



**HNIO-241A  
HNIO-241AR  
HNIO-241AX**

**2.4 GHz  
Analog/Digital  
I/O Wireless  
Modem**

**Features:**

- Send/receive 4-20 mA and control relays
- Multipoint, bidirectional operation
- Two analog and two relay channels
- Fully configurable through DIP switches
- FHSS technology at 460.8 kb/s data rate
- Class I Div 2 certified
- 2.4 GHz operation
- Operates over input voltage range of +9 to +30 Vdc making it suitable for battery and solar power sources

**Benefits:**

- Ability to confirm remote status
- Operate multiple devices from one modem
- Reliable performance in high RF noise environments
- Deploy in a wide variety of locations
- Useful for industrial and outdoor applications with a -40°C to +70°C operating temperature range and certified for hazardous location use

HNIO-241A series modems are used to transmit 4-20 mA analog signals, remotely control industrial relays and remotely monitor digital inputs such as switch and contact closures using highly robust 2.4 GHz FHSS radio technology. An HNIO network consists of a base station and one to four remotes. Each HNIO-241A series modem has two 4-20 mA inputs, two 4-20 mA outputs, two digital inputs and two relay outputs. Each 4-20 mA input in the base station can be configured to control a specific 4-20 mA output in a specific remote. Each 4-20 mA output in the base station can be controlled by one 4-20 mA input in one remote. Likewise, each digital input in the base station can be configured to control a specific relay in a specific remote, and each relay output in the base station can be controlled by one digital input in one remote. A fully implemented network provides two bidirectional 4-20 mA channels and two bidirectional relay control channels between the base station and its remotes. HNIO-241A series modems are Class 1 Div 2 certified. HNIO-241A wireless networks provide a means to quickly and economically send 4-20 mA signals, remotely control industrial relays and remotely monitor digital inputs in a wide variety of commercial and industrial applications.



**General Specifications**

RF Frequency	2401 - 2475 MHz
Certifications	FCC Part 15.247, Canadian RS-210 and ETSI 300-328
Spreading Method and Modulation	Frequency hopping spread spectrum using GFSK modulation
Transmit Power	+8 or +18 dBm selectable at RF connector; +14 or +24 dBm selectable with integral patch antenna
Receive Sensitivity	-93 dBm for 10-5 BER at RF connector; -99 dBm for 10-5 BER with integral patch antenna
RF Channels	75
RF Data Rate	460.8 kb/s
I/O	Two 4-20 mA current loop receivers (12-bit ADC) Two opto-isolated digital inputs 0 to 30 V Two 4-20 mA current loop transmitters (16-bit DAC) Two SPST Form-A relays, normally open (NO) and common (COM) connections, 250 VAC, 5 A One SPST relay for RF link status One RS-232 DB-9 serial port
Operating Voltage	+9 to +30 Vdc
Operating Power	5 W typical
Operating Temperature	-40°C to +70°C

## Mechanical Specifications

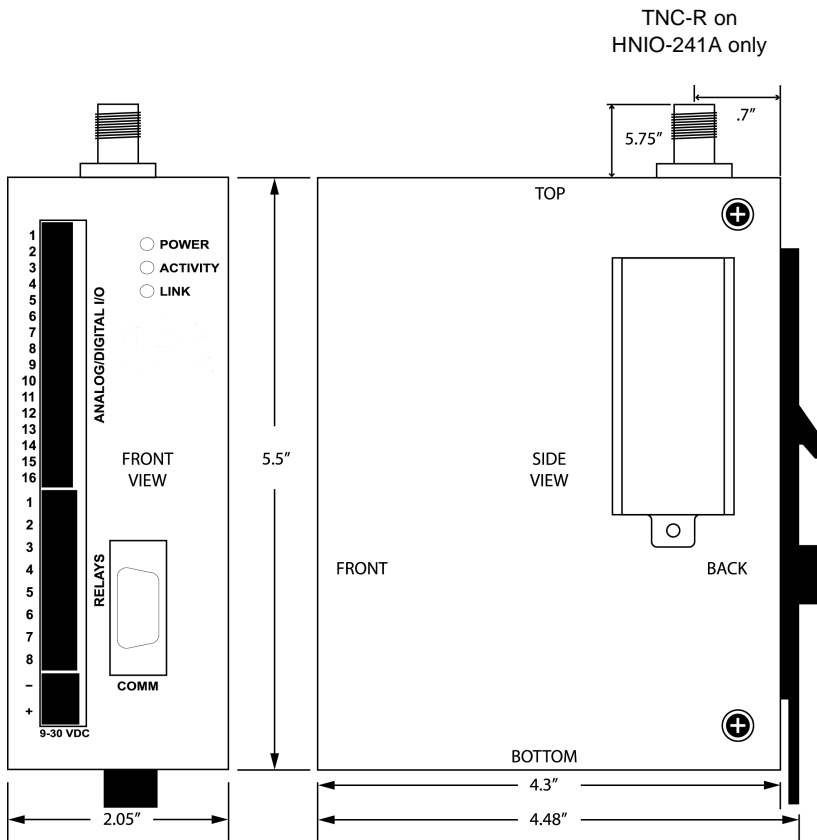
Model	HNIO-241A	HNIO-241AR	HNIO-241AX
Enclosure Material	ABS for network interface unit	ABS for network interface unit, Polycarbonate NEMA 4X for remote radio unit	ABS for network interface unit, Polycarbonate NEMA 4X for remote radio unit
Enclosure Size	14.6 x 11.4 x 5.2 cm for network interface unit case	14.6 x 11.4 x 5.2 cm for network interface unit case, 13.0 x 7.9 x 3.6 cm for remote radio unit case	14.6 x 11.4 x 5.2 cm for network interface unit case, 13.0 x 7.9 x 3.6 cm for remote radio unit case
Remote Radio Control Cable	N/A	50 ft cable (included)	50 ft cable (included)
Antenna	2 dBi dipole (included)	6 dBi integral patch	2 dBi dipole (included)
Antenna Connector	Reverse TNC on network interface unit	N/A	Reverse TNC on remote radio unit

## Connector Pinout

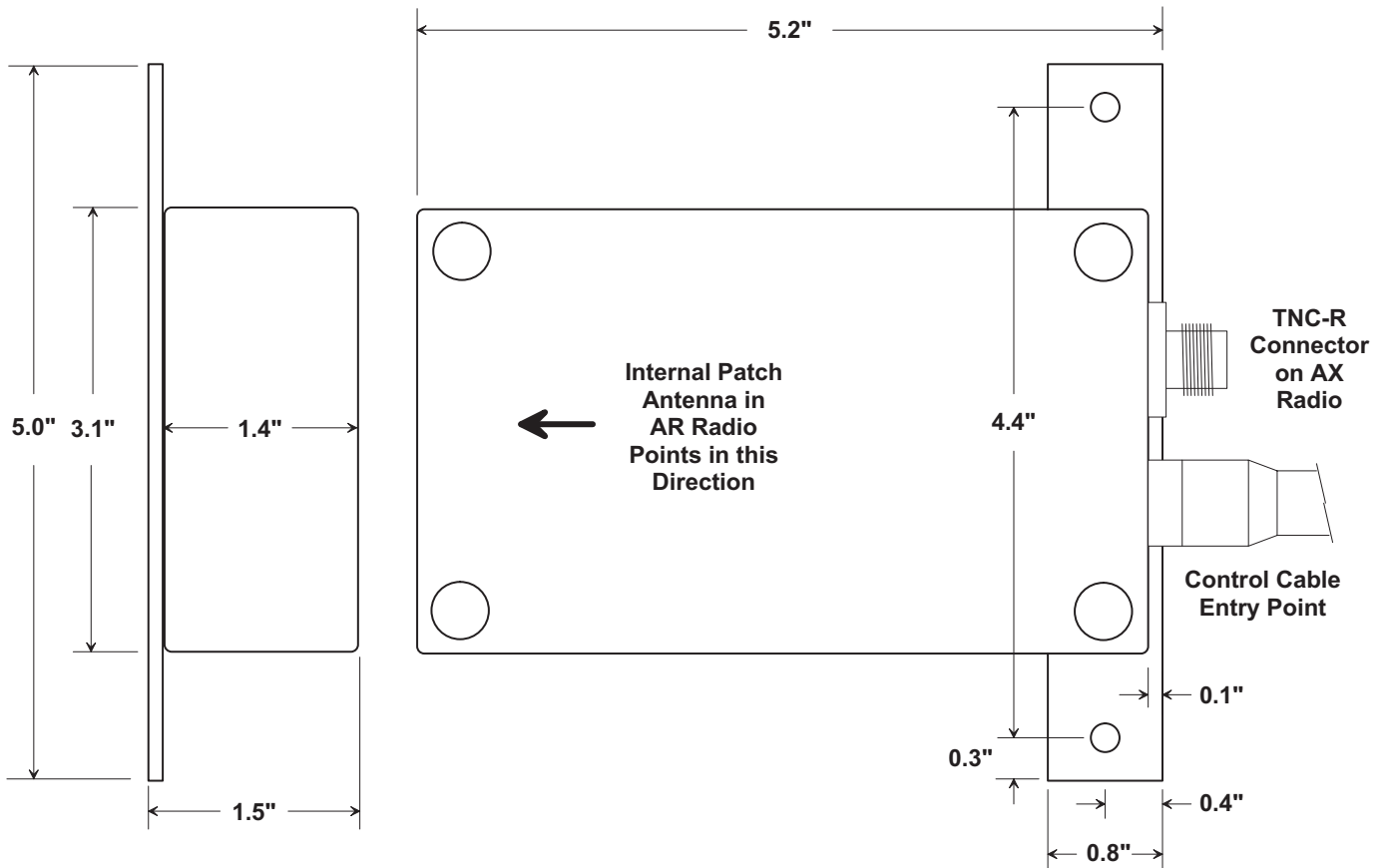
Pin 1 - RFLink NO
Pin 2 - RFLink COM
Pin 3 - Input1 +
Pin 4 - Input1 -
Pin 5 - Input2 +
Pin 6 - Input2 -
Pin 7 - Input3 +
Pin 8 - Input3 -
Pin 9 - Input4 +
Pin 10 - Input4 -
Pin 11 - IN A
Pin 12 - IN B
Pin 13 - OUT A
Pin 14 - OUT B
Pin 15 - GND
Pin 16 - GND

## Connector2 Pinout

Pin 1 - Relay1 NO
Pin 2 - Relay1 COM
Pin 3 - Relay2 NO
Pin 4 - Relay2 COM
N.C.
N.C.
N.C.
N.C.



Network interface unit - dimensions in inches  
(see Mechanical Specifications for metric case dimensions)



Remote radio unit - dimensions in inches  
(see Mechanical Specifications for metric case dimensions)

### I/O Modem Configurations

The HNIO-241A series modems are available in three compatible versions:

- The **HNIO-241A** modem consists of a single DIN-rail network interface unit that includes both the I/O interface and the radio. The HNIO-241A has a reverse TNC RF connector mounted on top of the case. The 2 dBi dipole antenna shipped with the modem can be installed directly on this connector or the antenna can be mounted remotely and connected to the modem with a short length of low-loss coaxial cable. Coaxial cable loss should be less than 3 dB to preserve good modem performance. RFM offers several high-gain accessory antennas that can be used with HNIO-241A to increase operating range.
- The **HNIO-241AR** modem consists of two modules - a DIN-rail network interface unit that contains the I/O interface, and a remote radio unit with an integral patch antenna. The remote radio unit is connected to the network interface unit by a 50 ft control cable that is shipped with the modem. This two-unit configuration allows the radio to be installed remotely in a location that provides good RF coverage. The HNIO-241AR requires no coaxial cable for installation.
- The **HNIO-241AX** modem consists of two modules - a DIN-rail network interface unit that contains the I/O interface, and a remote radio unit with a reverse TNC RF connector. The remote radio unit is connected to the network interface unit by a 50 ft control cable that is shipped with the modem. This two-unit configuration allows the radio to be installed remotely in a location that provides good RF coverage. The 2 dBi dipole antenna shipped with the modem can be installed directly on the RF connector or the antenna can be mounted separately and connected to the modem with a short length of low-loss coaxial cable. RFM offers several high-gain accessory antennas that can be used with HNIO-241AX to increase operating range.

### I/O Network Operation

A network built from HNIO-241A series modems consists of a base station modem and one to four remote modems. Periodically the base station transmits the value of each of its 4-20 mA input channels and the state of each of its digital input channels to the remotes in the network. Each remote in the network is configured to exclusively process one or more of these channels. The remotes convert the 4-20 mA values back to current outputs and digital input states back to relay positions based on their individual configurations. Following a base station data transmission, each remote, in order, transmits the value of each 4-20 mA input and/or the state of each digital input it is configured to process back to the base station. The base station converts the 4-20 mA input values from the remotes back to current outputs and digital input states back to relay positions. Network operation effectively provides bidirectional transfer of 4-20 mA signals and digital states to and from the base station and the remotes in the network. Up to four HNIO-241A series base stations can operate in the same area, allowing four co-located networks to be deployed.

## Fully Configurable

The HNIO-241A series modems are fully configurable through DIP switches. Configurable options include edge or level triggered inputs, positive or negative activation signals (selectable per channel), frequency of data updates from continuous to once every 45 minutes, and an RF link interruption fail-safe mode. A NO relay contact indicates RF link status.

## Industrial Networking

The HNIO-241A series modems are designed for industrial and outdoor applications with a -40°C to +70°C operating temperature range. The HNIO-241A modems can operate over an input voltage range of +9 to +30 Vdc, making them suitable for battery and solar power sources. The HNIO-091A modems are Class I Div 2 certified for hazardous location use. The standard DIN-rail enclosure or optional six inch cabinet allows easy installation whatever the application. The HNIO-241AR and HNIO-241AX are remote radio versions where the radio is housed in a separate NEMA 4X rated enclosure suitable for indoor or outdoor mounting.

## FHSS Technology

The frequency hopping spread spectrum technology used in the HNIO-241A series modems has been proven in a wide variety of mission-critical industrial applications for 17 years and embodies extensive experience in spread spectrum radio design. With superior immunity to jamming and multipath fading, RFM FHSS technology transmits data over the air at a crisp 460.8 kb/s rate providing short latencies and plenty of bandwidth. Operating in the 2.4 GHz band, the HNIO-241A series modems can be deployed license-free worldwide.

