

# MODULUS

## Meshing Radio Module - 2110

Modulus Meshing Radio modules link Modulus SCADA controllers, Scadaflex LPR (battery powered) and RIO packaged I/O modules together in a license-free mesh radio network. Meshing enables any node to automatically serve as a repeater, allowing wide-area coverage with less power. Meshing systems are “self healing” so if a node drops out, another will automatically take over message repeater functions. These modules also support standard **wired** communications with Modbus, DF1, SDI-12 and Ethernet IP, as well as Ethernet-Serial bridging and Ethernet Routing.

Meshing Radio modules have built-in analog and digital I/O for applications such as tank level monitoring, lift stations and pump control. They can also serve as communications concentrators with intelligent links to smart monitoring and control devices such as variable frequency drives and power meters.

Modulus Meshing Radio modules have a general purpose serial port that supports multiple types of interfaces; RS-232, RS-485 (2-wire), RS-422 (4-wire), and SDI-12. The buss port may also be used as a general purpose RS-485 serial port if not used for high-speed bus communications with other Modulus I/O modules.

### STANDALONE OPERATION

Modulus Meshing Radio modules can serve as standalone devices with SCADA communications, local and web human machine interfaces (HMI), historical trending and data logging, alarming, reporting, and programmable logic.

### COMMUNICATIONS

Meshing Radio modules have an Ethernet port and a general purpose serial port to communicate with Modbus devices and Allen Bradley PLCs. The module can serve as a communications concentrator or master controller. Ethernet to Serial bridging, and Ethernet routing to other Modulus modules' Ethernet ports, is also supported.

### GRAPHICAL, MOBILE, AND LOCAL HMIs

Configurable graphical web and mobile device interfaces are built into the Meshing Radio modules. The front panel display can also be customized to show live process values and states, and make setting changes.

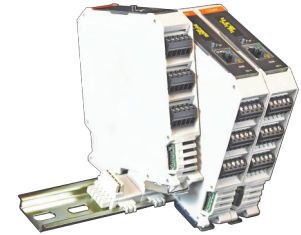
### HISTORICAL TRENDING AND EVENT LOGGING

Meshing Radio modules have an internal solid state flash disk, as well as a micro SD memory card slot to record over 100 years of data! Use the built-in web tools to retrieve and display historical trend and event data and extract it as spreadsheet files.

### REPORTING

Reports can be created in minutes showing live values, production totals, trend and event data, alarm summaries, etc. Customize reports with your own logos and graphics. Call up reports on demand, or have them automatically transferred to your computer.

8x-5001 2DI, 1DO, 1AI (20mA/V)



Modulus Meshing Radio Communications Module

- 1 ETHERNET PORT
- 1 900MHZ LICENSE-FREE MESHING RADIO
- 2 SERIAL PORTS (1 GENERAL PURPOSE AND 1 BUS PORT)
- 2 DISCRETE/HIGH-SPEED PULSE INPUTS
- 1 DISCRETE OUTPUT (PROTECTED FET)
- 1 ANALOG INPUT (PROCESS—mA/V)

### ALARMING

A Meshing Radio module can manage alarm conditions on any of its local inputs, as well as over 500 conditions monitored by communications with remote I/O and other devices. Alarms conditions can be displayed locally and annunciated with its discrete output, as well as with a Modulus Cellular Communications module for text message and e-mail alerts. The module maintains a journal spreadsheet file of when alarms occurred, when they were acknowledged, by whom, and when the alarm conditions cleared.

### PROGRAMMABLE LOGIC

Meshing Radio modules support programmable logic written in ladder logic, function block and text languages; all with 32-bit and floating point math. Programmable logic can supplement the built-in functions of the module.

### PID & PUMP CONTROL

Meshing Radio modules have a quad PID controller and a triplex pump controller (float or level control) with error detection and alarming. Without requiring any additional modules, the Meshing Radio Module is an ideal solution for SCADA operation of wells, lift stations, and booster pump stations.

### REDUNDANCY

Meshing Radio modules support redundancy for enhanced reliability. If a module goes off-line, a designated backup can take over automatically.

# Modulus Meshing Radio Communications Module - 2110 Specifications

## STANDARD FIELD I/O

### Digital Inputs:

- Input Range: 2 Non-isolated DC or contact closure, DC to 20KHz maximum  
Contact closure/open collector driver to ground, or 0 to 30Vdc (ON=<1.5V, OFF > 2.5V), **60Vdc absolute maximum**  
Input Current: Approximately 0.5mA (internal current source)  
Filtering: Individually configurable: 5Hz, 10Hz, 20Hz, 50Hz, 100Hz, 500Hz, 1KHz, 2KHz, 5KHz, 10KHz+

### Digital Outputs:

- Output Rating: 1 Solid-state Protected FET high-side driver (switches to input power when ON)  
30Vdc, 2A maximum, current limited to approximately 2.25A.

### Analog Inputs:

- Input Ranges: 1 16-bit, Delta Sigma, selectable input ranges  
Software selectable:  
• 20mA (minimum input for full accuracy is 0.5mA)  
• 5V and +/- 5V, 10V and +/- 10V, 30V

Maximum signal level 35Vdc on any range, **40Vdc absolute maximum**

## COMMUNICATIONS

### Ethernet:

- SCADA Protocols 1 10/100mb/s (10/100 Base-T)  
Modbus TCP & UDP (master/slave), Ethernet IP (master/slave PLC5 & SLC5/05 emulation), Ethernet to Serial bridging  
Internet Protocols HTTP (server), FTP (server & client), ICMP (ping; server & client), NTP (client), DHCP (server & client), DNS, DDNS

- Wireless:** 1 900MHz 1/4W (24dBm) Frequency Hopping Spread Spectrum meshing radio, -101 dBm sensitivity @ 200kbps, up to 64 remote nodes

### Serial:

- 1 RS-232, RS-485, RS-422, SDI-12 (for general purpose communications)  
1 RS-485 Bus port (this port is available for general purpose communications if not used for high-speed bus communications with other modules)  
Baud Rates (all ports) 115K, 38.4K, 19.2K, 9600, 4800, 2400, 1200 baud.  
Protocols Modbus RTU (master/slave), DF1 (slave), SDI-12 (general purpose port only)

## HMIs

**Local:** 128x32 graphical, wide temperature range yellow OLED and single pushbutton

**Graphical:** Web based, graphic library included. Compatible with most browsers, including Internet Explorer, Firefox, Chrome, Safari, Android

**Mobile:** Web based, text only, up to 50 registers. Compatible with most browsers, including Internet Explorer, Firefox, Chrome, Safari, Android

## PROGRAMMING

**Languages:** Ladder Logic, Function Block, Text—built-in web based graphical and text editor and debugger

**Capacity:** 64KB logic, 2MB source code, 32-bit integer and floating point math

## STORAGE

**Registers:** 504 Numeric registers, 504 Boolean registers

**Internal Flash disk:** 32MB

**Removable disk:** Micro SD Card (up to 256GB, supplied by customer)

## CLOCK

**Real Time Clock:** Temperature compensated with lithium battery backup power

Stability +/- 3ppm from -30°C to 70°C

## GENERAL

**Input Power:** 10Vdc to 30Vdc

### Power Consumption

Not using Ethernet 18mA @ 12Vdc / 13mA @ 24Vdc (Ethernet power saver enabled)

Using Ethernet 78mA @ 12Vdc / 43mA @ 24Vdc

+ radio transmitting 60mA @ 12Vdc 30mA @ 24Vdc in short transmit bursts

**Field Wiring Termination:** [81-5001] screw terminal blocks [82-5001] lever terminal blocks, 3.5mm, 22 to 14GA wires

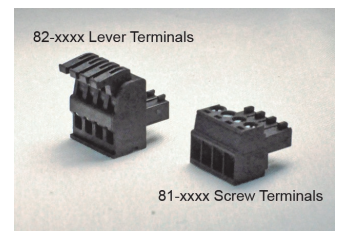
**Antenna Connector:** RP-SMA female (male pin center conductor)

**Temperature:** -40°C to 70°C (operating), -40°C to 85°C (storage)

**Humidity:** <95% RH (non-condensing)

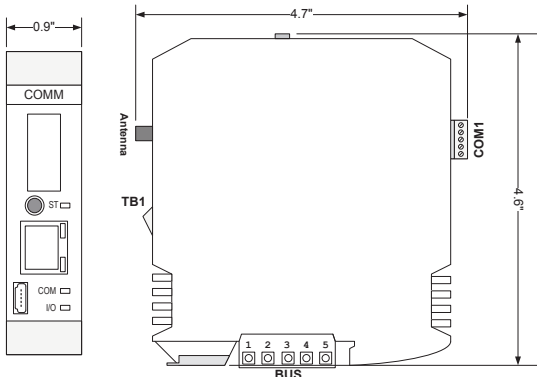
**Enclosure:** Polyamide, light gray (RAL 7035)

**Mounting:** 35mm DIN rail with bus connector block



# Modulus Meshing Radio Communications Module - 2110 DIMENSIONS and WIRING

## DIMENSIONS and WIRING

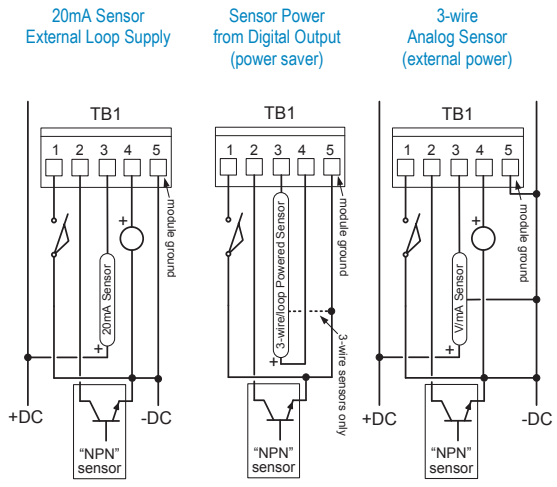


Terminal	Function
1	-485
2	+485
3	RESET#
4	GND
5	+V

TB1 terminals	Inputs/Outputs
1	DI1
2	DI2
3	AI1
4	DO1
5	GND

Refer to the installation manual for additional installation details and precautions.

## DISCRETE & ANALOG INPUTS/OUTPUTS—TB1



All discrete and analog inputs/outputs are referenced to the ground terminal (5). This terminal is connected internally to the modules power supply ground.

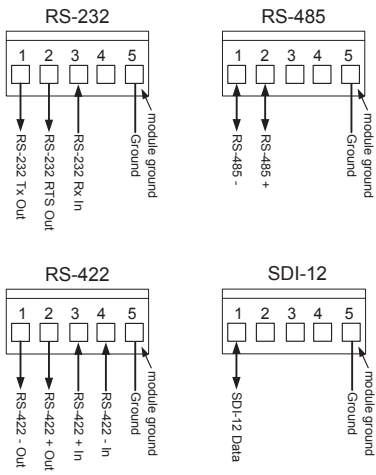
Discrete Inputs accept a contact closure or open-collector ("NPN" style) input signal. An external pull-up resistor is not required.

The Discrete Output sources current ("PNP" style) from the modules input power.

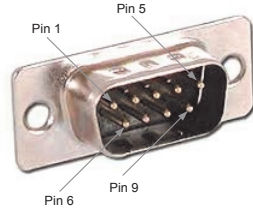
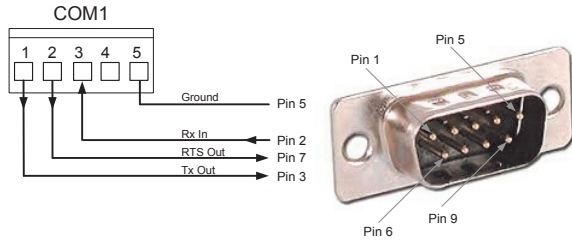
The Analog Input may be software configured to accept either current or voltage signals. In low power applications, the analog sensor may be powered from the Discrete Output, configured to power the sensor on only when needed to take an analog reading (with configurable "warmup" time).

Contact ICL Customer Service for available pre-wired Field Wiring Panel

## General Purpose Communications Port COM1 (modes are software configured)



## Typical COM1 RS-232 Wiring to Modem/Radio





Industrial Control Links, Inc.  
1364 Blue Oaks Blvd. Roseville, CA 95678  
**530.888.1800**