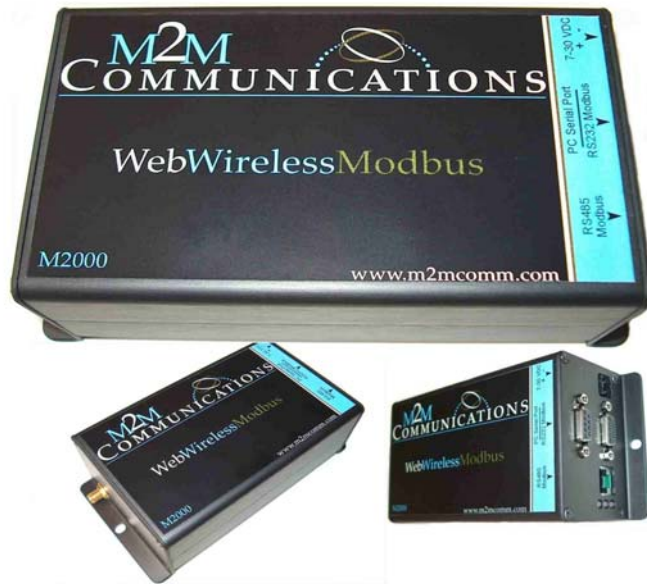


## Monitor Modbus Devices Anywhere in North America from Your Web Site *Receive Voice, Pager, or E-Mail messages within seconds*

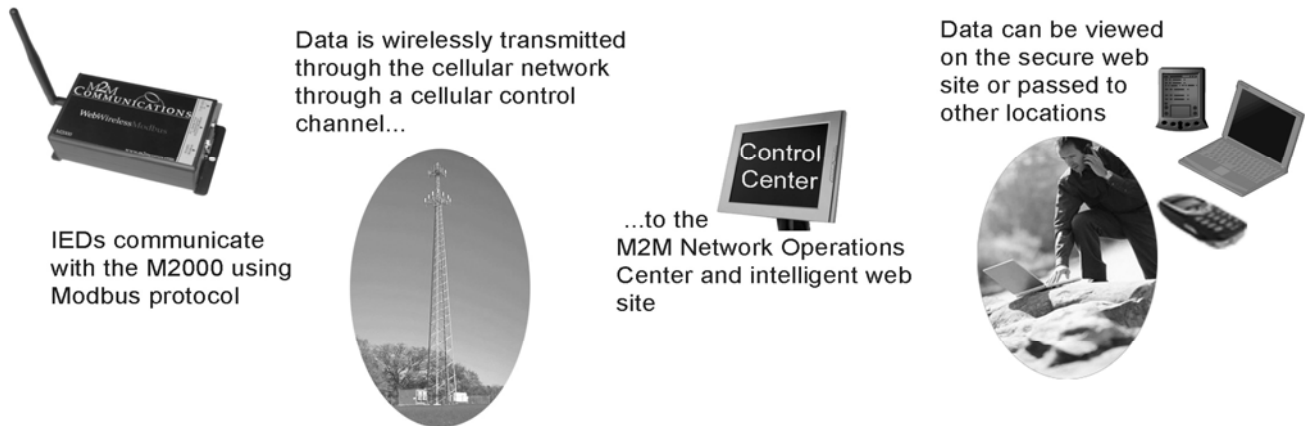
The M2000 Wireless Communicator is a web-to-wireless remote monitor, control, and communication device. An internal GSM cellular modem passes data between remote modbus devices and a secure web server.

RS232 and RS485 serial ports are used to communicate with a large variety of Intelligent Electronic Devices (IEDs) such as programmable controllers and measuring instruments using the standard modbus protocol.



Operation is very simple:

1. Select register values and I/O points to be read and/or written.
2. Connect the M2000 to the devices to be monitored or controlled. The M2000 will automatically establish 2-way communications over the cellular network to the [www.m2mcomm.com](http://www.m2mcomm.com) web site.
3. Log onto your private page on the web site to:
  - View the last reported status of your equipment – switch positions, diagnostic information, tank levels, temperature, pressure, flow rate, number of pulses received...
  - Request an up-to-date report from the unit.
  - Configure selected events to trigger an immediate notification by voice phone, pager or e-mail.



M2M Communications Process Diagram

### Select the registers and I/O to be read or written - Local Configuration & Test

Connect a laptop or desktop computer to the RS232-DB9 connector. Use the Local Configuration program (included) to display, edit, and save all programmable parameters and to test the connection and radio signal strength.

The M2000 has three basic modes of modbus communication:

- (1) As an Intelligent Modbus Master, the M2000 polls and reads data from specified addresses in modbus slave devices.
- (2) As an Intelligent Modbus Slave, the M2000 is configured to accept commands and data from a modbus master device. In both the master and slave modes, the M2000 will compare the data to customer-defined setpoints and automatically report when a specified condition exists or when one of the limits is exceeded.
- (3) As a Web-to-Wireless Slave Modem, the M2000 can be used as a completely flexible wireless modbus-to-cellular-to-web communication system, much like a simple modem. The modem mode does not analyze or format the data it receives; it simply transmits it to and from the web server.

When the M2000 is configured as a slave device, it can be used simultaneously in both the intelligent mode for automatic analysis and reporting and the web-to-wireless modem mode. For example, some data values can be loaded into the M2000 to be monitored and tested, while other data can be directly transmitted to the web server without further processing or interpretation.

The intelligent mode will monitor up to twelve digital inputs or outputs, twenty 16-bit register values, and four "bit-packed" registers. When an alarm condition occurs, the M2000 will report the event to the M2M Network Operation Center. Alarm conditions can be defined for both digital and analog readings. For each of the 12 digital (I/O) points and for each bit in the 4 bit-packed registers, an alarm condition and trigger time can be defined for open-close events, close-open events, both, or neither.

For each of the 20 analog registers, up to three setpoints or limits can be specified plus a trigger time and a dead band. This defines four operating “ranges” such as low, normal, high, and alarm. When any range change occurs for the trigger time, a report can be made.

In the master mode, up to 20 different user-defined modbus registers can be written to from the web site. Write operations can be repeated at a predefined frequency or can be one-time events based on commands sent from the web site. The values to be written can be pre-assigned or can be dynamic data read from another address. In the slave mode, up to 300 different user-defined commands or data values can be passed to the M2000 where they can be read by the master device.

### **Connect it -- Using Serial Comm Ports and Modbus Communication Protocol**

The M2000 is equipped with two modbus ports: RS232-DB9 and RS485-RJ45. Baud rates, parity, and addresses are programmable. As a modbus master, both ASCII mode and RTU mode are supported. In this mode, it can read and write inputs, outputs, and data registers in up to 32 slave devices. As a modbus slave, only the RTU mode is supported. For a full list of supported modbus functions, please refer to the user's manual.

### **GSM Cellular Communications**

The GSM cellular network provides very wide spread coverage throughout North America with no requirement for a local cellular account. The small size and low cost make it suitable for a wide variety of general monitoring and control applications.

When an M2000 makes a call from anywhere in North America (in cellular coverage), it is recognized by the local cellular provider as a roaming cell phone. As a part of the standard roaming protocol, the local cellular network automatically passes the module's identification numbers and data to the central cellular hub and on to the M2M Network Operations Center. The M2M module passes its data in a normally non-utilized data field. This technique allows the transmission of an identification number and the time and date plus 25-digits of customer specific data, all at a very low cost.

### **WWW.M2MCOMM.COM**

Data collected by the M2000 will be wirelessly transmitted to the M2M Comm Data Center where it can be stored, interpreted and displayed, or forwarded to another location. In addition, configuration and control information can be sent from the M2M web site to the M2000.

The central web server records and displays all incoming status messages and depending on the owner's instructions will notify the owner of the event via e-mail or telephone (using a text-to-speech voice message), and/or pass the data to a designated e-mail or IP address.

After entering a unique user ID and password:

- Both current and historical data can be viewed for all units. Displays can be customized with informative labels, scaling factors, and units.
- Data exporting options can be defined.
- Reporting options and user notification messages can be created and maintained.
- Time scheduled reports can be defined.
- Current status reports can be requested.

- Custom control commands can be designed that can be remotely written to the modbus device.

### Reporting Options

Reports are triggered for three reasons: (1) a specified alarm condition occurs such as an I/O state change or an analog range change, (2) a time scheduled call is due, or (3) a report is requested from the web site.

A variety of data reports have been pre-defined to optimize the available data packet. A typical report includes the status of 12 I/O points plus the range and present value of 3 registers. When an alarm occurs, the report that includes the alarming register data will be sent.

All register and I/O reports can be time scheduled, each at a predefined frequency, from once every hour to once every 240 hours (10 days). The reports can also be individually requested at any time from the web site or a single "Report All" command will request a group of pre-selected reports.

To reduce the number of calls that might result from over-active inputs or power cycling conditions, the number of calls can be limited to from 1 to 20 calls per day. Time scheduled calls and user requested status calls will continue to be placed even after this limit has been reached.

## Hardware Specifications

### Antenna

The standard antenna is a direct-connect ½ wave 50-ohm rubber duck. An external SMA connector provides the connection to the antenna. A remote antenna and cable can also be attached to the connector if desired. Higher gain or directional antennas can be used for fringe area installations.

### LED Indicators

Three bi-color LEDs are used to indicate power-on, normal operation, modbus read/write operations, cellular data transmission pass/fail and other troubleshooting indications.

### Cellular Radio Operating Specifications

The GSM / GPRS digital cellular modem has the following specifications:

- GPRS Class 10 operation
- Packet data up to 85.6K bps
- Embedded TCP/IP stack

### Power Supply / Enclosure Options

The standard M2000 operates from 8-30 VDC (1.6 Amp peak current draw during transmit). An extruded aluminum enclosure for indoor applications (6" x 3" x 2" high) makes it suitable for a wide variety of general monitoring applications. An external NEMA 4 enclosure and integrated 120 VAC power supply is also available.

### CPU / Memory and Programmable Configurations

The CPU is a Microchip PIC 18F6720. Integrated non-volatile (EEPROM) memory is used to store operational data. The default values for the programmable parameters are stored into the unit at the factory. These values can be changed in the factory by special order or by the user during the local (PC based) programming process.

The operating system and configuration data is stored in FLASH memory and can be field updated with new features at any time by the Local Configuration utility.

### Environmental

The recommended operating temperature range is -22 to 140 degrees F (-30 to 60 C). The recommended relative humidity range is 5 - 95% non-condensing.

### M2000 Ordering Information

- |                          |             |   |
|--------------------------|-------------|---|
| <input type="checkbox"/> | M2000DC_Int | Powered by 8-30 VDC, Aluminum Housing (for indoor use)          |
| <input type="checkbox"/> | M2000DC_Ext | Powered by 8-30 VDC, Exterior NEMA 4 Enclosure with hinged door |
| <input type="checkbox"/> | M2000AC_Int | Powered by 120 VAC, Aluminum Housing (for indoor use)           |
| <input type="checkbox"/> | M2000AC_Ext | Powered by 120 VAC, Exterior NEMA 4 Enclosure with hinged door  |

### Other Models

Other M2M products include direct connect (dry contact or 120 VAC sensing) digital inputs, which can be configured as alarms, counters, or counter/timers, analog inputs including 0-5 VDC and 4-20mA, and direct connect control outputs (relays). Please call for more information.

*Last update November 2007*