table B-13
	Get/Set	Total B UOM	U8		Table B-13
	Get/Set	Total C UOM	U8		Table B-13
	Get/Set	Line Size	U8		Table B-14
	Get	Electrode Material	U8		Table B-15
	Get	Electrode Type	U8		Table B-16
	Get/Set	Transmitter Tag	A8		8 Packed ASCII Characters
	Get	Flange Material	U8		Table B-17
	Get	Flange Type	U8		Table B-18
	Get	Liner Material	U8		Table B-19
	Get	Base Time Unit	U8		Table B-20
	Get	Base Volume Unit	U8		Table B-13
	Get	Coil Drive Frequency	U8		0: 5Hz 1: 37.5Hz
	Get	Digital Signal Processing Control	U8		0: Off 1: On
	Get	Operating Mode	U16		0: Normal 1: Filter
	Get	Samples	U8		1 - 125
	Get	Flow Display	U8		0: Flow, TotalizerA 1: Flow, TotalizerB 2: Flow, TotalizerC

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
04h	Get	Language	U8	113h	Table B-23
	Get	Display Lock	U8		0: Off 1: On
	Get	Pulse Mode	U8		0: Pulse Output 1: Frequency Output
	Get/Set	Counts	U8		2-50
	Get	Empty Pipe Limit	U8		1-10 Lowpower: 3-10
	Get	Flowing Limit	U8		1-10 Lowpower: 3-10
	Get	No Flow Limit	U8		1-10 Lowpower: 3-10
	Get	Continuous Limit	U8		2-10 Lowpower: 3-10
	Get	Discreet I/O direction control	U8		1: Input 2: Output 251: Not Available
	Get	DI/DO Input Mode	U8		Table B-24
	Get	DI/DO Output Mode1	U8		Table B-25

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
05h	Get	DI/DO Output Mode2	U8	114h	Table B-25
	Get	Status Mode 1	U8		Table B-26
	Get	Status Mode 2	U8		Table B-26
	Get	Limit Mode (Totalizer A Limit)	U8		Table B-26
	Get/Set	Reset Option (Totalizer A)	U8		0: Not Allowed 1: Allowed
	Get/Set	Direction (Totalizer A)	U8		0: Net 1: Forward 2: Reverse
	Get/Set	Reset Option (Totalizer B)	U8		0: Not Allowed 1: Allowed
	Get/Set	Direction (Totalizer B)	U8		0: Net 1: Forward 2: Reverse
	Get/Set	Reset Option (Totalizer C)	U8		0: Not Allowed 1: Allowed
	Get/Set	Direction (Totalizer C)	U8		0: Net 1: Forward 2: Reverse
	Get	Select sensor components to baseline	U8		Table B-27
	Get	Select system components to verify	U8		Table B-28
	Get	Select test condition of the process test condition	U8		Table B-11
	Get/Set	Address	U8		1-247
	Get/Set	Float Point Order	U8		Table B-29
	Get/Set	Minimum Response Delay	U8		0-250
06h	Get	Baud Rate	U8	115h	Table B-30
	Get	Parity	U8		0: No parity 1: Odd 2: Even
	Get	Stop Bits	U8		1: 1 stop bit 2: 2 stop bits
07h	Get	Auto Lock	U8	116h	0: Off 1: 1 Minute 2: 10 Minute
	Get	Transmitter Model	U8		60: 8732E Modbus
	Get	Manufacturer	U8		38: Rosemount Flow
	Get	Backlight	U8		Table B-31

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
08h	Get	Device ID	U32	117h	0X000000 - 0XFFFFFF
	Get	Sensor Serial Number	U32		0- 9,999,999 1: Demo Mode
	Get	Final Assembly Number	U32		0X000000 - 0XFFFFFF
	Get/Set	License Key	U32		
09h	Get	Lower Sensor Limit	F32	118h	-39.37 ft/s
	Get	Upper Sensor Limit	F32		39.37 ft/s
	Get	Primary Variable Minimum Span (Do not use)	F32		
	Get	Simulated Velocity	F32		
	Get	Actual Velocity	F32		
	Get	Transmitter Deviation	F32		
	Get	Sensor Deviation	F32		
	Get	Measured Coil Inductance	F32		
	Get	Measured Coil Resistance	F32		
	Get	Measured Electrode Resistance	F32		
0Ah	Get	Coil Inductance Baseline	F32	119h	0.5 - 20,000
	Get	Coil Resistance Baseline	F32		0.5 - 1000.0
	Get	Electrode Resistance Baseline	F32		0.1 - 5,000,000

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
0Bh	Get/Set	Flow Damping; Damping	F32	11Ah	0–256.0
	Get/Set	Conversion Number	F32		0–9,999,999
	Get/Set	Low Flow Cutoff	F32		0.01–38.37
	Get/Set	Pulse Scaling	F32		0.0001–3,401,574.912-ft
	Get/Set	Pulse Width	F32		.1 – 650.0
	Get/Set	Enter Flow Rate	F32		0.0 ft/s 1.0 - 39.37008 ft/s
	Get/Set	Density Value	F32		0.01–900 lbs/ft^3
	Get/Set	Trigger Level	F32		3–2000
	Get/Set	High Limit 1	F32		
	Get/Set	Low Limit 1	F32		
	Get/Set	High Limit 2	F32		
	Get/Set	Low Limit 2	F32		
	Get/Set	Flow Hysteresis	F32		
	Get/Set	Hight Limit (Totalizer Limit)	F32		-1,999,999,999 – 1,999,999,999 feet
	Get/Set	Low Limit (Totalizer Limit)	F32		-1,999,999,999 – 1,999,999,999 feet
	Get/Set	Totalizer Hysteresis	F32		0–1,999,999,999 feet
	Get/Set	Coating Level Limit 1	F32		0.0–100,000
	Get/Set	Coating Level Limit 2	F32		0.0–100,000
0Ch	Get/Set	Fixed pulse output value	F32	11Bh	0: Off 1–11000Hz
	Get/Set	Signal processing Percent of Rate	F32		0–100.0
	Get/Set	Signal processing Time Limit	F32		0.6–256.0
0Dh	Get/Set	Special Flow Rate Unit	A4	11Ch	4 Packed ASCII Characters
	Get/Set	Special Volume Unit	A4		4 Packed ASCII Characters
	Get/Set	Calibration Number	A16		Table B-32
0Eh	Get	Message	A32	11Dh	32 Packed ASCII Characters
	Get	Sensor Tag; Sensor Tag	A8		8 Packed ASCII Characters
	Get	Descriptor	A16		16 Packed ASCII Characters

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
0Fh	Get	Write Protect	U8	11Eh	Bit0: Write Protect
	Get	Update In Progress(Do not use)	U8		
	Get	Process Noise	U8		Table B-33
	Get	Line Noise	U8		Table B-33
	Get	Discrete I/O	U8		Table B-33
	Get	Meter Verification	U8		Table B-33
	Get	Electrode Coating	U8		Table B-33

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
10h	Get/Set	Reset All	U8	11Fh	0: Cancel 1: Reset
	Get/Set	Reset Total A	U8		0: Cancel 1: Reset
	Get/Set	Reset Total B	U8		0: Cancel 1: Reset
	Get/Set	Reset Total C	U8		0: Cancel 1: Reset
	Get/Set	Status Alert (Totalizer A Limit)	U8		0: Off 1: On
	Get/Set	Self Test	U8		0: Uninitialized/No test 1: Self test activate
	Get/Set	Start Digital Trim	U8		0: Inactive 1: Start/active
	Get/Set	Perform Auto Zero	U8		0: Inactive 1: Start/active
	Get/Set	Start Universal Trim	U8		0: Inactive 1: Start/active
	Get/Set	Start Meter Verification	U8		0: Inactive 1: Start/active
	Get/Set	Re-Baseline Sensor	U8		0: Inactive 1: Start/active
	Get/Set	Recall Last Baseline	U8		0: Inactive 1: Recall/active
	Get/Set	Reset Maximum Coating Resistance Value	U8		0: Inactive 1: Start/active
	Get/Set	Perform Master Reset	U8		0: Inactive 1: Recall/active
	Get/Set	Empty Pipe Detection	U8		Table B-34
	Get/Set	High Process Noise Detection	U8		Table B-34
	Get/Set	Grounding / Wiring Fault Detection	U8		Table B-34
	Get/Set	Electronics Temperature Range Detection	U8		Table B-34
	Get/Set	Electrode Coating Detection	U8		Table B-34
	Get/Set	Coils (Continuous Meter Verification)	U8		Table B-33
	Get/Set	Electrodes (Continuous Meter Verification)	U8		Table B-33
	Get/Set	Transmitter (Continuous Meter Verification)	U8		Table B-33

Table B-2. Input Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Trigger byte write attribute	Description
11h	Get	Electronics Failure	U8	120h	Table B-36
	Get	Coil Open Circuit	U8		Table B-36
	Get	Empty Pipe	U8		Table B-36
	Get	Reverse Flow	U8		Table B-36
	Get	Grounding / Wiring Fault	U8		Table B-36
	Get	High Process Noise	U8		Table B-36
	Get	Electronics Temperature Out of Range	U8		Table B-36
	Get	Electrode Coating Limit 1	U8		Table B-36
	Get	Electrode Coating Limit 2	U8		Table B-36
	Get	Continuous Meter Verification	U8		Table B-36
	Get	Coil Overcurrent Detected	U8		Table B-36
	Get	Sensor Electrode Saturated	U8		Table B-36
	Get	Coil Power Limit Exceeded	U8		Table B-36
	Get	Write Protect Start/Stop	U8		0: Disable 1: Enable
	Get	Write Protect Reset	U8		0: Disable 1: Enable
	Get	Start/Stop from the LOI	U8		0: Not Allowed 1: Allowed
	Get	Reset from the LOI	U8		0: Not Allowed 1: Allowed
12h	Get/Set	Status Alert 1	U8	121h	0: Off 1: On
	Get/Set	Status Alert 2	U8		0: Off 1: On
	Get/Set	Reverse Flow Mode	U8		0: Disable 1: Enable

B.3.4   Output parameters—explicit data

For all output parameters in the following table, the class is B1h and the instance is 01h.

Table B-3. Output Parameters—Explicit Data

Attribute	Access	Name	Type	Description
01h	Get/Set	Language	U8	Table B-23
	Get/Set	Display Lock	U8	0: Off 1: On
	Get/Set	Pulse Mode	U8	0: Pulse Output 1: Frequency Output
	Get/Set	Counts	U8	2-50
	Get/Set	Empty Pipe Limit	U8	1-10 Lowpower: 3-10
	Get/Set	Flowing Limit	U8	1-10 Lowpower: 3-10
	Get/Set	No Flow Limit	U8	1-10 Lowpower: 3-10
	Get/Set	Continuous Limit	U8	2-10 Lowpower: 3-10

Table B-3. Output Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Description
02h	Get/Set	Status Mode 1	U8	Table B-26
	Get/Set	Status Mode 2	U8	Table B-26
	Get/Set	Limit Mode (Totalizer A Limit)	U8	Table B-26
	Get/Set	Reset Option (Totalizer A)	U8	0: Not Allowed 1: Allowed
	Get/Set	Direction (Totalizer A)	U8	0: Net 1: Forward 2: Reverse
	Get/Set	Reset Option (Totalizer B)	U8	0: Not Allowed 1: Allowed
	Get/Set	Direction (Totalizer B)	U8	0: Net 1: Forward 2: Reverse
	Get/Set	Reset Option (Totalizer C)	U8	0: Not Allowed 1: Allowed
	Get/Set	Direction (Totalizer C)	U8	0: Net 1: Forward 2: Reverse
	Get/Set	Select sensor components to baseline	U8	Table B-27
	Get/Set	Select system components to verify	U8	Table B-28
	Get/Set	Select test condition of the process test condition	U8	Table B-11
	Get/Set	Address	U8	1-247
	Get/Set	Float Point Order	U8	Table B-29
	Get/Set	Minimum Response Delay	U8	0-250
03h	Get/Set	License Key	U32	

Table B-3. Output Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Description
04h	Get/Set	Flow Damping; Damping	F32	0 - 256.0
	Get/Set	Conversion Number	F32	0-9,999,999
	Get/Set	Low Flow Cutoff	F32	0.01–38.37
	Get/Set	Pulse Scaling	F32	0.0001–3,401,574.912-ft
	Get/Set	Pulse Width	F32	.1–650.0
	Get/Set	Enter Flow Rate	F32	0.0 ft/s 1.0–39.37008 ft/s
	Get/Set	Density Value	F32	0.01–900 lbs/ft^3
	Get/Set	Trigger Level	F32	3–2000
	Get/Set	High Limit 1	F32	
	Get/Set	Low Limit 1	F32	
	Get/Set	High Limit 2	F32	
	Get/Set	Low Limit 2	F32	
	Get/Set	Flow Hysteresis	F32	
	Get/Set	Hight Limit (Totalizer Limit)	F32	-1,999,999,999– 1,999,999,999 feet
	Get/Set	Low Limit (Totalizer Limit)	F32	-1,999,999,999– 1,999,999,999 feet
	Get/Set	Totalizer Hysteresis	F32	0–1,999,999,999 feet
	Get/Set	Coating Level Limit 1	F32	0.0–100,000
	Get/Set	Coating Level Limit 2	F32	0.0–100,000
05h	Get/Set	Fixed pulse output value	F32	0: Off 1–11000Hz
	Get/Set	Signal processing Percent of Rate	F32	0–100.0
	Get/Set	Signal processing Time Limit	F32	0.6–256.0
06h	Get/Set	Special Flow Rate Unit	A4	4 Packed ASCII Characters
	Get/Set	Special Volume Unit	A4	4 Packed ASCII Characters
	Get/Set	Calibration Number	A16	Table B-32
07h	Get/Set	Reverse Flow Mode	U8	0: Disable 1: Enable
08h	Set	Start All (1), Stop All (0)	U8	
09h	Get/Set	Reset All	U8	0: Cancel 1: Reset
0Ah	Get/Set	Reset Total A	U8	0: Cancel 1: Reset
0Bh	Get/Set	Reset Total B	U8	0: Cancel 1: Reset
0Ch	Get/Set	Reset Total C	U8	0: Cancel 1: Reset

Table B-3. Output Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Description
0Dh	Get/Set	Self Test	U8	0: Uninitialized/No test 1: Self test activate
0Eh	Get/Set	Perform Auto Zero	U8	0: Inactive 1: Start/active
0Fh	Get/Set	Start Meter Verification	U8	0: Inactive 1: Start/active
10h	Get/Set	Re-Baseline Sensor	U8	0: Inactive 1: Start/active
11h	Get/Set	Recall Last Baseline	U8	0: Inactive 1: Recall/active
12h	Get/Set	Perform Master Reset	U8	0: Inactive 1: Recall/active
13h	Get/Set	Empty Pipe Detection	U8	Table B-34
14h	Get/Set	High Process Noise Detection	U8	Table B-34
15h	Get/Set	Grounding / Wiring Fault Detection	U8	Table B-34
16h	Get/Set	Electronics Temperature Range Detection	U8	Table B-34
17h	Get/Set	Electrode Coating Detection	U8	Table B-34
18h	Get/Set	Coils (Continuous Meter Verification)	U8	Table B-35
19h	Get/Set	Electrodes (Continuous Meter Verification)	U8	Table B-35
1Ah	Get/Set	Transmitter (Continuous Meter Verification)	U8	Table B-35
1Bh	Get/Set	Status Alert 1	U8	0: Off 1: On
1Ch	Get/Set	Status Alert 2	U8	0: Off 1: On
1Dh	Get/Set	Status Alert (Totalizer A Limit)	U8	0: Off 1: On
1Eh	Set	Trriger Byte -1	U8	
1Fh	Set	Trriger Byte -2	U8	
20h	Set	Trriger Byte -3	U8	
21h	Set	Trriger Byte -4	U8	
22h	Set	Trriger Byte -5	U8	
23h	Set	Trriger Byte -6	U8	
24h	Set	Trriger Byte -7	U8	
25h	Set	Trriger Byte -8	U8	
26h	Set	Trriger Byte -9	U8	
27h	Set	Trriger Byte -10	U8	
28h	Set	Trriger Byte -11	U8	
29h	Set	Trriger Byte -12	U8	
2Ah	Set	Trriger Byte -13	U8	

Table B-3. Output Parameters—Explicit Data (continued)

Attribute	Access	Name	Type	Description
2Bh	Set	Trriger Byte -14	U8	
2Ch	Set	Trriger Byte -15	U8	
2Dh	Set	Trriger Byte -16	U8	
2Eh	Set	Trriger Byte -17	U8	
2Fh	Set	Trriger Byte -18	U8	
30h	Get	Flow Rate UOM	U8	Table B-12
31h	Get/Set	Total A UOM	U8	Table B-13
	Get/Set	Total B UOM	U8	Table B-13
	Get/Set	Total C UOM	U8	Table B-13
	Get/Set	Line Size	U8	Table B-14
	Get	Electrode Material	U8	Table B-15
	Get	Electrode Type	U8	Table B-16
	Get/Set	Transmitter Tag	A8	8 Packed ASCII Characters
	Get	Flange Material	U8	Table B-17
	Get	Flange Type	U8	Table B-18
	Get	Liner Material	U8	Table B-19
	Get	Base Time Unit	U8	Table B-20
	Get	Base Volume Unit	U8	Table B-13
	Get	Coil Drive Frequency	U8	0: 5Hz 1: 37.5Hz
	Get	Digital Signal Processing Control	U8	0: Off 1: On
	Get	Operating Mode	U16	0: Normal 1: Filter
	Get	Samples	U8	1 - 125
	Get	Flow Display	U8	0: Flow, TotalizerA 1: Flow, TotalizerB 2: Flow, TotalizerC

B.4   Get and Set services

The Get Attribute Single and Set Attribute Single services are used with many objects and attributes. Details of these two services are provided here.

B.4.1   Get Attribute Single service

Table B-4. Get Service Arguments

Parameter name	Data type	Required	Parameter value	Notes
Attribute ID	USINT	Y	The attribute ID of the attribute to be read	No default

B.4.2   Set Attribute Single service

Table B-5. Get Service Response

Return value	Data type
Attribute value	The data type of the returned attribute

Table B-6. Set Service Arguments

Parameter name	Data type	Required	Parameter value	Notes
Attribute ID	USINT	Y	The attribute ID of the attribute to be set	No default
Attribute Value	The data type of the attribute being set	Y	The value to which the attribute will be set	No default

Table B-7. Set Service Response

Return value	Data type
No success response data	

B.5   Data types

Table B-8. Data Types

Data type	Size (bytes)	Description	Range
BOOL	1	True/false represented as 0 = false and 1 = true	0, 1
SINT	1	8-bit signed integer	−128 to +127
USINT	1	8-bit unsigned integer	0 to 255
INT	2	16-bit signed integer	−32768 to +32767
UINT	2	16-bit unsigned integer	0 to 65535
DINT	4	32-bit signed integer	−2147483648 to +2147483647
UDINT	4	32-bit unsigned integer	0 to 4294967296
REAL	4	IEEE single-precision floating-point	−3.8E38 to +3.8E38
DREAL	8	IEEE double-precision floating-point	
ENGUNITS	1	Enumerated value representing an engineering unit of measure	4096 to 65535
BYTE	1	8-bit bitfield	N/A
SHORT_STRING	Up to 128 bytes	Character array where the first byte is the number of characters in the array, and the subsequent bytes contain the ASCII characters. This is not a NULL terminated string.	N/A

B.6   Codes and integer values

Table B-9. Slot 0 Transmitter Variable Index

Code	Description
0	Flow Rate
1	Pulse Output Frequency
2	Totalizer A
3	Totalizer B
4	Totalizer C
5	Electronics Temperature
6	Line Noise
7	5Hz SNR
8	37Hz SNR
9	Signal Power
10	Empty Pipe Value
11	Internal Flow Simulator Test Deviation (Continuous)
12	Electrode Coating Value
13	Electrode Resistance Value (Continuous)

Table B-9. Slot 0 Transmitter Variable Index (continued)

Code	Description
14	Coil Resistance Value (Continuous)
15	Coil Inductance Value (Continuous)
16	Coil Inductance Deviation (Continuous)

Table B-10. Meter verification results

Code	Description
0	Not Run
1	Pass
2	Fail
3	Not Licensed

Table B-11. Test condition

Code	Description
0	Not Run
1	No Flow, Full Pipe
2	Flow, Full Pipe
3	Empty Pipe
255	Not Initialized

Table B-12. Flow Rate Units

Code	Description
15	cubic feet/min
16	gal/min
17	liter/min
18	imp gal/min
19	cubic meter/hour
20	ft/s
21	meter/sec
22	gal/sec
24	liter/sec
26	cubic feet/sec
27	cubic feet/day
28	cubic meter/sec
29	cubic meter/day
30	imp gal/hour
31	imp gal/day
73	kg/sec

Table B-12. Flow Rate Units (continued)

Code	Description
74	kg/min
75	kg/hr
76	kg/day
77	metric ton/min
78	metic ton/hr
79	metric ton/day
80	lbs/sec
81	lbs/min
82	lbs/hr
83	lbs/day
84	short tons/min
85	short tons/hour
86	short tons/day
130	cubic feet/hr
131	cubic meter/min
132	barrel(42 gals)/sec
133	barrel(42 gals)/min
134	barrel(42 gals)/hr
135	barrel(42 gals)/day
136	gals/hr
137	imp gals/sec
138	liters/hr
235	gals/day
240	liters/day
241	barrels(31.gals)/sec
242	barrels(31.gals)/min
243	barrels(31.gals)/hr
244	barrels(31.gals)/day
248	cubic cm/min
253	Special

Table B-13. Totalizer Units

Code	Description
40	gals
41	liters
42	imp gals
43	cubic meters

Table B-13. Totalizer Units (continued)

Code	Description
44	feet
45	meters
46	barrels(42 gals)
61	kilograms
62	metric tons
63	pounds
64	short tons
112	cubic feet
246	cubic cm
247	barrels(31 gals)
253	special

Table B-14. Line/Tube Size

Code	Description
0	0.1-in
1	0.15-in
2	0.25-in
3	0.3-in
4	0.5-in
5	0.75-in
6	1.0-in
7	1.5-in
8	2.0-in
9	2.5-in
10	3.0-in
11	4.0-in
12	5.0-in
13	6.0-in
14	8.0-in
15	10.0-in
16	12.0-in
17	14.0-in
18	16.0-in
19	18.0-in
20	20.0-in
21	24.0-in
22	28.0-in

Table B-14. Line/Tube Size (continued)

Code	Description
23	30.0-in
24	32.0-in
25	36.0-in
26	40.0-in
27	42.0-in
28	44.0-in
29	48.0-in
30	54.0-in
31	56.0-in
32	60.0-in
33	64.0-in
34	66.0-in
35	72.0-in
36	78.0-in
37	80.0-in

Table B-15. Electrode Material

Code	Description
2	316L SST
3	Nickel Alloy 276
5	Tantalum
6	Titanium
7	Platinum-Iridium
8	Alloy 20 (8732E only)
17	Ryton (8732E only)
252	Other
253	Unknown

Table B-16. Electrode Type

Code	Description
0	Standard
1	Ultrasonic (8732E only)
2	Bullet
3	Standard and Ground
4	Replaceable
5	High Pressure
252	Other

Table B-16. Electrode Type

Code	Description
253	Unknown

Table B-17. Flange Material

Code	Description
0	Carbon Steel
1	304 SST
2	Wafer
3	316L SST
252	Other
253	Unknown

Table B-18. Flange Type

Code	Description
0	ANSI 150
1	ANSI 300
2	ANSI 600
3	PN 10
4	PN 16
5	PN 40
6	Wafer
7	ANSI 900
8	PN 25
9	PN 64
10	ANSI 1500
11	ANSI 2500
252	Other
253	Unknown

Table B-19. Liner Material

Code	Description
10	PTFE
14	Polyurethane
16	ETFE
17	RYTON
19	Neoprene
20	Natural Rubber
252	Other

Table B-19. Liner Material

Code	Description
253	Unknown

Table B-20. Base Time Unit

Code	Description
50	min
51	sec
52	hour
53	day

Table B-21. Fixed Output Codes for SMART Meter Verification

Value	Description
0	Last measured value
1	Fault value

Table B-22. Enable SMART Meter Verification

Code	Description
1	Enable with fixed output (see Table B-21)
5	Abort
6	Enable with continuous measurement

Table B-23. Language

Code	Description
0	English
1	Spanish
2	German
3	French
4	Portuguese

Table B-24. DI/DO Input Mode

Code	Description
0	PZR
1	Totalizer A Reset
2	Totalizer B Reset
3	Totalizer C Reset
4	Reset All Totalizers
251	Not Available

Table B-25. DI/DO Output Mode1&2

Code	Description
0	Reverse Flow
1	Zero Flow
2	Transmitter Fault(Alarm)
3	Empty pipe
4	Flow limit1
5	Flow limit2
6	Diagnostic Status Alert
7	Totalizer Limit 1
251	Not Available

Table B-26. Status/Flow Limit Mode

Code	Description
0	> High limit
1	< Low limit
2	In Range
3	Out of Range

Table B-27. Select Sensor Components to Baseline

Code	Description
0	All
1	Coils
2	Electrodes
255	Not Initialized

Table B-28. Select System Components to Verify

Code	Description
0	All
1	Flow tube
2	Transmitter
255	Not Initialized

Table B-29. Float Point Order

Code	Description
0	0-1-2-3
1	2-3-0-1
2	1-0-3-2
3	3-2-1-0

Table B-30. Baud Rate

Code	Description
0	1200
1	2400
2	4800
3	9600
4	19200
5	38400
6	57600
7	115200

Table B-31. Backlight

Code	Description
0	Off
1	10 Seconds
2	20 Seconds
3	30 Seconds
4	On

Table B-32. Calibration Number-"AAAAABCCDDDDDEFG"

Code	Description
AAAAA	01500-19999
B	0, 1, 2, 3, 4, 5 (XMTR_MODE = 0)
B	1, 5, 6 (XMTR_MODE = 1)
CC	00- 99
DDDDD	01500-19999
E	0 -9
F	0-9 (0-3 if B=5)
G	0-9 (0-3 if B=5)

Table B-33. License Status

Code	Description
Byte0:7	Reserved 0
6	Reserved 0
5	Reserved 0
4	Electrode Coating
3	8714i Verification
2	Digital I/O
1	Gnd /Wiring Fault Det

Table B-33. License Status (continued)

Code	Description
0	Hi process noise Det
Byte1:7	Reserved 0
6	Reserved
5	Reserved
4	Reserved
3	Reserved
2	Reserved
1	Reserved
0	Reserved

Table B-34. Diagnostic Handling

Code	Description
Bit:0	Empty Pipe
1	High Process Noise
2	Grounding/Wiring
3	Electrode Temp
4	Electrode Coating
5	Reserved, Always 0
6	Reserved, Always 0
7	Reserved, Always 0
8	Reserved, Always 0
9	Reserved, Always 0
10	Reserved, Always 0
11	Reserved, Always 0
12	Reserved, Always 0
13	Reserved, Always 0
14	Reserved, Always 0
15	Reserved, Always 0

Table B-35. Continuous Meter Verification Enabling

Code	Description
Bit:0	Coils
1	Electrodes
2	Transmitter
3	Reserved , Always 0
4	Reserved , Always 0
5	Reserved , Always 0

Table B-35. Continuous Meter Verification Enabling

Code	Description
6	Reserved , Always 0
7	Reserved , Always 0
8	Reserved , Always 0
9	Reserved , Always 0
10	Reserved , Always 0
11	Reserved , Always 0
12	Reserved , Always 0
13	Reserved , Always 0
14	Reserved , Always 0
15	Reserved , Always 0

Table B-36. Diagnostic Status Alert

Code	Description
Bit:0	Electronic Failure
1	Coil Open Circuit
2	Empty pipe
3	Reverse Flow
4	Ground/ Wiring Fault
5	High Process Noise
6	Elect Temp Out of Range
7	Electrode Coating Limit 1
8	Electrode Coating Limit 2
9	Reserved, Always 0
10	Reserved, Always 0
11	Reserved, Always 0
12	Continuous Meter verification
13	Coil Over Current
14	Sensor Electrode Saturation
15	Coil Power Limit
16	Reserved, Always 0
17	Reserved, Always 0
18	Reserved, Always 0
19	Reserved, Always 0
20	Reserved, Always 0
21	Reserved, Always 0
22	Reserved, Always 0
23	Reserved, Always 0

Table B-36. Diagnostic Status Alert (continued)

Code	Description
24	Reserved, Always 0
25	Reserved, Always 0
26	Reserved, Always 0
27	Reserved, Always 0
28	Reserved, Always 0
29	Reserved, Always 0
30	Reserved, Always 0
31	Reserved, Always 0

Table B-37. Status Register 0

Code	Description
Bit:0	Sensor Out of Range
1	Empty pipe condition detected
2	I/O Processor failure
3	Pulse output out of range
4	Update missed
5	Output at alarm level
6	Modbus non-volatile memory error
7	Pulse output fixed
8	EPROM checksum error
9	NOVRAM checksum error
10	RAM checksum error
11	Factory NOVRAM checksum error
12	Continuous meter verification error
13	PZR output is active
14	Coil drive current is zero
15	Reverse Flow detected

Table B-38. Status Register 1

Code	Description
Bit:0	Internal Flow Simulation Error
1	Excess Auto Zero Correction, ZR too Low
2	Excess Auto Zero Correction, ZR too High
3	Auto Zero attempt with Nonzero flow
4	Totalizer Limit Alert 1
5	Universal Trim Failure
6	Flow Limit Alert 1

Table B-38. Status Register 1 (continued)

Code	Description
7	Flow Limit Alert 2
8	Electrode Coated Limit 1
9	Electrode Coated Limit 2
10	Excess Calibration Correction. GN too Low
11	Excess Calibration Correction. GN too High
12	Calibration Attempt Without Calibrator
13	Grounding/Wiring Fault
14	High Process Noise Detected
15	Electronics Temperature Out of Range

Table B-39. Status Register 2

Code	Description
Bit:0	Digital I/O 1 Active
1	Digital Output 2 Active
2	Diagnostic Status Alert Active
3	Modbus in Listen Only mode
4	I/O Processor Comm Failure
5	Coil Over Current Detected
6	Sensor Electrode Saturated
7	Coil Power Limit
8	Electronics Failure
9	Coil Resistance Error
10	Coil Inductance Error
11	Digital Trim Failure
12	Reverse Flow Detected
13	Electrode Resistance Error
14	Auto Zero Failure
15	Reserved for Status bit

Appendix C   Specifications

C.1   Physical

C.1.1   Housing

Plastic housing with snap-on connection to DIN rail

Protection class: IP20

C.1.2   Dimensions

4.72-in. × 2.95-in. × 1.06-in. (120 mm x 75 mm x 27 mm) L×W×H

C.2   Electrical

C.2.1   Power supply

24 V ±20%

C.2.2   Power consumption

Maximum: 300 mA on 24 V

Typical: 100 mA

C.3   Environmental

C.3.1   Relative humidity

5 to 95% non-condensing

C.3.2   Temperature

Operating: 32 °F to 131 °F (0 °C to 55 °C)

Ambient: −13 °F to +185 °F (−25 °C to +85 °C)

C.4 Regulatory compliance

C.4.1 EMC compliance (CE)

Complies with EMC directive 2004/108/EC.

EN 61001-6-4 (2007)	Emission standard for industrial environment	EN 55016-2-3 (2006)	Class A
EN 61000-6-2 (2005)	Immunity standard for industrial environment	EN 61000-4-2 (2009) EN 61000-4-3 (2006) EN 61000-4-4 (2004) EN 61000-4-5 (2005) EN 61000-4-6 (2007)	

C.4.2 UL/c-UL compliance

The certification has been documented by UL in file E214107.

C.4.3 Galvanic isolation on Modbus serial interface

EN 60950-1 (2001)	Pollution Degree 2	
	Material Group IIIb	
	250 V RMS or 250 VDC	Working voltage
	500 V	Secondary circuit transient rating

Global Headquarters

Emerson Process Management

6021 Innovation Blvd.

Shakopee, MN 55379, USA

- +1 800 522 6277 or +1 303 527 5200
- +1 303 530 8459
- Flow.Support@Emerson.com

North America Regional Office

Emerson Process Management

7070 Winchester Circle

Boulder, CO 80301, USA

- +1 800 522 6277 or +1 303 527 5200
- +1 303 530 8459
- Flow.Support@Emerson.com

Latin America Regional Office

Emerson Process Management

Multipark Office Center

Turrubares Building, 3rd & 4th floor

Guachipelin de Escazu, Costa Rica

- +1 506 2505 6962
- +1 954 846 5121
- Flow.Support@Emerson.com

Europe Regional Office

Emerson Process Management Flow B.V.

Neonstraat 1

6718 WX Ede

The Netherlands

- +31 (0) 318 495555
- +31 (0) 318 495556
- Flow.Support@Emerson.com

Asia Pacific Regional Office

Emerson Process Management Asia Pacific Pte Ltd

1 Pandan Crescent

Singapore 128461

- +65 6777 8211
- +65 6777 0947
- APFlow.Support@Emerson.com

Middle East and Africa Regional Office

Emerson Process Management

Emerson FZE P.O. Box 17033,

Jebel Ali Free Zone - South 2

Dubai, United Arab Emirates

- +971 4 8118100
- +971 4 8865465
- FlowTechnicalSupport@Emerson.com

Linkedin.com/company/Emerson-Process-Management

Twitter.com/Rosemount_News

Facebook.com/Rosemount

Youtube.com/user/RosemountMeasurement

Google.com/+RosemountMeasurement

Standard Terms and Conditions of Sale can be found at:
www.Emerson.com/en-us/pages/Terms-of-Use.aspx
The Emerson logo is a trademark and service mark of Emerson Process Management.
SMART Meter Verification (SMV), Rosemount and Rosemount logotype are trademarks of Emerson Process Management.
EtherNet/IP is a trademark of ControlNet International under license by ODVA, Inc.
Modbus is a registered trademark of Modicon, Inc.
Anybus is a registered trademark of HMS Industrial Networks AB, Sweden, USA, Germany, and other countries.
Anybus Communicator is a trademark of HMS Industrial Networks AB, Sweden, USA, Germany, and other countries.
All other marks are the property of their respective owners.

ROSEMOUNT™

EMERSON™
Process Management