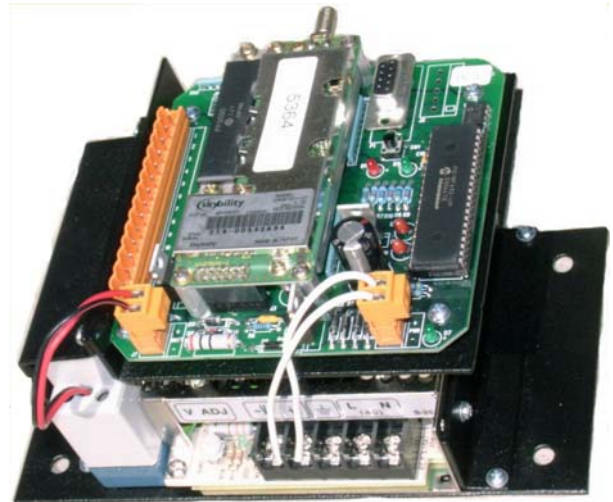


Monitor Equipment Anywhere in North America From Your Web Site

The M25x0 is a web-to-wireless communication device. Its internal cellular modem provides two-way communications to the automated M2M operations center and the www.m2mcomm.com web site. GSM cellular communications provide 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 applications

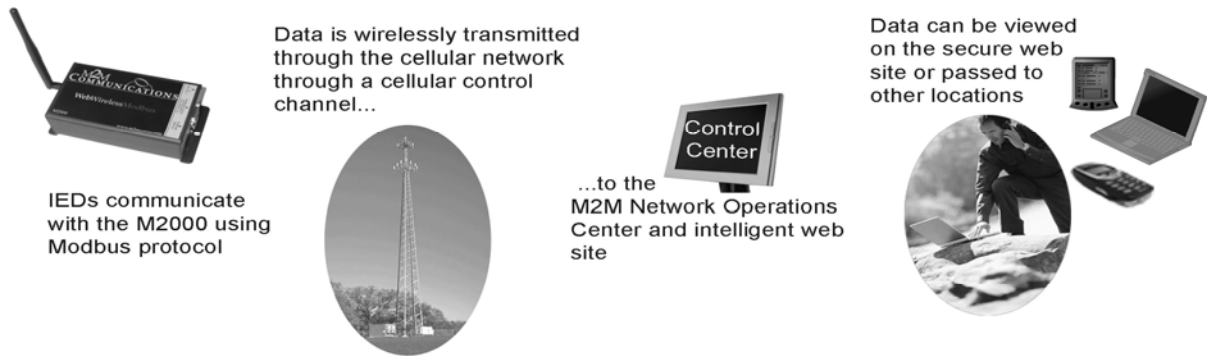
The M2500 directly monitors 10 digital inputs, which can be configured as alarms, counters, or counter/timers.

The M2510 also includes an onboard RS232 or RS485 serial port that can be used to remotely communicate with a large variety of Intelligent Electronic Devices (IEDs) such as programmable controllers and measuring instruments using the industry standard Modbus protocol.



Operation is very simple:

1. Connect the M25X0 to the switches or contacts that are to be monitored.
2. Select any Modbus registers to be read or written. The M25X0 will automatically establish 2 way communications over the cellular network to the www.m2mcomm.com web site.
3. Log onto your private page 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 user notification.



M2M Communications Process Diagram

Direct Connect Digital Inputs

The M25X0 is equipped with 10 digital status inputs. All inputs are opto-isolated and protected with surge suppression circuitry per ANSI C37.90.1-2002 to minimize the effect of external transient voltages. A PC based Local Programming utility (included) is used to define the inputs as follows:

- 1 Alarm style or 5-digit counter
- 2 Alarm style or 5-digit counter
- 3 Alarm style
- 4 Alarm style
- 5 Alarm style
- 6 Alarm style
- 7 Alarm style
- 8 Alarm style or maintenance / tamper switch
- 9 Alarm style or Counter / Timer
- 10 Alarm style or Counter / Timer

The unit will report the state of all 10 inputs when any “alarm style” input changes state in either direction (open-closed or closed-open) for longer than a programmable trigger time. The trigger time of each alarm style input is programmable by the user through the local programming utility and can be varied from a minimum of 1 second to a maximum of 30 minutes and 59 seconds. A different time can be specified for each input and each direction (open-closed and closed-open). Any change that does not remain stable for the specified trigger time will be ignored. The factory default trigger time is 5 seconds for both directions.

The digital inputs are designed for dry contacts. A loop voltage of +12 VDC is provided from a common terminal point. External voltages should not be connected to the inputs.

Inputs # 1 & 2 can be configured either alarm style or as counter inputs that count up to 99,999 closed-open state changes. They count at a maximum rate of 30 counts per second (at a 50% duty cycle). Either one or both inputs can be configured as counters using either the local programming utility or remotely from the web site. The unit can be programmed to report the counts on a time-based schedule, upon counter rollover, or upon request at any time. Each counter operates like an odometer, and rolls over to 0 after 99,999 counts. They can also be remotely reset to 0 at any time.

Input # 8 can be defined as alarm style or as a maintenance key. All changes to this input are reported. If maintenance mode is enabled and the key switch input is open, maintenance mode is ON and other input changes will not be reported. If the input is closed, maintenance mode is off and all input changes will be reported.

Inputs 9 & 10 can be individually defined as alarm style or as 3-digit timer / counters. This function is useful for reporting both the number of on/off cycles and the total run time of a pump or motor. The 3-digit timer values are reported in seconds, minutes, or minutes x 10 depending on the accumulated time.

Select any Modbus registers to be read or written - Local Configuration & Test (M2510 only)

Connect a laptop or desktop computer to the RS232-DB9 connector. Use the Local Programming utility to display, edit, and save all programmable parameters and to test the inputs and radio signal strength.

The M2510 will poll one or more Modbus slave devices to read up to 12 digital inputs or outputs, 20 binary register values, and 4 bit-packed registers. It will repeatedly read the specified registers at a rate of every 1-240 seconds. When an alarm condition occurs, the M2510 will report the event to the M2M Network Operation Center.

Alarm conditions can be defined for both digital and binary 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 and is measured for the trigger time, a report can be made.

Up to 20 different user-defined Modbus registers can be written to. 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 unit and/or register address.

Connect it -- Using Serial Comm Ports and Modbus Communication Protocol (M2510 only)

The M2510 connects to and communicates directly with intelligent electronic devices such as programmable logic controllers (PLCs), measuring instruments, controls, annunciators, and displays. Data collected by the M2510 will be wirelessly transmitted to the www.m2comm.com web site where it can be stored, interpreted and displayed, or forwarded to another location.

The M2510 can be ordered with either an RS232 or RS485 Modbus port.

Data polling is based on standard Modbus functions #1-6 as follows:

| Function | Description | Register Range | Value |
|----------|--------------------------------|----------------|---------|
| 1 | Read Coil Status (Read Output) | 0xxxx | 0 or 1 |
| 2 | Read Input Status (Read Input) | 1xxxx | 0 or 1 |
| 3 | Read Holding Register | 4xxxx | 0-65535 |
| 4 | Read Input Register | 3xxxx | 0-65535 |

| | | | |
|---|--|-------|---------|
| 5 | Force Single Coil (Write to Output) | 0xxxx | 0 or 1 |
| 6 | Preset Single Register (Write to Register) | 4xxxx | 0-65535 |

Both ASCII mode and RTU mode are supported at multiple baud rates. The M2510 is configured as a Modbus master. In this mode, it can read and write inputs, outputs, and data registers in up to 32 slave devices.

Integrated Power Supply & Battery Backup

The M25X0 operates from +15 VDC. It includes an on-board 12VDC voltage regulator that can be used to continually charge a small (0.8 Amp Hr) battery while AC power is present.

If the AC power is lost for more than one minute (if the incoming voltage drops below 13 VDC), the unit will report the power outage. The Call Reason will specify that the call is being sent because of an AC power outage. After the report has been sent, the radio will be turned off to conserve the battery. If a subsequent event and report is initiated, the radio will be turned back on long enough to make the report.

The program will continue to operate normally until such time as the battery voltage drops to approximately 12 Volts. At that time, a low battery report will be made and then the battery will be disconnected to prevent an excessive battery discharge that could reduce battery life.

When power is restored, a Power On call will be made.

Low power / sleep mode

The M1000 unit has two user-selectable low-power modes. In the “awake” low power mode, the radio is turned off to conserve power and therefore is unable to receive remote requests for input status reports. However all other functionality remains active. If an input changes or a time-scheduled report is due, the radio will be temporarily turned on to make the call.

In the lower power “sleep mode”, eight of the ten inputs are also turned off and the processor itself enters a low power sleep mode. The unit can be awakened on a time-based schedule to test all inputs or to query the attached IED. It will also be awakened and temporarily returned to the active mode by a change to either of the two powered inputs.

Daily Call Limits

To reduce the number of calls that might result from over-active inputs or power cycling conditions, the number of event-based calls per day can be limited. Time scheduled calls and user requested status calls will continue to be placed even after this limit has been reached. The “total daily call limit” should be selected so that the total number of calls is limited to no more than 20 calls per day and no more than 400 calls per month. The daily limit can be set from 1 to 20. The factory default setting is 10.

In addition, each direct connect input is limited to 15 calls per every 2 days. Each of the individual call counts is automatically cleared every 2 days unless the 15-call limit is reached. In that case, the specific input count can be cleared manually when the problem is solved or will be cleared automatically after 2 weeks.

On-Board Radio Signal Strength Indicator

A pushbutton switch initiates a test in which LEDs are used to indicate the signal strength being received by the radio. This is used to facilitate installation, antenna selection and orientation, and troubleshooting. The same LEDs provide a momentary pass/fail indication after each transmission as well as other troubleshooting indications.

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 M25x0 module makes a call from anywhere in North America (in GSM 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

At the M2MComm data center, the data is validated and processed for distribution to the end user. In addition, configuration and control information can be sent from the M2M web site to the field module.

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

Reporting Options

Reports are triggered for three reasons: (1) a specified alarm condition occurs such as a digital input change, 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. The open/closed status of all direct connected inputs as well as all counters and timers can be reported. A typical Modbus 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 input, 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 be individually requested at any time from the web site or a single "Report All" command will request a group of pre-selected reports.

Hardware Specifications

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

The standard antenna is a direct-connect ½ wave 50-ohm rubber duck with an SMA connector

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.

Power Supply / Enclosure Options

The basic M25x0 operates from 15 VDC (+/- 10%, 2 Amp peak current draw) and is sold as a printed circuit assembly (without an enclosure). This configuration assumes that the unit will be mounted on standoffs in a metal enclosure. Removable terminal blocks facilitate reliable field connections.

A 120 VAC powered unit is also available. This option includes an AC to DC power supply and a 0.8 Amp Hr battery. The components are assembled on a black power-coated metal bracket assembly. The internal 120 VAC option is pictured on the front page of this spec sheet.

Both the AC and DC options are available in a waterproof, gray NEMA 4 box with a hinged door.

M25X0 Ordering Information

M2500 Web-Wireless Communicator

Monitors up to 10 Direct Connect Dry Contacts. No Modbus functionality

Powered by 15 VDC

- M2500DC_INT Printed Circuit Assembly only - No enclosure
- M2500DC_Ext PCA in a NEMA 4 Enclosure with hinged door

Powered by 120 VAC, Includes a 0.8 A-Hr Battery

- M2500AC_INT Bracket Assembly - No enclosure (See picture on page 1)
- M2500AC_EXT Bracket Assembly in a NEMA 4 Enclosure with hinged door

M2510 Web-Wireless-Modbus Communicator *Specify either an RS232 or RS485 Modbus port*

Monitors up to 10 Direct Connect Dry Contacts and Monitors Modbus IEDs

Powered by 15 VDC

- M2510DC_INT Printed Circuit Assembly only - No enclosure
- M2510DC_EXT PCA in a NEMA 4 Enclosure with hinged door

Powered by 120 VAC, Includes a 0.8 A-Hr Battery

- M2510AC_INT Bracket Assembly - No enclosure (See picture on page 1)
- M2510AC_EXT Bracket Assembly in a NEMA 4 Enclosure with hinged door

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