AMIC A9240-A-001-485
User Manual

Rev. 1.0

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A9240-A-001-485 User Manual

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1. Introduction

Thank you for purchasing AMIC's A9240-A-001-485 RFID reader system.   AMIC's A9240-A-001-485 RFID reader is a feature rich HF RFID reader system incorporates flexibility, expandability, and durability.   A9240-A-001-485 can be used with external 50 ohm antennas of different size and shape to best fit users' specific applications. A9240-A-001-485 has built-in auxiliary I/Os.   A9240-A-001-485 allows connections to external devices such sensors, warning alarm, alarm indicator, programmable logic controller, and other user provided devices.   Unlike competing products, A9240-A-001-485 can be the base platform for your automation needs which require contactless RFID technology.

The included AMICWare RFID Expert GUI Software provides a graphical window based user interface for AMIC's various reader systems.   It is built upon the AMICTek Protocol and can be used to demonstrate the features and functions of AMIC RFID reader systems. System integrators can use it to develop system software utilizing AMIC's RFID reader systems.

2. **Delivery Content**

Please check that the box contains the following items:

1. A9240-A-001-485 RFID Reader x 1
2. DC +19V Power Supply Cable x 1
3. RS-485 cable with RJ-45 connector x 1
4. Utility CD x 1

If you find anything missing in the box, please contact your authorized AMIC representative.

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3. Hardware

3.1 Hardware Requirements

Single/Daisy-chain configuration minimum hardware requirement:

      A9240-A-001-485 RFID reader x 1

      RS-485 cable with RJ-45 connector

      DC +19V power supply cable x 1

      DC +19V power supply x 1 (not included)

      Antenna with reverse TNC connector (not included)

      PC or Laptop with RS-485 interface (not included)

Stand-alone configuration[1] minimum hardware requirement:

      A9240-A-001-485 RFID reader x 1

      RS-485 cable with RJ-45 connector

      DC +19V power supply cable x 1

      DC +19V power supply x 1 (not included)

      Antenna with reverse TNC connector (not included)

Please note that the user supplied power supply should be capable of supplying at least 1.0A of current while maintain +19V DC voltage.

Note:

  1. Not available at present

3.2 Hardware Installation

Reader Front Panel

Antenna Connector

Aux Input Ports

LED Indicators

FAN

Aux Output Ports

Reader Rear Panel

DC Power Connector

RS-485 Connectors

Address Switch
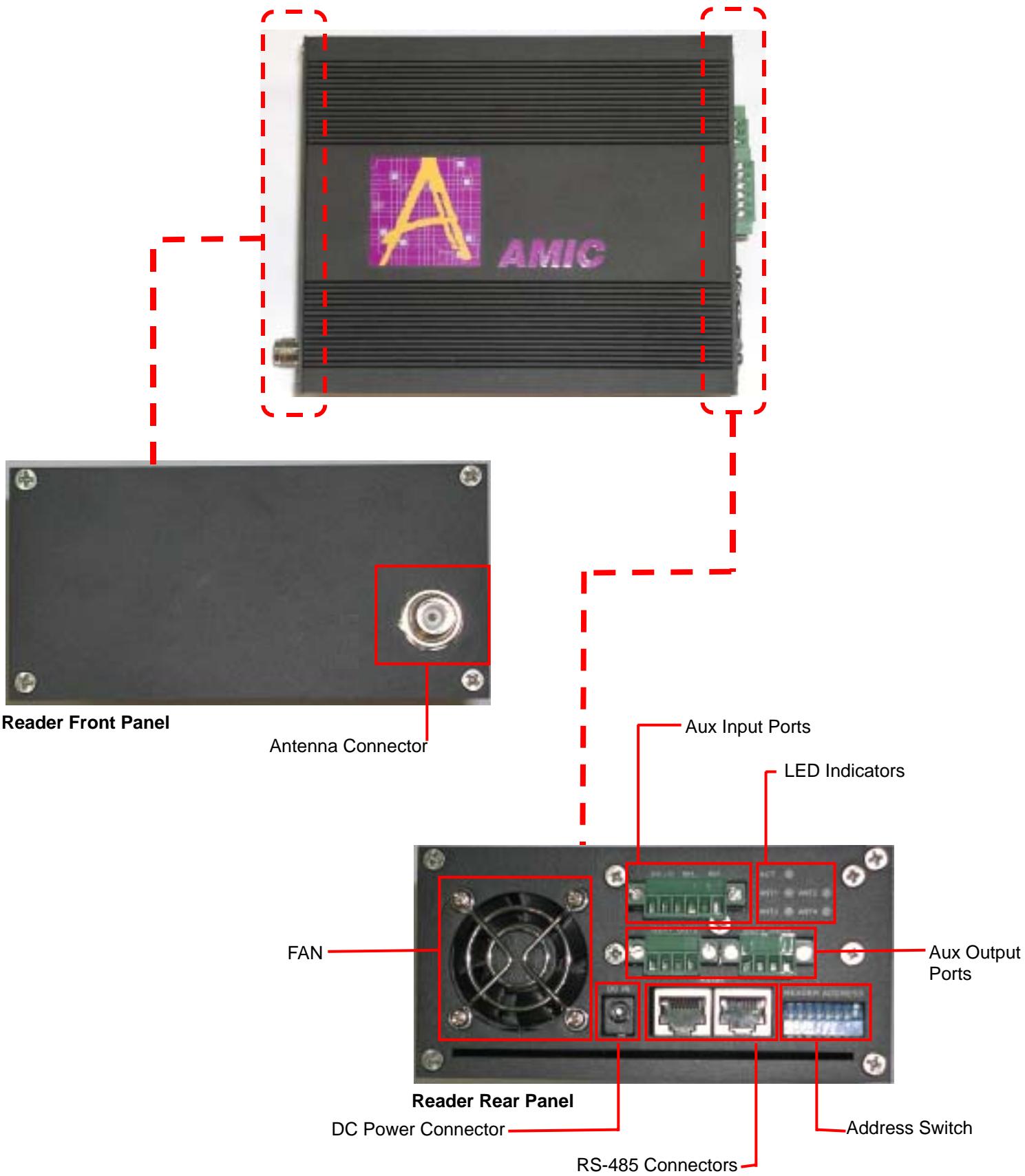
1. Connect A9240-A-001-485 RFID reader system to an appropriate 50ohm antenna with reverse TNC type connector.

2. Connect the A9240-A-001-485 RFID reader system to the remote host controller via 2-wire RS-485 network by inserting the supplied RS-485 cable or appropriate user supplied cable into one of the two RS-485 connectors.

3. Connect another RS485 cable to the 2nd RS485 connection if daisy chained configuration is desired.

4. If the RS-485 network contains more than one A9240-A-001-485 RFID reader, configure the reader's RS-485 address by setting the address switch. Otherwise set the address switch to 0x01 for default reader address.

5. Connect the +19VDC supply to the reader.   Please note that the power supply should not be connected to the reader system if the antenna is not already connected.   The A9240-A-001-485 RFID reader can be damaged if power supply is not connected last.

3.3 RS-485 Cable Interface

A typical RS-485 network is formed by two wires.   A9240-A-001-485 RFID reader's RS-485 interface uses RJ-45 type connector.   Proper wire connections should be made before inserting the cable into the RS-45 connector.   It is recommended that signal wire be twisted with ground wire as shown in the diagram below to minimize noise and interference. Pin 8 (B) of the RJ-45 connector should be used for the non-inverting RS-485 data signal. Pin 2 (O) of the RJ-45 connector should be used for the inverting RS-485 data signal. Ground should be connected to Pin 7 (BW) and Pin 1 (OW) of the RJ-45 connector.
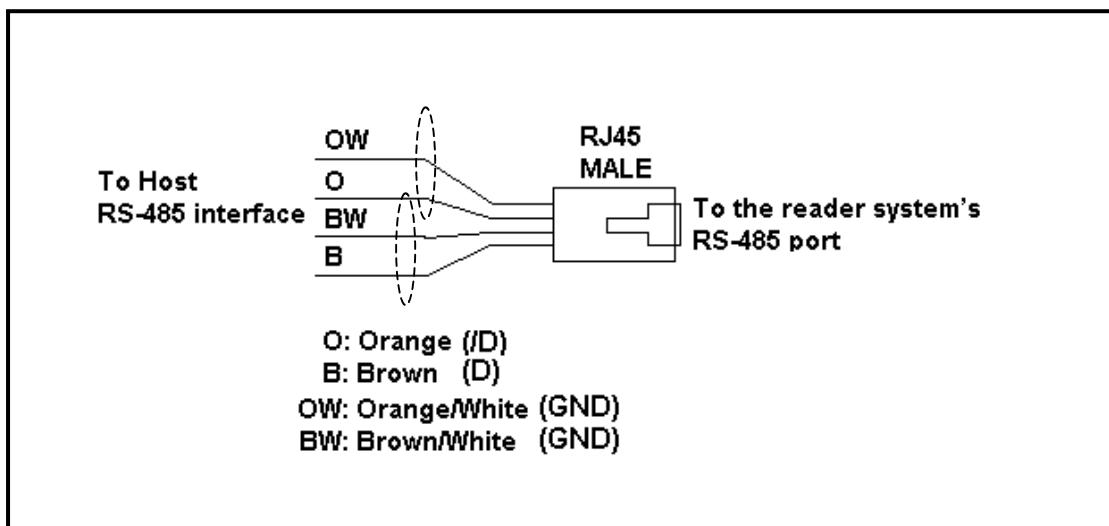
3.4 Reader Address Switch

The reader address switch on the rear panel is used to configure A9240-A-0010485 RFID reader's RS485 network address.   No device on the same RS-485 network should be using the same address.   Otherwise, data collision will result and no device on the RS-485 network will be able to communicate with the remote host controller.   The definition of the reader address switch setting is shown in the table below:

SW1 (MSB)	SW2	SW3	SW4	SW5	SW6	SW7	SW8 (LSB)	Reader Address (HEX / DEC)
ON	ON	ON	ON	ON	ON	ON	OFF	0x01 / 1
ON	ON	ON	ON	ON	ON	OFF	ON	0x02 / 2
ON	ON	ON	ON	ON	ON	OFF	OFF	0x03 / 3
ON	ON	ON	ON	ON	OFF	ON	ON	0x04 / 4
ON	ON	ON	ON	ON	OFF	ON	OFF	0x05 / 5
ON	ON	ON	ON	ON	OFF	OFF	ON	0x06 / 6
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	0xFE / 254
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0xFF / 255

Note:
1.   OFF state: Switch at up position.
2.   ON state: Switch at down position.

3.5 Reader LED Indicators
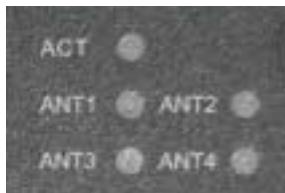
Indicator	Indicator Description	
ACT	Flashing LED indicates healthy reader operation	
ANT1	**LED On:** Antenna port 1 is being used	**LED Off:** Antenna port 1 is not used
ANT2	Reserved for future use	
ANT3	Reserved for future use	
ANT4	Reserved for future use	

3.6 Auxiliary I/O Interface

A9240-A-001-485 RFID reader provides 1 set of auxiliary input and four sets of auxiliary outputs.   All auxiliary I/O are optically isolated.   The +V and −V terminal blocks must be connected to +12V DC and ground in order for the auxiliary I/O to function properly.   Other voltage level should not be used.   User sensors, alarms, warning lights, or PLC (programmable logic controller) can be connected to the A9240-A-001-485 RFID reader to form a flexible infrastructure.

Optically Isolated Input

The optically isolated input terminals (IN1) are to be connected to external switch only. The external switches are either open or close.   There should not be any voltage or current draining / supply on these contacts.   The reader will sense the states of the external switch on these input terminals by means of optical coupler.   The second set of optically isolated input terminals (IN2) is reserved for future usage.   This auxiliary input should not be used. Please contact AMIC regarding the usage of input terminals, IN2.

Optically Isolated Output

There are four sets of optically isolated output ports.   Each output port consists of two terminals.   Each output port's terminals are either connected or disconnected through the internal relay controlled by optical coupler.   The electrical characteristics of the relay are described as follows:

Relay Contact capacity (Resistive load):	3A/125VAC or 3A/30VDC
Relay Contact capacity (Inductive load):	0.3A/125VAC or 0.3A/30VDC
Relay Contact resistance:	100m Max.
Relay Operation time:	5msec Max.
Relay Release time:	5msec Max.
Max. Relay ON/OFF switching (Mechanically):	300 operation/min
Max. Relay ON/OFF switching (Electrically):	30 operation/min

General specifications

|	
Isolation:	5000 Vrms
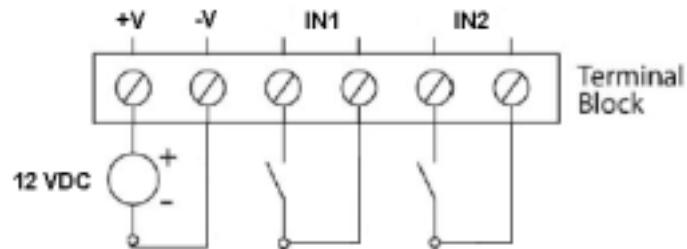
Optically Isolated Input
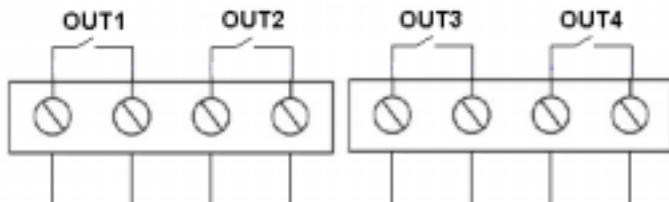

Optically Isolated Output

3.7 Connection Diagram

AMIC's A9240-A-001-485 reader system can be used in three different configurations. The first configuration consists of one reader system on the RS-485 network.   Reader address needs to be in the default setting (address = 0x01).   The second configuration consists of up to 255 readers maximum on the same RS-485 network.   This configuration requires the setting of the reader address switch to ensure that each reader is using a unique address on the RS-485 network.   The last configuration consists of a stand-alone reader.   This configuration requires customized reader firmware.   Please contact AMIC for this kind of application.   Customization charge will be applied where applicable.

3.7.1 Single Reader System Configuration
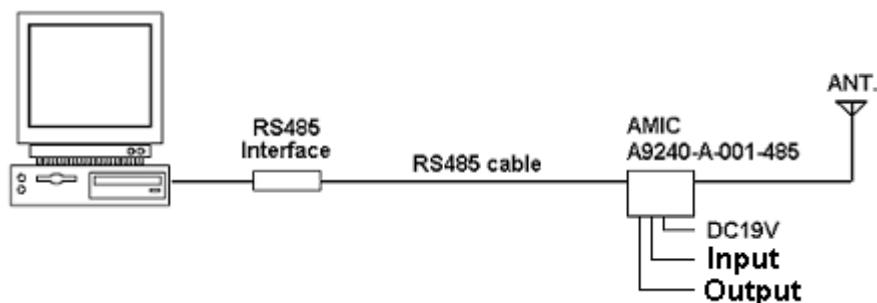
3.7.2 Daisy Chained Configuration
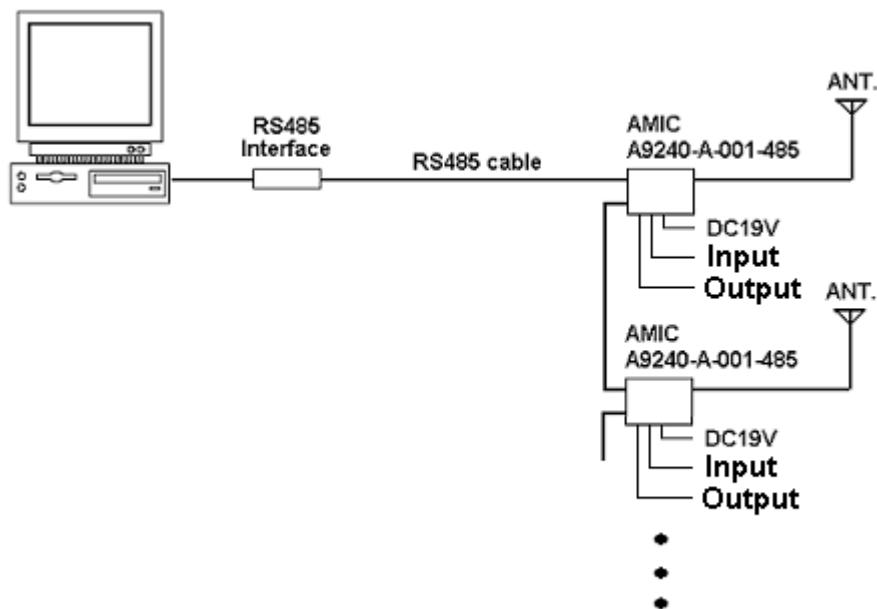
3.7.3 Stand-alone Configuration
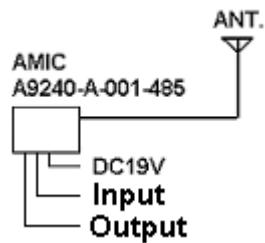
4 Software

4.1 Host System Requirements

The included AMICWare RFID Expert GUI Software requires the following system environment for proper installation:

Minimum host controller requirement:

> Pentium 133MHz
> 32MB RAM
> One RS-232 port (UART 16550A or compatible)
> 10MB of free disk space
> Resolution: 1024 x 768 with small fonts
> Color depth: 16 Bit (65536)

Host operating systems supported:

> Windows 98
> Windows 2000
> Windows XP

4.2 Software Installation

1. Insert the enclosed CD-ROM into computer's CD-ROM drive. After a short while the Welcome screen shall display.

    Click on the **Next** button.

Note: If the Welcome Screen is not displayed when the CD-ROM is inserted, go to **My Computer**, open the Setup Disk (CD-ROM) icon, and double-click the Setup.exe file.

2. The Software License Agreement screen will display.
    Select "I accept the terms in the license agreement".
    Click the on **Next** button.
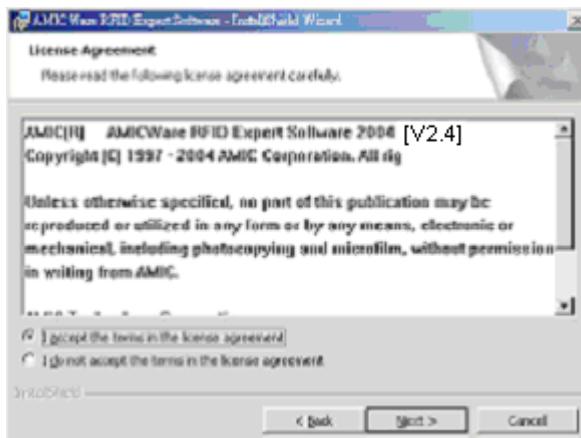
3. The Customer Information screen will display. Enter the information for User Name and Organization, and

Click on the **Next** button.

4. The Choose Destination Location screen will display. Use Change button to choose a different destination other then the default setting and

Click on the **Next** button.

The Ready to Install the Program screen will display.

Click on the **Install** button.
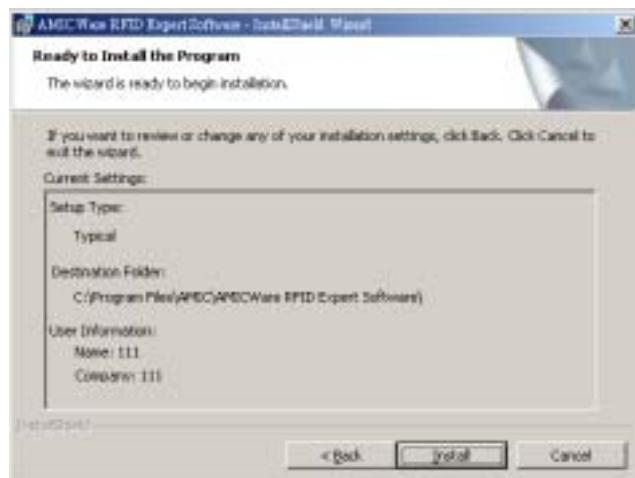
5. The Start Copying File screen will display.

When the setup operation is completed, the final setup screen will display.

Click on the **Finish** Button.
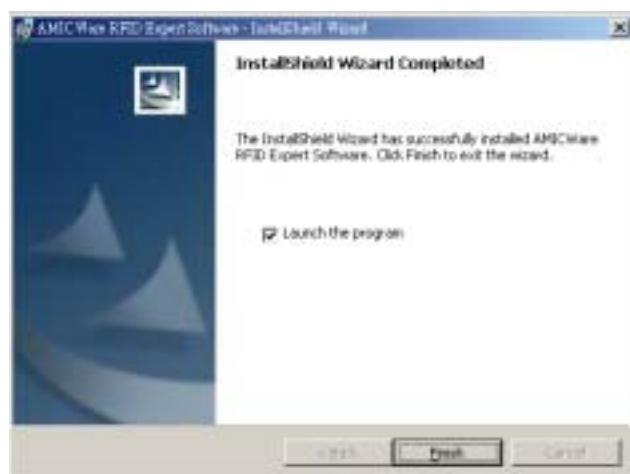
4.3 Uninstall AMICWare Software

Follow the procedure below to uninstall the AMICWare RFID Expert GUI Software from your computer.

7. Select ***Program/AMICWare RFID Expert Software*** from the Windows Start Menu.
8. Select ***Uninstall AMICRFID***.

4.4 Software Description

4.4.1 Starting and Quitting

1. Select **Program / AMICWare RFID Expert Software/AMICRFID** from the Windows Start Menu.

2. The AMICWare RFID Expert Software will start and the GUI screen will be displayed.
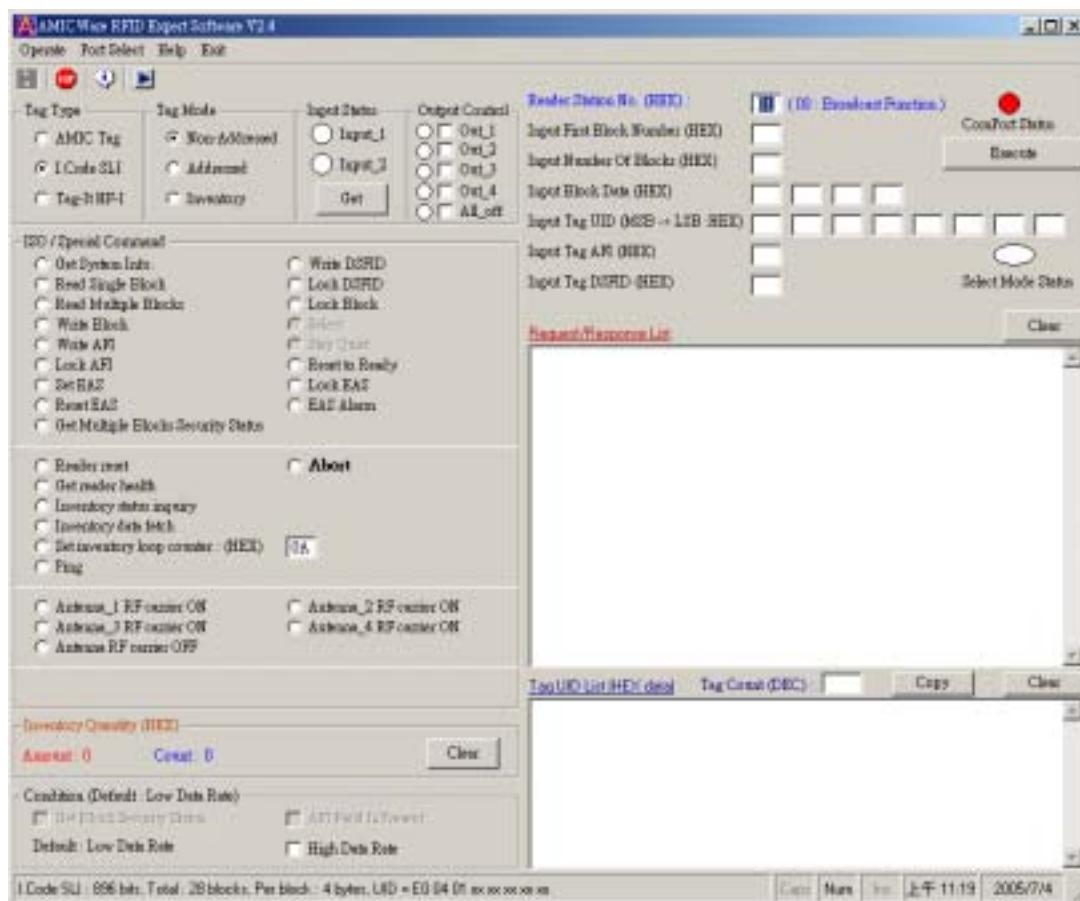
3. To quit, select **Exit** to close the AMICWare RFID Expert Software.

Default Setting :

The following is software's default setting when installed on your computer:

COM Port: COM1

Baud Rate: 115.2 kbits/sec, No parity bit, 8 data bits, 1 stop bit

User must change the above setting to reflect the actual PC hardware environment in order to establish proper communication with the AMIC reader system.

4.4.2 AMICWare RFID Expert GUI Software Screen Configuration

The followings describe the screen configuration of the AMICWare RFID Expert Software.
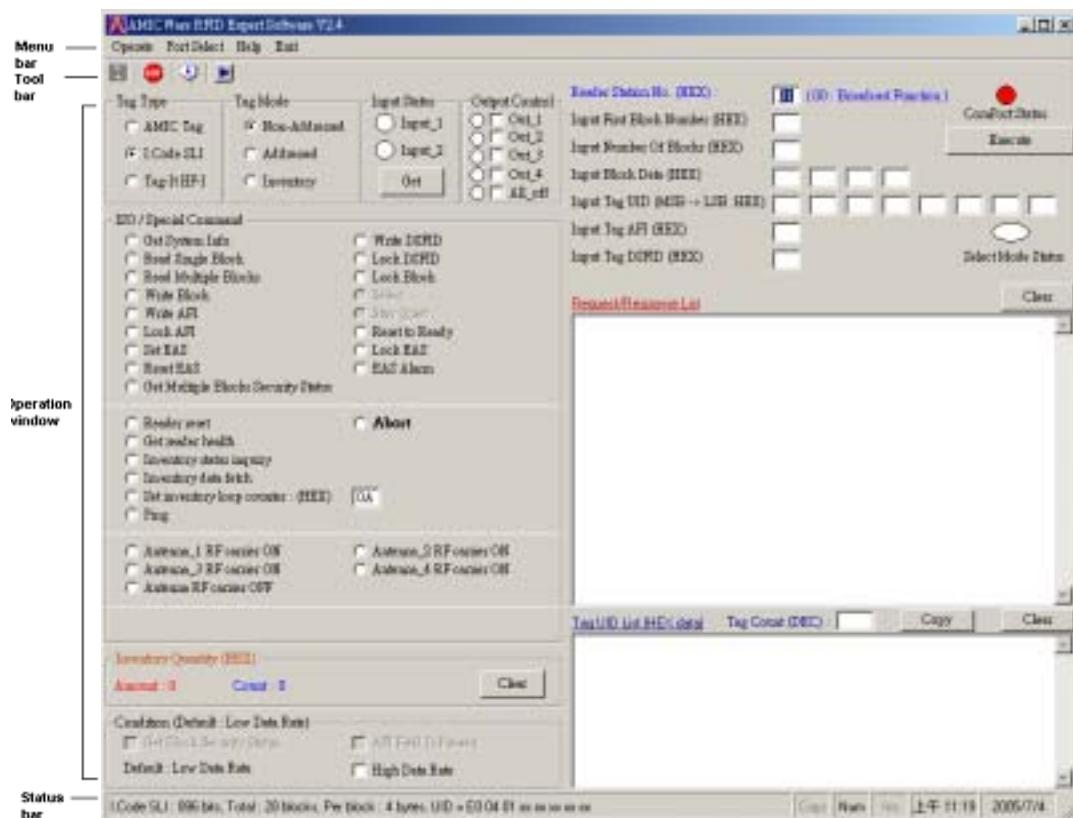
Menu Bar

The Menu Bar functions are listed in the following menu tree.
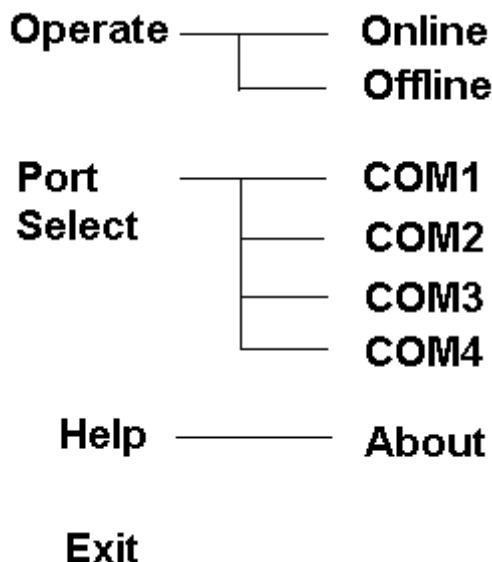
Tool bar

The following shortcut keys can be used from the Tooolbars.

Online
Offline
About
Execute

Status Bar

The Status Bar on the bottom of the display displays tag contents such as tag manufacturer, memory format, tag UID and others auxiliary information such as date, and time.

4.4.3 COM Port Setting

Select *Port Select* from the Menu Bar.

You can choose either COM1, COM2, COM3 or COM4.
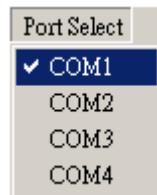
4.4.4 Toolbars Description

1. Online: PC's COM Port is opened.
   Note: The execute indicator will change to red on the right of the screen.

2. Offline: PC's COM Port is closed.
   Note: The execute indicator will change to black on the right of the screen.

3. About: General information for AMICWare RFID Expert Software will be displayed.
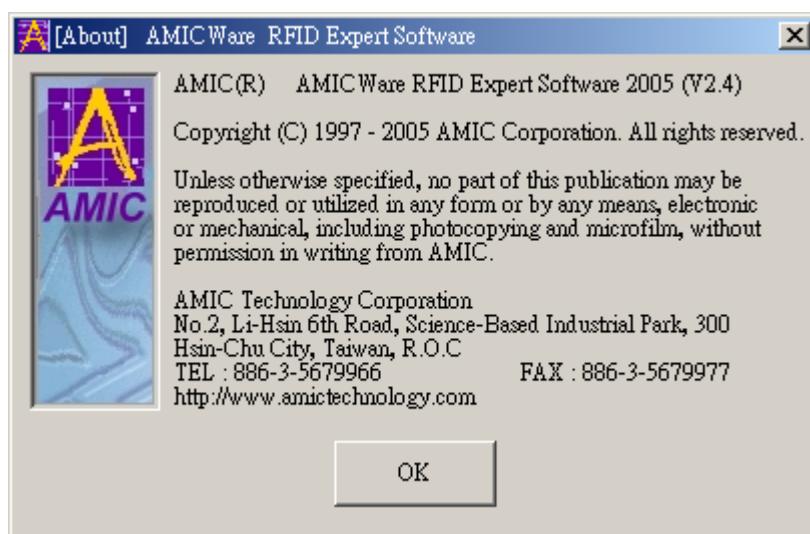
4. Execute: Transmit command to AMIC's A9240-A-001-485 reader system.

4.4.5 Operation Description

1. Select Tag Type:
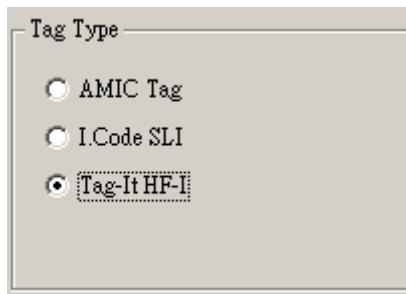
AMICWare RFID Expert GUI Software fully supports three IC manufacturers (AMIC, TI, PHILIPS at present) that offer ISO/IEC 15693 compatible tags.
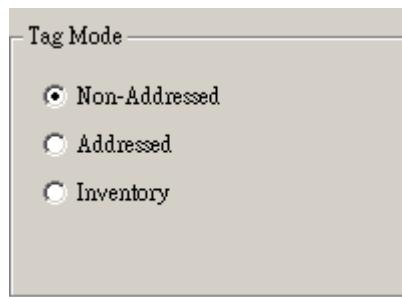
2. Select Tag Mode:

After you select the setting, AMICWare RFID Expert Software will automatic disable (gray-out) some functions as shown below:

Non-Addressed Mode   **Addressed Mode**   **Inventory Mode**

3. **Select Function:**

Choose the command that you want to perform.

4. **Input Status:**

The Input port status of the AMIC's A9240-A-001-485 reader system will be updated whenever the **Get** button is pressed.   A red bullet represents that the terminals for the particular input port are connected.   A black bullet represents that the terminals for the particular input port are disconnected.   Before the **GET** button is pressed for the first time, status bullets will be shown in white.

5. Output Control:
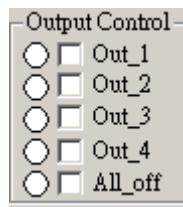
The round bullets represent the current condition for each output port.　A red bullet represent that the output port is currently on (terminals connected) while a black bullet represents the output port is currently off (terminals disconnected).　When the software is being brought up for the first time, all bullets will be shown in white which represents that the output ports are un-initialized.　To turn on a particular output port, check the square box next to the output port and click on the **Execute** box.　You should see the round bullet next to the output port become red.　To turn off a particular output port, check the square box next to the output port and click **Execute** box.　The red bullet next to the output port should become black.　All square boxes will be cleared whenever you click on the **Execute** box.

6. Condition:

Tag Mode and Function selected will determine the usable function of the Condition items.
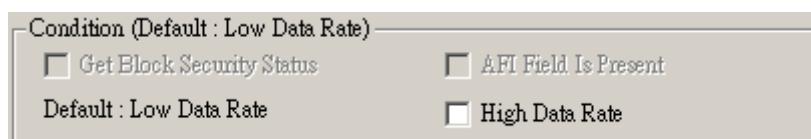
7. Inventory Data Fetch information:
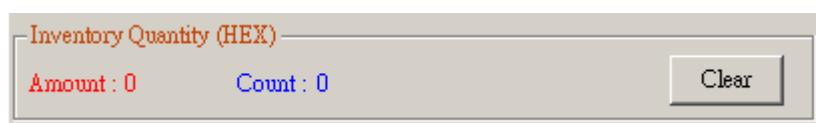
8. Data Key-in Section:

Reader systems other than the development kit will each have a unique address and must be set properly prior to system operation.

The operations of Data Key-in section depend on the Command selected.   User needs to fill in the appropriate blanks for the command to execute successfully.

9. Request / Response List:

The Request/Response List window will record command request and response related messages.   The request and response related messages will be cleared, whenever the **Clear** button is pressed.

10. Tag UID List:

Tag UID List frame will record Tag UID messages and Tag quantity detected by the reader system.   Tag UID related messages will be cleared whenever the **Clear** button is clicked.   Tag UID number will be copy to "Input Tag UID" field whenever the **Copy** Button is pressed.

Note : For other detail operation information, refer to the ISO/IEC 15693-3 specification.

Appendix 1: Tag Descriptions

Appendix 1.1 Tag-It HF-I ISO-15693 (Texas Instruments)

The complete Tag-It HF-I specification can be found in the Texas Instruments publication titled "Tag-It HF-I Transponder Inlays Reference Guide".

Memory Structure of the Tag-It HF-I

Block #	32 bits (4 bytes per block)			
0 (0x00)				
1 (0x01)				
2 (0x02)				
62 (0x3E)				
63 (0x3F)				

2K bits (256bytes) of user memory is available for read/write.

The user can permanently lock any block.

Once a block is locked it can not be unlocked again.

A 64-bit ID (factory programmed) uniquely identifies each Tag-It HF-I chip.

0xE0	0x07	Unique Tag ID – 48 bits (6 bytes)

Appendix 1.2   I   Code SLI ISO-15693 (Philips)

The complete I   Code SLI specification in the Philips publication titled "I   Code SLI Smart Label IC SL2 ICS20 Functional Specification".

Memory Structure of the I   Code SLI (version SL2 ICS20)

Block #	32 bits (4 bytes per block)			
0 (0x00)				
1 (0x01)				
2 (0x02)				
26 (0x1A)				
27 (0x1B)				

896 bits (112bytes) of user memory is available for read/write.

The user can permanently lock any block.

Once a block is locked it can not be unlocked again.

A 64-bit ID (factory programmed) uniquely identifies each I   Code SLI chip (SL2 ICS20).

0xE0	0x04	0x01	Unique Tag ID – 40 bits (5 bytes)

             Rev 1.0

Appendix 2. Revision History

Revision	Date	Description	By
1.0	07/07/2005	Initial creation	D. Lin

NOTE: The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

FCC INFORMATION

The Federal Communication Commission Radio Frequency Interference Statement includes the following paragraph:

The equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communication. However, there is no grantee that interference will not occur in a particular installation. If this equipment dose cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The user should not modify or change this equipment without written approval

Form AMIC Communication Co.   Modification could void authority to use this equipment.