

## Digi<sup>®</sup> WirelessRadio Modem For RS485/422 Communications



**Installation Guide.**

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## **Digi® Wireless Radio Modem Installation Guide:**

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**Warning: These products are not designed for use in, and should not be used for patient connected applications. In any critical installation an independent fail-safe back-up system must always be implemented.**

# Digi® Wireless Radio Modem For RS485/422 Communications

## Description:

The Digi® Radio Modems are used for long-range, low speed wireless communications. Powered by DigiMesh® networking protocol, featuring dense network operation using mesh technology with frequency hopping spread spectrum capability. Operating in the 900MHz license-free ISM band (Industrial, Scientific and Medical bands), the Digi® Radio Modems can wirelessly connect a variety of Intech RS485/422 devices across many applications including remote monitoring.

## Ordering Information:

**DIGI-MODEM** Digi RS485/422 RF Modem. Comes with:  
- Rubber Duck Antenna, RPSMA.  
- Terminal Connector.  
- 12Vdc Plug Pack Power Supply.



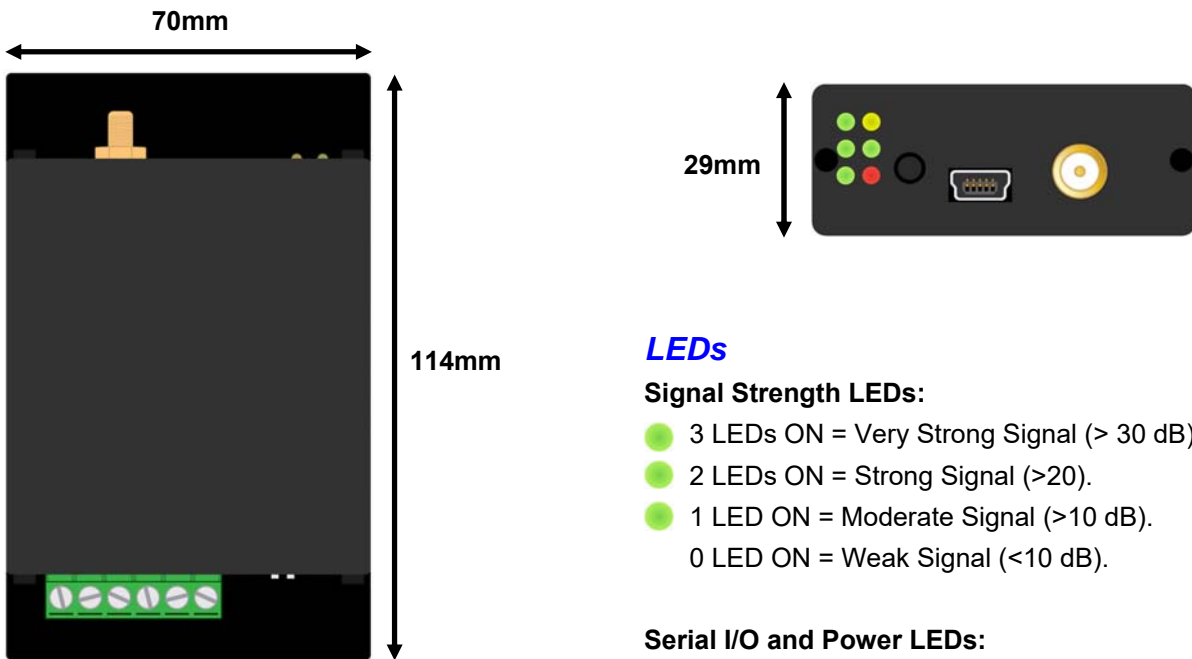
## Features:

- Supports RS485/422 Field Stations.
- 900 MHz license-free ISM band operation.
- Superior Line of Sight for outdoor applications
- 12Vdc external power adapter included, or terminal input power supply.
- DigiMesh® peer-to-peer mesh networking protocol.
- Self-healing and discovery for network stability.
- Rugged Compact Case.
- Easy to Install.

## Specifications:

Power Supply	7~30Vdc.
Max Current	140mA (@9Vdc).
Operating Temperature	-40° ~ +85°C.
RF Data Rate	200Kb/s
RF Frequency	915-928 MHz (located in the 900 MHz ISM Band).
RF Power	250mW.
Transmit Power	24dBm (Default, factory selectable).
Receiver Sensitivity	-101dBm.
RF Range	300m indoor urban, 6.5Km ideal line of sight with standard antenna.
Spread Spectrum	Frequency hopping.
Channel Capacity	8 hop sequences share 25 channels.
Network Topologies	Mesh, point-to-point, point-to-multipoint, peer-to-peer.
Communication Input Types:	
USB	USB Mini-B type factory setup only.
RS485/422	6-pin screw terminal.
Default Data Interface:	(Non standard baud rates factory selectable.)
Comms Baud Rate:	9600 Baud.
Data Bits	8.
Parity	None.
LED Indication	Power indicator, serial data in/out and signal strength.
Regulatory Approvals	C-TICK, FCC Part 15.247, IC, ROHS.
Dimensions	Case: L=114mm, W=70mm, D=29mm.
	Antenna: L=170mm, Ø=10mm.
Weight	0.15Kg.

## Digi® Radio Modem Physical Layout:



### LEDs

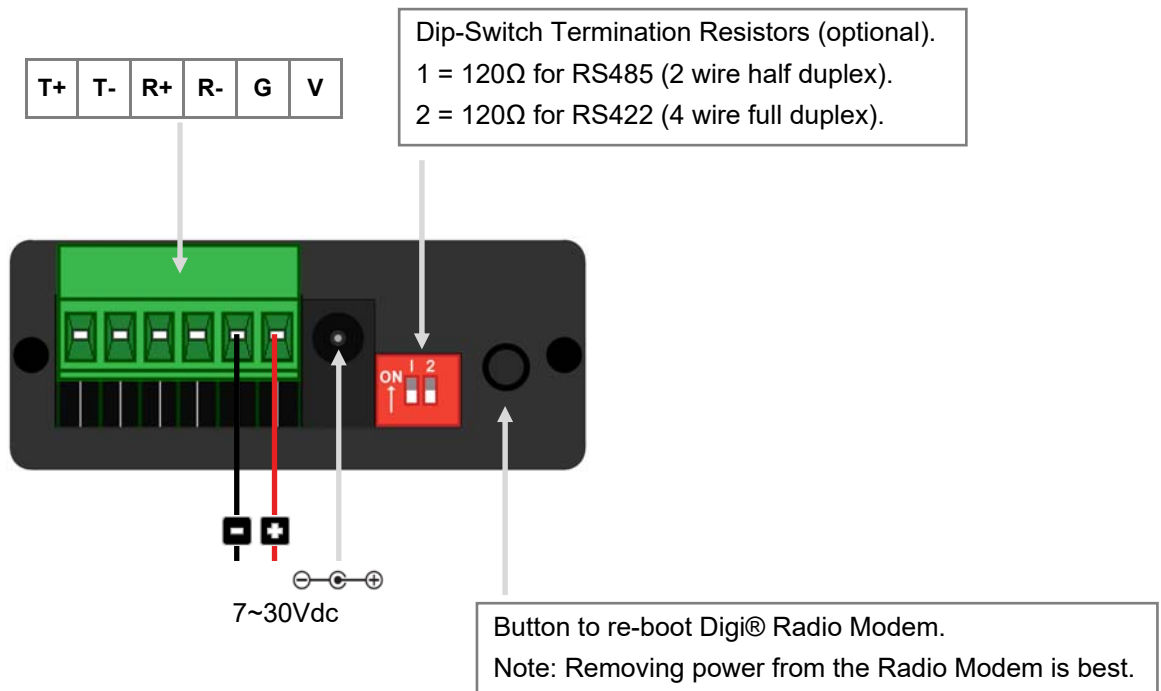
#### Signal Strength LEDs:

- 3 LEDs ON = Very Strong Signal (> 30 dB).
- 2 LEDs ON = Strong Signal (>20).
- 1 LED ON = Moderate Signal (>10 dB).
- 0 LED ON = Weak Signal (<10 dB).

#### Serial I/O and Power LEDs:

- Yellow (top) = Serial Data Out (to host).
- Green (middle) = Serial Data In (from host).
- Red (bottom) = Power/TX Indicator .  
the red light is on when powered, off briefly during RF transmission, heart beat when in sleep mode (no serial RF transmission).

## Digi® Radio Modem Power & Data Connections:

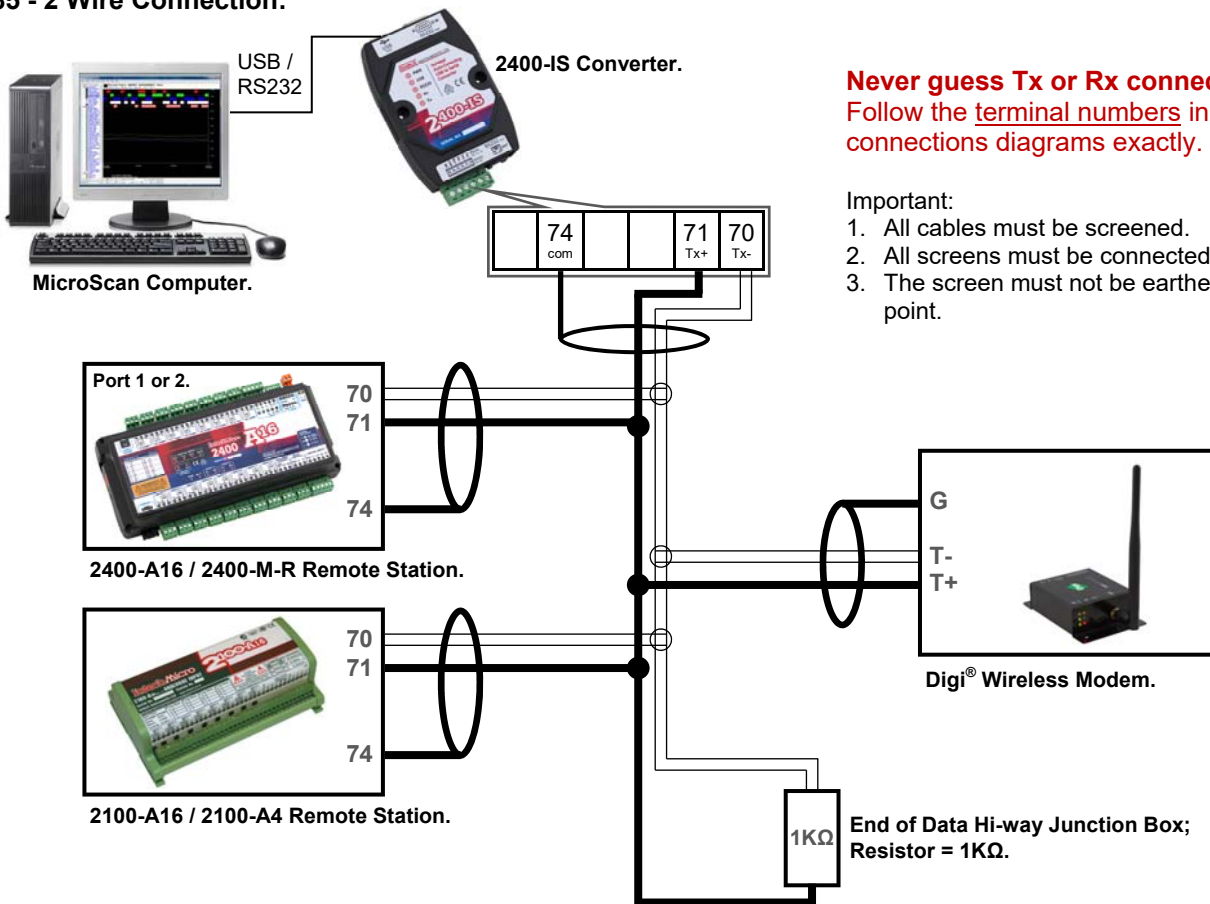


### Note:

1. Terminals "V" & "G" can be used to supply power to the Digi® Radio Modem instead of the DC power socket.
2. The dip-switch termination resistors may be used instead of the end of data hi-way resistors.

## RS485 Connection - Intech IS Converter to Digi® Radio Modem.

RS485 - 2 Wire Connection:



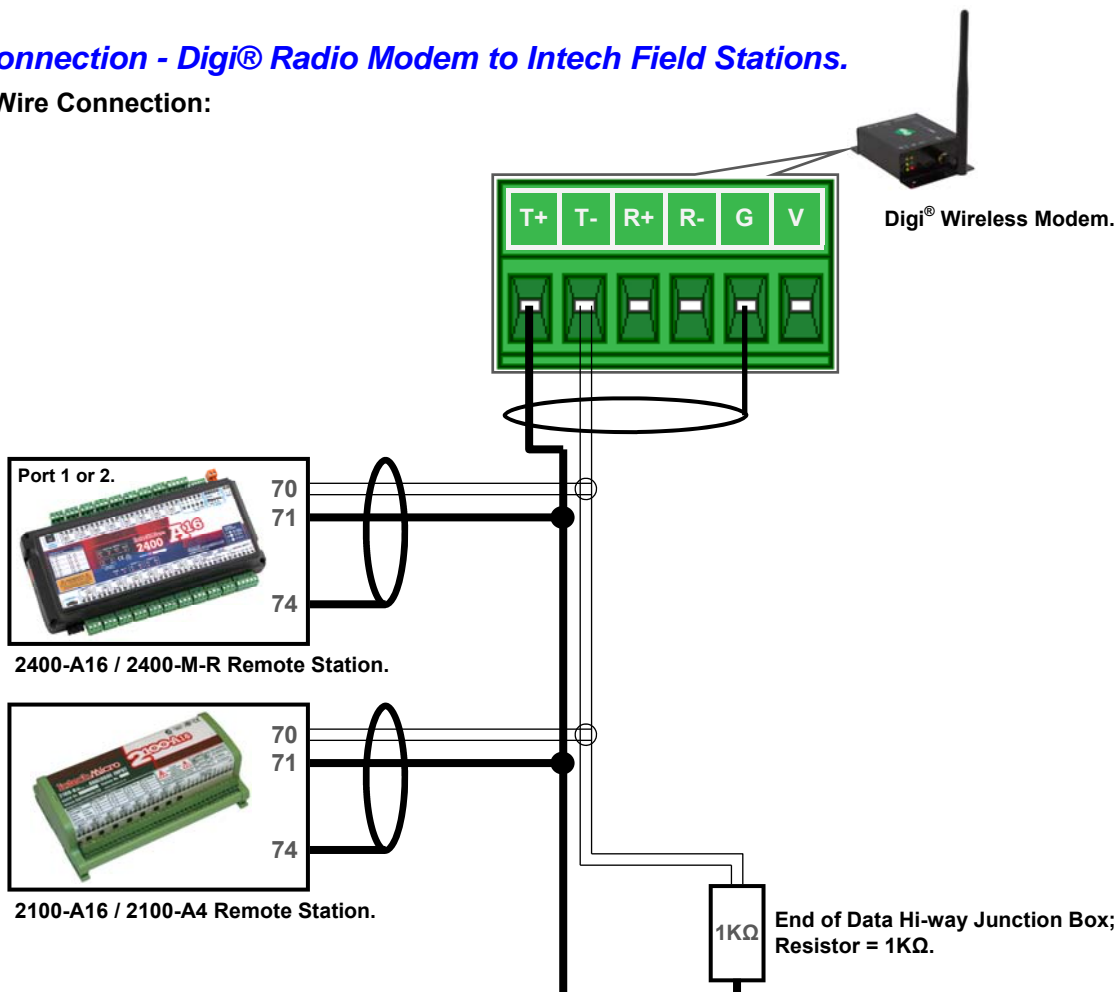
**Never guess Tx or Rx connections.**  
Follow the terminal numbers in the serial connections diagrams exactly.

Important:

1. All cables must be screened.
2. All screens must be connected together.
3. The screen must not be earthed at any point.

## RS485 Connection - Digi® Radio Modem to Intech Field Stations.

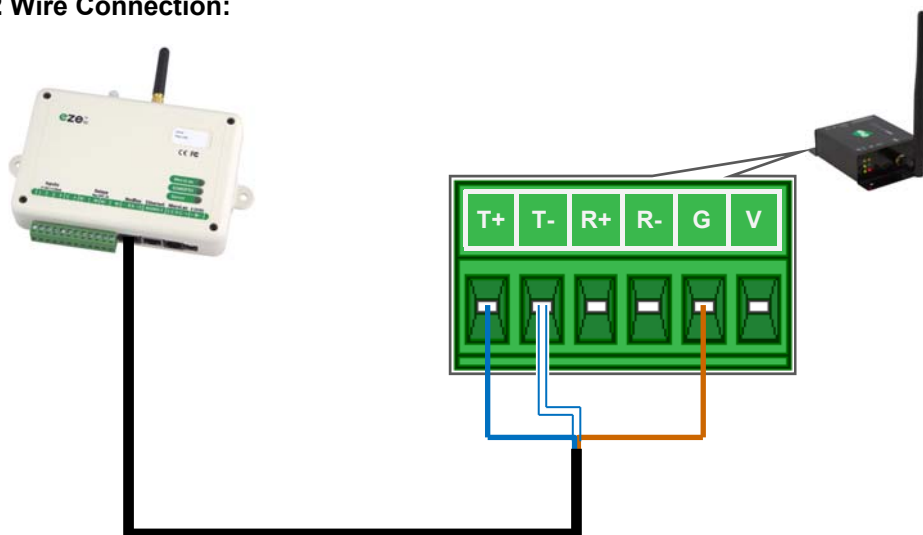
RS485 - 2 Wire Connection:



**Note:** End of data hi-way resistor is recommended, alternatively use dip switch 1 for 120Ω termination instead of the 1KΩ resistor.

## RS485 Connection - ezeio™ Controller to Digi® Radio Modem.

### RS485 - 2 Wire Connection:



Blue pair: Blue wire connects to **T+**.  
Blue/White wire connects to **T-**.

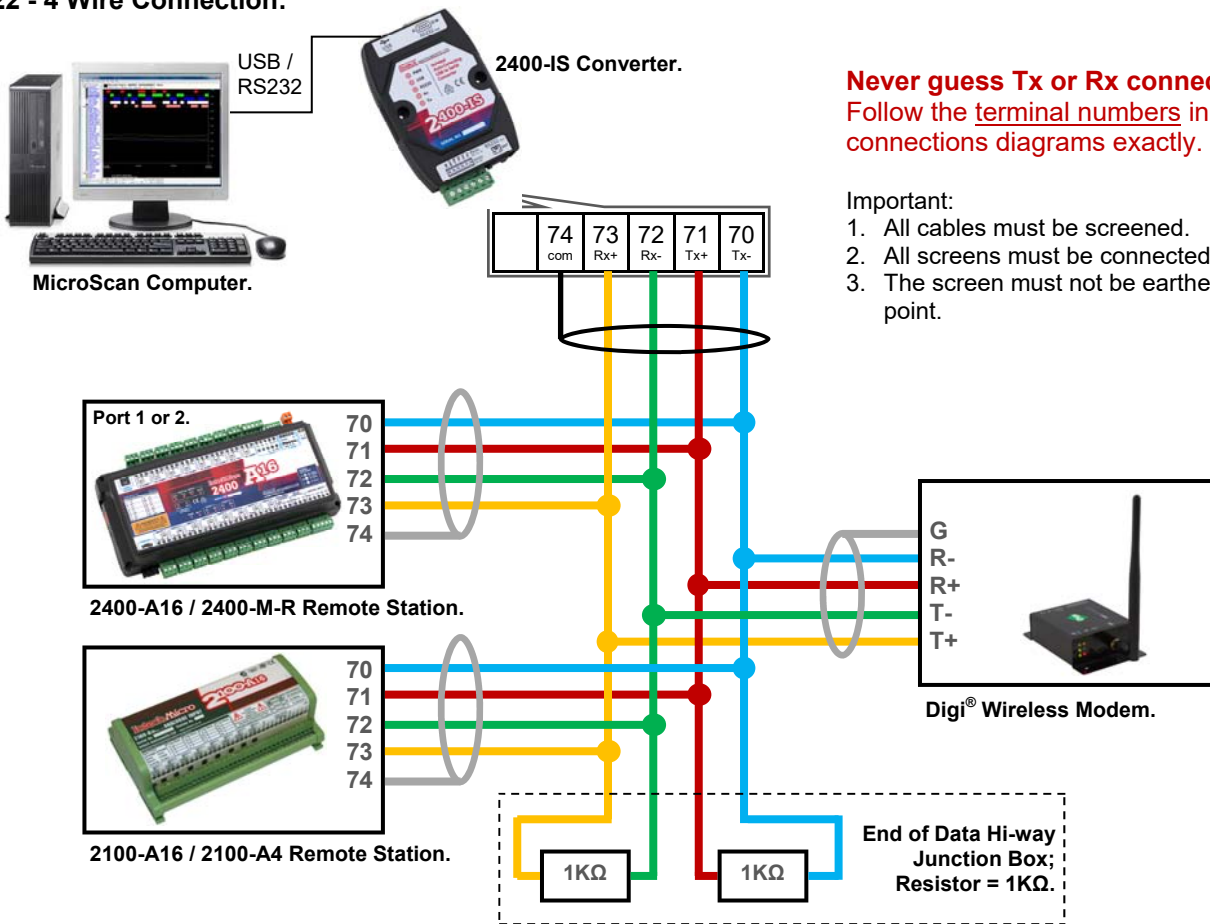
Brown pair: Brown wire connects to **G**.  
(Brown/White not connected).

**Note:** A 1K $\Omega$  resistor is highly recommended across the T+ and T- terminals of the Digi®, if it is the last station on the RS485 data hi-way (alternatively use dip switch 1 for 120 $\Omega$ ).

After the connections are complete, power up both the Digi® and the ezeio™ Controller.

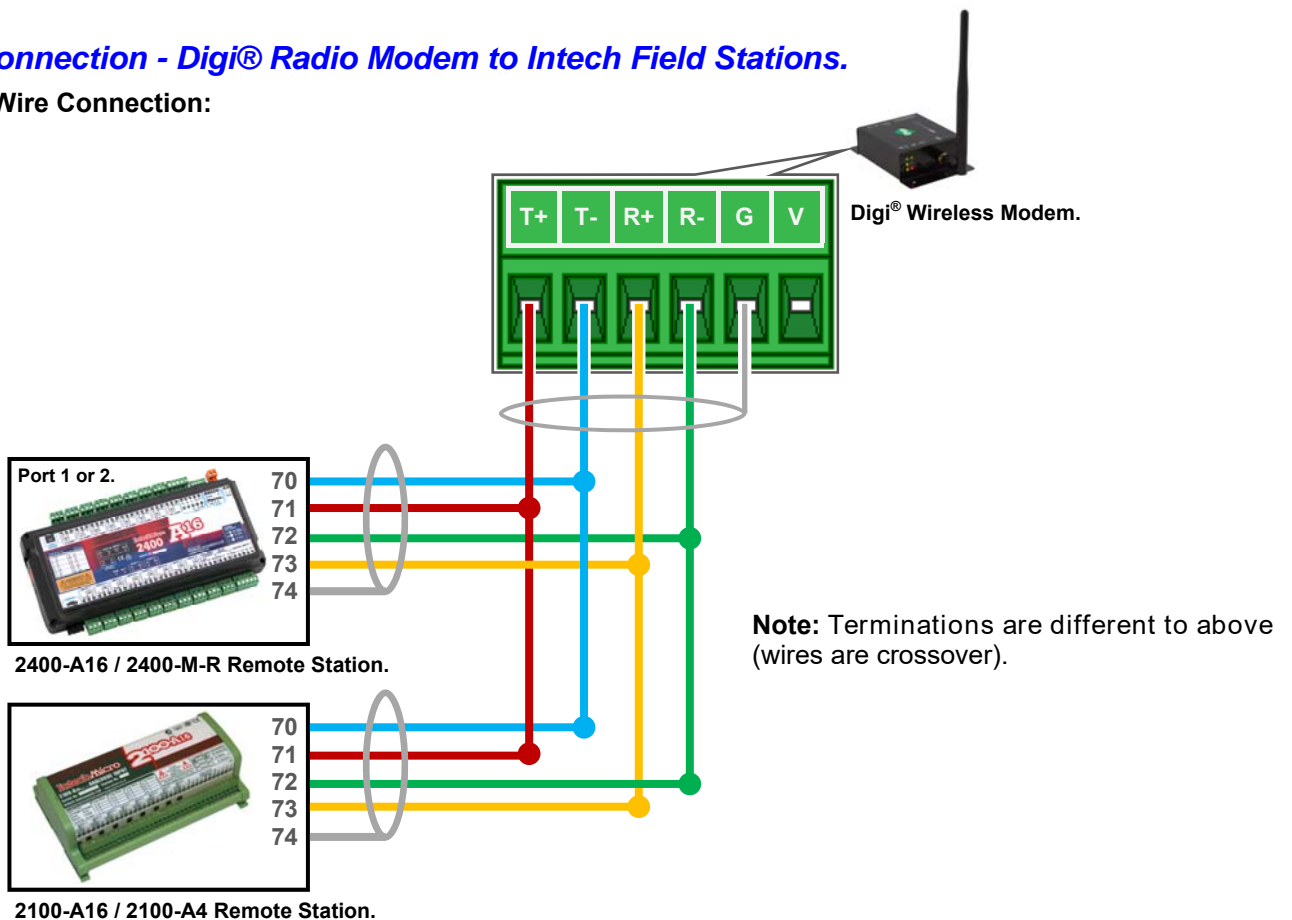
## RS422 Connection - Intech IS Converter to Digi® Radio Modem.

RS422 - 4 Wire Connection:



## RS422 Connection - Digi® Radio Modem to Intech Field Stations.

RS422 - 4 Wire Connection:



## Wiring and Installation:

### The Recommended Installation and Wiring of a Digi® Radio Modem:

All power and signals must be de-energised before connecting any wiring or antenna.

#### Mounting:

- 1) Mount in a clean and dry environment.
- 2) Do not subject to vibration, excess temperature or humidity variations.
- 3) Avoid mounting near power control equipment.
- 4) Allow 30mm minimum clearance between the Digi® radio modem terminals and ANY conductive materials.
- 5) Eliminate any contact with ground both the Digi® radio modem and any connected antenna.

#### Cover Removal:

Removing the cover of the Digi® radio modem will void the warranty. The Digi® radio modem has no user serviceable parts.

#### RS485/422 Comms Signal Cabling:

- 1) Use only low capacitance, twisted pair, overall screened data cable. The cable must equal or better the following specifications:

Cable Specifications:		
Conductor Size.		7/0.20mm, 24AWG
Conductor Resistance @ 20°C.		8.9Ω/100m
Max. Working Voltage.		300Vrms
Capacitance Between Wires of a Pair.		50pF/m
Capacitance Between Each Wire to All Others Bunched Together.		95pF/m
Cross-Talk Between Pairs.	@ 1KHz @ 100KHz	>-90dB/100m >-50dB/100m
Characteristic Impedance.	@ 100KHz	135Ω
Attenuation of a Pair.	@ 1KHz @ 10KHz @ 50KHz @ 100KHz @ 1MHz @ 1.5MHz	.15dB/100m .42dB/100m .80dB/100m .90dB/100m 1.9dB/100m 2.4dB/100m

**Note:** All cables are to be subject during manufacture to in-process spark testing @ 4kVrms.  
All cables are to be tested between conductors and conductors to screen for 1min @ 1500Vrms.

- 2) Minimum cable pairs: RS485 = 1 (*Plus overall screen*), RS422 = 2 (*Plus overall screen*).
- 3) Take care not to stress or damage cables during installation.
- 4) Total length of trunk line, including spurs, is not to exceed, typically 500m using RS485 or typically 1200m using RS422, without isolating boosters.
- 5) Terminating resistors - 1kΩ.
- 6) Cabling paths should avoid sources of radio frequency interferences such as fluorescent lights, variable speed motor drives, welding equipment, radio transmitters, etc.
- 7) There should be a minimum of 200mm physical separation between power cables and data cables.
- 8) Data cables should not be exposed to excessive heat or moisture, and should not be buried directly in the ground without protection.
- 9) Avoid powering a wireless device, remote station or controller from the same power supply as a variable speed drive.
- 10) All unused twisted pairs should be terminated at both ends with 1kΩ resistors. DO NOT ground unused pairs.
- 11) **Important:** The 2300-XX stations **cannot** share a data hi-way with the 2400-XX / 2100-XX stations and/or Shimaden Controllers.

#### Commissioning:

- 1) Check that all the above conditions have been met, and that the wiring is checked, before connecting the power cable.
- 2) Set the COM port in MicroScan to suit (Setup Tools > MicroScan Interface. Click 'Find 2400-IS' if one is attached). Check with Find Stations, Station status shows Station X Good (bottom left of MicroScan window).

**Intech**  
Instruments

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