User Manual

Original Instructions

Allen-Bradley

EtherNet/IP™Absolute Encoder

Catalog Numbers 842E-SIP1BA. 842E-SIP2BA, 842E-SIP3BA, 842E-SIP4BA, 842E-SIP5BA, 842E-SIP6BA, 842E-SIP7BA, 842E-SIP8BA, 842E-SIP9BA, 842E-SIP10BA, 842E-SIP11BA, 842E-SIP12BA, 842E-MIP1BA, 842E-MIP2BA, 842E-MIP3BA, 842E-MIP4BA, 842E-MIP5BA, 842E-MIP6BA, 842E-MIP7BA, 842E-MIP8BA, 842E-MIP9BA, 842E-MIP10BA, 842E-MIP11BA, 842E-MIP12BA

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Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Chapter 7

Diagnostics and Troubleshooting

Appendix A

Installing the Add-on Profile

Appendix B

RSLogix 5000® Sample Code

Notes:

About This Document

Read this section to familiarize yourself with the rest of the manual. It provides information concerning:

- Who should use this manual
- The purpose of this manual
- Related documentation
- Conventions that are used in this manual

Who Should Use This Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use 842E EtherNet/IP encoder.

You should have a basic understanding of electrical circuitry and familiarity with relay logic. If you do not, obtain the proper training before using this product.

Purpose of This Manual

This manual is a reference guide for the 842E EtherNet/IP encoders. It describes the procedures that you use to install, wire, and troubleshoot your encoder. This manual:

- Gives you an overview of the 842E EtherNet/IP encoders
- Explains how to install and wire your encoder

Related Documentation

The following documents contain additional information concerning Rockwell Automation® products. To obtain a copy, contact your local Rockwell Automation® office or Allen-Bradley distributor.

Resource	Description
Installation Instructions 842E EtherNet/IP Multi-turn Encoders	Pub. # 10000169360
EtherNet/IP Modules in Logix5000™ Control Systems User Manual, publication ENET-UM001	A manual on how to use EtherNet/IP modules with Logix5000™ controllers and communicate with various devices on the Ethernet network
Getting Results with RSLogix 5000®, publication 9399-RLD300GR	Information on how to install and navigate RSLogix 5000®. The guide includes troubleshooting information and tips on how to use RSLogix 5000® effectively.
Allen-Bradley® Industrial Automation Glossary, AG-7.1	A glossary of industrial automation terms and abbreviations

Common Techniques Used in This Manual

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide steps or hierarchical information.
- *Italic* type is used for emphasis.

Notes:

Safety

This chapter deals with your own safety and the safety of the equipment operators.

Read this chapter carefully before working with the 842E EtherNet/IP encoder or the machine or system in which the 842E EtherNet/IP encoder is used.

Authorized Personnel

ATTENTION: Only authorized personnel can install, commission, and service the 842E EtherNet/IP encoder.

Only trained and authorized Rockwell Automation® service personnel can make repairs to the 842E EtherNet/IP encoder.

The following qualifications are necessary for the various tasks:

Activity	Qualification
Mounting	Basic technical training Knowledge of the current safety regulations in the workplace
Electrical installation and replacement	Practical electrical training Knowledge of current electrical safety regulations Knowledge on the use and operation of devices in the related application (for example, industrial robots, storage, and conveyor technology)
Commissioning, operation, and configuration	Knowledge on the current safety regulations and the use and operation of devices in the related application Knowledge of automation systems (for example, Rockwell Automation® ControlLogix® controller) Knowledge of EtherNet/IP Knowledge of the usage of automation software (for example, Rockwell Automation RSLogix™)

Correct Use

The 842E EtherNet/IP Absolute Encoder is an instrument that is manufactured in accordance with recognized industrial regulations. It also meets the quality requirements as per ISO 9001:2008 and of an environment management system as per ISO 14_001:2009.

An encoder is a device for mounting that cannot be used independently of its foreseen function. For this reason, an encoder is not equipped with immediate safety devices. As per statutory regulations, the operator of the system provides considerations for the safety of personnel and systems. Due to its design, the 842E EtherNet/IP can only be operated within an EtherNet/IP network. It is

necessary to comply with the EtherNet/IP specifications and guidelines for installing an EtherNet/IP network. If any modifications are made to the 842E EtherNet/IP encoder, any warranty claim against Rockwell Automation is rendered void.

General Safety Notes and Protective Measures

ATTENTION: Observe the following procedures to confirm the correct and proper use of the 842E EtherNet/IP encoder.

Qualified personnel with knowledge of electronics, precision mechanics, and control system programming install and maintain the encoder. It is necessary to comply with the related standards for the technical safety stipulations.

All persons who install, operate, or maintain the device have to meet the safety regulations:

- The operating instructions must always be available and must always be followed.
- Unqualified personnel are not allowed to be present in the vicinity of the system during installation.
- The system is to be installed in accordance with all applicable safety regulations and the mounting instructions.
- All work safety regulations of the applicable countries are to be followed during installation.
- Failure to follow all applicable health and safety regulations results in personal injury or damage to the system.
- The current and voltage sources in the encoder are designed in accordance with all applicable technical regulations.

Environmental Protection

Note the following information on disposal.

Assembly	Material	Disposal
Packaging	Cardboard	Waste paper
Shaft	Stainless steel	Scrap metal
Flange	Aluminum	Scrap metal
Housing	Aluminum Die-cast	Scrap metal
Electronic assemblies	Various	Hazardous waste

Encoder Overview

The 842E family of encoders uses EtherNet/IP technology to provide its data to a programmable controller. These encoders include an embedded EtherNet/IP switch to connect additional EtherNet/IP capable products in series and/or support a Device Level Ring (DLR) topology for Ethernet media redundancy.

The 842E is an ultra-high resolution encoder in single-turn and multi-turn versions. These encoders have 18-bit single-turn resolution. The multi-turn has an additional 12 bits for counting the number of revolutions.

Overview of the Encoder

What Is an Encoder?

Encoders can electronically monitor the position of a rotating shaft to measure information such as speed, distance, RPM, and position. Rockwell Automation® offers various light- and heavy-duty incremental and absolute encoders. Our accessories help you easily install and efficiently use our encoders.

What Are the Different Kinds of Encoders?

Incremental

A simple and cost-effective solution for a wide variety of applications, incremental encoders electronically monitor the position or speed of a rotating shaft. Encoder feedback is compatible with programmable controllers, numerical controllers, motion controllers, and other position systems. Rockwell Automation® offers light-duty and heavy-duty incremental encoders for different shaft loads. Ruggedized incremental encoders are available with an enclosure rating of NEMA Type 4 and IP66. Incremental encoders are also available in solid and hollow shaft models for various mounting options. Applications include: machine tools, packaging machinery, motion controls, robotics, and DC drives.

Absolute

An absolute encoder has a unique digital output for each shaft position. The use of absolute encoders assures that true position is always available, regardless of power interruptions to the system. Absolute encoders can be single-turn or multi-turn.

Multi-turn units assign a unique digital output for each shaft position across multiple shaft rotations and have high-resolution capability. Rockwell Automation absolute encoders are available with an enclosure rating of NEMA Type 4 and IP66, and various mounting options. Applications include steel mills, overhead cranes, punch presses, transfer lines, oil rigs, wind mills, machine tools, and packaging.

Sine-cosine

A sine-cosine encoder is a position transducer, which uses two sensors, each 90° out of phase from each other. Sine-cosine encoders are able to be used directly by the drive or squared to provide a conventional A quad B digital signal. Therefore, the sine-cosine encoder can be used as an absolute, sine-cosine, or incremental feedback device.

Single-turn vs. Multi-turn

Absolute encoders are either single-turn or multi-turn. Single-turn encoders are used if the absolute position of the shaft for one revolution is required. Multi-turn encoders are used if the absolute position is required for multiple shaft revolutions.

842E Encoder Features

The 842E EtherNet/IP encoder features include:

- Support for the encoder profile 22h (0x22) defined in the Common Industrial Protocol (CIP™), according to IEC 61784-1
- Compatibility with star, linear, and Device Level Ring topology
- Robust nickel code disk for harsh ambient conditions
- Configurable resolution per revolution: 1 to 262,144
- High precision and availability
- Ball bearings are spaced 30 mm (1.18 in.) apart for longer life
- Face mount flange and servo flange/blind hollow shaft and through hollow shaft
- 18-bit single turn resolution
- 30-bit total resolution multi-turn resolution
- Endless shaft
- ControlFLASH™ update compatible

IMPORTANT A Series A encoder cannot be updated to a Series B. A Series B encoder must be purchased to update future firmware. Series A does not have ControlFLASH update capability.

Configurable Parameters

The EtherNet/IP technology allows for certain encoder parameters to be configured over the network.

- Count direction
- Counts per revolution
- Preset value
- Velocity output
- IP addressing

The Electronic Data Sheet File

The electronic data sheet (EDS) file contains all information that is related to the measuring-system-specific parameters and the operating modes of the 842E EtherNet/IP encoders. The EDS file is integrated using the EtherNet/IP network configuration tool to configure and place in operation the 842E EtherNet/IP encoder

For more information, go to www.rockwellautomation.com/resources/eds/ and search on "842E."

Operating Principle of the Encoder

The 842E EtherNet/IP encoder acquires the position of rotating axes and outputs the position in the form of a unique digital numeric value. Optical acquisition of the rotary position value is from an internal coded disk.

The 842E-SIP-xxx EtherNet/IP Is a Single-turn Encoder

Single-turn encoders are used if the absolute position of the shaft for one revolution is required.

The 842E-MIP-xxxEtherNet/IP Is a Multi-turn Encoder

Multi-turn encoders are used if the absolute position is required for multiple shaft revolution.

Scalable Resolution

The steps per revolution and the total resolution can be scaled and adapted to the related application.

The steps per revolution can be scaled in integers from 1...262,144. The total resolution of the 842E-MIP Multi-turn EtherNet/IP encoder must be 2^n times the steps per revolution. This restriction is not relevant if the round axis or endless shaft functionality is activated.

Special Features

Properties	Encoder	
	Single-turn	**Multi-turn**
Absolute Encoder in 60 mm (2.36 in.) design	■	■
Robust nickel code disk for harsh environment	■	■
High precision and reliability	■	■
Ball bearings are spaced 30 mm (1.18 in.) apart	■	■
High level of resistance to vibration	■	■
Optimal rotational accuracy	■	■
Compact design	■	■
Face mount flange, servo flange and blind	■	■
Hollow shaft	■	■
ControlFLASH upgradable	■	■
18-bit single-turn resolution (1 to 262,144 steps)	■	■
30-bit total resolution		■
12-bit multi-turn resolution (1…4,096 revolutions)		■
Round axis functionality/endless shaft functionality		■
EtherNet/IP interface (as per IEC 61784-1)	■	■
Supports the encoder profile 22h defined in the CIP (Common Industrial Protocol)	■	■
Device Level Ring (DLR)	■	■

EtherNet/IP Overview

Ethernet Industrial Protocol (EtherNet/IP) is a frame-based computer networking technology for local industrial area networks. It follows the seven layers of the Open Systems Interconnection model:

OSI Model		
Host Layers	**Layer**	**Function**
	7. Application	Network process to application
	6. Presentation	Data, encryption
	5. Session	Inter-host communication Explicit and implicit messaging
	4. Transport	Flow control, TCP/UDP
Media Layers	3. Network	Internet protocol, logical addressing
	2. Data Link	Physical addressing
	1. Physical	Media, signal and binary transmission, peer-to-peer, multicast, unicast

Use of the Common Industrial Protocol

EtherNet/IP implements the Common Industrial Protocol (CIP), the application layer protocol specified for EtherNet/IP.

EtherNet/IP uses the CIP on the process layer. The 842E encoder meets the requirements of the EtherNet/IP protocol according to IEC 61784-1 and the requirement of the encoder profile.

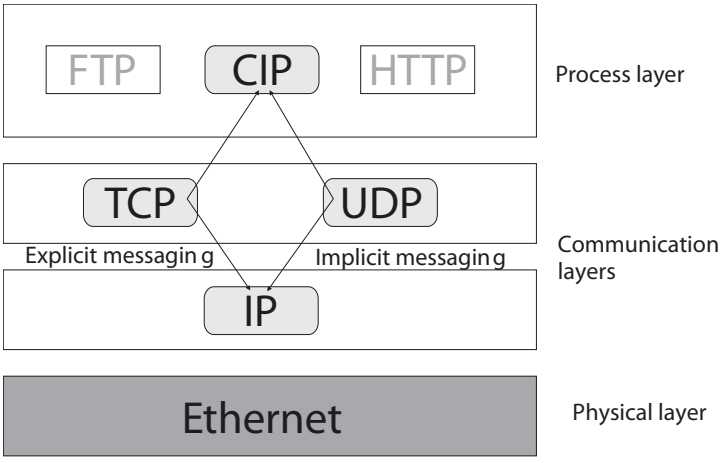


Figure 1

The encoder is an I/O adapter in the EtherNet/IP. It receives and sends explicit and implicit messages either cyclic or on request (polled).

TCP/IP and UDP/IP

EtherNet/IP uses TCP/IP or UDP/IP for communication. (TCP is transmission control protocol and UDP is user datagram protocol.)

Implicit messaging is used for real-time communication between a programmable logic controller (PLC) and the encoder in EtherNet/IP. With implicit messaging a connection is established between exactly two devices within the CIP protocol. Implicit messaging uses UDP/IP via port 2222.

Explicit Messaging is used in EtherNet/IP for communication that does not need to take place in real time. Explicit Messaging uses TCP/IP; it is used, for example, to transfer parameters from the PLC to the encoder.

MAC ID

Devices that originate or use data on the network have factory-assigned media access control (MAC) addresses for unique identification. The MAC ID (MAC ID) consists of 6 bytes. The first three bytes identify the manufacturer. The last three bytes are unique to the device. An example of a MAC ID is 00:00:BC:C9: D7:14.

Communication Frame

EtherNet/IP is based on the standard Ethernet frame. The frame contains the Ethernet header, the Ethernet data, and the Ethernet trailer. The MAC IDs of the receiver (destination address) and of the source (source address) are contained in the Ethernet header.

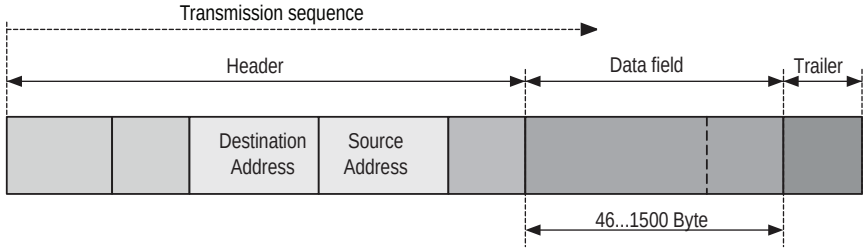


Figure 2

The Ethernet data field consists of several nested protocols:

- The IP datagram is transported in the user data of the Ethernet data field.
- The TCP segment or the UDP datagram is transported in the user data of the IP datagram.
- The CIP protocol is transported in the user data of the TCP segment or the UDP datagram.

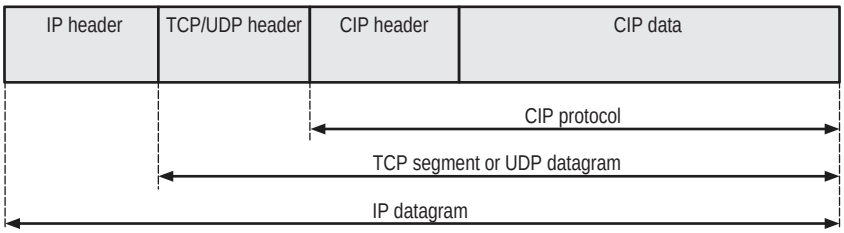


Figure 3

CIP is a message-based protocol that implements a relative path to send a message from the "producing" device in a system to the "consuming" devices.

The producing device contains the path information that steers the message along the proper route to reach its consumers. Because the producing device holds this information, other devices along the path simply pass this information; they do not need to store it.

The Producer/Consumer model has two significant benefits:

- You do not need to configure routing table in the bridging modules, which greatly simplifies maintenance and module replacement.
- You maintain full control over the route taken by each message, which enables you to select alternative paths for the same end device.

Understanding the Producer/Consumer Model

The CIP "Producer/Consumer" networking model replaces the old source/destination ("master/slave") model. The Producer/Consumer model reduces network traffic and increases speed of transmission. In traditional I/O systems, controllers poll input modules to obtain their input status. In the CIP system, the controller does not poll the input modules. Instead, they produce their data either upon a change of state or periodically. The frequency of update depends upon the options that are chosen during configuration and where on the network the input module resides. The input module, therefore, is a producer of input data and the controller is a consumer of the data.

The controller can also produce data for other controllers to consume. The produced and consumed data is accessible by multiple controllers and other devices over the EtherNet/IP network. This data exchange conforms to the Producer/Consumer model.

Specifying the Requested Packet Interval

The requested packet interval (RPI) is the update rate that is specified for a particular piece of data on the network. This value specifies how often to produce the data for that device. For example, if you specify an RPI of 50 ms, it means that every 50 ms the device sends its data to the controller or the controller sends its data to the device.

RPIs are only used for devices that exchange data. For example, a ControlLogix® EtherNet/IP bridge in the same chassis as the controller does not require an RPI because it is not a data-producing member of the system; it is used only as a bridge to remote modules.

EtherNet/IP Topologies

The 842E encoders can be connected in any of three network topologies: star, linear, or Device Level Ring (DLR).

IMPORTANT Rockwell Automation recommends that you use no more than 50 nodes on one DLR or linear network. If your application requires more than 50 nodes, we recommend that you segment the nodes into separate, but linked, DLR or linear networks.

Star Topology

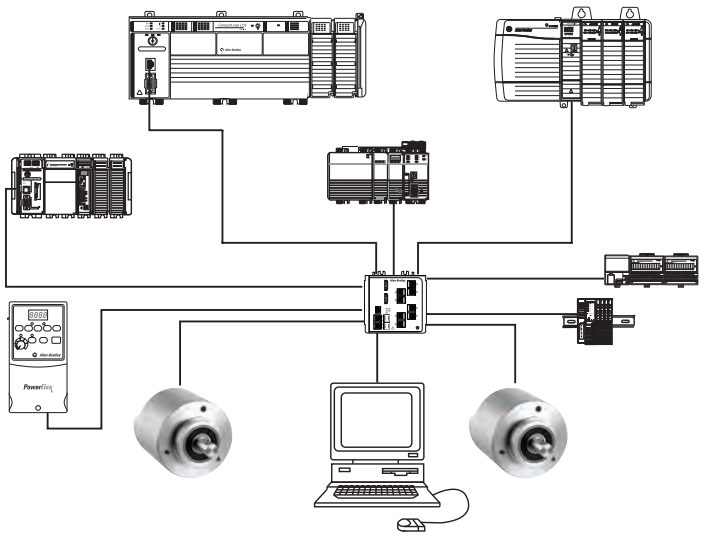


Figure 4

The star structure consists of a number of devices that are connected to a central switch.

IMPORTANT When this topology is used, make the Ethernet connection on the 842E encoder to the Link 1 connection. The Link 2 Ethernet connection must remain unused.

Linear Topology

The linear topology uses the embedded switching capability to form a daisy-chain style network that has a beginning and an end. Linear topology simplifies installation and reduces wiring and installation costs, but a break in the network disconnects all devices downstream from the break. When this topology is used, both Ethernet connections on the encoder are used. For the network connection use Link 1, Link 2, or both.

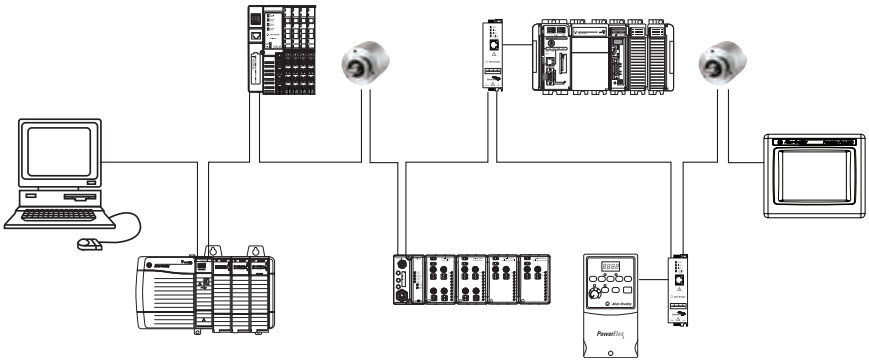


Figure 5

Device Level Ring Topology

A DLR network is a single-fault-tolerant ring network that is intended for the interconnection of automation devices. DLR topology is advantageous as it can tolerate a break in the network. If a break is detected, the signals are sent out in both directions. With this topology, use both the Link 1 and Link 2 Ethernet connections on the 842E encoder.

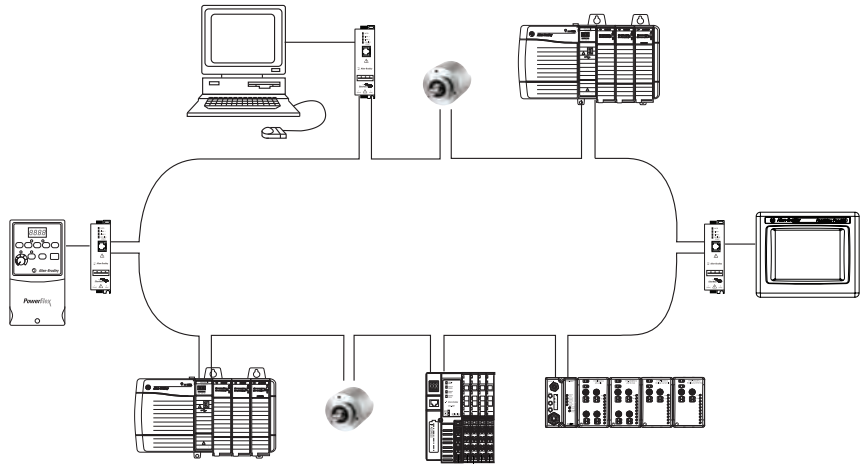


Figure 6

Endless Shaft Functionality

The endless-shaft feature is not supported for the single-turn encoder. This functionality is applicable only for the multi-turn Ethernet encoders and accessible only via messaging (not the AOP).

The round axis functionality or endless shaft functionality removes the restriction that the total resolution must be 2^n times the steps per revolution. The shaft is considered an endless shaft.

The steps per revolution are not configured directly. Instead the nominator and divisor for the number of revolutions are defined. The total measuring range can be scaled from 1...1,073,741,824 as an integer.

The encoder supports the function for round axes. During this process, the steps per revolution are set as a fraction. As a result, the total resolution does not have to be configured to 2^n times the steps per revolution and can also be a decimal number. The output position value is adjusted with the zero point correction, the counting direction set and the gearbox parameters entered.

Number of revolutions, nominator for the round axis functionality: The nominator can be scaled from 1...2,048 as an integer. The default factory setting for the nominator is 2,048.

Number of revolutions, divisor for the round axis functionality: The divisor can be scaled from 1...65,535 as an integer. The default factory setting for the divisor is 1.

Example:

A rotary table for a filling system is to be controlled. The number of filling stations define the steps per revolution. There are nine filling stations. For the precise measurement of the distance between two filling stations, 1000 steps are required.

The transmission ratio of the rotary table gearing defines the number of revolutions (= 12.5). The total resolution is then 9 × 1,000 = 9,000 steps to be realized in 12.5 revolutions of the encoder. This ratio cannot be realized via the steps per revolution and the total resolution, as the total resolution is not 2^n times the steps per revolution. The application problem can be solved using the round axis functionality. The steps per revolution are ignored here. The total resolution and the nominator and divisor for the number of revolutions are configured. 9,000 steps are configured as the total resolution. For the nominator for the number of revolutions, 125 is configured, 10 as the divisor (125/10 = 12.5). After 12.5 revolutions (that is after one complete revolution of the rotary table), the encoder reaches the total resolution of 9,000.

Enabling Endless Shaft Functionality

CIP message instructions must be used to configure the endless shaft functionality. The following attributes must be set for the functionality to be enabled.

- Attribute ID 0Eh, Scaling must be set to 1.
- Attribute ID 11 h, Total resolution must be set to between 1 ... 536,870,912.
- Attribute ID 7Dh, Round axis functionality must be set to 1.
- Attribute ID 7Eh, Nominator (CNR_N) must be set to 1 ... 2,048.
- Attribute ID 7Fh, Divisor (CNR_D) must be set to between 1 ... 65,535.

Attribute 14 (e hex) Scaling function control

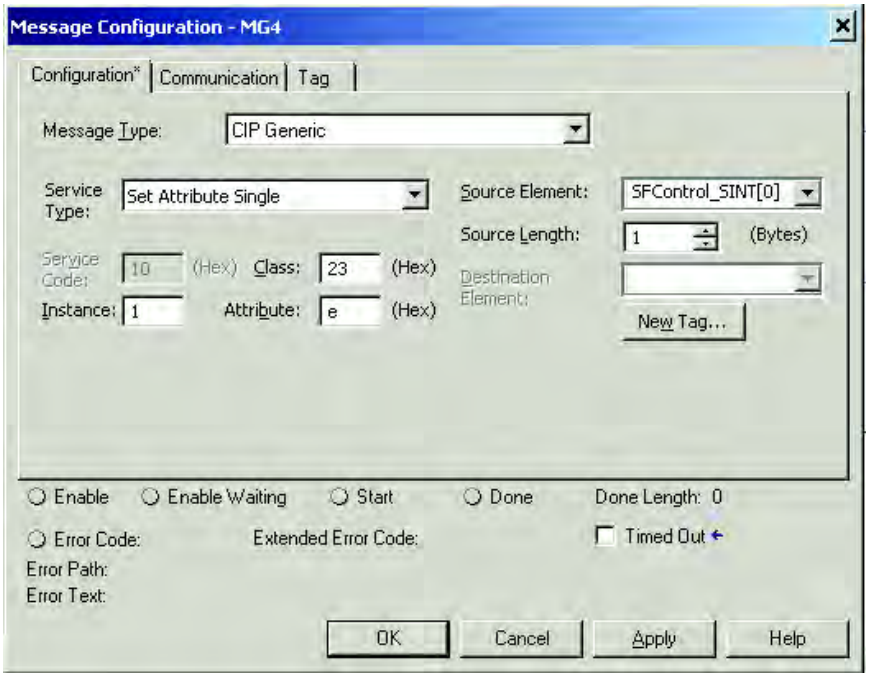


Figure 7

Attribute 125 (7d hex) Endless shaft functionality

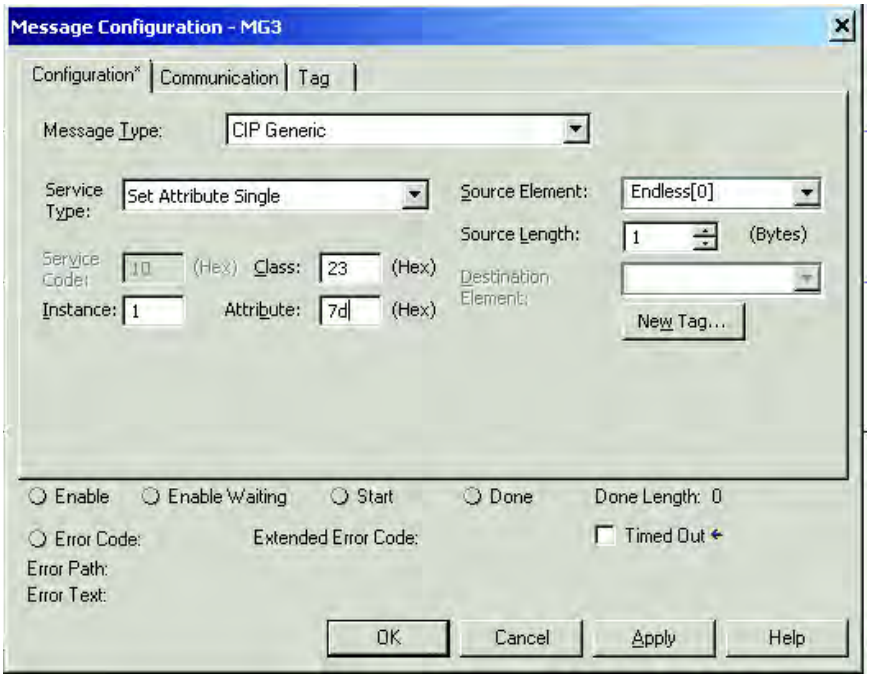


Figure 8

Attribute 126 (7e hex) Nominator

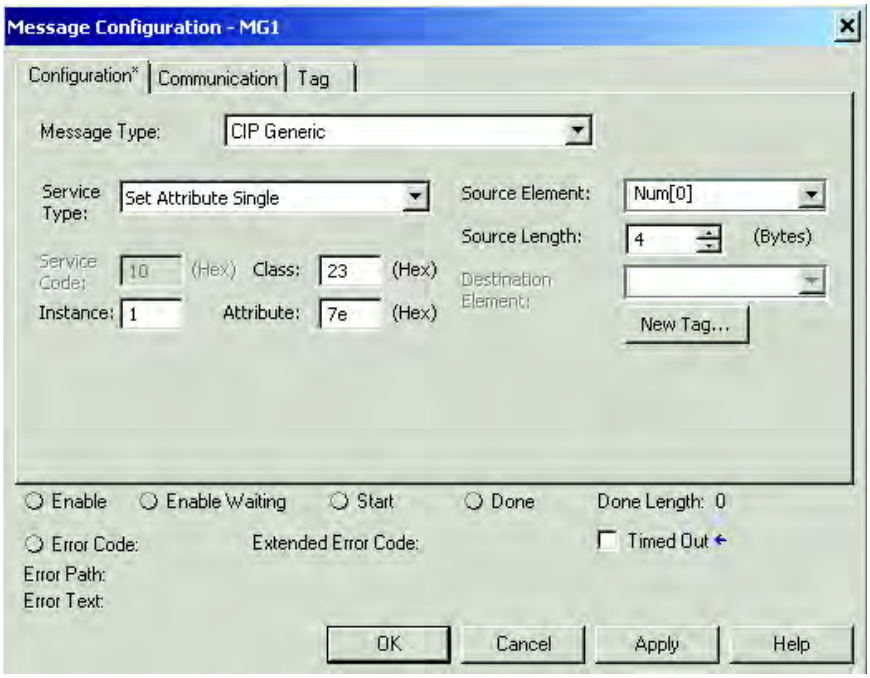


Figure 9

Attribute 127 (7f hex) Divisor

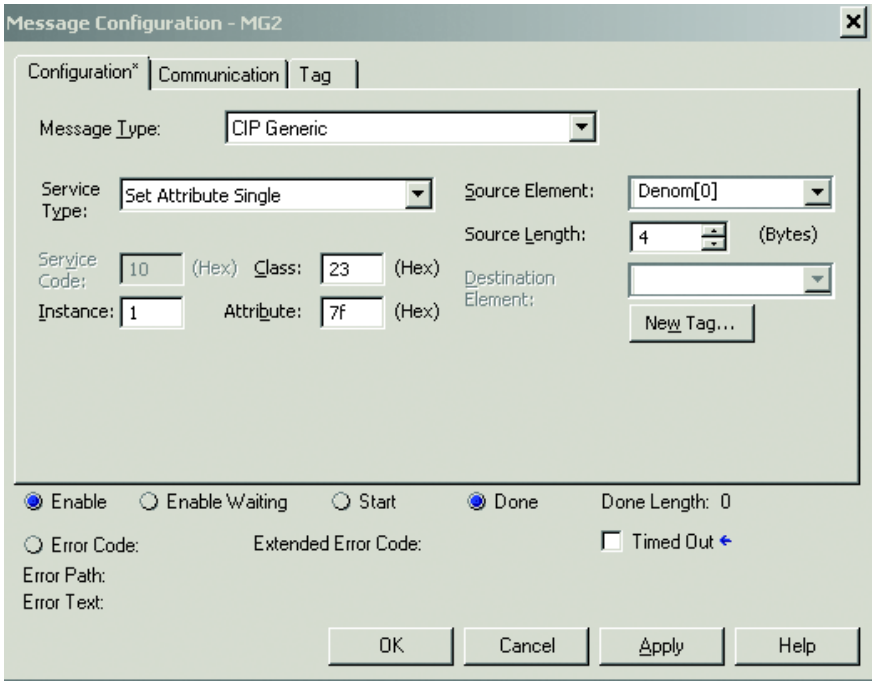


Figure 10

Attribute 17 (11 hex) Total measuring range

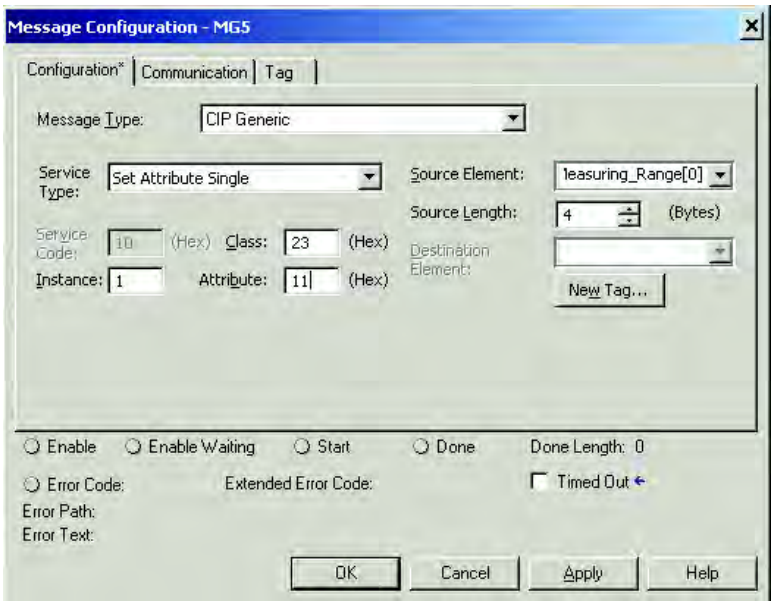


Figure 11

Update your logic to verify that the encoder is in the RUNNING state before executing the message instruction to set the endless shaft attribute. Otherwise the attribute will not be maintained upon power cycle.

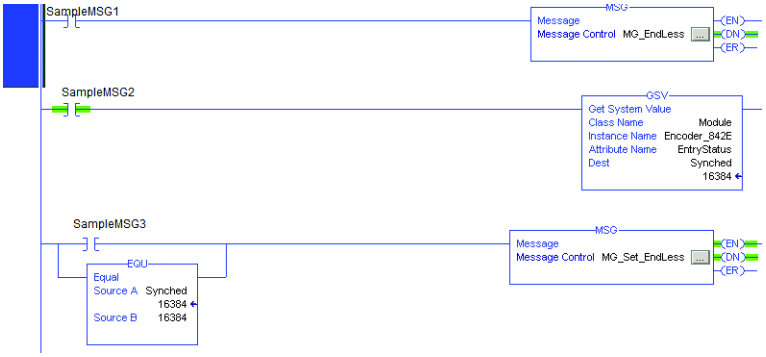


Figure 12

Features

Attribute 14 (e hex)	Scaling Function Control (SFC)
Attribute 125 (7d hex)	Endless Shaft Functionality (ESF)
Attribute 126 (7e hex	Nominator (CNR_N)
Attribute 127 (7f hex)–	Divisor (CNR_D)
Attribute 17 (11 hex)	Total Measuring Range (CMR)

IMPORTANT Don't make online scaling changes through the module profile unless the encoder device is inhibited. When you execute online changes, an error message is displayed; "Failed to modify properties. Failed to send configuration data to the module." Consequently changes are ignored.

CIP Object Model

EtherNet/IP uses an object model for network communication wherein all functions and data of a device are defined. The important terms are as follows:

Class: A class contains related objects of a device, which is organized in instances.

Instance: An instance consists of different attributes that describe the properties of the instance. Different instances of a class have the same services, the same behavior, and the same attributes. They can, however, have different values.

Attribute: The attributes represent the data that a device provides over EtherNet/IP. The attributes include the current values of, for example, a configuration or an input. Typical attributes are configuration and status information.

Service: Services are used to access classes or the attributes of a class or to generate specific events. These services execute defined actions such as reading the attributes.

The 842E EtherNet/IP encoder supports the following classes of the encoder profile:

Class Code	Object Class	Description	Number of Instances
0x01	Identity object	Contains information on the node within the network	1
0x02	Message router object	Processes all messages and routes them to the appropriate objects	1
0x04	Assembly object (I/O-assembly class)	Assembles attributes (data) of various objects to one object Used for I/O messages	7
0x06	Connection manager object	Contains connection-specific attributes for triggering, transport, and connection type	1
0x23	Position sensor object	Administrates device-specific data like position and counting direction	1
0x47	Device Level Ring (DLR) object	Contains the configuration and status information of the DLR protocol	1
0x48	QoS object	Contains mechanisms that are used to treat traffic streams with different relative priorities	1
0xF4	Port object	Contains implemented port types port numbers and port names	1
0xF5	TCP/IP interface object	Contains all attributes for configuring the TCP/IP interface	1
0xF6	Ethernet link object	Contains connection-specific attributes like transmission rate, MAC ID, or duplex mode	3

Table 1 - Supported Classes

Position Sensor Object

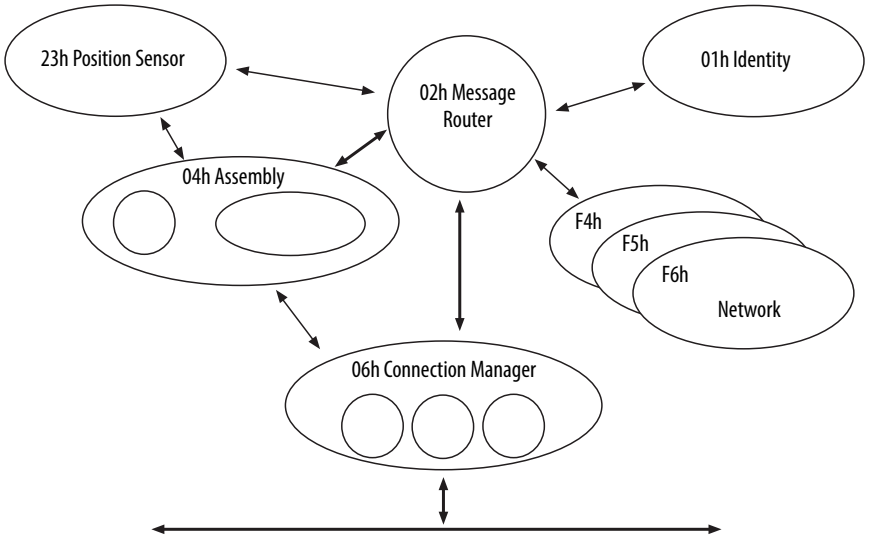


Figure 13

The Class Instance Attributes for the position sensor object are provided in Class Services of the Position Sensor Object on page 34.

See Appendix B on page 75 for an example of how to use the position sensor object to create an explicit message in RSLogix 5000®.

Identity Object

The device information and device parameters are opened via the instances.

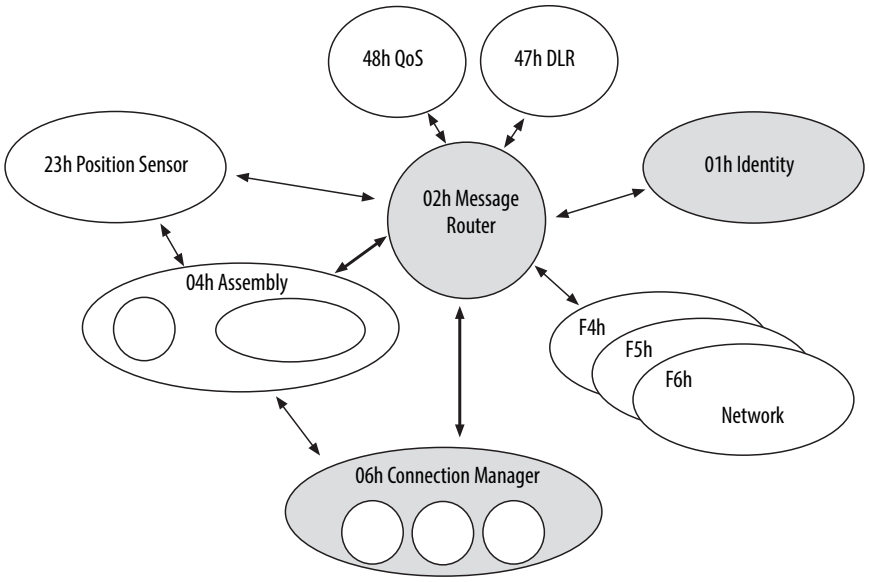


Figure 14 - Connections for the Identity Object

Service Code	Service	Description
01h	Get_Attribute_All	Returns the values of all attributes
0Eh	Get_Attribute_Single	Returns the values of one attribute

Table 2 - Class Services of the Identity Object

Attribute ID	Access	Description	Data Type	Default Value
1	Get	Object revision index	UINT	0001h
2	Get	Highest instance number within the class	UINT	0001h
3	Get	Number of object instances in this class	UINT	0001h
4	Get	Optional attribute list	STRUCT	—
6	Get	Highest existing class attribute ID	UINT	0007h
7	Get	Highest implemented instance attribute	UINT	0075h

Table 3 - Class Attributes of the Identity Object

IMPORTANT Class attribute 5 is not implemented.

Service Code	Service	Description
01h	Get_Attribute_All	Returns the values of all attributes
0Eh	Get_Attribute_Single	Returns the values of one attribute
05h	Reset	Resets the device: 0 = The device is reinitialized (power on). 1 = The device is reinitialized (power on) and reset to the factory settings.

Table 4 - Instance Services of the Identity Object

Attribute ID	Access	Name	Description	Data Type	Default Value
01h	Get	Vendor ID	Manufacturer ID	UINT	
02h	Get	Device Type	Device profile 22 h = Encoder	UINT	0022h
03h	Get	Product Code	Vendor-specific product code 03h = Single-turn 04h = Multi-turn	UINT	
04h	Get	Revision	Contains the firmware revision number in the format XX.XX	STRUCT	
	Get	Major Revision	First part of the revision number, for example, 01 (depending on the release)	UINT	01h
	Get	Minor Revision	Last part of the revision number, for example, 02 (depending on the release)	UINT	02h
05h	Get	Status	Device status flags	WORD	See Table 6
06h	Get	Serial Number	Serial number in the format YY.WW.xxx Y = Year W = Week x = Sequential number For example, 0E.34.0001 (depending on release)	UDINT	0E340001h
07h	Get	Product Name	Product name	Short_ String	AFx60A-Eth/IP
68 h	Get	Vendor	Firmware revision in the FPGA (for example, 1.2.0)	UDINT	00010200h

Table 5 - Instance Attributes of the Identity Object

Bit	Name	Description	Default Value
0	Owned	0 = No connection to the master 1 = Connection to the master established	0
1	—	Reserved	0
2	Configured	0 = Device with standard configuration 1 = No standard configuration	0
3	—	Reserved	0
4…7	Extended Device Status field	Vendor-specific status bits	See Table 7
8	Minor Recoverable Status	0 = No error 1 = Recoverable error (device not in error status)	0
9	Minor Unrecoverable Status	0 = No error 1 = Recoverable error (device not in error status)	0

Table 6 - Bits of the Instance Attribute "Status"

Bit	Name	Description	Default Value
10	Major Recoverable Status	0 = No serious error 1 = Serious error that can be reset (device in error status)	0
11	Major Unrecoverable Status	0 = No serious error 1 = Serious error that cannot be reset (device in error status)	0
12…15	—	Reserved	0000

Table 6 - Bits of the Instance Attribute "Status"

Possible Combinations Bit 4…7	Description
0000	Device in self-test
0001	Firmware update in progress
0010	At least one connection error
0011	No I/O connection established
0100	Configuration in nonvolatile memory (EEPROM) failed
0101	Serious error, bit 10, or bit 11 = 1
0110	At least one connection in the "Run" operating mode
0111	At least one connection exists, all in "Idle" operating mode
1000…1111	Reserved

Table 7 - Bits 4 of 7 of the Instance Attribute "Status"

Assembly Object

The Assembly Object allows assembling of data attributes of other objects in one single object. The 842E EtherNet/IP encoder supports only static assemblies of attributes. For this reason, the number of instances is fixed.

Service Code	Service	Description
01h	Get_Attribute_All	Returns the values of all attributes
0Eh	Get_Attribute_Single	Returns the values of one attribute

Table 8 - Class Services of the Assembly Object

Attribute ID	Access	Description	Data Type	Default Value
1	Get	Object revision index	UINT	0002h
2	Get	Highest instance number within the class	UINT	006Ah
3	Get	Number of object instances in this class	UINT	0007h
6	Get	Highest existing class attribute ID	UINT	0007h
7	Get	Highest implemented instance attribute	UINT	0004h

Table 9 - Class Attributes of the Assembly Object

IMPORTANT Class attributes 4 and 5 are not implemented.

Service Code	Service	Description
01h	Get_Attribute_All	Returns the values of all attributes
0Eh	Get_Attribute_Single	Returns the values of one attribute

Table 10 - Instance Services of the Assembly Object

Instance	Attribute ID	Access	Description	Bits	Bytes
1	3	Get	Position value	32	4
2	3	Get	Position value Warning and alarm flags	32 8	5
3	3	Get	Position value Velocity	32 32	8
4…5	—	—	—	—	—
100	3	Get	Configuration data	224	28
101	3	Get	Error Position value	32 32	8
102	3	Get	Error Position value Warning and alarm flags	32 32 8	9
103	3	Set/Get	Error Position value Velocity	32 32 32	12
101WS	3	Get	Error Position value	32 32	8
102WS	3	Get	Error Position value Warning and alarm flags	32 32 8	9
103WS	3	Set/Get	Error Position value Velocity	32 32 32	12
110	3	Set/Get	Dummy instance for the configuration data of a “Listen-only” connection	0	0

Table 11 - Instance Attributes of the Assembly Object

IMPORTANT
- Instances 4 and 5 from the encoder profile 22 h are not implemented.
- The instances 100 to 110 are manufacturer-specific assemblies.
- If the instances 101, 102, and 103 are used, then configuration assembly 100 is activated. If the instances 101WS, 102WS, and 103WS are used, then configuration assembly 100 is not activated.

I/O Assembly

The I/O data are retrieved/output via instances.

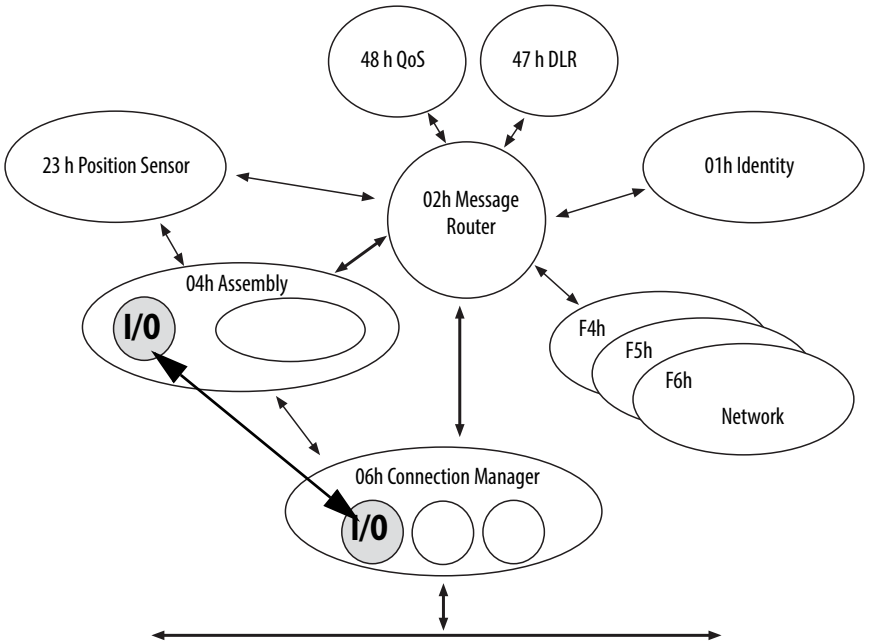


Figure 15 - Connections for the Configuration Assembly

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	Position value (least significant byte)							
	1	Position value							
	2	Position value							
	3	Position value (most significant byte)							
2	0	Position value (least significant byte)							
	1	Position value							
	2	Position value							
	3	Position value (most significant byte)							
	4							Warning	Alarm
3	0	Position value (least significant byte)							
	1	Position value							
	2	Position value							
	3	Position value (most significant byte)							
	4	Velocity value (least significant byte)							
	5	Velocity value							
	6	Velocity value							
	7	Velocity value (most significant byte)							

Table 12 - Data Format of the Attributes of the I/O Assembly

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
101/101WS	0	Fault header (least significant byte, see Table XX on page XXX)							
	1	Fault header							
	2	Fault header							
	3	Fault header (most significant byte)							
	4	Position value (least significant byte)							
	5	Position value							
	6	Position value							
	7	Position value (most significant byte)							
102/102WS	0	Fault header (least significant byte, see Table XX on page XXX)							
	1	Fault header							
	2	Fault header							
	3	Fault header (most significant byte)							
	4	Position value (least significant byte)							
	5	Position value							
	6	Position value							
	7	Position value (most significant byte)							
	8							Warning	Alarm
103/103WS	0	Fault header (least significant byte, see Table XX on page XXX)							
	1	Fault header							
	2	Fault header							
	3	Fault header (most significant byte)							
	4	Position value (least significant byte)							
	5	Position value							
	6	Position value							
	7	Position value (most significant byte)							
	8	Velocity value (least significant byte)							
	9	Velocity value							
	10	Velocity value							
	11	Velocity value (most significant byte)							

Table 12 - Data Format of the Attributes of the I/O Assembly

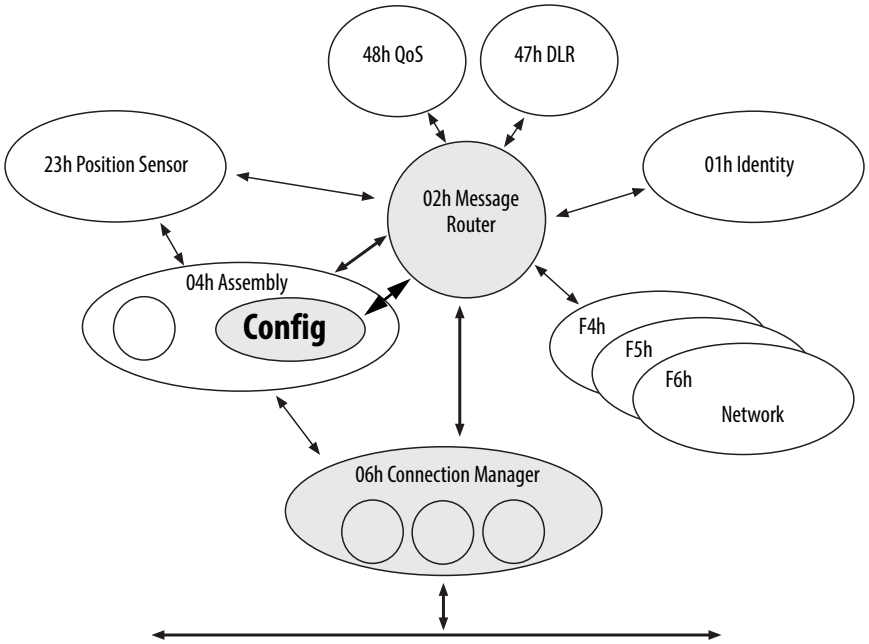


Figure 16 - Connections for the Configuration Assembly

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
100	0	Not used							
	1	Not used							
	2	Not used							
	3	Not used							
	4	Steps per revolution CPR (least significant byte)							
	5	CPR							
	6	CPR							
	7	CPR (most significant byte)							
	8	Total resolution CMR (least significant byte)							
	9	CMR							
	10	CMR							
	11	CMR (most significant byte)							
	12	Not used							cw/ccw
	13	Not used							scf [1]
	14	Not used							raf [2]
	15	Not used							
	16	Nominator for the number of revolutions CNR_N (least significant byte)							
	17	CNR_N							
	18	CNR_N							
	19	CNR_N (most significant byte)							
	20	Divisor for the number of revolutions CNR_D (lease significant byte)							
	21	CNR_D							
	22	CNR_D							
	23	CNR_D (most significant byte)							
	24	Velocity measuring unit (least significant byte)							
	25	Velocity measuring unit (most significant byte)							
	26	Not used							
	27	Not used							

Table 13 - Data Format for the Attributes for the Configuration Assembly

IMPORTANT
- The structure of the configuration assembly is fixed.
- During the initialization of the encoder, it reads the data from the control system.

1 Scaling function

2 Round axis functionality

Position Sensor Object

Instance	Service Name	Description
0x05	Reset	Restart with all EEPROM parameters of the encoder, restart with the factory defaults 00: Restart Object– read all EEPROM parameters 01: set and save factory defaults and restart object– read all EEPROM parameter
0x0E	Get_Attribute_Single	Returns value of attribute
0x15 (21dec)	Restore	Restore all parameter values from the non-volatile storage, customer defaults
0x16 (22dec)	Save	Save parameters to the non-volatile storage

Table 14 - Class Services of the Position Sensor Object

Num (dec)	Required/ Optional	Access Rule	Name	Data type	Description	Default
1	Required (implemented)	Get	Revision	INT	Object revision no	0x00 02
2	Implemented	Get	Max instance	INT	Max. instance number of an object in this class	0x00 01
3	Implemented	Get	Number of instances	INT	Number of object instances in this class	0x00 01
6	Implemented	Get	Maximum ID number class attributes	INT	Highest implemented class ID	0x00 64
7	Implemented	Get	Maximum ID number instance attributes	INT	Highest implemented instance attribute ID	0x00 7A
100	Get	NV (1)	Encoder firmware version	ARRAY of bytes	aa.bb: major revision minor revision dd.mm.yy: day.month.year	842eaa.bb dd.mm.yy

Table 15 - Class Attributes of the Position Sensor Object

(1) Nonvolatile

Instance Services of the position sensor object are automatically populated in the explicit message instruction configuration

Instance	Service name	Description
0x0E	Get_Attribute_Single	Returns value of attribute
0x10	Set_Attribute_Single	Sets value of attribute

Table 16 - Instance Services of the Position Sensor Object

Attribute ID (dec)	Attribute ID (hex)	Access rule [1]	NV / V [2]	Name	Data type	Description	Min. / Max. (default)
1	1	Get	V	Number of attributes	INT	Number of supported attributes in this class	0x0039
2	2	Get	V	Attribute list	ARRAY of byte	List of supported attributes	–
10	A	Get	V	Position value signed	DINT	Current position value (32 Bits)	none
11	B	Get	NV	Position sensor type (see following table, encoder ID)	INT	Device Type 0x01: Single-turn absolute encoder 0x02: Multi-turn absolute encoder	Min 0x00 01 Max 0x00 02 (0x00 02)
12	C	Set	NV	Direction counting toggle, code sequence (CS)	BOOL	Definition of direction of incrementing counts (10) 0: CW 1:CCW	(0: CW)
13	D	Set	NV	Commissioning diagnostic control (encoder position test)	BOOL	ON: 1 Encoder diagnostics possible OFF: 0 No diagnostics implemented	(OFF: 0)
14	E	Set	NV	Scaling function control (SFC)	BOOL	ON: 1 calc. value (from 16+42) OFF: 0 phys. resolution [steps]	(OFF: 0)
15	F	Set	NV	Position format	ENG UNIT	Format of position value (for example, arcsec or steps) Engineering unit: 0x1001 (counts)	(0x1001)
16	10	Set	NV	Counts per range	DINT	Number of requested steps per revolution.	Min 0x00 00 00 01 Max 0x00 04 00 00 (0x00 04 00 00)
17	11	Set	NV	Total measuring range	DINT	Total resolution	Min / Max 0x00 00 00 01 / Max. 2^n * Attr.16
18	12	Set	NV	Position measuring increment	DINT	Minimum resolution in steps (is always 0x00 01)	(0x00 00 00 01)
19	13	Set	NV	Preset value	DINT	The preset value is set to the current position value	Min / Max 0x00 00 00 00 / Attr.17 - 1 (0x00 00 00 00)
21	15	Get	V	Position status register	BYTE	State of the software limit switch Bit 0: Out of range Bit 1: Range overflow Bit: 2: Range underflow Bit 3 . . .7 reserved	(0x00)
22	16	Set	NV	Position low limit	DINT	Lower limit for position	0x00 00 00 00
23	17	Set	NV	Position high limit	DINT	Upper limit for position	0x3F FF FF FF
24	18	Get	V	Velocity value	DINT	Current velocity (32 Bits)	Format (25) and (26)
25	19	Set	NV	Velocity format	ENG INT	Format of velocity value 0x1F04 counts/s 0x1F0E revs/s 0x1F0F revs/min	(0x1F0F)
26	1A	Set	NV	Velocity resolution	DINT	Minimum resolution of velocity value (24)	(0x00 00 00 01)
27	1B	Set	NV	Minimum velocity setpoint	DINT	Minimum velocity setpoint for setting warning flag (47)	(0x00 00 00 00)
28	1C	Set	NV	Maximum velocity setpoint	DINT	Maximum velocity setpoint for setting warning flag (47)	(0x3F FF FF FF)
29	1D	Get	V	Acceleration value	DINT	Current acceleration (32 Bits)	Format (30) and (31)

Table 17 - Instance Attributes of the Position Sensor Object

Attribute ID (dec)	Attribute ID (hex)	Access rule [1]	NV / V [2]	Name	Data type	Description	Min. / Max. (default)
30	1E	Set	NV	Acceleration format	ENG UNIT	Format of acceleration value 0x0810: cps/s 0x0811: rpm/s 0x0812: rps/s	(0x0810)
31	1F	Set	NV	Acceleration resolution	DINT	Minimum resolution of acceleration value	(0x00 00 00 01)
32	20	Set	NV	Minimum acceleration setpoint	DINT	Minimum acceleration setpoint	(0x00 00 00 00)
33	21	Set	NV	Maximum acceleration setpoint	DINT	Maximum acceleration setpoint	0x3F FF FF FF
41	29	Get	V	Operating status	BYTE	Operating status encoder Bit 0: Direct. 0 (inc.) 1 (dec.) Bit 1: Scaling 0 (off) 1 (on) Bit: 2…4 Reserved Bit: 5: Diag. 0 (off) 1 (on) Bit 6…7 manuf. spec.	
42	2A	Get	NV	Physical resolution span (PRS)	DINT	Number of steps per rev (single-turn part)	(0x00 04 00 00)
43	2B	Get	NV	Physical resolution number of spans	INT	Number of revolutions (multi-turn part)	(0x00 01) single-turn (0x10 00) multi-turn
44	2C	Get	V	Alarms	WORD	Flags for alarms (errors)	
45	2D	Get	NV	Supported alarms	WORD	Information on supported alarms	0x3003
46	2E	Get	V	Alarm flag	BOOL	Indication of set alarm	0: OK 1: Alarm error
47	2F	Get	V	Warnings	WORD	Flags for warnings	
48	30	Get	NV	Supported warnings	WORD	Information on supported warnings	0x673C
49	31	Get	V	Warning flag	BOOL	Indication of set warning	0: OK 1: Warning Flag
50	32	Get	NV	Operating time	DINT	Storage of operating time counter [0,1h], the format of the counter is second.	0
51	33	Get	NV	Offset value	DINT	Offset value is calculated when using preset function	0x00 00 00 00
100	64	Get	V	Temperature value	INT	Current temperature value -40…100°C or -40…212°F Accuracy of the temperature sensor is about ± 5 °C (±9 °F).	0xF0 60 0x27 10 (-4000… +10000)
101	65	Set	NV	Temperature value format	ENG UNIT	Format of temperature value °C or °F (Fahrenheit) 0x1200: °C 0x1201: °F	(0x1200)
102	66	Set	NV	Temperature resolution	DINT	Minimum resolution of temperature value [°C/100] or [(°F)/100]	(0x00000001)
103	67	Set	NV	Minimum temperature value setpoint	INT	Minimum temperature setpoint (-40…100°C, -40…212°F)	0xF0 60 (-4000)
104	68	Set	NV	Maximum temperature value setpoint	INT	Maximum temperature setpoint (-40…100°C, -40…212°F)	0x27 10 (+10000) or 0x52D0 (+21200)
105	69	Get	V	Fault header (see Sensor error table)	DINT	Flags of encoder sensor errors and warnings	0x00 00 00 00

Table 17 - Instance Attributes of the Position Sensor Object

Attribute ID (dec)	Attribute ID (hex)	Access rule [1]	NV / V [2]	Name	Data type	Description	Min. / Max. (default)
106	6A	Set	NV	Slave sign of life	DINT	Flags for encoder functionalities (Bit field): Bit 0: Slave sign of life (on/off) Bit 1…7: not used Bit 8…15: UpdateFactor (1…127) Bit 16…31: not used	0x0000500
107	6B	Get	NV	Encoder motion time	DINT	Storage of the motion time. This counter is incrementing if the encoder is in rotation [sec].	0
108	6C	Get	NV	Encoder operating time [second]	DINT	Storage of the operating time. This counter is incrementing if the encoder is powered on [sec].	0
109	6D	Get	NV	Max velocity RA [cnts/ms]	DINT	Storage of the maximum velocity of the encoder in operational state.	0
110	6E	Get	NV	Max acceleration [cnts/(ms)2]	DINT	Storage of the maximum acceleration of the encoder in operational state.	0
111	6F	Get	NV	Max temp [°C/100]	DINT	Storage of the maximum temperature of the encoder in operational state	2000
112	70	Get	NV	Min temp [°C/100]	DINT	Storage of the minimum temperature of the encoder in operational state	2000
113	71	Get	NV	Number of startups	DINT	Storage of the number of startups (power-on) cycles	0
114	72	Get	V	light-emitting diode current value [µA]	INT	Current light-emitting diode current [µA] Range: 200…25.000	200…25.000 (0)
115	73	Get	NV	Max current value [µA]	INT	Max. light-emitting diode current [µA]	1.500
116	74	Get	NV	Min current value [µA]	INT	Min. light-emitting diode current [µA]	1.500
117	0X75	Get	V	Direction change counter	UDINT	Direction change counter, this counter is incrementing if the encoder is changing the direction, for example, cw to ccw or ccw to cw.	0
118	0x76	Get	V	Rotation counter-forward	UDINT	Rotation counter (0) (forward counter), this counter increments if the encoder was moving from standstill to a positive direction (cw).	0
119	0x77	Get	V	Rotation counter-backwards	UDINT	Rotation counter (1) (backwards counter), this counter increments if the encoder was moving from standstill to a negative direction (ccw).	0
120	0x78	Get	V	Power supply voltage (mV)	UINT	Current supply voltage (mV) Range: 9.500…30.500	9,500 30,500 (24,000)
121	0x79	Get	V	Maximum power supply voltage (V)	UINT	Maximum power supply voltage, this value is stored to the EEPROM data.	0 33 (0)
122	0x7A	Get	V	Preset offset value	DINT	Vendor-specific attribute: Offset value is calculated when using the preset function.	(00000000)
125	0x7D	Set	NV	Endless shaft functionality	BOOL	Encoder scaling with endless shaft (only with a multi-turn). 0: OFF, 1: ON	(0)
126	0x7E	Set	NV	Number of rotations, nominator	UDINT	This parameter is used if the parameter “endless shaft functionality” is set (1:ON)	1 2,048 (2,048)

Table 17 - Instance Attributes of the Position Sensor Object

Attribute ID (dec)	Attribute ID (hex)	Access rule (1)	NV / V (2)	Name	Data type	Description	Min. / Max. (default)
127	0x7F	Set	NV	Number of rotations, divisor	UDINT	This parameter is used if the parameter “endless shaft functionality” is set (1:ON)	1 65,535 (1)
128	0x80	Set	NV	Velocity filter integration time	UDINT	Velocity filter taps, integration time. Value is stored in EEPROM.	0 128 (1)
129	0x81	Set	NV	Velocity filter bandwidth	UDINT	Controls the bandwidth of the low pass filter that is applied to the raw velocity signal from feedback. EEPROM parameter: 0: attribute disabled 1…1000: recommended bandwidth (Hz)	0 1000 (100)
130	0x82	Set	NV	Acceleration filter integration time	UDINT	Acceleration filter taps, integration time	0 128 (1)
131	0x83	Set	NV	Acceleration filter bandwidth	UDINT	Controls the bandwidth of the low pass filter that is applied to the raw acceleration signal from feedback.	0 1000 (100)
132	0x84	Set	NV	Velocity hysteresis	UDINT	Get and set the hysteresis of the velocity	0 3ffffff (0)
133	0x85	Set	NV	Acceleration hysteresis	UDINT	Get and set the hysteresis of the acceleration	0 3FFFFFF (0)

(1) You can do a **Get** of all **Set** values, as shown in Appendix B, page 75. It is always good programming practice to do a Get after setting a value to verify the Set command was successful.

(2) Nonvolatile/volatile

Table 17 - Instance Attributes of the Position Sensor Object

Installation

Mechanical

This chapter describes how to install the 842E EtherNet/IP Encoder.

Also refer to the installation sheet provided in the box, **Publication No. 100000169360**.

Shaft Rotation Direction

When you view the encoder from the shaft side, the shaft rotation is clockwise (CW) or counterclockwise (CCW), as shown.

Figure 1

Mounting with a Solid Shaft

1. Be sure to select the proper size flexible coupling clamp to mate to the encoder shaft, for example, 845–FC–*–*. See our website at http://ab.rockwellautomation.com/Motion-Control/Encoders for encoder accessories.

ATTENTION: Do not rigidly connect the encoder shaft to the machine. A rigid connection causes premature failure of the encoder or machine bearings. Always use a flexible coupling.

2. To determine the encoder mounting hole locations, use the dimension drawings in the installation instructions (see "Related Documentation" on page 7).
3. Slide the flexible coupling onto the shaft, but do not tighten the set screws.

4. Mount the encoder and tighten with three size M4 mounting screws (not supplied).
5. Center the flexible coupling and tighten the set screws.
6. Rotate the machine slowly and verify that the flexible coupling is not deforming beyond specifications.
7. Align machine to its mechanical zero or home position.
8. Remove the screw cover on the back of the encoder and press the preset push button to change the preset value to the current shaft position value. (The factory preset value is zero.)
9. Replace the screw cover.

Mounting with a Hollow Shaft

IMPORTANT Be sure that the mating shaft is chamfered and grease-free.

1. Loosen the screw on the clamping ring with a 2.5 mm (0.098 in.) star driver.
2. Slide the encoder onto the mating shaft until the flex mount rests on the machine surface.

ATTENTION: The encoder slides freely onto the shaft; if not, do not force. Check the shaft for interferences such as gouges, burrs, rust, or size.

3. Hold encoder firmly and mark the two mounting holes. (If mounting holes exist, proceed to Step 6.)
4. Slide the encoder off. To accept M4 (or equivalent) screws, drill, and tap the marked holes.
5. Slide the encoder back onto the shaft until the flex mount rests on the machine surface.
6. Attach the encoder with two M4 (or equivalent) screws.

IMPORTANT Do not stress the flex mount while tightening the screws.

7. Tighten the clamping ring screw to 1.1 Nm (10 in–lb).
8. Align machine to its mechanical zero or home position.
9. Remove the screw cover on the back of the encoder and press the preset push button to change the preset value to the current shaft position value. (The factory preset value is zero.)
10. Replace the screw cover.

Mechanical Specifications

Face mount flange	10 x 19 mm (0.39 x 0.75 in.)
Servo flange	6 x 10 mm (0.24 x 0.39 in.)
Blind hollow shaft	8, 10, 12, 15 mm and 1/4, 1/2, 3/8, 5/8 in.

Electrical

ATTENTION: Switch off the power supply. The machine/system could unintentionally start while you are connecting the devices.

Confirm that the entire machine/system is disconnected during the electrical installation.

ATTENTION: Commissioning requires a thorough check by authorized personnel.

Before you operate a system that is equipped with the 842E EtherNet/IP absolute encoder, make sure that the system is checked and released by authorized personnel.

Read more in Chapter 1, Safety.

Electrical Wiring Instructions

Three electrical connections are on the back of the housing.

A 4-pin M12 connector is used for the power supply connection.

Two 4-pin M12 connectors are used for the Ethernet connection. The Link 1 connection is used for star networks. For ring networks, use both the Link 1 and Link 2 connectors. In a linear network, use Link 1, Link 2, or both connectors.

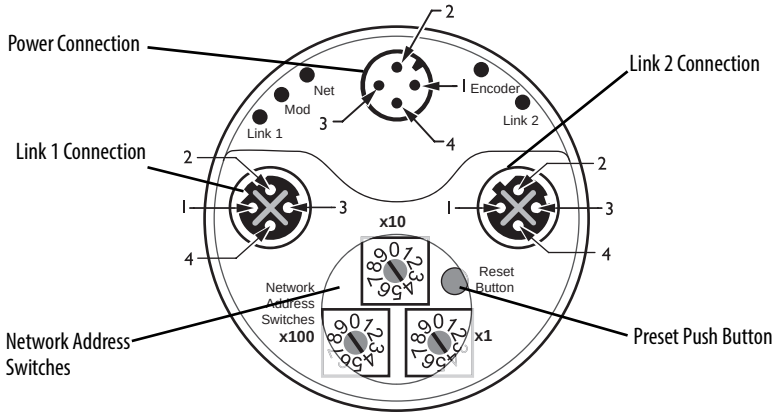


Figure 2

Pin Assignments

Pin	Signal	Mating Cable Wire Color	Function
1	Versus	Brown	Supply voltage 10…30V DC
2		White	Do not use
3	GND	Blue	0V DC (ground)
4		Black	Do not use

Table 1 - Voltage Supply

Pin	Signal	Mating Cable Wire Color	Function
1	TxD+	White orange	Ethernet
2	RxD+	White green	Ethernet
3	TxD–	Orange	Ethernet
4	RxD–	Green	Ethernet

Table 2 - Ethernet Link Connections – Link 1 and Link 2

Preset Push Button

ATTENTION: Pressing the preset push button results in a change of position reading.

The change in position causes unexpected motion, which could result in personal injury or damage to the product or equipment.

IMPORTANT Press the preset button briefly, no longer than one second.

To preset the position of the encoder, remove the screw cover from the back of the encoder and briefly press the Preset button inside (see figure on page 41 and “Preset Function” on page 62).

Network Address Switches

You can use the three Network Address switches to set the IP address of the encoder (see Figure 3 on page 47 and “Setting the IP address” on page 45).

Electrical Specifications

Operating voltage	10…30V DC
Power consumption	3 W
Load current	200 mA
Resolution per revolution	262,144
Revolutions	4,096
Repeat accuracy	±0.002°
Error limit	±0.03°
Code direction	CW or CCW programmable
Interface	EtherNet/IP per IEC 61784-1
Transmission speed	100 MBits/s
Duplex	Full or half

Notes:

Configuring the Encoder for Your EtherNet/IP Network

Setting the IP Address

The 842E encoder is shipped with the network address switches set to 888. Use one of these two methods to assign an IP address.

1. To set the last octet of the IP address (192.168.1.xxx) use the network address switches (see Figure 2 on page 41) on the encoder.
2. Use the network address switches to enable BOOTP / DHCP and use a BOOTP utility or DHCP server to assign the IP address of the unit on powerup.

Assigning the Last Octet in an IP Address Scheme of 192.168.1.xxx Using the Network Address Switches

1. Set the three network address switches to 999.
2. Cycle power to the encoder.
3. Set the three network address switches to a valid address of 001 – 254.
4. Cycle power to the encoder.
5. The encoder powers up with the IP address set to 192.168.1.xxx, where xxx is the position of the three network address switches.

Network Address Switches Set to 123

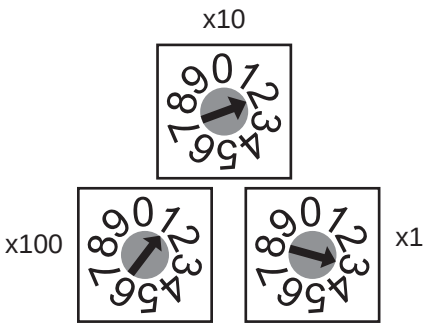


Figure 1

Assigning the IP Address Using BOOTP/DHCP:

Verify that the encoder MAC ID is in the relationship list in the BOOTP Utility or DHCP server before attempting to assign the encoder an IP address.

1. Set the three network address switches to 999 and cycle power.
2. Set the three network address switches to 000 and cycle power.
3. The encoder powers up and request an IP address from a BOOTP/DHCP server.
4. If the encoder MAC ID is in the relationship list, the BOOTP/DHCP server assigns the associated IP address to the corresponding MAC ID.

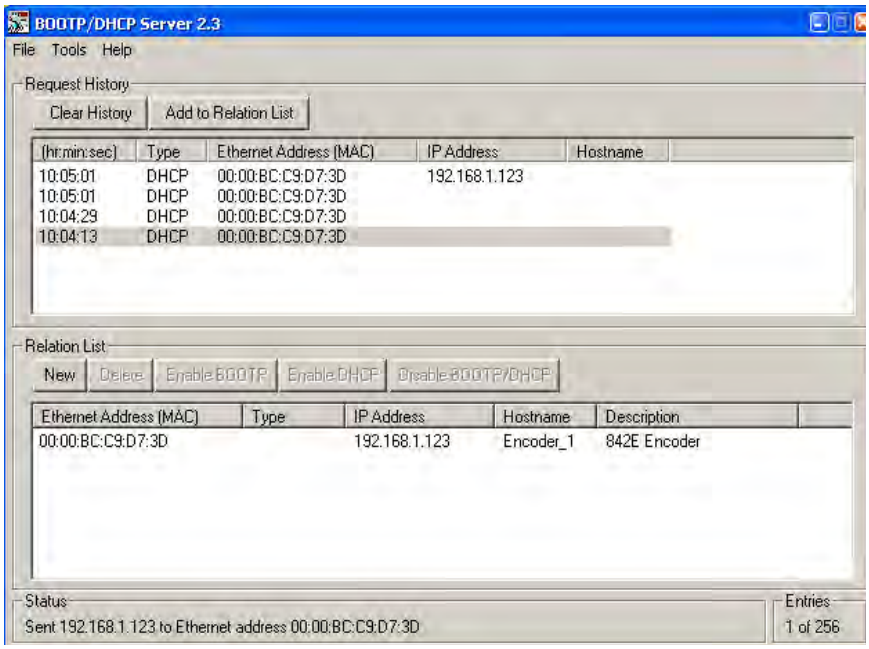


Figure 2

Setting of Network Address Switches	Function
001…254	Sets last octet of the IP address to the value indicated (xxx in 192.168.1.xxx)
888	Restores all factory default settings in the encoder and clears its IP address
999	Clears the encoder IP address

Table 1 - Function of Network Address Switch Settings

ATTENTION: Disable DHCP after the new network address is set (see next step).

When the DHCP is disabled, it prevents unexpected resetting of the network address, which could result in unintended machine motion or loss of process control.

5. Disable DHCP: highlight it by clicking once on the encoder in the relation list. Then click **Disable BOOTP/DHCP** to instruct the 842E encoder to retain the IP address at the next power cycle.

   Wait for the status message to show that the command was successfully sent. If the message does not appear, repeat this step.

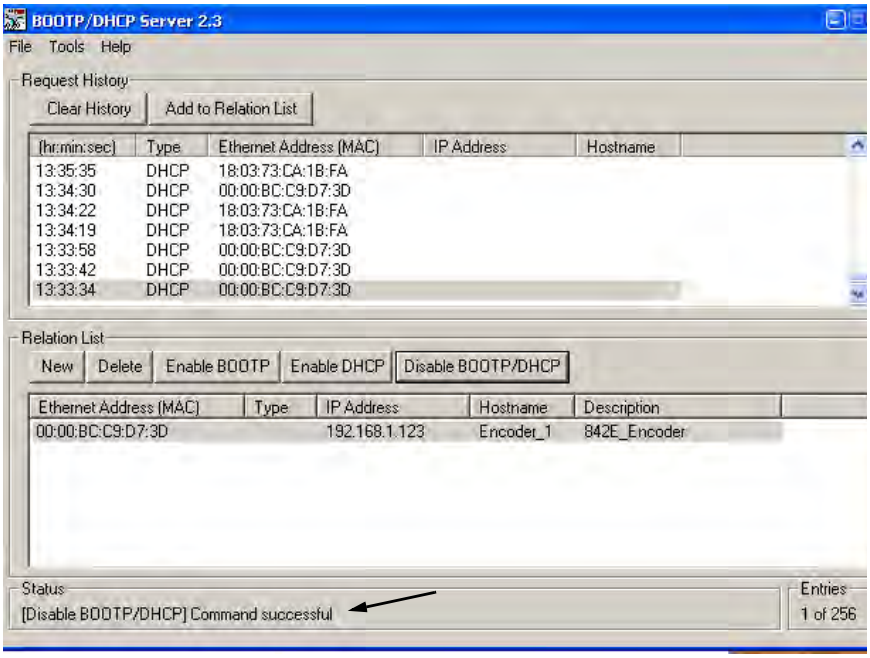


Figure 3

6. Click **File > Save As** to save the relationship, if desired.
7. Cycle the power to the 842E encoder. You no longer see that the 842E encoder appears in the request history panel.

From a DOS prompt, you can ping the new address. The response is four packets sent, four packets received, and zero lost.

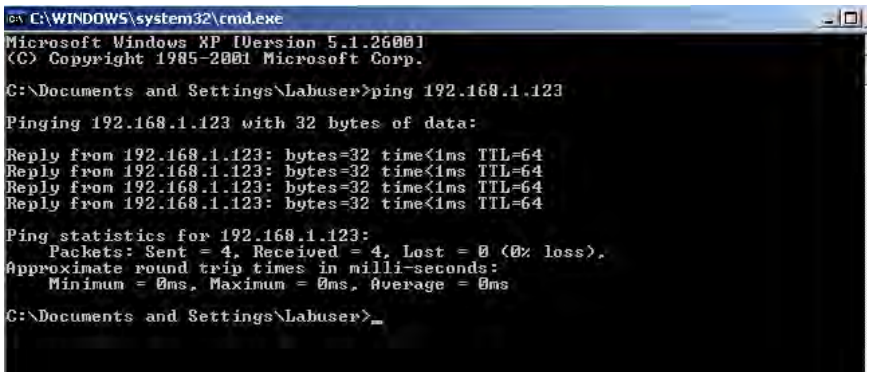


Figure 4

Notes:

Configuring the 842 E Encoder Using RSLogix 5000®

This chapter guides you through the steps that are required to configure your encoder using RSLogix 5000 software. The modules that are presented in this chapter are configured using RSLogix 5000 software, version 20.

Example: Installing the Hardware

In this example, a CompactLogix™ chassis contains the L35E processor in slot 1 and a built-in EtherNet/IP connection. The encoder is connected to a Stratix® 6000 Ethernet switch.

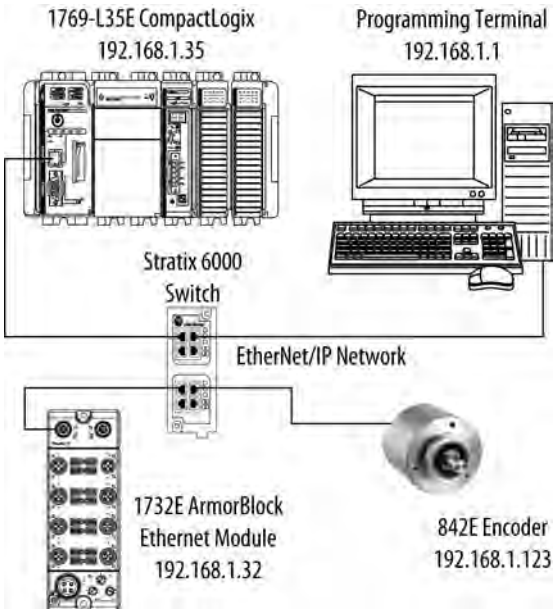


Figure 1

To work along with this example, install your system as shown.

- Verify the IP addresses for your programming terminal and 842E encoder.
- Verify that you connected all wiring and cabling properly.
- Be sure that you configured your communication driver (for example, AB_ETH-1 or AB-ETHIP-1) in the RSLinx® software.

Configuring the Encoder

You must configure your encoder upon installation. The encoder does not work until it has been configured with at least the default configuration.

RSLogix 5000 Configuration Software

You must use RSLogix 5000, version 18 or later to set configuration for your encoder. The instructions in this chapter use version 20.

There is an option to accept the default configuration for your encoder or to write point level configuration specific to your application. Both options are explained in detail, including views of software screens, in this chapter.

Checking the Integration in EtherNet/IP Via RSLinx® Classic

With the aid of the tool RSLinx® Classic, you can again check whether the IP address set detects the control system.

The EDS file (electronic data sheet) contains all information that is related to the parameters and the operating modes of the EtherNet/IP encoder (go to www.rockwellautomation.com/resources/eds/ and search on "842E," also see The Electronic Data Sheet File on page 13). Use the EDS hardware installation tool in the tools menu of RSLinx Classic software to register the EDS file.

1. Start RSLinx Classic (as a rule on the Start menu on your PC/notebook in Rockwell Software®, RSLinx, RSLinx Classic).
2. Click the **RSWho** button in the program.

Figure 2

3. Then open the path **AB_ETHIP1, Ethernet**. The encoder can be seen with its IP address.

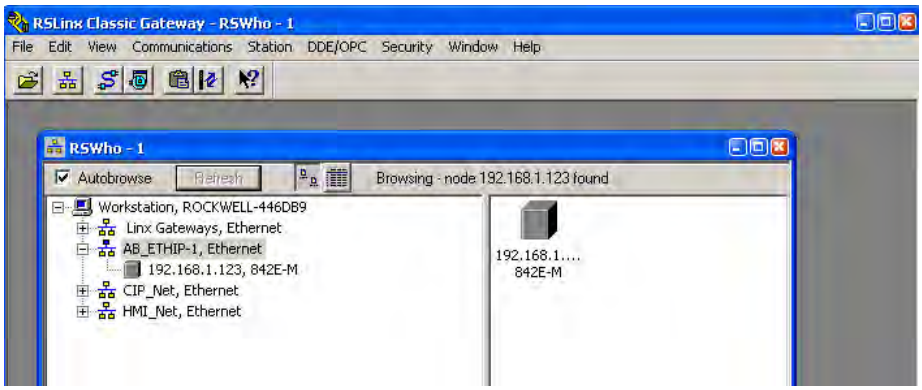


Figure 3

4. Install the Add-on Profile according to the instructions in Appendix A, page 71.

IMPORTANT Before proceeding, install the Add-on Profile (see Appendix A, page 71).

Installing the Add-on Profile in RSLogix 5000

After you install the encoder Add-on Profile (see Appendix A, page 71), install the Add-on Profile; here is an example of the setup procedure.

1. Open RSLogix 5000.
2. Click **File>New**.

Figure 4

3. Enter the new controller information.

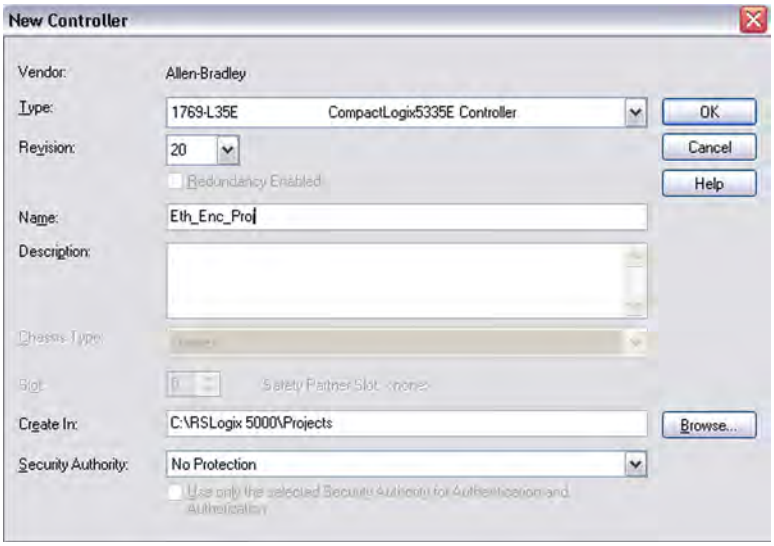


Figure 5

4. Right-click on the Ethernet port of the controller and select **New Module.**

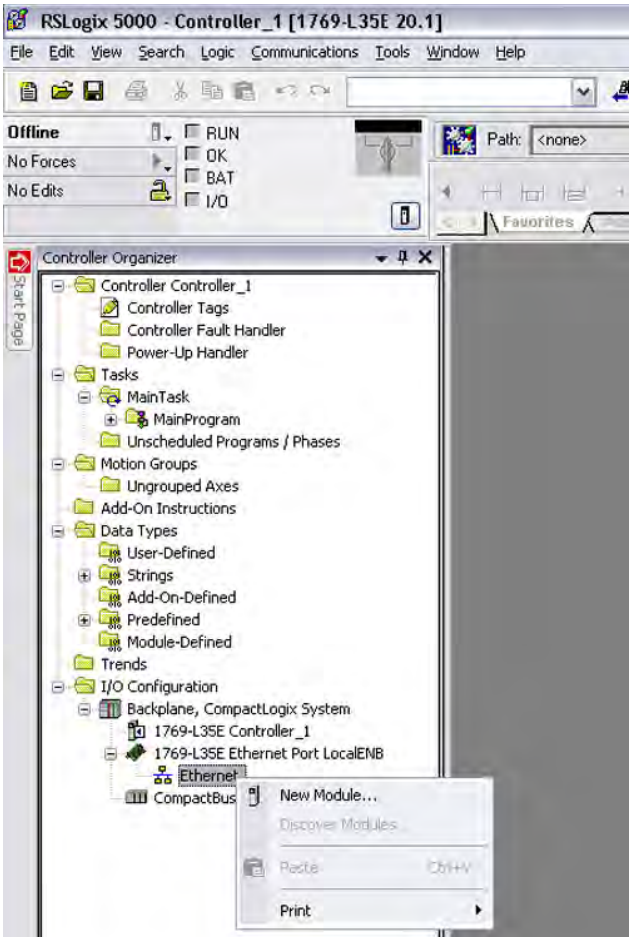


Figure 6

5. Select the desired 842E encoder and click **Create**.

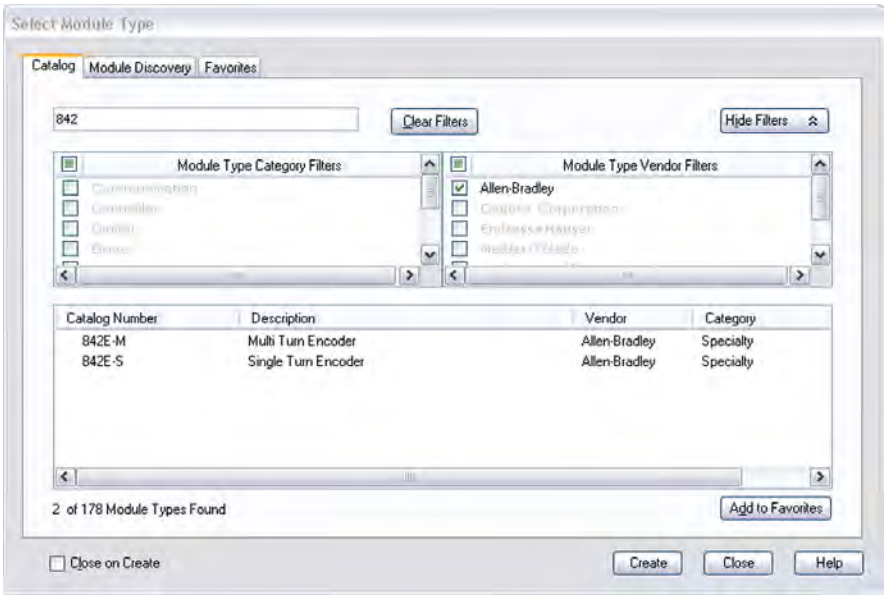


Figure 7

6. Close the select module type dialog box.
7. To complete the Add-on Profile, continue to the next sections.

General Tab

1. Enter a name for the encoder. In this example, the name is *Encoder_1*. You have multiple encoders or other modules, so be sure to give each a brief but descriptive name. The name that you assign to the encoder appears in the controller organizer I/O tree. The name also appears in the description of tags.
2. Enter a description of the encoder function.
3. Set the IP address for the encoder. In this example, the address is 192.168.1.123. The 123 reflects the address of the network address switches on the 842E.

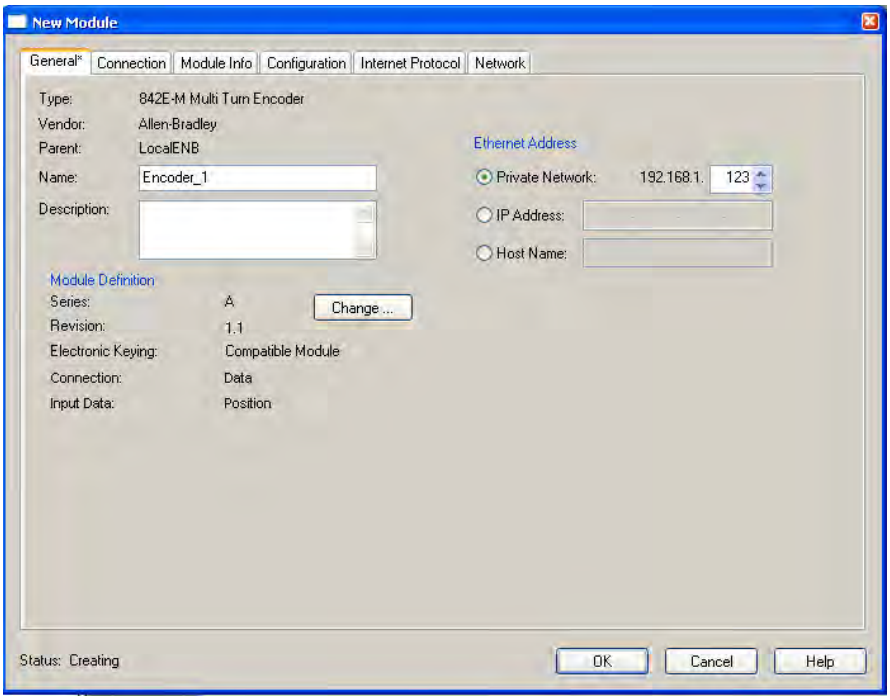


Figure 8

IPAddress

When the controller is offline, the IP address can be set. You have three options:

- When a private network is used, click the **Private Network** radio button. Enter a value of 1...254 for the last segment (octet) of the address. Be sure not to duplicate the address of an existing device. In the preceding example, the address of the EtherNet/IP encoder is 192.168.1.123.

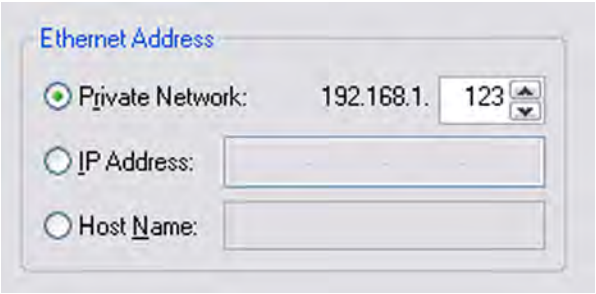


Figure 9

- When multiple networks exist, you choose to set the address to some other value. When offline, simply click the IP address radio button and enter the desired address.

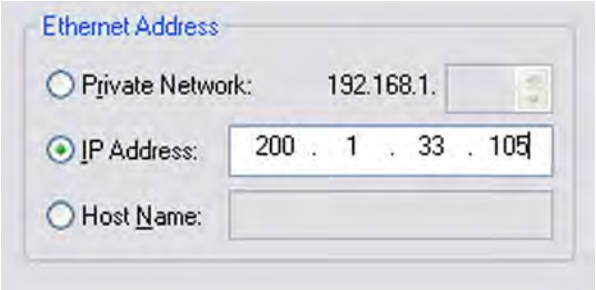


Figure 10

- Click the **Host Name** radio button and type in the name of the host. In the example below, the host name is QPACK4.

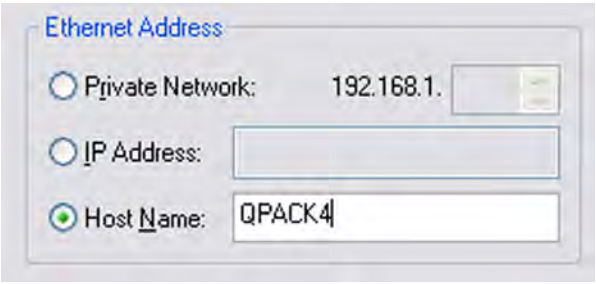


Figure 11

Module Definition

You do not have to change the default values. If necessary, follow the steps below to change series, revision, electronic keying, connection, and/or input data.

1. On the **General** tab, click the **Change** button. The module definition window opens.

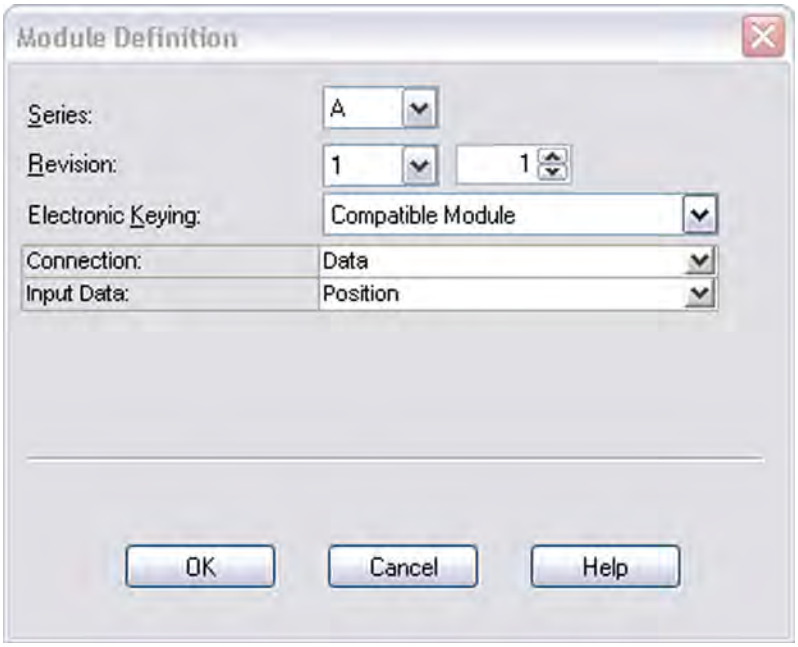


Figure 12

2. To complete the Add-on Profile, click the arrows at the right of each box to access pull-down menus.

- The connection pull-down menu allows you to select either a **Data** or **Listen Only** connection (see definitions, below).

- The Input data pull-down menu allows you to select position, position-status, or position-velocity (see "RSLogix 5000 Controller Tags" on page 63 for more information).

3. Click **OK** to accept the changes (or **Cancel** to retain the original settings). See the definitions below. Click **Help** for more information.

Data: This type of connection is used to read data from the encoder without controlling the outputs. This connection is not dependent on any other connection.

Listen Only: This type of connection is dependent on another connection to exist. If that connection is closed, the listen-only connection is closed as well.

Connection Tab

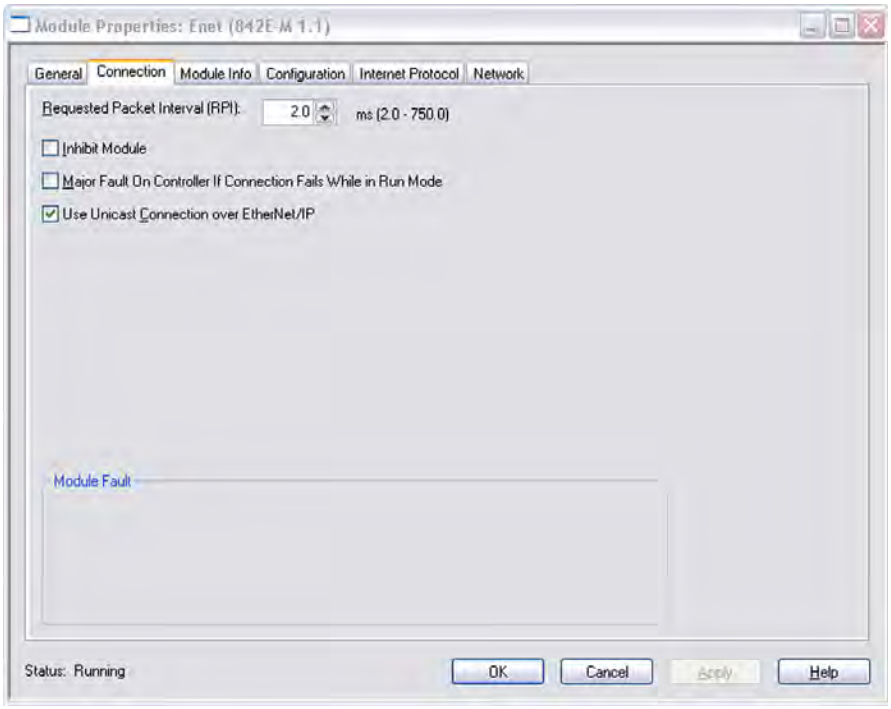


Figure 13

You do not have to change any settings on the **Connection** tab. For reference, the settings are:

Requested Packet Interval: Specify the number of milliseconds between requests for information from the controller to the encoder. The encoder provides data on a shorter interval, but if no data is received the controller asks the encoder for a status update. Minimum setting is 4 ms and the maximum setting is 750 ms.

Inhibit Module: When checked, the controller ignores all information from the encoder any time it is polled.

Major fault on controller if connection fails while in run mode: Check this box if a connection failure is considered a major fault.

Use Unicast Connection over EtherNet/IP: Unicast connections are point-to-point connections. Multicast connections are considered one to many. Unicast reduces the amount of network bandwidth used.

Module fault: Fault messages appear in this box.

Module Info Tab

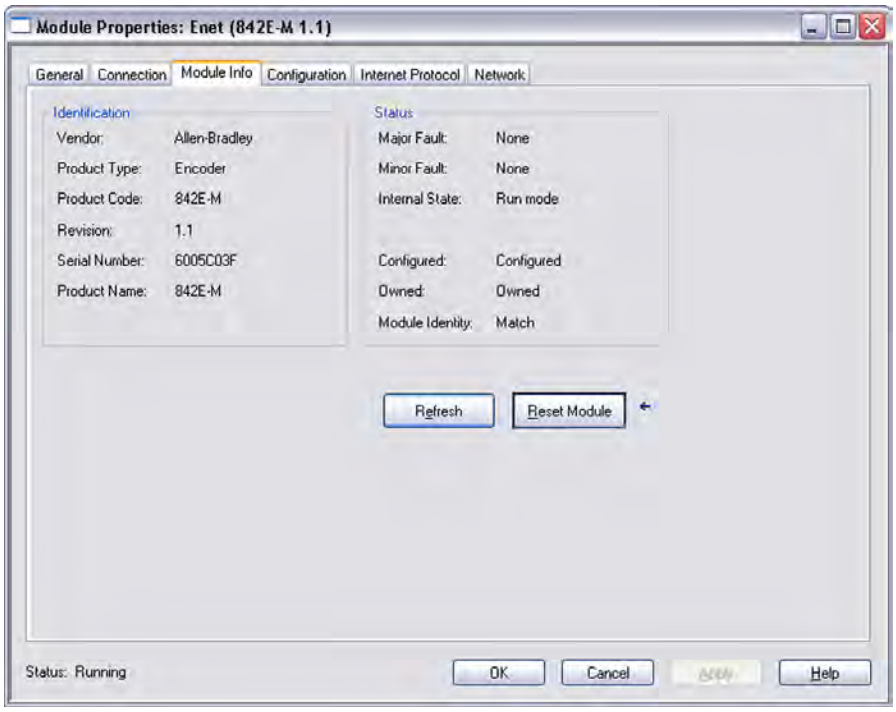


Figure 14

The **Module Info** tab contains read-only data that is populated when the controller goes on line (a program is downloaded or uploaded from the controller).

The left panel, **Identification**, shows the vendor, product type, product code, revision level, serial number, and product name.

The right panel, **Status,** shows the fault status, internal state (that is, run mode) and whether the file is owned and **Module Identity**.

The **Refresh** and **Reset Module** buttons are active when the controller is on line.

Refresh: Click this button to refresh the data in the window.

Reset Module: Click this button with care as it disconnects the module momentarily and control is interrupted. A warning window appears: "Click **Yes** or **No** as needed. Click **Help** for further information."

Configuration Tab

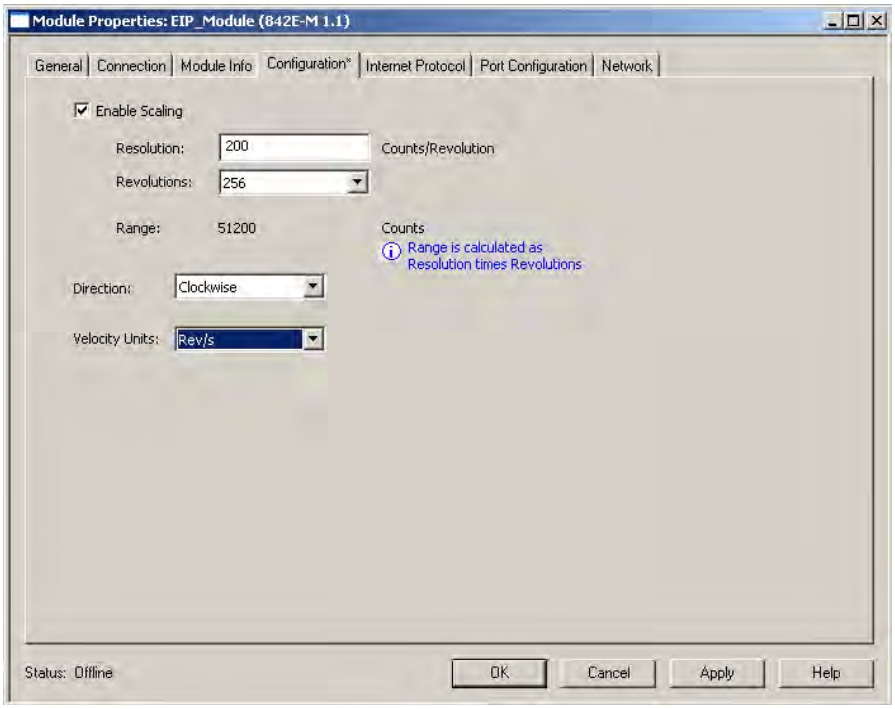


Figure 15

The **Configuration** tab is used to configure the encoder scaling, direction, and set velocity units. Click the **Enable Scaling** checkbox to change the encoder resolution. Use the **Direction** drop down box to set the direction of the encoder (check the definition in the old user manual). Use the velocity units to set the velocity units of the encoder.

Scaling makes it possible to scale the steps per revolution and the total resolution (see Linear Scaling Example on page 75 in Appendix B).

If the **Enable Scaling** box is checked, the values can be entered for the steps per revolution and the total resolution applied.

Direction: The direction of rotation (increase position value), viewed on the shaft, can be set to clockwise or counterclockwise.

- Clockwise = increase position value on clockwise revolution of the shaft
- Counterclockwise = increase position value on counterclockwise revolution of the shaft.

Velocity units: Use this parameter to define the units in which the velocity is transmitted. The options are the following:

- Counts/sec
- Revolutions/sec
- Revolutions/min

Internet Protocol Tab

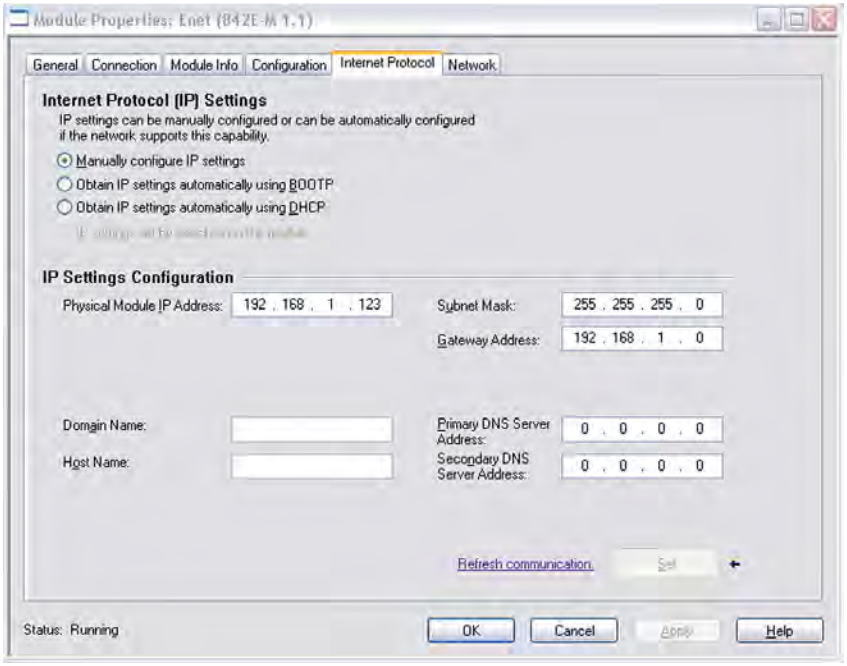


Figure 16

For this user manual, the user is expected to use a private address, that is, an address of 192.168.1.xxx. This window is automatically populated with the data.

Network Tab

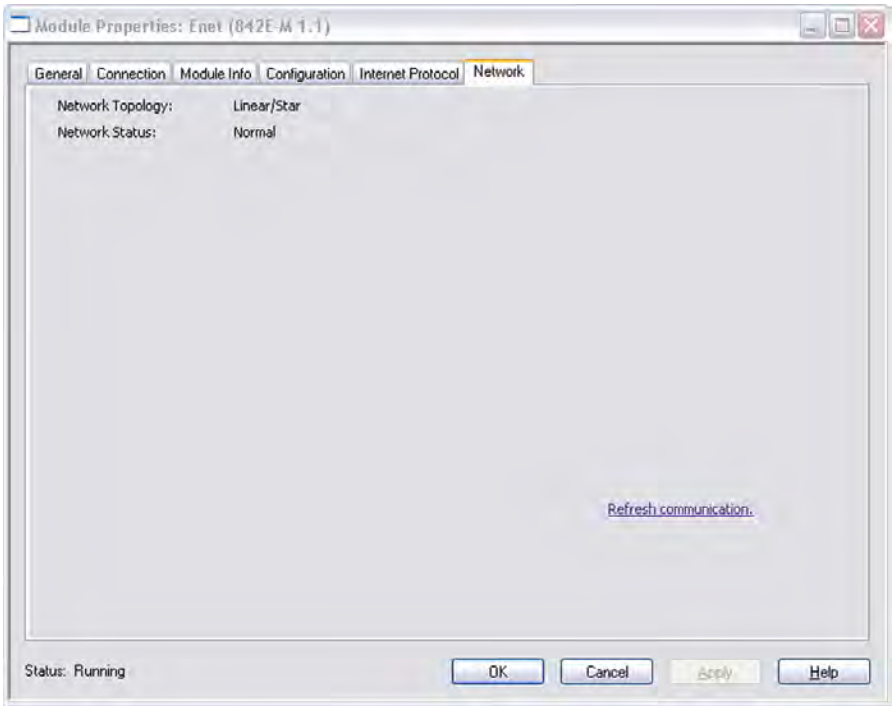


Figure 17

The **Network** tab contains read-only data that is populated when the controller goes online.

Network Topology: Displays the current network topology as either linear/star or ring.

Network Status: Displays the current network status as normal, ring fault, or unexpected loop detected.

The **Refresh Communication** link appears when communication with the encoder has failed. Click **Refresh Communication** to attempt to restart communication with the encoder.

Configuration

Default Encoder Settings

The 842E EtherNet/IP encoder is supplied with the following parameters:

- Direction = clockwise
- Scaling = none
- Steps per revolution = 262,144
- Total resolution = 1,073,741,823
- Preset = 0
- Velocity unit = rpm

Preset Function

The 842E encoder position value is set to zero when the preset function is executed (by the preset push button or EtherNet/IP). This predefined value is stored in the EEPROM. The factory default preset value is zero.

ATTENTION: The preset function results in a change of position reading. The change of position reading, causes unexpected motion, which could result in personal injury and damage to the product or equipment. During preset, steps are taken to confirm that the shaft is stationary and remains so.

The preset function is not intended for use in dynamic parameter setting operations, but as an electronic adjustment function during commissioning. Rather, it allocates a specific value to the mechanical rotary position of the 842E encoder. For example, the encoder zero position can be adjusted to the zero point of the machine.

If the EtherNet/IP sets the preset value, the value must be within the total working range that is configured (steps per revolution and number of revolutions).

The preset push button (see Figure 2 on page 41 and Preset Push Button on page 42) is only operated when the encoder is powered and the green status indicator is blinking or steady.

IMPORTANT Press the preset button briefly, no longer than one second.

RSLogix 5000 Controller Tags

During the encoder installation, the encoder tags are automatically loaded as controller tags. Making the tags available for all programs.

In the controller organizer, click the **Controller Tags**.

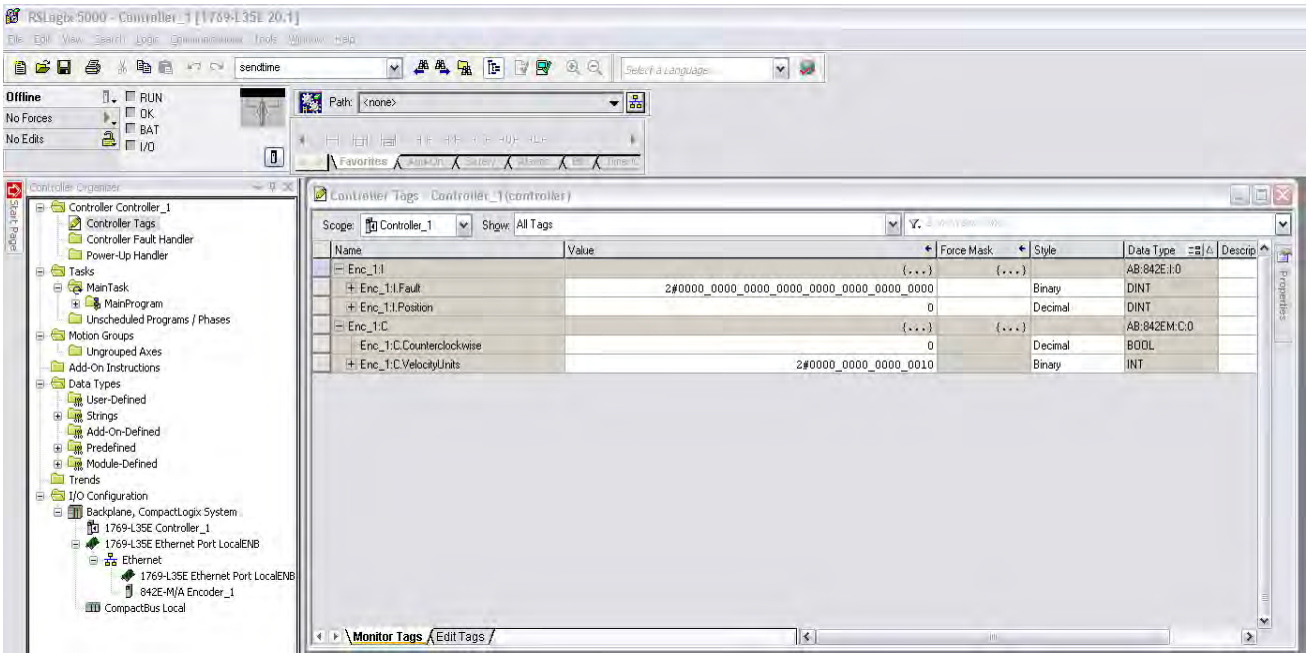


Figure 18

The categories of tags appear. The tag name is composed of the encoder name followed by a:

- :"C" for configuration
- :"I" for input

Configuration Image Table and Tags

Expand **Enc_1: C by clicking "+."** Showing the configuration image table, which has the following tags:

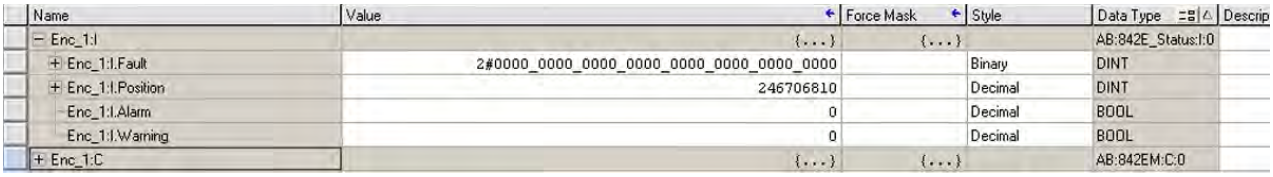
Name	Value	Force Mask	Style	Data Type	Descrip
+ Enc_1:I	{...}	{...}		AB:842E:I:0	
- Enc_1:C	{...}	{...}		AB:842EM:C:0	
Enc_1:C.Counterclockwise	0		Decimal	BOOL	
+ Enc_1:C.VelocityUnits	2#0000_0000_0000_0010		Binary	INT	

Enc_1: C.Counterclockwise: Configuration status of the direction of the count as defined in the encoder profile.

Enc_1: C.VelocityUnits: Velocity units status of the encoder as defined in the encoder profile.

Input Image Table and Tags

Expand **Enc_1: I** by clicking "+." Shows the input image table, which has the following tags:



Name	Value	Force Mask	Style	Data Type	Descrip
− Enc_1:I	{...}	{...}		AB:842E_Status:I:0	
+ Enc_1:I.Fault	2#0000_0000_0000_0000_0000_0000_0000_0000		Binary	DINT	
+ Enc_1:I.Position	246706810		Decimal	DINT	
Enc_1:I.Alarm	0		Decimal	BOOL	
Enc_1:I.Warning	0		Decimal	BOOL	
+ Enc_1:C	{...}	{...}		AB:842EM:C:0	

Figure 19

Enc_1: I.Fault: Fault status of the encoder.

Enc_1: I.Position: Position status of the encoder. If position-status is selected from the input data selection in the encoder definition, you also see alarms and warning status.

Enc_1: I.Velocity: Velocity status of the encoder is also included when selecting velocity-status from input data selection in the encoder definition.

Diagnostics and Troubleshooting

This chapter describes the diagnostic process to correct and clear fault conditions on the 842E encoder.

ATTENTION: Cease operation if the cause of the malfunction has not been identified.

Stop the machine if you cannot clearly identify the error and/or if you cannot safely rectify the malfunction.

Status Indicators

The Mod status indicator shows the device status. The Net status indicator shows the status of the CIP connection. The Encoder status indicator shows the status of the internal measuring device in the 842E EtherNet/IP encoder.

Five status indicators provide status information on the back of the encoder. The figure shows their location and the tables describe their status.

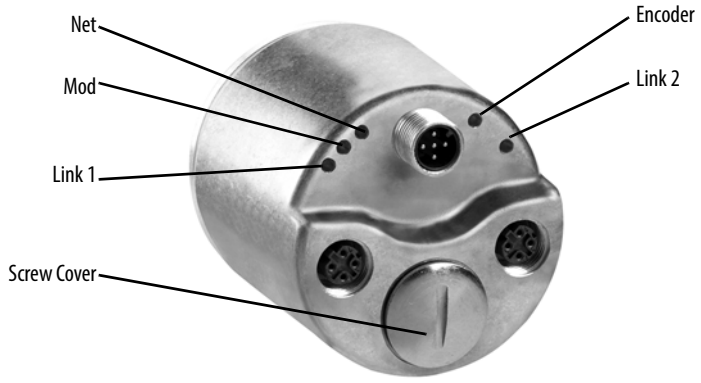


Figure 1 -

Read the status indicators according to the following tables.

Status Indicator Net	Description
OFF	No power or No IP address
Green blinking	No connection The device has an IP address but no CIP connection.
Green	The device has an IP address and a CIP connection.

Status Indicator Net	Description
Red blinking	Warning, connection time-out Cleared by reset or a new connection
Red	Error IP address has been assigned to another device already.
Green/Red blinking	Self-test at power-on

Status Indicator Mod	Description
OFF	No power
Green	Device operational
Green blinking	Standby/device not configured, no IP address assigned
Red blinking	Warning, but device still operational or Firmware update in progress
Red	Error, device not operational
Green/red blinking	Self-test at power-on

Status Indicator Encoder	Description
OFF	No power or No IP address
Green blinking	Warning Wrong parameter
Green	Device operational
Red blinking	Warning, but device still operational or Firmware update in progress
Red	Error Encoder error
Green / red blinking	Self-test at power-on

Ethernet Link Status Indicators Link 1 and 2

The Ethernet link status indicators, Link 1, and Link 2, display the status of the physical connection on the Ethernet interface.

Link 1 or Link 2 Status Indicators	Description
OFF	No link / power off
Green solid	Ethernet connection is established
Green blinking	Data transmission TxD/RxD
Amber solid	Interface port is locked
Amber blinking	Data collisions

Self-test Via EtherNet/IP

Electromagnetic interference (EMI) can cause incorrect operations or errors in the position value. Without a self-test, an immediate position change occurs on power-up.

Use the position sensor object triggers a self-test with attribute 13, see CIP Object Model on page 24. During this test, the sensor and the most important functions are tested automatically. If an error occurs, bit 27 in the fault header is set.

Warnings, Alarms, and Errors Via EtherNet/IP

ATTENTION: It is imperative to evaluate the alarms in your application.

If there is a serious error, incorrect position values are output. This change could cause an unexpected movement that results in a hazard for persons or damage to the system or other objects.

Within EtherNet/IP warnings, alarms, and errors can be retrieved using implicit messages and also explicit messages.

Alarms and warnings for the encoder can be read via the position sensor object with the aid of the attributes.

For errors, alarms, and warning the following applies:

Bit status = 0: no error, alarm, or warning

Bit status =1: error, alarm, or warning present

In addition, the **Net** status indicator illuminates red continuously.

Warnings

Bit	Warning	Description	FALSE (0) (47)	TRUE (1) (47)
0	Frequency exceeded	Max. velocity exceeded	OK	Exceeded
1	Light control reserve	Status indicator current critical	OK	Out of Range
2	CPU watchdog	Not implemented	Always 0	–
3	Operating time limit warning	Operating time limit is reached	Always 0	–
4	Battery charge	Not implemented	Always 0	–
5	Reference point	Not implemented	Always 0	–
6	Minimum velocity flag	Minimum velocity setpoint reached	OK	Fall below
7	Maximum velocity flag	Maximum velocity setpoint reached	OK	Exceeded
8	Minimum acceleration flag	Minimum acceleration setpoint reached	OK	Fall below
9	Maximum acceleration flag	Maximum acceleration setpoint reached	OK	Exceeded
10	Position limits exceeded	Max. position exceeded	OK	Exceeded
11	Reserved by CIP	–	Always 0	–
12	Reserved by CIP	–	Always 0	–
13	Vendor: Temperature out of range	Temperature setpoints reached	OK	Out of Range
14	Vendor: over / under voltage (9.700…30.300mV)	Voltage setpoints reached	OK	Out of Range

Table 1 - Supported Warnings (Attribute 47+48)

Alarms

The alarm type is coded in a bit field of attributes 44 and 45. If one of the bits listed below is set, the alarm flag (attribute 47) is also set.

If, for example, the velocity or temperature drop below/exceed the limit values, the warning flag is set (attribute 49 position sensor object).

In addition, the **Net** status indicator blinks red.

The warning type is coded in a bit field of attributes 47 and 48.

Note: The position value continues to be correctly calculated; the encoder is therefore still ready for operation.

Bit	Description	Description	FALSE (0) (44)	TRUE (1) (44)
0	Position ERROR	Position error	Ok	ERROR
1	Diagnostic ERROR	Diagnostic error	Ok	ERROR
2…11	Reserved by CIP	–	–	–
12	Vendor: checksum ERROR	Checksum error	Ok	ERROR
13	Vendor: startup ERROR	Startup error	Ok	ERROR
14…15	Vendor specific	–	–	–

Table 2 - Supported Alarms (Attribute 44+45)

Errors

Fault Header [byte]	Bit	Name	Description
0	0	Over temperature controller	Temperature value of the microcontroller is out of range
	1	Over temperature sensor	Temperature value of the sensor is out of range
	2	Light control reserve	Indicator current is not correct
	3	Voltage detection	Over/Under voltage detection (fall below/ exceeded the limit)
	4	Frequency exceeded.	Speed too high (limit exceeded)
	5	Velocity exceeded	Minimum/maximum velocity setpoint reached
	6	Acceleration exceeded	Minimum/maximum acceleration setpoint reached
	7	Position limits exceeded	Minimum/maximum position setpoint reached
1	8	Position error	Amplitude error single
	9	Position error	Amplitude error multiple
	10	Position error	Vector length single Vector length ($Sin^2 + cos^2$)
	11	Position error	Vector length multiple Vector length ($Sin^2 + cos^2$)
	12…14	Reserved	
	15	Reserved	

Table 3 - Sensor Error Table

Fault Header [byte]	Bit	Name	Description
2	16	Position error	LY digital random error and LY MFP5 error (single position)
	17	Position error	Position multi-turn error, synchronization
	18	Position error	Position multi-turn error, synchronization (quad-single)
	19	Position error	Position multi-turn error, internal interface
	20	Position error	Position multi-turn error FRAM (magnitude)
	21	Reserved	Always 0
	22	Reserved	
	23	Reserved	
3	24	Position or memory error	Memory or EEPROM Check Sum error
	25	Memory error	Memory or EEPROM I2C error
	26	Start-up error	Start-up error
	27	Diagnostic error	This flag is set if the encoder detects a diagnostic error.
	28	Reserved	
	29	Sanity-check flag	This flag is set if the encoder detects a diagnostic error.
	30	Slave sign of life	This functionality is active if byte 0 of attribute 106 is set.
	31	Reserved	

Table 3 - Sensor Error Table

The following error messages stem from the RSLogix 5000® software.

Error Code	Message	Possible Cause
16#0108	Connection-request error connection type (multi-cast/uni-cast) not supported.	Check whether the configuration assembly (instance 100 of the Assembly Object) is activated. If yes, check whether the configuration data are correctly and fully configured in this assembly (see Figure xx on page 55).
16#0114	Electronic keying mismatched: electronic keying product code and/or vendor ID mismatched.	Check whether the wrong EDS file has been selected (for example, single-turn instead of multi-turn or vice versa).
16#0127	Connection request error: invalid output size.	Check whether the correct communication format for the control system is used. The default value in the control system is “Data-DINT.” The encoder requires the communication format: “Input Data-DINT.”
16#0204	Connection request error: connection time-out.	Check the supply voltage on the encoder. Check the Ethernet cables for the encoder for open circuit. Check whether the IP address of the encoder matches the IP address that is saved in the control system. Possible causes: • The address switches are not engaged correctly. • The encoder has lost the IP address that is assigned to it after switching back on.

Table 4 - Error Messages

Installing the Add-on Profile

Introduction

This appendix shows how to install the Add-on Profile (AOP) of the encoder with the RSLogix 5000® program. Add-on Profiles are files that users add to their Rockwell Automation® library. These files contain the pertinent information for configuring a device that is added to the Rockwell Automation® network.

The Add-on Profile simplifies the setup of devices because it presents the necessary fields in an organized fashion. The AOP allows you to install and configure your systems in a quick and efficient manner.

The Add-on Profile is a folder, which contains numerous files for the device. It comes as an installation package.

Performing the Installation

Install the Add-on Profile following the on-screen instructions.

1. In the file explorer, locate the directory where the installation files were extracted.
2. Click **MPSetup.exe**.
3. Extract the zip file to a local directory on your computer.
4. To begin the installation, double-click **MPSetup.exe**.

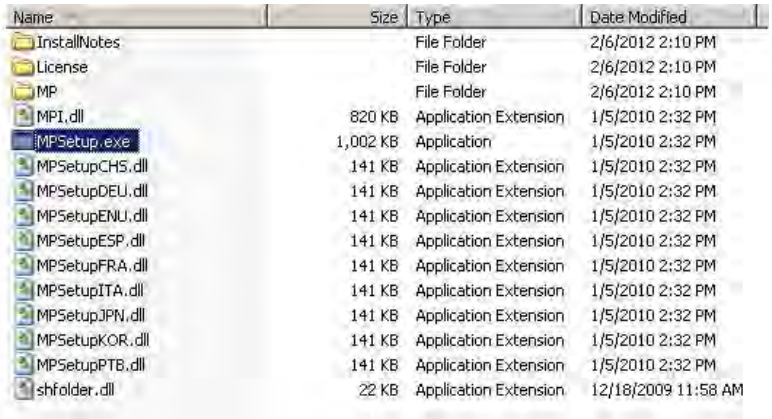


Figure 1

5. At the welcome screen, click **Next**.

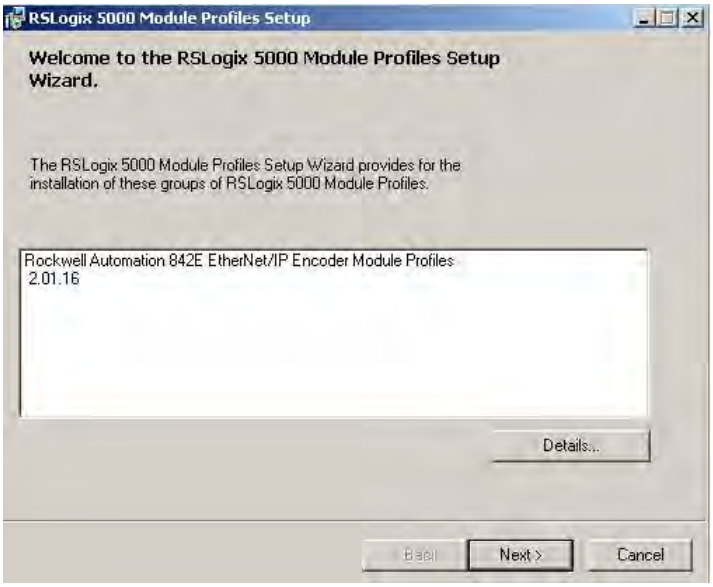


Figure 2

6. To accept the licensing terms, click the radio button, then click **Next**.

Figure 3

7. Click the **Install** radio button and then click **Next**.

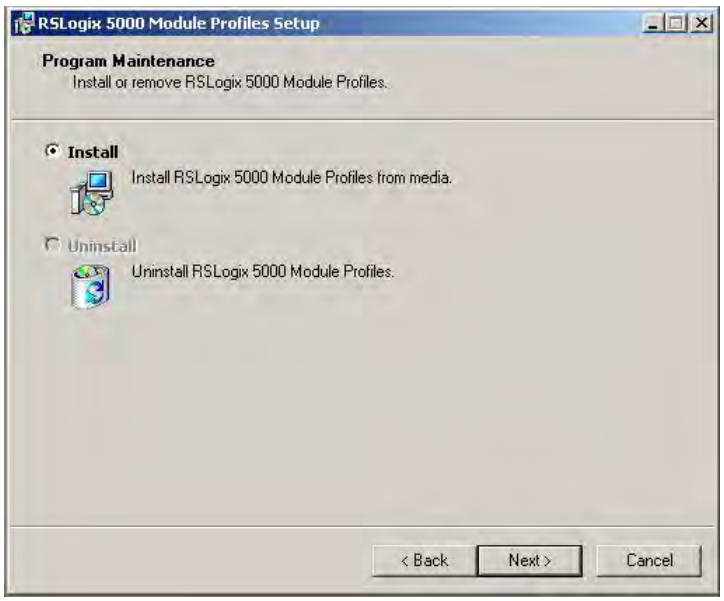


Figure 4

8. Click **Install** to begin the installation.

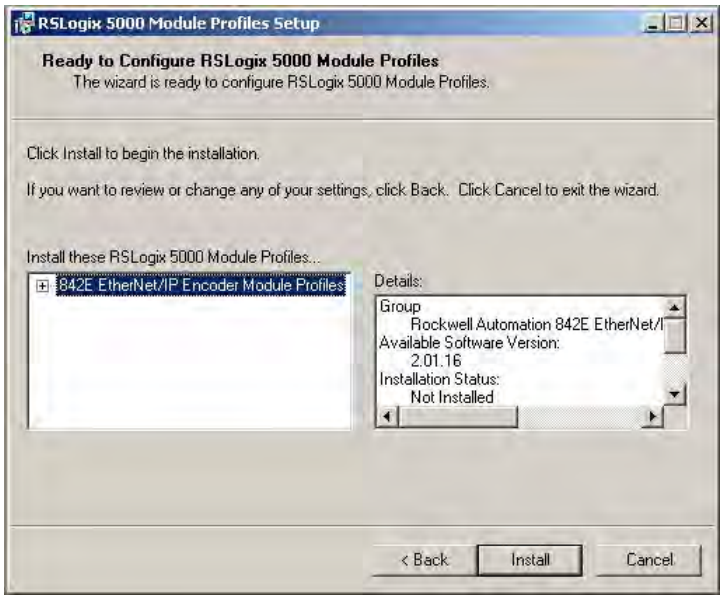


Figure 5

9. Click **Next** to install the Add-on Profile files.

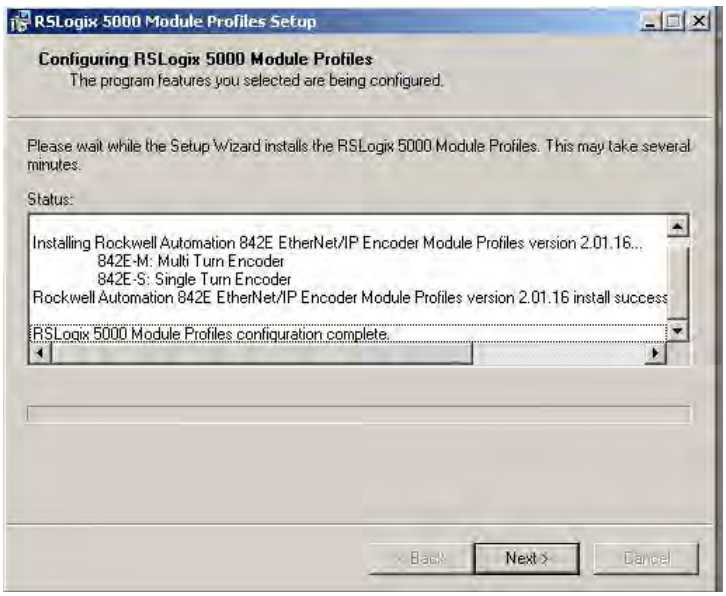


Figure 6

10. Click **Finish** to complete the installation.

Figure 7

RSLogix 5000® Sample Code

This appendix gives examples of using your encoder, including how to use RSLogix 5000 to set and read parameters.

Linear Scaling Example

A linear cart is to be controlled using ball screw slide. The cart will stop after 1 m (3.28 ft) of travel for loading and unloading. For precise measurement of the distance between stops, 10,000 steps are required.

The cart travels 20 mm (0.79 in.) for one revolution of the encoder, which brings the number of rotations the encoder turns for 1 m (3.28 ft) of travel distance to 50. For a resolution of 10,000 steps per meter, the encoder requires 200 steps per revolution.

There are three stops along the 3 m (9.84 ft) track, so our total resolution must be at least 3 x 10,000 = 30,000 steps to cover the length of the track. For the scaling function, our total resolution must be

$$2^n \times CPR$$

Or in this case

$$2^8 \times 200 = 51,200$$

Install the Configuration tab as follows.

1. Set **Parameter Scaling** to **Enable.**
2. Set **Counts per Revolution** to 200.
3. **Total Measuring Range** is 51,200.
4. Position the slide/encoder to a known start position.
5. Set the preset value. The encoder retains the preset value through a machine cycle.

Installing Your Project

1. Create a program file. Select the processor revision and name the project file. In this example, the CompactLogix™ 1769-L35E V20 was used.

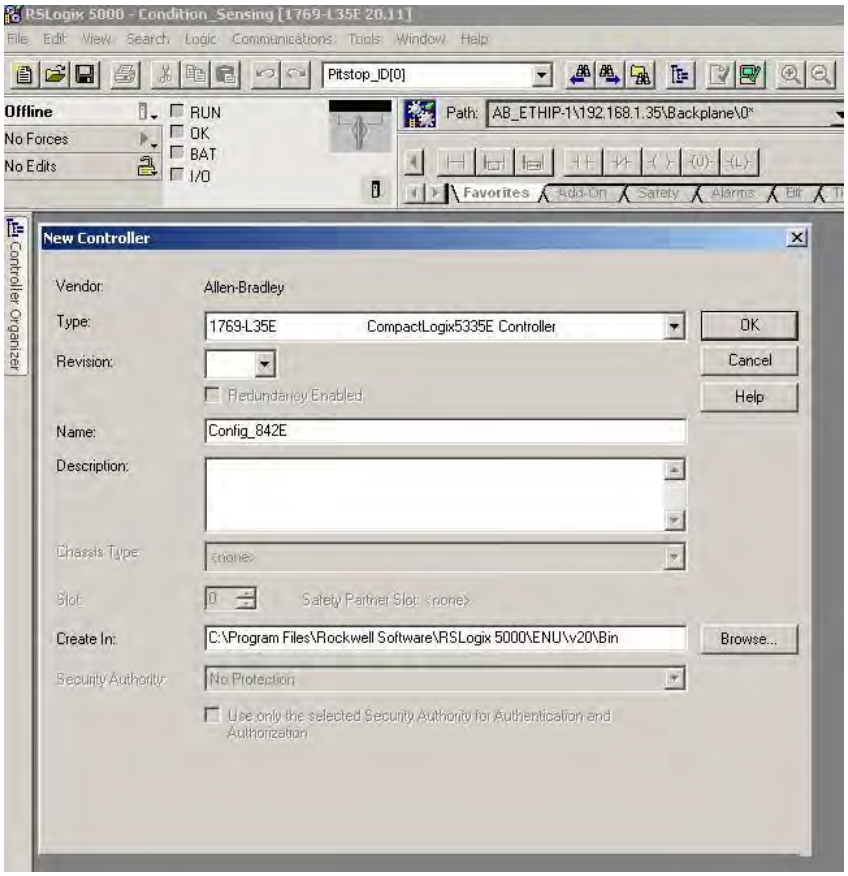


Figure 1

2. In the controller organizer, right-click **Ethernet Communication Adapter** and select **Properties**.

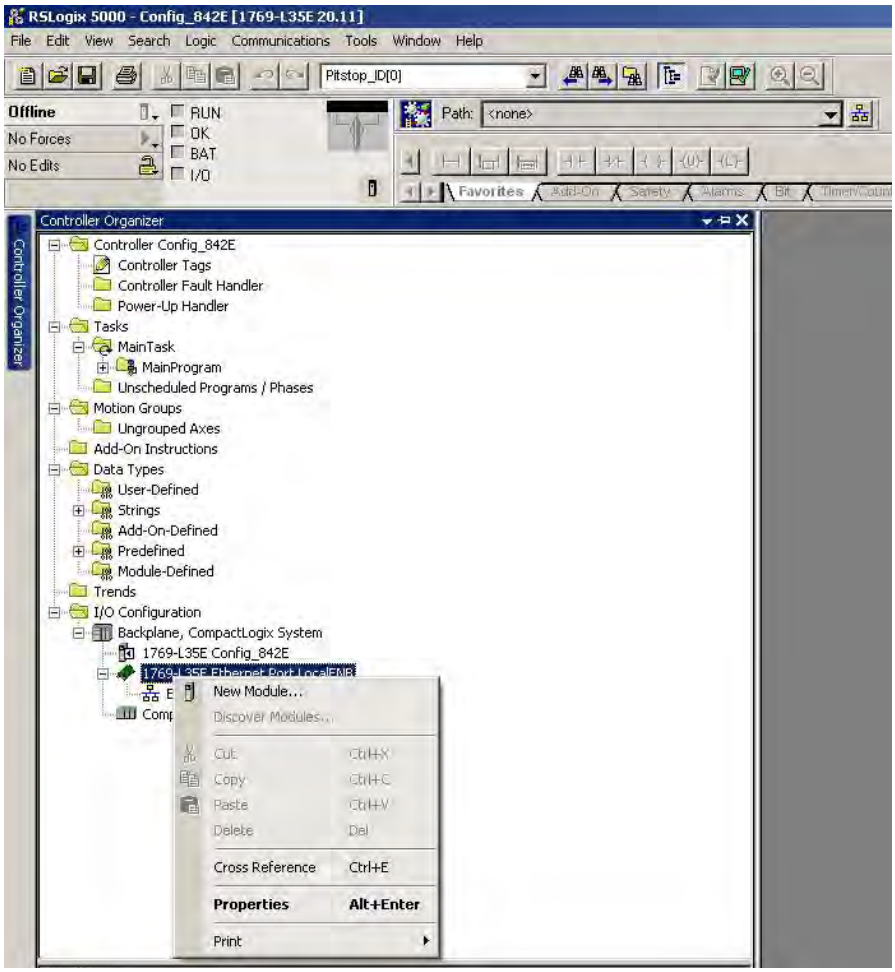


Figure 2

3. Configure the controller IP address, this example uses 192.168.1.100. Click **Apply**, then **OK**.

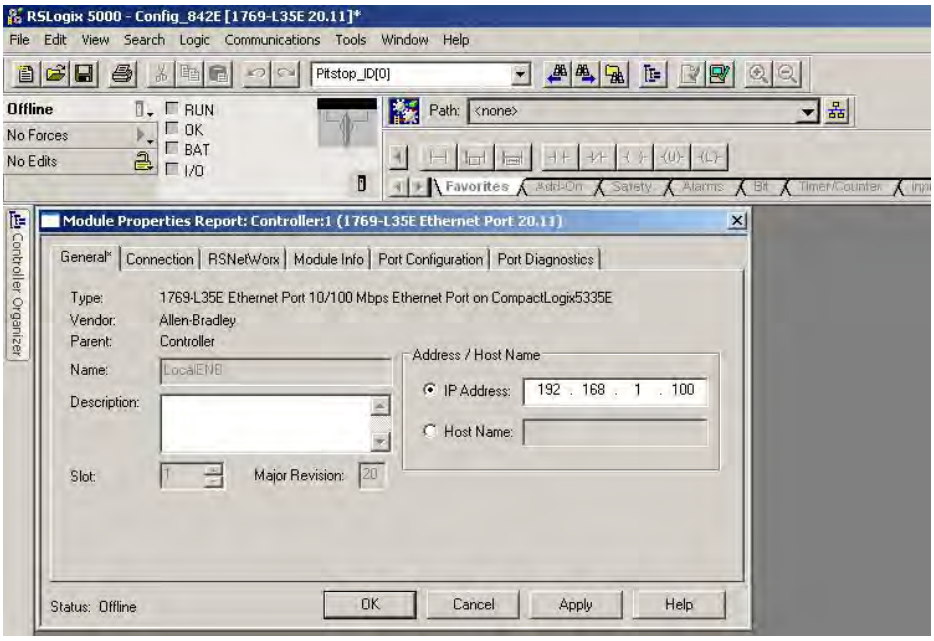


Figure 3

4. Right-click **Ethernet Network** and select **New Module**.

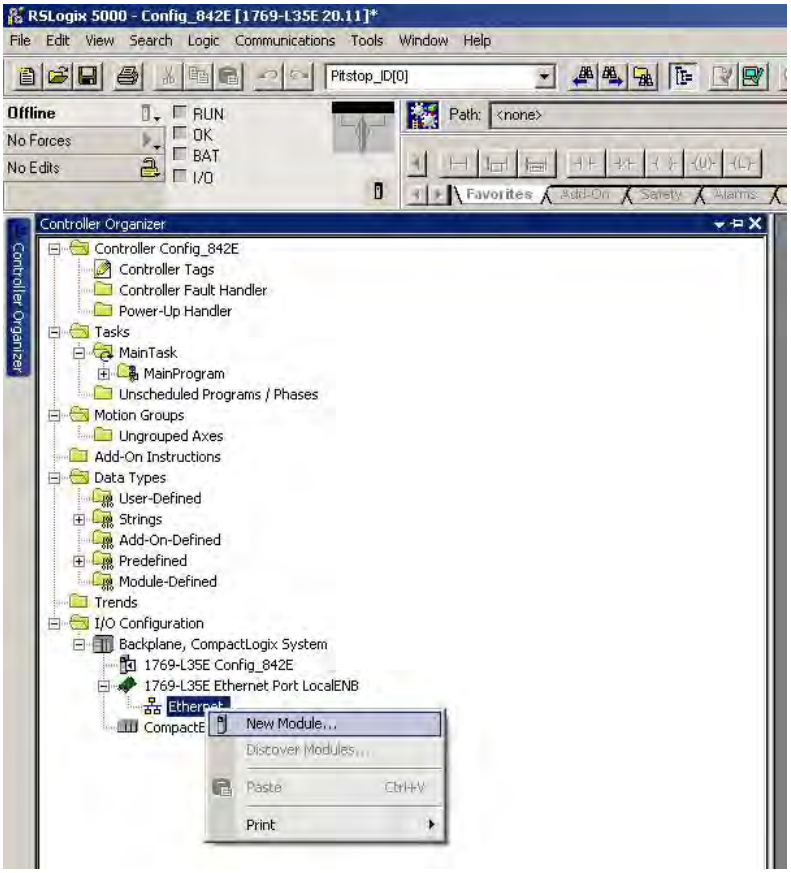


Figure 4

5. Find the encoder Add-on Profiles under specialty modules. Select the Add-on Profile for either **Multi-turn Encoder** or **Single-turn Encoder**, then click **Create**.

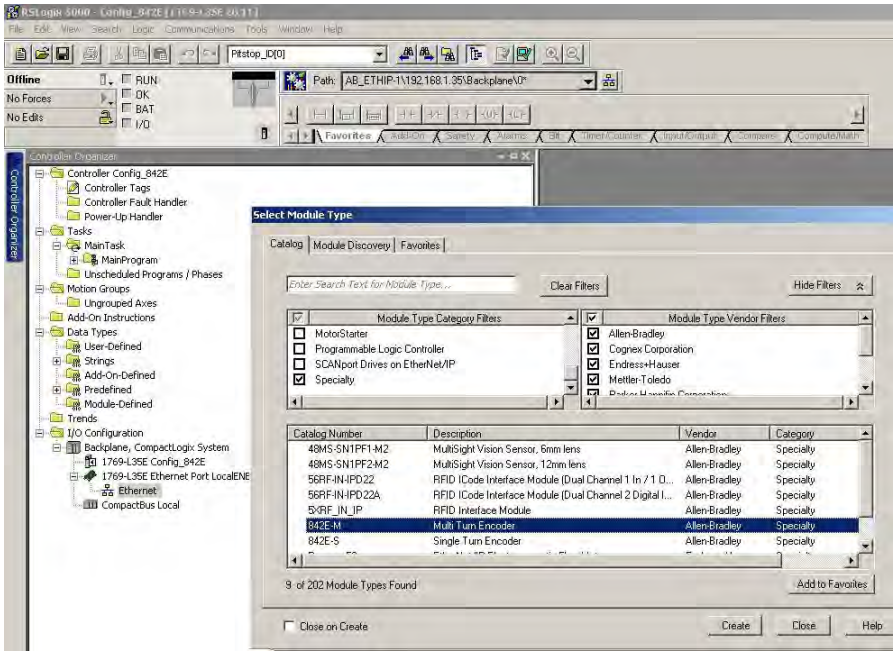


Figure 5

6. The encoder Add-on Profile configuration then launches. Name the encoder (In this example it is *My_842E)*. Configure the encoder IP address at 192.168.1.101.

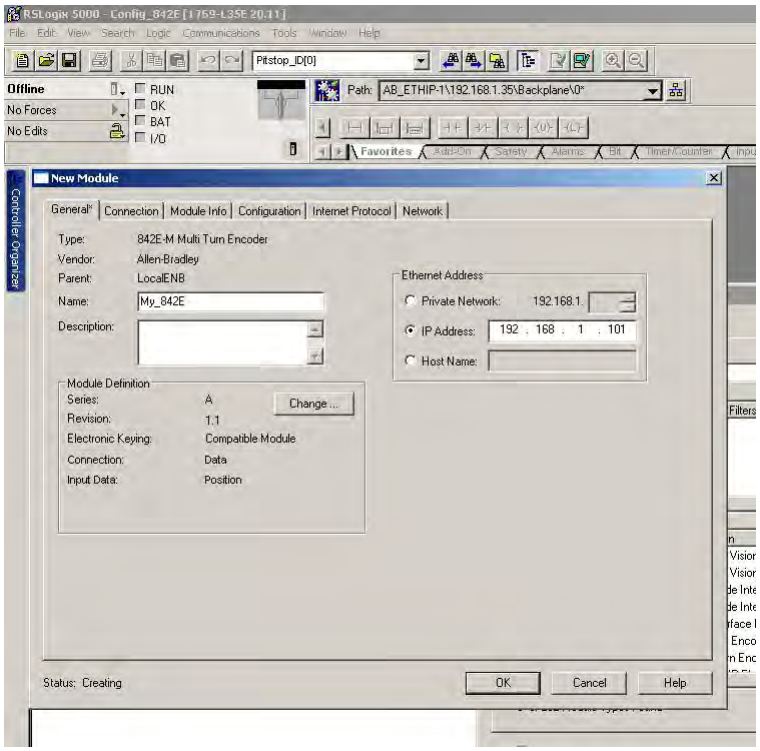


Figure 6

7. Click the Configuration tab and set it up as shown per the linear scaling example on page 75. Click **Apply**, then **OK**.

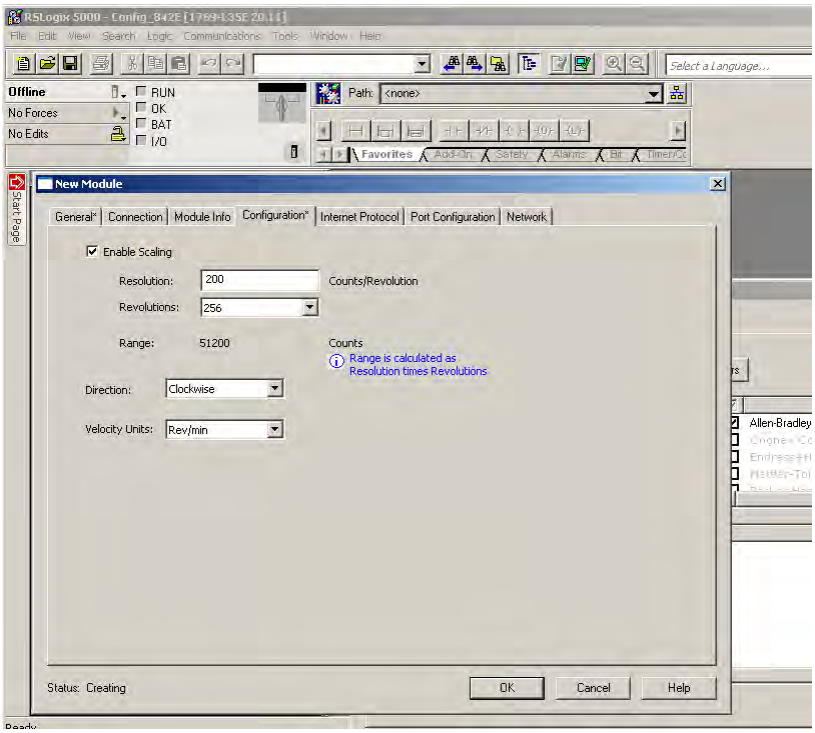


Figure 7

8. The encoder can now be seen as configured on the Ethernet network in the controller organizer.

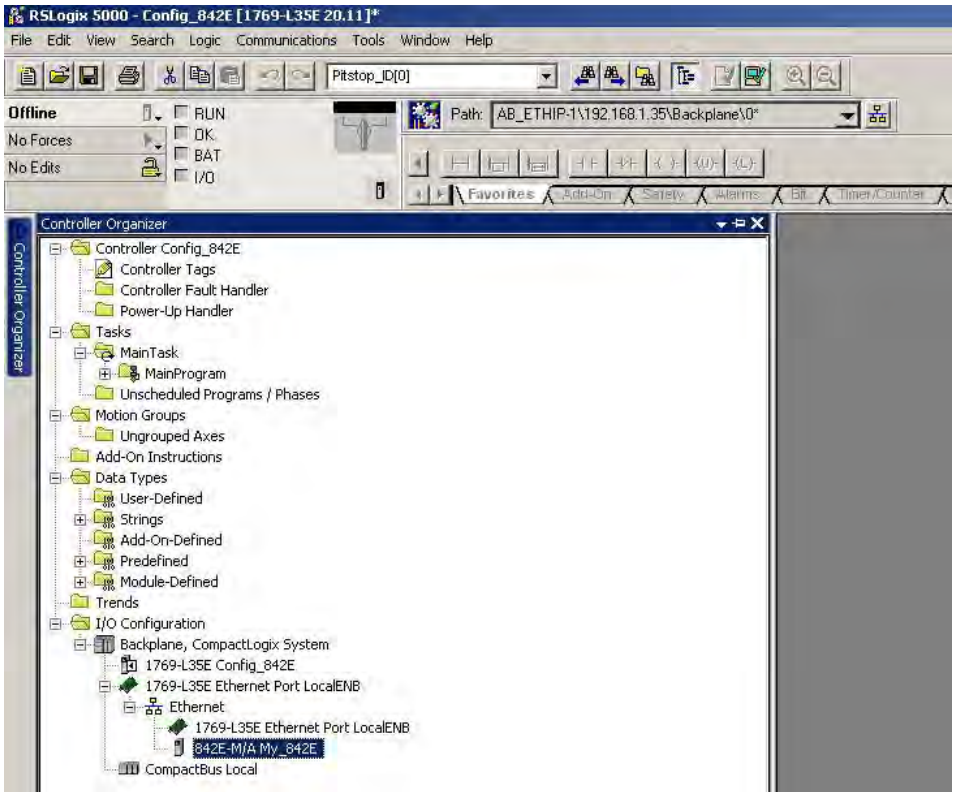


Figure 8

9. The project can then be downloaded to the controller.

Using an Explicit Message Configuration to Set Preset Encoder Value

ATTENTION: The preset function results in a change of position reading. The change can cause unexpected motion, which could result in personal injury and damage to the product or equipment. During preset, steps are taken to confirm that the shaft is stationary and remains so.

In this example, a value is sent to the preset attribute in the encoder. The encoder stores the preset value that is sent in nonvolatile memory. When you store the preset value it applies the preset value to the encoder position value.

The following program fragment sends an explicit message and confirms the message reception.

1. Create a message data type named *Preset_Message* and a DINT named *Preset_Value*.

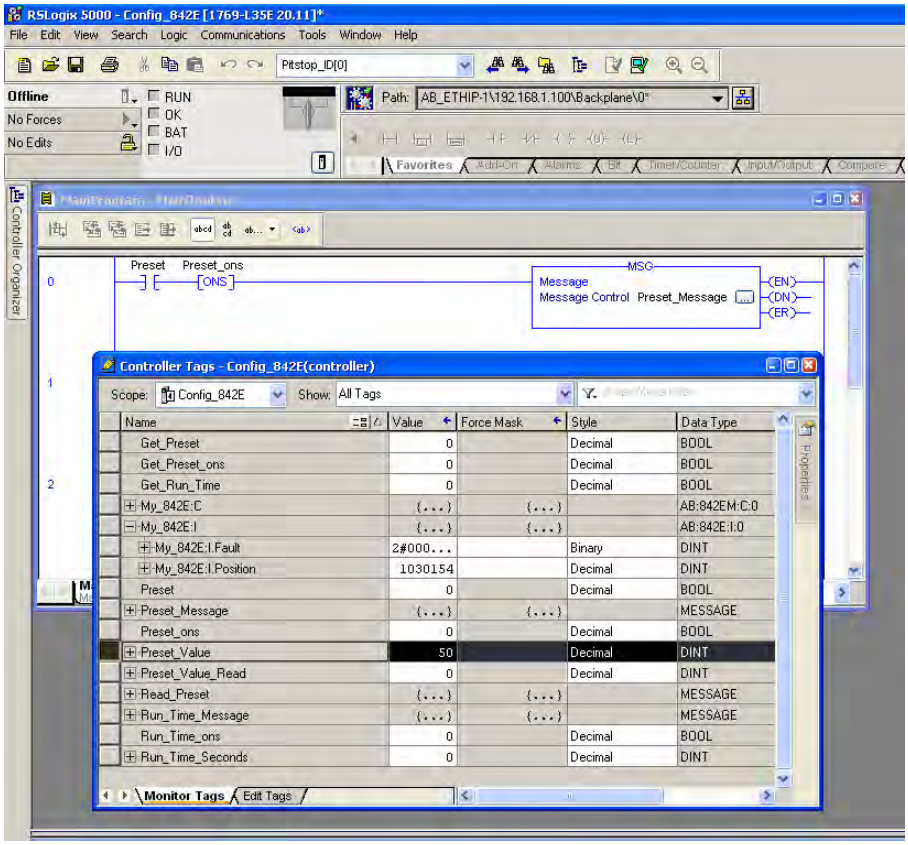


Figure 9

2. Add an MSG instruction to the program and browse to the **Preset_Message** data type created in step 1. Then to configure it, double-click the gray box on the message instruction.

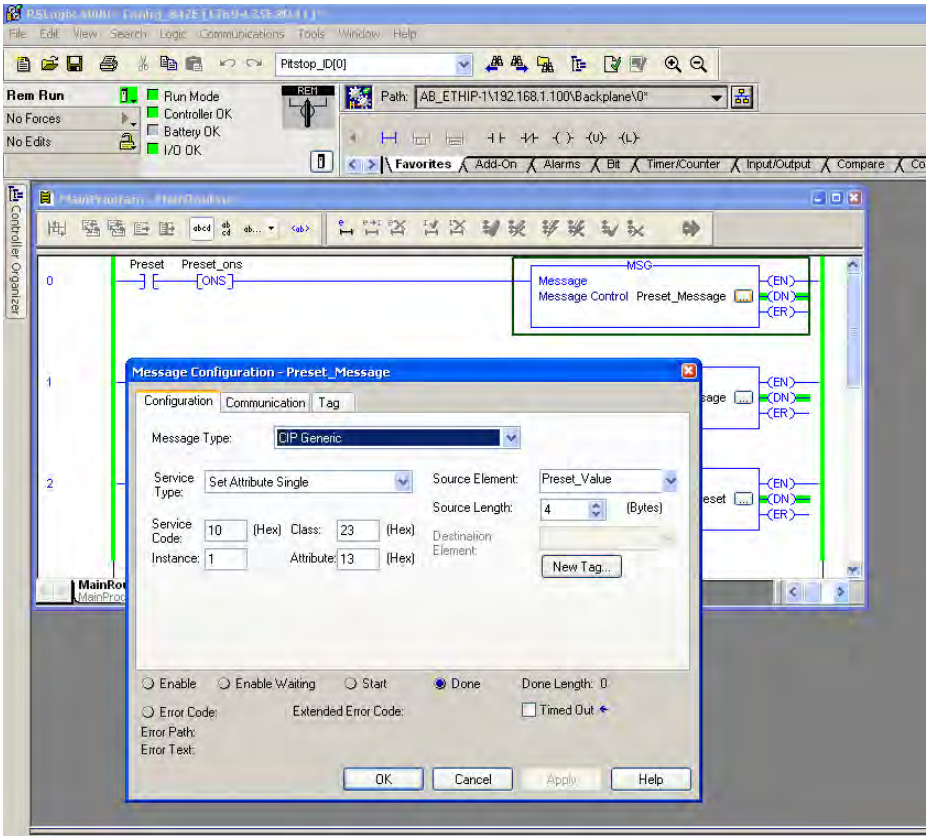


Figure 10

3. Use the Position Sensor Object to find the values you want to use to send an explicit message. In the Configuration tab select:

   Message type: CIP generic

   Service type: Set attribute single

   Service Code: (Automatically populated)

   Source element: Preset_value (browse to this tag).

   Source length: 4

   Instance: 1

   Class: 23*

   Attribute: 13*

   *hexadecimal values

4. In the **Communication** tab, browse to the encoder on the Ethernet network, then click **OK**.

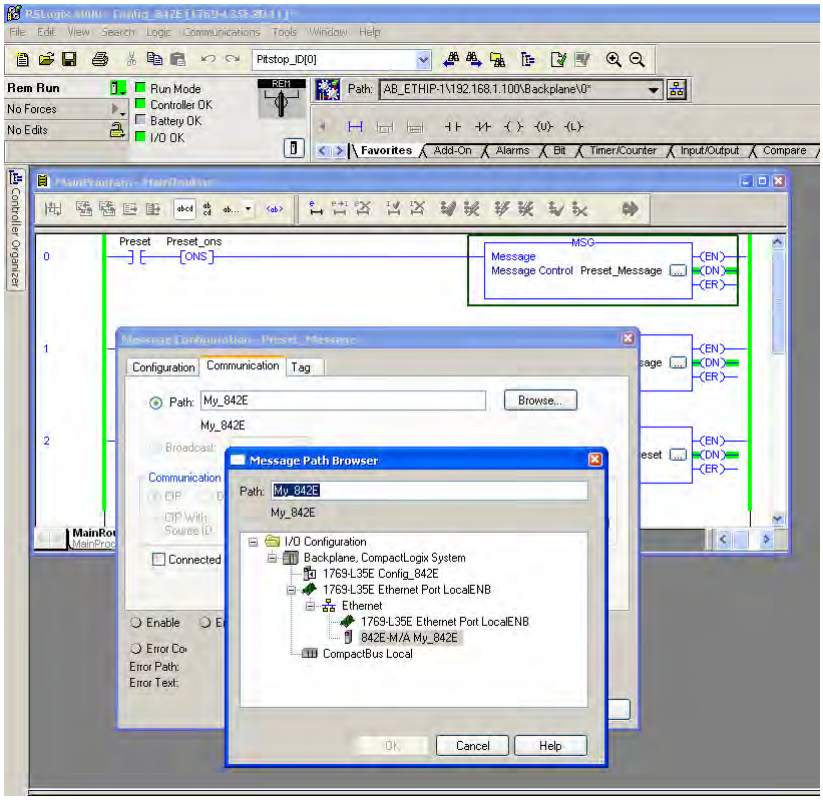


Figure 11

5. The **Tag** tab is populated for the **Preset_Message**

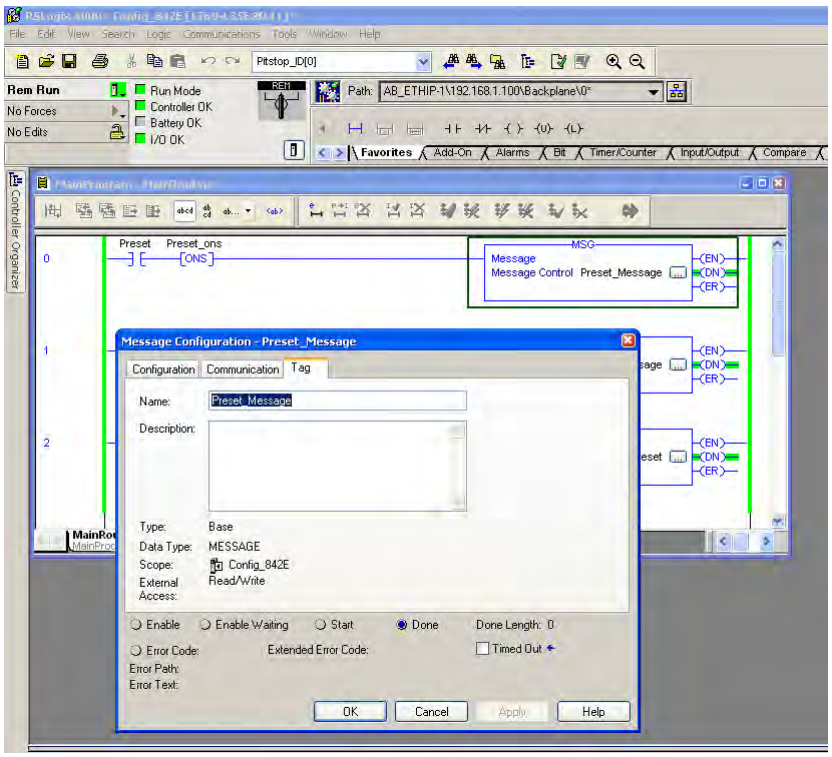


Figure 12

6. To initialize the message instruction, add a normally open contact and a one-shot instruction.

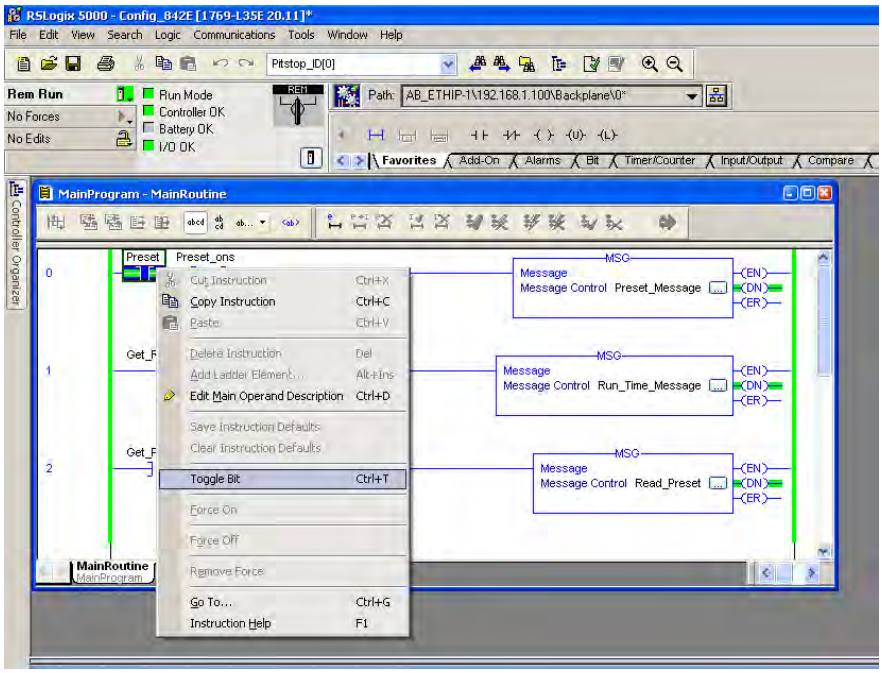


Figure 13

7. After you enter a value into the **Preset_Value DINT** and toggle the preset contact, the message instruction presets the current count value of the encoder. The position value is changed to the preset value you set.

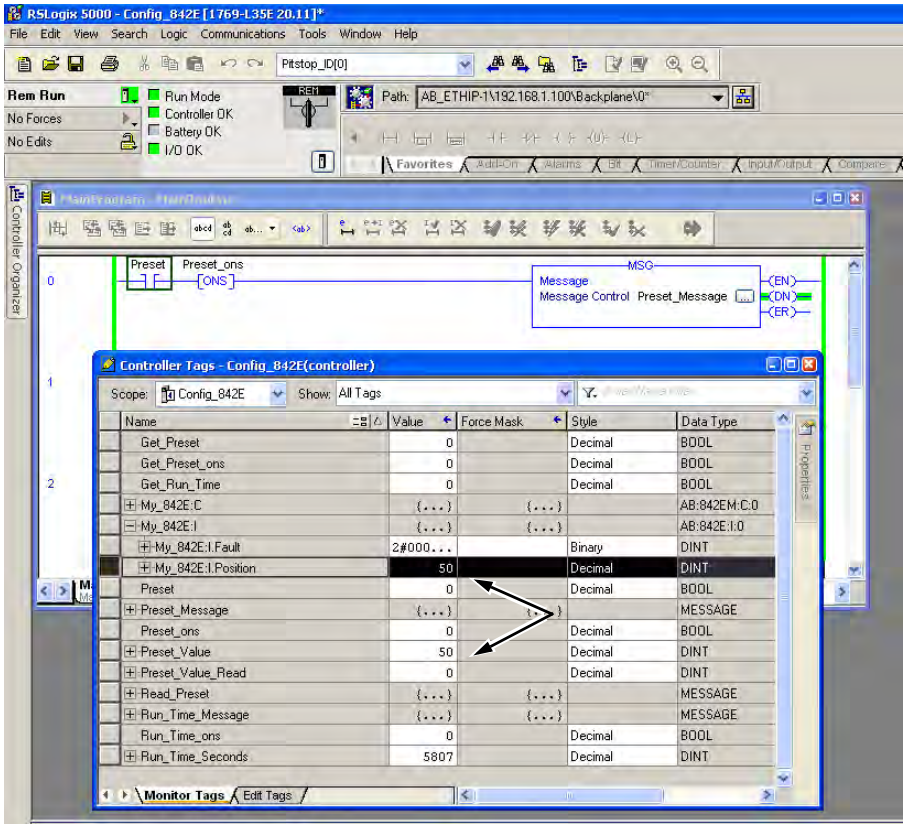


Figure 14

IMPORTANT Always do a *Get* after a *Set* to verify that the value was changed.

Using an Explicit Message Configuration to Read Preset Encoder Value

1. Create a message data type named Read_Preset and a DINT named Preset_Value_Read.

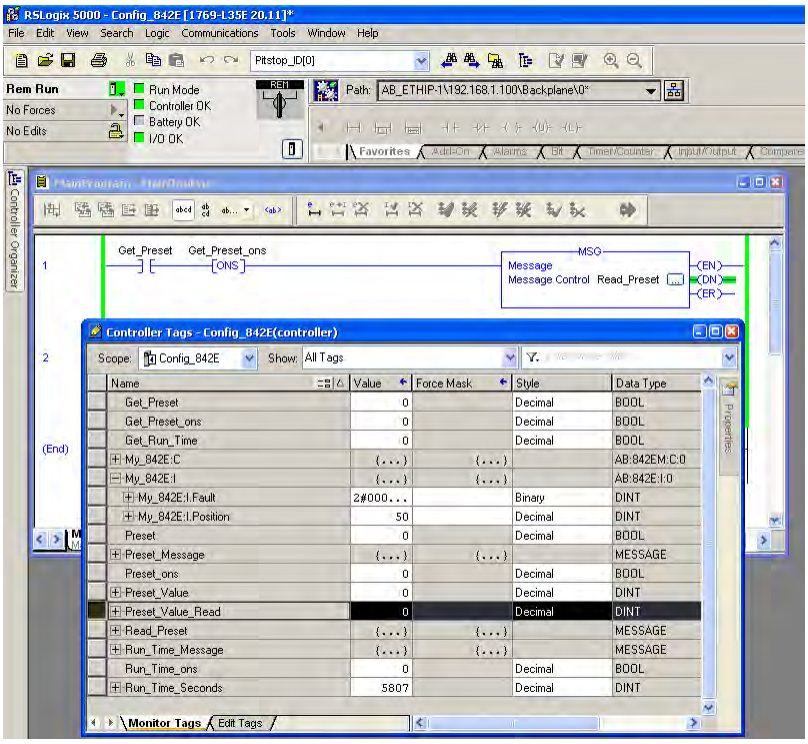


Figure 15

2. Add an MSG instruction to the program and browse to the Read_Preset data type created in step 1. To configure it, double-click the gray box on the message instruction.

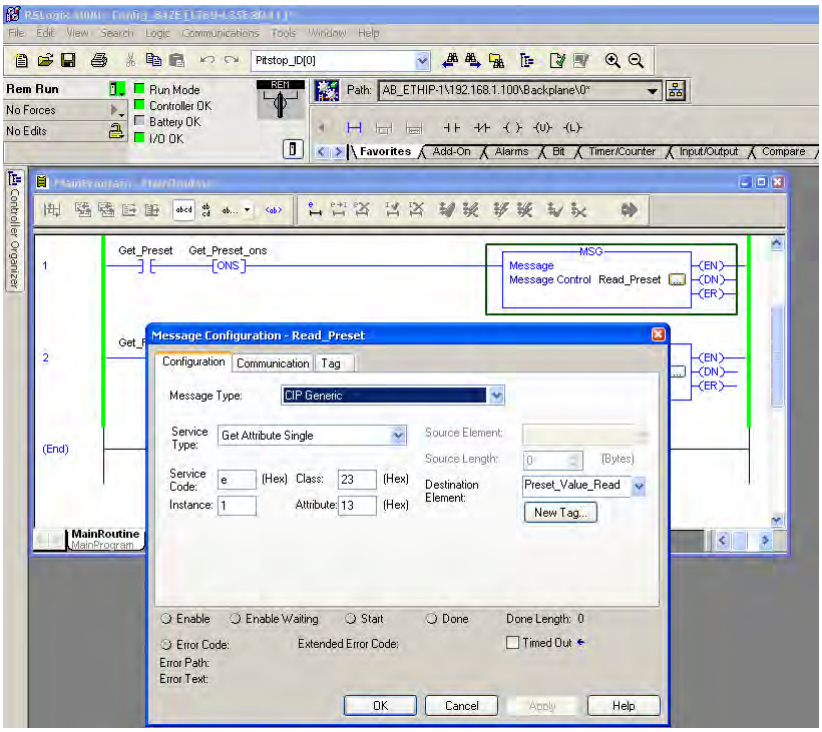


Figure 16

3. In the Configuration tab select:
   Message type: CIP generic
   Service type: Get attribute single
   Service Code: (automatically populated)
   Source element: Preset_Value_Read (browse to this tag).
   Instance: 1
   Class: 23*
   Attribute: 13*

   * hexadecimal values

4. In the Communication tab, browse to the encoder on the Ethernet network, then click OK.

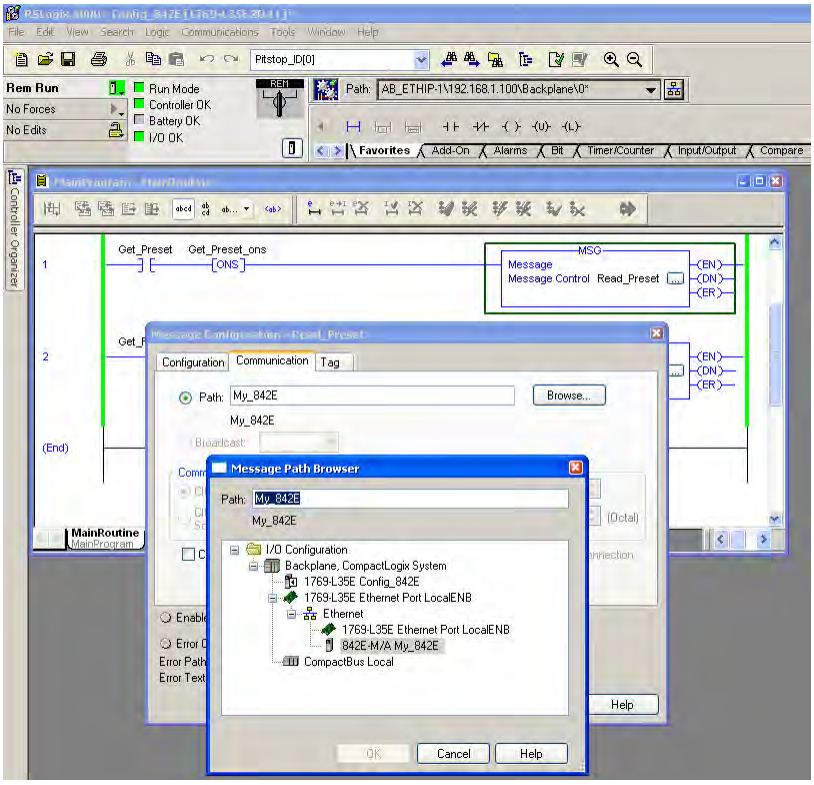


Figure 17

5. The Tag tab is populated for the Read_Preset.

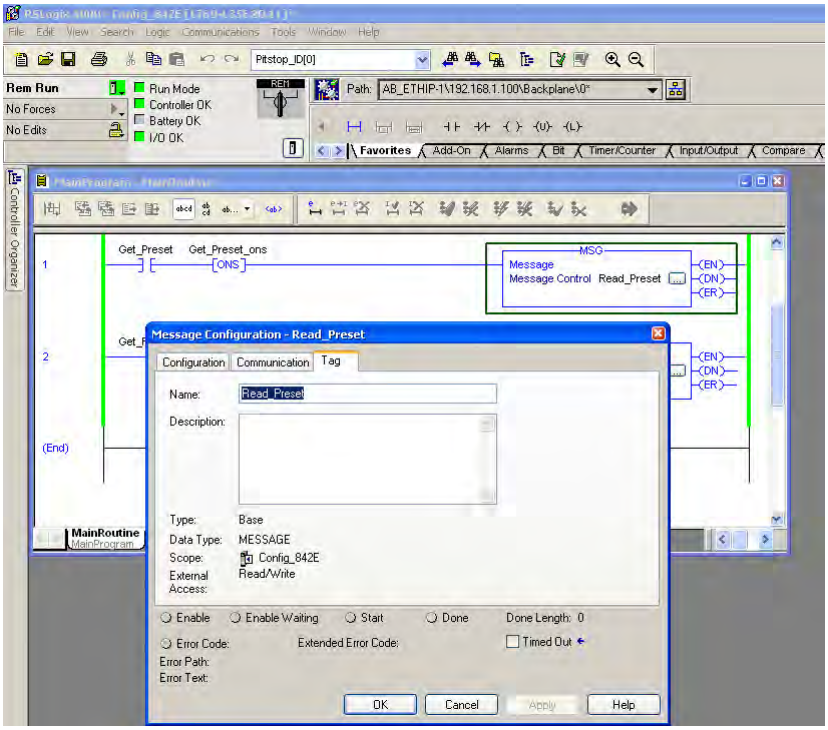


Figure 18

6. To initialize the message instruction, add a normally open contact and a one-shot instruction.

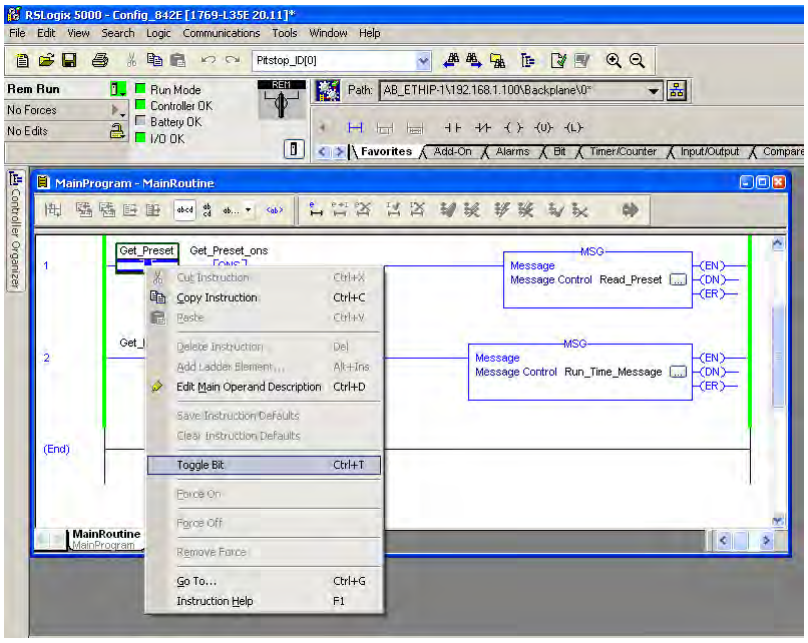


Figure 19

7. Toggle the Get_preset contact, the message instruction returns the preset value form the encoder into Preset_Value_Read DINT.

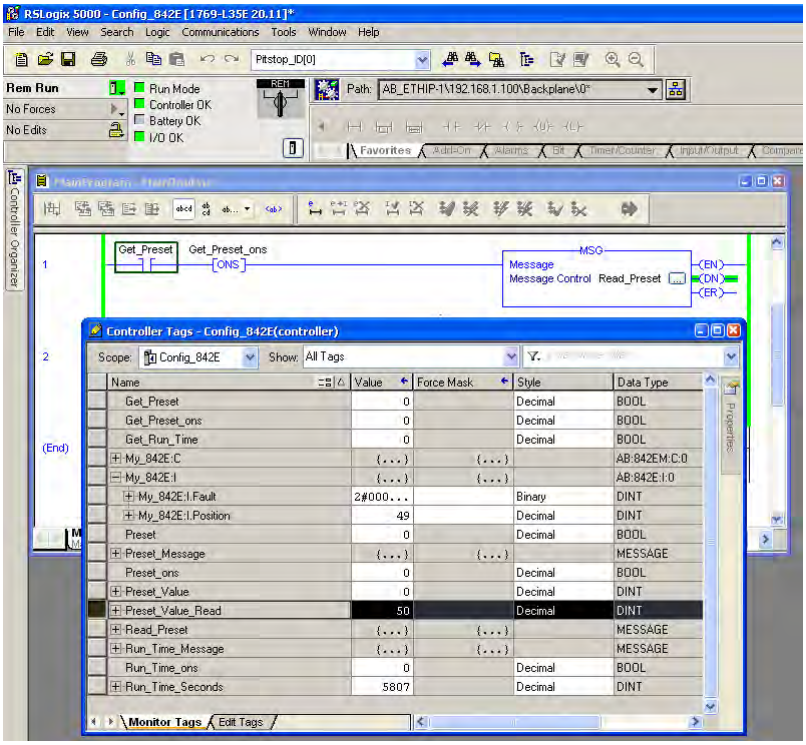


Figure 20

Using an Explicit Message Configuration to Obtain the Encoder Runtime in Seconds

This example is similar to the previous one, "Using an Explicit Message Configuration to Read Preset Encoder Value" on page 86.

1. Create a message data type named *Run_Time_Message* and a DINT named Run_Time Second.

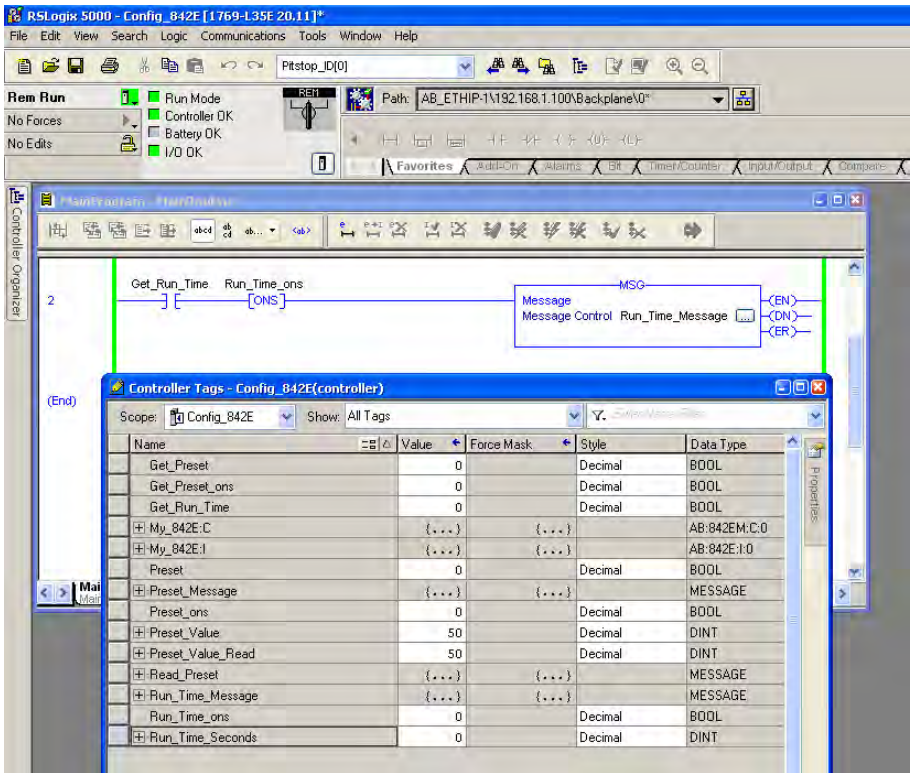


Figure 21

2. Add an MSG function block to the program, browse to the *Run_Time_Message* data type created in step 1. To configure the message instruction, double-click the gray box.

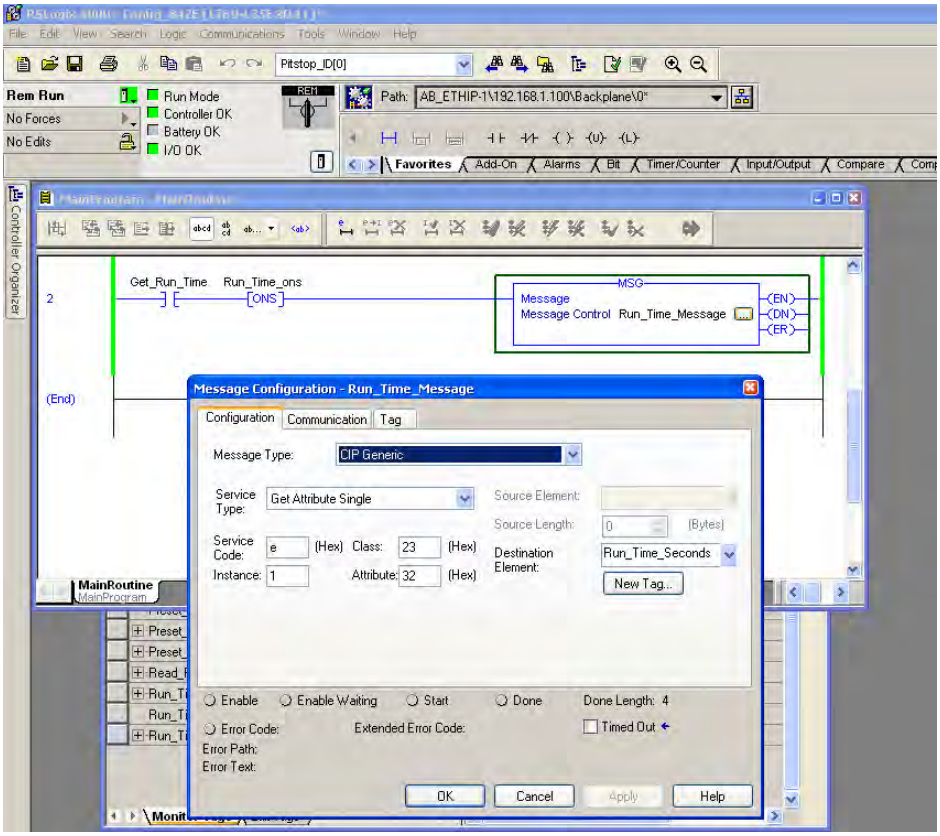


Figure 22

3. In the **Configuration** tab select:

   Message type - CIP Generic

   Service Type - Get Attribute Single

   Service Code - (Automatically populated)

   Destination Element - Run_Time_Seconds (browse to this tag)

   Instance - 1

   Class - 23*

   Attribute 32*

   * hexadecimal values

4. In the **Communication** tab, browse to the encoder on the Ethernet network, then click **OK**.

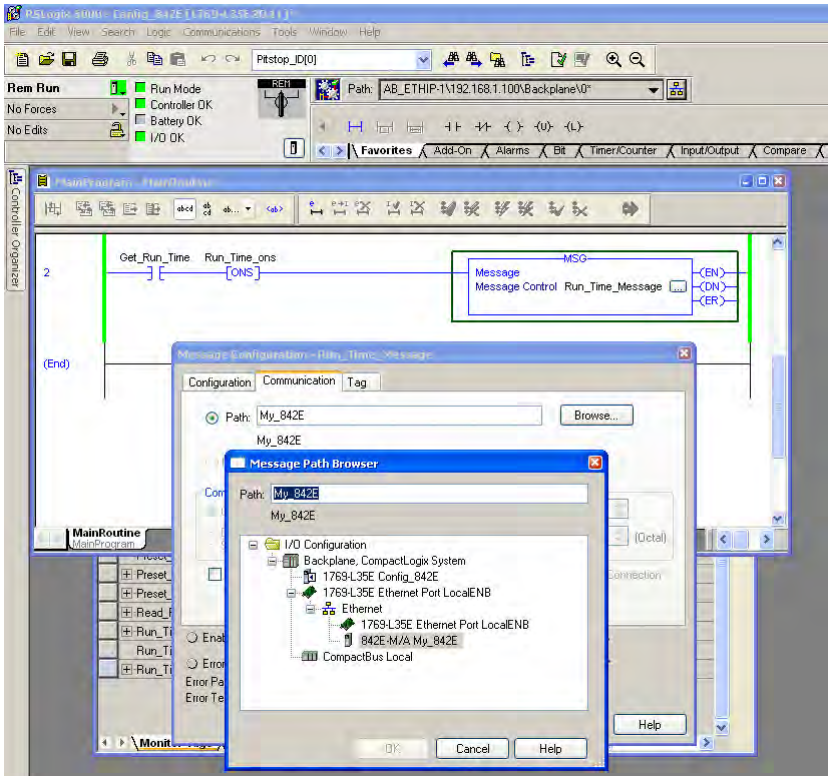


Figure 23

5. The **Tag** tab is populated f or the **Run_Time_Message.**

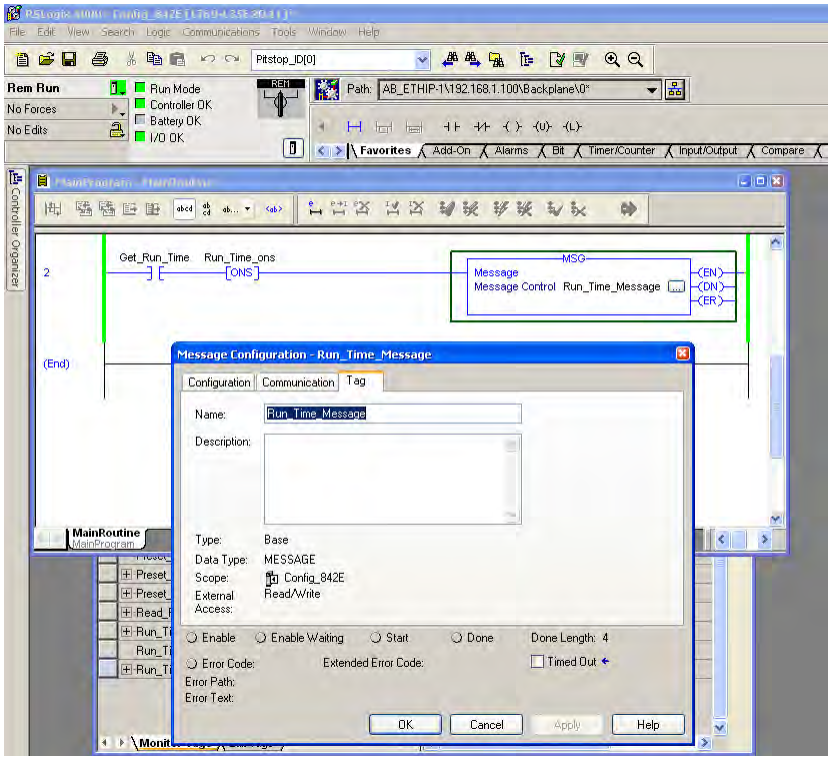


Figure 24

6. To initialize the message instruction, add a normally open contact and a one-shot instruction.

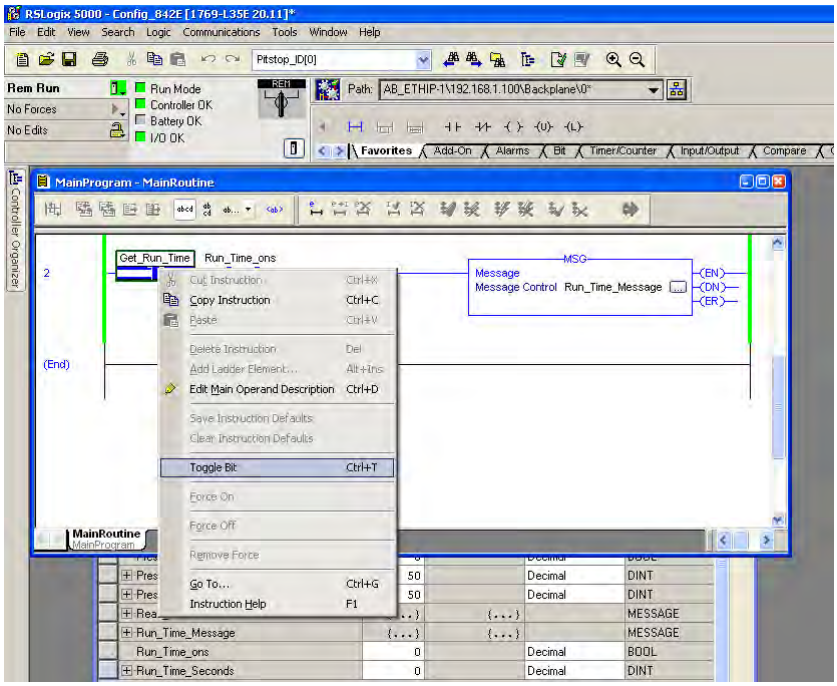


Figure 25

Toggle the **Get_Run_Time** contact to initiate the message instruction and return the current runtime in seconds into **Run_Time Seconds DINT**.

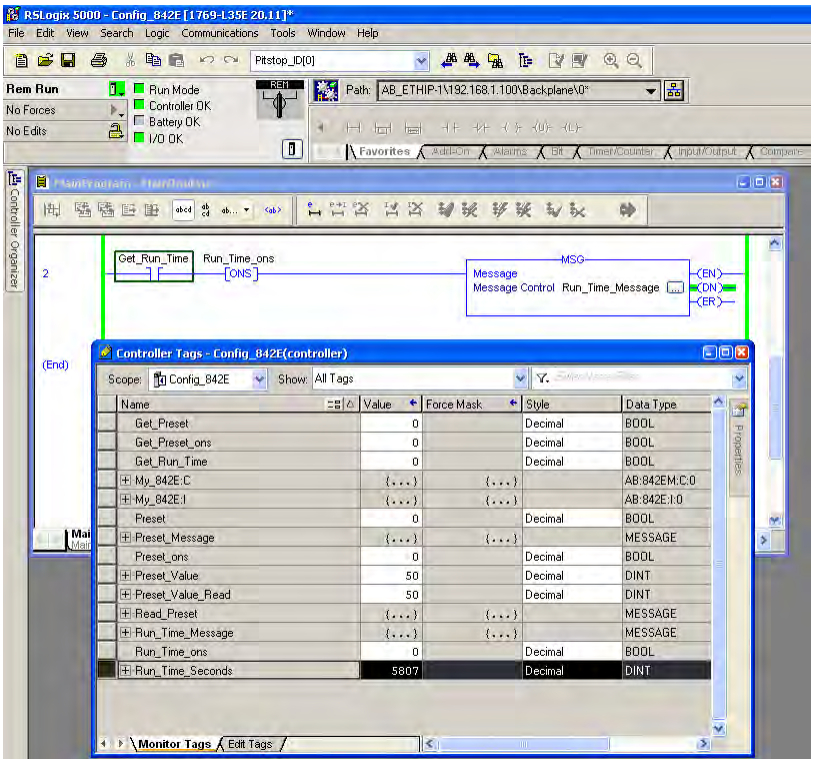


Figure 26

Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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