

MODULUS

Spread Spectrum Radio Modules - 2110

Modulus Spread Spectrum Radio modules wirelessly interconnect Modulus SCADA controllers with 900MHz 1 watt license-free spread spectrum radios. Every module can serve as a repeater for extended radio system coverage. The 8x-5x03 modules are compatible with the older Xtend radios used in previous generations of ICL SCADA controllers. The 8x-5x04 modules are newer technology radios with improved radio performance. These modules also support standard **wired** communications with Modbus, DF1, SDI-12 and Ethernet IP, as well as Ethernet-Serial bridging and Ethernet Routing.

Modulus Spread Spectrum Radio modules have built-in analog and digital I/O for tank level monitoring, and pump control applications such as wells, lift stations and booster pumping stations. 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 Spread Spectrum 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 Spread Spectrum Radio modules can serve as standalone devices with SCADA communications, local and web human machine interfaces (HMIs), historical trending and data logging, alarming, reporting, and programmable logic.

COMMUNICATIONS

Modulus Spread Spectrum 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 Spread Spectrum Radio modules. The front panel display can also be customized to show live process values and states, and make setting changes.

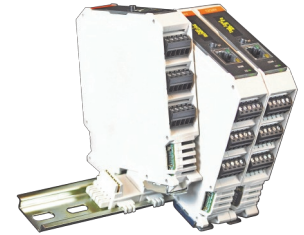
HISTORICAL TRENDING AND EVENT LOGGING

Modulus Spread Spectrum 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 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-5003 2DI, 1DO, 1AI (legacy)
8x-5004 2DI, 1DO, 1AI (new)



Modulus Spread Spectrum Radio Modules

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

ALARMING

A Spread Spectrum Radio module can manage alarm conditions on any of its local inputs, as well as over 500 conditions monitored by communications with 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

Spread Spectrum 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

Spread Spectrum 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 Spread Spectrum Radio Module is an ideal solution for SCADA operation of wells, lift stations, and booster pump stations.

REDUNDANCY

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

Modulus Spread Spectrum Radio Communications Module - 2110 Specifications

FIELD I/O

Digital Inputs:	2	Non-isolated DC or contact closure, DC to 20KHz maximum
Input Range:		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:	1	Solid-state Protected FET high-side driver (switches to input power when ON)
Output Rating:		30Vdc, 2A maximum, current limited to approximately 2.25A.
Analog Inputs:	1	16-bit, Delta Sigma, selectable input ranges
Input Ranges:		Software selectable: <ul style="list-style-type: none">• 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:	1	10/100mb/s (10/100 Base-T)
SCADA Protocols		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 1W (30dBm) Frequency Hopping Spread Spectrum Spread Spectrum radio, -110 dBm sensitivity @ 9.6kbps [8x-5x03] -110 dBm sensitivity @ 9.6kbps [8x-5x04] -113 dBm sensitivity @ 9.6kbps
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

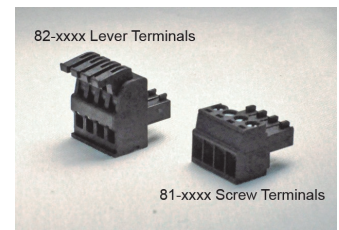
Registers:	504 Numeric registers, 504 Boolean registers
Internal Flash disk:	32MB
Removable disk:	Micro SD Card (up to 256GB, supplied by customer)

CLOCK

Real Time Clock:	Temperature compensated with lithium battery backup power
Stability	+/- 3ppm from -30°C to 70°C

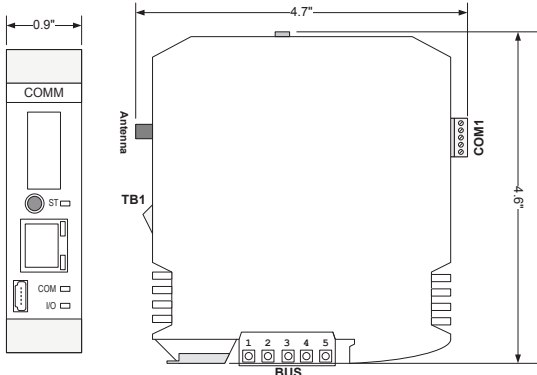
GENERAL

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	Add 300mA @ 12Vdc 150mA @ 24Vdc in short transmit bursts
Field Wiring Termination:	[81-580x] screw terminal blocks [82-580x] 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 Spread Spectrum Radio Communications Module - 2110 DIMENSIONS and WIRING

DIMENSIONS and WIRING

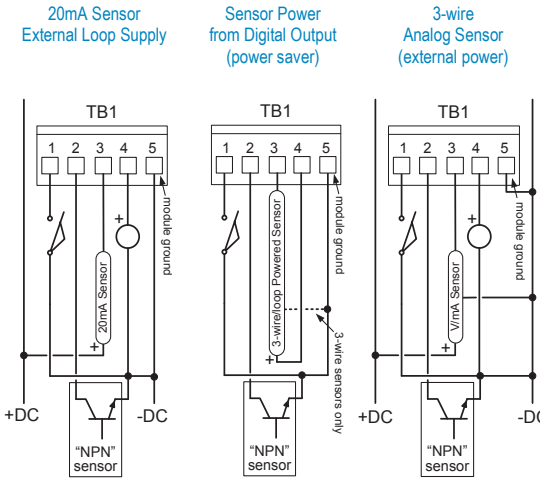


Terminal	Function
1	-485
2	+485
3	RESET#
4	GND
5	+V

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.

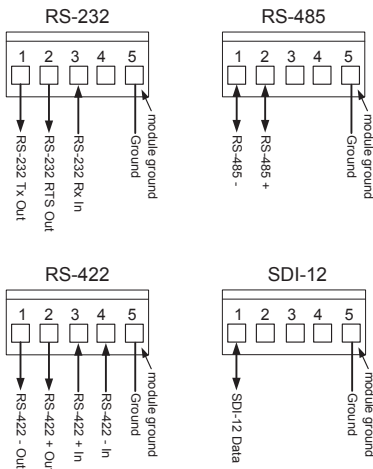
Discrete Inputs accept a contact closure or open-collector ("NPN" style) input signal. An external pull-up resistor is not required.

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

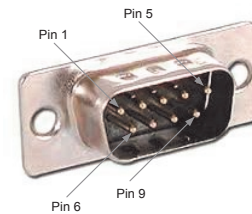
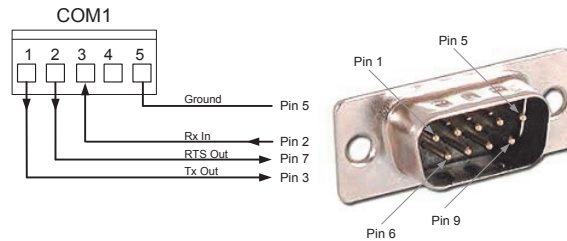
The Analog Input may be software configured to accept either current or voltage signals. In low power applications, the analog sensor may be powered from the Discrete Output, configured to power the sensor on only when needed to take an analog reading (with configurable "warmup" time).

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

General Purpose Communications Port COM1 (modes are software configured)



Typical COM1 RS-232 Wiring to Modem/Radio





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