AMAX-2050

GX2-400 with AMONet, CAN, LAN, 2xUSB, 2xRS-232, RS-422/485

User Manual

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

Step 1. Visit the Advantech web site at **www.advantech.com/support** where you can find the latest information about the product.

Step 2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
- Product name and serial number
- Description of your peripheral attachments
- Description of your software (OS, version, software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- AMAX-2050 Module
- AMAX-2050 Driver & Utility CD-ROM

Contents

CHAPTER 1

AMAX-2050 Overview

This chapter gives an overview, specifications, and background information on the AMAX-2050.

Sections include:

- Introduction
- Hardware Specifications
- Safety Precautions
- Block Diagram

Chapter 1 AMAX-2050 Overview

1.1 Introduction

AMAX-2050 comes with a built-in Microsoft Windows CE OS, offering a pre-configured image with optimized onboard device drivers. AMAX-2050 supports not only standard networking interfaces, such as Ethernet, CAN, RS-232, and RS-422/485 but also AMONet interface.

Because of its openness, great expansion capabilities and reliable design (fanless and diskless), the Advantech AMAX-2050 is an ideal embedded platform to implement custom applications for diversified applications.

1.2 Hardware Specifications

- **CPU:** AMD Geode GX2-400 processor, 256MB DDR onboard
- **VGA/Keyboard/Mouse:** DB-15 VGA Connector, PS/2 keyboard / mouse
- **Serial Ports:** 2 x RS-232
  1 x Isolated RS-422/485 port w/ auto-flow control
- **Speed:** RS-232:50~115.2 kbps, RS-422/485:50~921.6 kbps
- **USB Interface:** 2 x USB ports, USB OpenHCI, Rev. 1.1 compliant
- **LAN:** 1 x 10/100 EtherNet port (RTL8100B)
- **CAN:** 1 x Isolated CAN port (local)
- **AMONet:** 1 x Isolated AMONet with 1 x RJ-45 connectors (local)
- **SSD:** 1 x Internal (Master) &
  1 x External (Slave) Type I/Type II CompactFlash slot
- **Watchdog Timer:** Programmable.
- **LED:** Power, CF, Alarm for RAM Backup Battery
  4 Programmable Diagnostic LEDs
- **Power Supply:** Min. 15W (9 ~ 36VDC) (e.g +24V @ 625mA)
- **Power Consumption:** 8W (Typical) 15W (Max.)
- **Software Options:** Windows CE .NET V5.0

1.3 Safety Precautions

The following sections tell how to make each connection. In most cases, you will simply need to connect a standard cable.

Warning! *Always disconnect the power cord from your chassis whenever you are working on it. Do not connect while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.*

Caution! *Always ground yourself to remove any static electric charge before touching AMAX-2050. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.*

1.4 Block Diagram

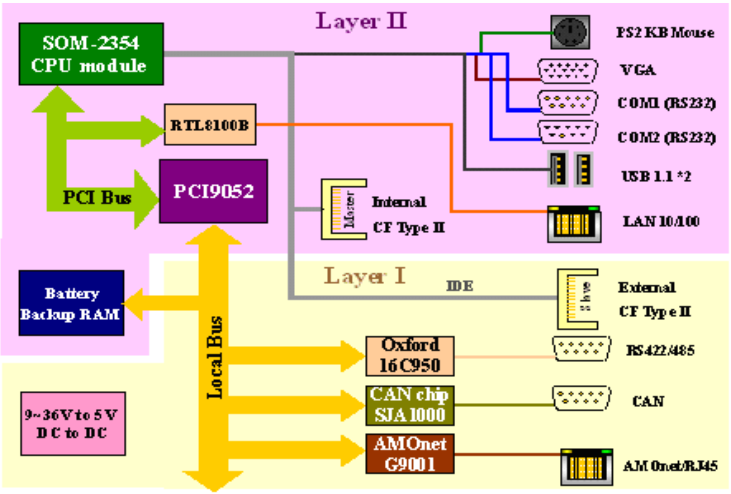


Figure 1.1: Block Diagram

CHAPTER 2

Hardware Functionality

This chapter shows how to set up the AMAX-2050's hardware functions, including connecting peripherals, switches and indicators.

Sections include:

- Board Connectors & Jumpers
- LED Indicators
- COM1 ~ COM2 RS-232 Interface
- RS-422/485 Interface
- AMONet Interface
- CAN Interface
- LAN: Ethernet Connector
- Power Connector
- PS/2 Mouse and Keyboard Connector
- USB Connector
- VGA Display Connector
- Battery Backup SRAM
- Reset Button
- Mounting

Chapter 2 Hardware Functionality

2.1 Board Connectors & Jumpers

Figure 2.1 ~ 2.3 show the locations of AMAX-2050 connectors and jumpers, and the description is listed in the Table 2.1.

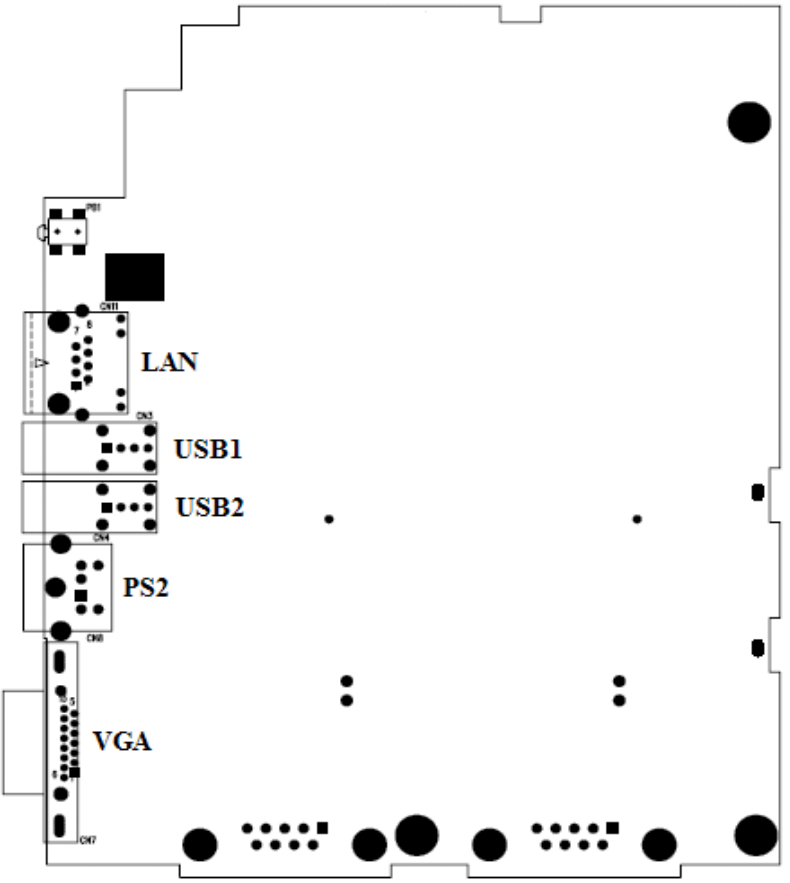


Figure 2.1: Front Panel of AMAX-2050 Layer 2

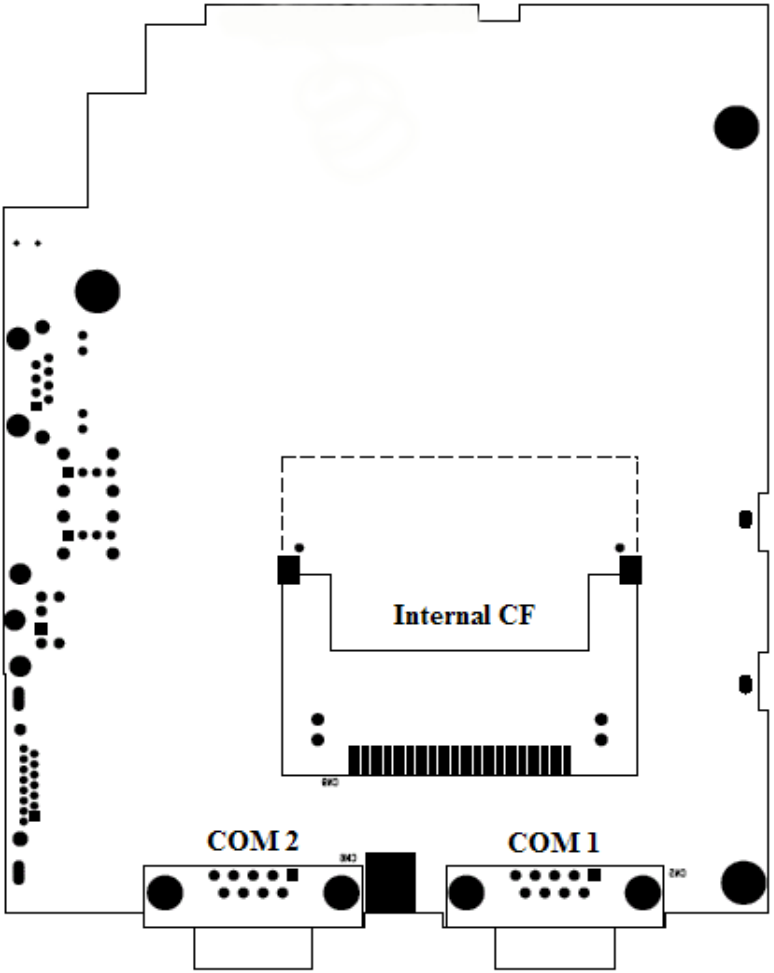


Figure 2.2: Rear Panel of AMAX-2050 Layer 2

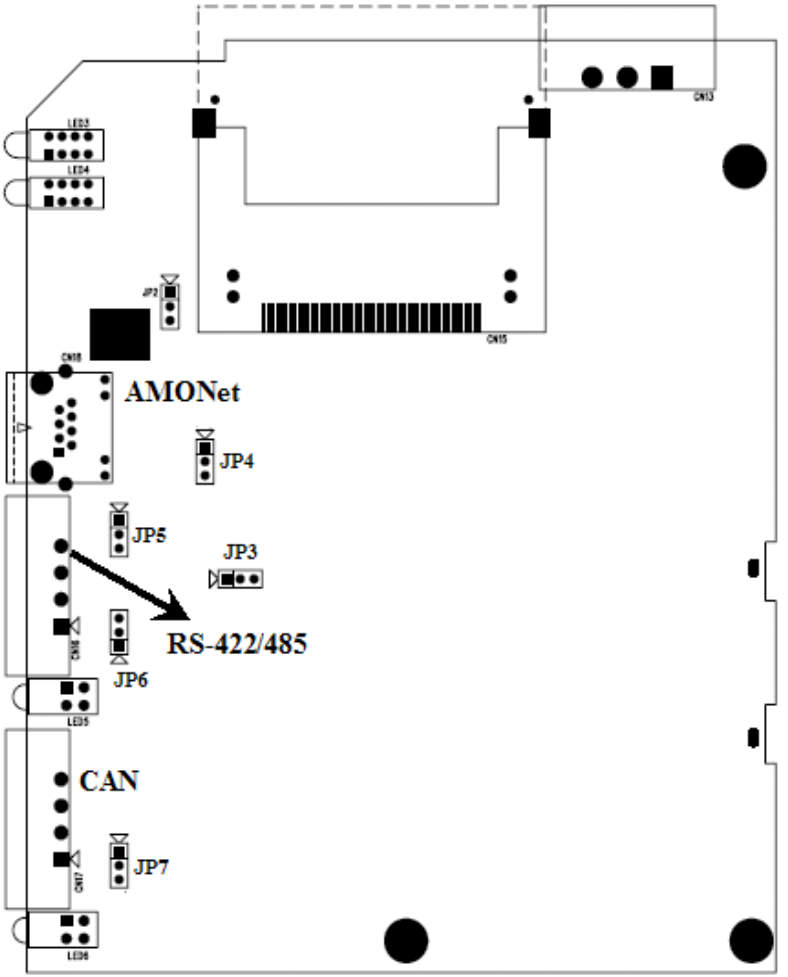


Figure 2.3: Front Panel of AMAX-2050 Layer 1

Table 2.1: AMAX-2050 Connectors & Jumpers	
CN3	USB connector 1
CN4	USB connector 2
CN5	COM1 standard RS-232 port
CN6	COM2 standard RS-232 port
CN7	VGA DB-15 connector
CN8	PS2 keyboard and mouse connector
CN9	Internal CompactFlash card slot
CN11	Ethernet RJ-45 connector
CN13	Phonex power connector
CN16	RS-422/485
CN17	CAN DB-9 connector
CN18	AMONet
JP3	RS-422/485 auto direction or always RS-422
JP4	Termination resistor of AMONet
JP5, JP6	Termination resistor of RS-422/485
JP7	Termination resistor of CAN

2.2 LED & Buzzer

There are few LEDs on the front panel of AMAX-2050, each of them has its own specific meaning as below table.

Table 2.2: AMAX-2050 LED Definition	
LED	Description
PWR	Power
CF0	Internal CF Card
CF1	External CF Card
BAT	Battery backup
L0 ~ L3	Programmble Diagnostic LED & Buzzer

Note: AMAX-2050 provides built-in examples to show how to configure the LED & Buzzer. Refer to console mode examples in: C:\Program Files\Windows CE Tools\wce500\AdvAMAX2050MUI\Examples\Generaldio

2.3 COM1~COM2: RS-232 Interface

The AMAX-2050 offers two standard RS-232 serial communication interface ports (COM1&COM2). Please refer to A.2 for the pin assignments.

2.4 RS-422/485 Interface

The AMAX-2050 offers one RS-422/485 serial communication interface port. Please refer to Appendix A.3 for their pin assignments.

2.4.1 RS-422/485 detection

In RS-422/485 mode, AMAX-2050 automatically detects signals to match

RS-422 or RS-485 networks. (No jumper change required)

2.4.2 RS-485 Auto Flow Control & RS-422 Master/Slave

You can set the “Auto Flow Control mode of RS-485 or “Master/Slave" mode of RS-422 by using the JP3 for each RS-422/485 port. In RS-485, if the switch is set to “Auto" the driver automatically senses the direction of the data flow and switches the direction of transmission. No handshaking signal (e.g. RTS signal) is necessary. This lets you conveniently build an RS-485 network with just two wires.

In RS-422, if the JP3 is set to “Master mode", the driver is always enabled, and always in high or low status.

Table 2.3: Jumper Settings		
Label	**Setting**	**Function description**
JP3		RS-422: Master mode (factory default setting)
		RS-485: Auto flow control RS-422; Slave mode
JP5~JP6		Termination resistor ON (120 ohms)
		Termination resistor OFF (factory default setting)

2.5 AMONet Interface

2.5.1 Specifications

- **Number of Rings:** 1
- **Transmission Speeds:** 2.5, 5, 10, 20 Mbps with automatic data flow control
- **Serial Interface:** Half duplex RS-485 with transformer isolation
- **Cable Type:** CAT5 UTP/STP Ethernet cable
- **Surge Protection:** 10 kV
- **Communication Distance:** Max. 100 m (20 Mbps/32 slave modules)
- **Communication Slave Module Capacity:** 1 Ring with Max. 64 Supported Software

2.5.2 AMONet Extension

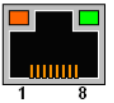


Figure 2.4: AMONet Extension

Pin	Label	Description
1	FG	Filed Ground
2	FG	Filed Ground
3	DATA+	High Speed RS-485 protocol
4	FG	Filed Ground
5	FG	Filed Ground
6	DATA-	High Speed RS-485 protocol
7	FG	Filed Ground
8	FG	Filed Ground

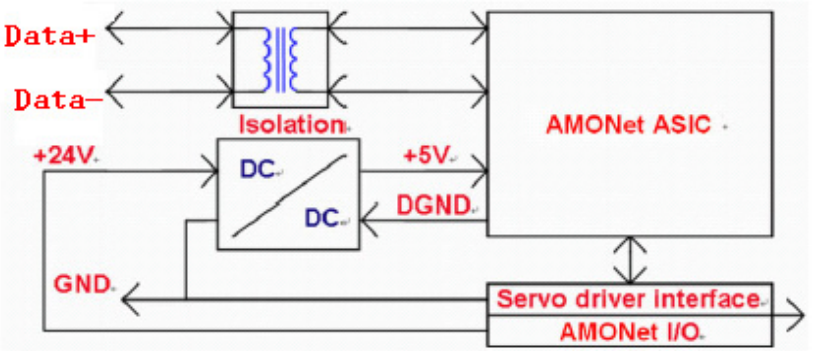


Table 2.4: Jumper Settings		
Label	**Setting**	**Function description**
JP4		Termination resistor ON (factory default setting)
		Termination resistor OFF

2.5.3 AMONet Extension Interface

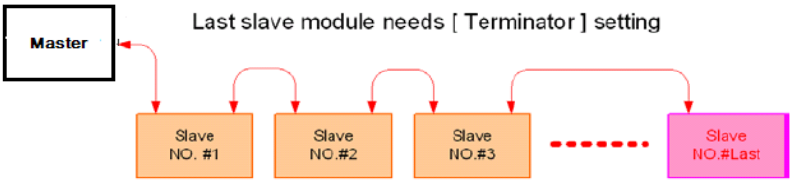


Figure 2.5: AMONet Slave Module Address Setting

2.6 CAN Interface

The AMAX-2050 offers one CAN serial communication interface port. Please refer to Appendix A.4 for the pin assignments.

Control Area Network

The CAN (Control Area Network) is a serial bus system specially suited for networking “intelligent” I/O devices as well as sensors and actuators within a machine or plant. Characterized by its multi-master protocol, real-time capability, error correction, high noise immunity, and the existence of many different silicon components, the CAN serial bus system, originally developed by Bosch for use in automobiles, is increasingly being used in industrial automation.

Table 2.5: Jumper Settings		
Label	**Setting**	**Function description**
JP7		Termination resistor ON (120 ohms) (factory default setting)
		Termination resistor OFF

Note: AMAX-2050 provides CAN example as the following path: C:\Program Files\Windows CE Tools\wce500\AdvAMAX2050MUI\Examples\CAN

2.7 LAN: Ethernet Connector

The AMAX-2050 is equipped with a Realtek RTL8100BL Ethernet LAN controller that is fully compliant with IEEE 802.3u 10/100Base-T CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack on the board, and LED indicators on the front side shows its link (Green LED) and active (Yellow LED) status. Please refer to Appendix A.5 for pin assignments.

2.8 Power Connector

The AMAX-2050 comes with a Phoenix connector to provide a 9~36 VDC external power input, and features reversed wiring protection. Therefore, it will not cause any damage to the system in the case of reversed wiring of ground line and power line. Please refer to Appendix A.6 for pin assignments.

2.9 PS/2 Keyboard & Mouse Connector

The AMAX-2050 provides a PS/2 keyboard and PS/2 mouse connector. A 6-pin mini-DIN connector is located on the rear panel of the AMAX-2050. The AMAX-2050 comes with an adapter to convert from the 6-pin mini-DIN connector to two 6-pin mini-DIN connectors for PS/2 keyboard and PS/2 mouse connection. Please refer to Appendix A.7 for its pin assignments.

2.10 USB Connector

The AMAX-2050 provides two connectors for USB interfaces, which gives complete Plug & Play, and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 1.1. The USB interface can be disabled in the system BIOS setup. Please refer to Appendix A.8 for its pin assignments.

2.11 VGA Display Connector

The AMAX-2050 provides a VGA controller (Chipset: VIA Twister chip with Integrated S3 Savage4 2D/3D/Video accelerator) for a high resolution VGA interface. It supports VGA and VESA, up to 1280 x 1024 @ 8 bpp and 1024 x 768 @ 16bpp resolution, and up to 32 MB shared memory. The VGA interface is reserved for system testing and debugging. The AMAX-2050's JP8 is a 6-pin mini connector and CN7 is a 15-pin connector for a VGA monitor. A VGA cable is attached to convert from a 6-pin mini connector to a standard VGA connector. You can choose one of the VGA interfaces for system testing and debugging. Pin assignments for VGA display are described in Appendix A.9.

2.12 Battery Backup SRAM

AMAX-2050 provides 512 KB of battery backed SRAM. This ensures that you have a safe place to store critical data.

There is a BAT LED in the front panel of the AMAX-2050, please replace the lithium battery with a new one if the BAT LED is activated. After changing a new battery, the data in SRAM will disappear.

The following are the specifications of the lithium battery:

Type: BR2032 (CR2032 is NOT recommended)

Output voltage: 3 VDC

Caution: The computer is provided with a battery-powered real-time clock circuit.There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacture. Discard used batteries according to the manufacturer's instructions

2.13 Reset Button

Press the Reset button to activate the reset function.

2.14 Mounting

AMAX-2050 supports two different mounting methods: Panel & DIN-rail.

2.14.1 Panel Mounting

AMAX-2050 can be wall mounted by using the included metal mounting kit. First, use the screws included in the package to combine the AMAX-2050 and metal mounting kit.

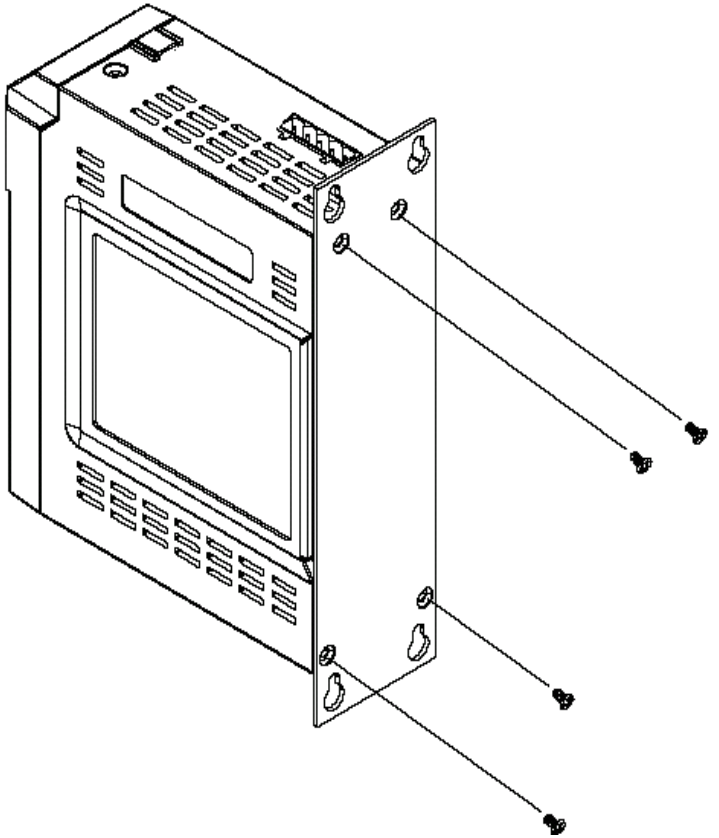


Figure 2.6: Combine the Metal Mounting Kit

Then, screw the whole device to the wall.

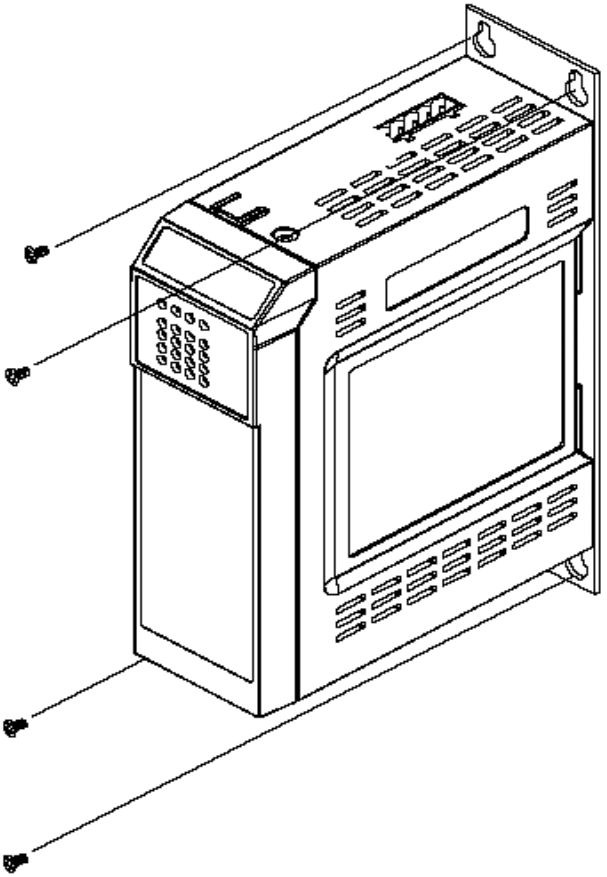


Figure 2.7: Attach AMAX-2050 to the Wall

2.14.2 DIN-rail Mounting

You can also mount AMAX-2050 on a standard DIN-rail by below steps.

First, pull down the kit in the back of AMAX-2050

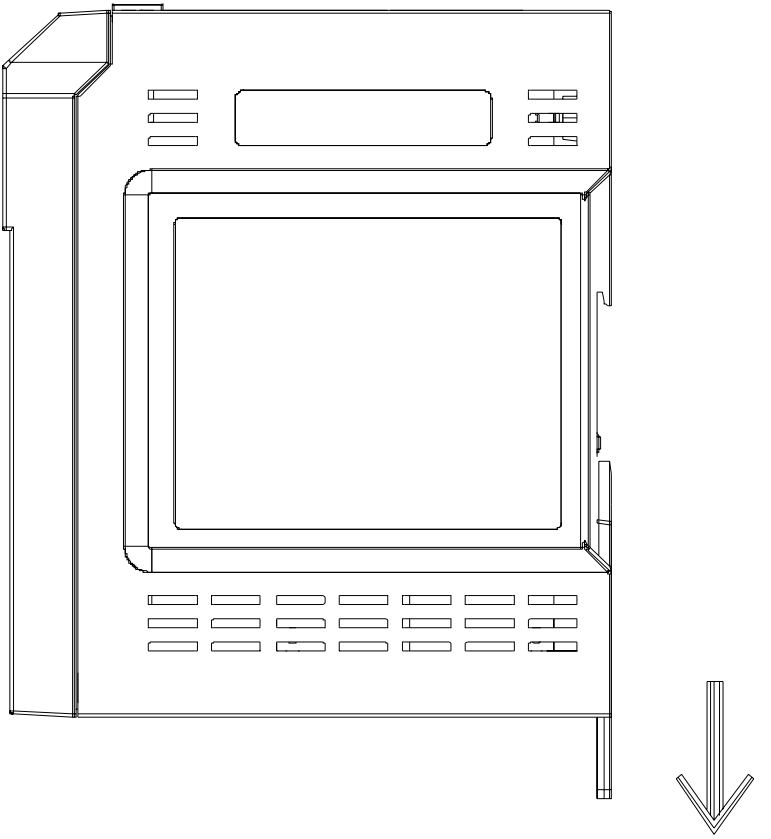


Figure 2.8: Installation to DIN-rail Step 1

Then, hang the AMAX-2050 to the DIN-rail with angle of inclination.

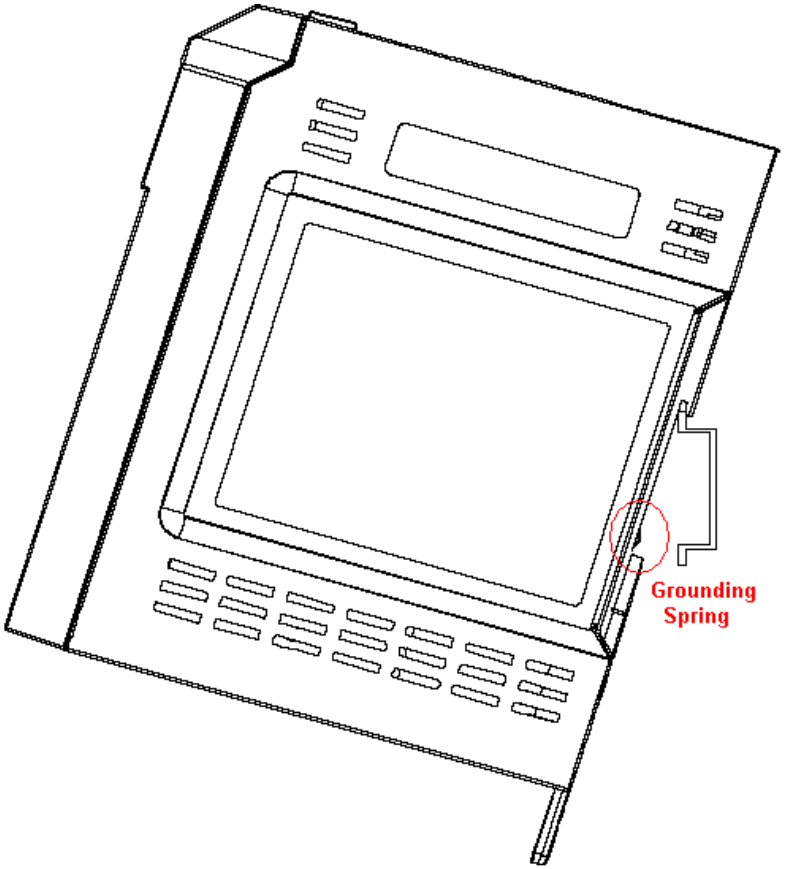


Figure 2.9: Installation to DIN-rail Step 2

Put the AMAX-2050 at a right angle with the DIN-rail. The grounding spring in the back should be flush with the aluminum rail. Then pull up the kit to wedge the AMAX-2050 firmly into place.

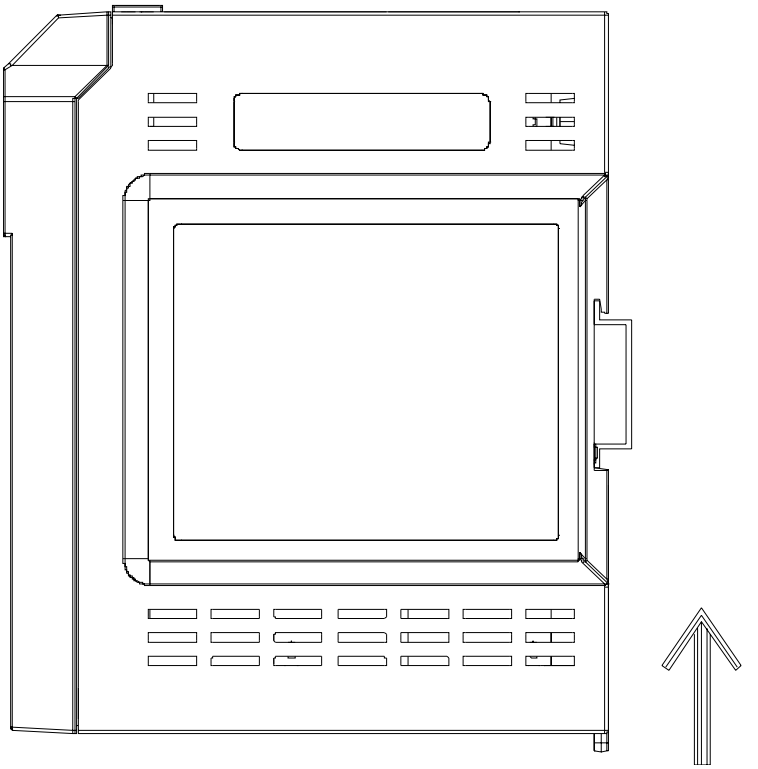


Figure 2.10: Installation to DIN-rail Step 3

CHAPTER 3

KW Multiprog Installation

This chapter will outline the installation process for Advantech's Multiprog Software (AMAX-2050KW series only)

Chapter 3 KW Multiprog Installation

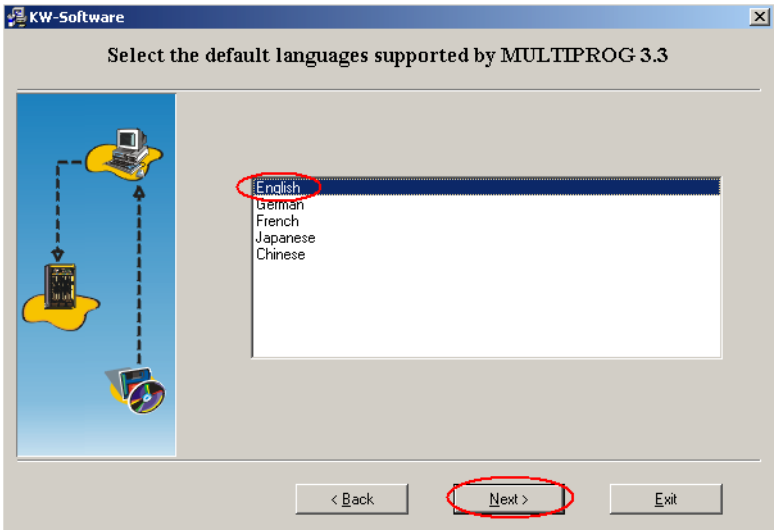
3.1 Multiprog Installation Procedure

1. Insert the Advantech Multiprog CD and click Multiprog item.

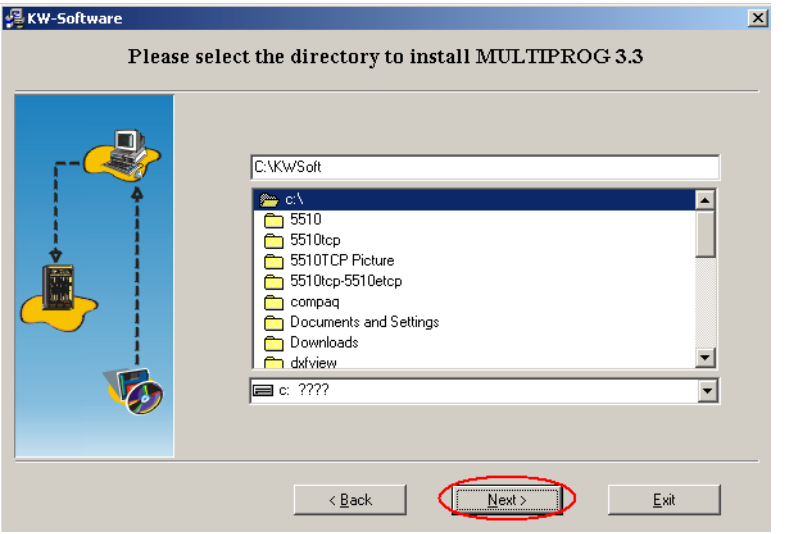
2. Click “Next” button

3. Select “I accept the item in the license agreement” and click “Next”

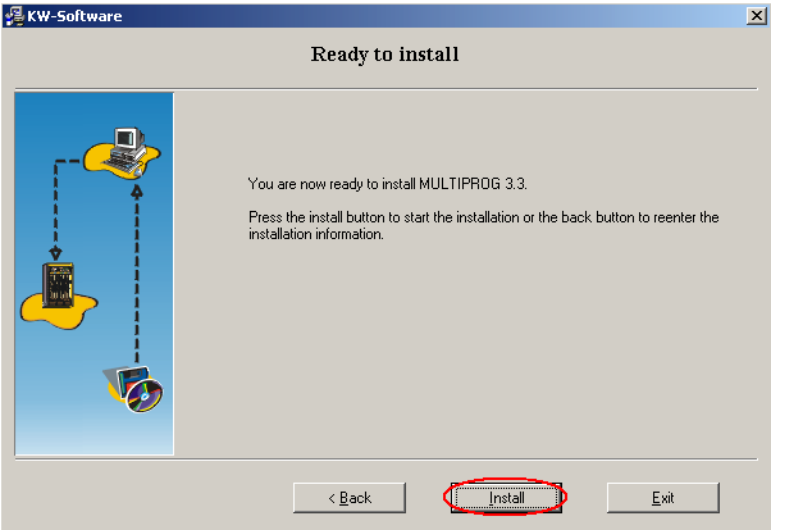
4. Select “English” only and click “Next”



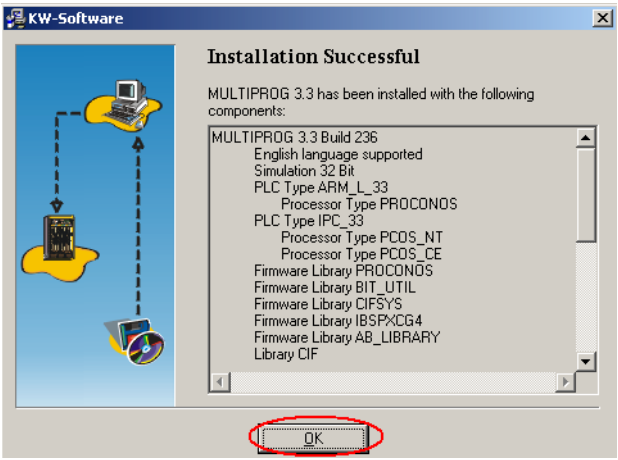
5. Click “Next” for default directory to install Multiprog.



6. Click “Install” to start the installation.



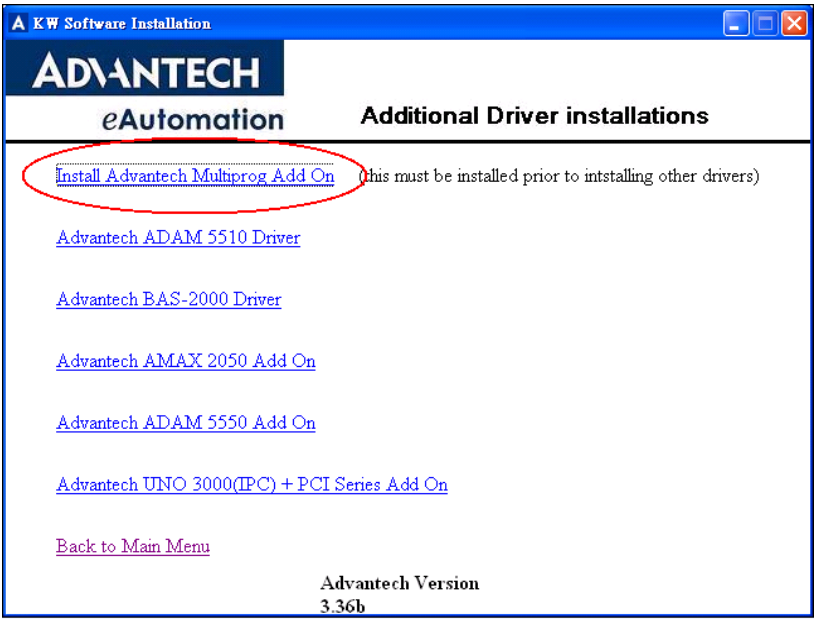
7. Click “OK” to finish the installation of Multiprog.



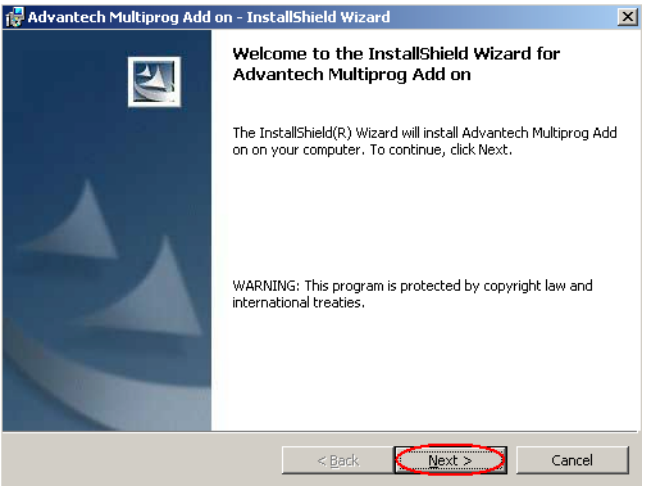
3.2 Multiprog Add-on Installation

1. Click “Multiprog Add On”.

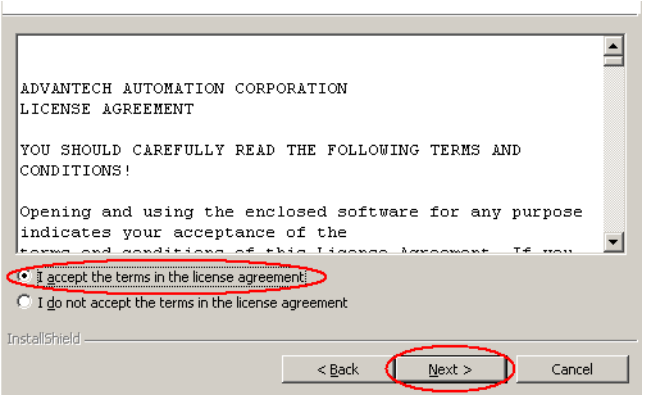
2. Click “Install Advantech Multiprog Add On”.



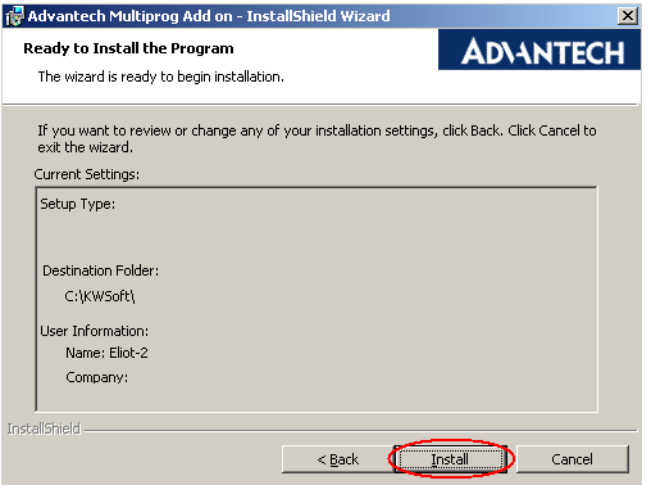
3. Click “Next”.



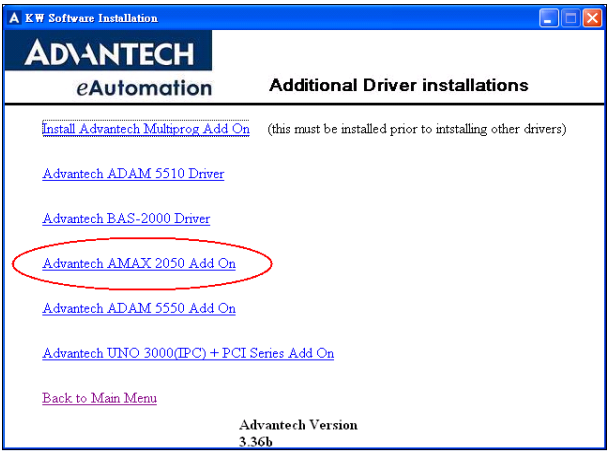
4. Read the agreement, then select “I accept the item in the license agreement” and click “Next”.



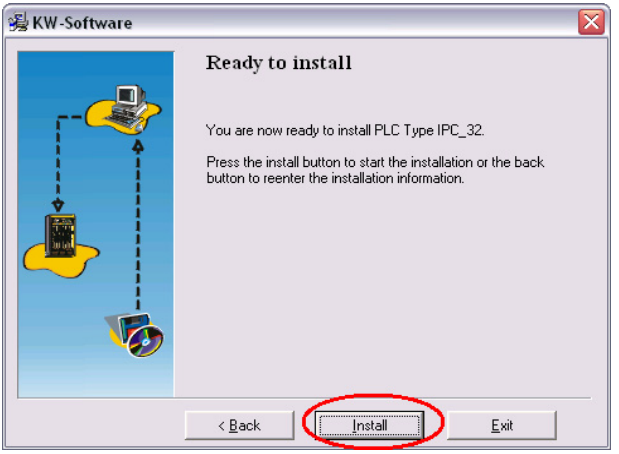
5. Click “Install”.



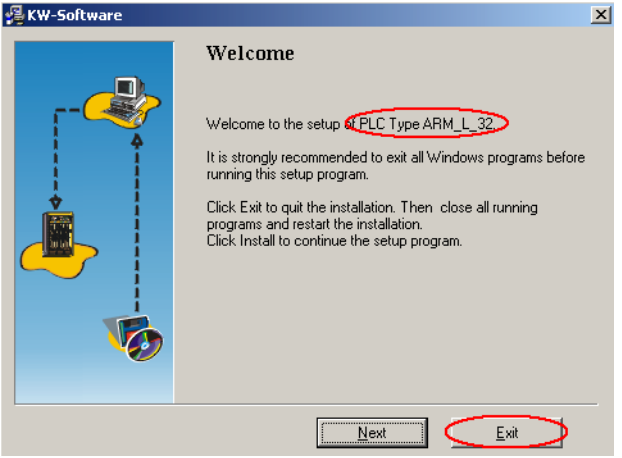
6. Click “Next” because “PLC Type IPC_32” is necessary.



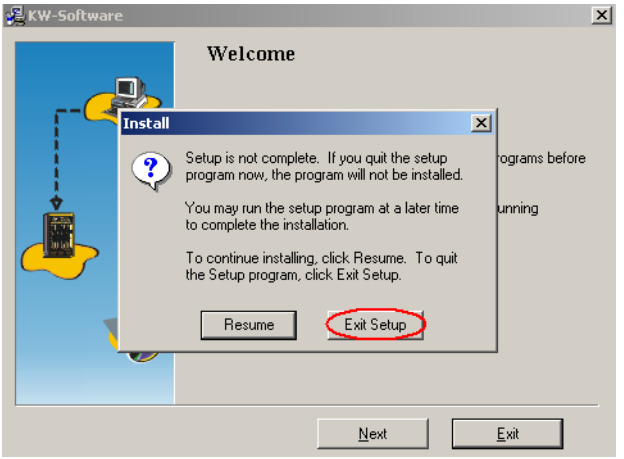
7. Click “Install”.



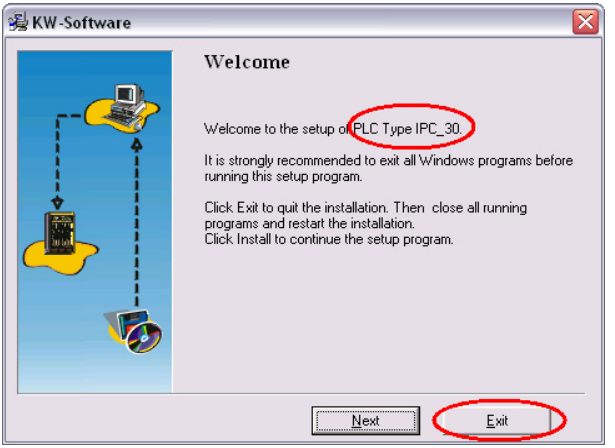
8. Click “EXIT” because “PLC Type ARM_L_32” is not necessary.



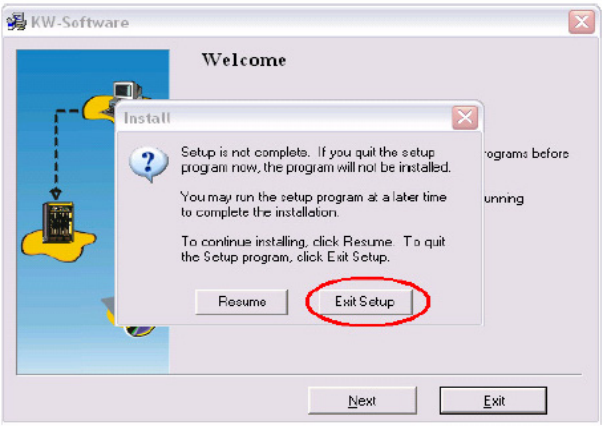
9. Click “Exit Setup”.



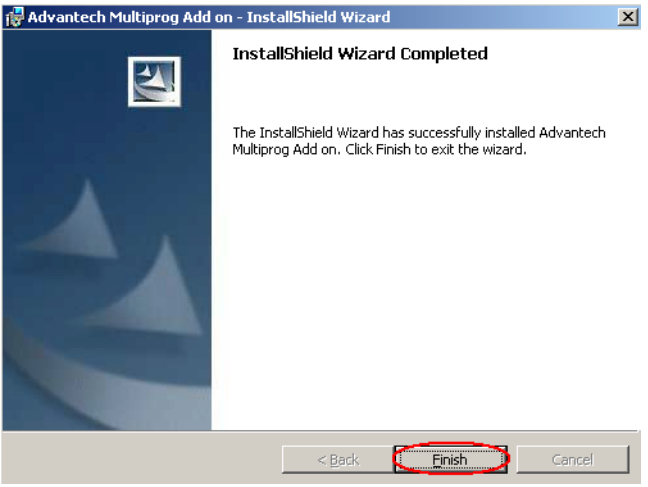
10. Click "Exit" because "PLC Type IPC_30" is not necessary.”.



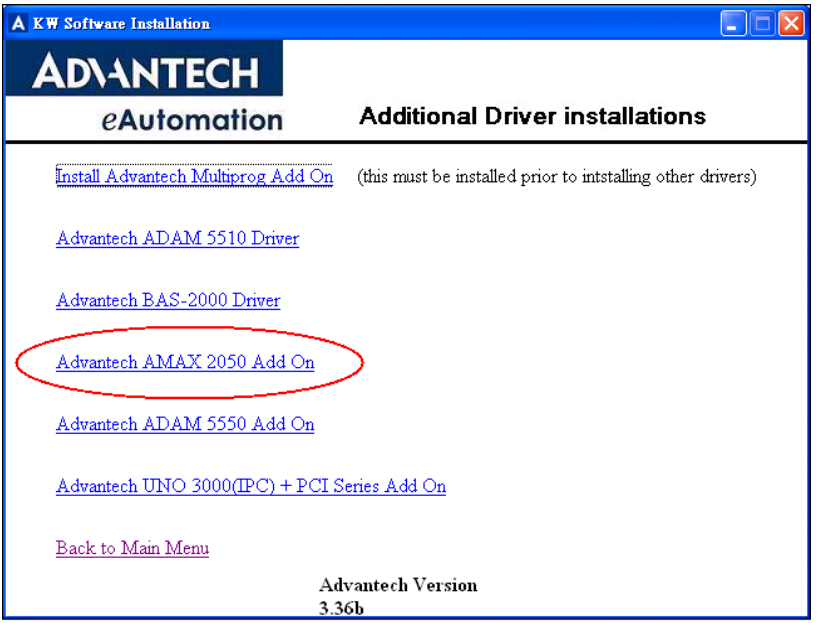
11. Click “Exit Setup”.



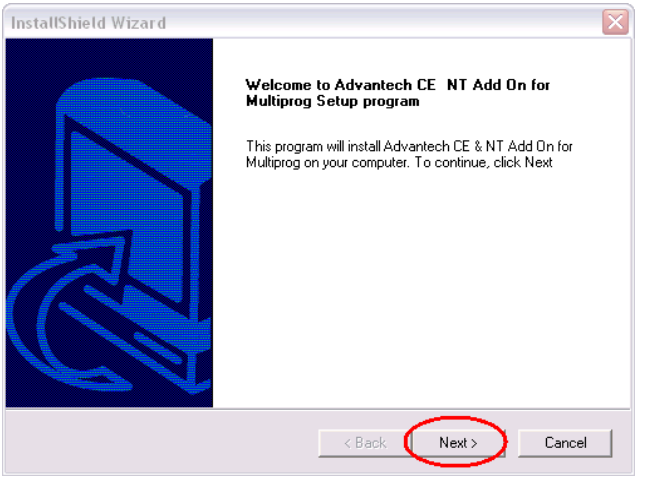
12. Click “Finish” to finish the installation.



13. Click “Advantech AMAX-2050 Add On”.

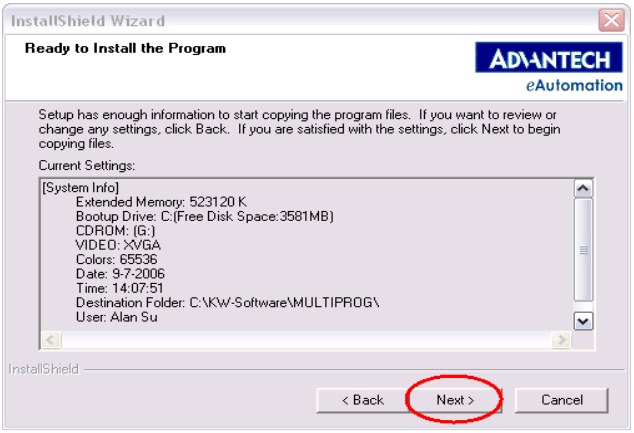


14. Click “Next”.

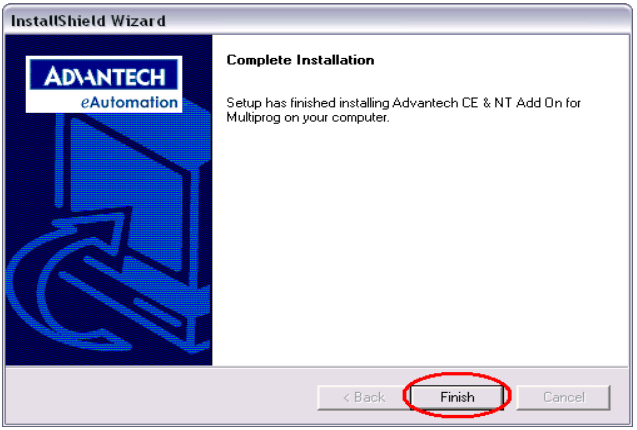


15. Click "Yes" to accept all the items of the preceding License Agreement.

16. Click "Next" to install the program..



17. Click “Finish” to finish the installation.



18. Click “Back to Main Menu”.

19. Click “Exit” to exit the installation page.

APPENDIX A

System Settings

This chapter provides information on the system settings of AMAX-2050.

Sections include:

- RS-232 Standard Serial Port
- RS-422/485 Serial Port
- CAN Serial Port
- Ethernet RJ-45 Connector
- Phoenix Power Connector (PWR)
- PS/2 Keyboard & Mouse Connector
- USB Connector
- VGA Display Connector

Appendix A System Settings

A.1 RS-232 Standard Serial Port (COM1,COM2)

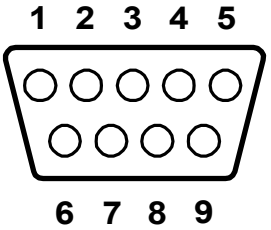


Table A.1: RS-232 Serial Port Pin Assignments

Pin	RS-232 Signal Name
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

A.2 RS-422/485 Serial Port

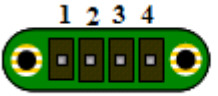


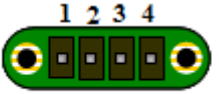
Table A.2: RS-422/485 Serial Port Pin Assignments

Pin	RS-422	RS-485
1	Rx+	NA
2	Rx-	NA
3	Tx+	DATA+
4	Tx-	DATA-
5	GND	GND

A.3 CAN Serial Port Pin Assignment

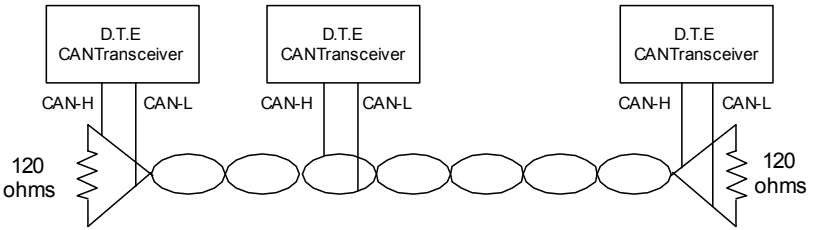
Table A.3: CAN Port Pin Assigns.

Pin	CAN Signal Name
1	GND
2	GND
3	CAN-H
4	CAN-L



A.3.1 CAN Signal Wiring

The CAN standard supports half-duplex communication. This means that just two wires are used to transmit and receive data.



A.4 Ethernet RJ-45 Connector (LAN1)

Table A.4: Ethernet RJ-45 Connector Pin Assigns.	
Pin	**10/100Base-T Signal Name**
1	XMT+
2	XMT-
3	RCV+
4	NC
5	NC
6	RCV-
7	NC
8	NC

A.5 Phoenix Power Connector (PWR)

Table A.5: Phoenix Power Connector Pin Assigns.	
Pin	**Signal Name**
1	+9~36 VDC
2	GND
3	Field Ground

A.6 PS/2 Keyboard and Mouse Connector

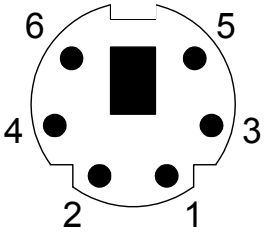


Table A.6: Keyboard & Mouse Connector Pin Assigns	
Pin	**Signal Name**
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB Clock
6	MS Clock

A.7 USB Connector (USB1, USB2)

Table A.7: USB Connector Pin Assignments		
Pin	**Signal Name**	**Cable Color**
1	VCC	Red
2	DATA+	White
3	DATA-	Green
4	GND	Black

A.8 VGA Display Connector

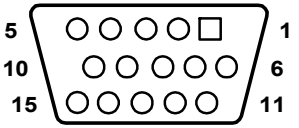


Table A.8: VGA Adaptor Cable Pin Assignment			
Pin	**Signal Name**	**Pin**	**Signal Name**
1	Red	9	NC
2	Green	10	GND
3	Blue	11	NC
4	NC	12	NC
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	NC
8	GND		

APPENDIX B

Programming the Watchdog Timer

Appendix B Programming the Watchdog Timer

To program the watchdog timer, you must write a program which writes I/O port address 443 (hex). The output data is a value of time interval. The value range is from 01 (hex) to 3E (hex), and the related time interval is 1 sec. to 62 sec.

Data	Time Interval
01	1 sec.
02	2 sec.
03	3 sec.
04	4 sec.
..	
..	
..	
3E	62 sec.

After data entry, your program must refresh the watchdog timer by rewriting the I/O port 443 (hex) while simultaneously setting it. When you want to disable the watchdog timer, your program should read I/O port 443 (hex).

The following example shows how you might program the watchdog timer in BASIC:

```
10   REM Watchdog timer example program
20   OUT &H443, data REM Start and restart the watchdog
30   GOSUB 1000 REM Your application task #1,
40   OUT &H443, data REM Reset the timer
50   GOSUB 2000 REM Your application task #2,
60   OUT &H443, data REM Reset the timer
70   X=INP (&H443) REM, Disable the watchdog timer
80   END
1000 REM Subroutine #1, your application task
..
..
..
1070 RETURN
2000 REM Subroutine #2, your application task
..
..
..
2090 RETURN
```

Note: AMAX-2050 provides Watchdog example as the following path: C:\Program Files\Windows CE Tools\wce500\AdvAMAX2050 MUI\Examples\Watchdog