User Manual

Original Instructions

Allen-Bradley

RFID Systems

Bulletin Number 56RF

Allen-Bradley • Rockwell Software

Rockwell Automation

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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited

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).

Table of Contents

Appendix B

CIP Information

Appendix C

Install the Add-on Profile (AOP)

Appendix D

Troubleshooting

Read this preface 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 used in this manual

Summary of Changes

This manual contains a new Taiwan NCC Warning Statement section on page 10.

Who Should Use this Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use Bulletin 56RF RFID products.

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 quick start guide assumes you have some familiarity with RSLogix software. It provides an example of the steps needed to get a 56RF RFID system set up and functioning. The reader should refer to appropriate user manuals for other details. This manual:

- explains how to install and wire an example RFID system
- install and setup the module in an RSLogix 5000 program
- set up a simple program to receive and transmit data to an RFID tag

Abbreviations

Abbreviation	Definition
AFI	Application Family Identifier
AOP	Add On Profile
DFSID	Data Storage Format Identifier
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DOS	Disk Operating System
EAS	Electronic Article Surveillance
FE	Functional Earth
IEC	International Electrotechnical Commission
INT	signed, two byte integer
ISO	International Organization for Standardization
JTC	Joint Technical Committee
MACID	Media Access Control Identification
QD	Quick Disconnect
RFID	Radio Frequency Identification
SB	Sub-committee
SINT	Signed, single byte integer
UID	Unique Identifier
UUID	Universally Unique Identifier

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
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.
Allen-Bradley Industrial Automation Glossary, AG-7.1	A glossary of industrial automation terms and abbreviations.
EtherNet/IP Embedded Switch Technology Application Guide, publication ENET-AP005	A manual on how to install, configure, and maintain linear and Device-level Ring (DLR) networks using Rockwell Automation EtherNet/IP devices with embedded switch technology.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http:/www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales office.

Introduction

What is RFID?

RFID represents Radio Frequency Identification. It is a method for communicating information from one point to another point by the use of electromagnetic waves (that is, radio waves). It has unique characteristics that make it attractive for use in industrial systems.

For example, you have a shipping carton that must be loaded with various goods to meet the specific purchase order of a customer. You can attach a tag to the carton. Before attaching the tag, you fill the tag with the specific items that the customer wants. Then, as the carton moves to the filling stations, each station places the required objects, only if needed, into the carton. If the tag does not require something, the station is skipped.

Each filling station has an RFID transceiver. The transceiver reads and writes to the tag. When the tag approaches the RFID transceiver, the transceiver reads the contents of the tag. Based on the information that is received, the packaging process adds items (or skips this step) and then writes to the tag that one or more items were added. The carton moves to the next filling station.

This scenario is a common use of RFID technology. What makes the Bulletin 56RF product line unique is its conformance to the open international standards: ISO15693 and ISO18000-3 M1.

International Standard Compliance

ISO/IEC 15693 is an ISO standard for what are called vicinity tags. The tags, commonly referred to as ICODE tags, can be read from a greater distance than proximity tags and closed couple tags. ISO/IEC 15693 systems operate at the 13.56 MHz frequency, and offer maximum read distance of 1…1.5 m (3.3…4.9 ft), depending on the transceiver. Library applications with large antennas are capable of these distances. Most industrial applications are less than 203.2 mm (8 in.) for a read/write range.

The ICODE compatible tags permit you to use lower-cost tags than proprietary systems currently provide. You can use tag configuration options from multiple vendors.

ISO/IEC 15693 forms part of a series of International Standards that specify non-contact tags. The tags can be attached to objects, like cartons, bags, and valuable items, which can then be tracked while in the vicinity of a reading device. ISO/IEC 15693-2:2006 defines the power and communications interface between the vicinity card and the reading device. Other parts of ISO/IEC 15693 define the physical dimensions of the card and the commands that the card and reader interpret.

Power is coupled to the tag by an AC field that is produced in the transceiver. The powering field has a frequency of 13.56 MHz and is one of the industrial, scientific, and medical (ISM) frequencies available for worldwide use. When the tag receives sufficient power, it is able to respond to commands sent from the coupler. The coupler sends commands to the card by modulating the powering field and by using a modulation system that is known as pulse position modulation, whereby the position of one pulse relative to a known reference point codes the value of a nibble or byte of data. This process allows the card to draw the maximum energy from the field almost continuously. Tags, which have no power source, can be energized at ranges of up to 1 m (3.3 ft) from a coupler that can only transmit power within the limits that international radio frequency (RF) regulations permit.

A tag only responds when it receives a valid command that selects one tag from a possible collection of cards within range of the coupler. This process of collision detection and selection, also known as anti-collision, is made possible by detecting the unique identification number encoded into every tag. Anti-collision, and the commands that are used, are defined in ISO/IEC 15693-3. The tag responds to the transceiver by drawing more or less power from the field and generates one or two subcarriers of around 450 kHz. These are switched on and off to provide special-encoded data that the transceiver detects.

Taiwan NCC Warning Statement

根據低功率電波輻射性電機管理辦法規定:

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。
前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

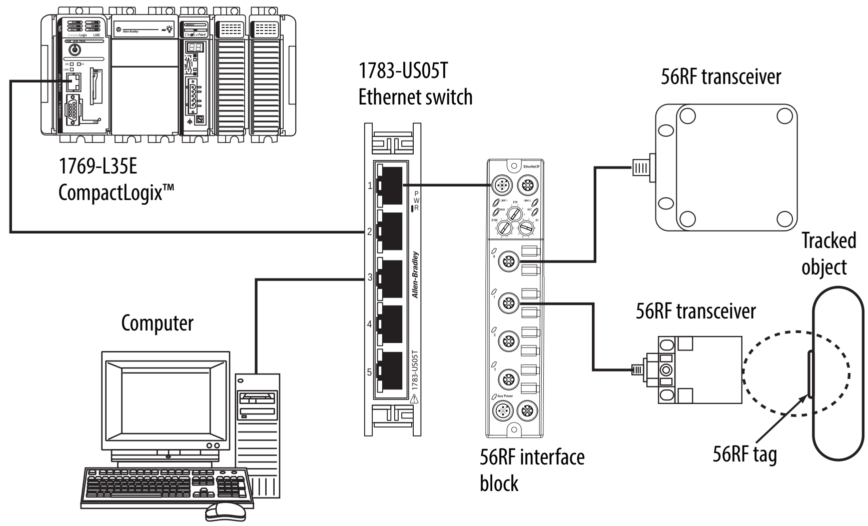
Backward Compatibility

The 56RF RFID system is offered on EtherNet/IP and is backward compatible with the previous offering of 56RF ICODE products. The transceivers and interface blocks are a matched pair so they cannot be interchanged. However, the tags can be interchanged with either system if they are ICODE tags. Both systems can read and write these tags seamlessly.

System Setup

Figure 1 shows a simple RFID system. This user manual describes the setup, installation, and programming that is required to get this system running.

Figure 1 - RFID System



Tags are attached to objects that must be tracked. The tags hold important information about the object. An RF transceiver reads and/or writes information to the tags when the tag moves within the transmission envelope of the transceiver (dotted ellipse). The physical size of the transceiver is directly related to the size of the transmission field. The larger the transceiver, the longer and wider the antenna field is. See the transceiver instruction sheets for antenna field sizes.

The transceivers are connected to a special RFID EtherNet/IP interface block. The distribution block has an Ethernet connection to an Ethernet switch. A 1759-L35E CompactLogix controller and a personal computer also have Ethernet connections to the Ethernet switch.

Notes:

RFID Components

This chapter covers the three key components that constitute the RFID system:

- Interface block
- Transceiver
- Tags

Interface Block

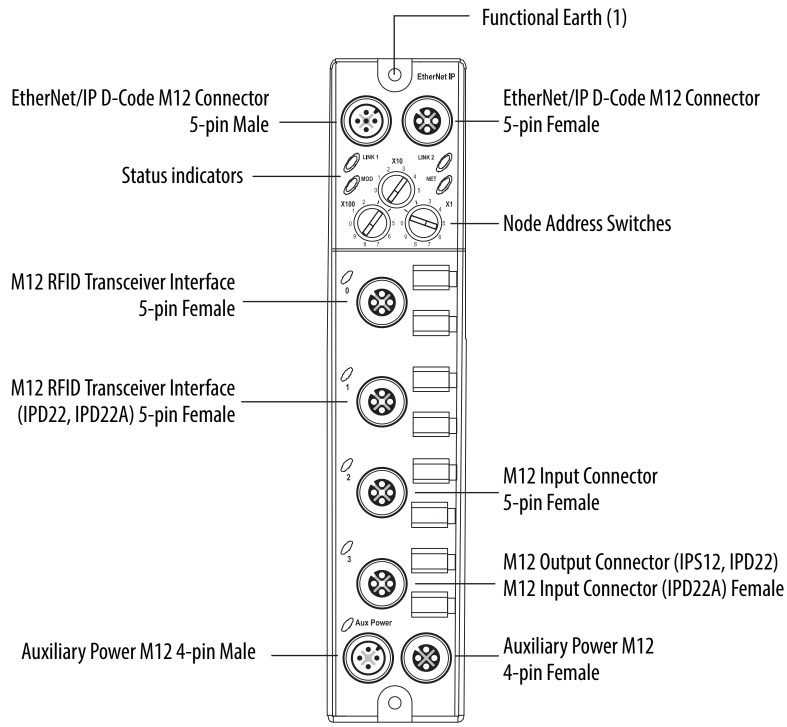
Three different interface blocks are available from which to choose. Table 1 shows the type of ports for each catalog number.

Table 1 - Type of Ports

Transceiver Ports	Input Ports	Output Ports	Cat. No.
1	1	1	56RF-IN-IPS12
2	1	1	56RF-IN-IPD22
2	2	0	56RF-IN-IPD22A

Figure 2 on page 14 identifies the connections for the EtherNet/IP, RF transceivers, input devices, output devices, and power.

Figure 2 - Connections



Status Indicators

When the status indicator is flashing, all flashes are 0.25 s ON and 0.25 s OFF.

This block has the seven different indicators.

Figure 3 - Status Indicators

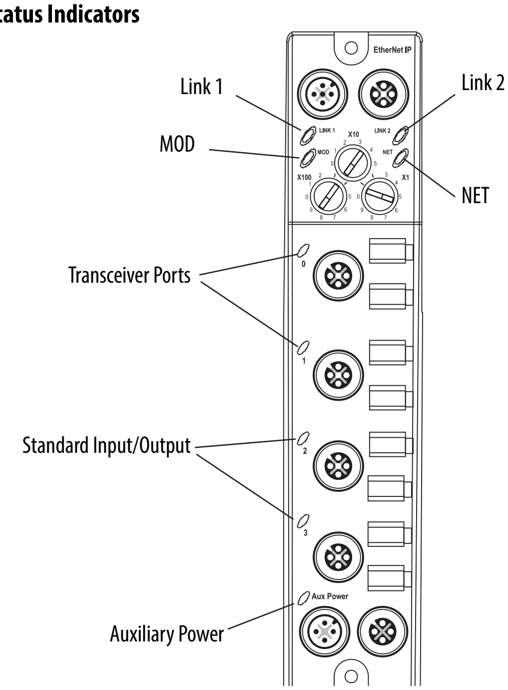


Table 2 - Status Indicators

Status Indicator Name	Status Indicator State	Indicates
Link1 and Link2	Off	No link
	Green	100 Mbps
	Flashing green	100 Mbps/active
	Yellow	10 Mbps
	Flashing yellow	10 Mbps/active
MOD (Module)	Off	There is no power applied to the block.
	Flashing red/ green	Device in self-test
	Green	The block is operating in a normal condition.
	Flashing green	Standby. The device is not communicating with the interface block. Normal state when only power has been applied to the transceiver.
	Flashing red	Recoverable fault. Most often occurs when data is corrupted between interface block and transceiver. CRC failures and so on. Recommended solution is to remove electrical noise near cabling or reduce communication rate between transceiver and interface block.
	Red	The transceiver has an unrecoverable fault; may need replacing.
NET (Network)	Off	There is no power or no IP address.
	Flashing red/ green	Device in self-test
	Green	The block is operating in a normal condition.
	Flashing green	Standby. The device is not communicating with the interface block. Normal state when only power has been applied to the transceiver.
	Flashing red	Connection timeout. Most often occurs when data is corrupted between interface block and transceiver. CRC failures and so on. Recommended solution is to remove electrical noise near cabling or reduce communication rate between transceiver and interface block.
	Red	Duplicate IP address. The transceiver has an unrecoverable fault; may need replacing.
Standard I/O	Off	Outputs inactive Inputs inactive
	Yellow	Outputs active Inputs active
	Flashing green	Outputs are idled and not faulted.
	Flashing red	Output faulted Inputs faulted
	Red	Outputs forced off Inputs unrecoverable fault
Aux Power	Off	No power is applied.
	Solid green	The applied voltage is within specifications.
	Solid yellow	The input power is out of specification.
RFID Port	Off	No power
	Flashing green	No tag present, but communicating
	Green	Communicating
	Flashing red	No transceiver is connected
	Amber	Tag present

Transceivers

Status Indicators

Figure 4 - Indicators

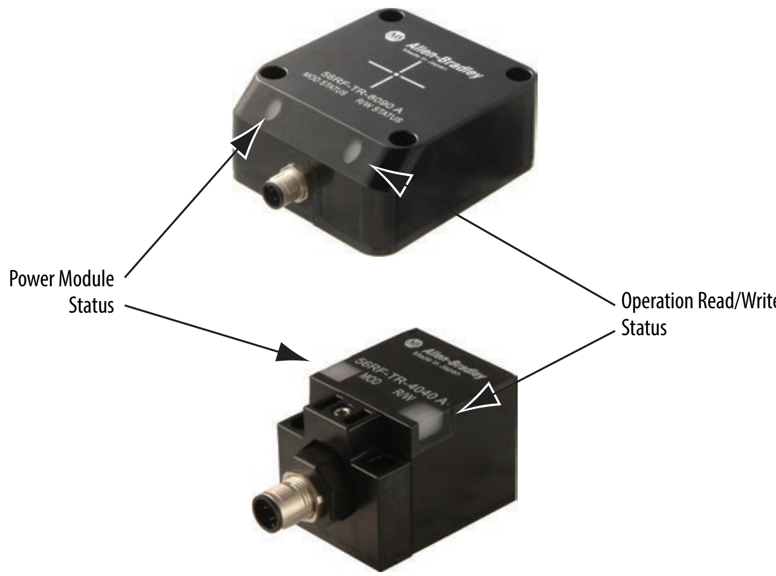


Table 3 - Status Indicators

Status Indicator Name	Status Indicator State	Indicates
Module Status	Off	There is no power applied to the block.
	Green	The block is operating in a normal condition.
	Red	The transceiver has an unrecoverable fault; may need replacing.
Read/Write Status	Off	There is no power applied to the device.
	Green	The EtherNet/IP interface block is communicating with the transceiver, but no tag is present. No errors received.
	Amber	A tag is present within the antenna field.
	Red	A communication error has occurred. Examples are: bad read/write, corrupt CRC[1]

(1) If a read/write command is not completed while the tag is within the field, an error occurs.

Transceiver Power Up Sequence

1. Both status indicators OFF.
2. Power status turns green. R/W status turns green for 0.25 seconds.
3. R/W status turns red for 0.25 seconds.
4. R/W status turns off for 3…5 seconds.
5. R/W status turns amber for 0.5 seconds.
6. R/W status turns green.

RFID Tags

RF tags come in many shapes and sizes. In general, the bigger the tag, the longer the sensing distance from the transceiver. Table 4 summarizes the size of the memory for each type of tag.

Table 4 - Memory

Tag Type	Total Tag Memory	User Memory		
		No. of Bytes	No. of Blocks	Bytes Per Block
SLI	128 bytes	112 bytes	28	4
SLI-S	256 bytes	160 bytes	40	4
SLI-L	64 bytes	32 bytes	8	4
FRAM	2048 bytes	2 kB	250	8

Tag Memory Structure

There are five types of tag memory structure:

- Universally Unique Identifier (UUID)
- Application Family Identifier (AFI)
- Data Storage Format Identifier (DSFID)
- Electronic Article Surveillance (EAS)
- Smart Label Integrated Circuit (SLI)

Universally Unique Identifier (UUID)

Each tag has a different 64-bit hexadecimal UUID that is programmed during the production process according to ISO/IEC 15693-3 and cannot be changed afterwards.

The numbering of the 64 bits is done according to ISO/IEC 15693-3 starting with the least significant bit (LSB) 1 and ending with the most significant bit (MSB) 64. This way is in contrast to the general used bit numbering within a byte (starting with LSB 0).

Byte 5 (bit 41…48) is the tag type. Byte 6 (bit 49…56) is the manufacturer code, which coincides with the number of bytes/block.

Table 5 shows the structure of RFID tags that Rockwell Automation offers.

Table 5 - Tag Structure

Byte		7	6	5	4	3	2	1	0
Name		UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0
Bit		64…57	56…49	48…41	40…1				
Value	SLI	E0	04	01	Unique Serial Number				
	SLI-S	E0	04	02	Unique Serial Number				
	SLI-L	E0	04	03	Unique Serial Number				
	FRAM	E0	08	01	Unique Serial Number				

Application Family Identifier (AFI)

The AFI represents the type of application targeted. AFI is coded on 1 byte, which constitutes two nibbles of 4 bits each. The most significant nibble of AFI is used to code one specific or all application families, as defined in Table 6. The least significant nibble of AFI is used to code one specific or all application subfamilies. Subfamily codes different from 0 are proprietary.

Table 6 - AFI Examples

AFI Most Significant Nibble	AFI Least Significant Nibble	Meaning	Examples/Notes
0	0	All families and subfamilies	No applicative preselection
X	0	All subfamilies of family X	Wide applicative preselection
X	Y	Only the Yth subfamily of family X	—
0	Y	Proprietary subfamily Y only	—
1	0, Y	Transport	Mass transit, bus, airline
2	0, Y	Financial	IEP, banking, retail
3	0, Y	Indentification	Access control
4	0, Y	Telecommunication	Public telephony, GSM
5	0, Y	Medical	—
6	0, Y	Multimedia	Internet service
7	0, Y	Gaming	—
8	0, Y	Data storage	Portable files
9	0, Y	EAN-UCC (European Article Numbering-Uniform Code Council) system for application indentifiers	Managed by ISO/IECJTC 1/SC 31
A	0, Y	Data Identifiers as defined in ISO/ IEC 15418	Managed by ISO/IEC JTC 1/SC 31
B	0, Y	UPU	Managed by ISO/IEC JTC 1/SC 31
C	0, Y	IATA (International Air Transport Association)	Managed by ISO/IEC JTC 1
D	0, Y	Reserved for Future Use	Managed by ISO/IEC JTC 1/SC 17
E	0, Y	Reserved for Future Use	Managed by ISO/IEC JTC 1/SC 17
F	0, Y	Reserved for Future Use	Managed by ISO/IEC JTC 1/SC 17

X = ‘1’ to ‘F’, Y = ‘1’ to ‘F’

Data Storage Format Identifier (DSFID)

The DSFID indicates how data is structured in the tag memory. The respective commands can program and lock it. It is coded on 1 byte. It allows for instant knowledge on the logical organization of the data.

Electronic Article Surveillance (EAS)

EAS is a technology that is typically used to help prevent shoplifting in retail establishments. An EAS detection system detects active tags and set off an alarm.

EAS status is 1-bit data (LSB side), which is stored in the system area of a tag. The initial value is 1. EAS bit 1 means goods-monitoring status, and EAS bit 0 means that goods-monitoring status is cleared.

Smart Label Integrated Circuit (SLI)

SLI tags use an EEPROM (electrically erasable programmable read-only memory) to store data. The 1024-bit EEPROM memory is divided into 32 blocks. Each block consists of 4 bytes (1 block = 32 bits). Bit 0 in each byte represents the least significant bit (LSB) and bit 7 the most significant bit (MSB), respectively.

Table 7 - SLI Tags

Block	Byte 0	Byte 1	Byte 2	Byte 3	Description
-4	UID0	UID1	UID2	UID3	Unique identifier (lower bytes)
-3	UID4	UID5	UID6	UID7	Unique identifier (higher bytes)
-2	Internally used	EAS	AFI	DSFID	EAS, AFI, DSFID
-1	00	00	00	00	Write access conditions
0					User Data
1					
2					
:					
:					
:					
22					
23					
27					

SLI

EAS Function

The LSB of Byte 1 in Block -2 holds the EAS bit (Electronic Article Surveillance mode active – the label responds to an EAS command)

Table 8 - EAS

Block -2, Byte 1							
MSB							LSB
X	X	X	X	X	X	X	e

EAS: e = 1 (EAS enabled) e = 0 (EAS disabled)

IMPORTANT Only change the EAS Configuration in a secure environment. The label must not be moved out of the communication field of the antenna during writing. We recommend putting the label close to the antenna and not to remove it during the operation.

Application Family Identifier

The ICODE system offers the feature to use an Application Family Identifier (AFI) at the inventory command and the two custom commands inventory read and fast inventory read (this feature allows, for example, the creation of label families).

This 8-bit value is at Byte 2 in Block -2 as shown in the following table and is only evaluated if the AFI flag is set in the reader command.

Table 9 - AFI

Block -2, Byte 2							
MSB							LSB
X	X	X	X	X	X	X	X

Data Storage Format Identifier

The Data Storage Format Identifier (DSFID) is at Byte 3 in Block -2.

Table 10 - DSFID

Block -2, Byte 3							
MSB							LSB
X	X	X	X	X	X	X	X

Write Access Conditions

The Write Access Condition bits in block -1 determine the write access conditions for each of the 28 user blocks and the special data block. These bits can be set only to 1 with a lock command (and never be changed back to 0), that is, already write-protected blocks can never be written to from this moment on.

In block -2 each byte can be individually locked.

Table 11 - Write Access

Block -1																
Byte 0									**Byte 1**							
	MSB							**LSB**	**MSB**							**LSB**
Condition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Write Access for Block Number	3	2	1	0	-2 (3)	-2 (2)	-2 (1)	-2 (0)	11	10	9	8	7	6	5	4

Block -1																
Byte 2									**Byte 3**							
	MSB							**LSB**	**MSB**							**LSB**
Condition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Write Access for Block Number	19	18	17	16	15	14	13	12	27	26	25	24	23	22	21	20

IMPORTANT Only change the Write Access conditions in a secure environment. The label must not be moved out of the communication field of the antenna during writing. We recommend putting the label close to the antenna and not to remove it during operation.

Smart Label IC – Secure (SLI-S)

The 2048-bit EEPROM memory is divided into 64 blocks. A block is the smallest access unit. Each block consists of 4 bytes (1 block = 32 bits). Four blocks are summed up to one page for password protection. Bit 0 in each byte represents the least significant bit (LSB) and bit 7 the most significant bit (MSB), respectively.

The memory is divided into two parts:

- Configuration Area

  This memory area stores all required information, such as UID, EPC data, write protection, access control information, passwords. Direct access to this memory area is not possible.
- User Memory

  This memory area stores user data. Direct read/write access to this part of the memory is possible depending on the related security and write protection conditions.

Table 12 shows the memory organization of an SLI-S tag.

Table 12 - SLI-S Memory Organization

Page	Block	Byte 0	Byte 1	Byte 2	Byte 3	Description
-6	-24					Configuration area for internal use
	-23					
	-22					
	-21					
:	:	:	:	:	:	
:	:	:	:	:	:	
:	:	:	:	:	:	
:	:	:	:	:	:	
-1	-4					
	-3					
	-2					
	-1					
0	0					User Memory 10 pages 4 blocks per page 4 bytes per block Total: 160 bytes
	1					
	2					
	3					
:	:	:	:	:	:	
:	:	:	:	:	:	
9	36					
	37					
	38					
	39					

Smart Label IC – Lean (SLI-L)

The SLI-L is used in applications that require smaller memory size. The 512-bit EEPROM memory is divided into 16 blocks. A block is the smallest access unit. Each block consists of 4 bytes (1 block = 32 bits). Four blocks are summed up to one page. Bit 0 in each byte represents the least significant bit (LSB) and bit 7 the most significant bit (MSB), respectively.

The memory is divided into two parts:

- Configuration Area

  This memory area stores all required information, such as UID, write protection, passwords. Direct access to this memory area is not possible.
- User Memory

  This memory area stores user data. Direct read/write access to this part of the memory is possible depending on the related write protection conditions.

Table 13 shows the memory organization of an SLI-L tag.

Table 13 - SLI-L Memory Organization

Page	Block	Byte 0	Byte 1	Byte 2	Byte 3	Description
-2	-8					Configuration area for internal use
	-7					
	-6					
	-5					
-1	-4					
	-3					
	-2					
	-1					
0	0					User Memory 2 pages 4 blocks per page 4 bytes per block Total: 32 bytes
	1					
	2					
	3					
	4					
	5					
	6					
	7					

Ferroelectric Random Access Memory (FRAM)

FRAM is a nonvolatile memory that uses ferroelectric film as a capacitor for storing data. FRAM offers high-speed access, high endurance in write mode, low power consumption, non-volatility, and excellent tamper resistance. The FRAM tags have 2000 bytes for use as user area and 48 bytes for use as system area.

The FRAM tag memory areas consist of a total of 256 blocks (250 blocks of user area and 6 blocks of system area). Each block can store 64 bits (8 bytes) of data.

The block is the unit that is used for the writing and reading of FRAM data. The memory configuration of FRAM is shown in Table 14.

Table 14 - FRAM Memory Configuration

Area	Block No.	Details	Data Read	Data Write
User area (2000 bytes)	00_H to $F9_H$	User area	Yes	Yes
System area (48 bytes)	FA_H	UUID (64 bits)	Yes	No
	FB_H	AFI, DSFID, EAS, security status	Yes	Limited
	FC_H to FF_H	Block security status	Yes	No

Blocks 00_H...$F9_H$ are user area, which is defined as an area that can be accessed when the corresponding block address is specified. While Blocks FA_H...FF_H are system area, which is defined as an area that can be accessed only with a specific command.

The system area consists of six blocks and contains UUID, AFI, DSFID, EAS bits, and security status (can write or cannot write) data for individual block. UID is fixed and cannot be updated. AFI, DSFID, and EAS bits are written at the factory, and can be updated and locked (disable to write) with commands (only EAS bit cannot be locked).

As shown in Table 14, FA_H holds the UUID, and FC_H...FF_H hold the security status information on individual user areas. The configuration of FB_H ...FF_H blocks is shown in Table 15 and Table 16. FB_H block is used for EAS status, AFI and DSFID data, the security status data of AFI and DSFID. Blocks FC_H...FF_H contain security status data.

Table 15 - Structure of FB_H

MSB											LSB
64	57	56	33	32	25	24	17	16	9	8	1
EAS Status		Reserved for future use		DSFID Lock Status		AFI Lock Status		DSFID		AFI	

Table 16 - Structure of FC_H to FF_H

	MSB									LSB
FC_H	3F	3E	3D	3C	3B	3A	39	03	02	01	00
FD_H	7F	7E	7D	7C	7B	7A	79	43	42	41	40
FE_H	BF	BE	BD	BC	BB	BA	B9	83	82	81	80
FF_H	Reserved for future use (6 bits)						F9	C3	C2	C1	C0

The security status of the user area is stored in the block security status bit in system area blocks of FC_H...FF_H per bit in each block. A user area is unlocked when the corresponding block security status bit is 0; it is locked (disable to write state) when the corresponding block security status bit is 1.

EAS bit is a single bit, and it is used for setting EAS status. It is possible to read/write data of two blocks at one time in the user area (if Read Multiple Blocks Unlimited command is used, up to 256 blocks can be accessed at one time).

Handheld Reader/Writer

The RFID ICODE handheld interface provides a portable solution for reading/writing values to the tag data area. The handheld interface is a touch screen operated computer with an attached RFID antenna and software that allows reading, writing, and saving tag RFID tag data. Each handheld interface comes with multiple connectivity methods, such as wireless, Bluetooth, and USB, which allow tag data to be transferred to/from a computer. The RFID ICODE handheld interface is IP65 rated for harsh industrial and outdoor environments. It is the ideal accessory for system setup, field service, fleet management, time and attendance, and any other application where transceiver mobility is required.

For more information on the RFID ICODE handheld interface, see publication 57RF-UM001.

Figure 5 - Handheld Interface

Product Selection

The following tables show the catalog numbers for the components in the Bulletin 56RF product family.

EtherNet/IP Interface Blocks

Transceiver Ports	Input Ports	Output Ports	Cat. No.
1	1	1	56RF-IN-IPS12
2	1	1	56RF-IN-IPD22
2	2	0	56RF-IN-IPD22A

Transceivers

Dimensions [mm]	Recommended Sensing Distance [mm (in.)] [1]	Sensing Distance, Max [mm (in.)] [1]	Cat. No.
Rectangular (80 x 90)	100 (3.9)	168 (6.6)	56RF-TR-8090
Square (40 x 40)	50 (2)	85 (3.3)	56RF-TR-4040
Cylindrical M30	35 (1.4)	60 (2.4)	56RF-TR-M30
Cylindrical M18	18 (0.7)	30 (1.2)	56RF-TR-M18

[1] Range reference for a 50 mm (2 in.) diameter tag.

Tags

Outline	Type	Total Memory Size [B]	User Memory Size [B]	Dimensions [mm (in.)]	Cat. No.
Disc	SLI	128	112	16 (0.6)	56RF-TG-16
				20 (0.8)	56RF-TG-20
				30 (1.2)	56RF-TG-30
				50 (2)	56RF-TG-50
	SLI-S	64	32	16 (0.6)	56RF-TG-16-64B
	SLI-L	256	160	10 (0.4)	56RF-TG-10-256B
Disc – High Impact Resistant	SLI	128	112	35 (1.4)	56RF-TG-35HIR
Disc – Mount on Metal	SLI	128	112	20 (0.8)	56RF-TG-20MOM
				50 (2)	56RF-TG-50MOM
Disc – FRAM	FRAM	2048	2 kB	20 (0.8)	56RF-TG-20-2KB
				30 (1.2)	56RF-TG-30-2KB
				50 (2)	56RF-TG-50-2KB
Label	SLI	128	112	54 x 86 (2.1 x 3.4)	56RF-TG-5486
				50 x 50 (2 x 2)	56RF-TG-5050
Smart Cards	SLI	128		54 x 86 (2.1 x 3.4)	56RF-TG-5486SC
Square – High Temperature	SLI	128		50 x 50 (2 x 2)	56RF-TG-50HT

Accessories

Table 17 - Transceiver

Style	Connector Type	No. of Pins	Shield	Wire Size [AWG]	Cat. No.
DC Micro (M12) Patchcords	Female straight to male straight	4	Shielded	22	889D-F5FCDM-J ❶
	Female straight to male right angle				889D-F5FCDE-J ❶
	Female right angle to male straight				889D-R5FCDM-J ❶
	Female right angle to male right angle				889D-R5FCDE-J ❶
DC Micro (M12) Cordsets	Female straight	4	Shielded	22	889D-F5FC-J ❷
	Female right angle				889D-R5FC-J ❷
	Male straight				889D-M5FC-J ❷
	Male right angle				889D-E5FC-J ❷
M12 Terminal Chambers	Female straight	4	—	18…22	871A-TS5-D1
	Female right angle				871A-TR5-D1
	Male straight				871A-TS5-DM1
	Male right angle				871A-TR5-DM1

❶ Available in 0.3, 1, 2, 5, or 10 m (1, 3.3, 6.6, 16.4, or 32.8 ft) lengths.
❷ Available in 2, 5, or 10 m (6.6, 16.4, or 32.8 ft) lengths.

Table 18 - Auxiliary Power

Style	Connector Type	No. of Pins	Shield	Wire Size [AWG]	Cat. No.
DC Micro (M12) Patchcords	Female straight to male straight	4	Unshielded	22	889D-F4ACDM-❸
	Female straight to male right angle				889D-F4ACDE-❸
	Female right angle to male straight				889D-R4ACDM-❸
	Female right angle to male right angle				889D-R4ACDE-❸
DC Micro (M12) Cordsets	Female straight	4	Unshielded	22	889D-F4AC-❹
	Female right angle				889D-R4AC-❹
	Male straight				889D-M4AC-❹
	Male right angle				889D-E4AC-❹
M12 Terminal Chambers	Female straight	4	—	22	871A-TS4-D
	Female right angle				871A-TR4-D
	Male straight				871A-TS4-DM
	Male right angle				871A-TR4-DM

❸ Available in 0.3, 1, 2, 5, or 10 m (1, 3.3, 6.6, 16.4, or 32.8 ft) lengths.
❹ Available in 2, 5, or 10 m (6.6, 16.4, or 32.8 ft) lengths.

Table 19 - EtherNet/IP

<table>
<tr><th>Style</th><th>Connector Type</th><th>No. of Pins</th><th>Shield</th><th>Wire Size [AWG]</th><th>Cat. No.</th></tr>
<tr><td rowspan="3">M12 D Code Patchcords</td><td>Male straight to male straight</td><td rowspan="3">4</td><td rowspan="3">Unshielded</td><td rowspan="3">24</td><td>1585D-M4TBDM-❶</td></tr>
<tr><td>Male straight to male right angle</td><td>1585D-M4TBDE-❶</td></tr>
<tr><td>Male right angle to male right angle</td><td>1585D-E4TBDE-❶</td></tr>
<tr><td rowspan="3">M12 D Code Patchcords</td><td>Male straight to male straight</td><td rowspan="3">4</td><td rowspan="3">Shielded</td><td rowspan="3">26</td><td>1585D-M4UBDM-❶</td></tr>
<tr><td>Male straight to male right angle</td><td>1585D-M4UBDE-❶</td></tr>
<tr><td>Male right angle to male right angle</td><td>1585D-E4UBDE-❶</td></tr>
</table>

❶ Available in lengths of 0.3, 1, 2, 5, 10, or 15 m (1, 3.3, 6.6, 16.4, 32.8, or 49.2 ft) increments of 5 m (16.4 ft) up to 75 m (246.1 ft).

Table 20 - Handheld Interface

Description	Cat. No.
RFID Handheld Interface, 52-Key Directional Pad	57RF-HH-56A
RFID Handheld Interface, 45-Key Pad	57RF-HH-56B

Table 21 - Handheld Accessories

Description	Cat. No.
Domestic single-position charging cradle with cable, USB cable, stylus	57RF-HH-56US1
Domestic wall-mount power supply, serial cable, USB cable, stylus	57RF-HH-56US2
International power supply kit, serial cable, USB cable, stylus	57RF-HH-56IN
Battery pack, rechargeable	57RF-HH-56BAT
Serial cable, 22.9 m (15 ft), RS-232	57RF-HH-56CA
64 MB CompactFlash card	1784-CF64
128 MB CompactFlash card	1784-CF128

Electrical Installation

Cable Overview

The Ethernet switch must be mounted inside a control panel. The Bulletin 56RF interface block and Bulletin 56RF transceivers can be mounted on the machine.

Figure 6 - Transceiver Mounting

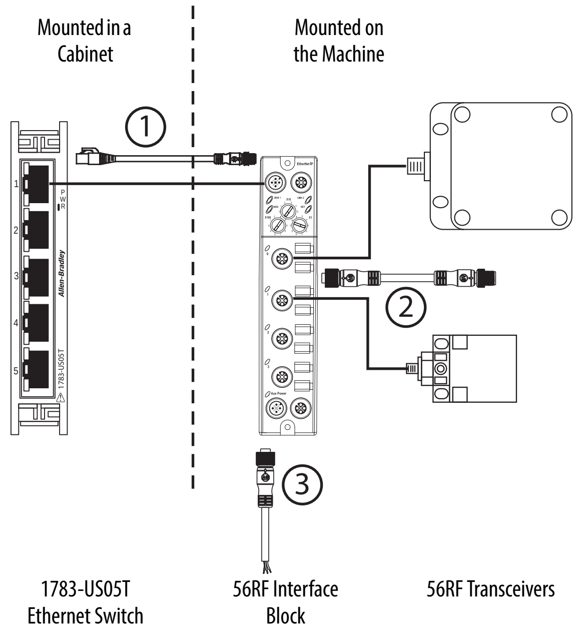


Figure 6 shows the three types of cables that are needed.

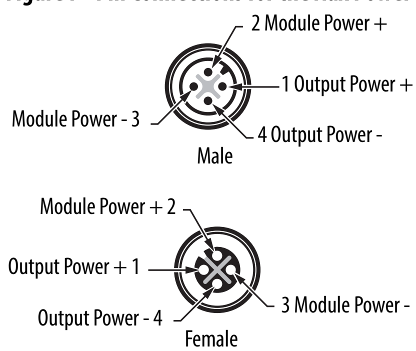
1. An Ethernet cable, RJ45 to M12-QD patchcord.
2. A 5-pin M12 to 5-pin M12 patchcord. The cable includes a shield that connects to the functional earth point on the interface block.
3. A 4-pin female micro QD cordset that connects power to the interface block.

Auxiliary Power Connection

Attach a micro-style 4-pin female to the micro-style 4-pin male receptacle as shown in Figure 7. The female side is used to daisy chain the power to another device. The power connection is limited to 4 A. When the daisy chain approach is used, the maximum number of interface blocks that can be connected is determined by the total power consumed by each block.

IMPORTANT	Power must be connected to the male connector first. Do not connect power to the female connector and leave the male connector exposed. The pins in the male connector have 24V DC potential for short circuit.

Figure 7 - Pin Connections for the Aux Power Connectors



The power for the output port is separate from the power to the remaining portions of the interface block. This configuration allows the output device to be turned off, while maintaining power to the transceivers, the input port, and the EtherNet/IP connection. When the output is connected to the safety-related portion of the machine control system, an actuator can be turned off, while diagnostic information is still available to the machine control system.

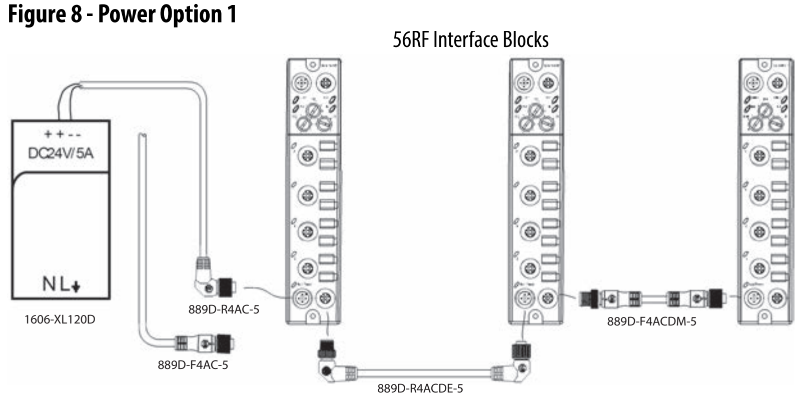
Power Connection Options

Each interface block is limited to 4 A total consumption.

Example 1: Daisy Chain the Power Connections

The example in Figure 8 allows for a simple and easy way to distribute power to the RFID system. This approach is preferred when the total current of the RFID system is less than 4 A.

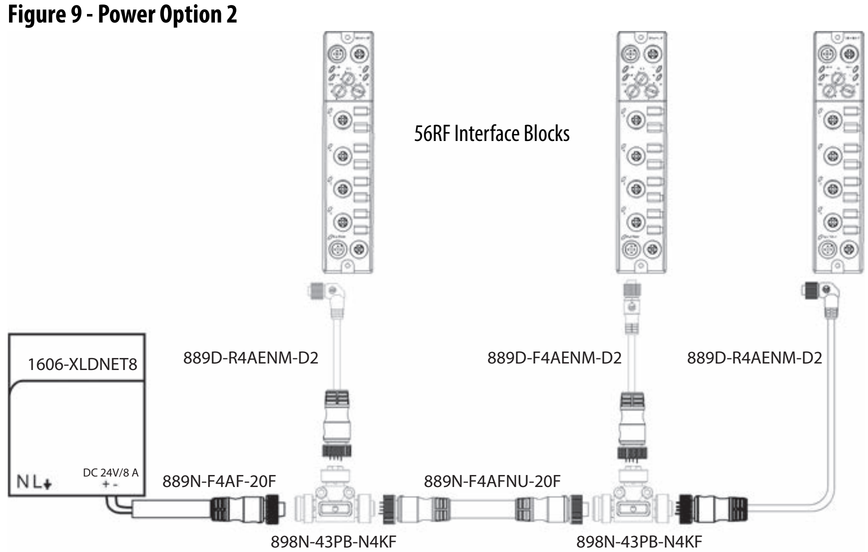
Figure 8 - Power Option 1



Example 2: System Needs More Than 4 A

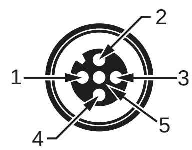
If multiple blocks are required on a machine and the current consumption exceeds 4 A, then a combination of mini-style and micro-style connections can be used to distribute the power. In the example shown in Figure 9, mini-style cordsets, patchcords, and tees are used to configure the power. A mini-to-micro style patchcord connects each 56RF interface block with the tee. In this example, the power supply is a catalog number 1606-XLDNET8, which can supply up to 8 A to the RFID system.

Figure 9 - Power Option 2



Transceiver Connection

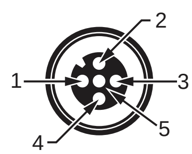
The following shows the M12 QD female connector for the transceivers. Pin 5 is the cable shield connection and is connected only at the block to functional earth (FE).



Pin	Function
1	24V DC power
2	Data +
3	24V common
4	Data -
5	Shield/FE

Digital Input Connection

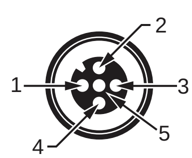
The following shows the female M12 QD input connector.



Pin	Function
1	24V DC power
2	Not used
3	24V common
4	Digital input
5	Shield/FE

Digital Output Connection

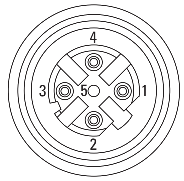
The following shows the female M12 QD output connector.



Pin	Function
1	Not used
2	Not used
3	24V common
4	Digital output
5	Shield/FE

EtherNet/IP Connection

The following shows the D-Code M12 connector on the interface block.



Pin	Function
1	Tx+
2	Rx+
3	Tx-
4	Rx-
5	Connector shell connected to FE

Use the catalog number 1585D-M4DC-H (polyamide small body unshielded) or catalog number 1585D-M4DC-SH (zinc die-cast large body shielded) mating connectors for the D-Code M12 female network connector.

Use two twisted-pair Cat 5E UTP or STP cables.

D-Code M12 Pin	Wire Color	Signal	8-Way Modular RJ45 Pin
1	White-Orange	Tx+	1
2	White-Green	Rx+	3
3	Orange	Tx-	2
4	Green	Rx-	6

The 56RF interface block encoders can be connected in the following network topologies:

- Star
- Linear
- Device Level Ring (DLR).

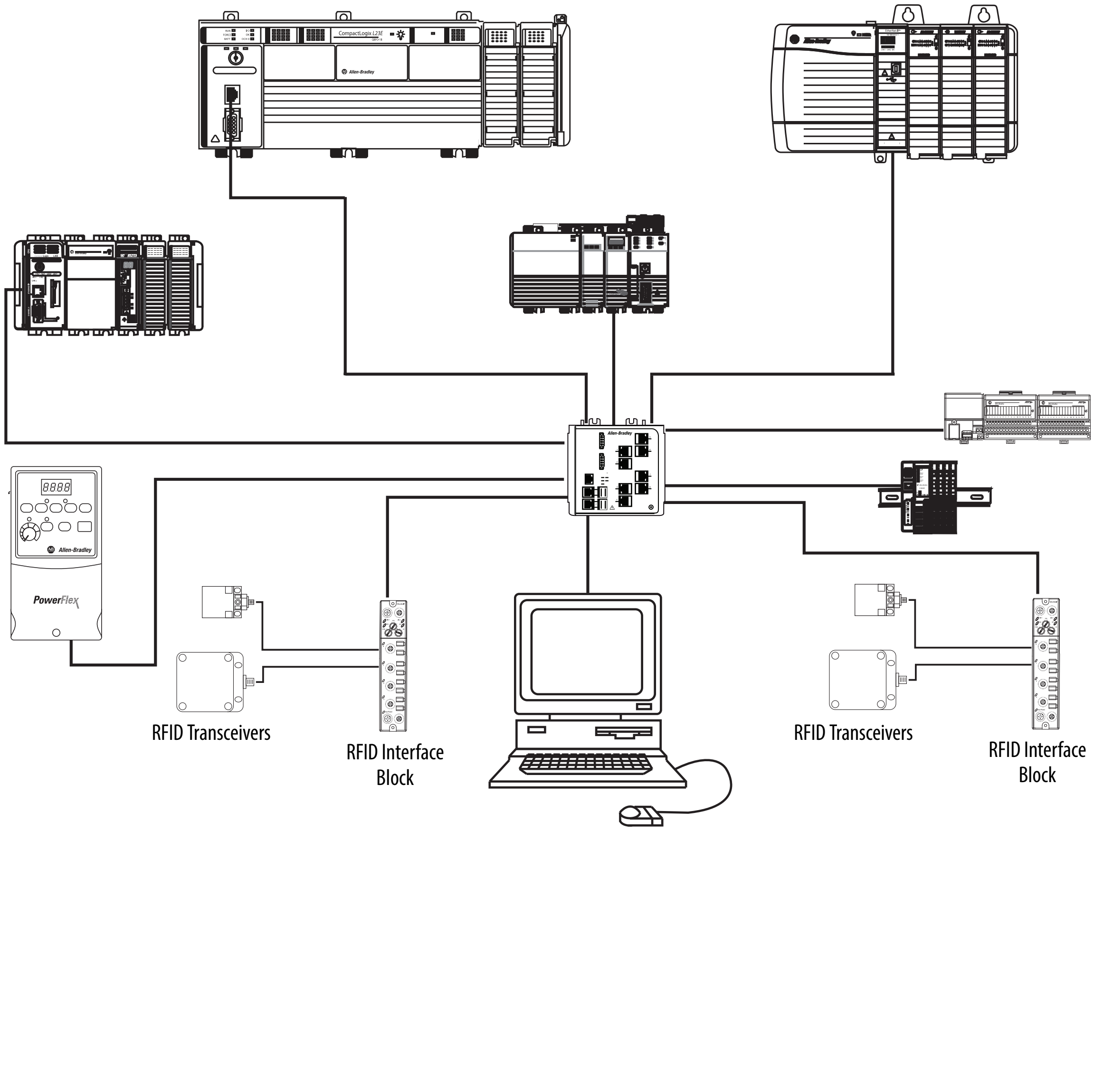
Notes:

EtherNet/IP Addressing

Star Topology

The Star topology consists of a number of devices that are connected to central switch. When this topology is used, only one Ethernet connection can be made to the Bulletin 56RF interface block – this connection is made to the Link 1 connector. The Link 2 connection must remain unused.

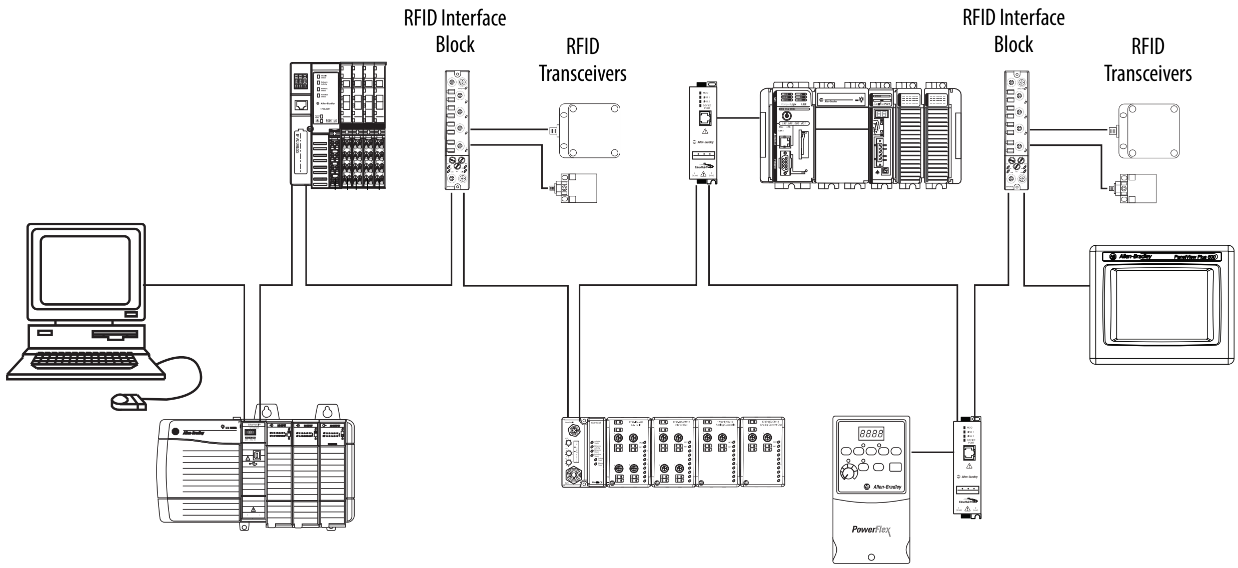
Figure 10 - Star Topology



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 are used. The network connection to Link 1 or Link 2 does not matter.

Figure 11 - Linear Topology



Device Level Ring (DLR) 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. When this topology is used, both Ethernet connections are used. The network connection to Link 1 or Link 2 does not matter.

We recommend 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 networks.

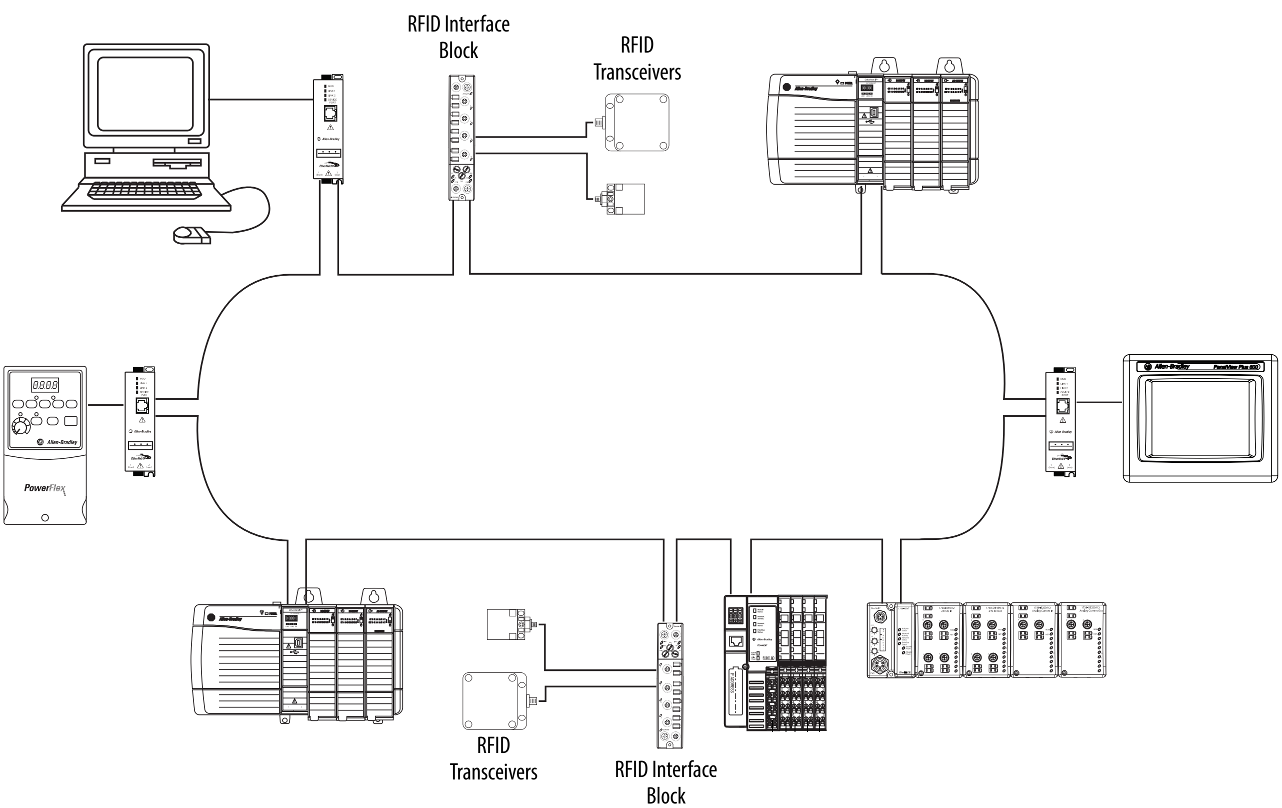
Smaller networks provide the following benefits:

- There is better management of traffic on the network.
- The networks are easier to maintain.
- There is a lower likelihood of multiple faults.

Additionally, on a DLR network with more than 50 nodes, network recovery times from faults are higher. The maximum cable length between devices cannot exceed 100 m (328 ft).

For more information on DLR network design and configuration, see publication ENET-AP005.

Figure 12 - DLR Topology



Setting the Network Address

Before using the 56RF interface block in an EtherNet/IP network, configure it with an IP address, subnet mask, and optional Gateway address. This chapter describes these configuration requirements and the procedures for providing them. The address can be set in one of three ways:

- Use the Network Address switches.
- Use the BootP/DHCP utility (version 2.3 or greater), which ships with RSLogix 5000®.
- Use RSLinx® software.

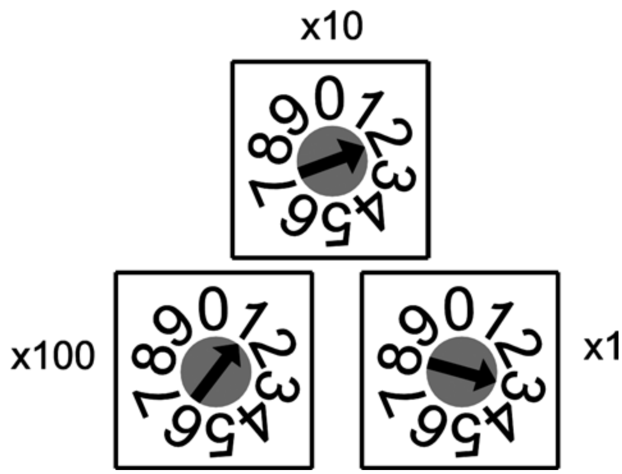
IP network addresses have a format of xxx.xxx.xxx.xxx. You must know what values are being used for the network. If your network has the fundamental 192.168.1.xxx scheme, then you can simply use the three network address switches. If your network is something other than 192.168.1.xxx, you must use advanced tools, such as the BootP/DHCPserver, to assign an IP address. After the address is set, you can use RSLinx to change the address.

Fundamental IP Addresses: 192.168.1.xxx

If your network scheme is 192.168.1.xxx, then you can adjust the network address switches to set the IP address. Remove the covers of the three network address screws. Use a small blade screwdriver to rotate the switches. Align the small notch on the switch with the number setting you wish to use. Valid settings range from 001…254.

When the switches are set to a valid number, the IP address of the interface block is 192.168.1.xxx (where xxx represents the number set on the switches). Cycle the power and the valid setting becomes effective immediately.

The following example shows an address setting of 192.168.1.123.



The subnet mask of the interface block is automatically set to 255.255.255.0 and the gateway address is set to 0.0.0.0. When the interface block uses the network address set on the switches, the interface block does not have a host name that is assigned to it or use a Domain Name Server (DNS).

Advanced IP Addresses

The following steps show how to change the IP address from the fundamental 192.168.1.xxx to an advanced address. This procedure assumes the 56RF interface block was already configured with an IP address using the network address switches. The following examples show the change process using specific addresses. You are not limited to these addresses; you can select any address that meets their needs. In the following example, we change from 192.168.1.115 to 192.168.2.115.

1. Set address switches to 888 and cycle the power.

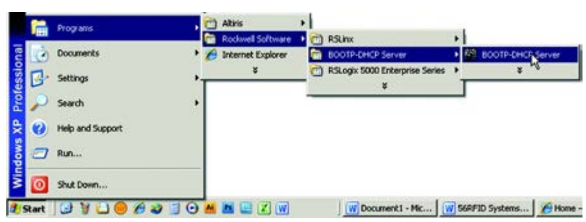
   On the 56RF interface block, the address switches had previously been to 115. Set the address switch settings to 888. Cycle the power and wait until the MOD indicator is blinking red. The MOD indicator blinks red once, green once, then solid red for a short while, then blinks green once, and finally blinks red continuously (about once each second). This process takes about 10 seconds after power is restored. The interface block is reset to its factory setting.

2. Set the address switches to 999 and cycle the power.

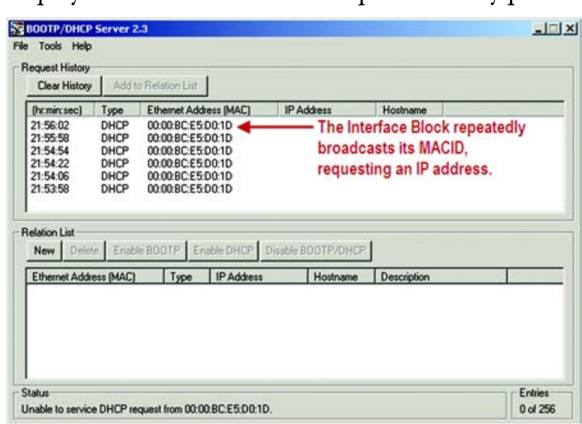
   On the 56RF interface block, set the address switch settings to 999. Cycle the power and wait until the MOD indicator is solid green. The MOD indicator blinks red once, green once, solid red for a short while and finally turns solid green. This process takes about 10 seconds after power is restored. The interface block IP address is reset.

3. Use BootP/DHCP Server to set new address

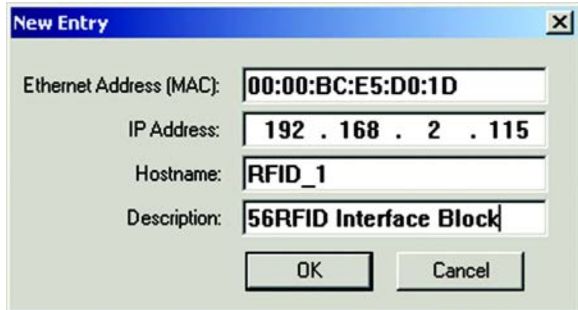
   Use the BootP/DHCP Server utility to assign a valid address to the interface block. From the Start button, select Programs > Rockwell Software > BOOTP-DHCP Server > BOOTP-DHCP Server.



   When power is restored, the interface block repeatedly broadcasts its MAC ID and requests an IP address. The BOOTP-DHCP server displays the MAC ID in the Request History panel.



Double-click one of the Ethernet addresses (MAC) of the device. The New Entry dialog appears showing the Ethernet address (MAC) of the device.

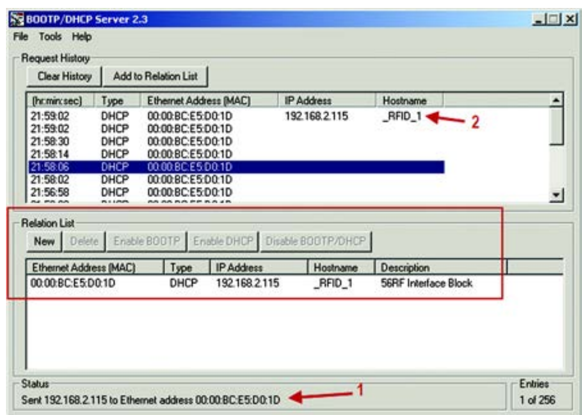


Type in the IP address, host name, and description and click OK. The host name and description are optional fields; they can be left blank.

The device is added to the Relation List, displaying the Ethernet address (MAC) and corresponding IP address, host name, and description.

When the address is assigned to the 56RF interface block

- The Status message is updated
- The IP address appears in the Request History window.

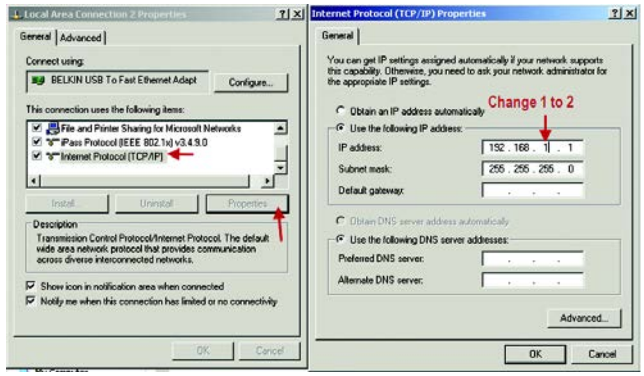


IMPORTANT	Wait for the Status message to show "Sent 192.168.2.115 to Ethernet address 00:00:BC:E5:D0:1D." This process can take up to 30 seconds.

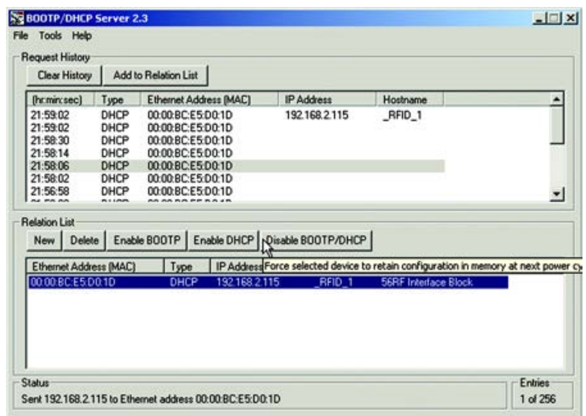
4. At this point, the IP addresses of other devices are changed.

5. Change the Network Adapter to 192.168.2.1.

   Open the network connections of the host computer. Highlight the Internet Protocol (TCP/IP) connection. Click **Properties**. In the IP address field, set the IP address to 192.168.2.1. Click **OK**. Click **Close** to close the Local Area Connection window (this window must be closed to apply the new address).

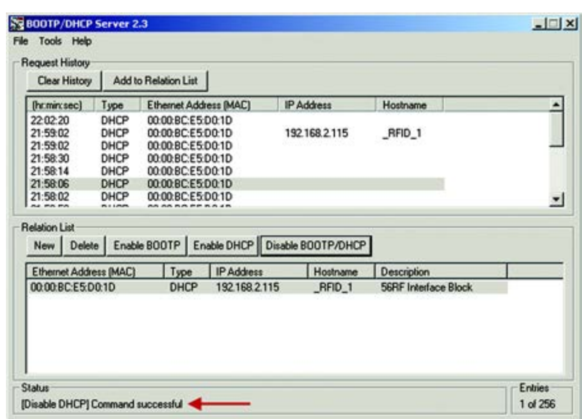


6. Disable DHCP.



   Click (only once) the interface block in the Relation List to highlight it. Then click Disable BOOTP/DHCP. This action instructs the 56RF interface block to retain the IP address at the next power cycle.

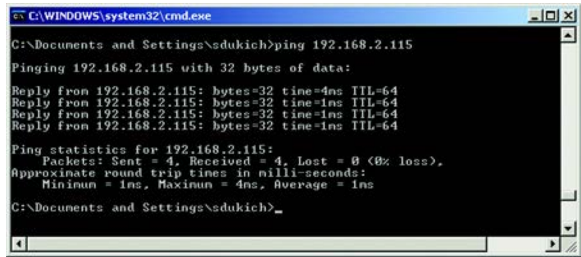
   Wait for the Status message to show that the command was successfully sent. If not, repeat this step.



Click File > Save As to save the relationship, if desired.

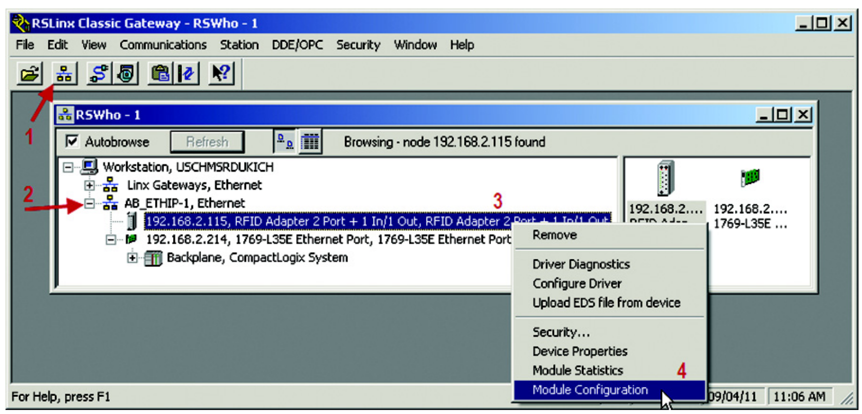
Cycle the power to the 56RF interface block. You should no longer see the 56RF interface block in the Request History panel.

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



Change IP Address from One Advanced Address to Another Advanced Address

The easiest way to change the IP address from one non-simple address to another non-simple address is to use RSLinx. In this case, the three network switches on the 56RF interface block are set to 999, and the address has been previously set using the BootP/DHCP server. The following example shows how to change the IP address from 192.168.2.115 to 192.168.3.115.

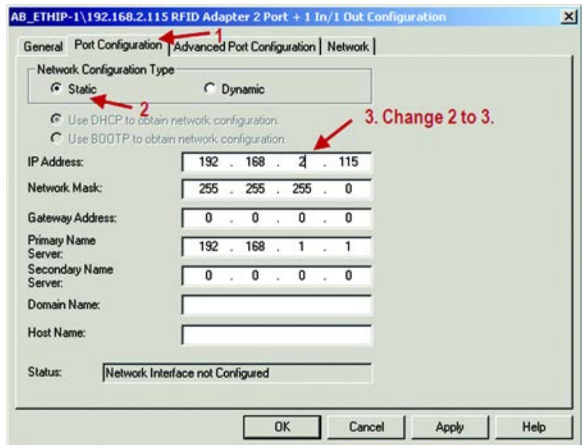


After you open RSLinx, do the following:

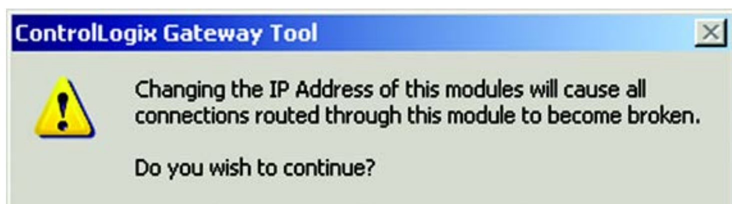
1. Click the RS-Who icon.
2. Expand the Ethernet connection.
3. Right-click the RFID Adapter.
4. Click Module Configuration.

After the Configuration window appears, do the following:

1. Click the Port Configuration tab.
2. Set the Network Configuration Type to Static (if not already done).
3. Change the IP address to the new address. In this example, the address is changed from 192.168.2.115 to 192.168.3.115.

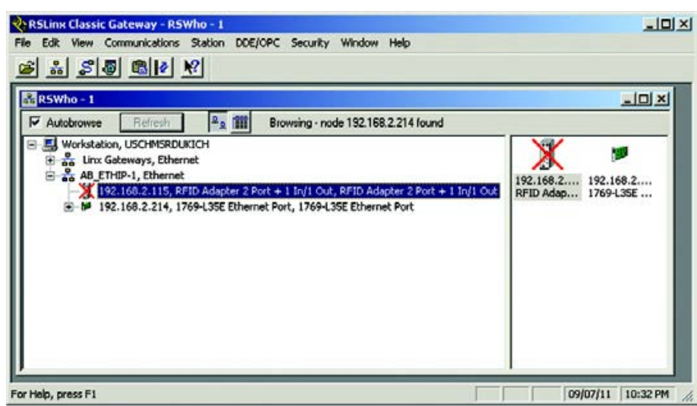


Click Yes to confirm the change.



Click OK to close the configuration window.

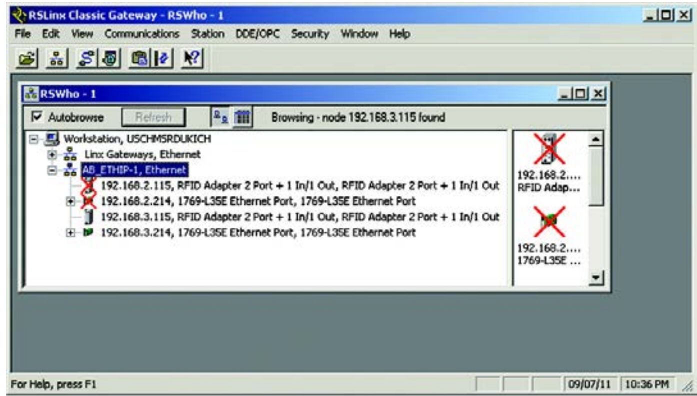
RSLinx places an X over the RFID adapter because it can no longer communicate with it.



Use the same steps to change the IP address of the other devices on the network.

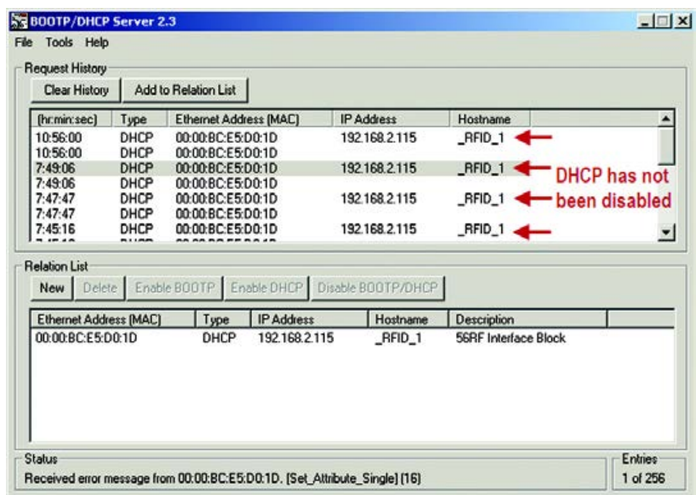
Change the Network adapter address to 192.168.3.1.

Close and reopen the RSWho window. The older addresses are not available and the new addresses (192.168.3.115 and 192.168.3.214) appear.



IMPORTANT	If DHCP is not disabled, the 56RF interface block shows two requests in the DHCP Server at each 56RF interface block power up.

In the following example, power was cycled to the 56RF interface block at 7:45:16, 7:47:47, 7:49:06, and again at 10:56:00. Each time power was applied, the 56RF interface block notified the BootP/DHCP server of its IP address, which indicates that DHCP has not been disabled. If DHCP is disabled, the 56RF interface block would show nothing.



IP Address 888

Address 888 is used to reset the interface block to the factory defaults. Rotate the address switches to 888 and cycle the power. The interface block clears out the current assigned IP address.

The MOD indicator blinks the following pattern: blinks red once, green once, then solid red, then blinks green once, and final blinks continuous red about once each second. The reset process takes about 10 seconds.

Mechanical Installation

Each of the transceivers has a similar but unique RF field that it generates.

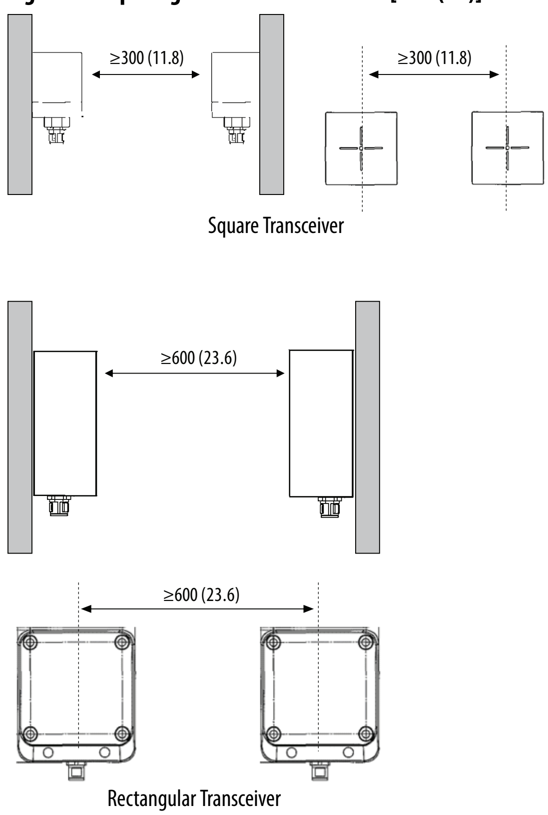
Fastening

Attach the transceiver to the flat plate with M5 screws. The tightening torque must be 1.5 N•m (13.3 lb•in) for the M5 screw.

Spacing Between Transceivers

Installing multiple transceiver causes radio frequency interference and may result in the difficulty of the tag communication. Keep a sufficient distance between the transceivers as shown in Figure 13.

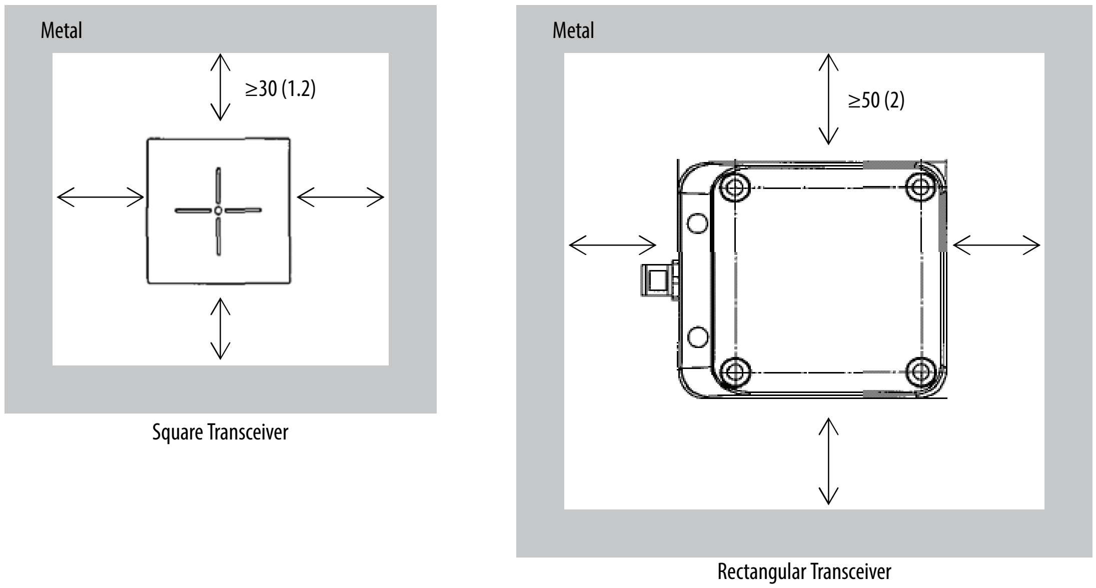
Figure 13 - Spacing Between Transceivers [mm (in.)]



Spacing Next to Metal Surfaces

For the square transceiver, the communication distance drops significantly when the distance between the transceiver and any surrounding metal is 30 mm (1.2 in.) or less. For the rectangular transceiver, the communication distance drops significantly when the distance between the transceiver and any surrounding metal is 50 mm (2 in.) or less.

Figure 14 - Transceiver Spacing with Metal Surfaces



Transceiver Field Maps

The transceiver has a three-dimensional RF field emanating from its sensing surface. The field consists of a main center lobe and a secondary side lobe.

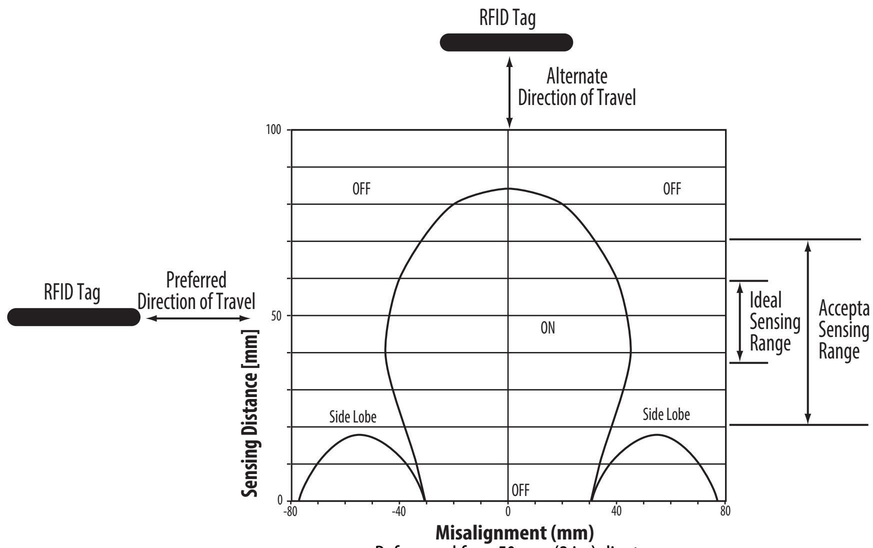
The RF tags must enter the RF field once, stay long enough to complete the read and write cycles, and then to leave the field smoothly and efficiently.

Ideally, the RFID tag should pass through the widest section of the main lobe. This arrangement maximizes the time that the transceiver has for reading and writing. Avoid the top of the field, and avoid the side lobes.

The preferred direction of travel is for the tag to pass across the RFID sensor surface. The tag can also approach the sensor surface directly and then move away directly backwards or to the side.

Figure 15 on page 47 shows the field map of the 65 x 65 mm (2.6 x 2.6 in.) transceiver.

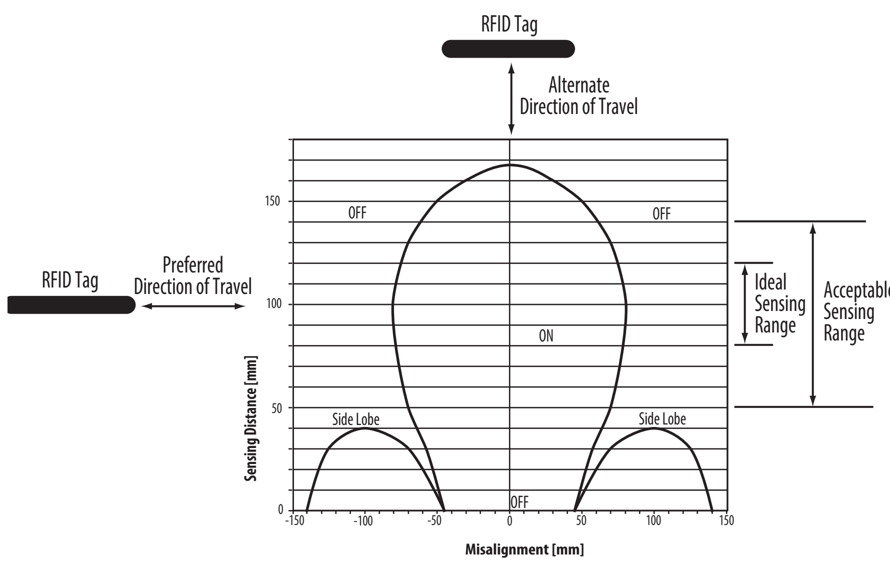
Figure 15 - 65 x 65 mm (2.6 x 2.6 in.) Transceiver



Referenced for a 50 mm (2 in.) disc tag

The field map for the 80 x 90 mm (3.1 x 3.5 in.) transceiver, which is shown in Figure 16, is similar.

Figure 16 - 80 x 90 mm (3.1 x 3.5 in.) Transceiver



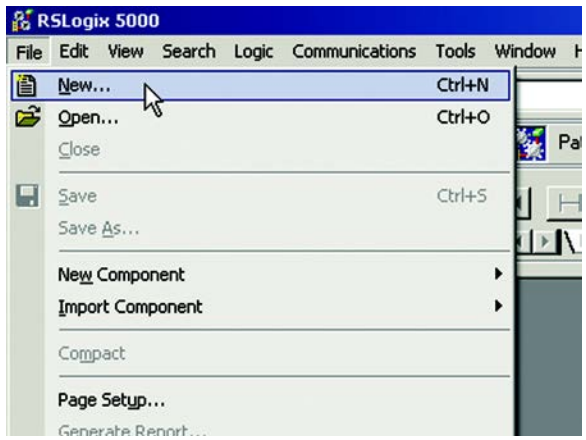
Referenced for a 50 mm (2 in.) disc tag

Notes:

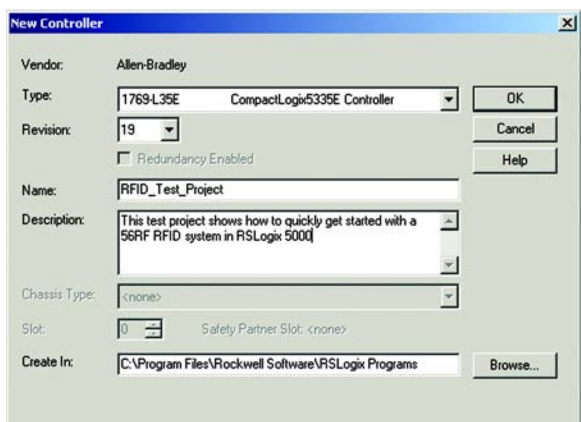
Add Your RFID Interface Block to an RSLogix 5000 Program

Procedure

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

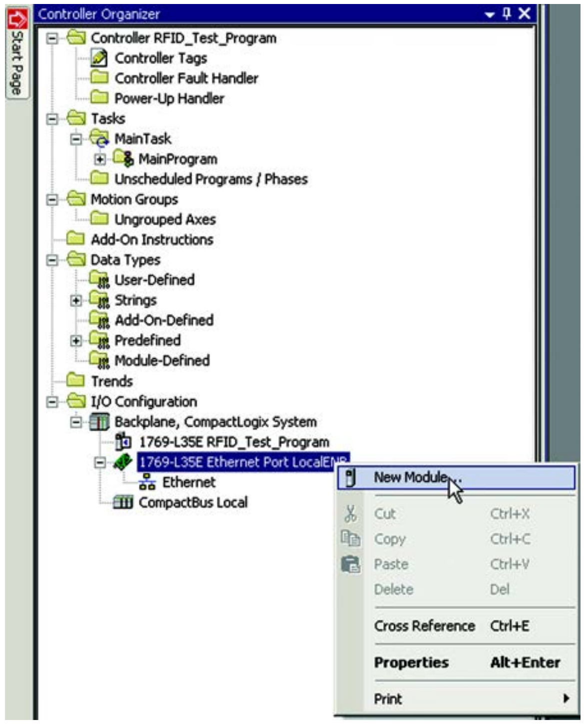


3. Enter the new controller information.

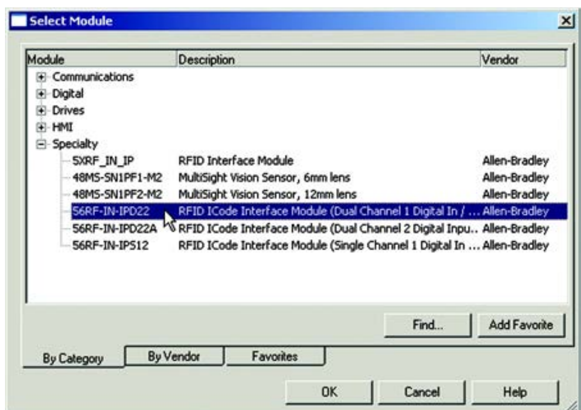


4. Right-click the Ethernet port of the controller.

5. Click New Module.

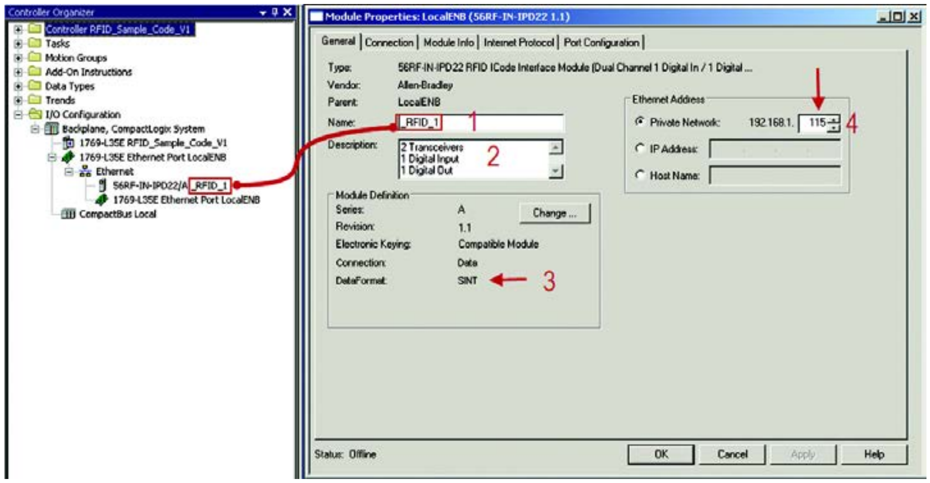


6. Select the desired 56RF module and click OK.



General Tab

The general panel describes the device, its definition, and its IP address. Make the changes that are shown in the following image and click Apply.



1. Enter a name for the module. In this example, the name is RFID_1. You may have multiple modules, so be sure to give it a brief but descriptive name. The name that you assign to the module appears in the Controller Organizer navigation pane. The name also appears in the description of the tags, which are described later.
2. Enter a description of the module or its function.
3. The Data Format can be left as SINT (preferred) or changed to INT (for compatibility with non-Rockwell Automation RFID tags).

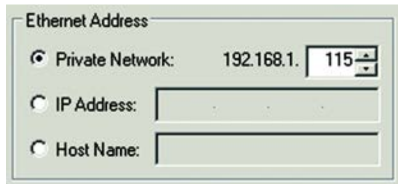
TIP A SINT is a signed single-byte integer, which can represent numbers from -255…255 in decimal format (-F…FF in hexadecimal format). An INT is a signed 2 byte integer, which can represent numbers from -65535…65535 in decimal format (-FFFF…FFFF in hexadecimal format).

4. Set the Ethernet Address for the module. In this example, the address is 192.168.1.115. The 115 reflects the address of the three rotary switches on the Bulletin 56RF interface block.

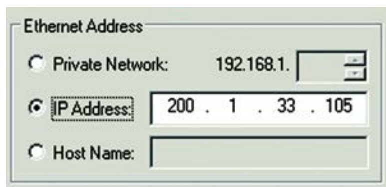
Ethernet Address

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

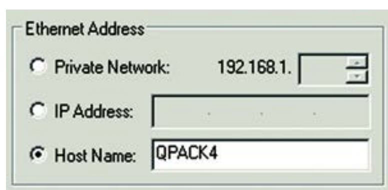
1. When a Private Network is used, click the Private Network radio button. Enter a value for the last octet between 1…254. Be sure not to duplicate the address of an existing device. In following example, the address of the RFID block is 192.168.1.115.



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



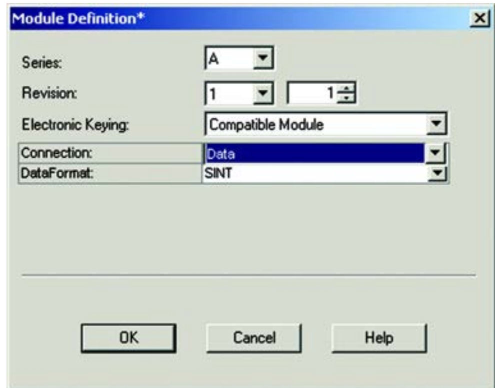
3. Click the Host Name radio button and type in the name of the host. In the following example, the host name is QPACK4.



Module Definition

You should not have to change the default values. If necessary, changes can be made by clicking the Change button.

You can change the Series, Revision, Electronic Keying, Connection, and Data Format. Click the down arrow on the Data Format field and select SINT.



Click OK to accept the changes (or Cancel to retain the original settings). Click Help for more info.

Connection Tab

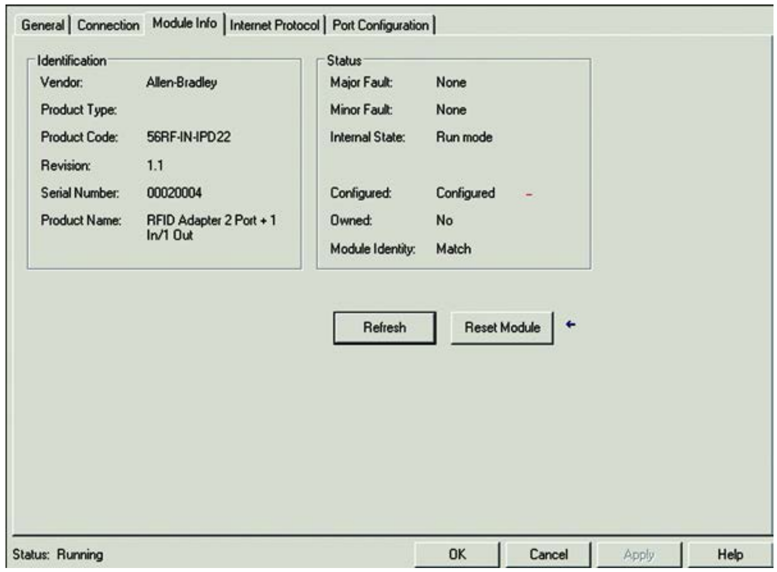
You should not have to change any settings on this tab.

Setting	Description
Requested Packet Interval	Specify the number of milliseconds between requests for information from the controller to the RFID block. The block may provide data on a shorter interval, but if no data is received, the controller asks the RFID block for a status update. Minimum setting is 2. Maximum setting is 750.
Inhibit Module	When checked, the RFID block is not polled for information, and the controller ignores any information that is provided.
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

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

In the left panel, the Add-on Profile (AOP) shows the vendor, product type, product code. Revision level, serial number, and product name.



In the right panel, the AOP shows the fault status, internal state (that is, Run mode), and whether the file is owned and Module Identity.

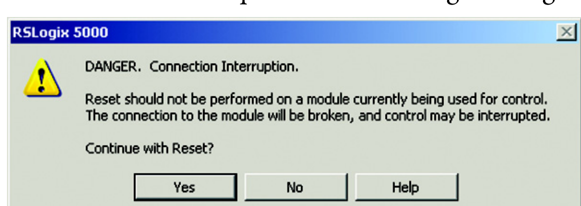
The Refresh and Reset Module button are active when the controller is online.

- Refresh

  Click this button to refresh the data in the window.

- Reset Module

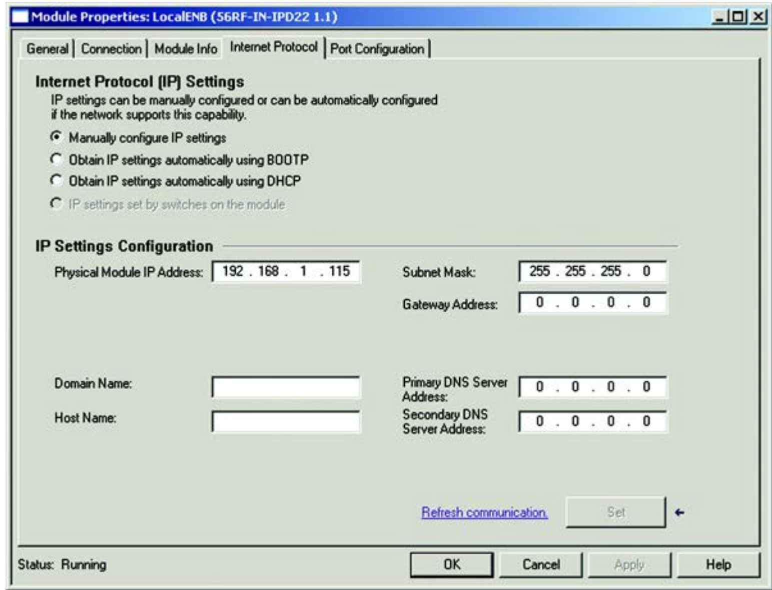
  Click this button with care as it disconnects the module momentarily and control is interrupted. The following warning window appears.



Click Yes or No as needed. Click Help for further information.

Internet Protocol Tab

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

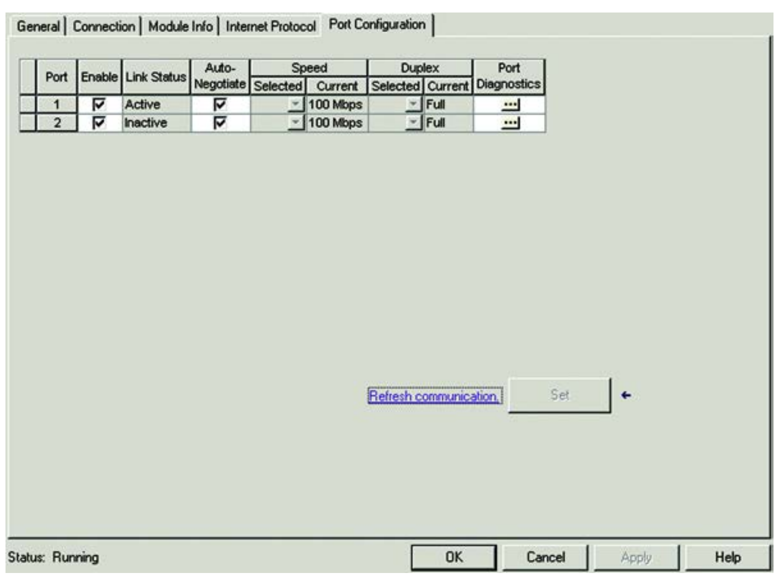


Port Configuration Tab

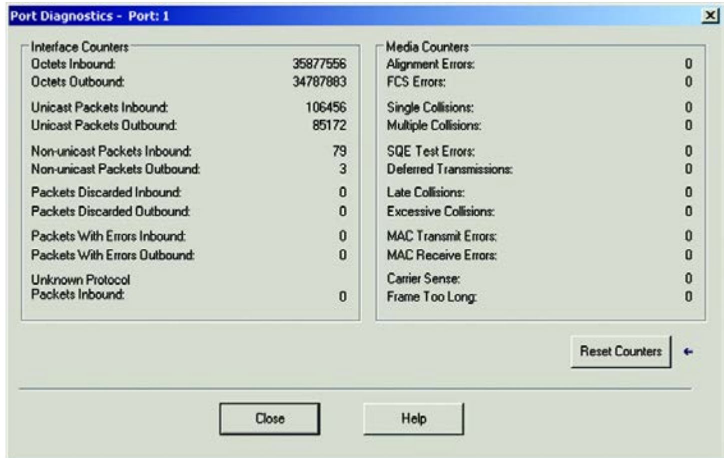
The Port Configuration fields should not need to be changed for the Quick Start process. These fields only become active when the controller is online.

The number of ports shown in this window varies depending on the block used. There should be either one or two ports.

The following window shows two ports. Port 1 is active, while Port 2 is inactive.



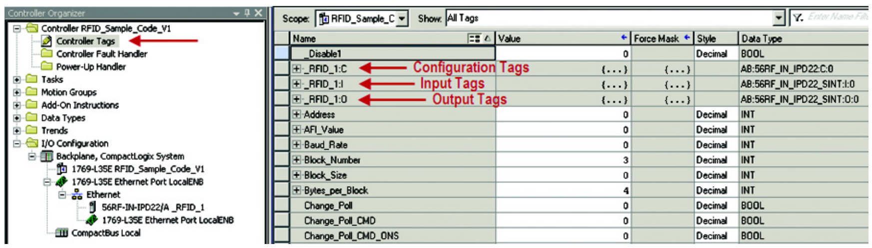
Click the ellipsis (...) under the Port Diagnostics. A window pops up showing the communications taking place between the controller and the transceiver that is connected to the port.



RSLogix 5000 Controller Tags

During the module installation, the RFID_1 tags are automatically loaded as controller tags, which makes the tags available to all programs.

In the Controller Organizer, click the Controller Tags.

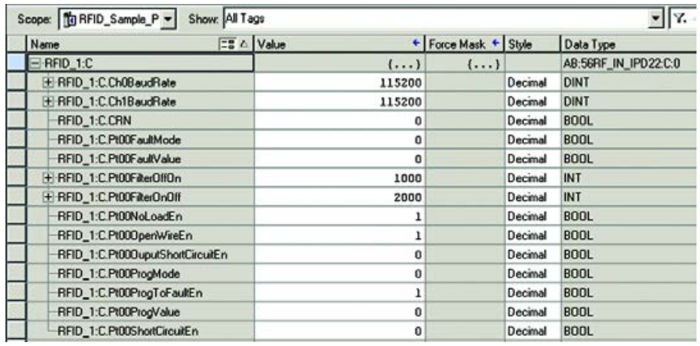


Three categories of tags appear. The tag name is composed of the module name followed by a:

- ":C" for Configuration
- ":I" for Input
- ":O" for Output.

Configuration Image Table and Tags

Expand the RFID_1:C by clicking the “+” box to show the configuration image table, which has the following tags:



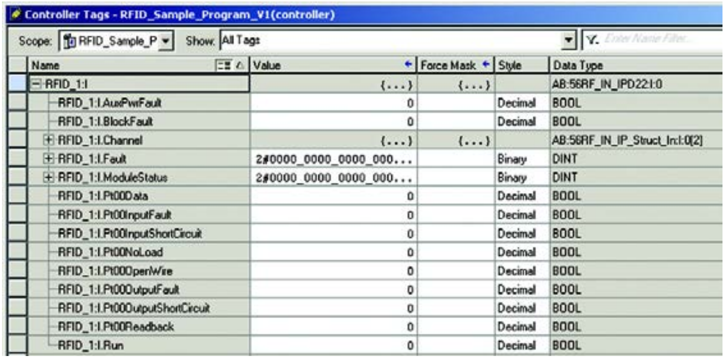
Scope: RFID_Sample_P Show: All Tags

Name	Value	Force Mask	Style	Data Type
RFID_1:C	{...}	{...}		AB:56RF_IN_IPD22:C:0
RFID_1:C.Ch0BaudRate	115200		Decimal	DINT
RFID_1:C.Ch1BaudRate	115200		Decimal	DINT
RFID_1:C.CRN	0		Decimal	BOOL
RFID_1:C.Pt00FaultMode	0		Decimal	BOOL
RFID_1:C.Pt00FaultValue	0		Decimal	BOOL
RFID_1:C.Pt00FilterOffOn	1000		Decimal	INT
RFID_1:C.Pt00FilterOnOff	2000		Decimal	INT
RFID_1:C.Pt00NoLoadEn	1		Decimal	BOOL
RFID_1:C.Pt00OpenWireEn	1		Decimal	BOOL
RFID_1:C.Pt00OuputShortCircuitEn	0		Decimal	BOOL
RFID_1:C.Pt00ProgMode	0		Decimal	BOOL
RFID_1:C.Pt00ProgToFaultEn	1		Decimal	BOOL
RFID_1:C.Pt00ProgValue	0		Decimal	BOOL
RFID_1:C.Pt00ShortCircuitEn	0		Decimal	BOOL

Tag	Description
Ch0BaudRate	The communication rate for Channel 0 from the RFID block to the RFID transceiver is stored in this tag. Allowable communication rates are 9600, 19200, 38400, and 115200. The default value is 115200.
Ch1BaudRate	The communication rate for Channel 1 from the RFID block to the RFID transceiver is stored in this tag. Allowable communication rates are 9600, 19200, 38400, and 115200. The default value is 115200.
CRN	The Configuration Revision Number is used internally with RSLogix™ for configuration information. You do not need to use this tag.
Pt00FaultMode	The Pt00FaultMode is used with FaultValue to configure the state of output 0 when a communications fault occurs. A value of 0 means that, if there is a communications fault, the value in FaultValue is used (Off or On). A value of 1 means that the last state is held. By default this value is 0.
Pt00FaultValue	The Pt00FaultValue is used with FaultMode to configure the state of output 0 when a communications fault occurs. A value of 0 is Off, and a value of 1 is On. By default the value is 0.
Pt00FilterOffOn	The Pt00FilterOffOn is used to determine the Off to On-delay time for input point 0 before the interface considers the input point on or True. A value of 0 indicates that there is no delay from an off condition to an on condition; the only delay would be a hardware delay. A value >0 would delay the input turning on by the configured value in milliseconds. By default this value is 0.
Pt00FilterOnOff	The Pt00FilterOnOff is used to determine the On to Off delay time for input point 0 before the interface considers the input point off or False. A value of 0 indicates that there is no delay from an on to off condition; the only delay would be a hardware delay. A value >0 would delay the input turning off by the configured value in milliseconds. By default this value is 0.
Pt00NoLoadEn	The Pt00NoLoadEn is used to enable or disable No Load diagnostic detection for output 0. A value of 1 means that No Load diagnostic detection is enabled. A value of 0 means that No Load diagnostic detection is disabled. By default this value is 0.
Pt00OpenWireEn	The Pt00OpenWireEn is used to enable or disable the open wire detection for input point 0. A value of 1 means that open wire detection is enabled. A value of 0 means that open wire detection is disabled. By default this value is 1.
Pt00OutputShortCircuitEn	The Pt00OutputShortCircuitEn is used to enable or disable the short circuit detection for output point 0. A value of 1 means that short circuit detection is enabled. A value of 0 means that short circuit detection is disabled. By default this value is 0.
Pt00ProgMode	The Pt00ProgMode is used with ProgValue to configure the state of output 0 when the controller is in Program mode. A value of 0 means that the ProgValue (Off or On) is used when the controller is in Program mode. A value of 1 means that the last state is held. By default this value is 0.
Pt00ProgValue	The Pt00ProgValue is used with ProgMode to configure the state of output 0 when the controller is in Program mode. A value of 0 is Off, and a value of 1 is On. By default this value is 0.
Pt00ShortCircuitEn	The Pt00ShortCircuitEn is used to enable or disable the short circuit detection for input point 0. A value of 1 means that short circuit detection is enabled. A value of 0 means that short circuit detection is disabled. By default this value is 0.

Input Image Table and Tags

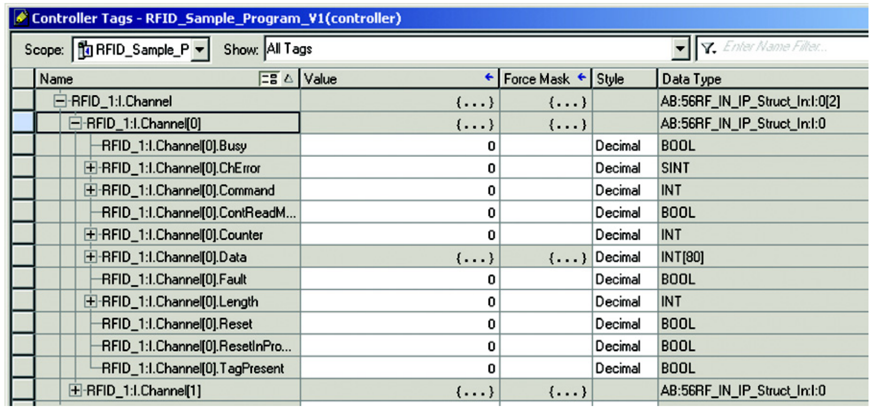
Expand the RFID_1:I by clicking the "+" box to show the input image table, which has the following tags:



Tag	Description
AuxPwrFault	The AuxPwrFault bit indicates if there is no auxiliary power detected. A value of 0 indicates no fault, a value of 1 indicates a fault condition.
BlockFault	The Block Fault bit indicates if any of the RFID channels or input/output points is in a fault condition. A value of 0 indicates that the RFID channels and input/output points are functioning correctly, a value of 1 indicates one or more of the RFID channels and/or input/output points are in a fault condition. Individual RFID channel fault bits are contained within each associated Channel[x] input word.
Channel	See Input Channel Tags on page 60.
Fault	The Fault word is a 4-byte value that stores the connection status between the interface and the controller. A value of 0 indicates that a connection has been established, and value of -1 indicates no connections.
ModuleStatus	The Module status is a 4-byte value that contains the overall status of the module. A value of 0 or 1 indicates that the module is functioning with no faults, a value greater than 1 indicates that a fault condition exists. The ModuleStatus word varies slightly based on the configured unit.
Pt00Data	The Pt00Data bit indicates if the status of input point 0. A value of 0 indicates open, a value of 1 indicates closed.
Pt00InputFault	The Pt00InputFault bit indicates if the input point 0 has a fault condition. Input faults would be Open Wire and/or Short Circuit. A value of 0 indicates no fault condition, whereas a value of 1 indicates a fault condition.
Pt00InputShortCircuit	The Pt00InputShortCircuit bit indicates if the input point 0 has a short condition. A value of 0 indicates no fault; a value of 1 indicates a fault condition. Short circuit detection can be enabled or disabled during configuration.
Pt00NoLoad	The Pt00NoLoad bit indicates if the output point 0 has a no load condition; No load detection only occurs when the output point is OFF. A value of 0 indicates no fault; a value of 1 indicates a fault condition. No load detection can be enabled or disabled during configuration.
Pt00OpenWire	The Pt00OpenWire bit indicates if the input point 1 has an open wire condition. A value of 0 indicates no fault, a value of 1 indicates a fault condition. Open wire detection can be enabled or disabled during configuration.
Pt00OutputFault	The Pt00OutputFault bit indicates if the output point 0 has a fault condition. Output faults would be No Load and/or Short Circuit. A value of 0 indicates no fault; a value of 1 indicates a fault condition.
Pt00OutputShortCircuit	The Pt00OutputShortCircuit bit indicates if the output point 0 has a short condition. A value of 0 indicates no fault; a value of 1 indicates a fault condition; output short-circuit detection only occurs when the output is ON. Short circuit detection can be enabled or disabled during configuration.
Pt00Readback	The Pt00Readback bit indicates the status of the output point Pt00Data. If the output bit Pt00Data is 1, indicating that the output has been commanded to turn ON, then when the output point turns ON Pt00Readback contains the value of 1.
Run	The Run bit indicates if the block is in run or program mode. A value of 1 indicates that the block is in run mode, a value of 0 indicates that the block is in program mode.

Input Channel Tags

Expand the RFID_1:Channel by clicking the "+" box to show that two channels exist (Channel[0] and Channel[1]). Expand the RFID_1:Channel[0] by clicking the "+" box. Each channel has the following tags:



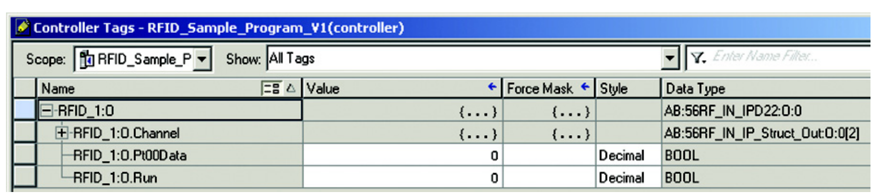
Tag	Description
Busy	The channel Busy bit indicates the status of an RFID channel. A value of 0 indicates that the RFID channel is not executing a command, a value of 1 indicates that a command is in the process of executing on that channel.
ChError	The channel ChError is a 1-byte word that contains the last error code for that channel. A value of 0 indicates no error, a value >0 indicates some error. See Error Codes for RFID Interface Block on page 131 for a list of the error codes.
Command	The channel command word is a 2-byte value that stores the last command that the channel received; at powerup this value must be 0. The allowable commands are listed in Table 22 on page 61.
ContReadMode	The channel ContReadMode bit indicates the status of Continuous Read Mode for an RFID channel. A value of 0 indicates that the RFID channel is not in continuous read mode; a value of 1 indicates that the RFID channel is in continuous read mode. While in Continuous Read Mode, the interface ignores all other commands except a Stop Continuous Read.
Counter	The channel counter word is a 2-byte value that increments its value by 1 after the interface has completed execution of a command. This value rolls over to 0 after it counts to 65535 and starts again; at powerup this value must be 0.
Data	Depending on the Data Format, the channel Data word is an array of either 2-byte values or an array of 1-byte values that total 160 bytes in length. This array is used to store information that is returned from the RFID interface. Upon completion a command, reply data is deposited in this array and the length of the reply (in 16-bit word increments) is placed within the associated length field; at powerup this value must be 0.
Fault	The channel fault bit indicates the fault status of the RFID channel. A value of 0 indicates that the channel is operating normally, a value of 1 indicates that the channel has faulted.
Length	The channel length word is a 2-byte value that indicates the data length for specific commands. Upon completion of a command, this word is populated with the number of 16-bit words returned to the data field; at powerup this value must be 0.
Reset	The channel reset bit indicates the reset status of the RFID channel. A value of 0 indicates that the channel is not in reset, a value of 1 indicates that the channel has completed a reset.
ResetInProgress	The channel ResetInProg bit indicates the status of an RFID channel reset. A value of 0 indicates that the RFID channel is not currently undergoing a reset; a value of 1 indicates a reset in progress on that channel.
TagPresent	The channel TagPresent bit indicates the status of a tag at the RFID channel. A value of 0 indicates that there is not tag present at the transceiver; a value of 1 indicates one or more tags have been detected at the transceiver.

Table 22 - Allowable Commands

Value	Command	Description
1	Read Single Block	Reads a single block of user data.
2	Read Multiple Blocks	Reads multiple blocks of user data from a tag.
3	Multi-tag Block Read	Reads information from up to four tags.
4	Read Byte	Reads bytes of user data from a tag.
5	Start Continuous Read	Initiates continuous read mode.
6	Stop Continuous Read	Stops continuous read mode.
8	Teach Continuous Read	Provides the ability to set the best time to start reading in continuous read mode automatically.
10	Write SingleBlock	Writes a single block of user data.
11	Write Multiple Blocks	Writes multiple blocks of user data to a FRAM tag.
12	Multi-tag Block Write	Writes multiple blocks of user data to up to four tags.
13	Clear Multiple Bytes	Clears multiple bytes of user data in a tag.
14	Write Byte	Writes bytes of data to a tag.
20	Inventory	Counts the number of blocks in the field (up to four) and returns the UUID of the first tag in the field.
31	Read Transceiver Settings	Read Baud Rate, Device ID,Retry Time, and Gain.
33	Get Version Information	Retrieves the firmware revision from the transceiver.
34	Get System Information	Gets Info Flags,UUID, DSFID, AFI,Memory Size, and IC Reference from Tag.
40	Lock Block	Locks blocks of memory.
41	Write AFI	Write the AFI byte to the tag.
42	Lock AFI	Locks the AFI byte from future changes.
43	Write DSFID	Writes the DSFID byte to the tag.
44	Lock DSFID	Locks the DSFID byte from future changes.
45	Get Multiple Block Security Status	Retrieves that security status of multiple blocks within a tag.

Output Image Table and Tags

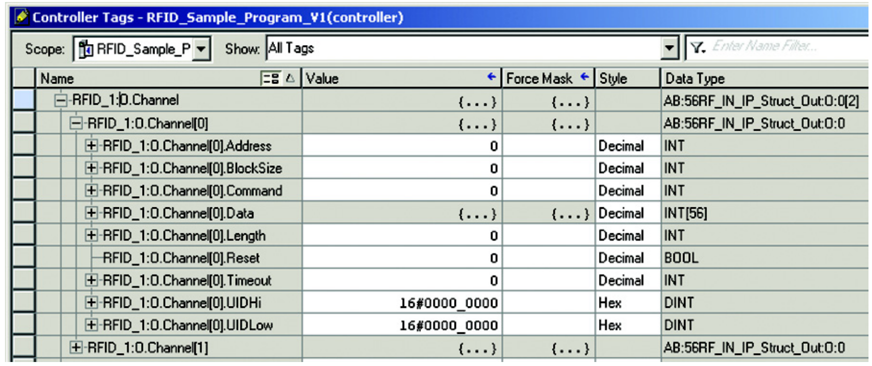
Expand the RFID_1:O by clicking the "+" box to show the output image table, which has the following tags:



Tag	Description
Channel	See Output Channel Tags on page 62.
Pt00Data	The Pt00Data bit is used to turn output point 0 either on or off. A value of 0 is used to turn off the output point, a value of 1 is used to turn on the output point.
Run	The Run bit is used to place the RFID block into run or program mode. A value of 0 is used for program mode, a value of 1 is used for run mode. When in program mode, the interface maintains the connection to the processor but does not execute commands. The discrete output point follows the mode of the processor and the Run bit, with the Run bit overriding.

Output Channel Tags

Expand the RFID_1:Channel by clicking the "+" box to show that two channels exist (Channel[0] and Channel[1]). Expand the RFID_1:Channel[0] by clicking the "+" box. Each channel has the following tags:



Tag	Description
Address	The channel Address word is a 2-byte value that contains the address or block value within the RFID tag that the command executes on.
BlockSize	The channel BlockSize word is a 2-byte value that stores the expected Block Size for the tag. Valid values are 0 bytes, 4 bytes, or 8 bytes per block. A value of 0 defaults to a Block Size of 4 bytes per block.
Command	The channel Command word is a 2-byte value that stores the next command for the interface to process. The RFID interface executes the command once when this value changes. If a command must be repeated, then set the value to zero first and then change it again to the desired command. Use a MOV or COP instruction to store the command value in this tag. The allowable commands are listed in Table 23 on page 63.
Data	Depending on the Data Format, the channel Data word is either an array of 2-byte values or an array of 1-byte values that total 112 bytes in length per channel. This array is used to store information that is directed to the RFID interface. Some commands, such as reading, do not require the use of this data field. Writing to tags uses this information with the length field to inform the RFID interface what values it must write. The size of this word allows the writing of up to 28 blocks of data to a tag at a time, with each block being 4 bytes in length.
Length	The channel length word is a 2-byte value that indicates the data length for specific commands. Upon completion of a command, this word is populated with the number of 16-bit words returned to the data field; at powerup this value must be 0.
Reset	The channel reset bit is used to command an RFID channel reset. A value of 0 indicates that the channel is not being commanded to reset, a value of 1 indicates a request to reset the channel.
Timeout	This value determines how long the interface waits for a command response from the transceiver before indicating a message timeout. The default value is 0, which sets the timeout at 750 ms. You can enter a timeout value in milliseconds. **IMPORTANT** A low timeout value can cause command failures by timing out before the command would otherwise have successfully completed.
UIDHi	The channel UID word is an 8-byte value that contains the UUID information for specific commands that allows the command to be targeted to a specific tag in the field. Under normal circumstances, this value is 0, which tells the RFID interface to perform an action regardless of what tag it is. Any value other than 0 attempts to direct the command to that specific tag. The UIDHi value contains bytes 0…1 and 6…7 of the UID.
UIDLow	The UIDLow value contains bytes 2…5 of the UID.

Table 23 - Allowable Commands

Value	Command	Description
1	Read Single Block	Reads a single block of user data.
2	Read Multiple Blocks	Reads multiple blocks of user data from a tag.
3	Multi-tag Block Read	Reads information from up to four tags.
4	Read Byte	Reads bytes of user data from a tag.
5	Start Continuous Read	Initiates continuous read mode
6	Stop Continuous Read	Stops continuous read mode
8	Teach Continuous Read	Provides the ability to set the best time to start reading in continuous read mode automatically.
10	Write SingleBlock	Writes a single block of user data.
11	Write Multiple Blocks	Writes multiple blocks of user data to a FRAM tag
12	Multi-tag Block Write	Writes multiple blocks of user data to up to four tags.
13	Clear Multiple Bytes	Clears multiple bytes of user data in a tag.
14	Write Byte	Writes bytes of data to a tag.
20	Inventory	Counts the number of blocks in the field (up to four) and returns the UUID of the first tag in the field.
31	Read Transceiver Settings	Read Baud Rate, Device ID and Retry Time.
33	Get Version Information	Retrieves the firmware revision from the transceiver.
34	Get System Information	Gets Info Flags,UUID, DSFID, AFI,Memory Size, and IC Reference from Tag
41	Write AFI	Write the AFI byte to the tag
42	Lock AFI	Locks the AFI byte from future changes.
43	Write DSFID	Writes the DSFID byte to the tag.
44	Lock DSFID	Locks the DSFID byte from future changes.
45	Get Multiple Block Security Status	Retrieves that security status of multiple blocks within a tag.

Notes:

Commands Summary

RFID Commands

This section provides a summary of the commands that are supported by the RFID transceiver. Detail of the commands can be found in Chapter 9. This guide assumes familiarity with RSLogix 5000®. The *.ACD file must already be downloaded into the PLC and working properly.

Table 24 assumes the following:

- You have configured the RSLogix 5000 Add-on Profile (AOP) with Data Format set to SINT.
- The RFID tag has blocks that are only 4 bytes each.
- The UUID is set to zero (unless specified).

TIP A Universally Unique Identifier (UUID) can be specified in xx.0.Channel[0].UIDLow and xx.0.Channel[0].UIDHi for most commands to operate on a specific tag. If xx.0.Channel[0].UIDLow and xx.0.Channel[0].UIDHi are set to 0, the command operates on the first tag in the transceiver field. All other Output values must be set to 0 where not specified.

Table 24 - Commands

Command	Description	Output xx.0.Channel[0]	Input xx.I.Channel[0]
Inventory	Option Flag 0 Returns number of tags in field Returns Universally Unique Identifier (UUID) of first tag in field	Command = 20 Length = 0 Data[0] = 0	Data[0] = # of tags Data[2…9, 10…17, 18…25, 26…33] = UUID of up to four tags
	Option Flag 1 Returns number of tags in field Returns Application Family Identifier (AFI) of first tag in field Returns Universally Unique Identifier (UUID) of first tag in field	Command = 20 Length = 1 Data[0] = 1	Data[0] = # of tags Data[2, 12, 22, 32] = AFI of up to 4 tags Data[4…11, 13…21, 24…31, 34…41] = UUID of up to four tags
Read Single Block	Option Flag 0 Reads a single block of user data from a tag	Command = 1 Data[0] = 0	Data[0…3] = User data (4 bytes)
	Option Flag 1 Reads a single block of user data from a tag Returns security status of the block	Command = 1 Data[0] = 1	Data[0…3] = User data (4 bytes) Data[4] = Security status
Write Single Block	Writes a single block of user data to a tag	Command = 10 Length =Block size BlockSize = Block size Data[0…1] = User data (4 bytes)	All data bytes are zero
Lock Block	Locks a single block of user data, preventing writing	Command = 40 UIDLow = UIDLow UIDHi = UIDHi	All data bytes are zero

Table 24 - Commands

Command	Description	Output xx.O.Channel[0]	Input xx.I.Channel[0]
Read Multiple Blocks	Option Flag 0 Reads multiple blocks of user data from a tag	Command = 2 Length = Number of blocks Data[0] = 0	Data[0…3] = Block x Data[4…7] = Block x+1
	Option Flag 1 Reads multiple blocks of user data from a tag Returns security status of the blocks	Command = 2 Length = Number of blocks Data[0] = 1	Data[0…3] = Block x Data[4] = Security status of block x Data[6…9] = Block x+1 Data[10] = Security status of block x+1
Write Multiple Blocks	Writes multiple blocks of user data to an FRAM tag	Command = 11 Length = Number of bytes (multiple of 8) BlockSize = Block size Data[0…3] = User data (8 bytes)	All data bytes are zero
Write AFI	Writes 1 byte of information into the Application Family Identifier (AFI) area that is contained within block -2	Command = 41 Length = 1 Data[0] = 00xx	All data bytes are zero
Lock AFI	Locks the 1 byte of information for the AFI area, preventing it from being modified	Command = 42 UIDLow = UIDLow UIDHi = UIDHi	All data bytes are zero
Write DSFID	Writes 1 byte of information in the DSFID area	Command = 43 Length = 1 Data[0] = 00xx	All data bytes are zero
Lock DSFID	Locks the 1 byte of information for the DSFID area, preventing it from being modified	Command = 44 UIDLow = UIDLow UIDHi = UIDHi Data[0] = 00xx	All data bytes are zero
Get System Information	Returns the following system information of the tag: Info_Flags UUID DSFID AFI Memory Size (Max Block Number +1 * Max Byte per Block +1) IC Reference	Command = 34	Data[0] = Info_Flag Data[2] = DSFID Data[4] = AFI Data[6…13] = UUID Data[14] = Max Block Number Data[15] = Max Byte Number in Block Data[16] = IC Ref
Get Multiple Block Security Status	Retrieves the security status of multiple blocks within a tag	Command = 45 Length = Number of blocks	Data[0…7] = UUID Data[8] = Security status of block x Data[10] = Security status of block x+1
Read Byte	Option Flag 0 Reads bytes of user data from a tag	Command = 4 Address = Starting byte Length = Number of bytes to read Data[0] = 0	Data[0…] = User data
	Option Flag 1 Reads the UUID from a tag Reads bytes of user data from a tag	Command = 4 Address = Starting byte Length = Number of bytes to read Data[0] = 1	Data[0…7] = UUID Data[8…] = User data
Write Byte	Writes bytes of user data to a tag	Command = 14 Address = Starting byte Length = Number of bytes to write Data[0] = Start of User data	Data[0…7] = UUID
Clear Multiple Bytes	Clears multiple bytes of user data in a tag	Command = 13 Address = Starting byte Length = Number of bytes to clear Data[0] = Cleared byte value	All data bytes are the cleared byte value

Table 24 - Commands

Command	Description	Output xx.O.Channel[0]	Input xx.I.Channel[0]
Multi-tag Block Read	Reads the following information from up to four tags in the field: Number of tags UUID Multiple blocks of user data	Command = 3 Address = First block to read Length = Number of blocks to read for each tag	Data[0] = Number of tags Data[2…9] = UUID of first tag Data[10…*] = User data of first tag Data[*…*] = UUID of second tag Data[*…*] = User data of second tag
Multi-tag Block Write	Writes multiple blocks of user data to up to four tags in the field Returns number of tags in the field Retrieves UUID of tags	Command = 12 Length = Number of bytes to write to each tag BlockSize = Block size Data[0] = Block x Data[4…7] = Block x+1	Data[0] = Number of tags Data[2…9] = UUID of first tag Data[10…17] = UUID of second tag Data[18…25] = UUID of third tag Data[26…33] = UUID of fourth tag
Read Transceiver Settings	Retrieves the following information from the transceiver: Communication rate Device ID Retry time	Command = 31	Data[0…1] = Device ID Data[2…5] = Communication rate Data[6…7] = Retry setting Data[8…9] = Gain
Get Version Information	Retrieves the firmware revision from the transceiver	Command = 33	Data = firmware revision

Notes:

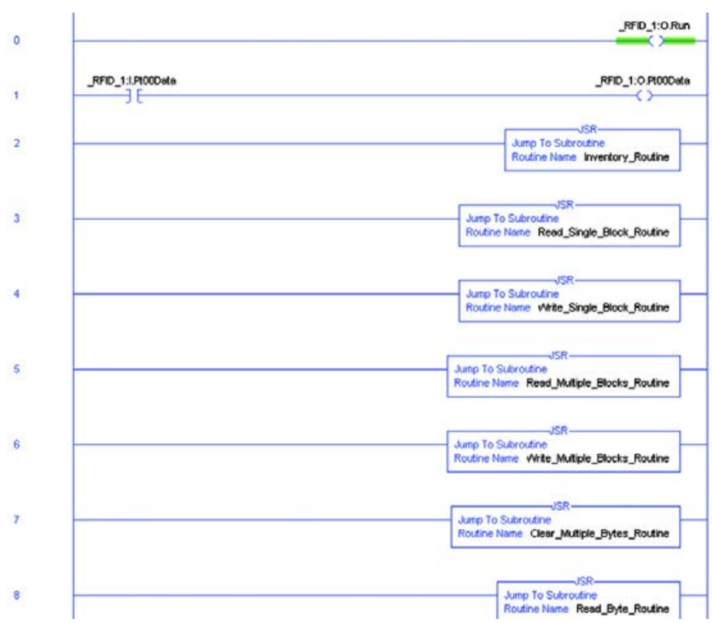
RSLogix 5000 Code Examples

This chapter contains examples of routines that run in RSLogix 5000®.

The examples are written for an RF transceiver that is connected to the "0" connector on the RF interface block. A momentary switch is connected to the Digital Input connector. The switch is used to enable the routine to allow you to repeat the routine easily.

In the examples, the RFID block is identified as "_RFID1"

Main Routine



A partial listing of the Main Routine is shown in the following section. The Main Routine sets the run bit. In program mode, the run bit is 0; and 1 for run mode. The remaining blocks jump to the various subroutines to execute the commands. In Rung 1, the momentary switch turns on Digital Output 0, which turns on a status indicator to confirm that you have pressed the momentary switch.

Example Command Routines - Overview

Many of the example routines (not the Main Routine) use the same Ladder Logic. The following explains the Ladder Logic.

Rung 0

Rung 0 initiates the routine. A sensor or momentary switch, which is connected to the input connection of the RFID interface block, senses that an object (with an RFID tag attached) is approaching and enables the execution of the read routine. The sensor is the XIC bit labeled _RFID_1:I:Pt00Data. When the sensor detects the object, the instruction latches ON.

Rung 1

Rung 1 initializes the output image table in preparation for command. Execution begins when the transceiver is not already busy reading a tag and a tag is present in the RF field.

This Examine If Closed (XIC) instruction is latched ON by the sensor in Rung 0.

RFID_1:I:Channel[0]Busy – This Examine If Open (XIO) instruction prevents the rung from executing when the transceiver is busy executing a command.

RFID_1:I:Channel[0].TagPresent – This XIC instruction closes when a tag is present in the RF field of the transceiver that is connected to Channel[0].

MOV variable to RFID_1:O:Channel[0]:variable – Moves data from a Controller tag to the output image table variable.

MOV 0 to RFID_1:0:Channel[0].Command – Initializes the output command to 0.

IMPORTANT	The transceiver executes a command when the command value changes. When repeating a command, set the command value to 0 first and then reset it to the same desired value.

Start – Latches a tag that indicates the function has started.

Unlatch – Unlatches (turns OFF) the instruction from Rung 0 and readies the routine for the next RFID tag.

Rung 2

Start – With the output channel properly initialized, the Start bit enables the rung to begin execution.

EQU RFID_1:I:Command[0].Command =0 – When an output command is updated, the interface block returns that command back to the input command. If the input command is zero (it was set in Rung 1), then the EQU output goes HI and enables the subsequent MOV command.

MOV x to RFID_1:O:Command[0].Command – Moving a nonzero value into the output command byte instructs the RFID block to execute the command.

Rung 3

Rung 3 verifies that another command is not initiated while a command is busy.

Start – The Start bit enables the rung to begin execution.

RFID_1:I:Channel[0].Busy – When the command begins execution, the Busy bit goes HI. This contact closes and the rung is executed.

InProgress – When command begins execution, an In-Progress bit is latched ON.

Start – This contact is opened, as the command has transitioned from start to busy.

Rung 4

Rung 4 confirms the completion of the command, as the interface block moves a value into the input channel command location.

InProgress – This contact closes when the read command begins execution.

RFID_1:I:Channel[0].Busy – This contact is open while the command is in process.

EQU RFID_1:I:Channel[0].Command – Upon completion of the command the interface block copies the value from output command to the input command. If the input command value equals the value of the command, the EQU output goes HI.

InProgress – This bit is unlatched when the command is successfully completed. The routine is now ready for the next RFID tag or other routine.

Clear Multiple Bytes

The Clear Multiple Bytes command clears multiple bytes of user data in an RFID tag. You can specify the number of bytes to clear and the address from which to begin. This is similar to a “copy” command. It copies the value that you specify in the output data image Data[0] location to the addresses you specify.

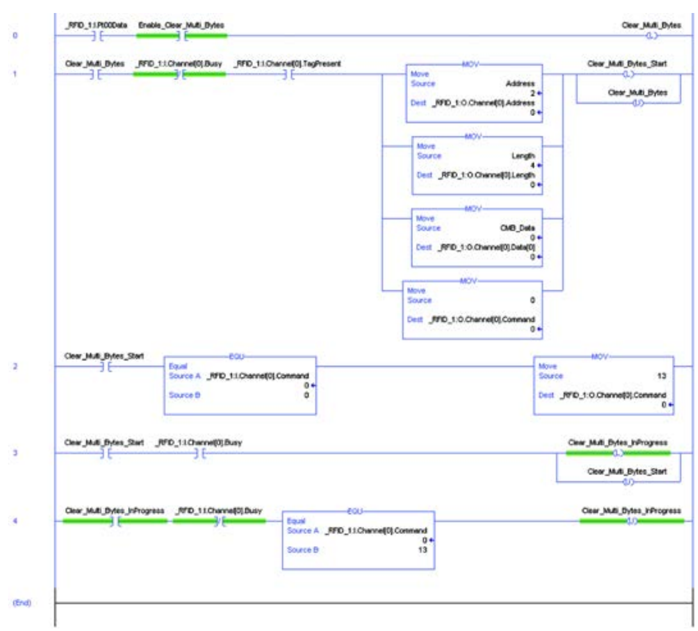
Set the following values in the output image table:

a. xx:O.Channel[0].Command = 13
b. xx:O.Channel[0].Address = starting address
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = 0 (or value that is used to clear the byte)
e. xx:O.Channel[0].Length = the number of bytes to clear
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

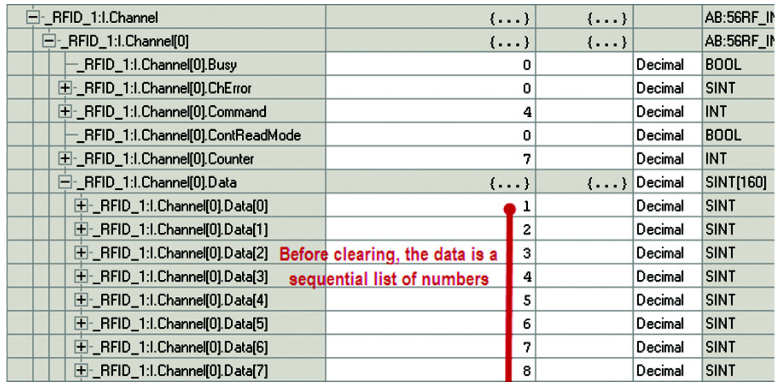
Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length data, the value that is used to clear the fields and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table. The value to be copied is initially stored in the controller tag CMB_Data. In the following example, CMB_Data is set to 0, but you can set this value to be any valid SINT value.



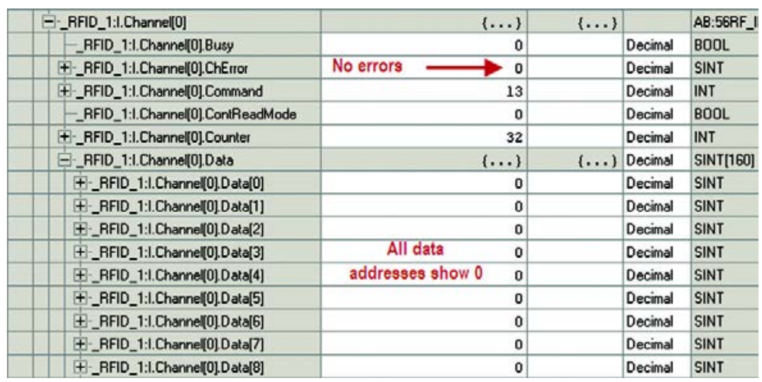
Example Results

To demonstrate the results, the Read Byte command was executed on an RFID tag. The data in this tag was a simple list of numbers starting from 1. Note that the counter is 31.



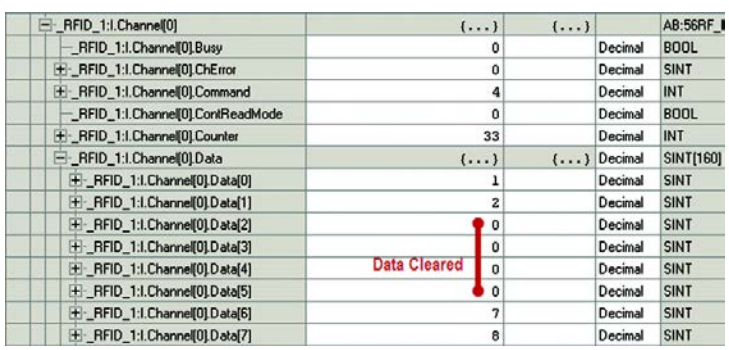
_RFID_1:I.Channel	{...}	{...}		AB:56RF_IN
_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_IN
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	4		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	7		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	1		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]	2		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	3		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]	4		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	5		Decimal	SINT
_RFID_1:I.Channel[0].Data[5]	6		Decimal	SINT
_RFID_1:I.Channel[0].Data[6]	7		Decimal	SINT
_RFID_1:I.Channel[0].Data[7]	8		Decimal	SINT

The Clear Multiple Byte command is executed successfully as the ChError = 0 and all data bytes are zero. The counter increments to 32.



_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_I
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	13		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	32		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[5]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[6]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[7]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[8]	0		Decimal	SINT

The tag is read again (command = 4) to confirm the clearing. Data bytes 2…4 are successfully set to 0.



_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_I
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	4		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	33		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	1		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]	2		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[5]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[6]	7		Decimal	SINT
_RFID_1:I.Channel[0].Data[7]	8		Decimal	SINT

Get Multiple Block Security Status

The Get Multiple Block Security Status command retrieves the security status of multiple blocks within a tag. It also displays the Universally Unique Identifier (UUID) of the RFID tag.

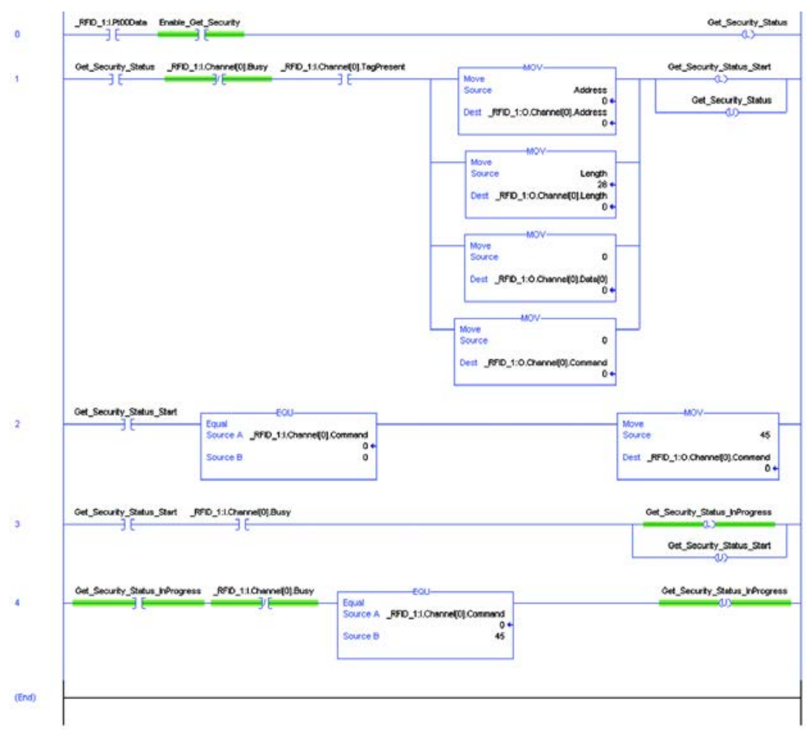
Set the following values in the output image table:

a. xx:O.Channel[0].Command = 45
b. xx:O.Channel[0].Address = the first block to read
c. xx:O.Channel[0].Block = 0
d. xx:O.Channel[0].Data[0] = 0
e. xx:O.Channel[0].Length = the number of blocks to read.
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

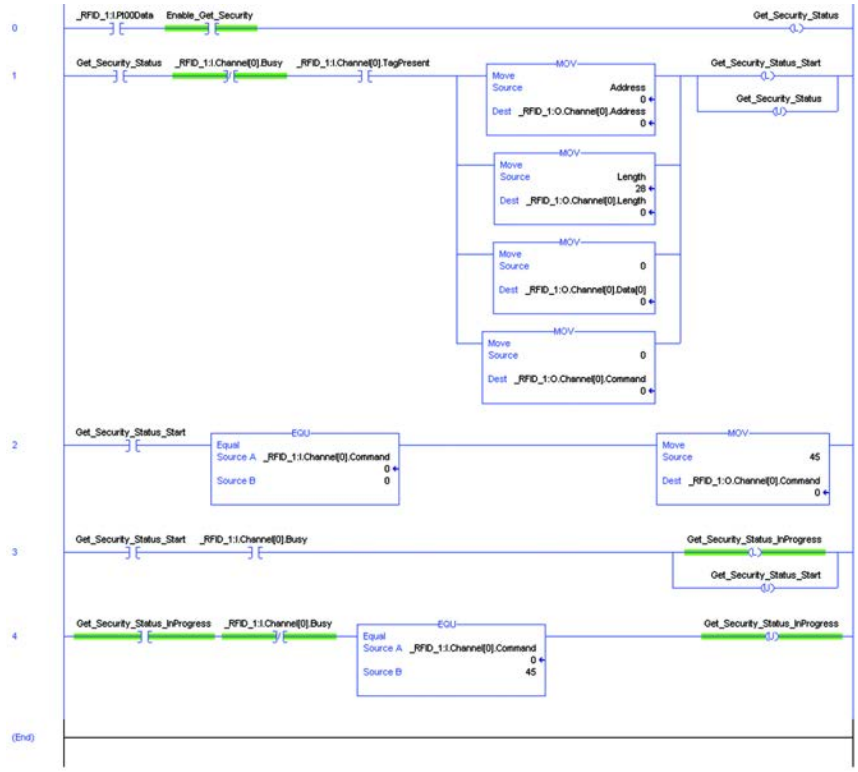
Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length data, the Data[0] value that is used to clear the fields and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table. The starting address is block 0. The command reads 28 blocks (all blocks of this RFID tag).



Example Results

The following example shows the security status for the first three blocks. Blocks 0 and 2 are locked. Block 1 is not locked.



The following information is displayed:

- xx:I.Channel[0].Data[0...7] = UUID
- xx:I.Channel[0].Data[8...9] = Security status of block x
- xx:I.Channel[0].Data[10...11] = Security status of block x+1

Get System Information

The Get System Information command returns the following RFID tag information:

- Info_Flag
- Data Storage Format Identifier (DSFID)
- Application Family Identifier (AFI)
- Universally Unique Identifier (UUID)
- Memory Size
- IC Reference

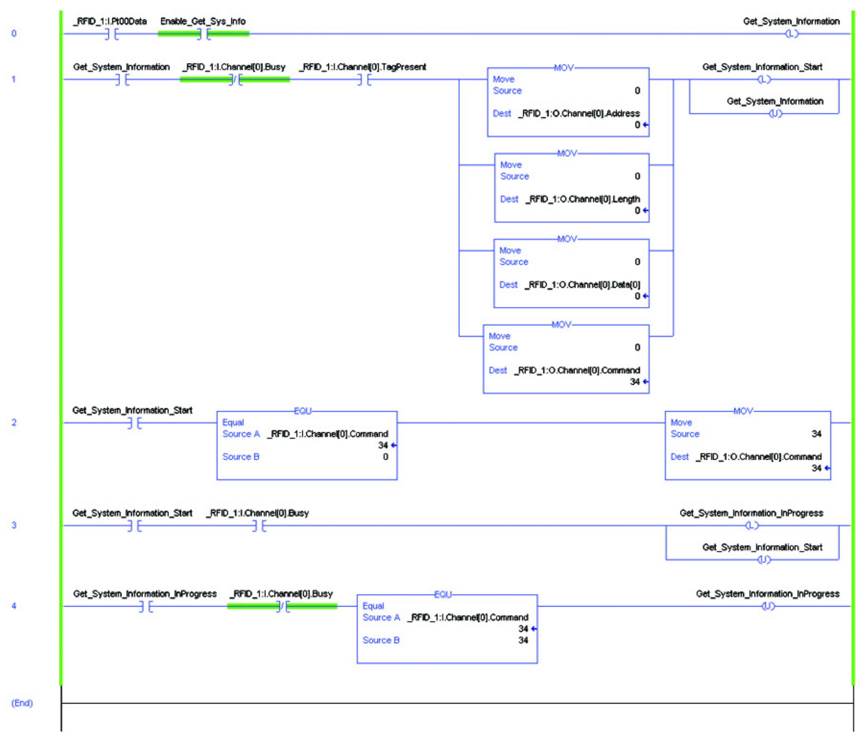
Set the following values in the output image table:

a. xx:O.Channel[0].Command = 34
b. xx:O.Channel[0].Address = 0
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = 0
e. xx:O.Channel[0].Length = 0
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length data, the Data[0] value that is used to clear the fields and sets the command value to 0. Because the address, length and data[0] can only be 0, the source in the MOV instruction can be set to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.



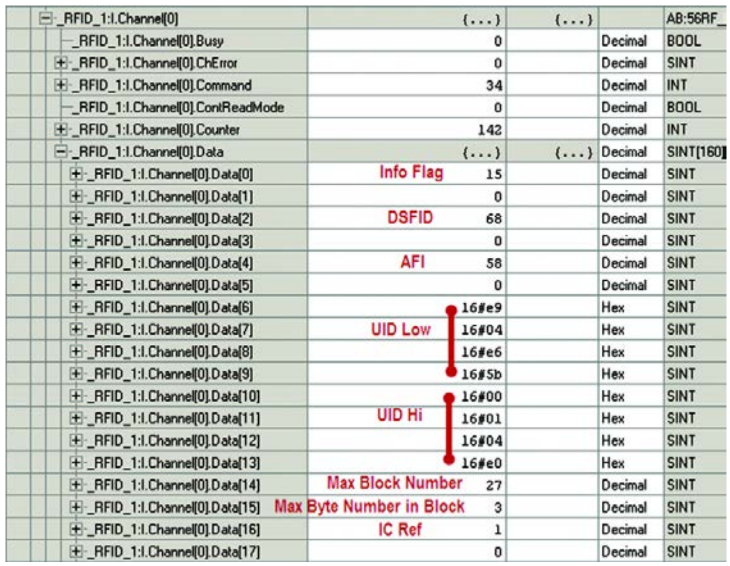
Example Results

The Info Flag contains data that is used to determine what parameters are passed back.

The DSFID, AFI, and UUID follow.

The tag being read was catalog number 56RRF-TG-30. This tag has 28 blocks. The maximum block number is 27, as the first block is 0. Each block has 4 bytes. The maximum byte number is 3, as the first byte is 0.

The IC Ref is the last byte reported.



Name	Label	Value	Force Mask	Style	Data Type
⊟-_RFID_1:I.Channel[0]		{...}	{...}		AB:56RF_
-_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError		0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command		34		Decimal	INT
-_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter		142		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]	Info Flag	15		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]		0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	DSFID	68		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[3]		0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[4]	AFI	58		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[5]		0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[6]		16#e9		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[7]	UID Low	16#04		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[8]		16#e6		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[9]		16#5b		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[10]		16#00		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[11]	UID Hi	16#01		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[12]		16#04		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[13]		16#e0		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[14]	Max Block Number	27		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[15]	Max Byte Number in Block	3		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[16]	IC Ref	1		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[17]		0		Decimal	SINT

Get Version Information

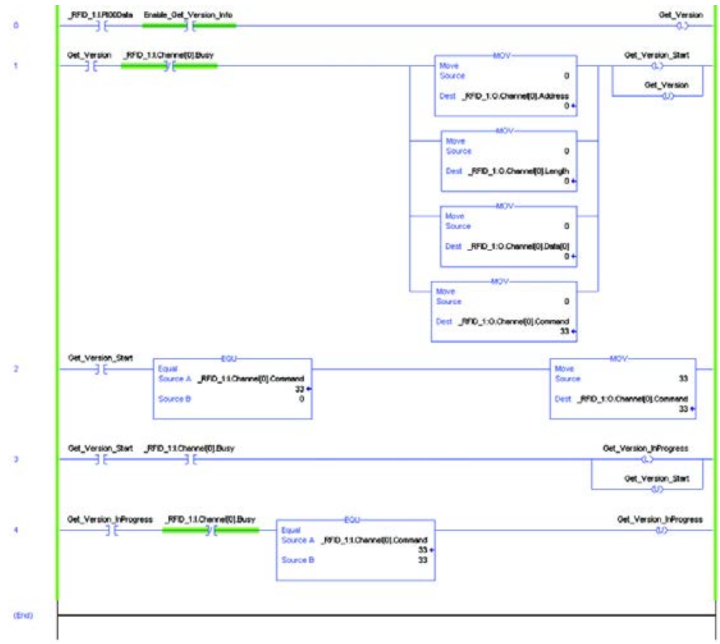
The Get Version Information command retrieves the firmware revision information from the transceiver.

Set the following values in the output image table:

a. xx:O.Channel[0].Command = 33
b. xx:O.Channel[0].Address = 0
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = 0
e. xx:O.Channel[0].Length = 0
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0
i. xx:O.Channel[0].UIDHi = 0

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length data, the Data[0] value that is used to clear the fields and sets the command value to 0. Because the address, length and data[0] can only be 0, the source in the MOV instruction can be set to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.



Example Results

The results are stored in Data [0...3]. In this example, the version is de20007 (version 2.07).

⊟-_RFID_1:I	{...}	{...}		AB:56RF_II
_RFID_1:I.AuxPwrFault	0		Decimal	BOOL
_RFID_1:I.BlockFault	0		Decimal	BOOL
⊟-_RFID_1:I.Channel	{...}	{...}		AB:56RF_II
⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_II
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	33		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	81		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]	16#07		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	16#00		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	16#e2		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	16#0d		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[4]	0		Decimal	SINT

Inventory

The inventory command returns the UUID and DSFID information from the RFID tags in the field. This command can read up to a maximum of four tags. The more tags in the field, the more time the tags must be in the field to complete the inventory command. By setting the output image fields to specific values, the Inventory command returns the following information:

1. Returns the number of tags in the field and the UUID of each tag. Set Address =0, Length = 0 and Data[0] = 0
2. Returns the number of tags in the field, the UUID, and the DSFID of each tag. Set Address =0, Length = 1 and Data[0] = 0
3. Returns the number of tags in the field, the UUID, and the DSFID of each tag that meets the specified AFI. Set Address =1, Length = 1 and Data[0] = AFI value. If the AFI value is 0, then all tags are reported.

Set the following values in the output image table:

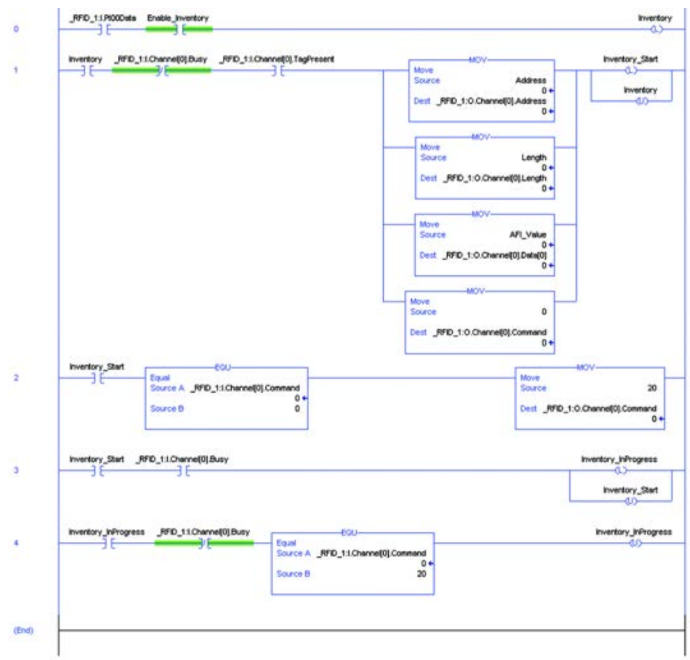
a. xx:O.Channel[0].Command = 20
b. xx:O.Channel[0].Address = 0 (or 1) (1)
c. xx:O.Channel[0].Block = 0
d. xx:O.Channel[0].Data[0] = 0 (or 1) (2)
e. xx:O.Channel[0].Length = 0 (or 1) (3)
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0
i. xx:O.Channel[0].UIDHi = 0

(1) Set Address = 0 to get all tags in the RF field.
Set Address = 1 to get all tags that have the AFI value specified in the Data[0] location.
(2) Set Data[0] = 0 to return all tags in the RF field.
Set Data[0] = AFI value (but not zero) to return only those tags that have that AFI value
(3) Set Length = 0 to get only the UUID for each tag.
Set Length = 1 to get both the UUID and the DSFID for each tag.

Example Routine

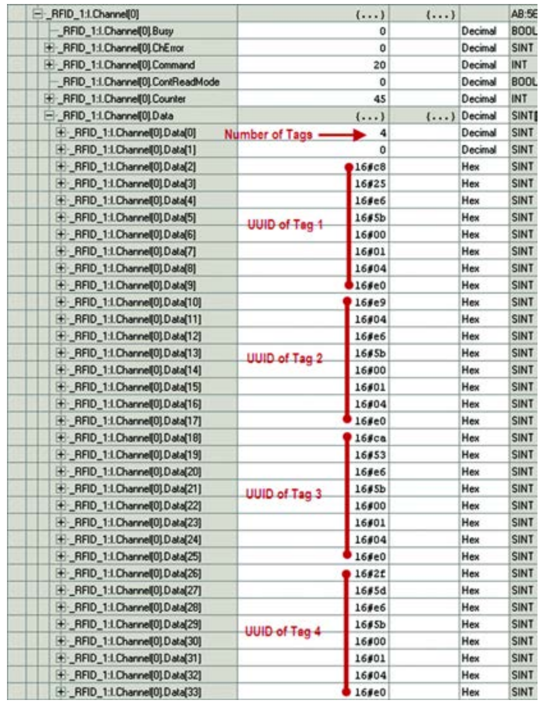
In the following example routine, the initialization in Rung 1 sets the address, length data, the Data[0] value that is used to clear the fields and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.

The example ladder diagram is initially set for Address =0, Length = 0 and Data[0] = 0. These values are then changed to obtain example results for the three versions of the Inventory command.



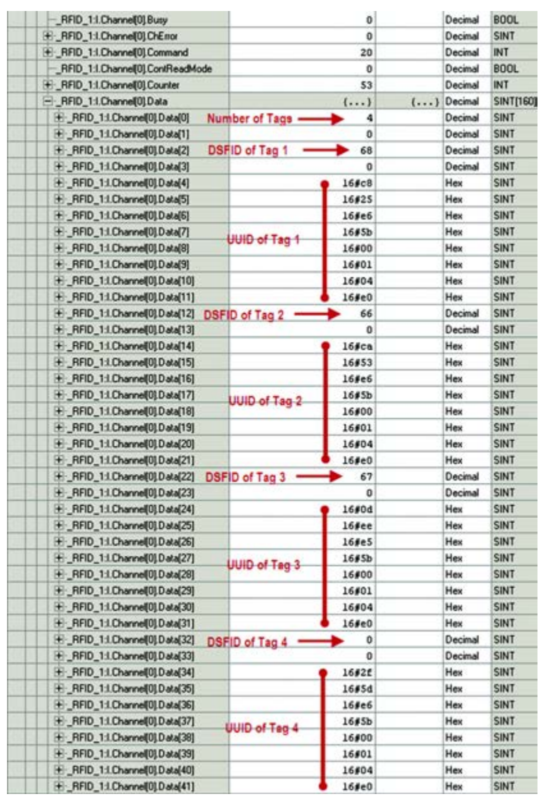
Example Results

In example 1, the Address = 0, Length = 0 and Data[0] = 0. Four RFID tags were in the RF field at the time the read command was executed. The controller tag values are shown in the following example. The data shows the number of tags in the RF field and the UUID for each tag.



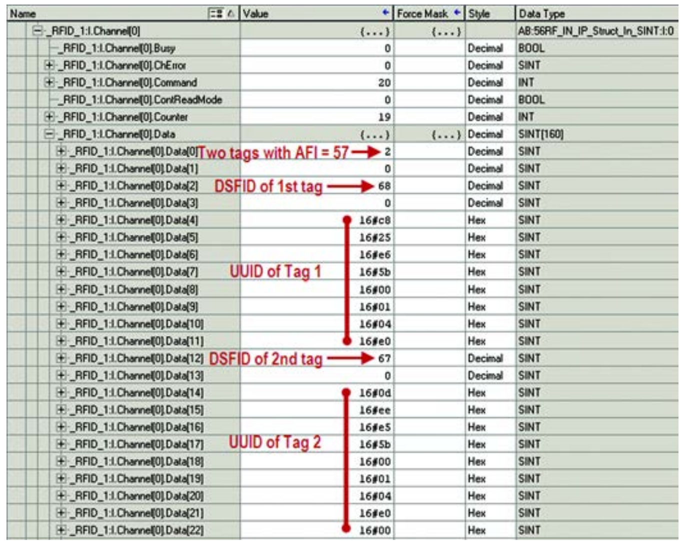
_RFID_1:I.Channel[0]		{...}	{...}		AB:5E
_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError		0		Decimal	SINT
_RFID_1:I.Channel[0].Command		20		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter		45		Decimal	INT
_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[
_RFID_1:I.Channel[0].Data[0]	Number of Tags →	4		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	UUID of Tag 1	16#c8		Hex	SINT
_RFID_1:I.Channel[0].Data[3]		16#25		Hex	SINT
_RFID_1:I.Channel[0].Data[4]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[5]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[6]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[7]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[8]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[9]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[10]	UUID of Tag 2	16#e9		Hex	SINT
_RFID_1:I.Channel[0].Data[11]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[12]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[13]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[14]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[15]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[16]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[17]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[18]	UUID of Tag 3	16#ca		Hex	SINT
_RFID_1:I.Channel[0].Data[19]		16#53		Hex	SINT
_RFID_1:I.Channel[0].Data[20]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[21]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[22]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[23]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[24]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[25]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[26]	UUID of Tag 4	16#2f		Hex	SINT
_RFID_1:I.Channel[0].Data[27]		16#5d		Hex	SINT
_RFID_1:I.Channel[0].Data[28]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[29]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[30]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[31]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[32]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[33]		16#e0		Hex	SINT

In example 2, the length was changed to 1. the Address = 0, Length = 1 and Data[0] = 0. Four RFID tags were in the RF field at the time the read command was executed. The controller tag values are shown in the following example. The data shows the number of tags in the RF field, the DSFID, and the UUID for each tag.



_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError		0		Decimal	SINT
_RFID_1:I.Channel[0].Command		20		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter		53		Decimal	INT
_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	Number of Tags →	4		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	DSFID of Tag 1 →	68		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	UUID of Tag 1	16#c8		Hex	SINT
_RFID_1:I.Channel[0].Data[5]		16#25		Hex	SINT
_RFID_1:I.Channel[0].Data[6]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[7]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[8]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[9]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[10]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[11]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[12]	DSFID of Tag 2 →	66		Decimal	SINT
_RFID_1:I.Channel[0].Data[13]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[14]	UUID of Tag 2	16#ca		Hex	SINT
_RFID_1:I.Channel[0].Data[15]		16#53		Hex	SINT
_RFID_1:I.Channel[0].Data[16]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[17]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[18]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[19]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[20]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[21]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[22]	DSFID of Tag 3 →	67		Decimal	SINT
_RFID_1:I.Channel[0].Data[23]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[24]	UUID of Tag 3	16#0d		Hex	SINT
_RFID_1:I.Channel[0].Data[25]		16#ee		Hex	SINT
_RFID_1:I.Channel[0].Data[26]		16#e5		Hex	SINT
_RFID_1:I.Channel[0].Data[27]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[28]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[29]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[30]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[31]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[32]	DSFID of Tag 4 →	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[33]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[34]	UUID of Tag 4	16#2f		Hex	SINT
_RFID_1:I.Channel[0].Data[35]		16#5d		Hex	SINT
_RFID_1:I.Channel[0].Data[36]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[37]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[38]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[39]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[40]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[41]		16#e0		Hex	SINT

In example 3, we get the tag information for only those tags that have a specific AFI. In this example, the AFI is 57. Address = 1, Length = 1 and Data[0] = 57. Two of the four RFID tags that were present in the RF field at the time the read command was executed had AFI set to 57. The controller tag values are shown in the following example. The data shows the number of tags in the RF field, the DSFID, and the UUID for each of these tags.



Name	Value	Force Mask	Style	Data Type
_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_IN_IP_Struct_In_SINT:I:0
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	20		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	19		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	2		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	68		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	16#c8		Hex	SINT
_RFID_1:I.Channel[0].Data[5]	16#25		Hex	SINT
_RFID_1:I.Channel[0].Data[6]	16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[7]	16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[8]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[9]	16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[10]	16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[11]	16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[12]	67		Decimal	SINT
_RFID_1:I.Channel[0].Data[13]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[14]	16#0d		Hex	SINT
_RFID_1:I.Channel[0].Data[15]	16#ee		Hex	SINT
_RFID_1:I.Channel[0].Data[16]	16#e5		Hex	SINT
_RFID_1:I.Channel[0].Data[17]	16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[18]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[19]	16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[20]	16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[21]	16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[22]	16#00		Hex	SINT

Lock AFI

The Lock AFI command locks the 1 byte of information for the Application Family Identifier (AFI), preventing it from being modified in the future.

IMPORTANT	Once the AFI byte is locked, it cannot be unlocked.

The AFI is used to group RFID tags by application. This configuration allows the transceiver to send out an AFI and target only the tags that meet the application criteria.

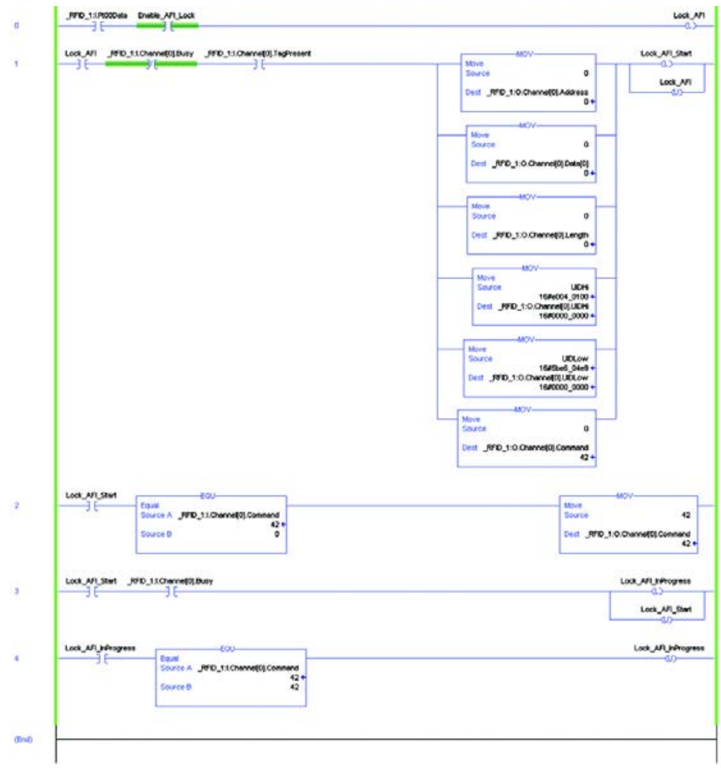
Set the following values in the output image table:

a. xx:O.Channel[0].Command = 42
b. xx:O.Channel[0].Address = 0
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = 0
e. xx:O.Channel[0].Length = 0
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = UIDLow
i. xx:O.Channel[0].UIDHi = UIDHi

The UIDLow and UIDHi bytes must be specified to lock the AFI value. The UUID can be found by performing the Inventory command.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, the Data[0, UIDLow and UIDHi values used to lock the AFI and sets the command value to 0. The BlockSize, Reset, and Timeout are set to 0 in the output image table.



Example Results

The following image shows an example of results on the input image table. The Command is showing 42 and the ChError is showing 0. The input data bytes are all zero.

⊟-_RFID_1:I.Channel	{...}	{...}		AB:56RF_IN_IP_
⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_IN_IP_
-_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	No error → 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	Command = 42 → 42		Decimal	INT
-_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	56		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	0		Decimal	SINT

Errors

The following ChErrors are generated:

- 0 – AFI was successfully locked.
- 4 – A tag with the wrong UUID entered the RF field.
- 8 – A tag that has already been locked entered the RF field.

Lock Block

The Lock Block command locks one block of user data, preventing future writing. The transceiver automatically determines the block size of the RFID tag.

IMPORTANT	Once the block is locked, the block cannot be unlocked.

Set the following values in the output image table:

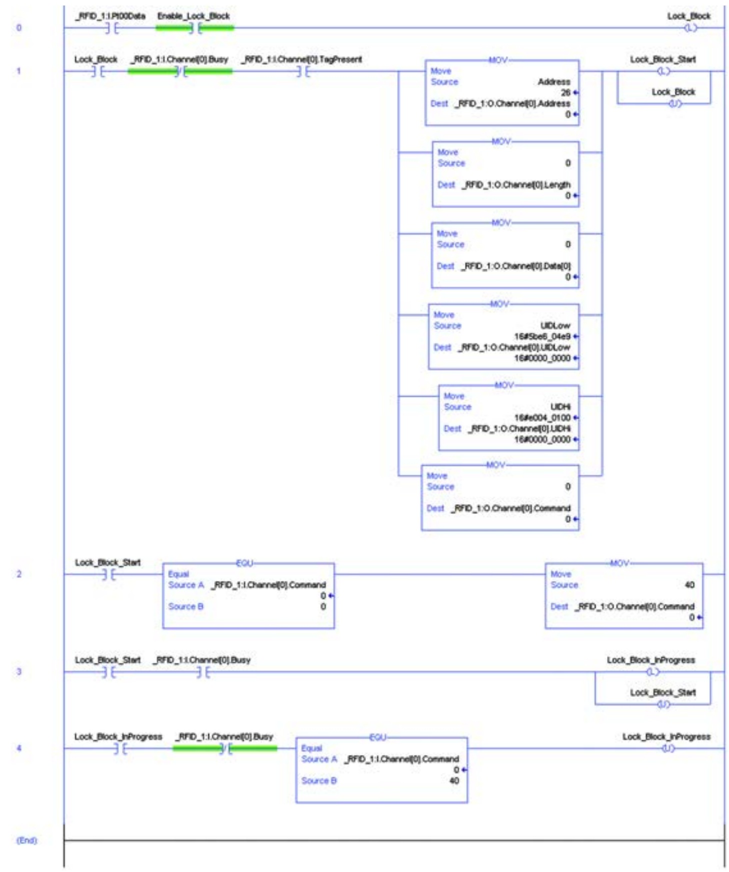
a. xx:O.Channel[0].Command = 40
b. xx:O.Channel[0].Address = the number of the block to lock
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = 0
e. xx:O.Channel[0].Length = 0
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = UIDLow
i. xx:O.Channel[0].UIDHi = UIDHi

The UIDLow and UIDHi bytes must be specified to lock the block values. The UUID can be found by performing the Inventory command.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, the Data[0], UIDLow, and UIDHi values used to lock the block and sets the command value to 0. The BlockSize, Reset, and Timeout are set to 0 in the output image table.

In the example routine, rung 1 initializes the output image table. The UUID is stored in a controllers tags UIDLow and UIDHi. Block 26 is locked. This tag has a total of 27 blocks.



Example Results

The output image table shows address 26, which is the second to last block of the catalog number 56RF-TG-30 tag. The command is 40. The UUID must be specified to lock any blocks.

_RFID_1:O.Channel[0]	{...}	{...}		AB:56RF_
_RFID_1:O.Channel[0].Address	Block to be locked → 26		Decimal	INT
_RFID_1:O.Channel[0].BlockSize	0		Decimal	INT
_RFID_1:O.Channel[0].Command	Command = 40 → 40		Decimal	INT
_RFID_1:O.Channel[0].Data	{...}	{...}	Decimal	SINT[112]
_RFID_1:O.Channel[0].Length	0		Decimal	INT
_RFID_1:O.Channel[0].Reset	0		Decimal	BOOL
_RFID_1:O.Channel[0].Timeout	0		Decimal	INT
_RFID_1:O.Channel[0].UIDHi	UUID → 16#e004_0100		Hex	DINT
_RFID_1:O.Channel[0].UIDLow	16#5be6_04e9		Hex	DINT

After completion of the lock block command, the input image table should show that the command is 40 and the ChError is 0.

_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	No error → 0		Decimal	SINT
_RFID_1:I.Channel[0].Command	Command = 40 → 40		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	12		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Fault	0		Decimal	BOOL
_RFID_1:I.Channel[0].Length	0		Decimal	INT
_RFID_1:I.Channel[0].Reset	0		Decimal	BOOL
_RFID_1:I.Channel[0].ResetInProgress	0		Decimal	BOOL
_RFID_1:I.Channel[0].TagPresent	0		Decimal	BOOL

Errors

The ChErrorfield is 8 if you try to lock a block that is already locked.

Lock DSFID

The Lock DSFID command locks the 1 byte of information for the Data Storage Format Identifier (DSFID) area of the tag, preventing it from being modified.

IMPORTANT	Once the DSFID byte is locked, it cannot be unlocked.

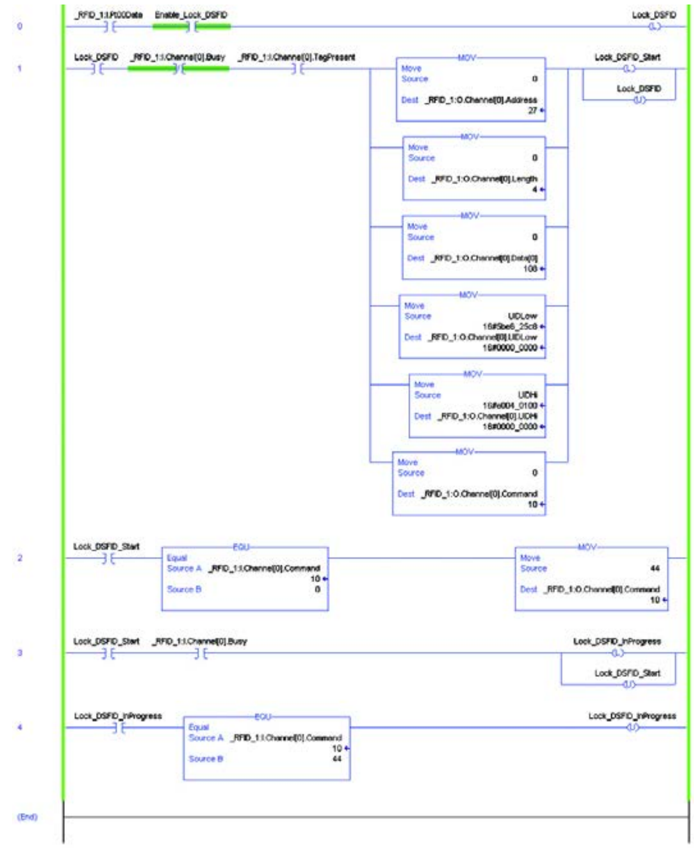
Set the following values in the output image table:

a. xx:O.Channel[0].Command = 44
b. xx:O.Channel[0].Address = 0
c. xx:O.Channel[0].Data[0] = 0
d. xx:O.Channel[0].Length = 0
e. xx:O.Channel[0].Reset = 0
f. xx:O.Channel[0].Timeout = 0
g. xx:O.Channel[0].UIDLow = UIDLow
h. xx:O.Channel[0].UIDHi = UIDHi

The UIDLow and UIDHi bytes must be specified to lock the DSFID value. The UUID can be found by performing the Inventory command.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, the Data[0], UIDLow, and UIDHi values used to lock the DSFID and sets the command value to 0. The BlockSize, Reset, and Timeout are set to 0 in the output image table.



Example Results

When successful, the results shown in the input image table show ChError = 0 and the Command number =44.

If you try to lock the DSFID on an RFID tag that is already locked, the ChError is equal to 8.

⊟-_RFID_1:I.Channel	{...}	{...}		AB:56RF_
⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	No error → 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	Command = 44 → 44		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	9		Decimal	INT
⊞-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160
_RFID_1:I.Channel[0].Fault	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Length	0		Decimal	INT
_RFID_1:I.Channel[0].Reset	0		Decimal	BOOL
_RFID_1:I.Channel[0].ResetInProgress	0		Decimal	BOOL
_RFID_1:I.Channel[0].TagPresent	0		Decimal	BOOL

Read Byte Command

The Read Byte command reads a user-specified number of bytes from a tag, starting at a user-specified address. An Option Flag can be set to return the UUID of the tag. The maximum number of bytes that can be read at a time is 160 bytes using option flag 0, and 152 bytes using option flag 1.

- Option Flag 0

  Returns the specified user data. Set xx:O.Channel[0].Data[0] = 0.
- Option Flag 1

  Returns the UUID of the RFID tag and the specified user data. Set xx:O.Channel[0].Data[0] = 1.

Set the following values in the output image table:

a. xx:O.Channel[0].Command = 4
b. xx:O.Channel[0].Address = starting address to read
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = Option Flag
e. xx:O.Channel[0].Length = the number of bytes to read
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0
i. xx:O.Channel[0].UIDHi = 0

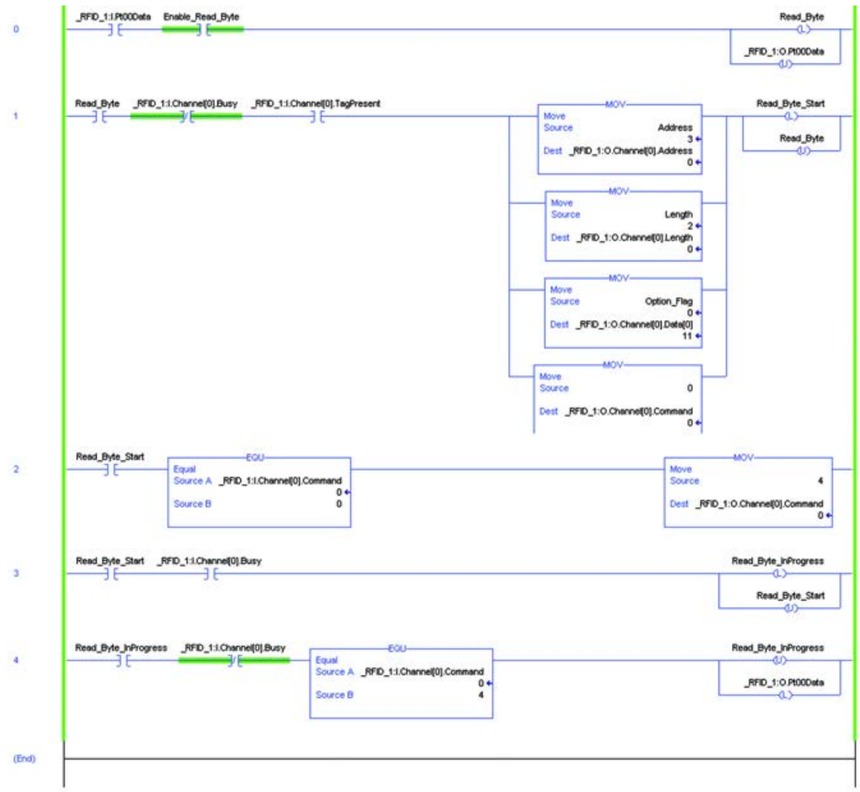
This command operates only on the first tag in the field.

Data[1] must also be set to 0.

Example Routine

The following example routine is to read all data and the UUID in a catalog number 56RF-TG-30 ICODE tag. This tag holds a maximum of 112 bytes of data.

In the following example routine, the initialization in Rung 1 sets the address, length, the Data[0]to the Option Flag, and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.



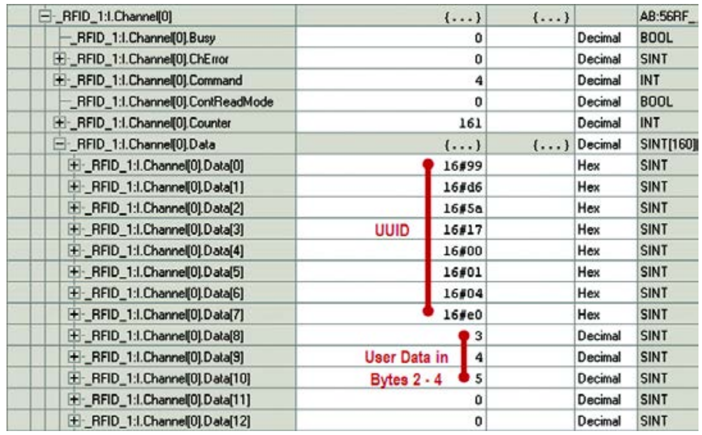
Example Results

The following image shows an example of results where the Option Flag was set to 1, which reads the UUID.

The UUID is loaded into Data[0] through Data[7]. The user data (1, 2, 3, 4, 5, 6...) begins in Data[8]. The following image only shows a partial listing of the user data. The command read in 112 bytes of data.

⊟-_RFID_1:I.Channel[0]		{...}	{...}		AB:56RF_I
-_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError		0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command		4		Decimal	INT
-_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter		160		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]		16#99		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	UID Low	16#d6		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[2]		16#5a		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[3]		16#17		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[4]		16#00		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[5]	UID Hi	16#01		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[6]		16#04		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[7]		16#e0		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[8]		1		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[9]		2		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[10]		3		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[11]	Partial View of	4		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[12]	User Data	5		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[13]		6		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[14]		7		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[15]		8		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[16]		9		Decimal	SINT

In the following image, the command was repeated with the Starting Address set to 2 and the number of bytes set to 3.



_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	4		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	161		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	16#99		Hex	SINT
_RFID_1:I.Channel[0].Data[1]	16#d6		Hex	SINT
_RFID_1:I.Channel[0].Data[2]	16#5a		Hex	SINT
_RFID_1:I.Channel[0].Data[3]	16#17		Hex	SINT
_RFID_1:I.Channel[0].Data[4]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[5]	16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[6]	16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[7]	16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[8]	3		Decimal	SINT
_RFID_1:I.Channel[0].Data[9]	4		Decimal	SINT
_RFID_1:I.Channel[0].Data[10]	5		Decimal	SINT
_RFID_1:I.Channel[0].Data[11]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[12]	0		Decimal	SINT

Multi-tag Block Read

The Multi-tag Block Read command reads multiple blocks of user data from multiple tags in the RF field. The transceiver automatically determines the block size. All RFID tags in the field should have the same block size.

This command can read up to four tags. Adequate time must be allowed to read all tags in the RF field.

Set the following values in the output image table:

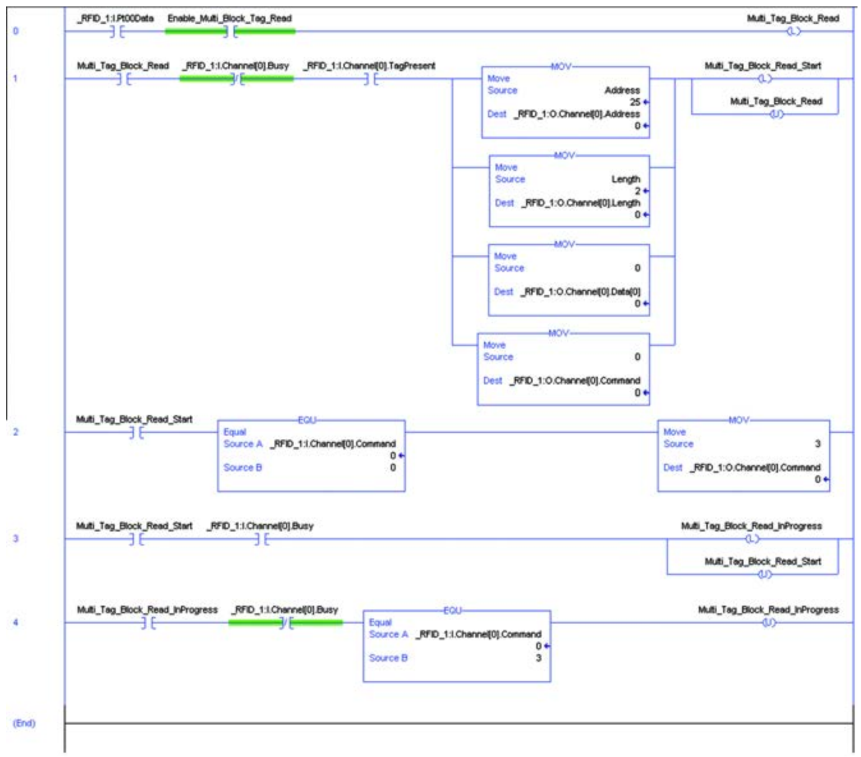
a. xx:O.Channel[0].Command = 3
b. xx:O.Channel[0].Address = the first block to read
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = 0
e. xx:O.Channel[0].Length = the number of blocks to read
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first four tags in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, the Data[0] value that is used to read multiple tags and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.

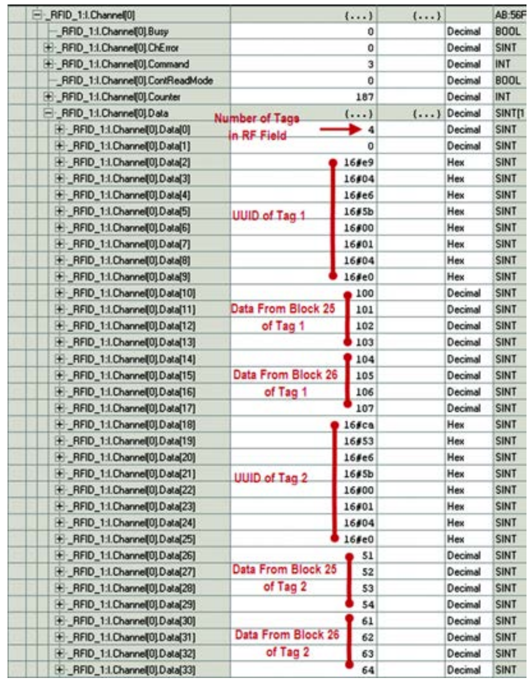
The example ladder diagram is initially set for Address = 25 and the Length = 2. The command reads blocks 25 and 26.



Example Results

The input image data fields are populated with the number of tags, followed by the UUID and block data of each tag.

In the following example, four catalog number 56RF-TG-30 RFID tags were read. These tags hold 4 bytes per block. Since two blocks (25 and 26) were read, a total of eight data fields are used to store the user data. The image only shows the information from two of the four RFID tags.



Read Multiple Blocks

The Read Multiple Blocks command reads multiple blocks of user data from an RFID tag. Option Flags can be set to return just the data in the blocks or return the data and the security status for each block of data. The maximum number of blocks that can be read at one time is 10.

- Option Flag 0

  Returns multiple blocks of user data. Set xx:O.Channel[0].Data[0] = 0.

- Option Flag 1

  Returns multiple blocks of user data and the security status of each block. Set xx:O.Channel[0].Data[0] = 1.

Set the following values in the output image table:

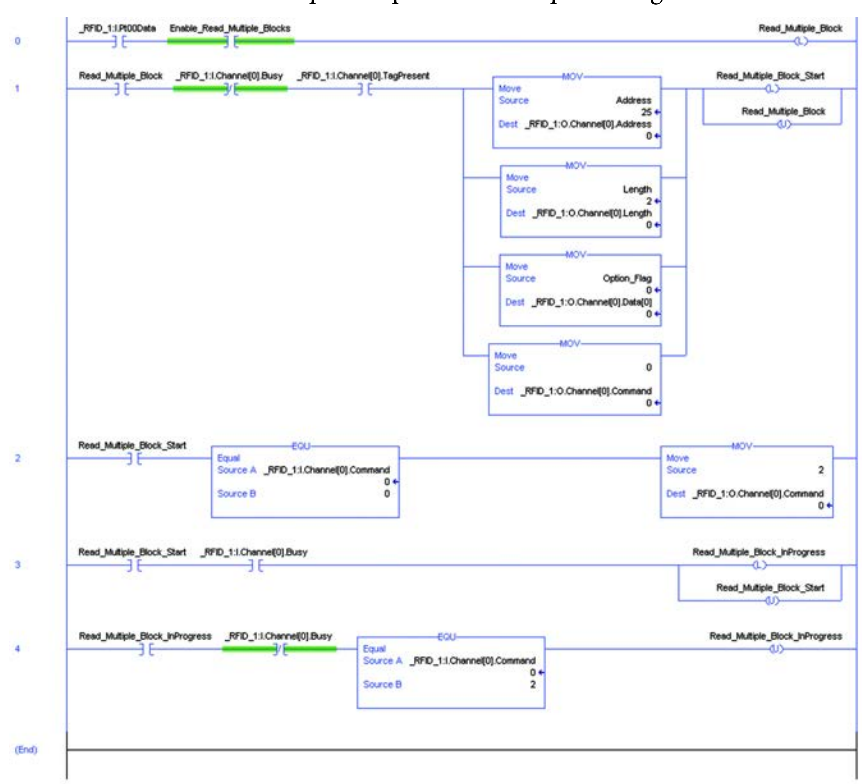
a. xx:O.Channel[0].Command = 2
b. xx:O.Channel[0].Address = the first block to read
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = the Option Flag
e. xx:O.Channel[0].Length = the number of blocks to read
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

Example Routine

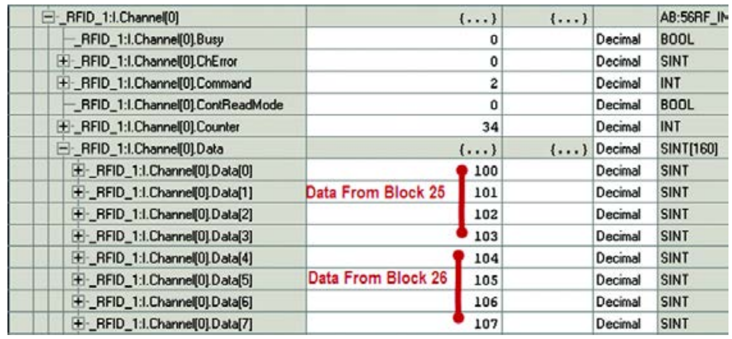
In the following example routine, the initialization in Rung 1 sets the address, length, and Data[0] values used to read multiple blocks and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.

The example ladder diagram is initially set for Address =25, the Length = 2. Data[0] is set to Option Flag 0 (return just the data). The command reads blocks 25 and 26. The example is repeated with Option Flag set to 1.



Example Results

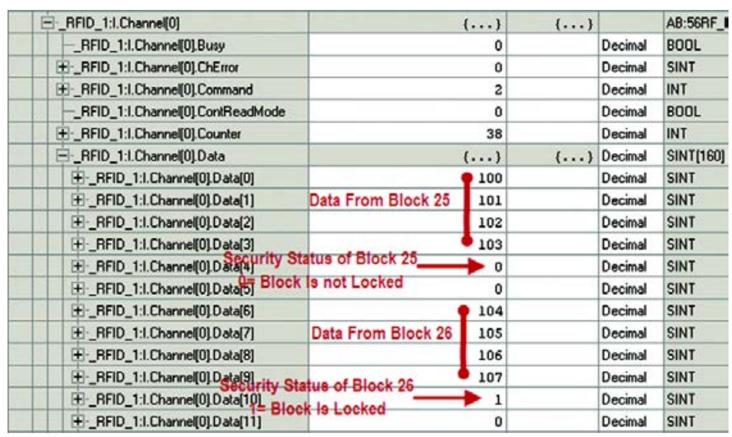
This first example uses Option Flag = 0; return only the data in the blocks. With a starting block number of 25 and two blocks to read, data from Blocks 25 and 26 are returned. The tag was a catalog number 56RF-TG-30, which has only 4 bytes per block. The data appears in the input channel Data[0…7].



_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_IN
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	2		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	34		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	100		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]	101		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	102		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]	103		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	104		Decimal	SINT
_RFID_1:I.Channel[0].Data[5]	105		Decimal	SINT
_RFID_1:I.Channel[0].Data[6]	106		Decimal	SINT
_RFID_1:I.Channel[0].Data[7]	107		Decimal	SINT

This second example shows the results for Option Flag = 1; return the data and the security status. With a starting block number of 25 and two blocks to read, data from Blocks 25 and 26 are returned. The tag was a catalog number 56RF-TG-30, which has only 4 bytes per block.

The data for the first block appears in the input channel Data[0…3]. The security status appears in Data[4]. The value of 0 indicates that the block is not locked.



_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_I
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	2		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	38		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	100		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]	101		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	102		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]	103		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[5]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[6]	104		Decimal	SINT
_RFID_1:I.Channel[0].Data[7]	105		Decimal	SINT
_RFID_1:I.Channel[0].Data[8]	106		Decimal	SINT
_RFID_1:I.Channel[0].Data[9]	107		Decimal	SINT
_RFID_1:I.Channel[0].Data[10]	1		Decimal	SINT
_RFID_1:I.Channel[0].Data[11]	0		Decimal	SINT

The data for the second block appears in the input channel Data[6…9]. The security status appears in Data[10]. The value of 1 indicates that the block is locked.

Read Single Block

The Read Single Block command reads a single block of user data from a tag. Option Flags can be set to return information the UUID and security status of the block.

- Option Flag 0

  Returns a single block of user data. Set xx:O.Channel[0].Data[0] = 0.
- Option Flag 1

  Returns a single block of user data and the security status of that block. Set xx:O.Channel[0].Data[0] = 1.

Set the following values in the output image table:

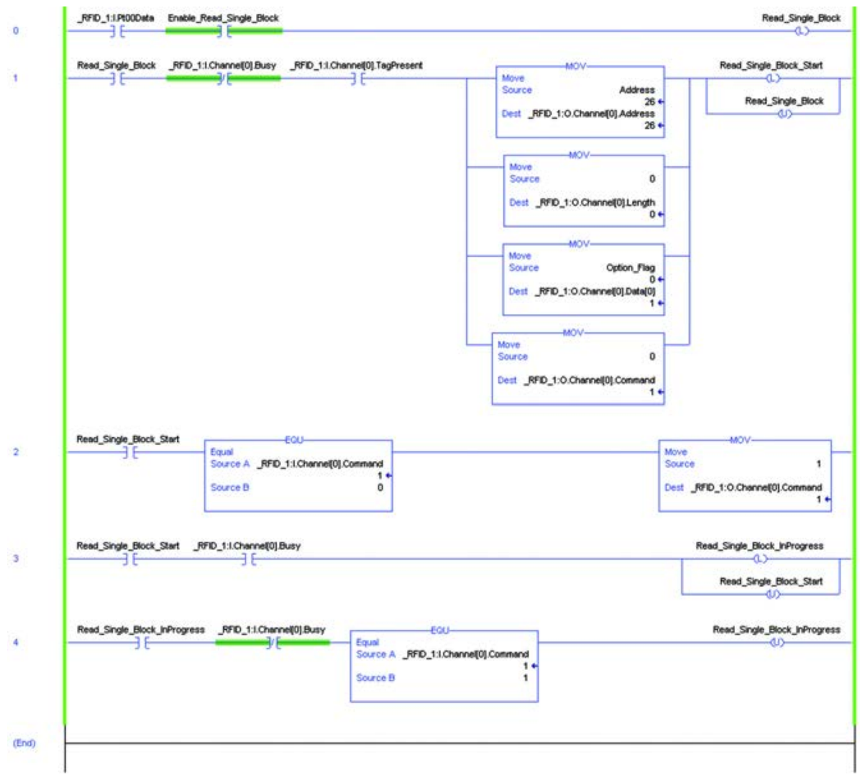
a. xx:O.Channel[0].Command = 1
b. xx:O.Channel[0].Address = the block number to read.
c. xx.O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = the Option Flag value
e. xx:O.Channel[0].Length = 0
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, and Data[0] values used to read multiple blocks and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.

The example ladder diagram is initially set for Address =26. Data[0] is set to Option Flag 0 (return just the data). The command reads blocks 25 and 26. The example is repeated with Option Flag set to 1.



Example Results

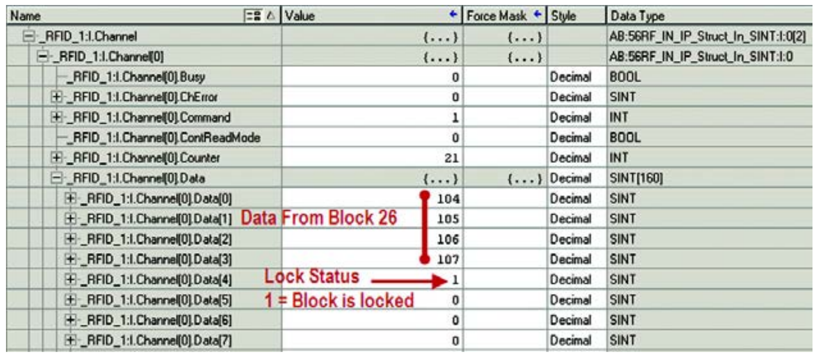
- Option Flag 0

  This first example uses Option Flag = 0; return only the data in the block. The block number is 26. The tag was a catalog number 56RF-TG-30, which has only 4 bytes per block. The data appears in the input channel Data[0…3].

⊟ _RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞ _RFID_1:I.Channel[0].ChError	0		Decimal	SINT
⊞ _RFID_1:I.Channel[0].Command Read Single Block Command = 1	1		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞ _RFID_1:I.Channel[0].Counter	22		Decimal	INT
⊟ _RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
⊞ _RFID_1:I.Channel[0].Data[0]	104		Decimal	SINT
⊞ _RFID_1:I.Channel[0].Data[1] Data From Block 26	105		Decimal	SINT
⊞ _RFID_1:I.Channel[0].Data[2]	106		Decimal	SINT
⊞ _RFID_1:I.Channel[0].Data[3]	107		Decimal	SINT

- Option Flag 1

  The second example demonstrates the results when Option Flag = 1. Data[0] shows the security status of the block. The 1 indicates that the block has been locked. A zero indicates that the block is unlocked. The data appears in Data[1…4].



Name	Value	Force Mask	Style	Data Type
_RFID_1:I.Channel	{...}	{...}		AB:56RF_IN_IP_Struct_In_SINT:I:0[2]
_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_IN_IP_Struct_In_SINT:I:0
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	1		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	21		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	104		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]	105		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	106		Decimal	SINT
_RFID_1:I.Channel[0].Data[3]	107		Decimal	SINT
_RFID_1:I.Channel[0].Data[4]	1		Decimal	SINT
_RFID_1:I.Channel[0].Data[5]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[6]	0		Decimal	SINT
_RFID_1:I.Channel[0].Data[7]	0		Decimal	SINT

Read Transceiver Settings

The Read Transceiver Settings command retrieves the following information from the transceiver:

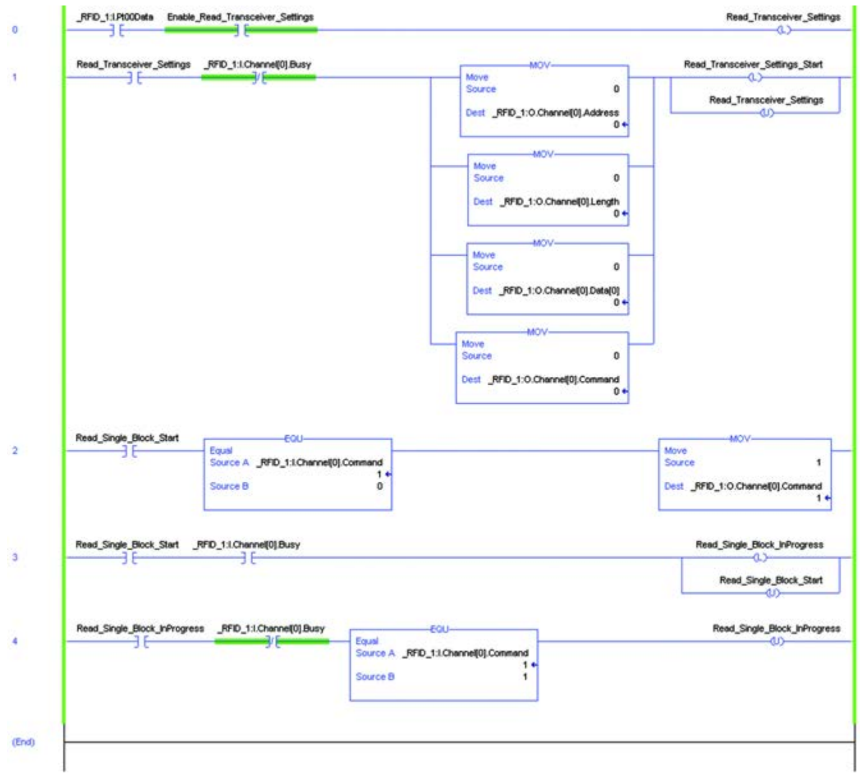
- Device ID
- Communication rate
- Retry time
- Gain

Set the following values in the output image table:

a. xx:O.Channel[0].Command = 31
b. xx:O.Channel[0].Address = 0
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = 0
e. xx:O.Channel[0].Length = 0
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0
i. xx:O.Channel[0].UIDHi = 0

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, data, and command. Because the address, length and Data[0] can only be 0, the source in the MOV instruction can be set to 0. The UIDLow, UIDHi, BlockSize, Reset, and Timeout are set to 0 in the output image table.

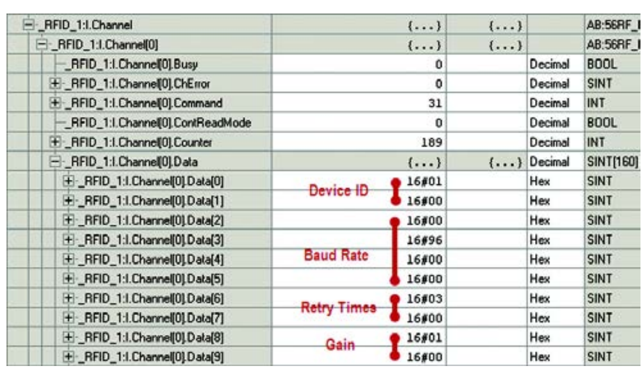


Example Results

The following information is displayed:

- xx:I.Channel[0].Data[0…1] = Device ID
- xx:I.Channel[0].Data[2…5] = Communication rate
- xx:I.Channel[0].Data[6…7] = Retry setting
- xx:I.Channel[0].Data[8…9] = Gain

Gain is 0…3, with 0 being the highest gain.



_RFID_1:I.Channel	{...}	{...}		AB:56RF_I
_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_I
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
_RFID_1:I.Channel[0].Command	31		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter	189		Decimal	INT
_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[1]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[2]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[3]	16#96		Hex	SINT
_RFID_1:I.Channel[0].Data[4]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[5]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[6]	16#03		Hex	SINT
_RFID_1:I.Channel[0].Data[7]	16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[8]	16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[9]	16#00		Hex	SINT

Write AFI

The Write AFI command writes 1 byte of information into the Application Family Identifier (AFI). The AFI is used to group RFID tags by application. This configuration allows the transceiver to read and write only to those tags with the specified AFI value.

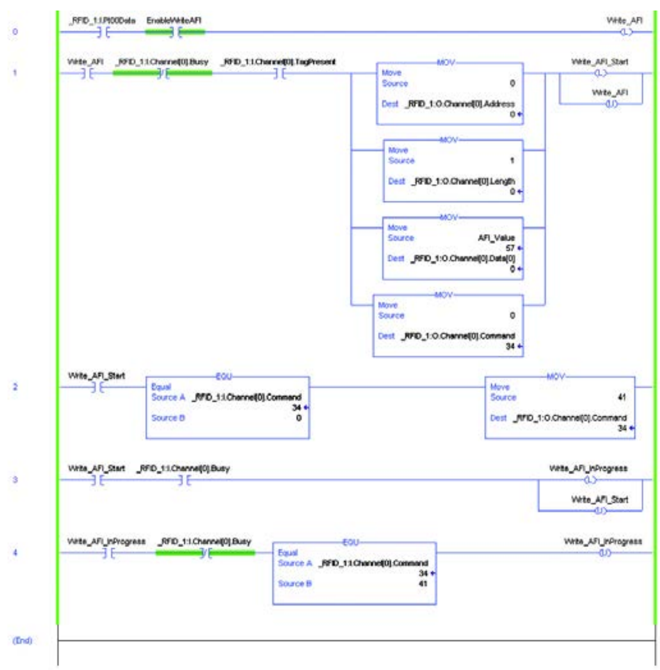
Set the following values in the output image table:

a. xx:O.Channel[0].Command = 41
b. xx:O.Channel[0].Address = 0
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0] = AFI value
e. xx:O.Channel[0].Length = 1
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

Example Routine

In the following example routine, the initialization sets the address, length data, and command. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.



Example Results

The following image shows an example of results on the input image table. The Command is showing 41 and theChError is showing 0. The data bytes are all zero. Confirmation that the AFI was written can be observed in the Get_System_Information_Routine.

⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	41		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	30		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[4]	0		Decimal	SINT

Write Byte Command

The Write Byte command writes bytes of user data to a tag. You must specify the data, the start byte, and the number of bytes to write.

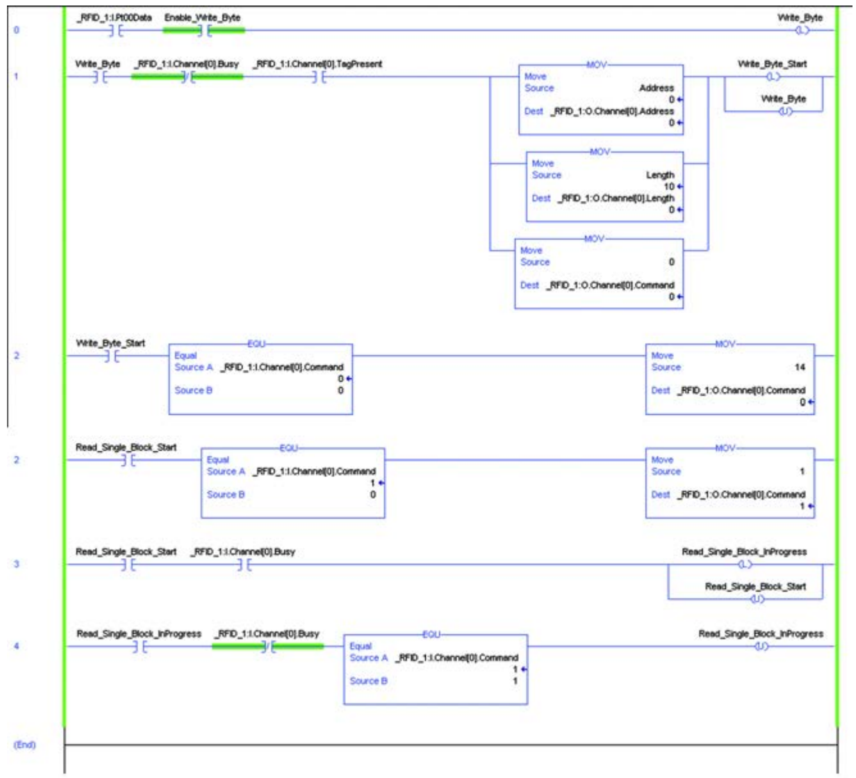
a. xx:O.Channel[0].Command = 14
b. xx:O.Channel[0].Address = starting addressto write
c. xx:O.Channel[0].BlockSize = 0
d. xx:O.Channel[0].Data[0...111] = the data to write
e. xx:O.Channel[0].Length = the number of bytes to write
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

Unless a UUID is specified, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, and Data[0] values used to read multiple blocks and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.

The example ladder diagram is initially set for Address =0, the Length = 10. Data[0…9] are set to a sequential list of numbers starting with 11.



Example Results

The following image shows the output image table with the 10 bytes of data that is written to the RFID tag. The sequence is 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20.

⊟-_RFID_1:O.Channel[0]	{...}	{...}		AB:56RF_IN
⊞-_RFID_1:O.Channel[0].Address	0		Decimal	INT
⊞-_RFID_1:O.Channel[0].BlockSize	0		Decimal	INT
⊞-_RFID_1:O.Channel[0].Command	14		Decimal	INT
⊟-_RFID_1:O.Channel[0].Data	{...}	{...}	Decimal	SINT[112]
⊞-_RFID_1:O.Channel[0].Data[0]	11		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[1]	12		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[2]	13		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[3]	14		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[4]	15		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[5]	16		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[6]	17		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[7]	18		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[8]	19		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[9]	20		Decimal	SINT

10 Bytes of Data to Write

After successful completion of the Write Byte command, the input image table shows the UUID of the tag.

Name		Value	Force Mask	Style	Data Type
⊟-_RFID_1:I.Channel[0]		{...}	{...}		AB:56RF_II
_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	ChError = 0	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	Command = 14	14		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter		99		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]		16#0d		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[1]		16#ee		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[2]		16#e5		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	UUID of RFID Tag	16#5b		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[4]		16#00		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[5]		16#01		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[6]		16#04		Hex	SINT
⊞-_RFID_1:I.Channel[0].Data[7]		16#e0		Hex	SINT

The Read_Byte_Routine can be used to read the data. The data is stored in the input channel data, starting at location 0.

Name		Value	Force Mask	Style	Data Type
⊟-_RFID_1:I.Channel[0]		{...}	{...}		AB:56RF_IN
_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError		0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	Read Command = 4	4		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter		100		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]		11		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]		12		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]		13		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	10 Bytes of	14		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[4]	Data	15		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[5]		16		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[6]		17		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[7]		18		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[8]		19		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[9]		20		Decimal	SINT

Write DSFID

The Write DSFID (Data Storage Format Identifier) command writes 1 byte of information in the Data Storage Format Identifier (DSFID) of the RFID tag.

Set the following values in the output image table:

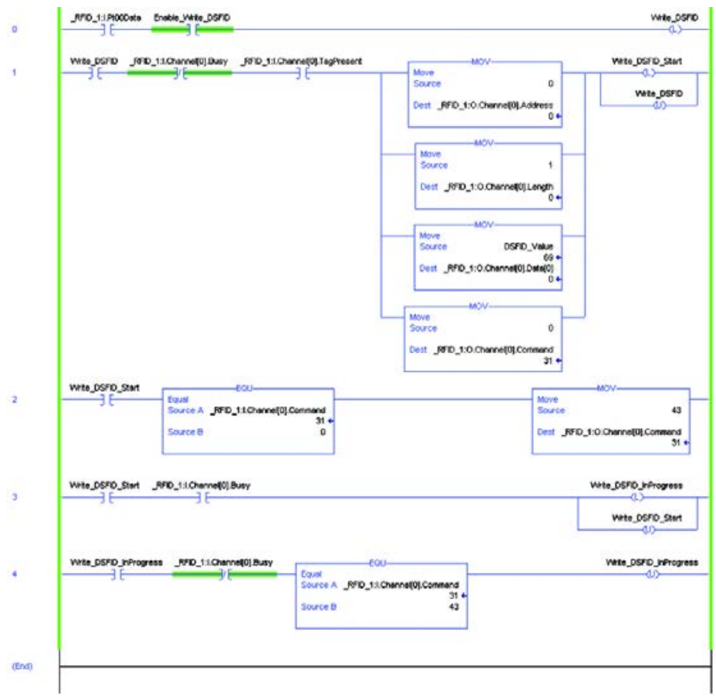
a. xx:O.Channel[0].Command = 43
b. xx:O.Channel[0].Address = 0
c. xx:O.Channel[0].Data[0] = DSFID value
d. xx:O.Channel[0].Length = 1
e. xx:O.Channel[0].Reset = 0
f. xx:O.Channel[0].Timeout = 0
g. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
h. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

If UIDLow and UIDHI are set to 0, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, and Data[0] values used to read multiple blocks and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.

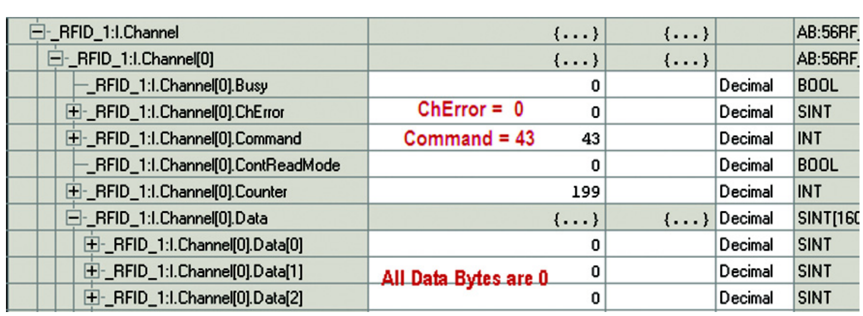
The example ladder diagram is initially set for Address =0, the Length = 0. Data[0] is set to the DSFID value.



Example Results

The command is executed successfully if the ChError = 0, the Command value = 43 and all Data bytes are 0.

Use the Get System Information command or the Inventory command to read the DSFID.



⊟-_RFID_1:I.Channel	{...}	{...}		AB:56RF_
⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	ChError = 0 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	Command = 43 43		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	199		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160
⊞-_RFID_1:I.Channel[0].Data[0]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	All Data Bytes are 0 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	0		Decimal	SINT

Write Multiple Blocks

The Write Multiple Blocks command writes to either one or two blocks of user data to a FRAM tag. This command only works on FRAM tags. Catalog number 56RF-TG-2KB is a FRAM tag.

a. xx:O.Channel[0].Command = 11
b. xx:O.Channel[0].Address = starting block to write
c. xx:O.Channel[0].BlockSize = number of bytes per block
d. xx:O.Channel[0].Data[0…xxx] = data to write
e. xx:O.Channel[0].Length =the number of blocks to write
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

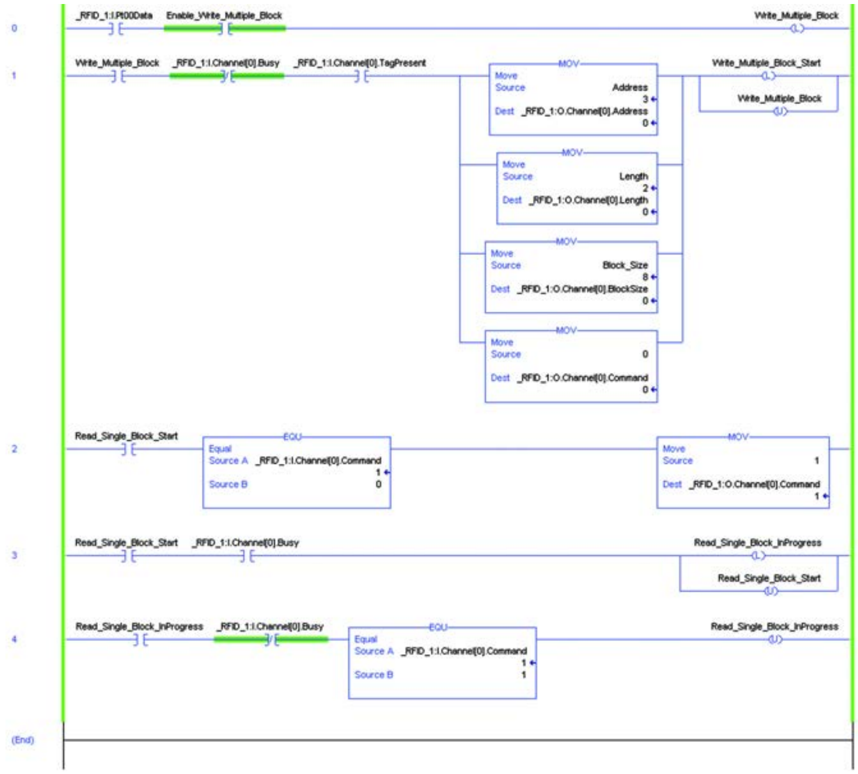
If UIDLow and UIDHi are set to 0, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

The following table shows the valid values for length, block size, and the number of bytes written or each combination.

Length	1	1	1	2	2	2
Block Size	0	4	8	0	4	8
Bytes Written	4	4	8	8	8	16

Example Routine

In the following example routine, the initialization in Rung 1 sets the address, length, and block size values that are used to write multiple blocks and sets the command value to 0. The BlockSize, Reset, Timeout, UIDLow, and UIDHi are set to 0 in the output image table.

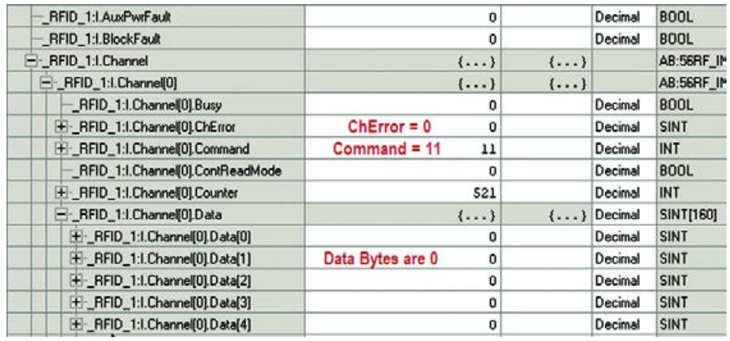


Example Results

The following image shows the output image table with the data that is written (a simple numeric sequence starting at 2). Two blocks of 8 bytes each is written to the tag. The data is written to address locations 3 and 4.

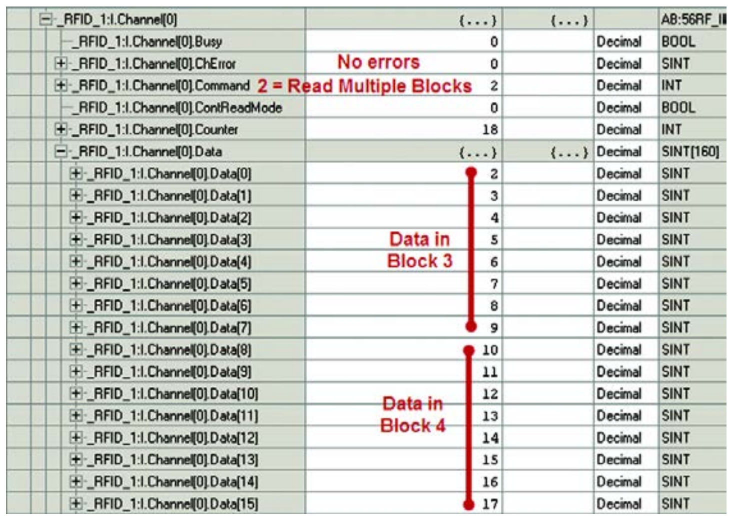
⊟-_RFID_1:O.Channel[0]		{...}	{...}		AB:56RF_I
⊞-_RFID_1:O.Channel[0].Address	Place Data in Address 3	3		Decimal	INT
⊞-_RFID_1:O.Channel[0].BlockSize	Bytes per Block = 8	8		Decimal	INT
⊞-_RFID_1:O.Channel[0].Command		11		Decimal	INT
⊟-_RFID_1:O.Channel[0].Data		{...}	{...}	Decimal	SINT[112]
⊞-_RFID_1:O.Channel[0].Data[0]		2		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[1]		3		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[2]		4		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[3]	Data for Block 1	5		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[4]		6		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[5]		7		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[6]		8		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[7]		9		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[8]		10		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[9]		11		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[10]		12		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[11]	Data for Block 2	13		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[12]		14		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[13]		15		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[14]		16		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[15]		17		Decimal	SINT

If the write multiple blocks command is executed properly, the input table image results show ChError = 0, Command = 11 and Data[0-xxx] =0.



-_RFID_1:I.AuxPwrFault	0		Decimal	BOOL
-_RFID_1:I.BlockFault	0		Decimal	BOOL
⊟-_RFID_1:I.Channel	{...}	{...}		AB:56RF_I
⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_I
-_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	ChError = 0 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	Command = 11 11		Decimal	INT
-_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	521		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	Data Bytes are 0 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[4]	0		Decimal	SINT

Use the Read Multiple Block command (=2) to read the data.



⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF_I
-_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	No errors 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command 2 = Read Multiple Blocks	2		Decimal	INT
-_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	18		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[160]
⊞-_RFID_1:I.Channel[0].Data[0]	2		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	3		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	4		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	Data in 5		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[4]	Block 3 6		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[5]	7		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[6]	8		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[7]	9		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[8]	10		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[9]	11		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[10]	12		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[11]	Data in 13		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[12]	Block 4 14		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[13]	15		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[14]	16		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[15]	17		Decimal	SINT

Multi-tag Block Write

The Multi-tag Block Write command writes one or more blocks of user data to multiple tags in the transceiver field. The maximum number of tags in the RF field is limited to four and all tags must have the same block size.

Set the following values in the output image table:

a. xx:O.Channel[0].Command = 12
b. xx:O.Channel[0].Address = starting address to write
c. xx:O.Channel[0].BlockSize = number of bytes/block
d. xx:O.Channel[0].Data[0…xxx] = data to write
e. xx:O.Channel[0].Length = number of blocks to write
f. xx:O.Channel[0].Reset = 0
g. xx:O.Channel[0].Timeout = 0
h. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
i. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

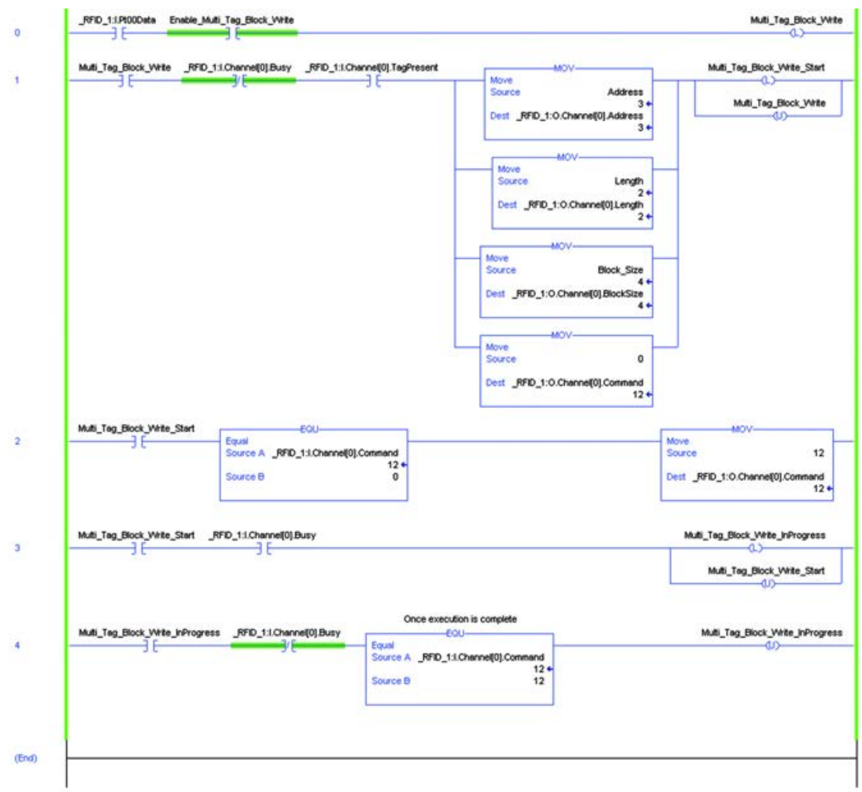
If UIDLow and UIDHi are set to 0, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

IMPORTANT	Length must be in 4-byte increments (for example, 4, 8, 12…) for ISO15693 tags or 8-byte increments (for example, 8, 16, 24…) for FRAM tags.

IMPORTANT	The BlockSize field is used to specify the number of bytes/block of the tag. Valid values are: • 0 = 4 bytes/block • 4 = 4 bytes/block • 8 = 8 bytes/block Typically, ISO15693 tags have a block size of 4 bytes/block, and FRAM tags have a block size of 8 bytes/block.

Example Routine

In the following example, data is written to two blocks, starting with Block 3. The data is loaded into the output channel image table. Block three is populated with Data[0...3] = 11, 13, 15 and 17. Block 4 is populated with Data[4...7] = 19, 21, 23, 25.



Example Results

The input channel image table shows the number of RFID tags that were written and the UUID of each RFID tag.

Name	Annotation	Value	Force Mask	Style	Data Type
_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError		0		Decimal	SINT
_RFID_1:I.Channel[0].Command		12		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter		286		Decimal	INT
_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]	Number of Tags in RF Field	2		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	UUID for Tag 1	16#c8		Hex	SINT
_RFID_1:I.Channel[0].Data[3]		16#25		Hex	SINT
_RFID_1:I.Channel[0].Data[4]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[5]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[6]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[7]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[8]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[9]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[10]	UUID for Tag 2	16#ca		Hex	SINT
_RFID_1:I.Channel[0].Data[11]		16#53		Hex	SINT
_RFID_1:I.Channel[0].Data[12]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[13]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[14]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[15]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[16]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[17]		16#e0		Hex	SINT

Use the Read Multi Tag Block command (=3) to read the blocks and confirm that the data was written.

Name	Annotation	Value	Force Mask	Style	Data Type
_RFID_1:I.Channel[0]		{...}	{...}		AB:56RF_I
_RFID_1:I.Channel[0].Busy		0		Decimal	BOOL
_RFID_1:I.Channel[0].ChError		0		Decimal	SINT
_RFID_1:I.Channel[0].Command		3		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode		0		Decimal	BOOL
_RFID_1:I.Channel[0].Counter		300		Decimal	INT
_RFID_1:I.Channel[0].Data		{...}	{...}	Decimal	SINT[160]
_RFID_1:I.Channel[0].Data[0]		2		Decimal	SINT
_RFID_1:I.Channel[0].Data[1]		0		Decimal	SINT
_RFID_1:I.Channel[0].Data[2]	Tag 1 UUID	16#c8		Hex	SINT
_RFID_1:I.Channel[0].Data[3]		16#25		Hex	SINT
_RFID_1:I.Channel[0].Data[4]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[5]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[6]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[7]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[8]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[9]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[10]	Tag 1 Block 3 Data	11		Decimal	SINT
_RFID_1:I.Channel[0].Data[11]		13		Decimal	SINT
_RFID_1:I.Channel[0].Data[12]		15		Decimal	SINT
_RFID_1:I.Channel[0].Data[13]		17		Decimal	SINT
_RFID_1:I.Channel[0].Data[14]	Tag 1 Block 4 Data	19		Decimal	SINT
_RFID_1:I.Channel[0].Data[15]		21		Decimal	SINT
_RFID_1:I.Channel[0].Data[16]		23		Decimal	SINT
_RFID_1:I.Channel[0].Data[17]		25		Decimal	SINT
_RFID_1:I.Channel[0].Data[18]	Tag 2 UUID	16#ca		Hex	SINT
_RFID_1:I.Channel[0].Data[19]		16#53		Hex	SINT
_RFID_1:I.Channel[0].Data[20]		16#e6		Hex	SINT
_RFID_1:I.Channel[0].Data[21]		16#5b		Hex	SINT
_RFID_1:I.Channel[0].Data[22]		16#00		Hex	SINT
_RFID_1:I.Channel[0].Data[23]		16#01		Hex	SINT
_RFID_1:I.Channel[0].Data[24]		16#04		Hex	SINT
_RFID_1:I.Channel[0].Data[25]		16#e0		Hex	SINT
_RFID_1:I.Channel[0].Data[26]	Tag 1 Block 3 Data	11		Decimal	SINT
_RFID_1:I.Channel[0].Data[27]		13		Decimal	SINT
_RFID_1:I.Channel[0].Data[28]		15		Decimal	SINT
_RFID_1:I.Channel[0].Data[29]		17		Decimal	SINT
_RFID_1:I.Channel[0].Data[30]	Tag 1 Block 4 Data	19		Decimal	SINT
_RFID_1:I.Channel[0].Data[31]		21		Decimal	SINT
_RFID_1:I.Channel[0].Data[32]		23		Decimal	SINT
_RFID_1:I.Channel[0].Data[33]		25		Decimal	SINT

Write Single Block

The Write Single Block command writes a single block of user data to an RFID tag.

Set the following values in the output image table:

a. xx:O.Channel[0].Command = 10
b. xx:O.Channel[0].Address = starting address to write
c. xx:O.Channel[0].BlockSize = 0, 4, or 8
d. xx:O.Channel[0].Data[0...112] = data to write
e. xx:O.Channel[0].Length = 0, 4, or 8
f. xx:O.Channel[0].BlockSize = 0, 4, or 8
g. xx:O.Channel[0].Reset = 0
h. xx:O.Channel[0].Timeout = 0
i. xx:O.Channel[0].UIDLow = 0 (or UIDLow)
j. xx:O.Channel[0].UIDHi = 0 (or UIDHi)

If UIDLow and UIDHi are set to 0, this command operates on the first tag in the field. Specify a UUID in xx:O.Channel[0].UIDLow and xx:O.Channel[0].UIDHi to perform the command on a specific tag.

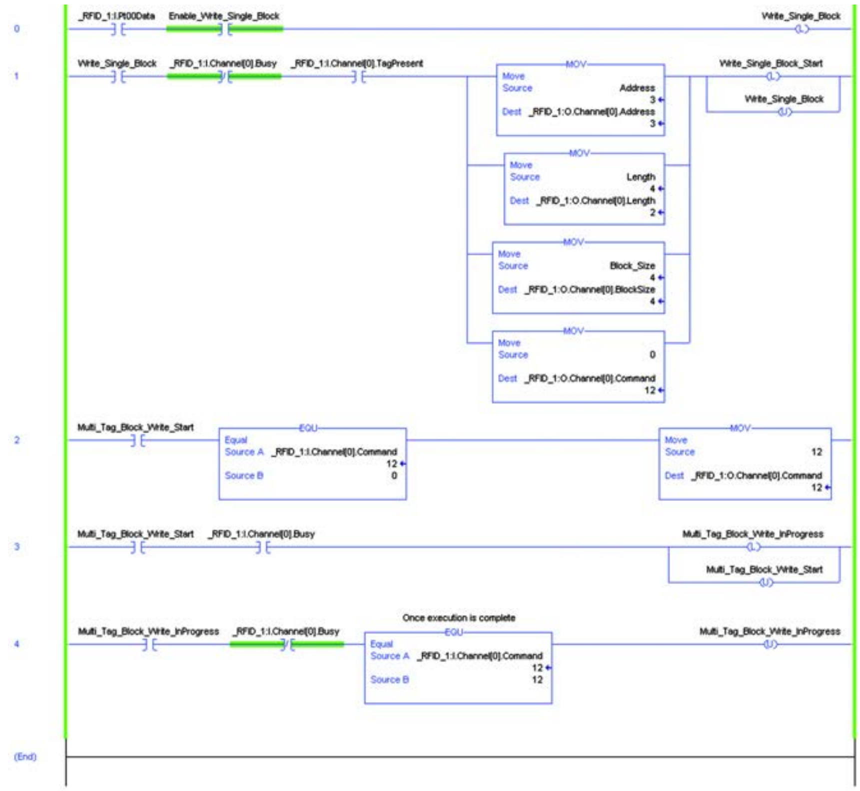
The Length and Block Size fields are used to specify the number of bytes/block of the tag. Valid values are:

- 0 = 4 bytes/block
- 4 = 4 bytes/block
- 8 = 8 bytes/block

Typically, ISO15693 tags have a block size of 4 bytes/block, and FRAM tags have a block size of 8 bytes/block.

Example Routine

In the following example, 4 bytes of data is written to Block 3. The data is loaded into the output channel image table. Block three is populated with Data[0...3] = 41, 42, 43, and 44.



Example Results

The output image table shows that the address is set to Block 3; the block size is 4 and the command is 10. The data to be written to block 3 is 41, 42, 43, and 44.

⊟-_RFID_1:O.Channel[0]		{...}	{...}		AB:56RF_I
⊞-_RFID_1:O.Channel[0].Address	Write to Block 3	3		Decimal	INT
⊞-_RFID_1:O.Channel[0].BlockSize	Block Size is 4	4		Decimal	INT
⊞-_RFID_1:O.Channel[0].Command		10		Decimal	INT
⊟-_RFID_1:O.Channel[0].Data		{...}	{...}	Decimal	SINT[112]
⊞-_RFID_1:O.Channel[0].Data[0]		41		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[1]	4 Bytes of Data	42		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[2]	to Write to Block	43		Decimal	SINT
⊞-_RFID_1:O.Channel[0].Data[3]		44		Decimal	SINT

Upon successful completion of the write block command, the Input Image table shows that Command = 10 and ChError = 0. The input channel data fields are all zero.

⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RF
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	No errors 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	10		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	5		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[16
⊞-_RFID_1:I.Channel[0].Data[0]	0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	Data Bytes are 0 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	0		Decimal	SINT

Use the Read Single Block command (=1), with option flag set to zero, to read the contents of the tag in block 3.

⊟-_RFID_1:I.Channel[0]	{...}	{...}		AB:56RI
_RFID_1:I.Channel[0].Busy	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].ChError	No Errors 0		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Command	1 = Read Block Cmd 1		Decimal	INT
_RFID_1:I.Channel[0].ContReadMode	0		Decimal	BOOL
⊞-_RFID_1:I.Channel[0].Counter	6		Decimal	INT
⊟-_RFID_1:I.Channel[0].Data	{...}	{...}	Decimal	SINT[16
⊞-_RFID_1:I.Channel[0].Data[0]	41		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[1]	Data From 42		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[2]	Block 3 43		Decimal	SINT
⊞-_RFID_1:I.Channel[0].Data[3]	44		Decimal	SINT

Continuous Read Mode

The Continuous Read command is used for specialty applications that require high line speeds (up to 3 m/s). See Continuous Read Mode on page 122 for details on this command.

Stop Continuous Read

The Stop Continuous Read command is used with the Continuous Read command for specialty applications that require high line speeds (up to 3 m/s). See Continuous Read Mode on page 122 for details on this command.

Teach Continuous Read

The Teach Continuous Read command is used to train the interface for Continuous Read operations. See Teach Continuous Read on page 125 for details on this command.

Notes:

SLC Code Examples

This sample code is an example using a SLC-5/05 with a catalog number 56RF-IN-IPD22 interface block.

Read Byte Routine

The Read Byte command (value =4) reads a user-specified number of bytes from a tag, starting at a user-specified address. Additionally, an Option Flag can be set to return the UUID of the tag.

- Option Flag 0

  Returns the specified user data

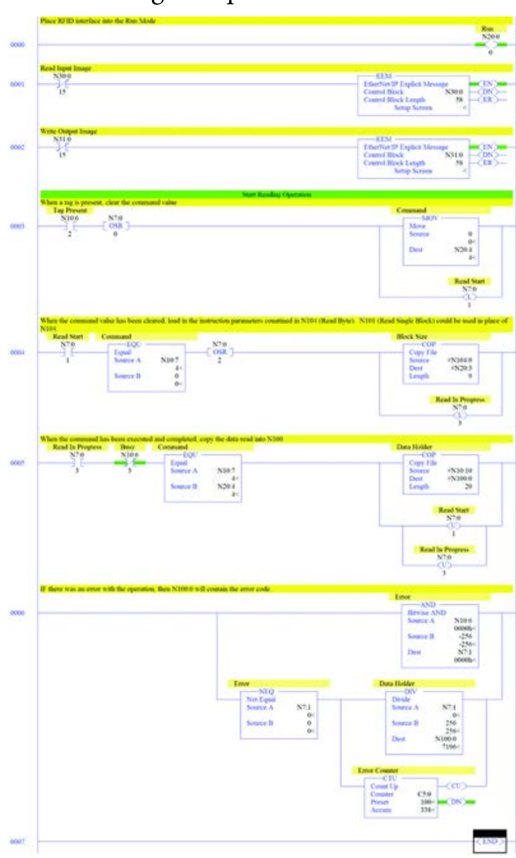
- Option Flag 1

  Returns the UUID of the tag and the specified user data

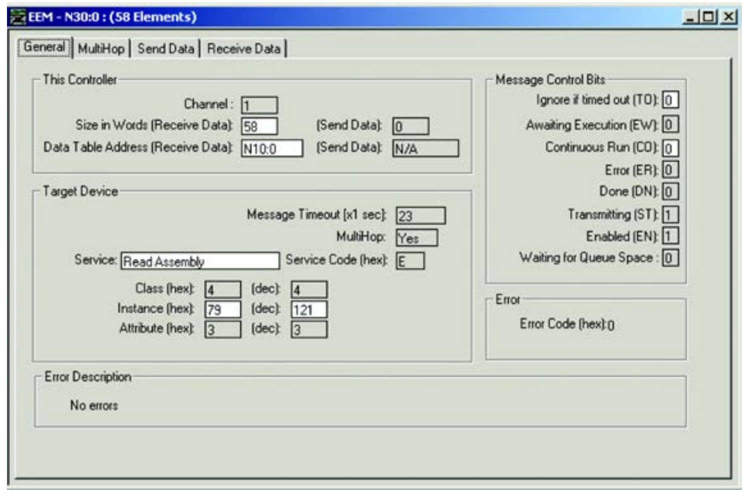
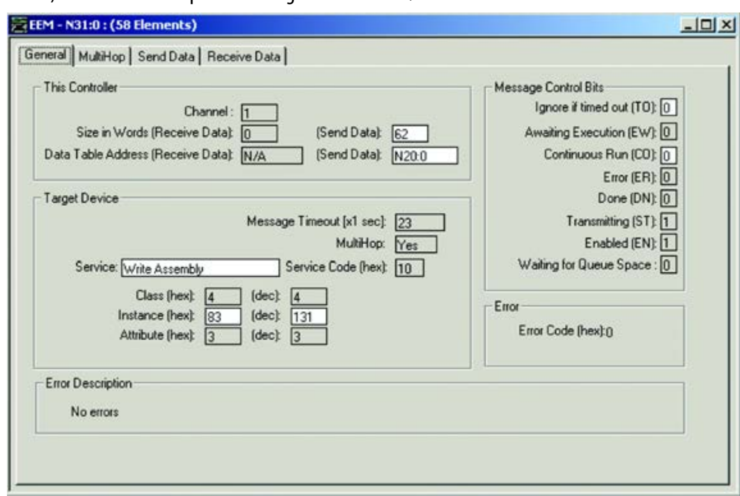
IMPORTANT	This command operates only on the first tag in the field.

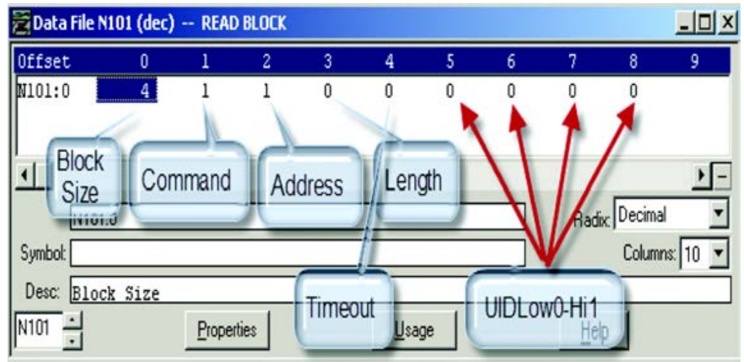
Example Routine

The following example code is for an SLC-5/05.



Example Routine

<table>
<tr><th>Rung</th><th>Description</th></tr>
<tr><td>0000</td><td>Place RFID interface into the Run mode. The bit must be highlighted in green. If the bit is not green, right-click it and click Toggle Bit.</td></tr>
<tr><td>0001</td><td>Read Input Image. Double-click the EEM box to enter the setup screen. Input Size is 116 bytes (58 words). Click the MultiHop tab to configure an EtherNet/IP device.

</td></tr>
<tr><td>0002</td><td>Write Output Image. Double-click the MSG box to enter the setup screen. Output size is 124 bytes (62 words). Click the MultiHop tab to configure an EtherNet/IP device.

</td></tr>
<tr><td>0003</td><td>The Tag Present bit is highlighted in green when a tag is present. When a tag is present, clear the command value.</td></tr>
</table>

Rung	Description
0004	When the command value has been cleared, load in the instruction parameters contained in N104 (Read Byte). N101 (Read Single Block) could be used in place of N104. 
0005	Wait for the read command to run. The Read in Progress bit is highlighted in green when the command is running. When the command has completed, the Read in Progress bit returns to its original state. When the command has been executed and completed, copy the data that is read into N100.
0006	If there was an error with the operation, then N100:0 contains the error code.

Notes:

MicroLogix 1400 Code Examples

Read Byte

The Read Byte command (value =4) reads a user-specified number of bytes from a tag, starting at a user-specified address. Additionally, an Option Flag can be set to return the UUID of the tag.

- Option Flag 0

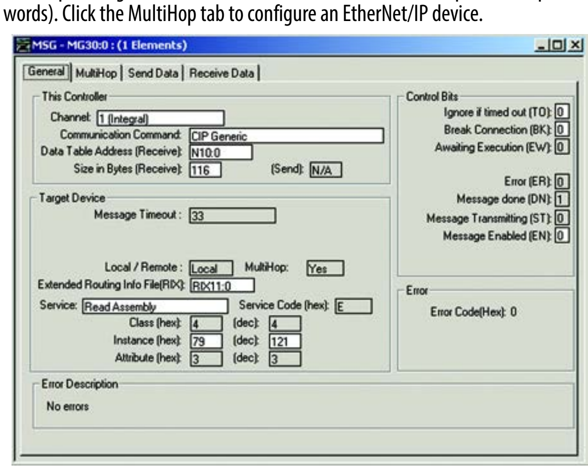
  Returns the specified user data

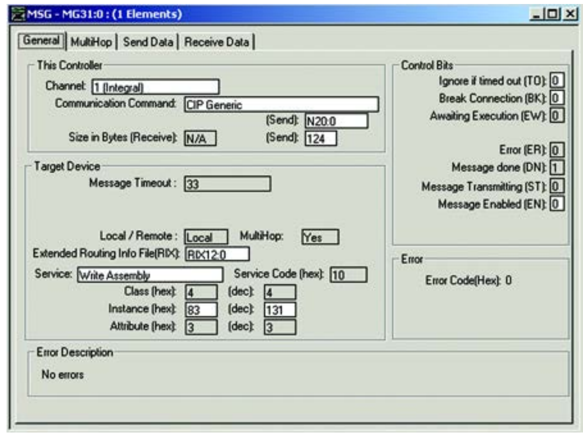
- Option Flag 1

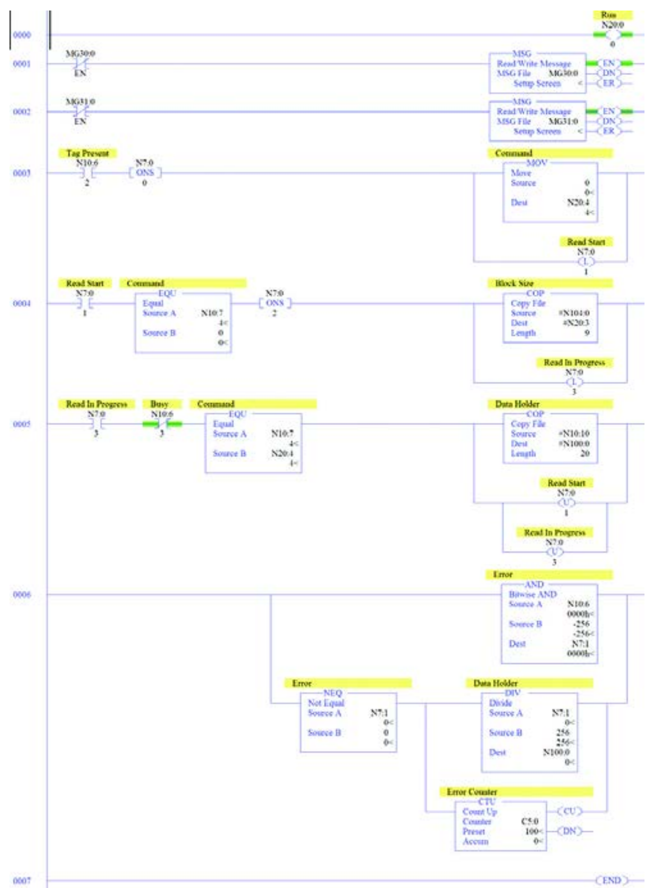
  Returns the UUID of the tag and the specified user data

IMPORTANT	This command operates only on the first tag in the field.

Example Routine

Rung	Description
0000	Place RFID interface into the Run Mode. The bit must be highlighted in green. If the bit is not green, right-click it and click Toggle Bit.
0001	Read Input Image. Double-click the MSG box to enter the setup screen. Input size is 116 bytes (58 words). Click the MultiHop tab to configure an EtherNet/IP device. 

<table>
<tr><th>Rung</th><th>Description</th></tr>
<tr><td>0002</td><td>Write Output Image. Double-click the MSG box to enter the setup screen. Output size is 124 bytes (62 words). Click the MultiHop tab to create an EtherNet/IP device.

</td></tr>
<tr><td>0003</td><td>The Tag Present bit is highlighted in green when a tag is present. When a tag is present, clear the command value.</td></tr>
<tr><td>0004</td><td>When the command value has been cleared, load in the instruction parameters contained in N104 (Read Byte). N101 (Read Single Block) could be used in place of N104.</td></tr>
<tr><td>0005</td><td>Wait for the read command to run. The Read in Progress bit is highlighted in green when the command is running. When the command has completed, the Read in Progress bit returns to its original state. When the command has been executed and completed, copy the data that is read into N100.</td></tr>
<tr><td>0006</td><td>If there was an error with the operation, then N100:0 contains the error code.</td></tr>
</table>



Write Byte

The Write Byte command (value = 14) writes bytes of user data to a tag. You can specify the data, the start byte, and the number of bytes to write.

IMPORTANT This command operates only on the first tag in the field.

Example Routine

Rung	Description
0000	Place RFID interface into the Run Mode. The bit must be highlighted in green. If the bit is not green, right-click it and click Toggle Bit.
0001	Read Input Image. Double-click the MSG box to enter the Setup Screen. Input Size is 116 bytes (58 words). Click the MultiHop tab to configure an EtherNet/IP device.
0002	Write Output Image. Double-click the MSG box to enter the Setup Screen. Output Size is 124 bytes (62 words). Click the MultiHop tab to configure an EtherNet/IP device.
0003	The Tag Present bit is highlighted in green when a tag is present. When a tag is present, clear the command value.
0004	When the command value has been cleared, load in the instruction parameters contained in N114 (Write Byte). N110 (Write Single Block) could be used in place of N114.
0005	Wait for the write command to run. The Write in Progress bit is highlighted in green when the command is running. When the command has completed, the Write in Progress bit returns to its original state. When the command has been executed and completed, copy the data that is read into N100.
0006	If there was an error with the operation, then N100:0 contains the error code.

Read Multiple Blocks

The Read Multiple Blocks command (value = 2) reads multiple blocks of user data from a tag. Additionally, Option Flags can be set to return information such as the Universally Unique Identifier (UUID) or the Data Storage Format Identifier (DSFID) of the tag.

- Option Flag 0

  Returns multiple blocks of user data
- Option Flag 1

  Returns multiple blocks of user data and the security status of each block

IMPORTANT Unless a UUID is specified, this command operates on the first tag in the field.

Example Routine

Rung	Description
0000	Place RFID interface into the Run Mode. The bit must be highlighted in green. If the bit is not green, right-click it and click Toggle Bit.
0001	Read Input Image. Double-click the MSG box to enter the Setup Screen. Input Size is 116 bytes (58 Words.) Click the MultiHop tab to configure an EtherNet/IP device.
0002	Write Output Image. Double-click the MSG box to enter the Setup Screen. Output Size is 124 bytes (62 Words). Click the MultiHop tab to configure an EtherNet/IP device.

Rung	Description
0003	The Tag Present bit is highlighted in green when a tag is present. When a tag is present, clear the command value.
0004	When the command value has been cleared, load in the instruction parameters contained in N102 (Read Multiple Blocks).
0005	Wait for the read command to run. The Read in Progress bit is highlighted in green when the command is running. When the command has completed, the Read in Progress bit returns to its original state. When the command has been executed and completed, copy the data that is read into N100.
0006	If there was an error with the operation, then N100:0 contains the error code.

Write Multiple Blocks

The Write Multiple Blocks command (value = 11) writes multiple blocks of user data to an FRAM tag.

IMPORTANT	This command only works on FRAM tags. Unless a UUID is specified, this command operates on the first tag in the field.

Example Routine

Rung	Description
0000	Place RFID interface into the Run Mode. The bit must be highlighted in green. If the bit is not green, right-click it and click Toggle Bit.
0001	Read Input Image. Double-click the MSG box to enter the Setup Screen. Input Size is 116 bytes (58 Words.) Click the MultiHop tab to configure an EtherNet/IP device.
0002	Write Output Image. Double-click the MSG box to enter the Setup Screen. Output Size is 124 bytes (62 Words). Click the MultiHop tab to configure an EtherNet/IP device.
0003	The Tag Present bit is highlighted in green when a tag is present. When a tag is present, clear the command value.
0004	When the command value has been cleared, load in the instruction parameters contained in N111 (Write Multiple Blocks).
0005	Wait for the write command to run. The Write in Progress bit is highlighted in green when the command is running. When the command has completed, the Write in Progress bit returns to its original state. When the command has been executed and completed, copy the data that is read into N100.
0006	If there was an error with the operation, then N100:0 contains the error code.

Input Image Layout

See Appendix B for details on the Input Image Layout.

Output Image Layout

See Appendix B for details on the Output Image Layout.

RFID Tag Speed

The following tables are a guide to help determine the amount of information that can be written to/read from an RFID tag based on the speed of your application. For example, to read 8 bytes consistently from a tag using the square transceiver, your line speed must be 0.827 m/s or slower.

If you have a high-speed application, it is best to choose the largest transceiver, larger tag, which provides the largest antenna range. The larger tag provides the longest time that the tag is in the field for read/write functions and also helps with tag misalignment issues.

If your tag is stopped when all read/write functions occur, and tag misalignment is not an issue, smaller transceivers can be used.

IMPORTANT It is recommended that the tag be stopped if large amounts of data is written to/read from the tag.

Table 25 - Rectangular (80x90) Transceiver

	Max Tag Speed (m/s)	
Bytes	**Read**	**Write**
4	1.488095	1.328609
8	1.378676	1.121915
16	1.202887	0.8566533
32	0.9578544	0.5811701
64	0.6802721	0.3535235
112	0.4743833	0.2227833
160	0.3641661	0.1626369
2000	0.03674939	0.01432665

Table 26 - Square (40x40) Transceiver

	Max Tag Speed (m/s)	
Bytes	**Read**	**Write**
4	0.8928571	0.7971656
8	0.8272058	0.6731489
16	0.7217322	0.513992
32	0.5747126	0.348702
64	0.4081633	0.2121141
112	0.28463	0.13367
160	0.2184996	0.09758213
2000	0.02204964	0.008595988

Table 27 - M18 Transceiver

	Max Tag Speed (m/s)	
Bytes	**Read**	**Write**
4	0.1984127	0.1771479
8	0.1838235	0.1495886
16	0.1603849	0.1142204
32	0.1277139	0.07748935
64	0.09070295	0.04713646
112	0.06325111	0.02970444
160	0.04855547	0.02168492
2000	0.004899919	0.00191022

Table 28 - M30 Transceiver

	Max Tag Speed (m/s)	
Bytes	**Read**	**Write**
4	0.3373016	0.3011515
8	0.3125	0.2543007
16	0.2726544	0.1941748
32	0.2171137	0.1317319
64	0.154195	0.08013199
112	0.1075269	0.05049755
160	0.0825443	0.03686436
2000	0.008329863	0.003247374

Continuous Read Mode

Command Objective

Perform tag read operations as fast as possible.

Operation

Command 5 is issued from the controller to place an interface RFID channel into continuous read mode; no additional commands are required from the controller to retrieve information from a tag. The read type that is issued would be a Read Multiple Block or a Read Single Block depending on the number of blocks requested. The maximum number of blocks that can be read at one time is 10. Each time the interface reads a tag successfully, the counter value increments by 1. If there was an issue reading the tag, the counter value does not increment and the ChError indicates the error code value.

While the interface is in this mode, it rejects all other commands sent to it for that channel except a Stop Continuous Read. The interface does not perform its normal poll cycle on that channel while it is in this mode of operation. During Continuous Read Mode, the ContReadMode and Busy bit is set to true.

When the interface receives a stop command, Command 6, it reverts to the normal mode of operation and resume the polling cycle. Continuous Read mode can also be canceled by issuing a channel reset (reset bit in the output image word set to 1).

When using a 50 mm disc tag, catalog number 56RF-TR-8090 transceiver, and reading 4 bytes of data, it can be possible to achieve a line speed of up to 3 m/s.

Modes of Operation

Only one type of mode of operation can be used on each channel. To change modes you must issue a Stop Continuous Read, and then reissue a Start Continuous Read with the new mode. Both channels can be configured for the same mode or different modes simultaneously. Modes of operation are limited based on the model number of the interface.

56RF-IN-IPS12

- One RFID Channel (Channel 0)
- One discrete input and one discrete output
- Support modes 0 and 1 only

56RF-IN-IPD22

- Two RFID Channels (Channel 0, Channel 1)
- One discrete input and one discrete output
- Support modes 0, and 1 only.

The single input can be used for either channel.

56RF-IN-IPD22A

- Two RFID Channels (Channel 0, Channel 1)
- Two discrete inputs
- Support modes 0, 1, 2, and 3

The same input can be used for either channel.

Mode Overview

1. Mode 0

The interface waits for the delay time, sends out a read, obtains data, and returns that data back to the PLC. This cycle repeats until a Stop Continuous Read command is issued.

2. Mode 1

The interface waits for input point 0 to turn ON, waits for the delay timer to expire then sends out a read, obtains data, and returns that data back to the PLC. This cycle repeats until a Stop Continuous Read command is issued.

3. Mode 2

The interface waits for input point 1 to turn ON, waits for the delay timer to expire then sends out a read, obtains data, and returns that data back to the PLC. This cycle repeats until a Stop Continuous Read command is issued.

4. Mode 3

The interface waits for both input point 0 and 1 to turn ON, waits for the delay timer to expire then sends out a read, obtains data, and returns that data back to the PLC. This cycle repeats until a Stop Continuous Read command is issued.

Command Structure

a. xx:O.Channel[0].Reset =0
b. xx:O.Channel[0].Command = 5
c. xx:O.Channel[0].BlockSize = Bytes per Block in the tag
d. xx:O.Channel[0].Address = Starting Block
e. xx:O.Channel[0].Length = Number of blocks to read
f. xx:O.Channel[0].Timeout = Delay time between sending commands
g. xx:O.Channel[0].UIDLow = 0
h. xx:O.Channel[0].UIDHi = 0
i. xx:O.Channel[0].Data[0] = Mode x
j. xx:O.Channel[0].Data[1] = Option Flag

Table 29 - Commands

Command	Description
Address	Block within the tag to start read operations from.
BlockSize	Size in bytes per block of the tag.
Length	Number of blocks to read

Table 29 - Commands

Command	Description
Timeout	Delay time between sending command attempts in Mode 0. Delay time after input condition is true before sending commands in modes 1…3.
UIDLow/UIDHigh	Can be used to target only a specific tag for read operations, otherwise this value would be 0 to read any tag.
Mode x	Specifies the mode of operation for the Continuous Read.
Option Flag	Used to specify the mode of one or more Read Multiple/ Read Single Blocks command. A zero value would only read the data that is requested starting at the address that is specified, for the number of blocks specified in the Length field. A value of 1 would read and return both the security block status and the tag data. For modes 1…3, you can either set the delay time on their own or they can train the interface and the transceiver so that the value is determine automatically based on their system setup and line speed. A delay time of 0 causes the interface to send out the command as soon as it sees that the input condition goes true. For mode 0, there is no ability to train the system.

Teach Continuous Read

Command Objective

This operation is valid only for modes 1...3 and is used to train the interface to the approximate delay time that should be used before it sends out the read command based on input conditions and tag speeds.

Operation

Command 8 is issued from the Controller to place an RFID interface channel into teach mode.

When first entering Teach Mode (Phase 1), the interface waits for one or more input conditions to go true, and then poll for tag detection. Once 10 good detections have occurred, the unit enters phase 2.

During Phase 2, the unit waits for one or more input conditions to go true, then issue the Read Multiple/Read Single Block command after the predetermined time delay and adjust the delay time as necessary. Once 10 good reads in a row have occurred, the unit exits teach mode and reports back the average and recommended delay time in milliseconds.

If the interface is unable to obtain 10 good reads in a row, it decrements the delay time by 1 ms and start again in phase 2. If the delay time has been decremented more than 30 ms from the average, the interface exits teach mode and reports back the recommended delay time of -1. A -1 value indicates that the interface cannot determine what the best delay time would be due to variations in tag speed.

Phase progression in teach mode can be monitored by viewing the counter value in the input image table. Phase 1 is always a value <10, Phase 2 is always a value >10. Once the counter reaches 20, the interface exits teach mode and reports the average and recommended delay times. You must load the recommended delay time value into the Timeout field before initiating a continuous read.

During Teach Mode, the ContReadMode and Busy bit are set to true.

Issuing a channel reset can cancel Teach mode (reset bit in the output image word set to 1).

Command Structure

a. xx:O.Channel[0].Reset =0
b. xx:O.Channel[0].BlockSize =Bytes per Block in the tag
c. xx:O.Channel[0].Command = 8
d. xx:O.Channel[0].Address = Starting Block
e. xx:O.Channel[0].Length = Number of Blocks
f. xx:O.Channel[0].Timeout = 0
g. xx:O.Channel[0].UIDLow = 0
h. xx:O.Channel[0].UIDHi = 0
i. xx:O.Channel[0].Data[0] = Mode x
j. xx:O.Channel[0].Data[1] = Option Flag

RFID Interface Block Web Page

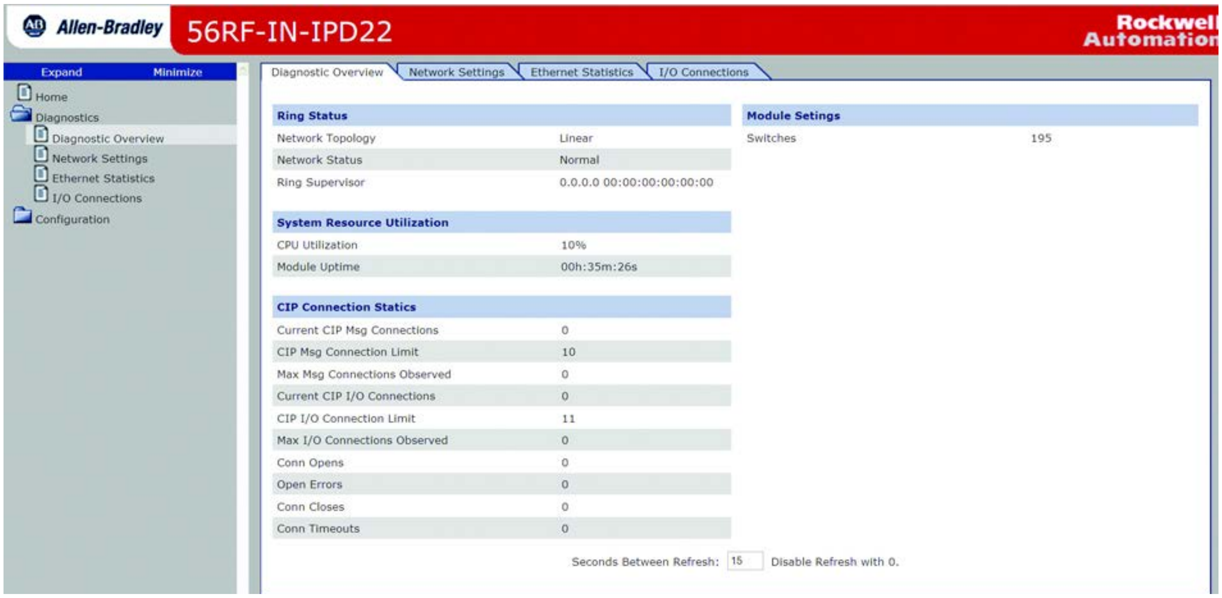
The RFID interface block web page is accessible by entering the IP address of the interface block into a web browser. The interface block must have Ethernet connectivity and power to be viewable on the web page. The web page provides diagnostic and configuration for the RFID interface block.

Home

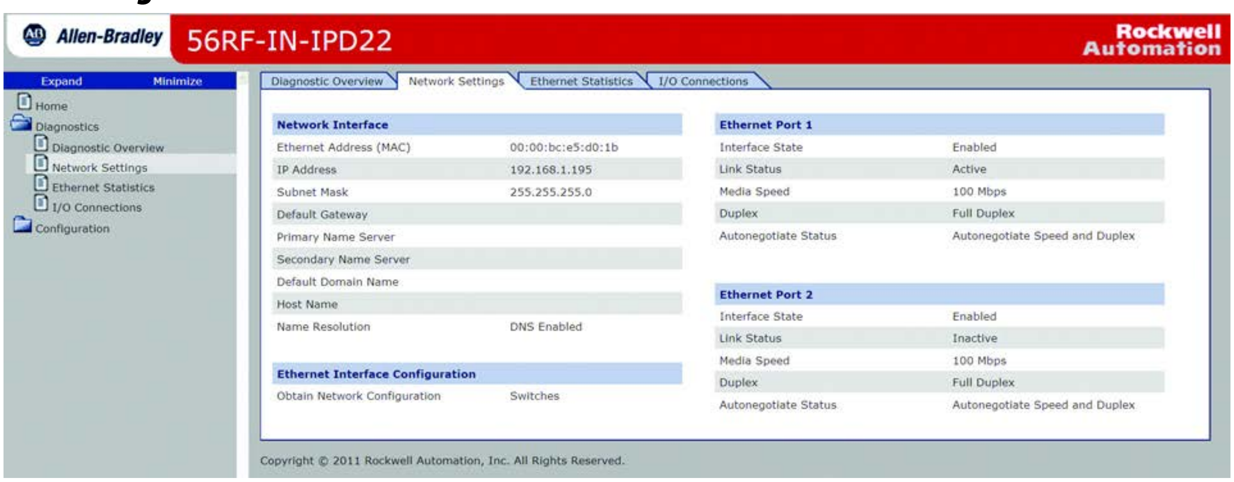
The home page allows you to view basic information about the interface block. Data cannot be changed on the home page. The Device Description and Device Location are specified and can be changed on the Device Identity tab in the Configuration section.

Diagnostics

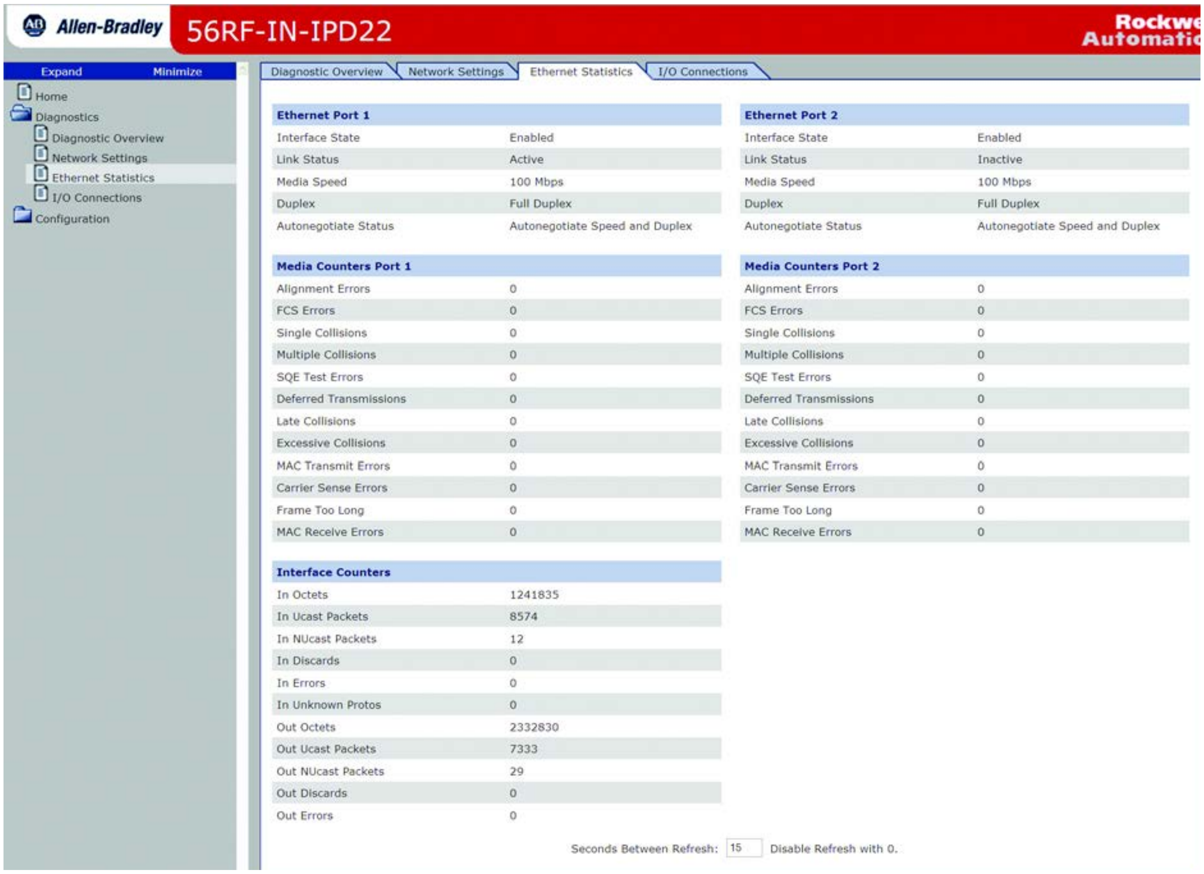
The Diagnostic section has three tabs of view-only detailed information on the status of the interface block. The tabs show Diagnostic Overview, Network Settings, and Ethernet Statistics. The I/O Connections tab contains a field that allows you to change the web page refresh rate.



Network Settings



Ethernet Statistics



I/O Connections

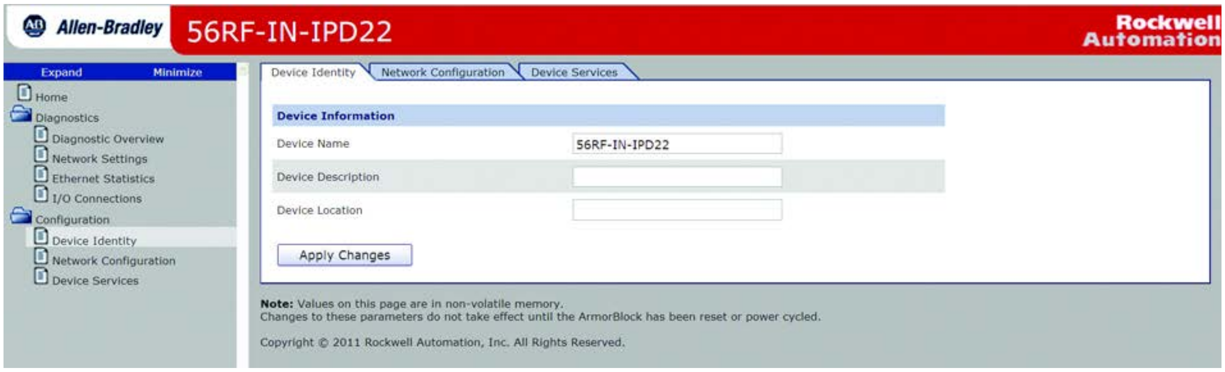
Configuration

To access the configuration section of the RFID interface block web page, a username and password are required. The default username is Admin, and there is no password by default. The username and password can be changed on the Device Services tab.

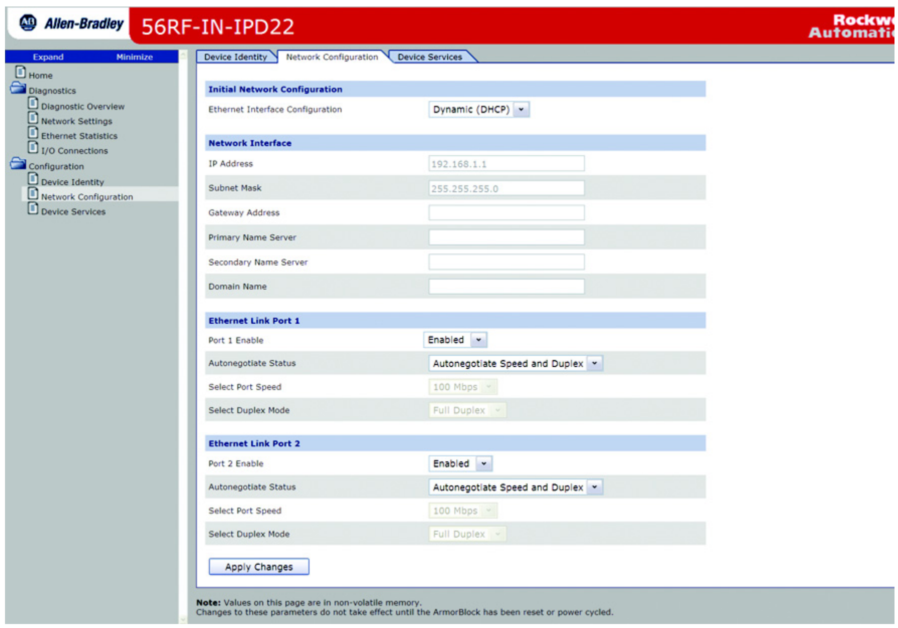
IMPORTANT	If the username and password are lost, the interface block must be reset to default before it can be accessed again. The username and password are reset to the default values.

Device Identity

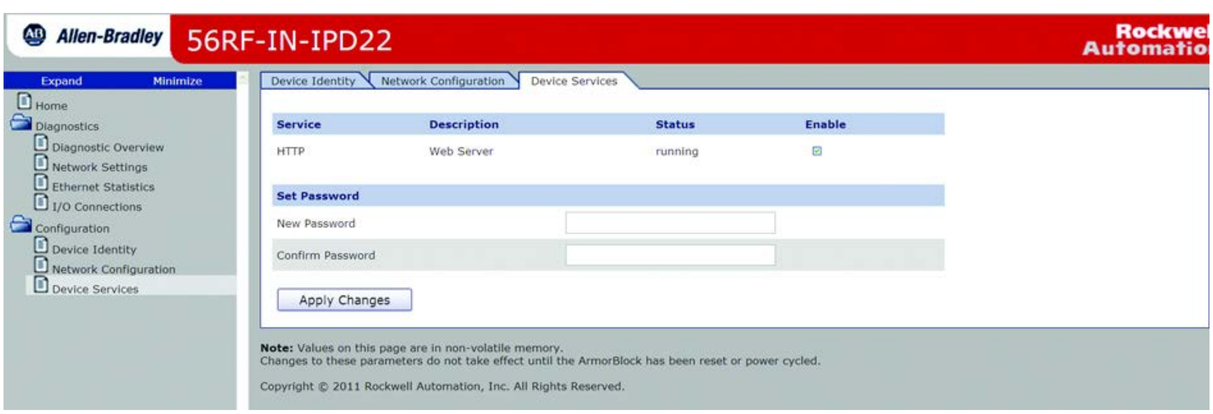
Change the device name, description, or location. Changes take place after power to the interface block has been cycled.



Network Configuration



Device Services



Error Codes for RFID Interface Block

Error Codes

The error codes for the RFID interface block are stored in the input for each channel. In the examples in the manual, the error codes are stored in the image table RFID_1:I:Channel[0].ChError and RFID_1:I:Channel[1].ChError.

Error Codes	Status Word	Binary
0	OK	0000
1	Transceiver not found	0001
2	Invalid Response	0010
3	Invalid Parameter	0011
4	No Tag Detected	0100
5	Instruction Timed Out	0101
6	Block Access Error	0110
7	Format Error	0111
8	Tag Communications Error	1000
9	Address Error	1001
10	Mismatch Error	1010
11	Internal Channel Error	1011
12	Malformed Packet	1100
13	Unit in Program Mode	1101
14	Reserved	1110
15	Module Error	1111

- OK (Decimal 0)

  Indicates that there are no issues with the channel in question when the decimal value of these bits is equal to zero.
- Transceiver not found (Decimal 1)

  Indicates that communications with the transceiver for the specified channel has been lost.
- Invalid Response (Decimal 2)

  Indicates that the response to a command is not what was expected.
- Invalid Parameter (Decimal 3)

  Indicates that either a passed or received parameter was out of bounds.
- No Tag Detected (Decimal 4)

  Indicates that a command was attempted on a channel but there was no tag detected in the field.

- Instruction Timed Out (Decimal 5)

  Indicates that the timeout value that is associated with a command was exceeded before a response could be obtained.
- Block Access Error (Decimal 6)

  Indicates that either:
  - A read command attempted to read a block but was denied access.
  - A write command attempted to write to a block but was denied access.
- Format Error (Decimal 7)

  Indicates that the format of the command or response was invalid.
- Tag Communications Error (Decimal 8)

  Indicates that the interface block was not able to complete command execution with a tag before the tag left the field or the Output Channel Timeout is set too short. For example, set the Output Channel Timeout to 100 ms and then try to read 112 bytes of data from a catalog number 56RF-TG-30 tag.
- Address Error (Decimal 9)

  Indicates that the block address value was out of bounds for the tag.
- Mismatch Error (Decimal 10)

  Indicates that there are more tags that are detected in the field than the unit can process.
- Internal Channel Error (Decimal 11)

  Indicates that there is some internal issue with channel (hardware fault).
- Malformed Packet (Decimal 12)

  Indicates an issue with the command packet that is received by the transceiver.
- Unit in Program Mode (Decimal 13)

  Indicates that a command was issued but the module is in program mode.
- Module Error (Decimal 15)

  Indicates that there is some internal issue interface block (hardware fault).

CIP Information

Product Codes and Name Strings

The following table lists the product codes and name strings for the EtherNet/IP interface block.

Product Type	Product Code	Cat. No.	Identity Object Name String
139	4	56RF-IN-IPS12	RFID Adapter 1 Port + 1In/1 Out
139	5	56RF-IN-IPD22	RFID Adapter 2 Port + 1In/1 Out
139	6	56RF-IN-IPD22A	RFID Adapter 2 Port + 2In/0 Out

CIP Explicit Connection Behavior

The RFID interface block allows connected explicit messages to drive user outputs when no I/O connection exists, or when an I/O connection exists in the idle state. One EtherNet/IP Class 3 explicit connection is allowed to send explicit control messages via an Active Explicit connection. An EtherNet/IP Class 3 explicit connection becomes the explicit control connection when it becomes the first EtherNet/IP Class 3 explicit connection to send a set service to one of the following:

- The Value attribute of any DOP instance (class code 0x09).
- The Data attribute of any output (consumed) Assembly Instance (class code 0x04).
- Attribute 3 or 4 of the Control Supervisor Object (class code 0x29).

CIP Objects

The following CIP™ objects are covered in the following subsections. CIP objects provide a window into the devices properties that can be read/written to. Each CIP Class contains instances (copies of a class structure), and attributes for each instance. Most devices have only one instance of a class.

Class	Object
0x0001	Identity Object
0x0004	Assembly Object
0x0008	Discrete Input Point Object
0x0009	Discrete Output Point Object

Identity Object Class Code 0x0001

This Identity Object provides identification of and general information about the device.

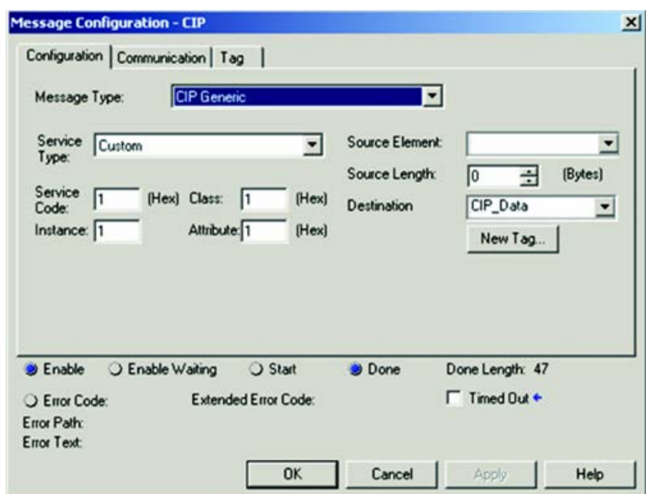
Instance 1 of the Identity Object contains the following attributes:

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Vendor	UINT	1
2	Get	Device Type	UINT	139
3	Get	Product Code	UINT	4, 5, or 6
4	Get	Revision Major Revision Minor Revision	Structure of: USINT USINT	The initial release is Major Rev. 1, Minor Rev. 1.
5	Get	Status	WORD	See Table 30 on page 135.
6	Get	Serial Number	UDINT	Unique number for each device
7	Get	Product Name String Length ASCII String	Structure of: USINT STRING	Product Code specific

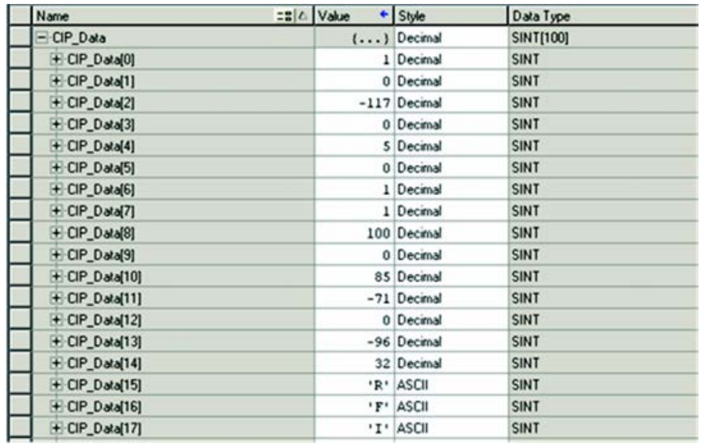
The following common services are implemented for Instance 1.

Service Code	Implemented for:		Service Name
	Class	Instance	
0x01	Yes	Yes	Get_Attributes_All
0x05	No	Yes	Reset
0x0E	Yes	Yes	Get_Attributes_Single

Accessing the Identity Object requires the creation of a Message Instruction (MSG) to be configured as a CIP Generic type.



- Service Code: 1- Get Attribute All
- Class: 1 - Identity Object
- Instance: 1 - First instance
- Attribute: 1 - First attribute
- Destination: CIP_Data - a SINT[100] array to hold the data



Name	Value	Style	Data Type
⊟ CIP_Data	{...}	Decimal	SINT[100]
⊞ CIP_Data[0]	1	Decimal	SINT
⊞ CIP_Data[1]	0	Decimal	SINT
⊞ CIP_Data[2]	-117	Decimal	SINT
⊞ CIP_Data[3]	0	Decimal	SINT
⊞ CIP_Data[4]	5	Decimal	SINT
⊞ CIP_Data[5]	0	Decimal	SINT
⊞ CIP_Data[6]	1	Decimal	SINT
⊞ CIP_Data[7]	1	Decimal	SINT
⊞ CIP_Data[8]	100	Decimal	SINT
⊞ CIP_Data[9]	0	Decimal	SINT
⊞ CIP_Data[10]	85	Decimal	SINT
⊞ CIP_Data[11]	-71	Decimal	SINT
⊞ CIP_Data[12]	0	Decimal	SINT
⊞ CIP_Data[13]	-96	Decimal	SINT
⊞ CIP_Data[14]	32	Decimal	SINT
⊞ CIP_Data[15]	'R'	ASCII	SINT
⊞ CIP_Data[16]	'F'	ASCII	SINT
⊞ CIP_Data[17]	'I'	ASCII	SINT

- CIP_Data[0]...[1]= Vendor (1=Allen-Bradley)
- CIP_Data[2]...[3]= Device Type (139=RFID)
- CIP_Data[4]...[5]=Device Code (5=56RF-IN-IPS12)
- CIP_Data[6]= Major Revision (1)
- CIP_Data[7]= Minor Revision (1)
- CIP_Data[8]...[9]= Status (100 decimal, 000000001100100 binary)
- CIP_Data[10]...[13]= Serial Number (A000B955)
- CIP_Data[14]= Product Name Length (32 bytes)
- CIP_Data[15]-[n]= Product Name

Table 30 - Device Status (CIP_Data[8…9])

Bits	Name	Description
0	Owned	0=Not Owned, 1=Owned by a Master
1	Reserved	Reserved
2	Configured	0=Not configured, 1=Configured
3	Reserved	Reserved
4…7	Extended Device Status	See Table 31
8	Minor Recoverable Fault	1=Detected a recoverable minor fault
9	Minor Unrecoverable Fault	1=Detected a non-recoverable minor fault
10	Major Recoverable Fault	1=Detected a recoverable major fault
11	Major Unrecoverable Fault	1=Detected a non-recoverable major fault
12…15	Reserved	Reserved

Table 31 - Values for the Extended Device Status (Bits 4…7)

Value	Description
0	Self-Testing or Unknown
1	Firmware Update in Progress
2	At least one faulted I/O connection
3	No I/O connections established
4	Non-Volatile Configuration Bad
5	Major Fault
6	At least one I/O connection in run mode
7	At least one I/O connection is established, all in idle mode
8 & 9	Reserved
10…15	Vendor specific

Assembly Object Class Code 0x0004

The Assembly Object binds attributes of multiple objects, which allows data to or from each object to be sent or received over one connection. Controllers that cannot create and establish a class 1 (scheduled) connection can use the Assembly Object in a Message Instruction to obtain both the input and output assemblies of the RFID interface.

The following services are implemented for the Assembly Object:

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x18	No	Yes	Get_Member

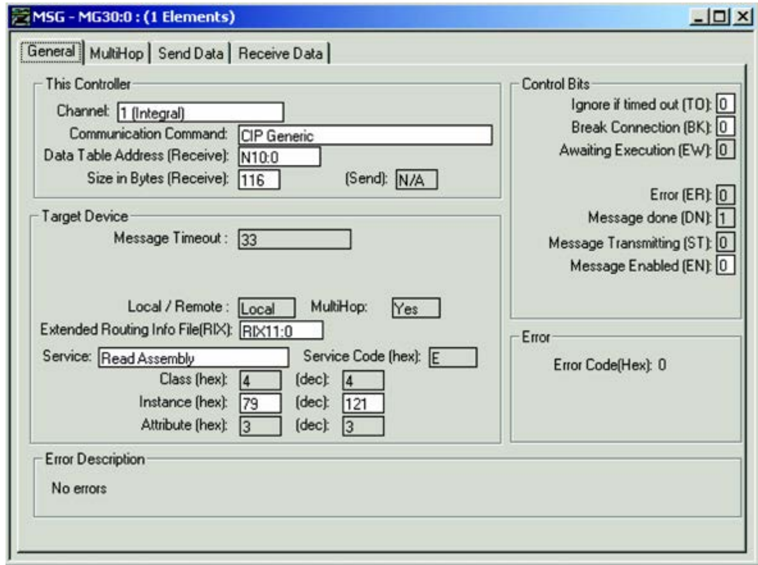
Different connection instances are needed for each RFID interface based on the model. These class 3 connection instances are different than the class 1 instances that are used by a ControlLogix® or CompactLogix™ processor due to the limitations within the SLC™ and Micrologix™ for handling Send and Receive data.

Use Table 32 to determine the class 3 connection instance and Send/Receive size for your unit.

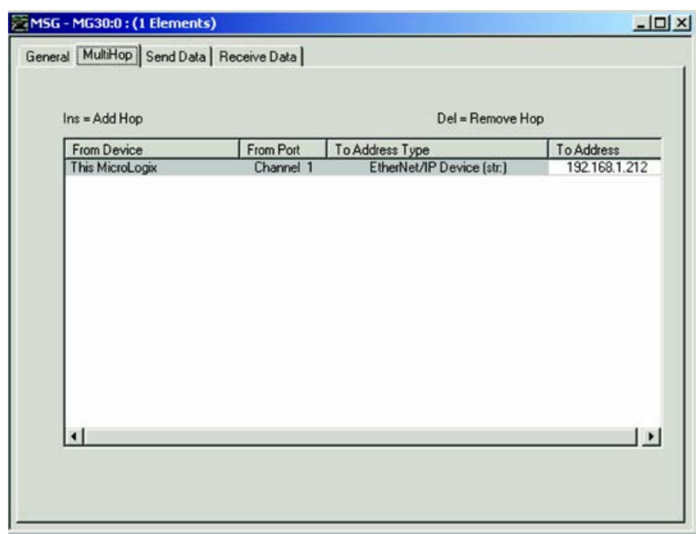
Table 32 - Class 3 Connection Instances with Size (in bytes)

Cat. No.	Input	Size	Output	Size	Config	Size
56RF-IN-IPS12	120	64	130	64	103	16
56RF-IN-IPD22	121	116	131	124	109	20
56RF-IN-IPD22A	122	116	132	124	112	24

Reading the Input Image Table of a 56RF-IN-IPD22 with a MicroLogix 1400



- N10:0 is the data table address where the input image is stored and spans N10:0…N10:57.
- The number of bytes to receive is 116 (58 words).
- The extended routing file (RIX11:0) is used to store the Multi-Hop routing information.
- Service is type Read Assembly
- Class 4 is the Assembly Instance Class
- Instance 79h is the input image connection instance.
- Attribute 3 is the assembly attribute for the input image table



The Multi-Hop information is used to configure the communications path from the MicroLogix to the RFID interface.

Input Image (56RF-IN-IPD22)

Word	Description	Word	Description
N10:0 – N10:1	Module Connection Status	N10:9	Length
N10:2	Module Status	N10:10 – N10:31	Data
N10:3	Reserved	N10:32	Channel[1] Diagnostics
N10:4	Block Status	N10:33	Command Value
N10:5	I/O Data	N10:34	Counter Value
N10:6	Channel[0] Diagnostics	N10:35	Length
N10:7	Command Value	N10:36 – N10:57	Data
N10:8	Counter Value		

Module Status

Bit	Definition	Bit	Definition
0	Run Status	8	Reserved
1	Block Fault	9	Reserved
2	Aux Power Fault	10	Reserved
3	Reserved	11	Reserved
4	Pt00 Input Fault	12	Pt00 Output Fault
5	Pt00 Open Wire	13	Pt00No Load
6	Pt00 Input Short Circuit	14	Pt00 Output Short Circuit
7	Reserved	15	Reserved

I/O Data

Bit	Definition	Bit	Definition
0	Pt00 Data	8	Pt00 Readback
1	Reserved	9	Reserved
2	Reserved	10	Reserved
3	Reserved	11	Reserved
4	Reserved	12	Reserved
5	Reserved	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

Channel[n] Diagnostics

Bit	Definition	Bit	Definition
0	Reset	8	Error Code
1	Fault	9	Error Code
2	Tag Present	10	Error Code
3	Busy	11	Error Code
4	Reset in Progress	12	Reserved
5	Continuous Read Mode	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

Input Image (56RF-IN-IPD22A)

Word	Description	Word	Description
N10:0 – N10:1	Module Connection Status	N10:9	Length
N10:2	Module Status	N10:10 – N10:31	Data
N10:3	Reserved	N10:32	Channel[1] Diagnostics
N10:4	Block Status	N10:33	Command Value
N10:5	I/O Data	N10:34	Counter Value
N10:6	Channel[0] Diagnostics	N10:35	Length
N10:7	Command Value	N10:36 – N10:57	Data
N10:8	Counter Value		

Module Status

Bit	Definition	Bit	Definition
0	Run Status	8	Pt01 Input Fault
1	Block Fault	9	Pt01 Open Wire
2	Aux Power Fault	10	Pt01 Input Short Circuit
3	Reserved	11	Reserved
4	Pt00 Input Fault	12	Reserved
5	Pt00 Open Wire	13	Reserved
6	Pt00 Input Short Circuit	14	Reserved
7	Reserved	15	Reserved

I/O Data

Bit	Definition	Bit	Definition
0	Pt00 Data	8	Reserved
1	Pt01 Data	9	Reserved
2	Reserved	10	Reserved
3	Reserved	11	Reserved
4	Reserved	12	Reserved
5	Reserved	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

Channel[n] Diagnostics

Bit	Definition	Bit	Definition
0	Reset	8	Error Code
1	Fault	9	Error Code
2	Tag Present	10	Error Code
3	Busy	11	Error Code
4	Reset in Progress	12	Reserved
5	Continuous Read Mode	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

Input Image (56RF-IN-IPS12)

Word	Description	Word	Description
N10:0 – N10:1	Module Connection Status	N10:6	Channel[0] Diagnostics
N10:2	Module Status	N10:7	Command Value
N10:3	Reserved	N10:8	Counter Value
N10:4	Block Status	N10:9	Length
N10:5	I/O Data	N10:10 – N10:31	Data

Module Status

Bit	Definition	Bit	Definition
0	Run Status	8	Reserved
1	Block Fault	9	Reserved
2	Aux Power Fault	10	Reserved
3	Reserved	11	Reserved
4	Pt00 Input Fault	12	Pt00 Output Fault
5	Pt00 Open Wire	13	Pt00 No Load
6	Pt00 Input Short Circuit	14	Pt00 Output Short Circuit
7	Reserved	15	Reserved

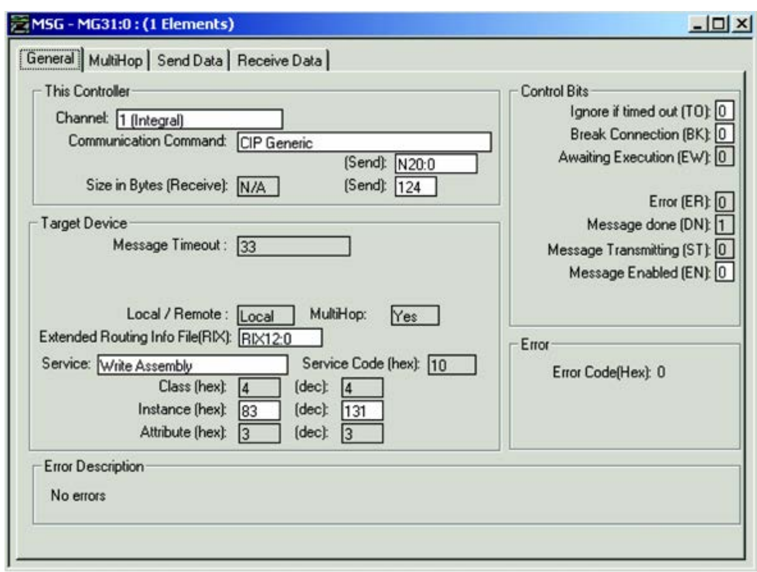
I/O Data

Bit	Definition	Bit	Definition
0	Pt00 Data	8	Pt00 Readback
1	Reserved	9	Reserved
2	Reserved	10	Reserved
3	Reserved	11	Reserved
4	Reserved	12	Reserved
5	Reserved	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

Channel[n] Diagnostics

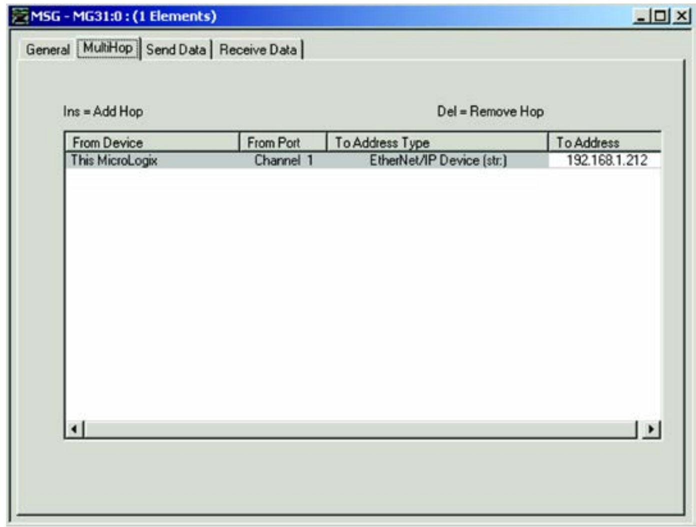
Bit	Definition	Bit	Definition
0	Reset	8	Error Code
1	Fault	9	Error Code
2	Tag Present	10	Error Code
3	Busy	11	Error Code
4	Reset in Progress	12	Reserved
5	Continuous Read Mode	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

Writing to the Output Image Table of a 56RF-IN-IPD22 with a MicroLogix 1400



- N20:0 is the data table address to store the output image and spans N20:0…N20:61.
- The number of bytes to send is 124 (62 words).
- The extended routing file (RIX12:0) is used to store the Multi-Hop routing information.

- Service is type Write Assembly
- Class 4 is the Assembly Instance Class
- Instance 83h is the output image connection instance.
- Attribute 3 is the assembly attribute for the output image table



The Multi-Hop information is used to configure the communications path from the MicroLogix to the RFID interface.

Input Image (56RF-IN-IPD22)

Word	Description	Word	Description
N20:0	Module Data	N20:12…N10:31	Data
N20:1	Reserved	N20:32	Channel[1] Reset
N20:2	Channel[0] Reset	N20:33	Block Size
N20:3	Block Size	N20:34	Command
N20:4	Command	N20:35	Address
N20:5	Address	N20:36	Length
N20:6	Length	N20:37	Timeout
N20:7	Timeout	N20:38…N20:39	UIDLow
N20:8…N20:9	UIDLow	N20:40…N20:41	UIDHi
N20:10…N20:11	UIDHi	N20:42…N20:61	Data

Module Data

Bit	Definition	Bit	Definition
0	Run Mode	8	Pt00 Data
1	Reserved	9	Reserved
2	Reserved	10	Reserved
3	Reserved	11	Reserved
4	Reserved	12	Reserved
5	Reserved	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

Input Image (56RF-IN-IPD22A)

Word	Description	Word	Description
N20:0	Module Data	N20:12…N10:31	Data
N20:1	Reserved	N20:32	Channel[1] Reset
N20:2	Channel[0] Reset	N20:33	Block Size
N20:3	Block Size	N20:34	Command
N20:4	Command	N20:35	Address
N20:5	Address	N20:36	Length
N20:6	Length	N20:37	Timeout
N20:7	Timeout	N20:38…N20:39	UIDLow
N20:8…N20:9	UIDLow	N20:40…N20:41	UIDHi
N20:10…N20:11	UIDHi	N20:42…N20:61	Data

Module Data

Bit	Definition	Bit	Definition
0	Run Mode	8	Reserved
1	Reserved	9	Reserved
2	Reserved	10	Reserved
3	Reserved	11	Reserved
4	Reserved	12	Reserved
5	Reserved	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

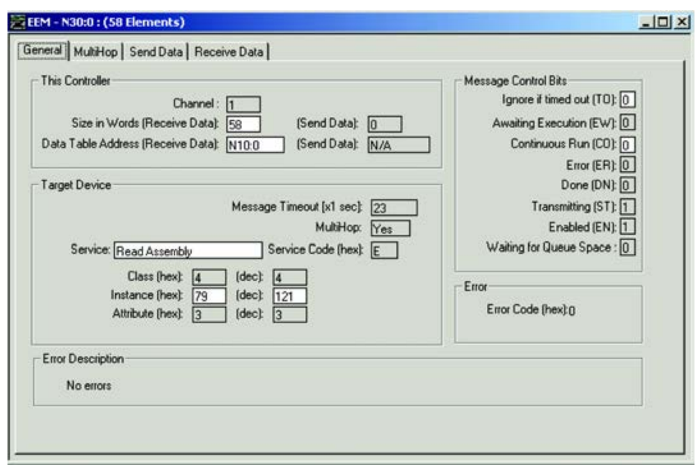
Input Image (56RF-IN-IPS12)

Word	Description	Word	Description
N20:0	Module Data	N20:6	Length
N20:1	Reserved	N20:7	Timeout
N20:2	Channel[0] Reset	N20:8…N20:9	UIDLow
N20:3	Block Size	N20:10…N20:11	UIDHi
N20:4	Command	N20:12…N10:31	Data
N20:5	Address		

Module Data

Bit	Definition	Bit	Definition
0	Run Mode	8	Pt00 Data
1	Reserved	9	Reserved
2	Reserved	10	Reserved
3	Reserved	11	Reserved
4	Reserved	12	Reserved
5	Reserved	13	Reserved
6	Reserved	14	Reserved
7	Reserved	15	Reserved

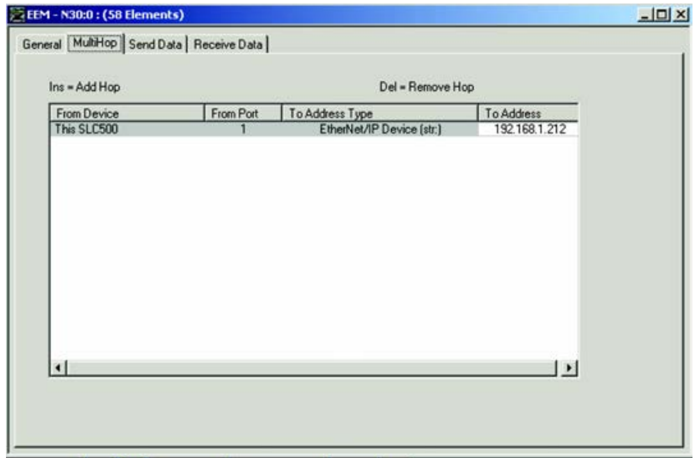
Reading the Input Image Table of a 56RF-IN-IPD22 with a SLC-5/05

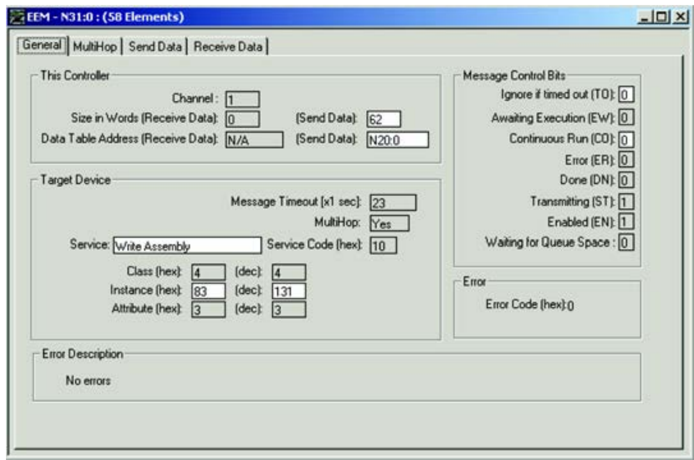


The biggest difference between the MicroLogix1400 and the SLC-5/05 is that the SLC uses an EEM instruction instead of an MSG instruction, but the setup is basically the same. The routing information for the EEM is stored within the Control Block address (N30:0)

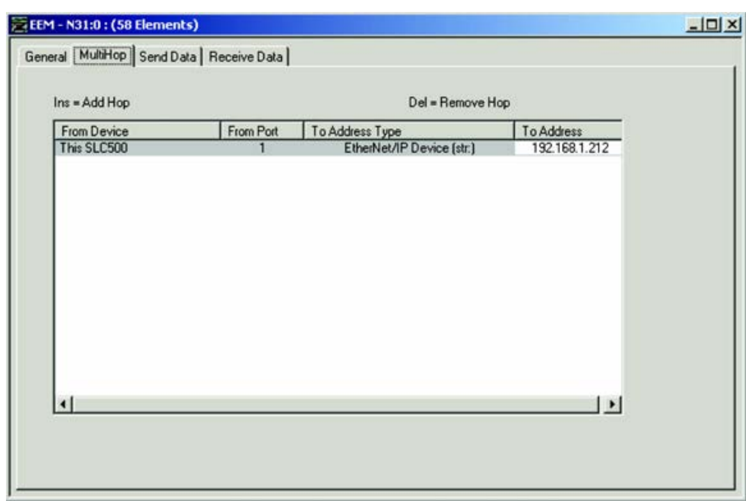
- N10:0 is the data table address where the input image is stored and spans N10:0...N10:57.
- The size in words is 58 (116 bytes).
- Service is type Read Assembly
- Class 4 is the Assembly Instance Class
- Instance 79h is the input image connection instance.

- Attribute 3 is the assembly attribute for the input image table





- N20:0 is the data table address to store the output image and spans N20:0…N20:61.
- The Send Data size is 62 (124 bytes).
- Service is type Write Assembly
- Class 4 is the Assembly Instance Class
- Instance 83h is the output image connection instance.
- Attribute 3 is the assembly attribute for the output image table



Class 1 Connections

Class 1 connections are used to transfer I/O data, and can be established to the Assembly Object instances. Each Class 1 connection establishes two data transports, one consuming and one producing. The heartbeat instances are used for connections that can access only inputs. Class 1 uses UDP transport.

- Total numbers of supported Class 1 connections equals 2 (total for: exclusive owner + input only + listen-only)
- Supported API: 2…3200 ms (The minimum API can be higher if processor resources become a problem)
- T->O Connection type: point-to-point, multicast
- O->T Connection type: point-to-point
- Supported trigger type: cyclic, change of state

The producing instance can be assigned to multiple transports, using any combination of multicast and point-to-point connection types.

Only one Exclusive-owner connection is supported at each time. If an Exclusive-owner connection is already established and an originator tries to establish a new Exclusive-owner connection, an Ownership conflict (general status = 0x01, extended status = 0x0106) error code is returned.

For a connection to be established, the requested data sizes must be an exact match of the connections points that the connection tries to connect to. If the requested and actual sizes do not match, an Invalid connection size (general status = 0x01, extended status = 0x0109) error code is returned.

Exclusive Owner Connection

This connection type is used for controlling the outputs of the module and must not be dependent on any other condition. Only one exclusive owner connection can be opened against the module.

If an exclusive owner connection is already opened a Connection in use (general status = 0x01, extend status = 0x0100) error code is returned.

- Connection point O -> T must be Assembly Object, Instance 3, 162 or 166 (162 for product codes <= 0x100 only, 166 for product codes > 0x100 only).
- Connection point T -> O must be Assembly Object, Instance 52, 150 or 151 (150 for product codes <= 0x100 only, 151 for product codes > 0x100 only).

Input Only Connection

This connection is used to read data from the module without controlling the outputs. This connection is not dependent on any other connection.

It is recommended that the originator sets the data size in the O->T direction of the Forward_Open to zero.

IMPORTANT	If an exclusive owner connection has been opened against the module and times out, the input only connection times out as well. If the exclusive owner connection is properly closed, the input only connection is not be affected.

- Number of supported input only connections equals two (shared with exclusive owner and listen-only connection).
- Connection point O -> T must be Assembly Object, Instance 191 (Input only heartbeat).
- Connection point T -> O must be Assembly Object, Instance 52, 150, or 151 (150 for product codes <= 0x100 only, 151 for product codes > 0x100 only).

Listen-only Connection

This connection is dependent on another connection to exist. If that connection(exclusive owner or input only) is closed, the listen-only connection must be closed as well.

It is recommended that the originator sets the data size in the Forward_Open to zero.

- Number of supported listen-only connections equals two (shared with exclusive owner and listen-only connection).
- Connection point O -> T must be Assembly Object, Instance 192 (listen-only heartbeat)
- Connection point T -> O must be Assembly Object, Instance 52, 150 or 151 (150 for product codes <= 0x100 only, 151 for product codes > 0x100 only)

Class 3 Connections

Class 3 connections are used to establish connections to the message router. The connection is used for explicit messaging. Class 3 connections use TCP connections.

- Three concurrent encapsulation sessions are supported
- Six concurrent Class 3 connections are supported
- Multiple Class 3 connection per encapsulation session are supported
- Supported API: 100…10000 ms
- T->O Connection type: point-to-point
- O->T Connection type: point-to-point
- Supported trigger type: application

Discrete Input Point Object Class Code 0x0008

The following class attributes are currently supported for the Discrete Input Point Object:

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	0xC7	2
2	Get	Max Instance	UINT	4

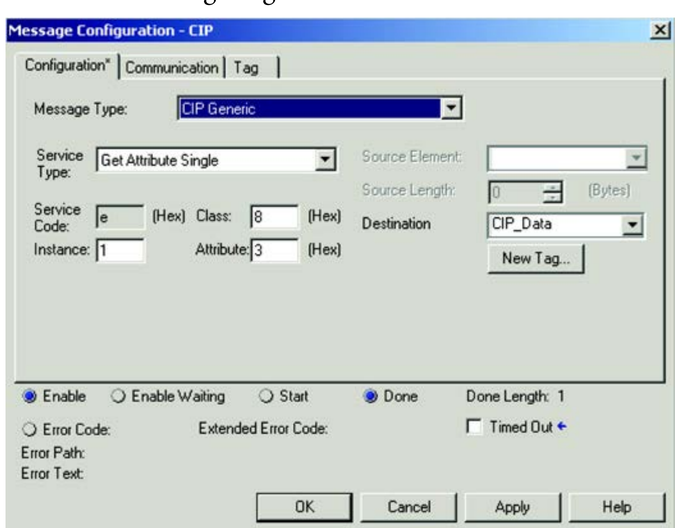
Two instances of the Discrete Input Point Object are supported. All instances contain the following attributes.

Attribute ID	Access Rule	Name	Data Type	Value
3	Get	Value	BOOL	0 = OFF, 1 = ON
5		FilterOffOn	0xC7	0 = No Delay 1000 = 1 ms 2000 = 2 ms 4000 = 4 ms 8000 = 8 ms 16000 = 16 ms
6		FilterOnOff	0xC7	0 = No Delay 1000 = 1 ms 2000 = 2 ms 4000 = 4 ms 8000 = 8 ms 16000 = 16 ms

The following common services are implemented for the Discrete Input Point Object.

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

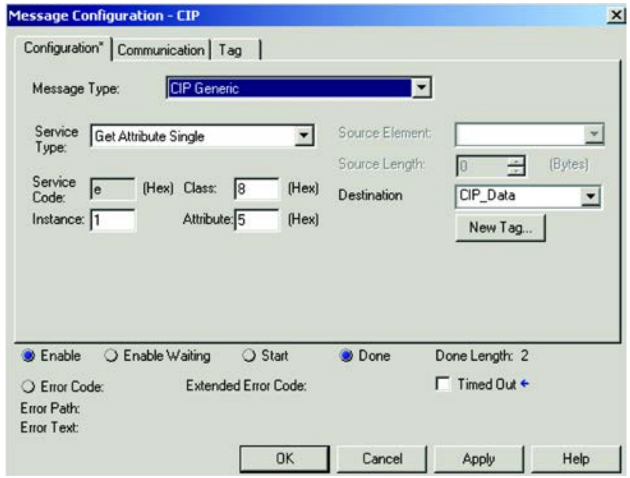
To obtain the status of an input point (ON or OFF), configure a CIP message as shown following image:



Instance 1 is the first input (Pt00), if the RFID interface supports two inputs, then Pt01 would be instance 2.

The return value in CIP_Data[0] is either 0 (Input OFF) or 1 (Input ON).

To obtain the Input Filter OffOn value of an input point, configure a CIP message as shown in the following image:



Instance 1 is the first input (Pt00), if the RFID interface supports two inputs, then Pt01 would be instance 2.

The return value contains the filter time in milliseconds.

Discrete Output Point Object Class Code 0x0009

The following class attributes are supported:

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	0xC1	1
2	Get	Max Instance	UINT	4 or 10

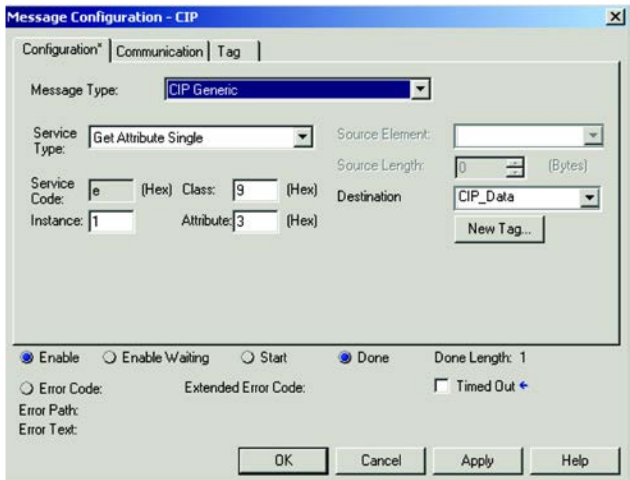
Two instances of the Discrete Output Point Object are supported. All instances contain the following attributes.

Attribute ID	Access Rule	Name	Data Type	Value
3	Get	Value	BOOL	0 = OFF, 1 = ON
5	Get/Set	FaultMode	BOOL	0 = Use Fault Value 1 = Hold Last State
6	Get/Set	FaultValue	BOOL	0 = OFF 0 = ON
7	Get/Set	ProgMode	BOOL	0 = Use Program Value 1 = Hold Last State
8	Get/Set	ProgValue	BOOL	0 = OFF 1 = ON

The following common services are implemented for the Discrete Output Point Object.

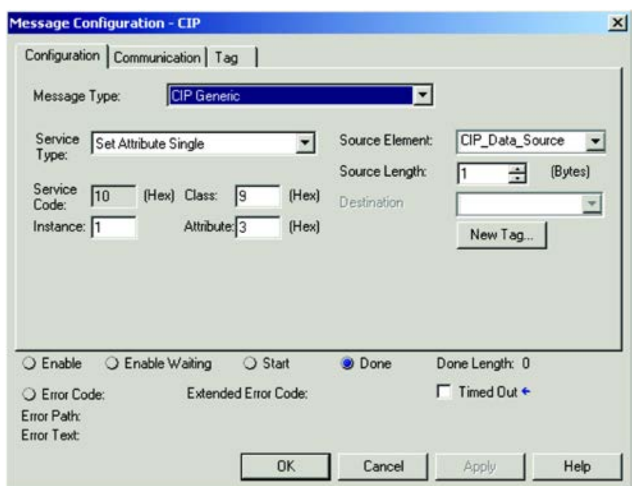
Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

To obtain the state of an output point, configure a CIP message as shown in the following image:



The return value contains the state of the output (0=Off, 1=On)

To set the state of an output point, configure a CIP message as shown in the following image:



CIP_Data_Source is a SINT that contains the value to set the output too (0=Off, 1=On).

Install the Add-on Profile (AOP)

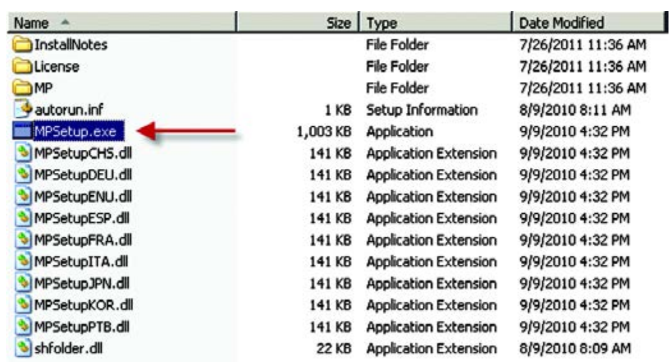
Introduction

This appendix goes through the AOP of the RFID transceivers with the RSLogix 5000® program. AOPs are files that you add to your Rockwell Automation library. These files contain the pertinent information for configuring a device that is added to the Rockwell Automation network.

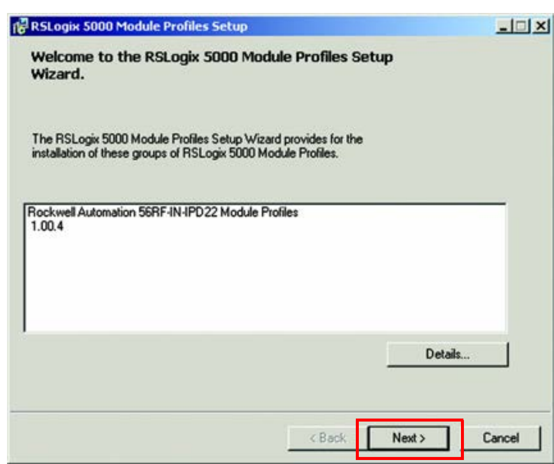
The AOP simplifies the setup of devices. It presents the necessary fields in an organized fashion, which allows you to create and configure your system in a quick and efficient manner.

The AOP is a folder that contains numerous files for the device. It comes as an installation package. Install the AOP following the on-screen instructions.

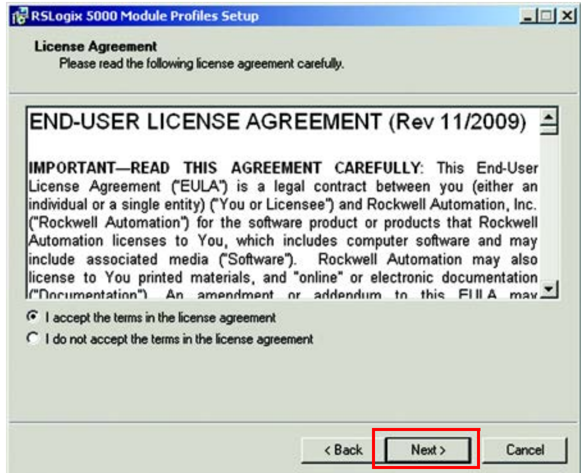
1. In the File Explorer, locate the directory where the installation files were extracted.
2. Click MPSetup.exe



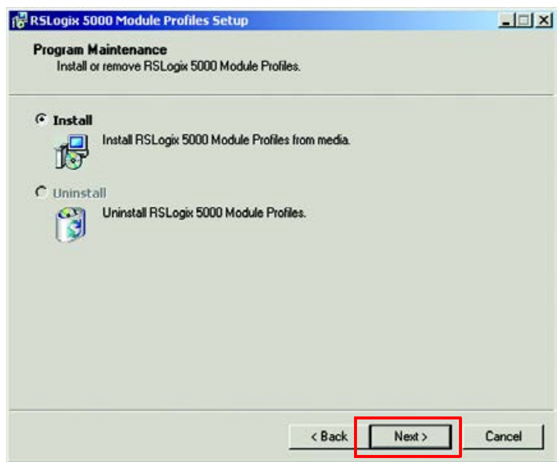
3. The window identifies the module profiles and the firmware revision. Click Next.



4. Accept the terms of the license agreement and click Next.

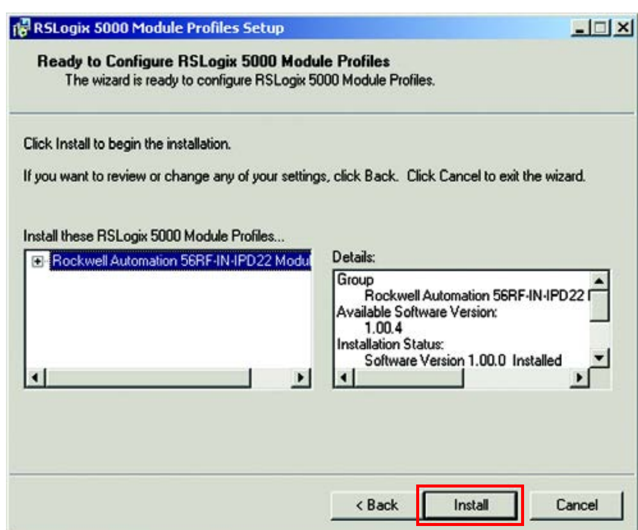


5. With Install selected, click Next.



6. The profile name appears in the left-hand box and its details appear in the right-hand box. Verify that the module name is correct.

   Click Install.



Troubleshooting

Common Solutions

The following table lists common problems and solutions for the RFID system.

Problem	Solution
I just hooked this unit up out-of-the-box and cannot see the RFID interface in RSLinx®.	The RFID interface is shipped with DHCP/BootP enabled and does have an assigned EtherNet/IP address unless the MAC address of the RFID is in the relationship list. There are three rotary switches on the RFID interface (all set to 0 by default), adjust the switches to a valid IP address in the range of 192.168.1.xxx where xxx is the position of the three rotary switches. Once the switches are in place, cycle power to the RFID interface.
I am getting a yellow triangle in RSLogix 5000® for my RFID interface.	Open the properties of the RFID interface in RSLogix 5000 and verify: • The Inhibit Module box in the connection tab is not checked. • The IP address in the General Tab is the same as the IP address configured in the RFID interface. • The IP address of the RFID interface is on the same subnet as the Ethernet module in the Logix rack. Also, verify that the RFID interface has power by checking that the Aux Power status indicator is on solid green and the MOD status indicator is solid green, the Link 1 status indicator is flashing green, the NET status indicator is solid green.
My RFID channel[x] status indicator is flashing red on the interface.	Flashing red indicates no communications between the interface and the transceiver. Check cables between the RFID interface and transceiver. Verify that the power status indicator on the transceiver is green.
When I put a tag in the RFID field the status indicator on my transceiver and interface turns amber.	When one or more RFID tags are detected in the field, the status indicators on the interface and transceiver turn amber, which indicates tag presence. When no tags are detected, the status indicators turn green indicating that no tags are detected but communications are healthy.
When I put a tag in the RFID field the power status indicator on the transceiver is solid green, the R/W Status status indicator is solid green, and the status indicator for that channel is solid green.	Verify that the RFID tag is an ICODE compatible or SL2 style tag. The RFID interface may not be able to detect proprietary tag types.

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

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.

Allen-Bradley, CompactLogix, ControlLogix, Micrologix, Rockwell Automation, Rockwell Software, RSLinx, RSLogix, RSLogix 5000, SLC, and TechConnect are trademarks of Rockwell Automation, Inc.

CIP is a trademark of ODVA, Inc.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 56RF-UM001B-EN-P - April 2018

Supersedes Publication 56RF-UM001A-EN-P - October 2011

Copyright © 2018 Rockwell Automation, Inc. All rights reserved. Printed in the U.S.A.