58UHF RFID Systems

Bulletin Number 58UHF

AB QUALITY

Allen-Bradley

by **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.

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

WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

These 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).

The following icon may appear in the text of this document.

Identifies information that is useful and can help to make a process easier to do or easier to understand.

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Purpose of this Manual

This user manual assumes you are familiar with RSLogix™ software. This manual provides an example of steps to configure and make functional a 58UHF RFID system. See the appropriate user manuals for other details. Use this manual to accomplish the following:

- Learn how to install and wire an example RFID system.
- Install and configure the module in an RSLogix 5000® program.
- Built a simple program to receive and transmit data to an RFID tag.

Who Should Use this Manual

Use this manual if you are responsible for design, installation, programming, or troubleshooting of control systems that use Bulletin 58UHF RFID products.

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

Abbreviations

Abbreviation	Definition
AFI	Application Family Identifier
AOI	Add-On Instruction
AOP	Add-on Profile
CRD	Customer Requirement Document
DFSID	Data Storage Format Identifier
DHCP	Dynamic Host Configuration Protocol
DLR	Device Level Ring
DNS	Domain Name Server
DoS	Disk Operating System
EAS	Electronic Article Surveillance
FE	Functional Earth
INT	Signed, two-byte integer
IEC	International Electrotechnical Commission

Abbreviation	Definition
ISO	International Organization for Standardization
JTC	Joint Technical Committee
MAC address	Media Access Control (Ethernet) address
MACID	Media Access Control Identification
QD	Quick Disconnect
RFID	Radio Frequency Identification Device
SB	Subcommittee
SINT	Signed, single-byte integer
UHF	Ultra High Frequency
UII/EPC	Unique Item Identifier/Electric Product Code

Additional Resources

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

Resource	Description
58UHF RFID Short-range Transceiver Installation Instructions, publication 58UHF-IN001	Provides information that is required to install short-range transceivers for both EU/UK and US/North America models.
58UHF RFID Long-range Transceiver Installation Instructions, publication 58UHF-IN002	Provides information that is required to install long-range transceivers for both EU/UK and US/North America models.
CIP Security with Rockwell Automation Products, publication SECURE-AT001	Describes how to implement the Common Industrial Protocol (CIP™) Security standard in your industrial automation control system (IACS). [1]
EtherNet/IP Network Devices User Manual, publication ENET-UM006	This manual describes how to use EtherNet/IP™ communication modules in Logix 5000™ control systems.
Allen-Bradley Industrial Automation Glossary, AG-7.1	A glossary of industrial automation terms and abbreviations.
EtherNet/IP Device Level Ring Application Technique, publication ENET-AT007	This publication describes DLR network operation, topologies, configuration considerations, and diagnostic methods.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation® industrial system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

(1) When using CIP Security™, only use version 6.2 for FactoryTalk® Policy Manager.

You can view or download publications at rok.auto/literature.

Introduction

RFID Definition

RFID (radio frequency identification) is a method to communicate information from one point to another point by the use of electromagnetic waves (radio waves). RFID has unique characteristics that make it attractive for use in industrial systems.

For example, you must load a shipping carton with various goods to meet the specific purchase order of a customer. You can fill a tag with the specific items that the customer wants and attach the tag to the carton. Then, as the carton moves to the filling stations, each station places the required objects into the carton. If the tag does not require an item, 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. The Bulletin 58UHF product line is unique because of its conformance to the open international standards: ISO 18000-63 standard Type C (EPCglobal Gen2).

International Standard Compliance

Use the EPCglobal Gen2 (ISO 18000-63) standard. This standard is for transceivers and tags that operate within the 860…960 MHz radio frequency range. Passive tags are tags that receive their power from the transceivers signal to function. These tags respond by backscattering this information to the transceiver. You can use different tag options from multiple vendors as long as the tags follow the same standard that is previously listed.

The EPCglobal Gen2 (ISO 18000-63) standard specifies the requirements for the signaling layer of communications between transceivers and tags. This standard also specifies requirements for the operating procedures, for commands between transceiver and tag, and for air interference.

FCC Information (58UHF-TR-100-SR15US and 58UHF-TR-200-LR50US Models)

Each country has their specific frequency band requirements.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. This device must not cause harmful interference, and
2. This device must accept any interference received, including interference that can cause undesired operation.

Changes and modifications that Rockwell Automation does not explicitly approve can void your authority to operate this equipment under the rules of the Federal Communications Commission.

ISED Information

Short-range Model (58UHF-TR-100-SR15US)

This device complies with the Innovation, Science, and Economic Development license-exempt RSS Industry Canada license-exempt RSS standards. Operation is subject to the following two conditions: (1) this device may not cause interference; and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IMPORTANT	This equipment complies with ISED radiation exposure limits for an uncontrolled environment and meets RSS 102 of the ISED radio frequency (RF) Exposure rules. When you install and operate this equipment, keep a minimum of 35 cm (13.78 in.) between the radiator and a person's body.
	Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non-contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR 102 de l'ISDE. Cet équipement doit être installé et utilisé en gardant une distance de 35 cm (13.78 in.) ou plus entre le radiateur et le corps humain.

Long-range Model (58UHF-200-LR50US)

This device complies with Innovation, Science, and Economic Development Canada license-exempt RSS standards. Operation is subject to the following two conditions: (1) this device may not cause interference; and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IMPORTANT	This equipment complies with ISED radiation exposure limits for an uncontrolled environment and meets RSS-102 of the ISED radio frequency (RF) Exposure rules. When you install and operate this equipment, keep a minimum of 90 cm (35.4 in.) between the radiator and a person's body.
	Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non-contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISDE. Cet équipement doit être installé et utilisé en gardant une distance de 90 cm (35.4 in.) ou plus entre le radiateur et le corps humain.

Declaration of Conformity

CE Conformity

Rockwell Automation, Inc. declares that 58UHF-TR-100-LR15EU and 58UHF-TR-100-SR15EU are in compliance with the 2014/53/EU Radio Equipment Directive and the 2011/65/EU RoHS Directive.

For a comprehensive CE certificate visit: rok.auto/certifications.

UKCA Conformity

Rockwell Automation, Inc. declares that 58UHF-TR-100-LR15EU and 58UHF-TR-100-SR15EU are in compliance with the Radio Equipment Regulations (2017 No. 1206) and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations (2012 No. 3032).

For a comprehensive UKCA certificate visit: rok.auto/certifications.

System Setup

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

Figure 1 – RFID System
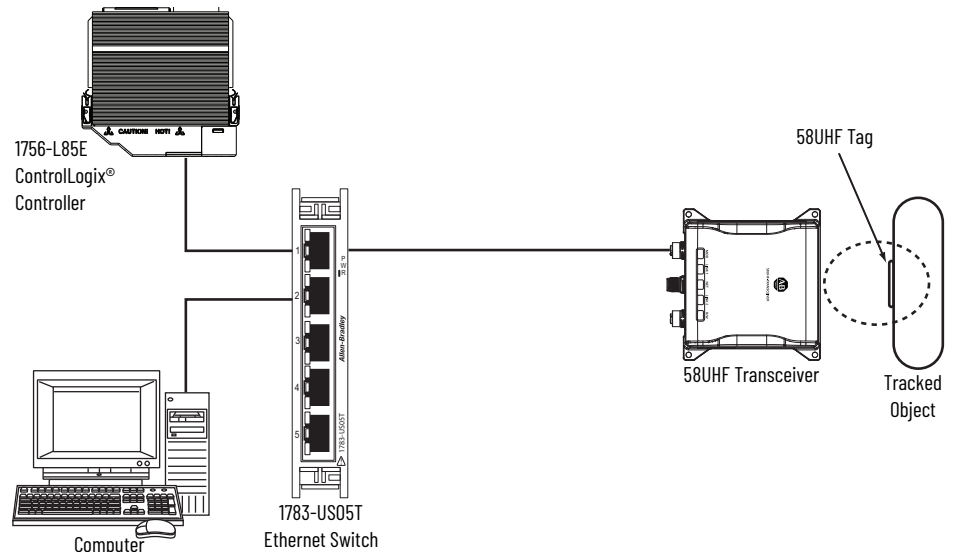
Tags attach to objects that must be tracked. The tags hold important information about the object. An RF transceiver reads and/or writes information to the tags when the tag moves within the transmission envelope of the transceiver (dotted ellipse). The physical size of the transceiver directly relates to the size of the transmission field. The larger the transceiver, the longer and wider the antenna field.

The transceivers connect to a PLC through an Ethernet connection and have an external power source.

Notes:

RFID Components

Transceivers

Status Indicators Functionality

Table 1 - Status Indicators [1]

Name	Description	State	Indicates
MOD	Indicates status of the transceivers	Off	No power
		Steady green	Device operational
		Flashing green	Standby (device has not been configured)
		Flashing red	Major recoverable fault
		Steady red	Major nonrecoverable fault
		Flashing green/red	Self-test (power-up testing)
Link1/2	Indicates status of Ethernet (E1/E2) port	Off	No link
		Steady green	Link
		Steady yellow	Port disabled
		Flashing green	Port activity (data packets currently being exchanged)
		Flashing yellow	Collision
		Steady red	Major NIC fault
NET	Indicates status of the connections	Off	No power or powered on with no IP address
		Flashing green	No connections (IP address, but no CIP™ connections are established, and an exclusive owner connection has timed out)
		Steady green	Connected
		Flashing red	Connection timeout
		Steady red	Duplicate IP
		Flashing green/red	Self-test (power-up testing)
R/W	Indicates status of the read/write commands	Off	No power
		Steady green	Powered but idle
		Flashing green	Transmitting RF carrier wave - no tags detected
		Steady yellow	Succeeded at tag operation - tag read/write complete
		Flashing yellow	Failed at tag operation - tag read/write incomplete
		Flashing red	RF transmit failure

(1)   Status indicators are the same for short and long-range transceivers.

Product Selection

Table 2 and Table 3 show the catalog numbers for the components in the Bulletin 58UHF product family.

Main Components

Table 2 - Transceivers [1]

Cat. No.	Description	Dimensions [mm (in.)]	Sensing Distance [m (ft.)]
58UHF-TR-100-SR15US	Short-range	109 x 116 x 54 (4.3 x 4.6 x 2.1)	1.5 (4.92)
58UHF-TR-200-LR50US	Long-range	203 x 212 x 66 (8 x 8.3 x 2.6)	5 (16.4)
58UHF-TR-100-SR15EU	Short-range	109 x 116 x 54 (4.3 x 4.6 x 2.1)	1.5 (4.92)
58UHF-TR-200-LR50EU	Long-range	203 x 212 x 66 (8x 8.3 x 2.6)	5 (16.4)

(1)   See Specifications on page 51 for more information.

Accessories

Table 3 - EtherNet/IP [1]

Cat. No. [2]	Type/Style	Connector Type	No. of Pins	Shield	Wire Size [AWG]
1585D-M4TBJM-x	EtherNet/IP™ DC Micro (M12) patchcords	Straight plug	4	–	24
889D-F4AC-x	DC Micro (M12) cordset [power]	Straight socket	4	–	22
889D-R4AC-x	DC Micro (M12) cordset [power]	Right-angle socket	4	–	22

(1)   The transceiver supports both shielded and unshielded Ethernet cords.

(2)   x = 2 (2 m [6.6 ft]), 5 (5 m [16.4]), or 10 (10 m [32.8 ft]) for standard cable lengths.

Electrical Installation

Cable Overview

The Ethernet switch must mount inside a control panel. The Bulletin 58UHF transceivers can mount on the machine.

Figure 2 - Transceiver Mounting

Mounted in a Cabinet	Mounted on the Machine

1783-US05T
Ethernet Switch
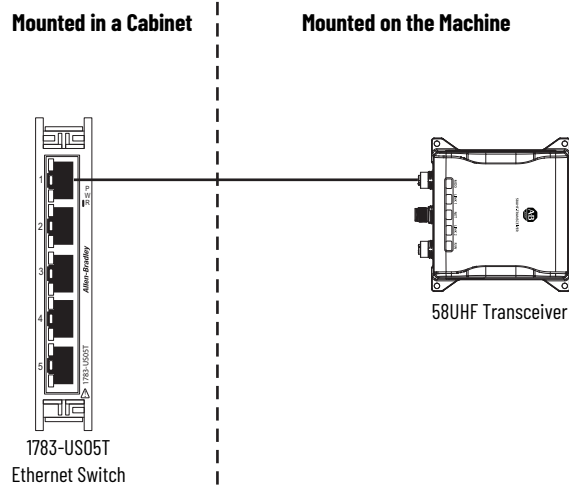
58UHF Transceiver

Connections

Power I/O Connection (on Transceiver)

Table 4 - Power I/O

DC M12, D-coded, 4-pin Socket	Pin	Signal	Color
	1	+24V DC	Brown
	2	Input	White
	3	COM	Blue
	4	Output	Black

EtherNet/IP Connection (on Transceiver)

Table 5 - EtherNet/IP [1]

DC M12, D-coded, 4-pin Plug	Pin	Signal	Color
	1	TxData +	White/orange
	2	Recv Data +	White/green
	3	TxData -	Orange
	4	Recv Data -	Green

[1] E1 - Standard right-angle Ethernet cables point left.
E2 - Standard right-angle Ethernet cables point right.

Notes:

EtherNet/IP Addressing

Star Topology

The star topology consists of a number of devices that connect to the central switch. When you use this topology, only one Ethernet connection can be made to the Bulletin 58UHF transceiver interface block.

Figure 3 - Star Topology
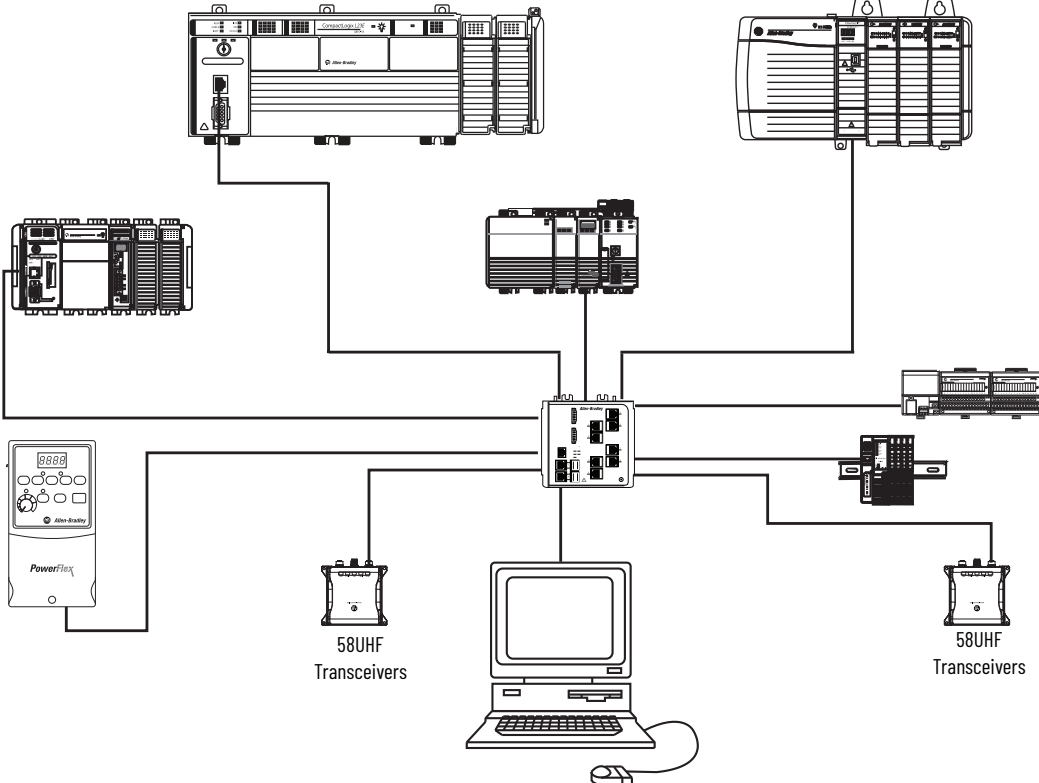
Linear Topology

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 you use this topology, both Ethernet connections are used. The network connection to Link 1 or Link 2 is irreverent.

Figure 4 - Linear Topology
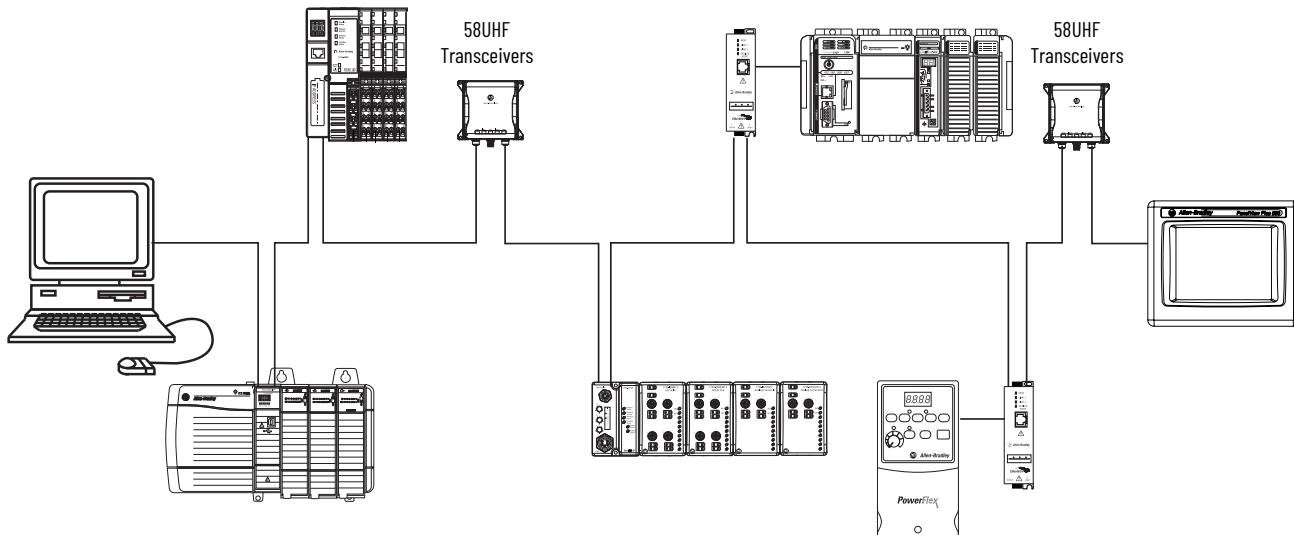
Device Level Ring (DLR) Topology

A DLR network is a single-fault tolerant ring network that is intended for the interconnection of automation devices. DLR topology can tolerate a break in the network. If a break is detected, the signals are sent out in both directions. When you use this topology, both Ethernet connections are used. The network connection to Link 1 (E1) or Link 2 (E2) is irreverent.

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:

- Better management of traffic on the network.
- Ease of maintenance.
- 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-AP007](#).

Figure 5 - DLR Topology

58UHF
Transceivers

58UHF
Transceivers
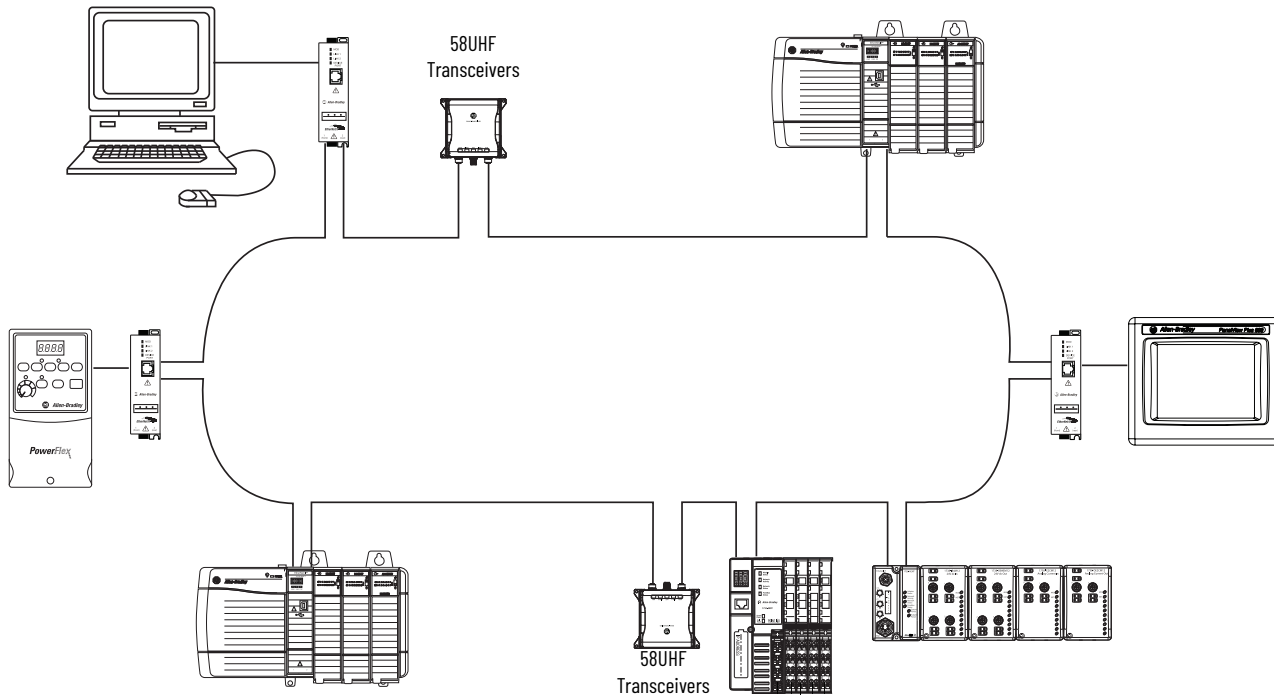
Set the Network Address

Before you use the 58UHF transceiver in an EtherNet/IP™ network, configure an IP address, subnet mask, and optional gateway address. This section describes these configuration requirements and the procedures to provide them. Use the BootP/DHCP utility (version 2.3 or greater), which ships with RSLogix 5000® software to set the address.

IP network addresses have a format of xxx.xxx.xxx.xxx. You must know what values are used for the network. Default mode for this device is DHCP.

Set IP Address

See step 1...step 7 for how to set the IP address for the 58UHF transceiver.

1. The default setting is DHCP, so the PLC cannot detect the 58UHF transceiver first.
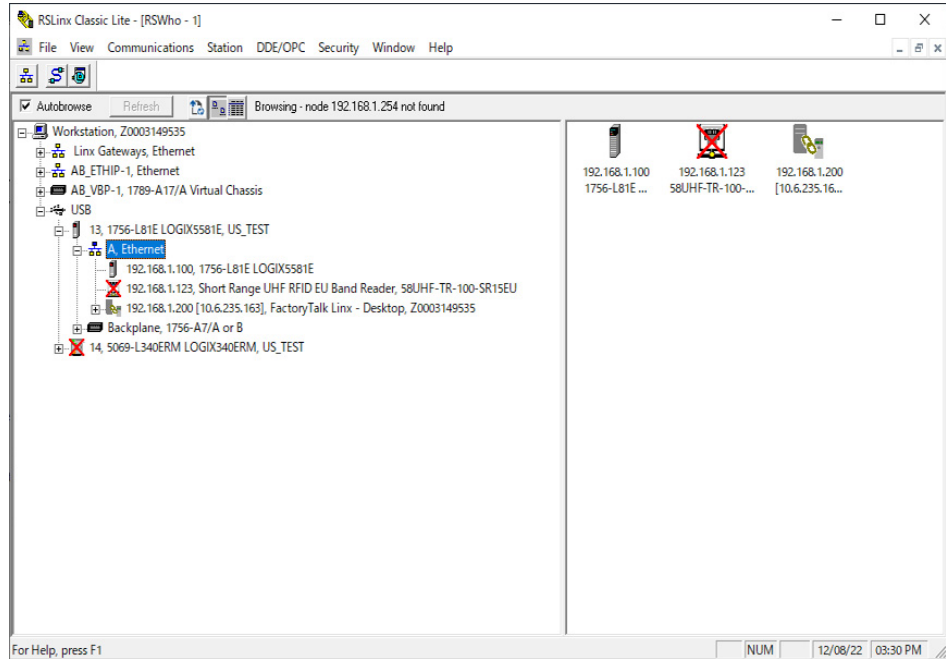
2. Connect your PC to the 58UHF module by the Ethernet cable. Set the IP address of the Ethernet port of your PC the same as the segment of static IP address that you want to set (for example, 192.168.1.200).

3. Select BootP-DHCP-Tool.exe and start the program. Select Interface.

   Select the IP Address of the Ethernet port of your PC that connects to the 58UHF module and click OK.
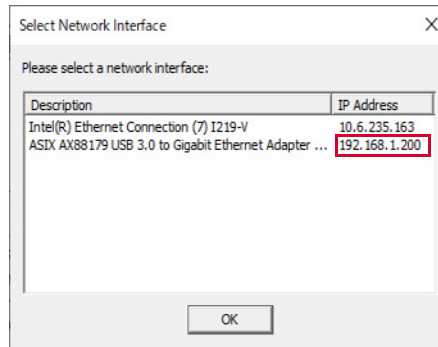
4. The Boot DHCP window appears. After a few seconds, if the tool detects the MAC address of the connected 58UHF module, the MAC address appears in the Discovery History field. Select the MAC address, then click Add Relation.
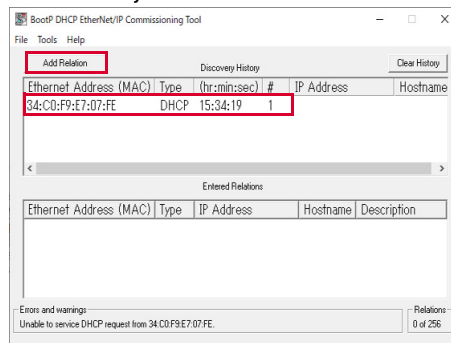
5. The New Entry window appears. Set the Client IP Address the same as the Ethernet port segment of your PC and the PLC (for example, 192.168.1.123). Click OK.

6. The new relation appears in the Entered Relation field of the Boot DHCP window. If applied correctly, the IP address appears in the Discovered History field after a few seconds.

a. Click the MAC address in the Entered Relations field.

b. The Disable BOOTP/DHCP button appears. Click the button; the success message appears at in the Errors and Warnings field.

7. After you disable the BOOTP/DHCP, connect the PLC to the 58UHF module via the Ethernet port. Open the RSLinx® window, right-click the PLC Ethernet, select Properties, and add the static IP address of the 58UHF module.
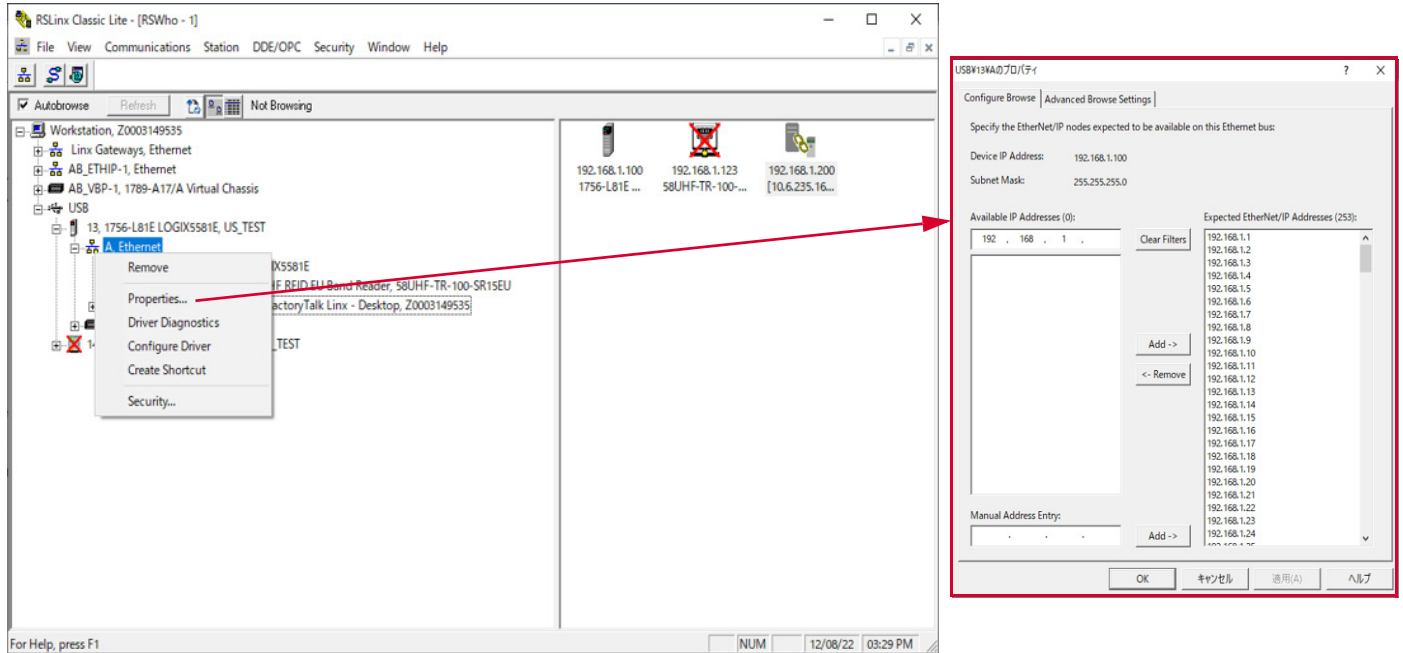
If the IP address of the Ethernet port is the same segment (for example, 192.168.1.123), you see the 58UHF module icon.
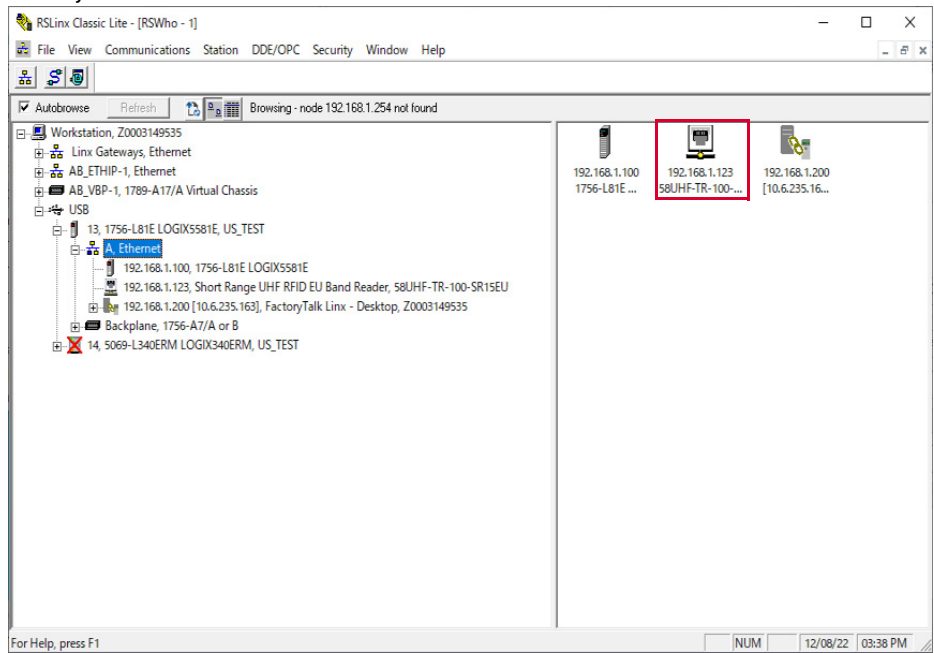
Mechanical Installation

IMPORTANT	Each transceiver generates a similar, but unique, RF field.

Mount the Transceiver

For both models, attach the transceiver to a flat plate with VESA standard 75 mm, M4 screws.

Spacing

There is no minimum space requirement between transceivers. If you experience a problem with the interference, space the transceivers further apart. Operation of the transceivers in an area near metallic objects can impair communication performance. If you must mount the tags on metal surfaces, use tags designed for that application.

Transceiver Field Maps

The transceivers have a three-dimensional RF field that emanates from its sensing surface. The field does not change depending on the antenna polarity chosen (circular, vertical, or horizontal) within the AOP. However, the way a tag must go through the sensing zone to be read does change. If you use an antenna polarity other than circular, test the ability of the antenna to read the RFID and note the tag orientation before utilization.

Tag reading is more reliable if utilized at less than the maximum sensing distance.

Approximate Dimensions
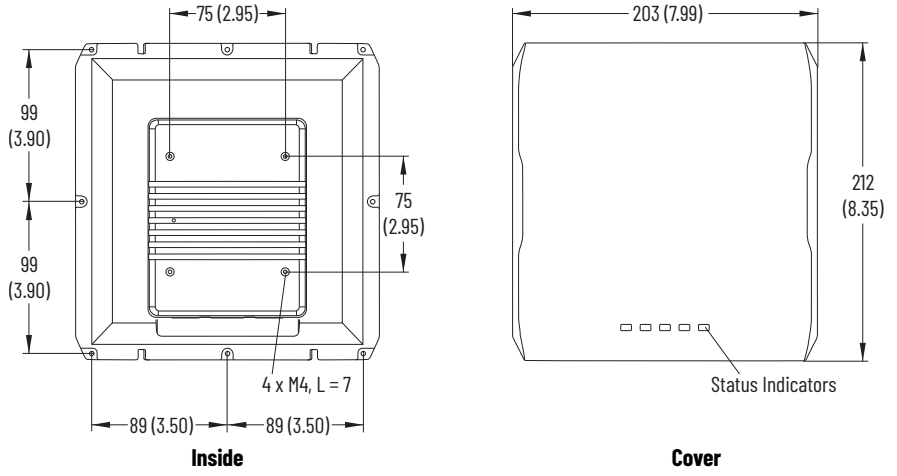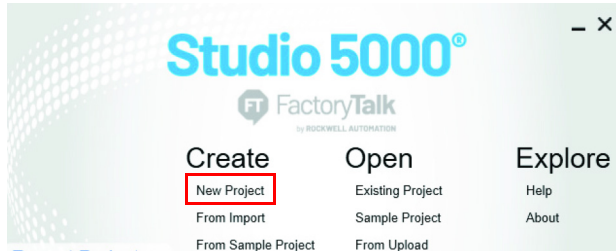
Figure 6 - Short-range Transceiver [mm (in.)]

Unit

Cover
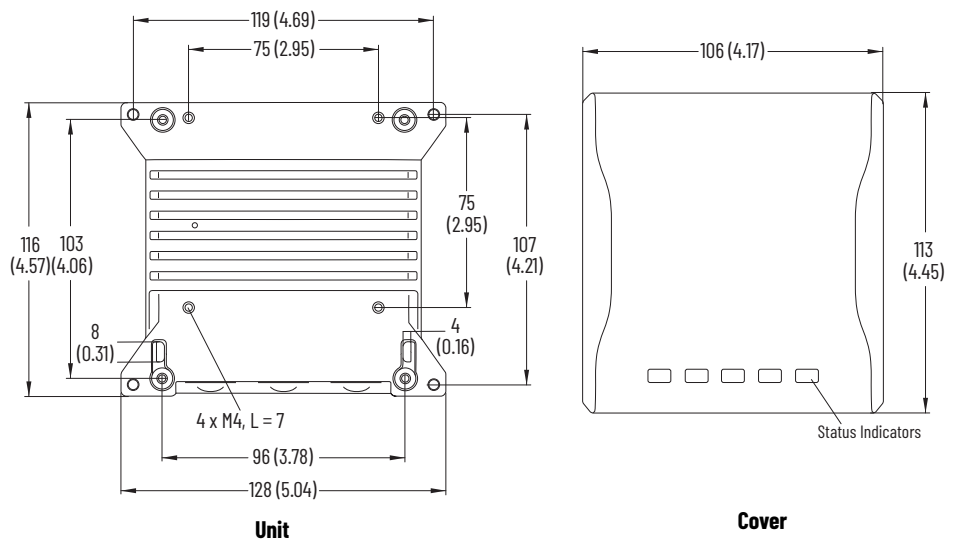
Figure 7 - Long-range Transceivers [mm (in.)]

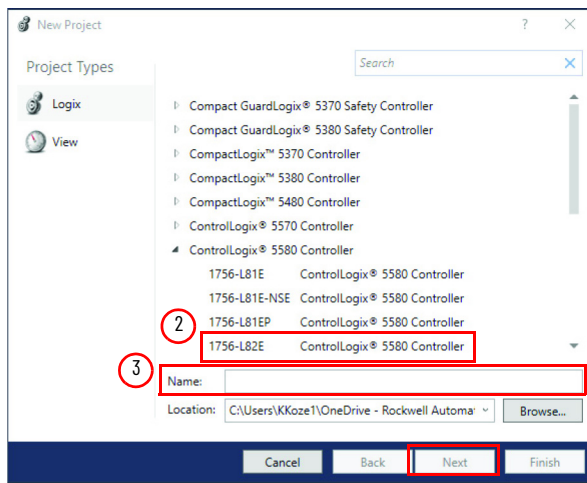

Inside

Cover

Status Indicators

Add 58UHF Module to RSLogix 5000
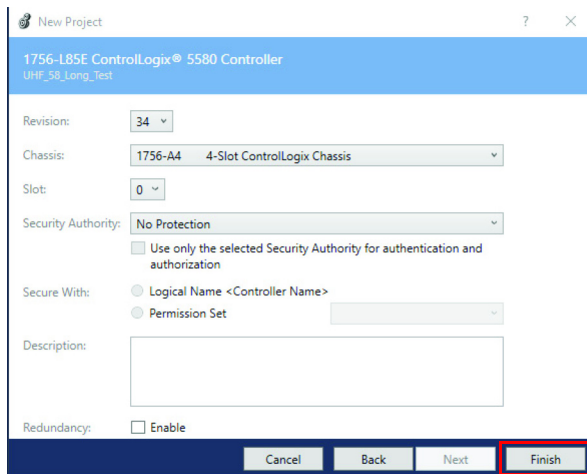
Procedure

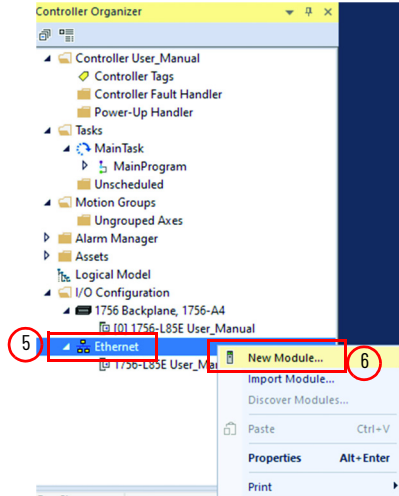1. Open Studio 5000® software and create new project.

2. Select your controller.
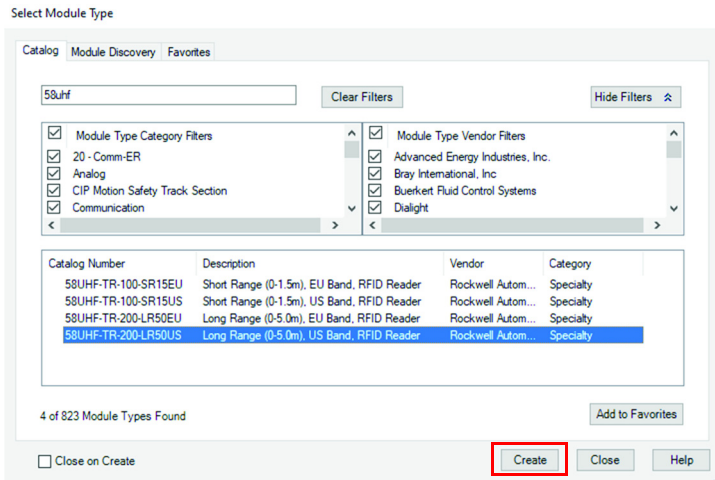3. Name your project and click Next.

4. Configure the controller and click Finish.

5. Right-click the Ethernet port of the controller.
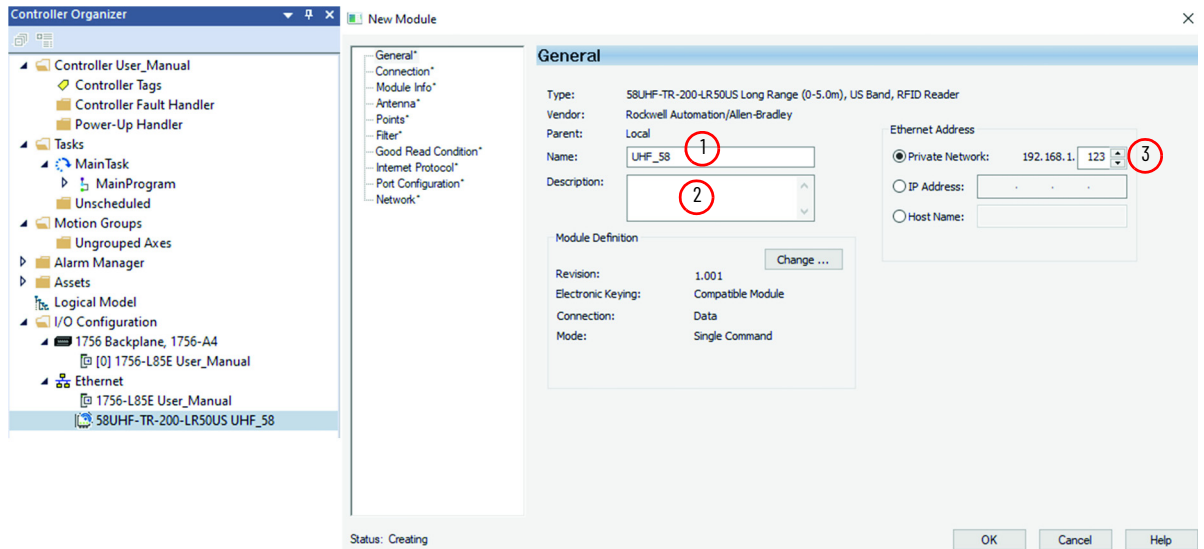
6. Click New Module.

7. Select the desired 58UHF module and click Create.

General Tab

The General tab describes the device, its definition, and its IP address. Make the changes that are shown Figure 8 and click OK.

Figure 8 - General Tab

1. Enter a name for the module. In this example, the name is UHF_58. As you can have multiple modules, use 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 (see <u>Connection Tab on page 26</u>).

2. Enter a description of the module or its function.

3. Set the MAC address for the module. In this example, the address is 192.168.1.123.

IP Address

When the controller is offline, you can set the IP address. Set the IP address in one of three ways:

- When you use a Private Network, click Private Network. Enter a value for the last octet between 1...254. Do not duplicate the address of an existing device. In this example, the address of the RFID block is 192.168.1.115.

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

- Click Host Name, type in the name of the host, and click Apply. In this example, the host name is QPACK4.
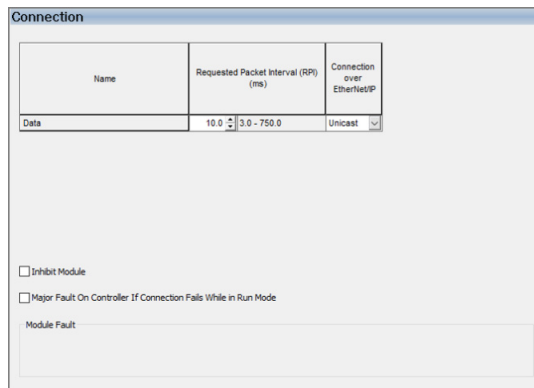
Module Definition

You do not need to change the default values. If necessary, click Change to change the Revision, Electronic Keying, Connection, and Mode. Connection is Data.

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

Connection Tab

You do not need to change any settings on the Connection tab unless you must inhibit the module.

| Setting	Description
Requested Packet Interval (RPI)	Specify the number of milliseconds between requests for information from the controller to the unit. The unit can provide data on a shorter interval, but if no data is received, the controller asks the unit for a status update. Minimum setting is 10 [1]. Maximum setting is 750.
Inhibit Module	When checked, the unit is not pulled 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.
Connection Over EtherNet/IP	This uses Unicast connections that are point-to-point connections.
Module Fault	Fault messages appear in this box.

(1)   The minimum that is shown in the Connection tab is 3.0. Settings less than 10 result in an error. The minimum setting will change to 3 in a future release of the program.

IMPORTANT   If you use the Immediate Output (IOT) instruction, you must add a minimum interval RPI before each execution of IOT.

Module Info Tab

The Module Info tab contains read-only data that populates when the controller goes online (a program downloads to or uploads from the controller).

In the left-side panel, the Add-on Profile (AOP) shows the vendor, product type, product name, catalog number, series, revision, product code, serial number, manufacture date, and warranty.
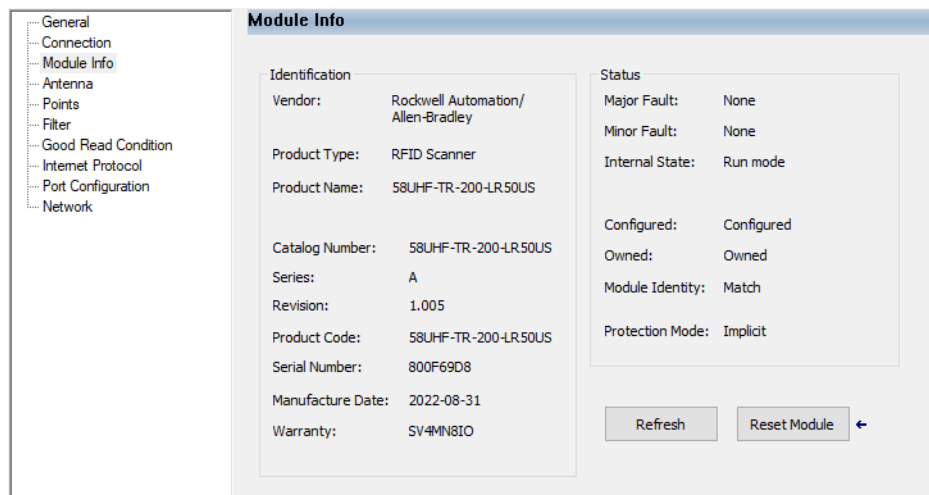
In the right-side panel, the AOP shows the fault status, internal state (Run mode), and if the module is configured and owned, the module identity, and the protection mode.

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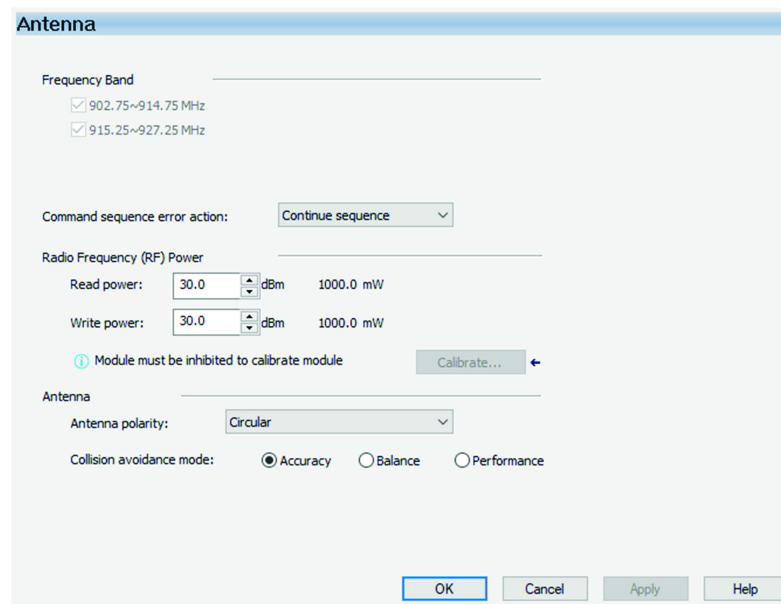
- Refresh

  Click to refresh the data in the window.

- Reset Module

  This option disconnects the module momentarily and interrupts the control. The following warning window appears.
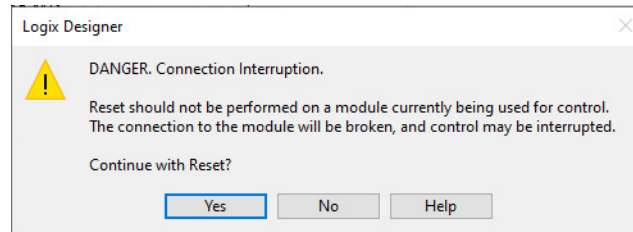
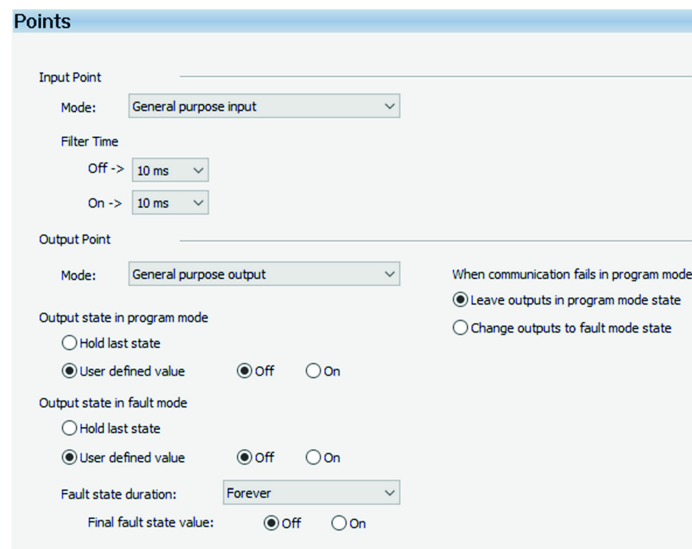Click Yes or No as needed. Click Help for further information.

Antenna Tab

Changes to the fields on the Antenna Tab are not required for the Quick Start process.

Points Tab

Changes to the fields on the Points Tab are not required for the Quick Start process.

Filter Tab

Changes to the fields on the Filter Tab are not required for the Quick Start process.
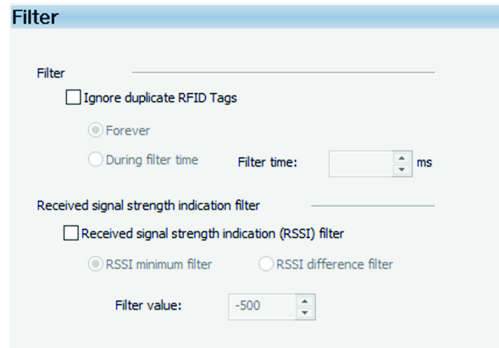
Good Read Condition Tab

Changes to the fields on the Good Read Condition Tab are not required for the Quick Start process.

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 automatically populates with the data.
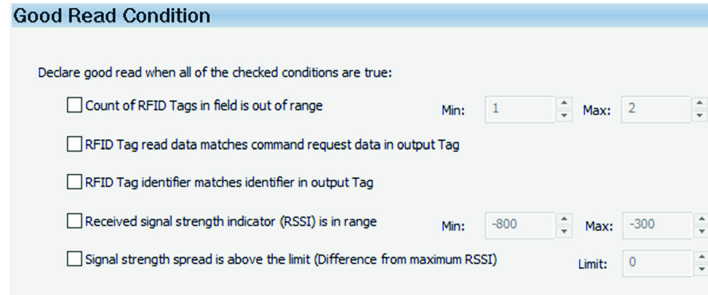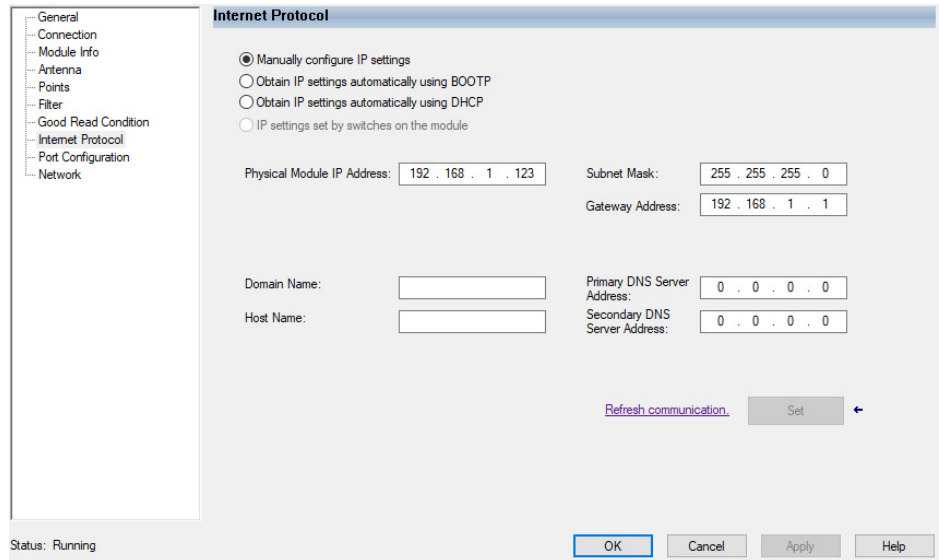
Port Configuration Tab

Changes to the fields on the Port Configuration tab are not required for the Quick Start process. These fields are only active when the controller is online.

The window always shows two ports. This example shows that Port 1 is active, while Port 2 is inactive.
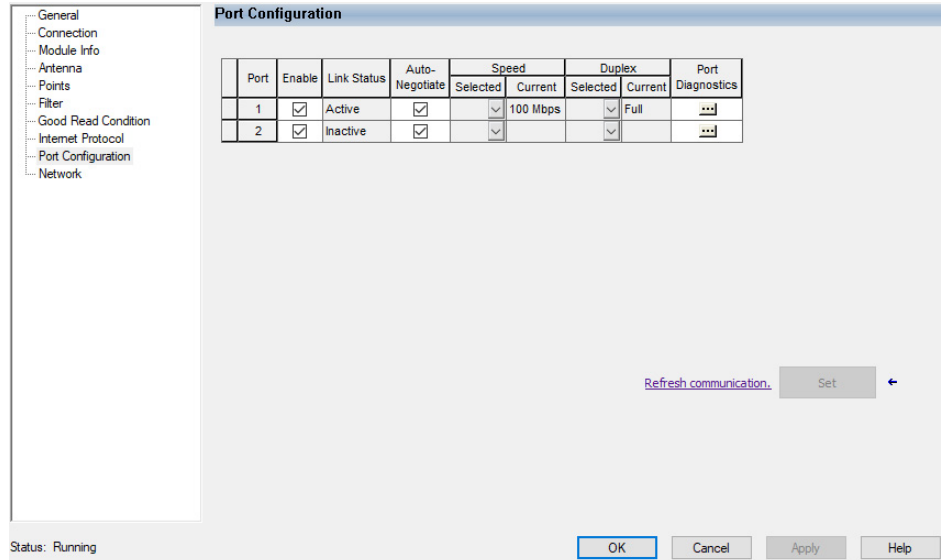
Click the ellipsis (...) under the Port Diagnostics. The following window appears, which shows the communication that takes place between the controller and the transceiver that is connected to the port.
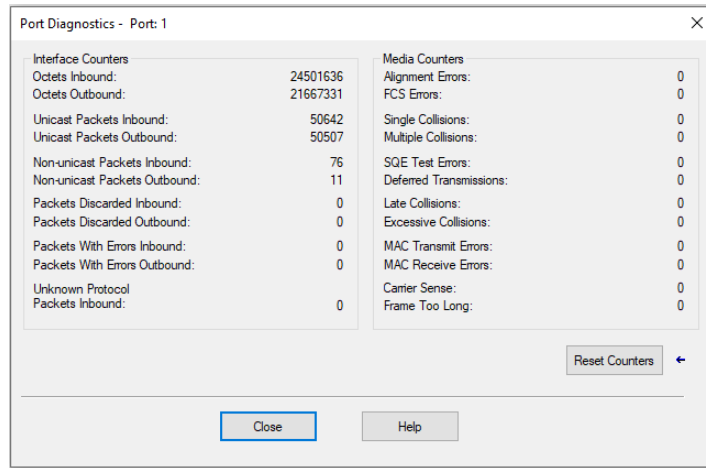
Network Tab

Changes to the fields on the Network tab are not required for the Quick Start process.
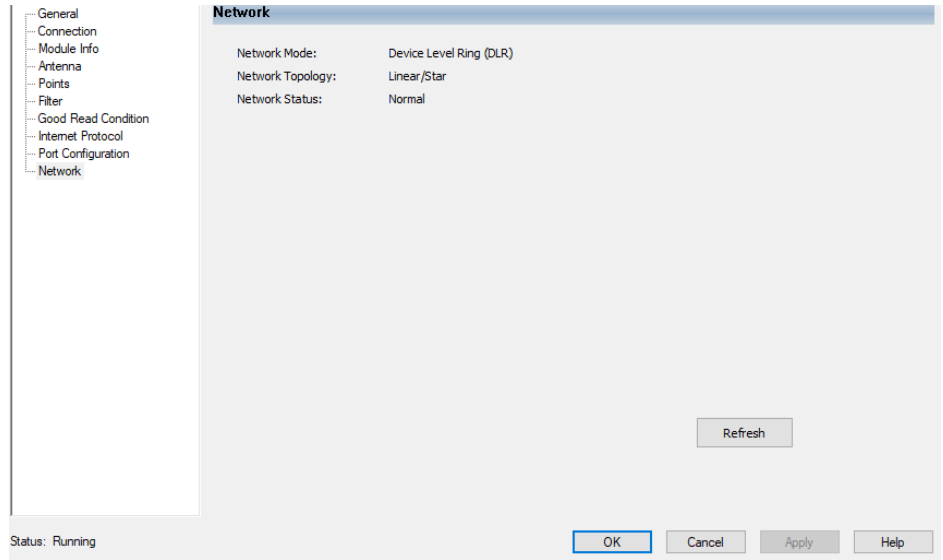
RSLogix 5000 Controller Tags

During the module installation, the UHF_58 tags automatically load as controller tags, which make the tags available to all programs.

In the Controller Organizer, click the Controller Tags.
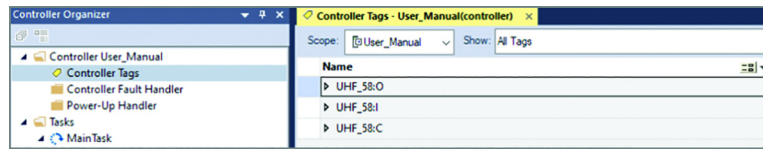
Three categories of tags appear. The tag name is composed of the module name followed by:

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

Configuration Image Table and Tags

Click ▷ to expand the UHF_58:C to show the configuration image table, which has the following tags:

Name		Value	Force Mask	Style	Data Type
▷ UHF_58:O		{...}	{...}		AB:5000_RFID:O:0
▷ UHF_58:I		{...}	{...}		AB:5000_RFID:I:0
▲ UHF_58:C		{...}	{...}		AB:5000_RFID:C:0
▷ UHF_58:C.PtInMode		0		Decimal	SINT
▷ UHF_58:C.PtOutMode		0		Decimal	SINT
▷ UHF_58:C.PtIn		{...}	{...}		AB:5000_DI_Channel:...
▷ UHF_58:C.PtOut		{...}	{...}		AB:5000_DO_Channel:...
▷ UHF_58:C.SignalReadPower		300		Decimal	INT
▷ UHF_58:C.SignalWritePower		300		Decimal	INT
▷ UHF_58:C.ChannelEnMask		1125899906842623		Decimal	LINT
▷ UHF_58:C.AntennaPolarity		0		Decimal	SINT
▷ UHF_58:C.CollisionAvoidanceFactor		0		Decimal	SINT
▷ UHF_58:C.FilterTimeout		0		Decimal	DINT
UHF_58:C.StopOnError		0		Decimal	BOOL
▷ UHF_58:C.SignalStrengthFilterType		0		Decimal	SINT
▷ UHF_58:C.SignalStrengthFilterValue		-500		Decimal	INT
▷ UHF_58:C.GoodReadSettings		{...}	{...}		AB:5000_RFID_GoodR...

Table 6 – Configuration Image Tags

Tag		Description
PtInMode		Depend on connection, select one of the following options: • Queued command (value: 0, 1, and 3) • Single command (value: 0 and 3) • Continuous inventory (value: 0, 2, and 3) Trigger input for commands. • 0. General-purpose Input: Use the input point as general-purpose input only. • 1. Trigger Single RFID Tag Command: If input signal level changed L->H, RFID Command prepared on Output tag queues to device. • 2. Trigger Multiple RFID Tag Inventory: If the input signal level changed L->H, send the inventory command until the number of tags reach to O:RequestedRFIDTagCount. • 3. Turn off antenna: When signal level is high, shut off the antenna (no command is sent from the antenna).
PtOutMode		Event for automatically change of Digital Output level from Low to High. Enable if each bit set to 1. Only one of the options from the list can be selected. Paired event cannot select in this field (bit 1 and 2). • 0 - General-purpose output • 1 - Antenna Off: If the antenna/reader turns off or shuts down. • 2 - Antenna On: If the antenna/reader connects to power. • 3 - RFID Tag present: If success response comes for the Query command. • 4 - Bad/Incomplete response: If a Some command error happens. • 5 - Reader Fault: If the reader fault has happened. The high wins. The output tag (O:PtOut.Data) can change this digital output level. If either condition for the selected event has happened or the output tag set to 1, output goes high.
PtIn	Input Off On Filter	The interval applying level change of Digital Input from Off to On to avoid chattering. The InputFilterOffOn 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. • 14: 2 ms • 15: 5 ms • 16: 10 ms (default) • 17: 20 ms • 18: 50 ms
	Input On Off Filter	The interval applying level change of Digital Input from On to Off to avoid chattering. The InputFilterOnOff is used to determine the On to Off delay time for input point 0 before the interface considers the input point as 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. • 14: 2 ms • 15: 5 ms • 16: 10 ms (default) • 17: 20 ms • 18: 50 ms

Table 6 - Configuration Image Tags (Continued)

Tag		Description
PtOut	Program To Fault Enable	Determines if an output transitions to the Fault mode if the connection faults while in Program mode 0 = stay in Program mode. 1 = Go to Fault mode.
	Program Value - Boolean	Defines the value that the output takes when the connection transitions to Program mode if the ProgMode bit is set to User-Defined Value.
	Program Mode	Selects the behavior that the output channel takes when transitioned into Program mode. Either hold the last state (1) or go to a user-defined value (0). ProgValue defines the value to go to when set to the user-defined value.
	Fault Mode	Selects the behavior that the output channel takes if a communication fault occurs. Either hold the last state (1) or go to a user-defined value (0). FaultValue defines the value to go to when set to the user-defined value.
	FaultValue - Discrete	Defines the value that the discrete output assumes if a communication fault occurs when FaultMode = 0, 0 = Off, 1 = On
	Fault Value State Duration	This value determines the length of time the Fault mode state is held before the FaultFinalState is applied. Default = 0 hold forever. Other enumeration values 1 = 1 second, 2 = 2 seconds, 5 = 5 seconds, 10 = 10 seconds.
SignalReadPower		Long: Values of 100...300 equate to 10.0...30.0dbm. Short: Values of 100...240 equate to 10.0...24.0dbm. Drags in from AOP selection. Affected command: 1, 2, 3, 4, 5, 6 (multi), 7 (multi), 8 (multi)
SignalWritePower		Long: Values of 100...300 equate to 10.0...30.0dbm. Short: Values of 100...240 equate to 10.0...24.0dbm. Drags in from AOP selection. Affected command: 6, 7, 8, 12...32
ChannelEnMask		The using Frequency Channels. The value is bit field format, each bit indicates 1 Frequency Channel. The valid channel depends on Region setting. Some regions, this setting is ignored. You can select multiple Ch (combination of Bits) from the following choices. **IMPORTANT** Because of FCC regulation, the U.S./North America model must use all 50 channels for short and long models. 58UHF-TR-100-SR15US (US/North America short-range model): • Fixed as 902.75...927.25 MHz 58UHF-TR-200-LR50US (US/North America long-range model): • Fixed as 902.75...927.25 MHz 58UHF-TR-100-SR15EU and 58UHF-TR-200-LR50EU (EU/UK model): • Bit0: 865.7 MHz • Bit1: 866.3 MHz • Bit2: 866.9 MHz • Bit3: 867.5 MHz
AntennaPolarity		Polarization of Antenna. Values of 0 (circular), 1 (vertical), 2 (horizontal). Drags in from AOP selection.
CollisionAvoidanceFactor		Indicates the setting of tag response speed and collision avoidance. **IMPORTANT** Speed and accuracy are the trade-off. EU15 and US15: • 0: Accuracy mode (fixed) EU50 and US50: • 0: Accuracy mode • 1: Balance mode • 2: Performance (speedy) mode
FilterTimeout		0...2147483647, -1 Timer value for Duplicate Filter Timeout. This function is applied for Inventory or Read commands. Unit is 1 ms. • -1: Filter forever (never time out) • 0: Instant timeout (default) • 1 to any positive value: Duplicated filter time setting with ms unit If this feature is deactivated (value 0), the device tries to remember the RFID tag UII as much as possible. If the number of tags reach to the limit to memory (more than 100 tags), the oldest tag data is removed from the device to remember the new one.
StopOnError		Behavior for large/multi read/write command when error is happened in the middle of sequence. • 0: Continue sequence • 1: Stop sequence

Table 6 – Configuration Image Tags (Continued)

Tag	Description
SignalStrengthFilterType	Select RSSI (Received signal strength indication) Filter type • 0: No filter • 1: RSSI Filter (High pass filter by RSSI Filter Value) • 2: RSSI Difference Filter (High pass filter for Delta from Maximum RSSI in stored tag list by RSSI Filter Value)
SignalStrengthFilterValue	-32768…+32767 Value for RSSI (Received signal strength indication) Filter Type. • RSSI Filter Type = 0: Not used • RSSI Filter Type = 1: Used to discard data with lower RSSI power than this value. • RSSI Filter Type = 2: Used to discard data with lower delta value from maximum RSSI power than this value.
GoodReadSettings	Select one or multiple conditions that filter the result of the inventory/read command I.GoodRead is set in the following conditions: • Bit0: Number of RFID Tags Condition: GoodRead if read tag number is over C.MinRFIDTagCount and under C.MaxRFIDTagCount, in multiple read/write/inventory commands, • Bit1: Match Data: In the read command, GoodRead if Read data matches the O.Data with O.DataLength. • Bit2: Match UII: In the read/inventory command, GoodRead if UII matches the O.UII masked O.GoodReadUIIMask. • Bit3: Match SignalStrength: In the read/Inventory command, GoodRead If a tag RSSI value falls in between C.SignalStrengthUpperRangeLimit and C.SignalStrengthLowerRangeLimit. • Bit4: Match SignalStrength Relative read/inventory command: GoodRead If a tag RSSI value is out of the range that C.RelativeSignalStrengthRange specifies from the largest RSSI range in the stored tag. Largest RSSI info is from Stored tag buffer in FW application. O.ClearStoredTagInfo can clear the stored tag buffer.
Min RFID Tag Count	1…126 If the value is 0, the minimum limitation is deactivated.
Max RFID Tag Count	2…127 If the value is 0, the maximum limitation is deactivated.
Signal Strength UpperRange Limit	-32767…+32767 (must be larger than LowerRangeLimit)
Signal Strength LowerRange Limit	-32768…+32766 (must be smaller than LowerRangeLimit)
Relative Signal Strength Range	0…32767 (must be between Upper and Lower)

Input Image Table and Tags

Click ▷ to expand the UHF_58:I to show the input image table, which has the following tags:

Name		Value	◆ Force Mask	◆ Style	Data Type
▷ UHF_58:O		{...}	{...}		AB:5000_RFID:O:0
◢ UHF_58:I		{...}	{...}		AB:5000_RFID:I:0
UHF_58:I.RunMode		0		Decimal	BOOL
UHF_58:I.ConnectionFaulted		0		Decimal	BOOL
UHF_58:I.DiagnosticActive		0		Decimal	BOOL
▷ UHF_58:I.DiagnosticSequenceCount		0		Decimal	SINT
UHF_58:I.Busy		0		Decimal	BOOL
UHF_58:I.ParameterError		0		Decimal	BOOL
▷ UHF_58:I.PtIn		{...}	{...}		CHANNEL_DI:I:0
▷ UHF_58:I.PtOut		{...}	{...}		CHANNEL_DO:I:0
▷ UHF_58:I.CommandResponse		{...}	{...}		AB:5000_RFID_Comm…

Table 7 – Input Image Tags

Tag	Description
RunMode	Indicates whether the device is in a Run or Program mode. • 0: UHF Module is in Program mode • 1: UHF Module is in Run mode When changed from 0 to 1, the Internal Buffer is cleared.
ConnectionFaulted	The status of the Class1 IO connection between the device and the controller. • 0: Connection established • 1: Connection has failed
DiagnosticActive	Not used in this product
DiagnosticSequenceCount	Not used in this product

Table 7 - Input Image Tags (Continued)

Tag	Description
Busy	The status if the transceiver is processing any command • 0: If not processing any command • 1: If processing a command **IMPORTANT** This bit is not used for Queue and Continuous Inventory mode.
DataLoss	An indication of a loss of a command response. It basically means that the internal buffer has overflown and the oldest data has been overwritten. When the internal buffer is full, the new response overwrites the old data and I.DataLoss is set to 1. • 0: No data loss • 1: Data loss (clear by power cycle, reset the module, or ladder download) **IMPORTANT** This bit is not used for Single mode.
ParameterError	If the Request command parameter is illegal, this bit is set. Example: Set undefined number to O.Type(over 32), over 65,536 bytes to O.DataLength or set 0 to O.RequestedRFIDTagCount, and so on. • 0: Command request with correct parameter. • 1: Command request with illegal parameter.
Overflow	An indication of a loss of a command request. If the new request when the queue is full, this bit is set. • 0: No command loss • 1: Command loss (Cleared by next command request) **IMPORTANT** This bit is not used for Single and Continuous Inventory mode.
ExecutedCommandNumber	The last command ID (refer to I.CommandNumberAck) that the module executed. At power-up, this value must be 0. This value is updated when command execution is finished, even if with the error response (HWFault, Timeout, CRCError, InvalidType, WriteVerificationFault, and so on)
PtIn	The physical state of the Digital Input • 0: Digital Input is Low • 1: Digital Input is High
PtOut	The physical state of the Digital Output • 0: Digital Output is Low • 1: Digital Output is High
CommandResponse	See Table 8 on page 36
RFIDTag	See Table 9 on page 37

Table 8 – CommandResponse

Tag	Description
Fault	Set if any error condition occurs. • Write Verification Fault • Timeout • Data Offset Error • CRC Error • Invalid Type • Error response from RFID tag (example: Accessed bank is Locked) • HW Error
Uncertain	Not used in this product
Good Read	The status of a Good Read condition for the latest command result (set by config assembly). The GoodRead is described in the C.GoodReadCondition. This tag is updated when you get a command response. Single/Queue mode: each result of a command Continuous mode: AND result of 1...28 results • 0: Selected Good read condition is not met for the latest command • 1: Selected Good read condition is met for the latest command
Write Verification Fault	If the request command is Single/LargeWrite with O.WriteVerifyEn=1, this bit is set only when verification is failed. When O.WriteVerifyEn=0, this value always 0. This tag is updated when you get a command response. • 0: Write verification has succeeded, or Write verify is not selected. • 1: Write verification is failed.
Timeout	Set if no response comes back for a Command you trigger within the time the firmware defines. If the Tag response is lost in the middle, this error is set. This tag is updated when the requested command is timed out.
Data Offset Error	Set if the access area targeted by O.DataOffset and O.DataLength is invalid and failed to access the target RFID tag. This tag is updated when you get a command response. Example: If there is no user bank in the UHF tag, but a command tries to access the user bank, this error is set to 1
CRC Error	Set if CRC error is happened for response packet. This tag is updated when a command response comes back.
Invalid Type	Set if the accessed RFID tag does not support the executed command. When a command to access to User Bank of Tag is not support User Bank and I.UserMemoryIndicator=0, this value set to 1.
Request Type	The command ID related to tag information current stored input tag. See Allowable Commands on page 38 Valid range: 1...32
Command Number	Serial Number of requested command. (use O.CommandNumberAck) Usual command uses a designated sequence number in the consume tag. Input trigger and continuous inventory use fixed number. • Continuous Inventory: 10001 • Input triggered: 10002 Valid range: 0...10002
Data Responses Remaining	The number of the stored tag data in the transceiver currently. Number is increased if new response comes, decreased if stored response is sent to Logix by updating O.DataResponseNumberAck to the same number as I.DataResponseNumber. (Maximum number of stored tags is 500) Valid range: 0...500
Data Response Number	The number of sequences of the data stored in TagInformation currently. If O.DataResponseNumberAck is updated to the same number of I.DataResponseNumber, the stored response is pushed to Logix. Valid range: –32,768...+32,767

Table 9 - RFIDTag

Tag	Description
Single/Queue Mode	
UIILength	The data length for UII/EPC. Valid range: 0...62
UII 0...61	UII/EPC data of the detected tag. Unique item identifier 62 and 63 are not used. If the RFID tag supports XPC, UII, and UIILength, include XPC information.
UserMemoryIndicator	Indicates whether the accessed tag has user bank. • 0: Not exist • 1: User bank exists You can change this value in some RFID tags.
EPCGlobalGS1	Indicates whether the accessed tag is following EPC global. • 0: Follow EPC global • 1: Not follow EPC global You can change this value in some RFID tags.
CRC	CRC of the detected tag reply.
SignalStrength	Signal strength that returns from the accessed tag. This value is typically negative.
Continuous Inventory Mode	
Valid	The status of a tag for Continuous mode. • 0: There is not tag data present at the index. • 1: Tag data have been detected at the index.
UII Trancated	The status of a tag for Continuous mode. • 0: Read UII Length equal to 12 bytes or shorter. • 1: Read UII Length longer than 12 bytes and they are truncated.
UII Length	Whole length of UII/EPC data of detected tag. Valid range: 0...62
UII	12 byte UII/EPC data of the detected tag, from the top.

Allowable Commands

Table 10 - RequestedType Tags

Value	Command	Description
1	Inventory	Reads UII and RFID tag information
2	Read Reserved	Reads Reserved bank of RFID tag information
3	Read EPC	Reads EPC bank of RFID tag information
4	Read TID	Reads TID bank of RFID tag information
5	Read User	Reads User bank of RFID tag information
6	Write Reserved	Write Reserved bank of RFID tag information
7	Write EPC	Write EPC bank of RFID tag information
8	Write User	Write User bank of RFID tag information
9	Virtual Tag Read	Reads Virtual Tag that Large Read command stores
10	Virtual Tag Write	Write Virtual Tag that is used for Large Write command
11	Flush Virtual Tag	Clear Virtual Tag
12	Lock AccessPassword	Lock Access Password area (cannot read/write without password)
13	Lock KillPassword	Lock Kill Password area (cannot read/write without password)
14	Lock EPC	Lock EPC bank (cannot write without password)
15	Lock TID	Lock TID bank (cannot write without password) **IMPORTANT** Usually, the vendor locks the TID bank.
16	Lock User	Lock User bank (cannot write without password)
17	UnLock AccessPassword	UnLock Access Password area (can read/write without password)
18	UnLock KillPassword	UnLock Kill Password area (can read/write without password)
19	UnLock EPC	UnLock EPC bank (can write without password)
20	UnLock TID	UnLock TID bank **IMPORTANT** Usually, the TID bank cannot be unlocked.
21	UnLock User	UnLock User bank (cannot write without password)
22	Permanent Lock AccessPassword [1]	Lock Access Password area permanently (cannot read/write even if correct password)
23	Permanent Lock KillPassword [1]	Lock Kill Password area permanently (cannot read/write even if correct password)
24	Permanent Lock EPC [1]	Lock EPC bank permanently (cannot write even if correct password)
25	Permanent Lock TID [1]	Lock TID bank permanently (cannot write even if correct password) **IMPORTANT** Usually, the vendor locks the TID bank.
26	Permanent Lock User [1]	Lock User bank permanently (cannot write even if correct password)
27	Permanent UnLock AccessPassword	UnLock Access Password area permanently (cannot lock read/write)
28	Permanent UnLock KillPassword	UnLock Kill Password area permanently (cannot lock read/write)
29	Permanent UnLock EPC	UnLock EPC bank permanently (cannot lock write)
30	Permanent UnLock TID	UnLock TID bank permanently **IMPORTANT** Usually, the TID bank cannot be unlocked.
31	Permanent UnLock User	UnLock User bank permanently (cannot lock write)
32	Kill	Kill RFID permanently (cannot access)

(1)   Some RFID tags do not support an individual ParmanentLock command.

Output Image Table and Tags

Click ▶ to expand the UHF_58:O by to show the output image table, which has the following tags:

Name		Value	Force Mask	Style	Data Type
◢ UHF_58:O		{...}	{...}	{...}	AB:5000_RFID:O:0
▶ UHF_58:O.PtOut		{...}	{...}		CHANNEL_DO:O:0
UHF_58:O.ClearStoredRFIDTags		0		Decimal	BOOL
▶ UHF_58:O.CommandRequest		{...}	{...}		AB:5000_RFID_Comm...
▶ UHF_58:O.CommandNumberAck		0		Decimal	INT
▶ UHF_58:O.DataResponseNumberAck		0		Decimal	INT

Table 11 – Output Image Tags

Tag	Description
PtOut	Level of Digital Output(HW). • 0: Digital output become Low • 1: If Digital output become High
ClearStoredRFIDTags	Tag for clearing stored tag information. If I:StoredTagNumber is not 0, you can clear information of stored tags by changing the value from 0 to 1. (Maximum number of stored tags is 500)
CommandRequest	See Table 12.
CommandNumberAck	The Serial Number of requested commands. Usual command uses a designated sequence number in the consume tag. In Continuous mode, Input trigger and continuous inventory use fixed number. Valid range: 0…10000
DataResponseNumberAck	Number for next data tag request. If I.DataResponsesRemaining > 0, you can get data when O.DataResponseNumberAck is updated to the same number as I.DataResponseNumber. Valid range: -32,768…+32,767

Table 12 – CommandRequest

Tag	Description
Type	The next command ID for the transceiver to process. The transceiver runs the command once when this value changes. Valid range: 1…32
ResetSession	The inventoried flag Reset mode. 💡 Session flag is within each tag. If the inventoried flag is initialized, the Tag responds every command. If not initialized, Tag does not reply any response until the inventoried flag of the tag is cleared. Clear timing is dependent on each tag. For detail see Session 0: No action. 1: Clear inventoried flag B to A, every Query (ISO Command). The change of this bit is not applied during the process of executing. **IMPORTANT** For the Single Read/Write/Lock/Unlock command, the Inventoried Flag is not changed even if ResetSession=0
BlockWriteEn	The selection of the ISO Write command. • 0: Use Write (ISO Command) in all write operation. • 1: Use BlockWrite(ISO optional Command) in all write operation. The change is not applied during the process of executing. **IMPORTANT** Block Write command is optional, not all tags can respond to this command (depends on tag specification). In some RFID tags, DataOffset and DataLength must keep 4-byte alignment.
WriteVerifyEn	The selection of Write Verify mode. • 0: Not verify read after write operation. • 1: Verify read after write operation. This function is applied for only Write, Large Tag Write commands(O.RequestRFIDTagCount = 1). Not applied for Multi-tag Write command (O.RequestRFIDTagCount > 1). The change is not applied during the process of executing. This function only applicable for when SpecificRFIDTagEn=1. If SpecificRFIDTagEn=0, this field is ignored and the write command is not verified.

Table 12 - CommandRequest (Continued)

Tag	Description
SpecificRFIDTagEn	The Tag Selection mode for single tag/large tag commands. • 0: The first reply tag • 1: The specified tag
RFIDFieldTagRange	Slot number of Query command (how many Query commands are sent one time). For smaller values, the operation is faster, but the tag collision rate is increased. For larger values, the tag collision rate is reduced, but the operation is slower. If you get no response to the queries, decrease the Q value. If you get multiple tags that respond, increase the Q value, which increases the range of numbers the tags can generate. See ISO 18000-63 for the details. Valid range: 0...7
Session	Session of Query command you want to use. All sessions have Inventoried Flag (A or B). • 0: S0, After RF carrier wave tune off, flag is cleared to A. • 1: S1, After more than 500 ms from the tag reply, the flag is cleared to A. • 2: S2, After more than 2 sec from RF carrier wave tune off, the flag is cleared to A. • 3: S3, After more than 2 sec from RF carrier wave tune off, the flag is cleared to A. **IMPORTANT**　For the Single Read/Write/Lock/Unlock command, the Inventoried Flag is not changed even if ResetSession=0
Password	The Access or Kill Password (4-bytes data) Information. -For read/write/lock commands, this value is used as access password - For kill command, this value is used as kill password. **IMPORTANT**　The read/write commands do not require the password if allowed by the lock status of the memory being accessed. Set all zero data when it is not required. And If execute kill command, the tag cannot be used. In the lock/kill commands, this value is always used. When the target bank is permanently locked: • Cannot read/write for Access/Kill Password area even if Password is correct. • Cannot write for other bank even if Password is correct.
RequestRFIDTagCount	The target number of tags that you want to read/write. If RequestRFIDTagCount>1, Command is finished when the transceiver gets the target number of reply. • RequestRFIDTagCount = 1: Single/Large Read/Write/Inventory command • RequestRFIDTagCount > 1: Multi Read/Write/inventory command Valid range: 1...256
DataOffset	The address within the RFID tag that the command runs on. **IMPORTANT**　If the Total number of DataOffset and DataLength exceed the size of the target area, I.DataOffsetError is set. Valid range: 0...65534
DataLength	The Number of bytes to read/write, and virtual read/write. If the Read or Write command to O.Type, the specification is changed depend on the value of DataLength. The values must be even value (except 0), and up to follow maximum value. • 1...64 for Write: Single Write (O.RequestRFIDTagCount=1, BlockWriteEn=0), Multi-Tag Write (O.RequestRFIDTagCount>1, BlockWriteEn=0) • 65...65536 for Write: Large Write (O.RequestRFIDTagCount=1, BlockWriteEn=0), 1...256 for BlockWrite: Single Write (O.RequestRFIDTagCount=1, BlockWriteEn=1), Multi-Tag Write (O.RequestRFIDTagCount>1, BlockWriteEn=1) • 257...65536 for BlockWrite: Large Tag Write (O.RequestRFIDTagCount=1, BlockWriteEn=1) • 1...256 for Read: Single Read (O.RequestRFIDTagCount=1), Multi-Tag Read (O.RequestRFIDTagCount>1) • 257...65536: Large Tag Read (O.RequestRFIDTagCount=1)
Data	The data is used to store information that is directed to the transceiver. Depends on the Data Format of each command. 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 transceiver what values it must write. This data is also used for the condition of MatchData in C.GoodReadCondition. For the read command, the firmware judges if the response is matched to O.Data and O.DataLength.

Table 12 - CommandRequest (Continued)

Tag	Description
UIILength	The data length for Specified Tag UII/EPC (EPC bank). Transceiver can accept response that is a partial matched. Example: When you set O.UIILength=8, if the UII Length of the target RFID tag is 12 bytes, can accept response that is read from the top is matched as O.UII[0]…[7], even if the remaining 4 bytes is not matched) Valid range: 0…62
UII	UII/EPC data (EPC bank) of the specified tag. Also used for Match UII Condition of C.Good Read Condition. This command is masked O.GoodReadUIIMask to decide Comparison value. Example: When you set O.UIILength=8, if the UII Length of the target RFID tag is 12 bytes, can accept response if read 7 bytes from the top is matched as O.UII[0]…[7], even if the remaining 4 bytes is not matched
GoodReadUIIMask	Used for Match UII Condition of C.Good Read Condition. This mask O.UII to decide Comparison value.
Run(ContinuousInventory Mode)	Selection for continuous inventory command (this bit is appeared only when Continuous Inventory mode). If this bit =1, the command is triggered by updating O.DataBufferSeqNum. • 0: Not execute Continuous Inventory command • 1: Execute Continuous Inventory command

Notes:

RSLogix 5000 Code Examples

This section shows three examples of routines that run in the RSLogix 5000® program.

-
-
- (unique tag identifier)

The examples are written for an UHF RFID transceiver that connects to the E1 Ethernet port, the L8 Logix Controller, and a computer.

In the examples, the unit is identified as US_Long_58.

Continuous Inventory

The following steps show how to set the Continuous Inventory AOP.
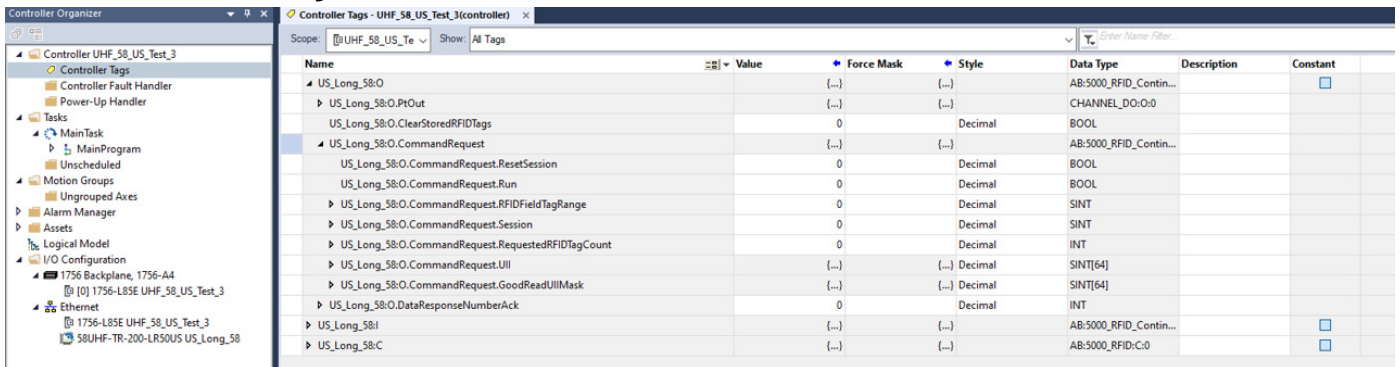
1. From the General tab of the RSLogix 5000® program, click Change to change the mode.
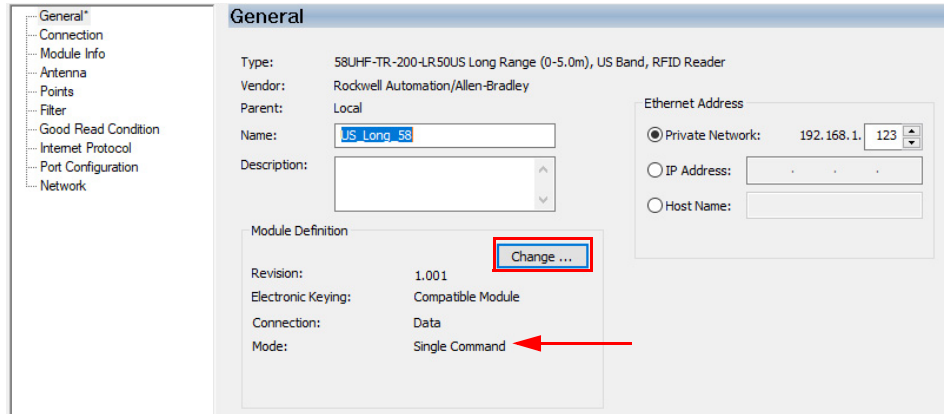
2. Select Continuous Inventory from the pull-down menu and click OK.
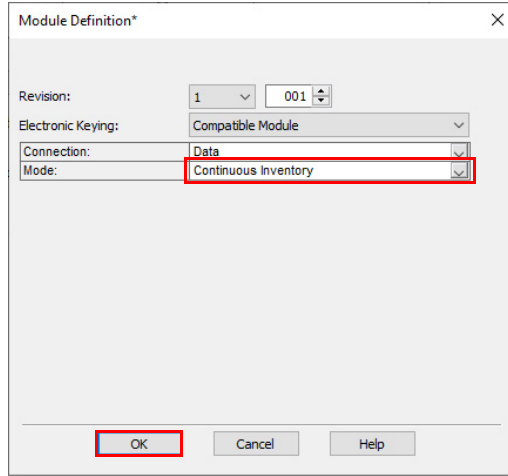
3. The General tab shows the values in the following image. Select the Connection tab
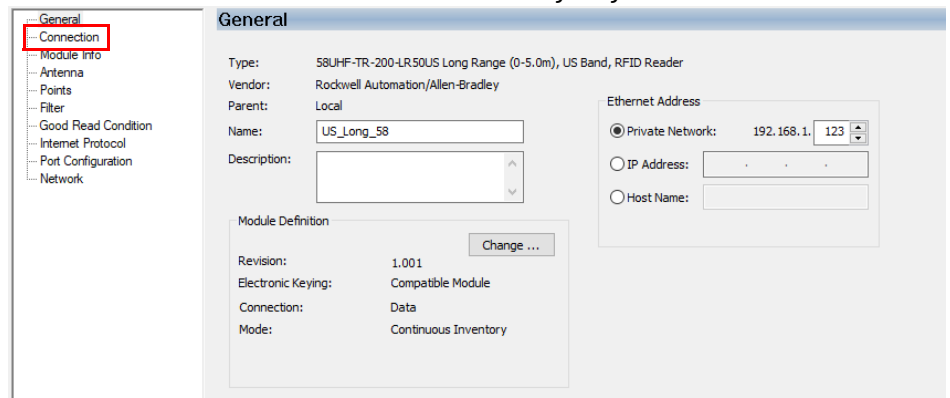
4. If necessary, calibrate the unit. Calibration can be needed if the desired sensing distance is smaller than the maximum sensing distance.

The device must first be in Rem Prog mode.

a. Check the Inhibit Module box and click Apply.
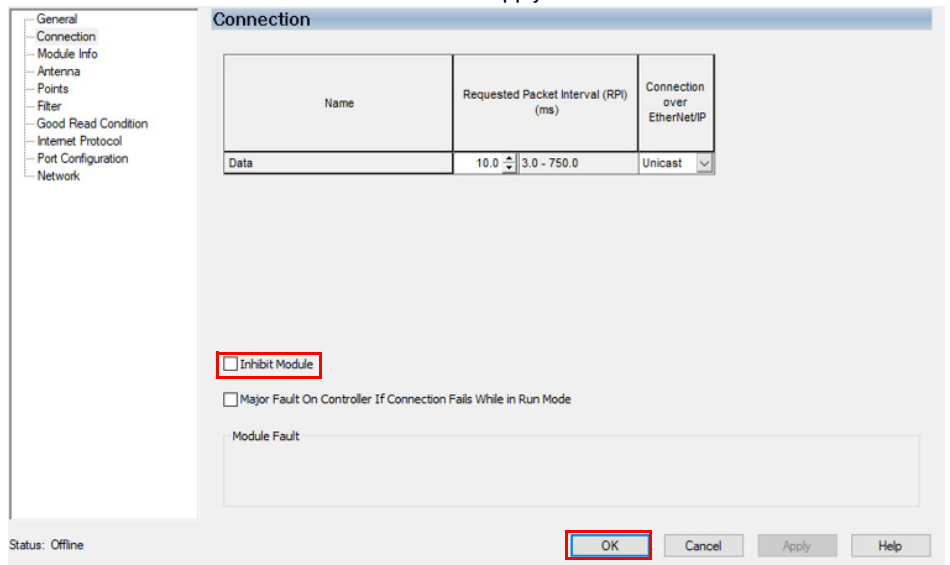
b. Navigate to the Antenna tab and click Calibrate.
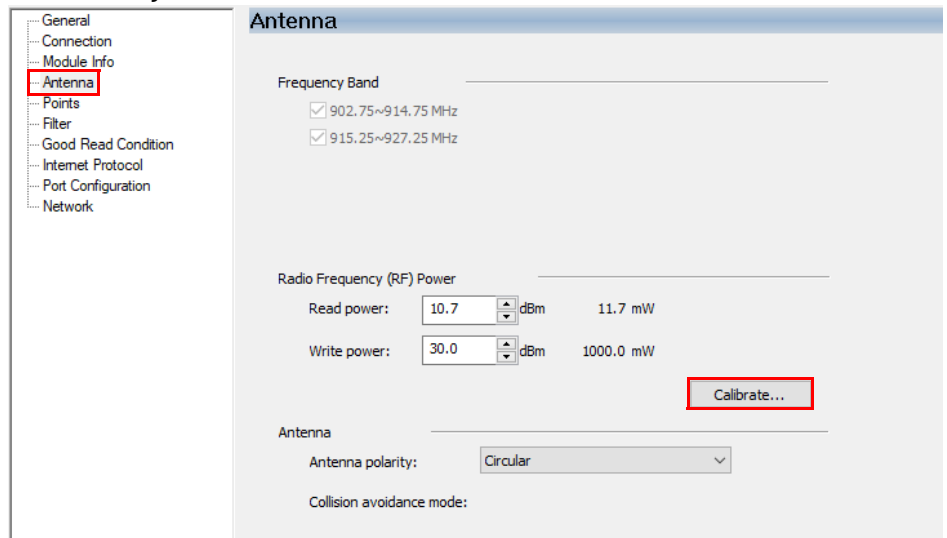
c. The Radio Frequency Calibration Wizard appears. Follow the prompts and click Finish when the calibration is complete.
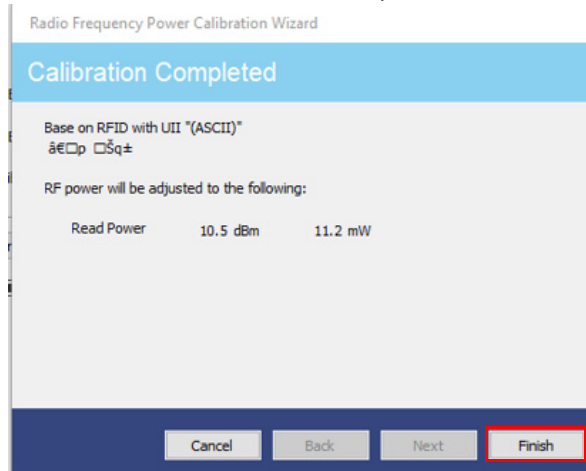
d. . From the Antenna tab, click Apply.
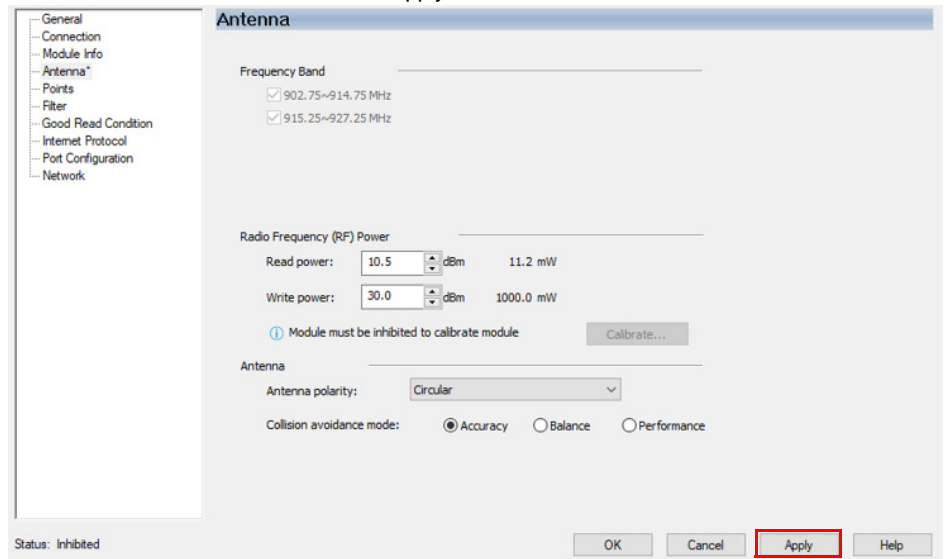
e. Click Yes to apply changes.
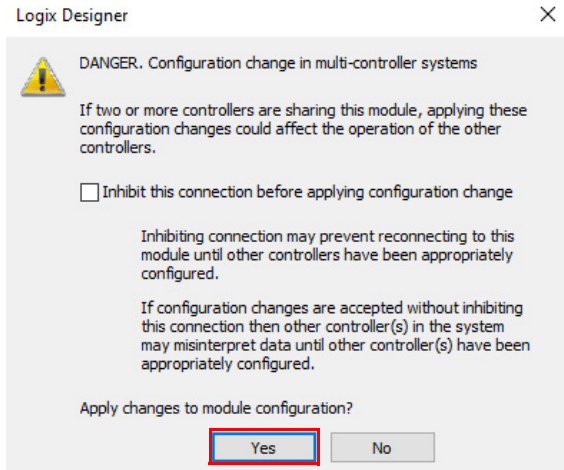
5. Navigate to the Filter tab.

6. If desired, set the filter to ignore duplicate RFID tags. This configuration causes the unit to ignore duplicate tags as they travel through the sensing zone.

   Check the Ignore Duplicate RFID Tags box, then click Apply.
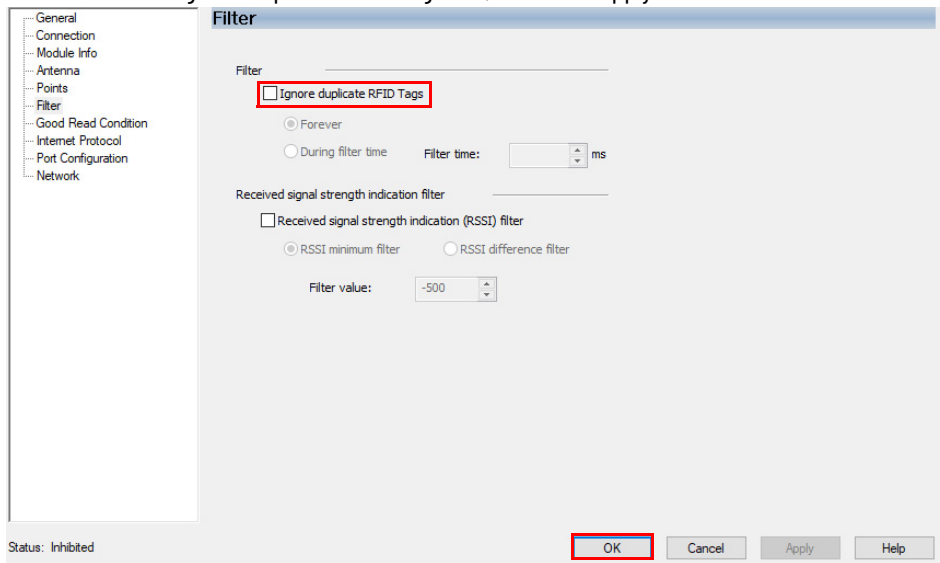
If you do not set the filter to ignore duplicate RFID tags, the xx:I.CommandResponse.DataResponseRemaining value increases with the same tag.

7. To complete AOP setup for continuous inventory, click OK.
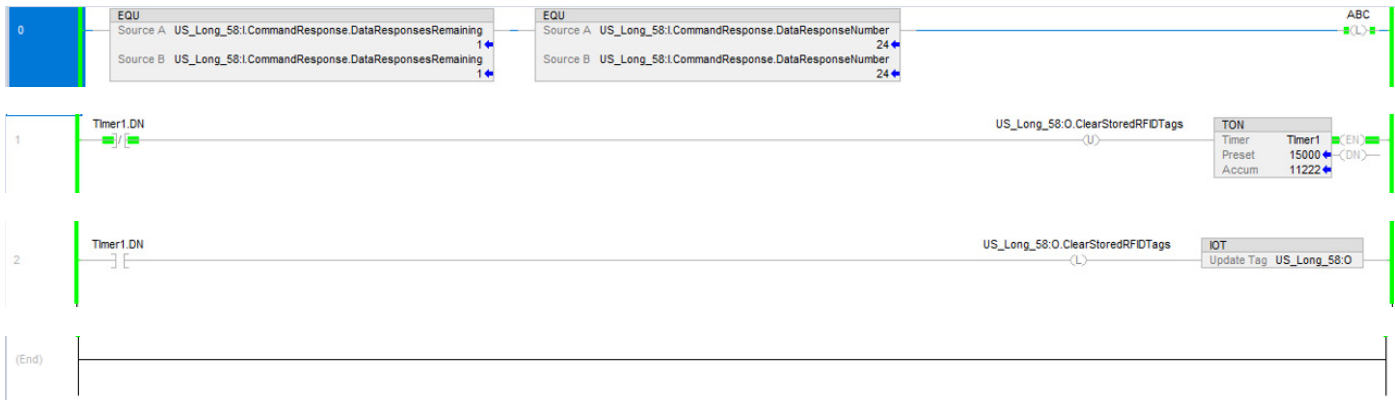
Queued Command

The following steps show how to set a Queued Command.

1. From the General Tab, follow and from to change the mode to Queued Command.

2. Click Apply.
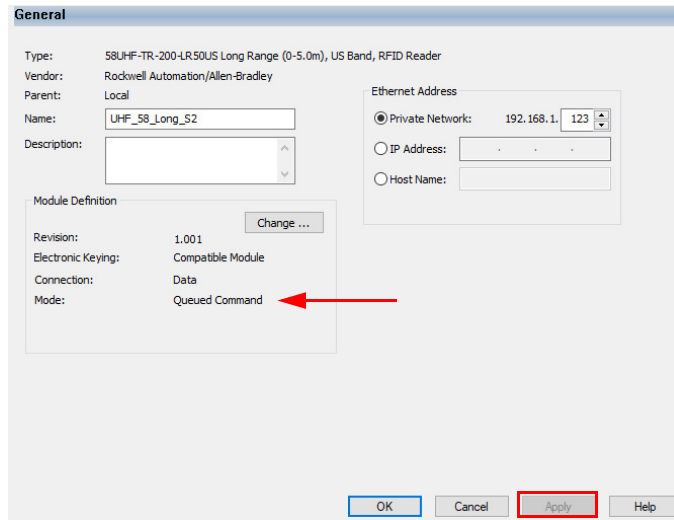
No other changes to the AOP are necessary. See the following example routine.
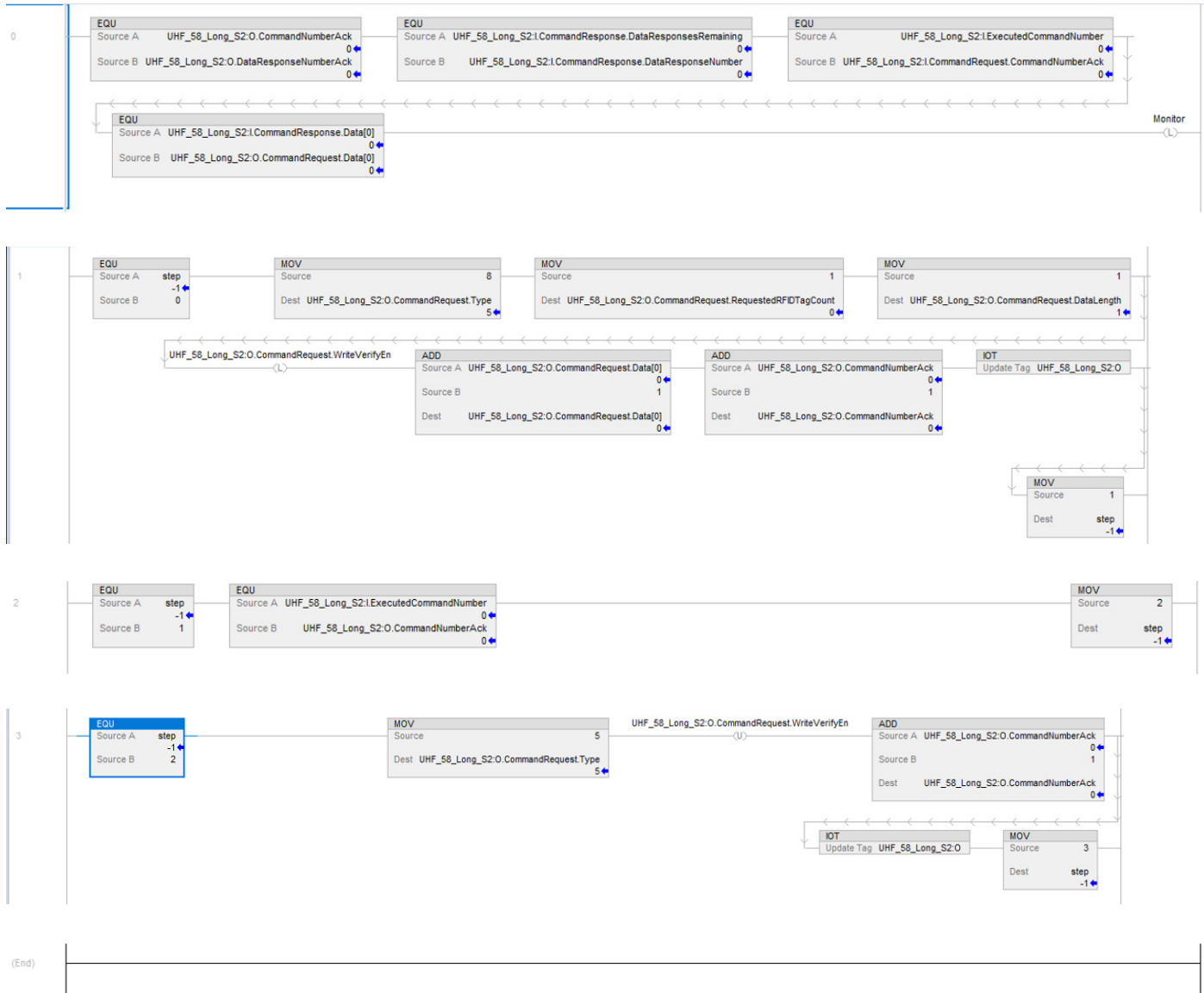
Get TID

The following steps show how to get the TID (unique tag identifier).

1. To change the mode to Single Command, follow .

The Read TID command reads the TID bank of RFID tag information. This information is unique to each tag and cannot be written over. This identifier comes with the tag from the manufacturer.

2. Set the following values in the output image table:
    -   xx:O.CommandRequest.Type = 4
    -   xx:O.CommandRequest.RequestedRFIDTagCount = 1
    -   xx:O.CommandRequest.DataOffSet = 0...256
    -   xx:O.CommandRequest.DataLength = 1...10

- xx:O.CommandNumberAck = 1+n (for every command given, increase this tag by n=1)

Name	Value
◢ UHF_58_Long_S3:O	{...}
▷ UHF_58_Long_S3:O.PtOut	{...}
UHF_58_Long_S3:O.ClearStoredRFIDTags	0
◢ UHF_58_Long_S3:O.CommandRequest	{...}
▷ UHF_58_Long_S3:O.CommandRequest.Type	4
UHF_58_Long_S3:O.CommandRequest.ResetSession	0
UHF_58_Long_S3:O.CommandRequest.BlockWriteEn	0
UHF_58_Long_S3:O.CommandRequest.WriteVerifyEn	0
UHF_58_Long_S3:O.CommandRequest.SpecificRFIDTagEn	0
▷ UHF_58_Long_S3:O.CommandRequest.RFIDFieldTagRange	0
▷ UHF_58_Long_S3:O.CommandRequest.Session	0
▷ UHF_58_Long_S3:O.CommandRequest.Password	{...}
▷ UHF_58_Long_S3:O.CommandRequest.RequestedRFIDTagCount	1
▷ UHF_58_Long_S3:O.CommandRequest.DataOffset	1
▷ UHF_58_Long_S3:O.CommandRequest.DataLength	3
▷ UHF_58_Long_S3:O.CommandRequest.Data	{...}
▷ UHF_58_Long_S3:O.CommandRequest.UIILength	0
▷ UHF_58_Long_S3:O.CommandRequest.UII	{...}
▷ UHF_58_Long_S3:O.CommandRequest.GoodReadUIIMask	{...}
▷ UHF_58_Long_S3:O.CommandNumberAck	1
▷ UHF_58_Long_S3:O.DataResponseNumberAck	1

If the module is running, you see:

- xx:I.CommandResponse.DataResponseRemaining = 1
- xx:I.CommandResponse.DataResponseNumber = 1

3. Now set the following value:

- xx:O.DataResponseAck = xx:I.CommandResponse.DataResponseNumber = 1

Name	Value	F
◢ UHF_58_Long_S3:I	{...}	
UHF_58_Long_S3:I.RunMode	1	
UHF_58_Long_S3:I.ConnectionFaulted	0	
UHF_58_Long_S3:I.DiagnosticActive	0	
▷ UHF_58_Long_S3:I.DiagnosticSequenceCount	0	
UHF_58_Long_S3:I.Busy	0	
UHF_58_Long_S3:I.ParameterError	0	
▷ UHF_58_Long_S3:I.PtIn	{...}	
▷ UHF_58_Long_S3:I.PtOut	{...}	
◢ UHF_58_Long_S3:I.CommandResponse	{...}	
UHF_58_Long_S3:I.CommandResponse.Fault	0	
UHF_58_Long_S3:I.CommandResponse.Uncertain	0	
UHF_58_Long_S3:I.CommandResponse.GoodRead	0	
UHF_58_Long_S3:I.CommandResponse.WriteVerificationFault	0	
UHF_58_Long_S3:I.CommandResponse.Timeout	0	
UHF_58_Long_S3:I.CommandResponse.DataOffsetError	0	
UHF_58_Long_S3:I.CommandResponse.CRCError	0	
UHF_58_Long_S3:I.CommandResponse.InvalidType	0	
▷ UHF_58_Long_S3:I.CommandResponse.RequestedType	4	
▷ UHF_58_Long_S3:I.CommandResponse.CommandNumber	1	
▷ UHF_58_Long_S3:I.CommandResponse.DataResponsesRemaining	0	
▷ UHF_58_Long_S3:I.CommandResponse.DataResponseNumber	1	
▷ UHF_58_Long_S3:I.CommandResponse.RFIDTag	{...}	
▷ UHF_58_Long_S3:I.CommandResponse.DataLength	3	
◢ UHF_58_Long_S3:I.CommandResponse.Data	{...}	
▷ UHF_58_Long_S3:I.CommandResponse.Data[0]	-128	
▷ UHF_58_Long_S3:I.CommandResponse.Data[1]	17	
▷ UHF_58_Long_S3:I.CommandResponse.Data[2]	112	

You see the following changes:

- xx:I.CommandResponse.RequestedType = 4
- xx:I.CommandResponse.CommandNumber = 1
- xx:I.CommandResponse.DataResponseRemaining = 0
- xx:I.CommandResponse.DataLength = 3
- xx:I.CommandResponse.Data[0] = #
- xx:I.CommandResponse.Data[1] = #
- xx:I.CommandResponse.Data[2] = #

Notes:

Specifications

IMPORTANT	Only a controller that is configured with the 58UHF transceiver secure zone can issue a factory default reset. If you lose connection to the controller, there is no way to restore the factory defaults setting. There is no physical factory defaults reset.

General

Table 13 - General Specifications

Attribute	Long-range	Short-range
Sensing distance, max [1] [m (ft.)]	5 (16.4)	1.5 (4.92)
Tag compatibility	ISO 18000-63	
Compliance	FCC, UL/cUL, CE, ISED, and UKCA	
Enclosure rating	IP66/67	
Operating temperature	-20…+55 °C (-4…+131 °F)	
Storage temperature	-40…+85 °C (-40…+185 °F)	
Relative humidity [2]	• Operating: 35…95% • Storage: 25…85%	
Vibration	10 g at 10…500 Hz	
Shock resistance [g]	50	

(1) The setting limits depend on the country or the function. This reference value can vary depending on the operating environment and tag type.
(2) No condensation

Connections

Table 14 - Connection Specifications

Attribute	Long-range	Short-range
Communication protocol	EtherNet/IP™	
Connector	• EtherNet/IP: M12 4-pin plug DC Micro • Power and I/O: M12 4-pin socket DC Micro	
Frequency	• 865.7…867.5 MHz EU and UK model (at 600 kHz intervals, 4 channels total) • 902.75…927.25 MHz US and North America model (at 500 kHz intervals, 50 channels total)	
Communication rate	• RFID: 2048 bps • Ethernet: 10/100 Mbps, half or full-duplex	• RFID: 1024 bps • Ethernet: 10/100 Mbps, half or full-duplex
Supply voltage	19.2…26.4V DC	
Current consumption at 24V DC, max	Supply: 1 A Class 2 SELV Input: 15 mA Output: 0.5 A	
Transmission output, max	1 W (10…30 dBm)	0.25 W (10…24 dBm)

Notes:

Add-on Profile

IMPORTANT	The following AOP installation instructions are for Bulletin 56RF RFID systems. The installation steps are the same for 58UHF transceivers except that you must download the 58UHF AOP.

Install

This appendix goes through the Add-on Profile (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. The AOP 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. Follow the on-screen instructions to install the AOP.

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.
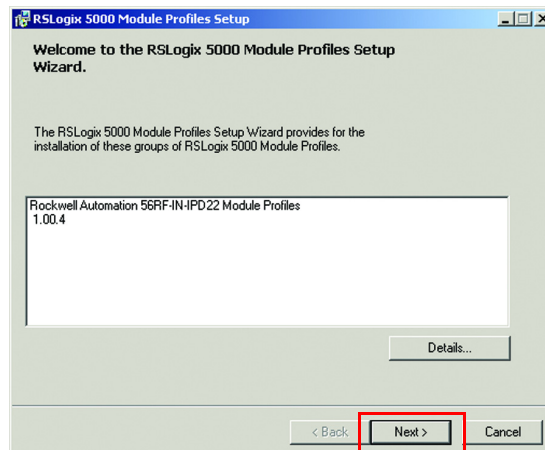
4. Accept the terms of the license agreement and click Next.
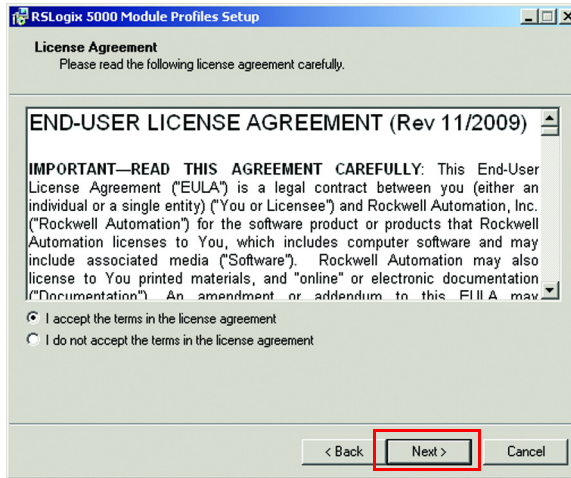
5. With Install selected, click Next.
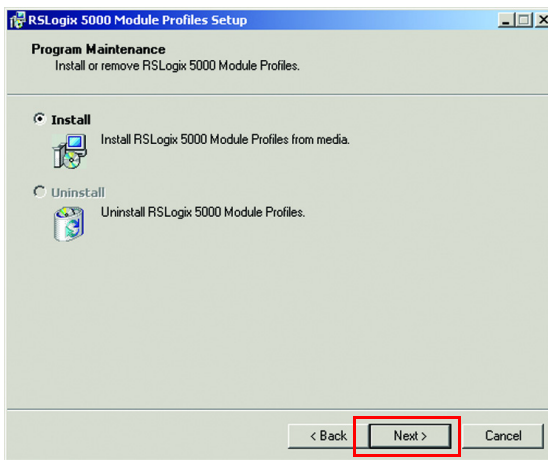
6. The profile name appears in the left-hand box and its details appear in the right-hand box. Verify that the module name is correct.

    Click Install.
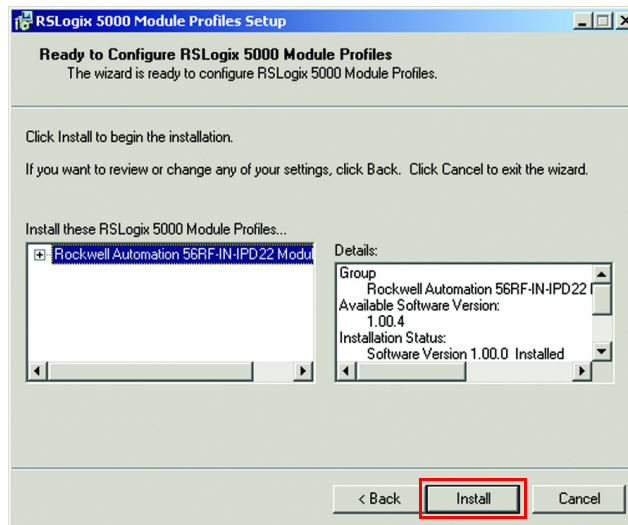
Troubleshooting

RF Tags

If the RF tag cannot be read or written to:

Check	Action
Is the RF tag in position for reading/writing?	Move the RF tag into position. The transceiver cannot read the RF tag if its position is too far or too near. The writing distance can be shorter than the reading distance.
Is the RF tag at an angle against the antenna?	Place the surface of the RF tag parallel to the surface of the antenna. The transceiver cannot read RF tags at an angle.
Are there metal objects or radio devices near the antenna?	Keep all metal objects and radio devices away from the antenna.
Are there metal objects near where the RF tag is attached?	Keep the RF tag a minimum of 150 mm (5.91 in.) from metal objects.
Is the RF tag, or the area attaches to, wet?	Dry the RF tag and surrounding attachment area and attempt to read/write the tag again.
Did reading/writing fail, even though the tag is within the range to the antenna?	The RF tag did not receive enough power from the transceiver to complete the transaction. Increase power, move RF tags closer, improve the environment, or break the transaction into multiple pieces to make the data length smaller.

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Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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