



AwiaTech WirelessHART™ Rapid Development Kit Manual

FCC STATEMENT

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

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This 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 instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does 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.*

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

1. INTRODUCTION

AwiaTech WirelessHART Rapid Development Kit (RDK) is a fast and low-risk development solution that enables you to create a fully functional WirelessHART HART 7 prototype from your existing HART 5, 6, or FSK 7 devices.

2. RDK INTERNALS

The RDK connects to a wired HART device via RDK's FSK port and turns the device into a single WirelessHART device. There is no change to the HART device. The RDK serves as a wired HART master on this two-device wired HART network. From an outsider's perspective, the RDK presents itself as a full HART device in the wired or wireless HART network.

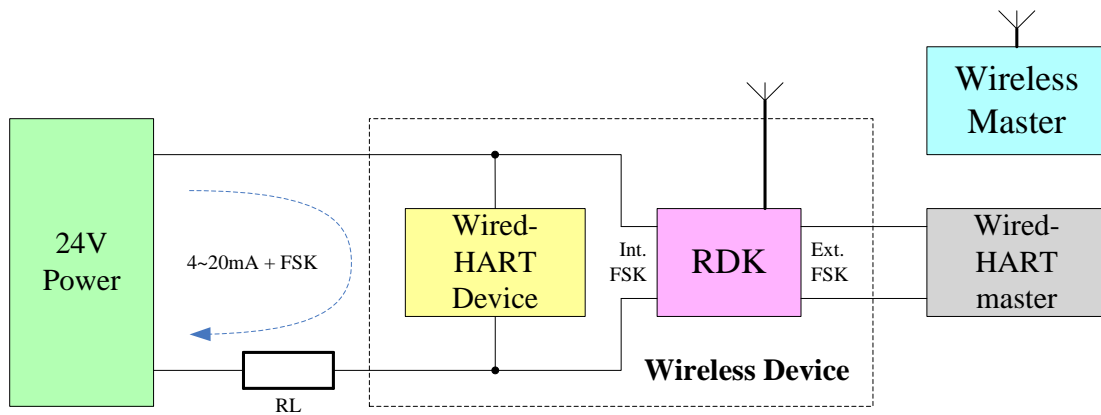


Figure1. A Fast Approach To Equip A HART Device With WirelessHART Capability
Via An RDK

3. DEVICE DESCRIPTION

3.1. HARDWARE DESCRIPTION

AwiaTech RDK is an evaluation product that has the same physical dimensions as the Awia Warrior Module, as shown in Figure 2. A detailed description is shown in Figure 3 and in Table 1.

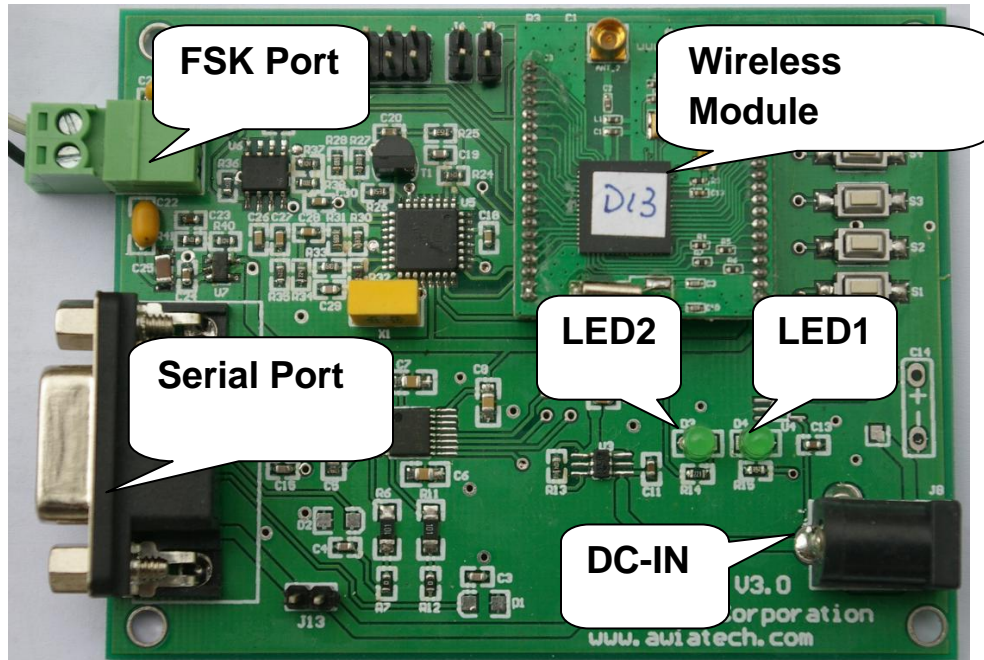


Figure 2. AwiaTech RDK Physical Layout

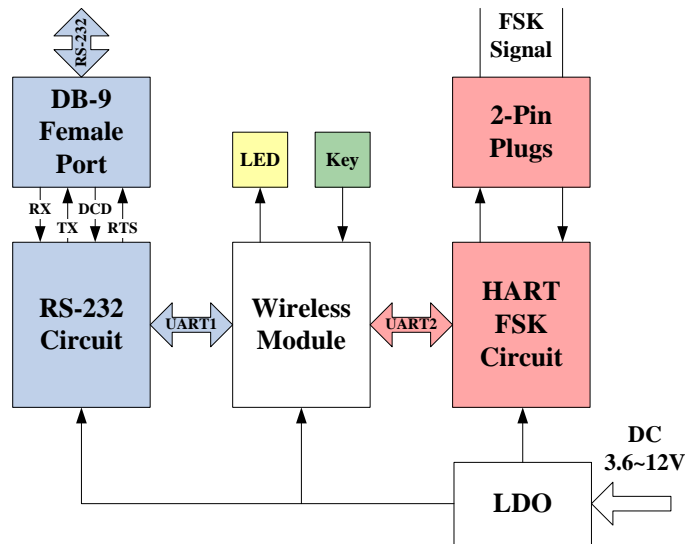


Figure 3. RDK Internal Diagram

Item	Comments
DC-IN	This power input connects via either a battery case in the kit or an AD-DC adaptor.
LED 1	This communication indicator turns on after this RDK joins a network; it blinks when the module is transmitting or receiving data.
LED 2	This power indicator is on when the power source is connected to the device.
Wireless Module	The WirelessHART communication module includes an antenna connector.
Serial Port	This port allows for communication between this RDK and an external PC or sensor. Communication is conducted on RS232 protocol with HART frames.
FSK Port	This port allows for Communication between this RDK and a traditional HART slave device.

Table 1. Description of the Hardware Interfaces

3.2. CAPABILITIES DESCRIPTION

The RDK acts as a wireless component for the smart HART field device and extends its wireless capabilities. As shown in Figure 2, RDK connects the traditional wired FSK HART network and the WirelessHART network. So, RDK acts as a different type of device in a different network.

When connecting with the internal field device, RDK acts as a wired HART master to request that the HART commands conform to HART 5 or HART 6. In the wireless network or the external wired network, RDK acts as a slave to receive and respond to commands in HART 7.

As shown in Figure 4, RDK works in the following ways:

- Upon start-up, the RDK will first establish a connection with the wired HART device and retrieve necessary device information, such as device ID, tag, etc. The RDK will then take over the identity of the device.
- The RDK then waits to be initiated; this occurs either through the external wired network or by joining a wireless network.
- The RDK will handle all wireless and wired HART commands. When handling a command, the RDK, as needed, either sends a corresponding command to the

internal HART device for the response or uses different commands to retrieve the desired information. The RDK may reply with a DELAY indication to the external masters if the internal wired device doesn't respond in time. In that case, the RDK will not return the correct answers until commands are initiated from the internal wired device.

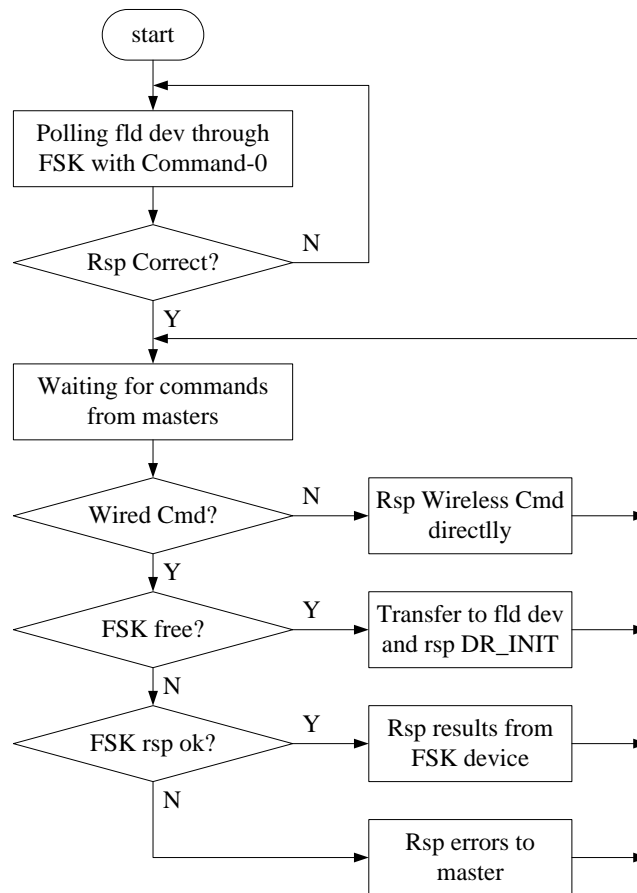


Figure 4. Transfer Process Sequences

The RDK now can communicate with a HART 5 device and support most of the universal commands listed in Table 2. It is also compliant with a HART 6 device except the new capabilities in HART 6.

Command Num	Comments	Treatment Process
Cmd-0	Read Unique Identifier	Poll upon startup and response directly WITH modified information
Cmd-1	Read Primary Variable	Forward to wired device and delay response WITHOUT modification
Cmd-2	Read Loop Current and Percent of Range	Forward to wired device and delay response WITHOUT modification
Cmd-3	Read Dynamic Variables And Loop Current	Forward to wired device and delay response WITHOUT modification
Cmd-6	Write Polling Address	Forward to wired device and delay response WITH modification
Cmd-7	Read Loop Configuration	Responds directly
Cmd-8	Read Dynamic Variable Classifications	Responds directly
Cmd-9	Read Device Variables with Status	Request the wired device with Cmd-2 or Cmd-3, and delay response WITH modification
Cmd-11	Read Unique Identifier Associated With Tag	Poll and get tag from wired device upon startup, response directly WITH modification
Cmd-12	Read Message	Forward to wired device and delay response WITHOUT modification
Cmd-13	Read Tag, Descriptor, Date	Forward to wired device and delay response WITHOUT modification
Cmd-14	Read Primary Variable Transducer Information	Forward to wired device and delay response WITHOUT modification
Cmd-15	Read Device Information	Forward to wired device and delay response WITH modification
Cmd-16	Read Final Assembly Number	Forward to wired device and delay response WITHOUT modification
Cmd-17	Write Message	Forward to wired device and delay

Command Num	Comments	Treatment Process
		response WITHOUT modification
Cmd-18	Write Tag, Descriptor, Date	Forward to wired device and delay response WITHOUT modification
Cmd-19	Write Final Assembly Number	Forward to wired device and delay response WITHOUT modification
Cmd-20	Read Long Tag	Responds directly
Cmd-21	Read Unique Identifier Associated With Long Tag	Responds directly
Cmd-22	Write Long Tag	Responds directly
Cmd-38	Reset Configuration Changed Flag	Responds directly
Cmd-48	Read Additional Device Status	Responds directly

Table 2. Commands supported in RDK

4. APPLICATION GUIDE

4.1. SYSTEM CONNECTIONS

The system connection for the RDK is shown in Figure 5.

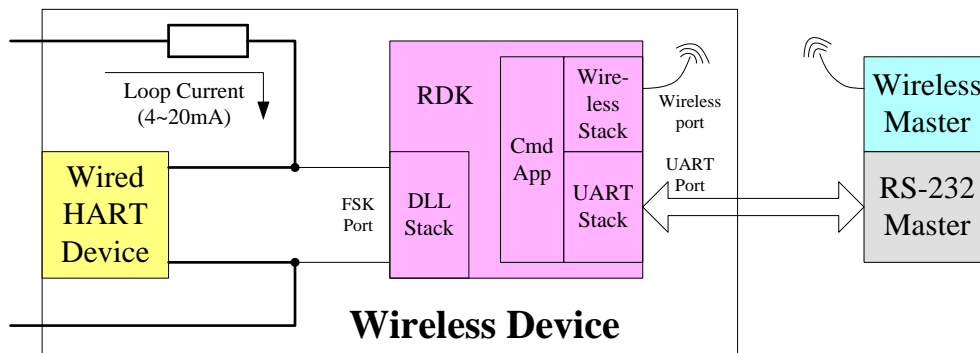


Figure 5. System Connections for RDK

Via the RS-232 port, the updated wireless device with the RDK also can be extended to another FSK port with an external HART Modem. This updated wireless device can then

treat the traditional HART commands from a wired master. This process is shown in Figure 6.

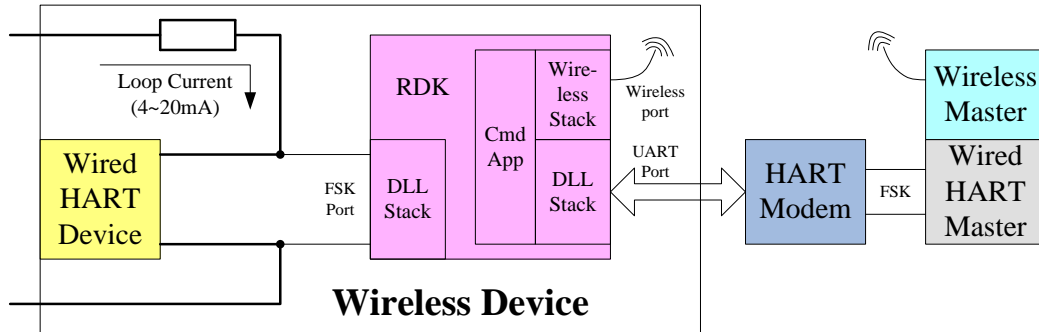


Figure 6. Extended FSK Port with an External HART Modem

4.2. DEMANDS FOR ASSISTANT DEVELOPMENT

At present, the information about AwiaTech’s RDK is provided for evaluation purposes only. The RDK can be connected via the FSK port with a special type of wired HART 5 or HART 6 device, which will extend its wireless capabilities. In order to smooth the connection between this RDK and the wired HART device, the manufacturer of this wired HART device should provide some basic information, as listed in Table 3.

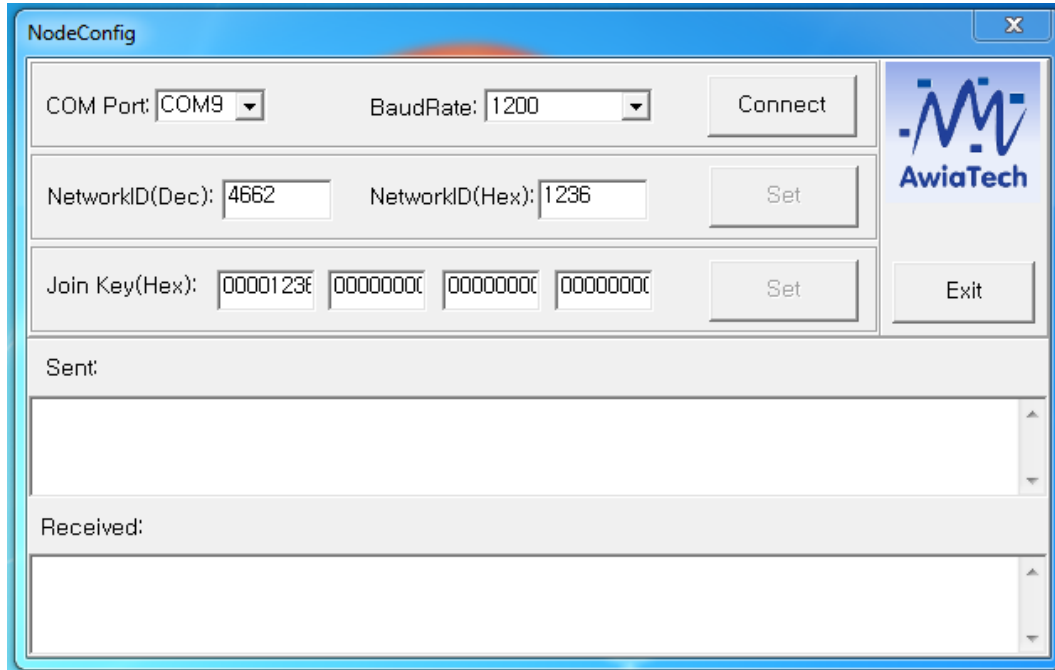
Item	Comments
Manufacturer Name	
Manufacture ID Code	(HEX)
Model Name	
Device Type Code	(HEX)
HART Protocol Revision	
Device Revision	
Physical Layers Supported	FSK
Physical Device Category	Transmitter

Item	Comments
Unique ID	
Tag	(HEX)
Long Tag	
Primary Variable Classification	(HEX)
Primary Variable Unit	(HEX)
Secondary Variable Classification	(HEX)
Secondary Variable Unit	(HEX)
Tertiary Variable Classification	(HEX)
Tertiary Variable Unit	(HEX)
Quaternary Variable Classification	(HEX)
Quaternary Variable Unit	(HEX)
Number of Device Variables	
Device Variable 1 Code	(HEX)
Device Variable 1 Classification	(HEX)
Device Variable 1 Unit	(HEX)
Device Variable 2 Code	(HEX)
Device Variable 2 Classification	(HEX)
Device Variable 2 Unit	(HEX)
...	

Table 3. Device Description

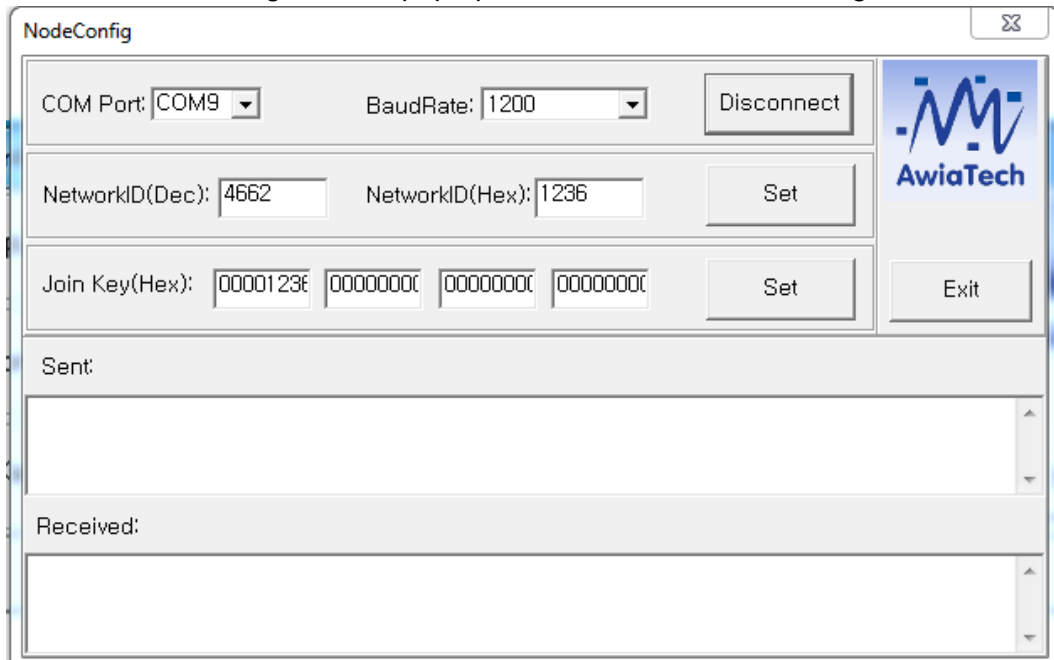
5. CONFIGURE NETWORK ID AND JOIN KEY

1. Connect your Windows PC to the RDK through a RS232 or USB-to-RS232 cable (not included)
2. Power up the PC and the RDK
3. Double click "NodeConfig.exe" to start the configuration tool

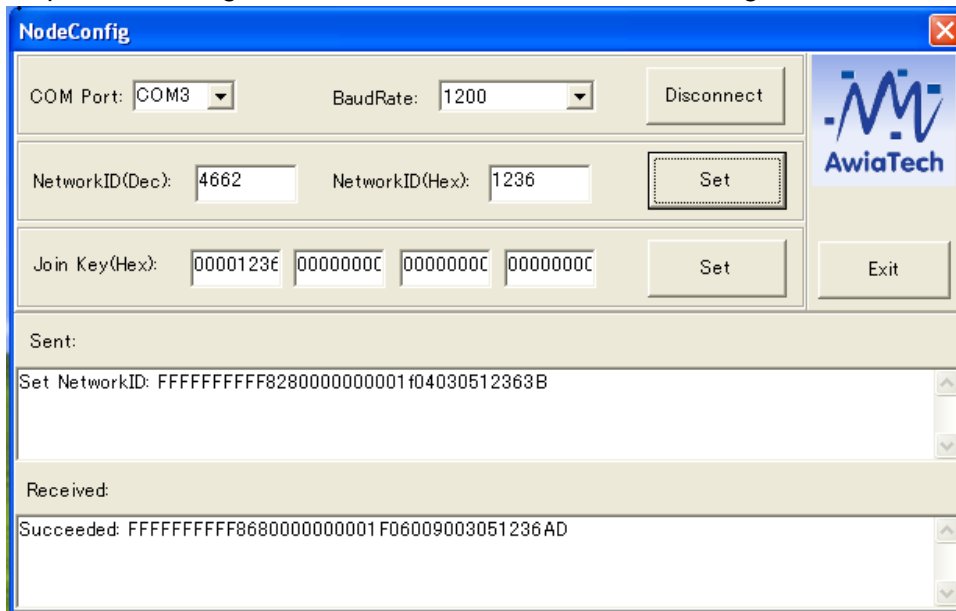


4. In the "Com Port:" dropdown list, select the port you used in Step 1) to connect the RDK
5. Leave the "BaudRate" at 1200

- Click the "Connect" button. If it succeeds, the two "Set" buttons become enabled. Otherwise, a messagebox will pop up with a detailed error message.

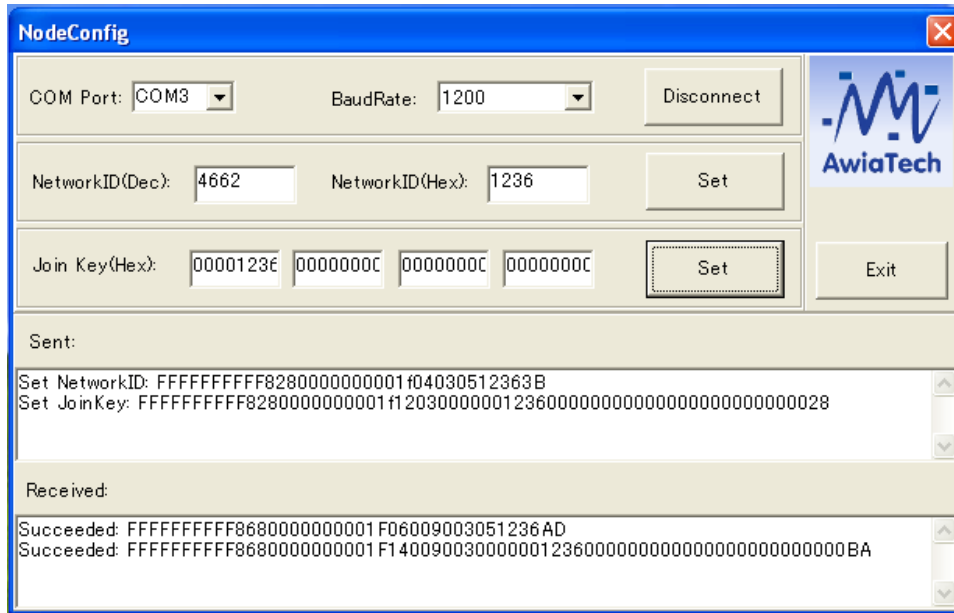


- Enter the network id in the "NetworkID(Dec):" if it is in decimals, or in "NetworkID(Hex)" if it is in hexidecimals. You only need to fill in one field, and the tool will do the conversion automatically
- Click the "Set" button to the right of "NetworkID(Hex):", the message sent to the RDK will be displayed in the "Sent:" text area. If this operation succeeds, the response message in the "Received" text area should begin with "Succeeded:".



- Enter the join key in the four text fields, 4 bytes for each field.
- Click "Set" button next to the join key to write the join key to the RDK. If this operation is successfully, the response message in the "Received" text area

should begin with
"Succeeded".



11. Click "Exit" to exit the utility.

6. TECHNICAL SPECIFICATION

WirelessHART Software

- WirelessHART User Guide. HCF_LIT-84
- Coexistence Test Plan. HCF_LIT-85
- Approved IEEE 802.15.4 Transceivers. HCF_LIT-088
- IEEE STD 802.15.4-2006. Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANs). 2006

Awia Warrior 220 Module

Peripherals/Software	Detail
Input	UART, FSK, RS485, SPI
Radio	IEEE802.15.4 radio module
Hardware Chip	FreeScale MC13224V (RF+MCU)
Electrical & Mechanical	Detail
Input Voltage	4.5 – 12v DC
Main Board Dimensions	2.75in(W) x 3.40in(L); 6.98cm(W) x 8.64cm(L)
Child Board Dimensions	1.06in(W) x 1.25in(L); 2.69cm(W) x 3.17cm(L)
Certifications	Detail
EMI	FCC (FCC-ID: ZCO-220), CE
Standard	WirelessHART-conforming, registration ready
Default Configurations	Detail
Network ID	0x1236
Join Key	0x00001236000000000000000000000000

Subject to change without prior notice.

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