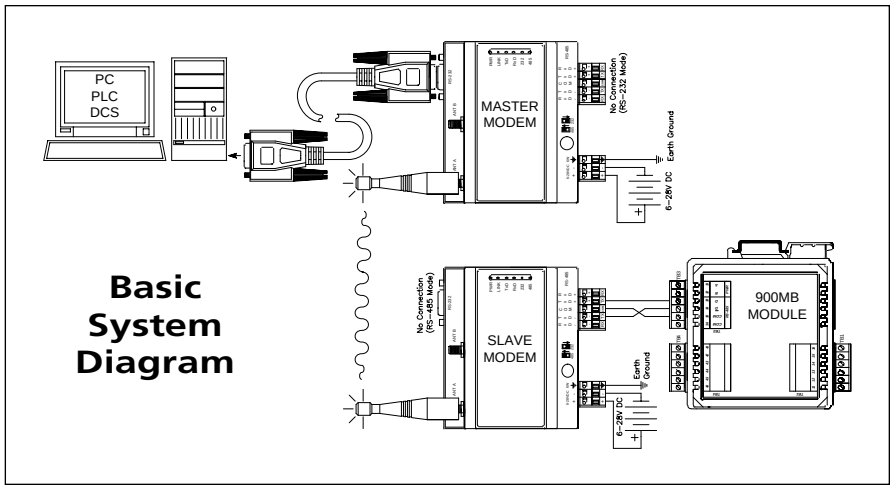
Modbus/RS-485



OS2400-485 Radio Modem for Modbus

Description

The OS2400-485 industrial grade spread spectrum radio modem uses advanced digital signal processing (DSP) to provide the ultimate in performance and reliability. The versatility of the DSP core and small, DIN rail-mountable form factor make the OS2400-485 ideally suited for your industrial and utility wireless applications.

The OS2400-485 operates in the license-free 2.4 GHz ISM band and can be used throughout the world with no site licenses or monthly leased line / wireless service fees.

Serial Data Interface
RS-485, RS-422, RS-232

Communication/Protocol
Asynchronous half/full-duplex, Modbus, DNP3. Data rates of 1200 bps to 115.2 Kbps full-duplex.

Power Requirement
6 to 28V DC

Operating Temperature
-40 to 75°C

Approvals
CE marked. UL, cUL, FCC, Industry Canada, and Europe listed. Class I, Div 2, Groups A, B, C, D

Special Features

- Universal RS-232/422/485 radio operates as a master, slave or as a repeater
- Secure, wireless, and license-free communication with ARC4 and 2.4 GHz FHSS technology
- Compact DIN rail-mount packaging with pluggable terminals
- Full-duplex asynchronous communication rates to 115.2 Kbps
- Low latency for real-time applications
- Integrated Modbus and DNP3 router
- Automatic antenna diversity (supports two antennae for local/long-distance)
- 32 unique, user-selectable data channels
- Supports network-wide diagnostics from any radio
- User programmable with easy to use, Windows-based software

Applications

- Distributed I/O
- Industrial Automation
- Oil and Gas Field Monitoring
- SCADA
- Water and Waste Water Management

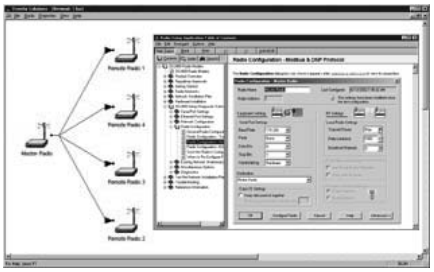
Benefits

Peace of Mind
Designed for high interference environments, the OS2400-485 combines advanced frequency hopping and digital signal processing technology with outstanding receiver sensitivity and antenna diversity. The result is exceptional noise and interference rejection and peace of mind for you.

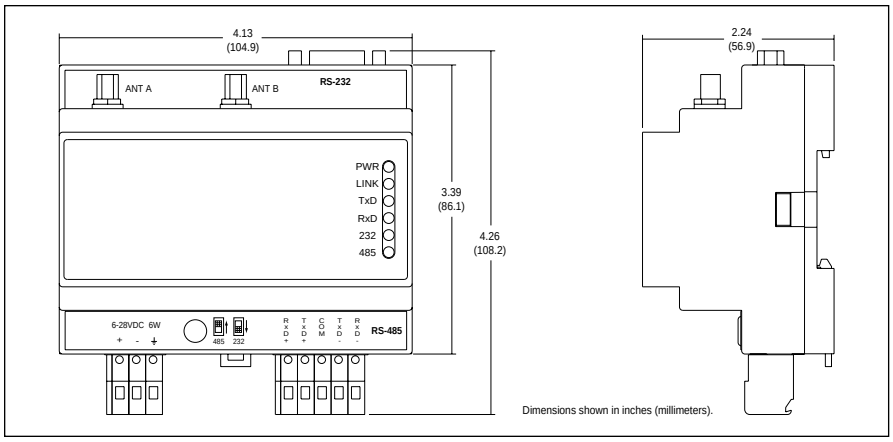
Flexibility
Configure the OS2400-485 to operate in point-to-point, broadcast, or point-to-multipoint modes. Addressable, multidrop RS-485 operation is built in. The RF output levels are user configurable and 32 data channels allow multiple networks to operate in the same area.

Speaks Your Language
With integrated Modbus RTU support, this unit directly supports your industrial application's RS-232, 422, 485 or DNP3 data interfaces.

Easy to Use
Windows-based software for setup and remote diagnostics is included. A graphic interface makes the OS2400-485 easy to install and operate.



Software simplifies configuration of your system.



Performance

General

Physical
114 x 105 x 59 mm (4.5" W x 4.12" H x 2.32"D).
224 grams (8 ounces).

Antenna
Two RP SMA connectors; automatic antenna diversity.

Supports two antennas for superior reception and operation as a "repeater" device.

Typical Indoor Range
150 to 450 meters.

Typical Outdoor Range
3+ kilometers with 2dBi omni antenna; up to 25 kilometers line of sight with high gain antennas.

Software
Windows-based user setup, diagnostic, and communication software (included with Setup Kit and each modem purchase).

Data Interface

Serial Data Interface
RS-485, RS-422, RS-232.

Communication
Asynchronous half/full-duplex, Modbus and DNP3.

I/O Data Rate
1200 bps to 115.2 Kbps full-duplex.

Network Topology
Point-to-point, store & forward repeater, point-to-multipoint, and peer-to-peer (DNP3 only).

Hop Patterns
32 user selectable, non-interfering, networks.

Error Detection / Correction
32 bit CRC with ARQ (Automatic Re-Send Query).

Encryption
ARC4 (40 bit).

Latency
<20 ms.

Environmental

Ambient Temperature
Operating: -40 to 75°C.

Humidity
To 90% RH (noncondensing).

Power
Supply Voltage: 6 to 28V DC.

Power (Average): 2.5W master, 1.25W remote.

Approvals
FCC listed (FCC Part 15.247).

Industry Canada listed (RSS 210).

Europe listed (ETSI300.328, ETSI 300.826, EN60950).

CSA marked (C22.2 No. 142-M1987, 213-1987).

UL listed (UL1604 Class 1: Div. 2; Groups A,B,C,D Temp. Code: T4A).

Transceiver Characteristics

Frequency
2.4 to 2.4835 GHz for USA; varies for other countries.

Radio Type
Frequency hopping spread spectrum (FHSS).

Number of Frequency Channels
79 for USA; varies for other countries.

Output Power
1 mW to 250 mW, programmable.

Channel Data Rate
250 Kbps.

Receiver Sensitivity
-96 dBm @ 10^{-6} BER.

Adjacent Channel Rejection
> 40 dB.

Spurious Rejection
> 50 dB.

Ordering Info

Modems

OS2400-485-SK1*
Starter Kit #1-US and Canada
Includes: 2 each OS2400-485-1 modems

OS2400-485-SK2*
Starter Kit #2-Europe
Includes: 2 each OS2400-485-2 modems

OS2400-485-1
Radio frequency modem: US and Canada

OS2400-485-2
Radio Modem: Europe

* Each kit also includes:
Two 2dbi straight antennas, one 6 ft. DB9 serial cable, two power supplies, software, and user's manual (PDF)

Cables

5035-818
RP N bulkhead jack - RA RP SMA plug, 2 ft.

5035-822
RP RA SMA plug - RP N plug, 2 ft.

5035-957
RS232 communication cable, DB9, Male/Female, 6 ft.

Antennas

5035-888
Omni-directional straight, 2dbi, 2.4Ghz, RP SMA

5035-876
Omni-directional articulating, 5dbi, 2.4Ghz, RP SMA

5035-880
Omni-directional collinear, 8dbi, 2.4Ghz, RP N

5035-884
Directional patch, 11dbi, 2.4Ghz, RP SMA

5035-898
Omni-directional antenna mounting bracket, 8dbi

Lightning Protection

5035-945
RP N (female) jack - RP N (female) bulkhead jack

5035-949
RP N (female) bulkhead jack - RP N (male) plug

Miscellaneous

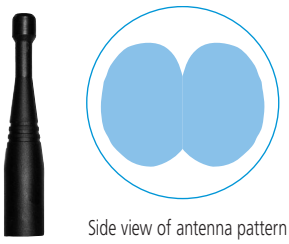
5035-961
Power supply, 120V AC to 12V DC w/connector

5035-971
Setup and diagnostic software on CD-ROM with user's manual (PDF format only) for OS2400-485

5035-953
Antenna site survey kit

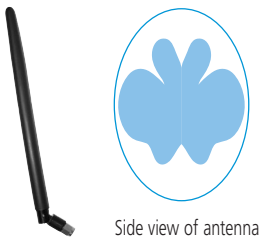
OS2400 Antennas, Cables, and Lightning Protection

Omni-directional (2dBi)
Model 5035-888



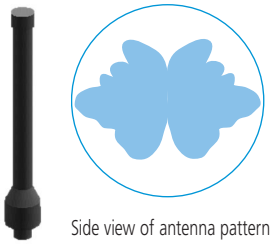
Side view of antenna pattern

Omni-dir. Articulating (5dBi)
Model 5035-876



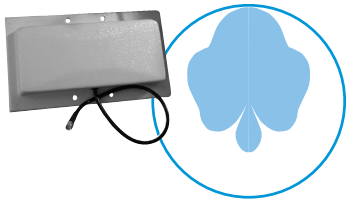
Side view of antenna pattern

Omni-dir. Collinear Array (8dBi)
Model 5035-880



Side view of antenna pattern

Directional Patch (11dBi)
Model 5035-884



Side view of antenna pattern

Choosing the Right Antenna

Link Gain is a composite of the gains of each of the antennas (the Master's antenna and the Remote's antenna) as well as any cable loss. For example, if you want to communicate over a 2 mile (3.2km) unobstructed distance, you should include at least 7dB of Link Gain.

Master antenna gain:	8 dBi (Omni-directional xxx-xxxx)
Remote antenna gain:	8 dBi (-----)
Cable at the Master:	-2 dBi (4 feet or 1.2 meters)
Cable at the Slave:	-5 dBi (10 feet or 3.0 meters)
Total Link Gain:	9 dBi

More gain will give you more distance. It doesn't make any difference whether the gain is on the Master or the Remote radio. The gains of the two antennas is additive.

Make the choice for each antenna pair (if you have a point-multipoint system).

Distance Chart

The chart to the right has been adjusted to allow for 10dB of "margin" in your system. This margin accounts for expected changes in the environment during operation.

Link Gain (dB)	*Unobstructed Distance
35	15 mi (24.2 km)
30	12 mi (19.4 km)
25	10 mi (16.1 km)
15	5 mi (8.0 km)
7	2 mi (3.2 km)
4	1 mi (1.6 km)

* Radio power set to Max.

NOTE: Contact factory for a reference list of antenna and cable suppliers if needed.