ADAM-2000 Series

Wireless Sensor Network Data Acquisition Modules

Overview

ADAM-2000 series is the wireless solution of the ADAM family of products and integrates the IEEE802.15.4 standard, I/O and Sensor technologies. Features of the ADAM-2000 series are low power consumption, reliability and integration with I/O.

User Manual and Software

For more detailed information on this product, please refer to the ADAM-2000 Series User Manual on the CD-ROM (PDF format). CD:\Document\User Manual\ ADAM-2000_Series_User_Manual.pdf

Adobe® Reader® is required for viewing any PDF files. Acrobat Reader can be found on the CD. CD:\Adobe Acrobat\ The configuration software can be found on the CD. CD:\ADAM-2000 Utility\Advantech AdamApax .NET Utility.exe

Certification

ADAM-2000 Series developed by Advantech Co., Ltd. has passed the CE(R&TTE), FCC, NCC and SRRC certified test for environmental specifications. For more details see the User Manual.

Packing List

Before you begin installing your module, please make sure that the following materials have been shipped:

1 x ADAM-2000 Series

1 x ADAM-2000 series support CD

1 x DIN-rail mounting bracket (attached)

1 x ADAM-2000 Series Startup Manual

1 x Panel mounting bracket

If any of these items are missing/damaged, contact your distributor or sales representative immediately.

Notes

For more information on this and other Advantech products, please visit our websites at:

http://www.advantech.com

http://www.advantech.com/eAutomation

For technical support and service:

http://www.advantech.com.tw/eservice

This startup manual is for the ADAM-2000 Series

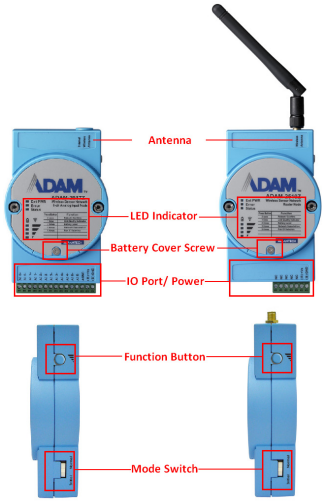
Part No: 2003201800	1st Edition
	May 2012

Network Concept

Coordinator, Router and End Device are three basic elements of the Wireless Sensor Network. Each of them has different functions. All devices have to set the same PAN ID and RF channel to perform the communication. A Coordinator is essential to associate a PAN of the Wireless Sensor Network in a specific PAN ID and RF channel. It is also a data collector of the PAN and usually works as a gateway to translate wireless data into any other data formats, such as Modbus RTU.

An optional router works as a wireless repeater to enhance the wireless signal strength and selects the best path for wireless communication. A WPAN with routers can make the network work as tree or mesh topology. An end device is a wireless remote I/O for data acquisition. The data is acquired from sensors or devices which can then be transmitted through it, which can communicate with the coordinator directly or via a router to a coordinator.

WPAN: A Wireless Personal Area Network (WPAN) is used for communication between devices The ADAM-2000 series integrates the IEEE 802.15.4 standard, allowing devices to interconnect without wires.



Normal Mode: Modules with the same PAN ID & RF channel which will perform self-association to form a Personal Area Network, Router and I/O End Device will send data to Coordinator automatically after power up.

Initial Mode: The Initial Mode is for user to configure parameters of the ADAM-2000 devices, which include PAN ID, RF channel, Slave ID and essential parameters.

Pair ID: In the Initial Mode, the Coordinator will search unoccupied Modbus ID Range (4 set of ID from 241~244) for module settings. Routers and End Devices must be associated with the corresponding Coordinator.

The images below show Pair ID: 2(242) and 4(244) in the LED indicator.

PAN ID: Personal Area Network ID, a unique number among Coordinator, Router and End Device to associate and share the same address space of connection.

RF Channel: Provide 11-26 channels for device operating in different frequency bands.

Slave ID: Modbus RTU Slave ID of module.

Data Cycle: The Data Cycle is the transmit interval of End Device (not for Coordinator and Router), the End Device can update data from once per second to once per day. For the rest of the time, End Device will enter sleep mode to save power.

Level Index: Show Link Quality, Level of battery power and Pair ID information.

Hardware Installation & Network Association

The ADAM-2000 series utilize a wireless connection way to form a Personal Area Network (PAN), follow Quick Network Association below to guide you quickly to build ADAM-2000 standard network. If quick network association cannot create an associate network properly, you may manually configure your modules with simple four processes through hardware and software installation processes following the Advance Installation Procedure.

Quick Network Association

Step 1. Take out Coordinator, Router and End Device from box, and check devices mode switch in **Normal Mode** position.

Step 2. Connect Coordinator to Host PC USB or RS-422/485 interface port then contact power to devices directly.

Step 3. Install AdamApax .NET Utility and then search serial port of Wireless Sensor Networks in the utility for ADAM modules.

Step 4. After searching, ADAM-2000 device will list in the tree view with model name, information and parameters. Users can monitor Coordinator, Router and End Device configurations and I/O status via AdamApax .NET Utility.

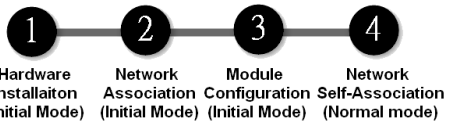
NOTE: Confirm Coordinator, Router and End Device in power on status, Normal Mode position before implementing quick network association. For factory default settings refers to below Configuration Parameters table.

NOTE: If the user uses 2 AA Alkaline batteries for power the Ext PWR LED of device will not be turned on. The Ext PWR LED only turns on when connected to external power.

NOTE: When the Coordinator uses USB for main communication interface install the USB driver first. The USB driver can be found on the support CD.

NOTE: When SCADA or other data acquisition software attempts to get more than one Router or End device data in application ensure all devices had set different Slave IDs. For detail setting information refer to advanced Installation Procedure below.

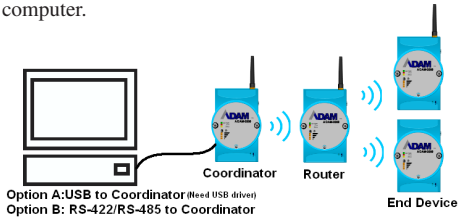
Advance Installation Procedure



CAUTION: When device switch to Initial Mode, ADAM devices will constantly sending data among Coordinator, Router and End Device. Therefore, devices operate with 2 AA Alkaline batteries under Initial Mode which can sustain power for 2 days approximately. It is strongly recommended selecting an external power input for the main power source and battery power for backup power source during Initial Mode.

Coordinator ❶ ❷

There are two ways to connect your Coordinator to a computer.



1. Move the right side mode switch of module to Initial Mode for module setup. (Factory default setting is in Normal Mode) Connect type B end of the USB cable to the ADAM-2520Z and the other end to host PC. For RS-422/485 interface user, please connect TX+/-, RX+/- (RS-422) or D+/D- (RS-485) from terminal block to host PC communication port.
2. When module connects with power, all LEDs turn on for 0.5 second then turn off after module initial. **NOTE**: When the Coordinator adopts USB for main communication interface install the USB driver first. The USB driver can be found on the CD.
3. Status LED turns on, and **Error LED** blinks **3** seconds. When it hosts PAN Error LED turns off.
4. Level Index will indicate Pair ID 1 if there are no modules occupied Pair ID 1 at the same time. When error LED blinks continually without stop, please refer to the troubleshooting section in the user manual. *ADAM-2520Z Pair ID will auto search for an unoccupied ID for its Pair ID, this cannot be selected by the user.
5. Run AdamApax .NET Utility to search gateway then set parameters, PAN ID and RF Channel.

Router ❶ ❷

1. Connect ADAM-2520Z (Initial Mode) to host PC and ensure ADAM-2510Z also in Initial Mode. (Default setting is Normal Mode)
2. Connect $24V_{DC}$ to Router power terminal (+VS and GND), or remove the screw of name plate in the front of the end device then install 2 AA Alkaline batteries
3. When module connects with power source, all LEDs turn on for 0.5 second then turn off which will remain Ext PWR LED and Status LED on
   NOTE: If the user uses 2 AA Alkaline batteries for power the **Ext PWR LED** of device will not be turned on. The **Ext PWR LED** only turns on when connected to external power.
4. Press the **Router** function button **5** times to select Router Pair ID. Default Pair ID is 1, and it displays on Level Index when Status LED is flashing.
5. Press the **Router** function button to change Router Pair ID, which must same as ADAM-2520Z Pair ID.
6. Hold the **Router** function button for **2** seconds to confirm Pair ID, Level Index will indicate Pair ID number. If fail to confirm Pair ID, Error LED will blink or all LEDs turn off.
7. Once confirmed Status LED will stop flashing then press the function button **3** times to associate network.
8. During network association, the **Error LED** will blink until network is built, and Level Index will turn on and indicate Pair ID number. If Level Index doesn't indicate identical Pair ID with coordinator or router, please hold function button for **2** seconds to reboot module then repeat steps 3 to 8

End Device ❶ ❷

CAUTION: When End device switch to Initial Mode which will not get into sleep mode during operation, and squander energy to shorten batteries life. Therefore, devices operate with 2 AA Alkaline batteries under Initial Mode which can sustain power for approximately 2 days. It is strongly recommended selecting an external power input during Initial Mode.

1. Connect ADAM-2520Z (Initial Mode) to host PC and end device also ensure in Initial Mode. (Default setting is Normal Mode)
2. Connect $24V_{DC}$ to end device power terminal (+VS and GND), or remove the screw of name plate in the front of the end device then install 2 AA Alkaline batteries.
3. When module connects with power source, all LEDs turn on for 0.5 second then turn off after module initial which will remain Ext PWR LED on.
   NOTE: If the user uses 2 AA Alkaline batteries for power the Ext PWR LED of device will not be turned on. The Ext PWR LED only turns on when connected to external power.
4. Press the **Function** button **5** times to select end device Pair ID. Default Pair ID is 1, and it displays on Level Index when Status LED is flashing.
5. Press the **End Device** function button to change end device Pair ID, which must same as gateway ADAM-2520Z or router ADAM-2510Z.
6. Hold the **End Device** function button for **2** seconds to confirm Pair ID. After confirmed, all LEDs turn off, if fail to confirm Pair ID, Error LED will blink.
7. Once confirmed all LEDs turn off and stop flashing then press the function button **3** times to associate a network.
8. During network association, the **Error LED** will blink until the network is built, and **Level Index** will turn on then indicate Pair ID number. If Level Index doesn't indicate identical Pair ID with coordinator or router, hold the **Function** button for **2** seconds to reboot module then repeat steps 3 to 8.
   NOTE: For more information refer to the user manual.

Software Configuration

NOTE: Before installing AdamApax .NET Utility, you need to install .NET Framework 2.0 or later. (We recommend installing .NET Framework 3.5, the support CD includes .NET Framework 2.0 in Microsoft .NET Framework folder)

1. Install the ADAM-2520Z USB driver and AdamApax .NET Utility from the support CD or you can download it from the Advantech Website then follow instructions to finish installation.
2. Launch AdamApax .NET Utility from the desktop shortcut icon.

Configure the PAN ID and RF Channel

Coordinator ❸ ❹

1. Click right button of COM port in the Wireless Sensor Networks then select the "**Search**" function. The AdamApax .NET Utility will search ADAM-2520Z gateway.
   NOTE: The virtual COM port number of USB is assigned by the PC please check your COM port number in device manager.
2. After searching, the ADAM-2520Z gateway will be listed in the tree view with model name, information and parameters.
3. In the Status Display Area, please setup the ADAM-2520Z connection parameters, which include the PAN ID and RF Channel in "Wireless Configuration".
4. Click "**Apply All**" when you finish Coordinator setting, and start to set up Router or End Device until all finished then switch mode switch to Normal Mode.

NOTE: When setup Coordinator, Router and End Device parameters which must All in Initial Mode. Once all configurations are done, Coordinator, Router and End Device must move the Mode Switch to the Normal mode at the same time.

Router ❸ ❹

NOTE: Before utility searching module processes please ensure Router associated network with Coordinator.

NOTE: The virtual COM port number of USB is assigned by the PC check your COM port number in device manager.

1. Right click the COM port button in the Wireless Sensor Networks then select the "**Search**" function. The AdamApax .NET Utility will search ADAM-2520Z gateway and ADAM-2510Z Router.

2. After searching, ADAM-2510Z Router will be listed in the tree view with model name, information and parameters.

3. In the Status Display Area, please setup ADAM-2510Z's connection parameters, which include the PAN ID, RF Channel and Slave ID in "**Wireless Configurations**".

4. Click "**Apply All**" when you finish router setting.

NOTE: When setup Coordinator, Router and End Device parameters which must All in Initial Mode. Once all configurations are done, Coordinator, Router and End Device must move the Mode Switch to the Normal mode at the same time.

End Device ❸ ❹

NOTE: Before utility searching module processes please ensure end device associated with Coordinator.

NOTE: The virtual COM port number of USB is assigned by the PC please check your COM port number in device manager.

1. Right click the COM port button in the Wireless Sensor Networks then select the "**Search**" function. The AdamApax .NET Utility will search ADAM-2520Z Gateway and End Device.
2. After searching, the end device will be listed in the tree view with model name.
3. In the Status Display Area, please setup end device's connection parameters, which include the PAN ID, RF Channel and Salve ID in "**Wireless Configurations**" and special function in signal page for different End Device.
4. Click "**Apply All**" when you've finished all settings.

NOTE: When setup Coordinator, Router and End Device parameters which must All in Initial Mode. Once all configurations are done, Coordinator, Router and End Device must move the Mode Switch to the Normal mode at the same time.

NOTE: For more detailed information refer to the user manual.

Data Acquisition Applications

When all configurations are done switch Coordinator, Router and End Device Mode Switch to the Normal mode. Run AdamApax .NET Utility to get module data, the setting of data reading is as same as normal Modbus RTU device. Detail information of Function code, Register Address and Value refer to Appendix B of the user manual.

NOTE: When SCADA or other data acquisition software attempt to get more than one Router or End device data in application ensure all devices are set to different Slave IDs.

Configuration Parameters

Coordinator	Router/ End Device
Channel: 11~26 (Default:26)	Channel: 11~26 (Default:26)
PAN ID: 1~16300 (Default:2000)	PAN ID: 1~16300 (Default:2000)
"Slave ID: 245~248 (Normal Mode Default:245) 241~244 (Initial Mode Default:241)	Slave ID: 1~240 (Default:1)
X	Transmission Interval (Second): 1~86400 (Default:30)

NOTE: For detailed information of Modbus ID, Function code, Register Address and Value refer to Appendix B of the user manual.

Installation Flowchart