



Impeller
Data Industrial®

Data Acquisition Server

Model 3700



Badger Meter

IND-UM-01923-EN-07 (June 2016)

User Manual

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OVERVIEW

The Model 3700 data acquisition server provides owners and managers of commercial and industrial facilities with a cost-effective means of gathering crucial information in a timely manner. To meet these requirements, the Model 3700 server provides the installer with all the tools necessary to install and configure the hardware and software with a minimum of time and investment.

Installation Checklist

A Model 3700 server installation has the following components:

Required Hardware

- Model 3700 server (required)
- Data connection (Ethernet or phone line)
- Ethernet Cat 5 standard or crossover cable (required for LAN or direct laptop-to-Model 3700 server connection) or
- Phone line and cord (required for modem connection)

Optional Hardware

- Analog sensors for temperature, humidity, and so on
- Pulse output transducers for measuring water, electricity, gas and so on from existing meters and sensors
- Additional Modbus RTU devices

Connection Methods

For LAN installations only:

- Ethernet 10/100 Mbit connection point (hub or switch)
- IP address and Netmask (check with server administrator)
- Gateway address (check with server administrator)
- DNS server address (check with server administrator)
- HTTP Proxy address (optional), may be required if the Model 3700 server is behind a firewall (check with server administrator)

For dial-out installations only (Model 3700 server initiates a phone call to your ISP or modem server):

- Phone line with dialtone; may be shared with other devices, such as a fax machine
- Phone cord for connection to phone server
- Dial-out access prefixes and long distance access code, if required (for instance, dial 9 for local line)
- ISP account or Modem Server phone number (check with ISP)
- DNS server address (check with ISP)
- Time to dial if phone line is shared; choose a time of day when other devices are not in use, such as 4 a.m.
- A regular telephone for line testing and diagnostics

For dial-in installations only (Model 3700 server receives/answers a phone call from your computer):

- Phone line with dialtone must NOT be shared with other devices (or use an appropriate line-sharing device)
- Phone cord for connection to phone server
- Telephone number for the phone line that the Model 3700 server will be attached to (so you can call the server)
- Make note of the Model 3700 server dial-in IP/Netmask for future use
- A regular telephone for line testing and diagnostics

HARDWARE OVERVIEW

Specifications

Processor	Arm9 embedded CPU, Arm7 I/O coprocessor
Operating Server	Linux
Flash Memory	16 MB flash
Memory	32 MB ram
LED	8× input, 4 modem activity, Modbus TX/RX, power, server, I/O status
Console	2 × 16 character LCD, two push-buttons
LAN	RJ45 10/100 Ethernet, full half duplex, auto polarity
Modem	V.34 bis, 33,600 bps (A8812-1 only) GSM/GPRS Cellular (A8812-GSM only)
Protocols	Modbus/RTU, Modbus/TCP, TCP/IP, PPP, HTTP/HTML, FTP, NTP, XML
Power Supply	24V DC, 1A, class 2 wall brick transformer North America: 110...120V AC, 60 Hz, primary (standard, included) CE/Europe: 100...240V AC, 50...60 Hz, primary, with interchangeable plug adapters (optional)
Interval Recording	User selectable 1...60 minutes; default 15 minute interval
Serial Port1	RS-485 Modbus, supports up to 32 external devices (expandable)
Inputs1	8 flex-I/O inputs with multiple modes: voltage, current, resistance, pulse and status.
Voltage mode	0...10V DC (min/max/average/instantaneous data) Accuracy: ± 0.25% of full scale at 20° C
Current mode	4...20 mA (min/max/average/instantaneous data) Accuracy: ± 0.25% of full scale at 20°c
Resistance mode	100 Ohms...100 k Accuracy: 100 Ω...1 kΩ ±1% of 1 kΩ at 20° C 1k Ω...10k Ω ±1% of 10 kΩ at 20° C 10k Ω...47.5kΩ ±1% of 47.5 kΩ at 20° C 47.5 kΩ...100 kΩ ±1% of 100 kΩ at 20° C 100 kΩ...10 MΩ accuracy unrated
Pulse mode	Intended for use with dry contact outputs (consumption/rate/runtime/status) Standard and KYZ modes for form A and C relay outputs Maximum rate: 10 Hz Adjustable contact closure threshold: 100 Ω...10 kΩ
Outputs¹	2 optically isolated outputs Type: opto-fet, dry contacts. Rating: 30V DC, 150 mA max.
Isolation²	The RJ45 Ethernet, RJ11 Modem, pulse outputs, and the primary side of the power adapter are electrically isolated from the Model 3700 server main PCB board and inputs.
Environmental	North America: Indoor, temperature 0...50° C, 0...95% humidity, non-condensing. CE/Europe: Indoor, temperature 5... 40° C, 0...90% humidity, non-condensing.
Size	8 × 9.25 × 2.5 in. (203 × 235 × 64 mm)
Mass	5 lb (2.3 kg)

Table 1: Specifications

¹ inputs are intended for low voltage class II outputs.

² if the product is used in a manner not specified by the manufacture, the protection provided by the equipment may be impaired.

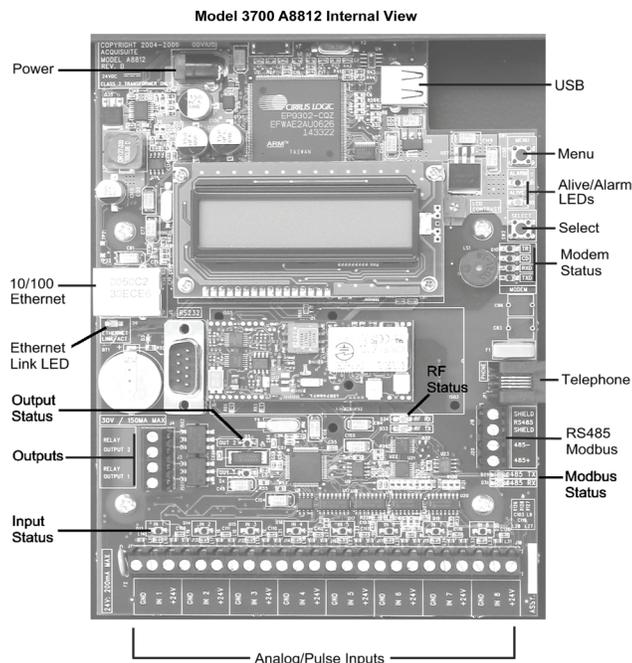


Figure 1: Electrical connections

Hardware Installation

1. Unpack materials: Remove all materials from shipping box and verify all required components are available.
2. Mount the Model 3700 server on the wall or other appropriate location.
3. Optional: Connect any analog or pulse output sensors you may have. For analog sensors, 0...10V or 4...20 mA sensor types are allowed. The combined power consumption of all the analog sensors attached to the Model 3700 server must not exceed 200 mA. If more current is required, use an external power supply. See *Figure 2*.
4. Optional: Connect the Modbus network loop. See *Figure 1*. Follow the manufacturer's instructions for installing and powering the Modbus devices. Verify that the Modbus address settings are unique for each device (for instance, no two devices with the same address) and power up the device. Connect each device in the chain by "daisy-chaining" the devices together. Observe positive (+) and negative (-) polarity on the Modbus devices.

NOTE: Low Voltage analog, pulse, and RS-485 wiring that enters electrical panels must have a minimum insulation rating that exceeds the voltage inside the panel. In addition, other regulations may apply; consult the building codes in your area prior to installation.

NOTE: Some Modbus devices do not use the same label notation as the Model 3700 server. Emon uses Low, High and Gnd in place of -, + and S. To attach an Emon meter, use + to High, - to Low, and shield to Gnd.

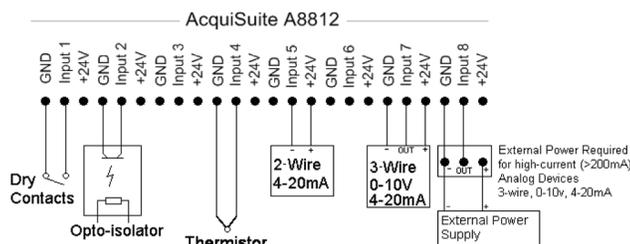


Figure 2: Wiring diagram

NOTE: The Model 3700 server internal I/O module (analog and pulse inputs) uses Modbus address 250 and shows up in the Modbus device count as a single Modbus device. Additional A8923-4 I/O modules may be added to the Modbus loop, as needed.

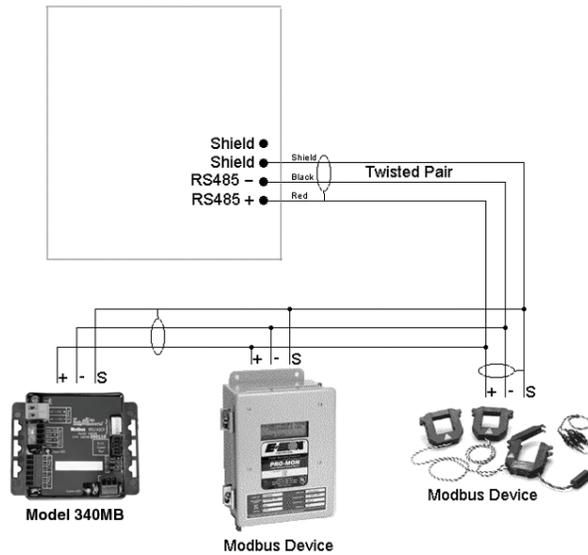


Figure 3: Network loop

5. Power-up and diagnostics: Attach the power supply to the power input jack on the Model 3700, and plug the power brick into a wall outlet. The power brick should be in a location that is accessible for connection and disconnection. After power is applied, the green Alive LED in the upper right of the Model 3700 server comes on and the LCD display shows a series of diagnostic screens ending with the following message on the LCD display (this boot sequence may require up to 20 seconds to complete):

Model 3700 server Ready
192.168.40.50

The message indicates that the Model 3700 server has loaded properly and is ready for configuration and connection to the network and sensors. If, the power light does not come on or the LCD display does not cycle to the above screen, verify that the power cord is plugged in. If, after cycling the power, the unit still does not power up (or if an error message appears in the LCD display), contact technical support. After the Model 3700 server has been powered up for a minute, the green Alive LED blinks once per second during normal operation.

LED Name	Description
Modbus TX/RX	The Modbus TX and RX LEDs blink to indicate data on the RS-485/Modbus loop. The RX LED blinks only when data is received by the Model 3700.
Modem RTS	The modem is being monitored or operated by the Model 3700 server, off when the modem is idle. This LED will be on when a dial-out call is in progress, or when dial-in is enabled and waiting for an inbound call.
Modem CD	The modem has a carrier connection to a remote server.
Modem TX/RX	Data is being sent or received on the modem.
Alive	Blinks once per second while the server is operating correctly.
Alarm	Blinks to indicate a problem.
Inputs 1-8	In pulse or status mode, the LED is on when contacts are closed. In analog 4...20 mA and 0...10V mode, the LED blinks quickly (2 Hz) to indicate an over-range alarm error. In 4...20 mA mode when the input current is less than 4 mA, or in resistance mode where the input resistance is above 10 Mohm, the LED blinks a pattern (blink, blink, off) to indicate a broken wire alarm.
Ethernet Link/Act	ON when connected to a hub or switch, OFF when not connected. Blinks when there is LAN traffic.
RS-485 RX/TX	The 485TX LED blinks once per second during normal operation. The RX LED blinks when external Modbus devices communicate with the Model 3700 server.
RF TX / RF RX	If the A8812 has a built-in option with an on-board radio, the RF LEDs blink showing transmit and receive packets.

Table 2: LED descriptions

-
6. Verify connected devices: To verify that the Modbus devices are installed and reporting correctly, use the Modbus status utility on the Model 3700 server:
 - a. Press and release the **Menu** (top) button on the server. The LCD display shows:
[Main Menu]
TCP/IP Config
 - b. Press the **Menu** (top) button several more times until the LCD display shows:
[Main Menu]
Modbus Status
 - c. Press the **Select** (bottom) button on the server. The server begins the diagnosis of the Modbus loop. After the check is completed, the LCD display shows:
X devices OK
X fail, X new
 - d. Verify that the number of devices located by the server (the total of *OK*, *Fail* and *New*) matches the number of devices actually installed and connected. For a first-time installation, all devices appear as *New*. The server's Internal I/O (pulse and analog inputs) appear as one device in this list.

NOTE: A *device* is the Modbus-connected device, not necessarily the sensor. For example, an A8923-4 I/O module with 4 sensors connected is only one Modbus *device*, not four. For further information on the LCD console, see "*LCD Console*" on page 30.

The server completes a background scan for new Modbus devices every 2...5 minutes. Increasing the RS-485 Modbus timeout may increase the time required to detect new devices. If the Modbus devices are connected after the server is booted up, the devices may not appear on the screen for several minutes. In the worst case, allow up to 5 minutes for the server to locate all the connected devices.

- e. When all devices are reporting properly, connect the server to the network or phone line for remote reporting and configuration.

BASIC NETWORK CONFIGURATION

Determine the IP Addressing Needs

The IP address of the Model 3700 server can be implemented three ways. Check with the network administrator to determine which method applies. For phone installations, use *Direct Connection to Laptop* to allow initial configuration.

- A **Static IP Address** is a fixed IP address assigned by a network administrator and hard-coded into the server.
- A **Dynamic Host Configuration Protocol (DHCP) Address** is a process that dynamically assigns an IP address to the Model 3700 server when it is connected to the network from a host DHCP server.
- A **Direct Connection to Laptop** is a connection between the server and a single temporary computer, such as a laptop. The primary connection is dial-in or dial-out by modem.

Obtain the following information from your network administrator: The addresses are in the form of "###.###.###.###"), where "#" refers to the numbers 0...9.

Static IP Address	DHCP	Direct Connection to Laptop
IP address: _____.____.____.____	P address: (dhcp assigned)	IP Address: 192.168.40.50
Netmask: _____.____.____.____	Netmask: (dhcp assigned)	Netmask: 255.255.255.0
Gateway: _____.____.____.____	Gateway: (dhcp assigned)	Gateway: 192.168.40.1
DNS server : _____.____.____.____	DNS server : (dhcp assigned)	DNS: 198.107.56.37
DNS server : _____.____.____.____	HTTP Proxy _____	HTTP Proxy: [blank]
HTTP Proxy _____	proxy server port: _____	
proxy server port: _____		(factory default settings)

Table 3: Network address worksheet

Configure the IP Address

Configure the IP address as selected from the table above. For *Direct Connection to a Laptop*, the address settings above are set as the factory default. You may be able to skip to "*Laptop/Computer Setup*" on page 12 if the factory default settings are present.

1. To begin configuration, press and hold the **Menu** (top) button on the server until the start screen displays:
Model 3700 Server Ready
192.168.40.50
2. To change the IP address to the static address assigned by the network administrator:
 - a. Press the **Menu** (top) button once to get to the *TCP/IP Config* menu:
[Main Menu]
TCP/IP Config
 - b. Press the **Select** (bottom) button twice to select the *TCP/IP Config* menu:
[TCP/IP Config]
IP Address
 - c. Press the **Select** button again to select the *IP Address* menu. The cursor on the display be blinks on the first number in the IP address on the second line.
[IP Address]
192.168.40.50
 - d. To change the number, press the **Menu** (top) button. The display cycles through the digits 0...9 and the period (.). When the correct digit displays, press the **Select** (lower) button to advance to the next digit and repeat the process until all the digits are correct.
 - e. When the IP address on the server matches the assigned IP address, press the **Select** (bottom) button once more to return to the main *TCP/IP Config* menu.

3. Using the same technique, set the *Netmask*, *Gateway*, and *DNS Server(s)* addresses as noted in *Table 3 on page 10*. The only change is that after step 2b, press the **Menu** (top) button multiple times to see the *Netmask*, *Gateway*, and *DNS Server(s)* setup menu, then press the **Select** (bottom) button to set the option.

NOTE: If *DHCP Configuration* is selected, the *IP*, *Netmask*, *Gateway*, and *DNS Server(s)* addresses are automatically obtained automatically. Simply select **Enable DHCP** from the first TCP/IP configuration menu.

4. After setting the address information, reboot the server:
 - a. Select the **Previous Menu** option after step 2b. A message says that the Model 3700 server must be rebooted for the changes to take effect.
 - b. Press the **Select** (bottom) button to reboot the server.

When the server has rebooted, the new IP address displays on the console. If DHCP addressing was specified, the server-assigned address displays.

NOTE: If DHCP is unable to obtain an IP address, the Model 3700 server uses the fallback address of 192.168.0.100.

LAPTOP/COMPUTER SETUP

To configure the Model 3700 server, you need a computer or laptop with an Ethernet connection (on the LAN or by direct connection) and a Web browser.

NOTE: If your building already has an existing LAN that the Model 3700 server is attached to, you can use an existing computer on that LAN. Check with your network administrator for details. If this option is available, use a LAN connected computer and skip to the Model 3700 server Administration Overview section on the next page.

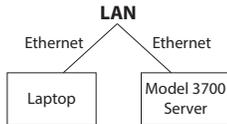


Figure 4: LAN connection

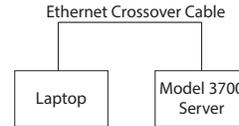


Figure 5: Direct connection

1. Attach the laptop to the Model 3700 server or to the LAN. The server automatically detects whether a direct or crossover cable is required, and reverses polarity accordingly. This feature allows you to use either a straight cable or a crossover LAN cable interchangeably. If the laptop is to be attached to an existing LAN, obtain a static IP address (or use DHCP addressing) from the network administrator.
2. Configure the laptop IP address using the following steps.

NOTE: Only Windows® XP is detailed below, however you can use any OS/Browser you wish. Details on network setup for non-windows operating servers is beyond the scope of this document.

- a. From the Windows *Start* menu, select **Settings > Network Connections**. Double-click the **Local Area Network** connection icon in the network folder, then click **Properties**.

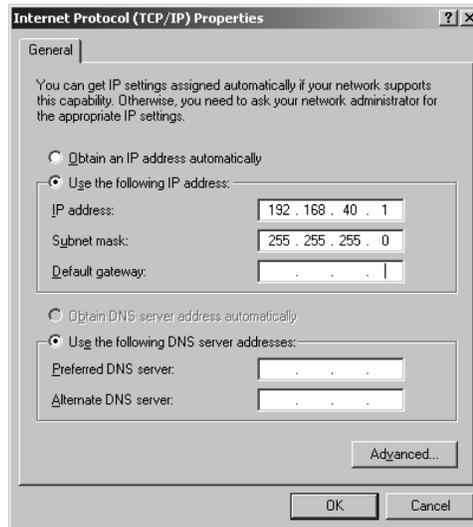


Figure 6: Internet protocol properties

Static IP Address	DHCP	Direct Connection to Laptop
Specify an IP address	Obtain an IP address automatically	IP Address: 192.168.40.1
IP address: ____ . ____ . ____ . ____	(All other required settings are assigned by the DHCP server)	Netmask: 255.255.255.0
Netmask: ____ . ____ . ____ . ____		(Model 3700 server factory default settings)

Table 4: Laptop address worksheet

- b. The network setup dialog shows a list of items including adapters, clients and protocols. Locate *Internet Protocol (TCP/IP)*.

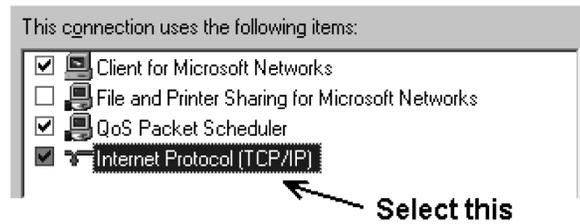


Figure 7: Select the protocol

- NOTE:** If you have multiple Ethernet cards, you may have multiple lines labeled *TCP/IP Ethernet Card*. Locate the Ethernet card that corresponds to the physical connection to the Model 3700 server and then select the TCP/IP option that is linked with that Ethernet card.
- c. Double-click the TCP/IP option you selected in step B above. The Internet Protocol properties dialog displays. This page allows you to select DHCP (to obtain an IP address automatically) or configure an address manually.
- d. Select **Use the following IP address**. Set the IP and Netmask from *Table 4 on page 12*. Note your previous settings so you may set them back after you are done with the server configuration.
- e. Close the TCP/IP settings dialog and the Network dialog.

MODEL 3700 SERVER ADMINISTRATION OVERVIEW

After configuring the network, you can use a browser to access the Model 3700 server:

1. Use your web browser to connect to the Model 3700 server by entering **http://192.168.40.50/setup/**
Where 192.168.40.50 is the IP address shown on the on the Model 3700 server LCD display.
2. At the prompt, use the following default login information
Login: admin
Password: admin

Your Web browser displays the Model 3700 server configuration menu. On the left is a list of configuration options. On the right, a specific configuration page is shown. The first page is a welcome message with some server status information.

3. Click the plus sign (+) next to the *Accounts* menu to expand the menu. Select the **Admin** account and click **Change Password**. All units are shipped with the same factory default password. Change your password.
4. Click the plus sign (+) next to the *Networking* option and select **Setup**. Verify the addresses are consistent with those in the *Network Address Worksheet, Table 3 on page 10*.
5. Click the plus sign (+) next to the *Modbus* option and select **Device List** to see a list of each Modbus device attached to the Model 3700 server. Before the Model 3700 server can begin logging data, each Modbus device must be assigned a unique name:
 - a. Click the device number to the left of the unconfigured Modbus device. A page with the current device status and readings displays.
 - b. Click **Configure** at the bottom of the page.
 - c. Enter a name for the device.
 - d. (Optional) Change low and high range alarm settings.
 - e. Click **Save** to save your changes.
 - f. Repeat steps 5a through 5e for each Modbus device.

Some devices may require additional information. The Veris H8238 Multi circuit power meter allows the CT size to be specified. The Model 3700 server internal I/O module has additional configuration options on each data point line to specify the details of the analog or pulse input. These include the 4...20 mA device scale, multipliers and engineering units. Each 4...20 mA or 0...10V sensor should be supplied with technical information, including the low and high range values that can be used to configure the Model 3700 server. Also, the Model 3700 server has many common sensor types pre-programmed that you can select from a drop-down list. See "*Modbus*" "*Modbus Advanced Configuration Options*" on page 16 for further configuration details.

7. Select **Modbus/Setup**. Specify the *Modbus Loop Name*, which becomes the name of the Model 3700 server. This is the name that will appear on the Building Manager Online (BMO) website service (if subscribed). Contact Badger Meter for more information on the BMO service.
8. Specify the *Data Logging Period*. The default is 15 minutes.
9. Select a method of data transfer. See *Table 20 on page 28*. If you select the *HTTP/Post* method to send data to the BMO website, you can configure this by selecting the **Log File Data > Setup/Upload** page.
 - a. Note the Model 3700 server serial number.
 - b. Select upload options for time-of-day to upload the data and retry control.
 - c. Check the box next to **Allow remote configuration** so you can reconfigure the Model 3700 server from the BMO website without having to connect directly to the Model 3700 server.
 - d. Specify the **Target address to upload data**. This is the website address where the Model 3700 server will send the collected data. If you have an in-house data collection service, enter the address of your data server in this field. Contact Badger Meter about the Building Manager Online (BMO) service that can collect and report data for you. If using the BMO service, set the target address to upload data to <http://www.buildingmanageronline.com/upload.php>
 - e. When configuring the Model 3700 server to send data to the BMO site or to your own data collection server, the Model 3700 server will authenticate itself with the server by using the serial number and a password. Enter the password here. The password can be obtained from your database administrator or when you subscribe for the BMO service.
 - f. Click **Apply** to save your changes.

If you select a manual transfer method, remove (blank out) the target address in the *Modbus/Upload Data* page.

SECURITY

The Model 3700 server has three levels of security—Admin, Operator and User.

When using a browser to access the Model 3700 server, basic http authentication is used to prompt your browser for a username and password. The *Admin* level uses **admin** as the default password. To change the password:

1. Select the **Accounts** menu from the left side of the display.
2. Select the account name.
3. Click **Change Password** and follow the prompts to enter a new password.

Admin	The Admin level has full access to modify any of the server settings. The default password is <i>admin</i> .
Operator	The Operator level may view settings but may only change Modbus alarm ranges and device names.
User	The User level can view some server settings, including the Modbus device status pages, but can change nothing.

Table 5: Accounts menu

When using FTP to access the Model 3700 server, you may use the *Admin* username and password for read-only access. Log information is stored in */var/log/Modbus*. For read-write-delete access, use the login name **root** and the **admin** password.

The three security levels cannot be changed or renamed, nor can arbitrary usernames be added to the Model 3700 server. Access is controlled only by setting the password for the three existing levels.

The Operator and User accounts are disabled by default. These accounts are activated when you first set a password for each.

MODBUS

Modbus Device List

The Model 3700 server automatically searches for Modbus devices on the RS-485 serial loop. The *Modbus Device List* page shows all the currently detected or configured devices the Model 3700 server has found. The list includes the Modbus address number, status (OK, Error, Alarm, Unconfigured), the device name (user-specified) and the device identification string.

Click on the Modbus address number for any device for specific device details.

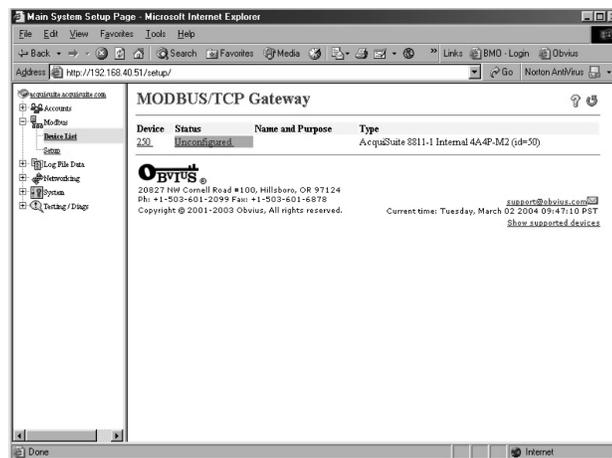


Figure 8: Modbus device list

NOTE: Not all Modbus devices are supported by the Model 3700 server. If a device appears in the list with *Unsupported* in the *Status* column, you may need to upgrade the firmware on the Model 3700 server to access the device. At the bottom right corner of the *Modbus Device List* page, a link is shown that will enumerate all the supported Modbus devices in the installed version of the firmware. Use the *Server/Firmware Update* page to check for newer versions of the firmware.

At the bottom of the device list, there is a device *renaming* option, which is useful for initial deployments. There is also a *troubleshooting* link that looks for common configuration problems and alerts you to the appropriate solution.

Modbus Device Details

The *Device Detail* page lists all the meter data points, alarm settings and console options. The data point names for most devices are automatically entered. Some devices, such as the A8923-4 I/O module, have generic inputs, and are labeled as *Pulse Input #1*. The top of the page shows the device status. The status usually reports *OK*, however it may include error information if the device is not responding properly. See *Table 26 on page 33* for a list of device errors. At the bottom of the page are the following buttons:

Button Label	Description
Done	Returns to the <i>Device List</i> page.
Log File	Displays a tabular view of the most recent data in the current log file. Use the log file export page for complete log data access.
Configure	Allows you to change the device parameters, such as the name, alarm and console settings.
Device Configuration	Refreshes the <i>Device Details</i> page and makes available the device name, alarm settings and console checkbox.
Device Name	Allows you to specify a name for the device, such as <i>Main Building Power</i> , to indicate the location or function of the device. A name must be assigned to a device before the Model 3700 server can log data for it.
Low Alarm, High Alarm	Specify a threshold for the alarm. If the data point is recorded below the Low Alarm, or above the High Alarm levels at the time a log entry is taken, the point is considered to be in an alarm state.
Console	Check this box and the Model 3700 server displays this data point on the LCD console. Multiple data points are rotated about every 10 seconds. The values on the LCD console are updated when the next log interval occurs.
Point Config	Some devices have configurable point features. The A8923-4 I/O module has 4 pulse and 4 analog inputs that require additional configuration. The H663/704 BCM product requires only the circuit breaker name in this menu. Most device points are automatically configured and this option may not be displayed.
Advanced	At the lower right corner of the page, an advanced configuration button may be present, depending on the Modbus device features.

Table 6: Device details menu

Modbus Advanced Configuration Options

The *Advanced Configuration* page contains special options specific to the device you are configuring. For the A8923-4 I/O module, you may specify the pulse rate speed for the pulse inputs, as well as review the 4...20 mA or 0...10V input status. On power meters, the CT size and orientation options may be present. The device serial number and other specific parameters, if available, are displayed.

Modbus Internal I/O Configuration

The Model 3700 server provides 8 multipurpose inputs onboard. The onboard I/O inputs are always device 250 in the device list.

1. Click on the device number 250 in the device list to display the device inputs page. Each input has 5 lines on this page. Analog inputs have one line each for an instantaneous, minimum, maximum and average value. Pulse inputs have a line for the accumulated value, rate, runtime and status.

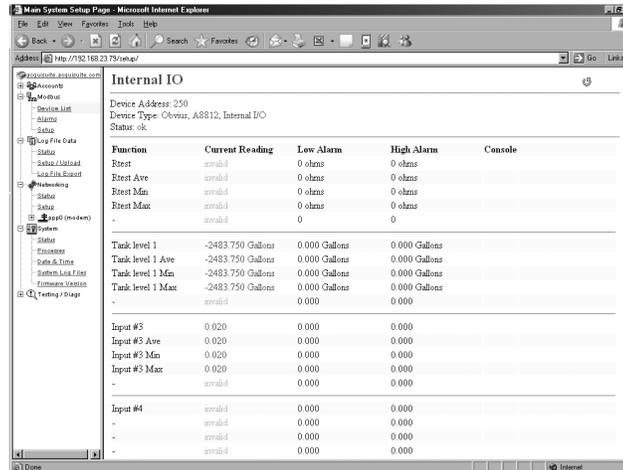


Figure 9: Device inputs page

2. Click **Configure** at the bottom of the page to edit the device name and alarm level fields.
3. Type a name for the device at the top of the page. The name should describe the purpose or location of the I/O module. For device 250, you may want to use the name Internal I/O.

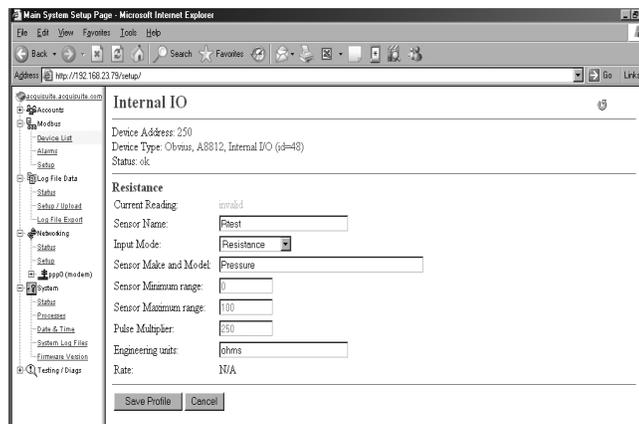


Figure 10: Editable fields for device inputs

4. For each input that you wish to use, click **Config Point** to the right of the input.
5. The input configuration requires several options. The input mode controls how the input functions, including measuring voltage, current, resistance, pulse or runtime. Use the drop-down menu to select the mode that is appropriate for your sensor. The input configuration must be completed for each input that is in use.

Option	Description
Sensor Name	Type a name that describes the input. This can be anything you wish, such as <i>Indoor Temperature</i> .
Input Mode	Select from the pull-down menu: Voltage 0...10V, Current 4...20 mA, Resistance, Pulse, Pulse-KYZ, status or Unconfigured.
Sensor Make and Model	This entry is a space for the model number of the sensor. It is only used for reference.
Sensor Minimum Range	All analog sensors have minimum and maximum range values. For example, a temperature sensor may have a range of 50...95° F. Enter the low range number here.
Sensor Maximum Range	Enter the high range value of the analog sensor here.
Pulse Multiplier	For pulse mode inputs, this option specifies the multiplier for the input.
Pulse Rate	For most units, this feature is an automatic rate field. For KWH points, the rate is KW.
Engineering Units	Enter the units of measure. For example, Degrees F or %RH

Table 7: Device input field descriptions

6. After saving the sensor profile, the *Device Configuration* page displays again. The input values should now be scaled correctly and the names updated to your new configuration. You may wish to set any alarm thresholds required, or check the **Console** checkbox for any data points that should be displayed on the LCD console.

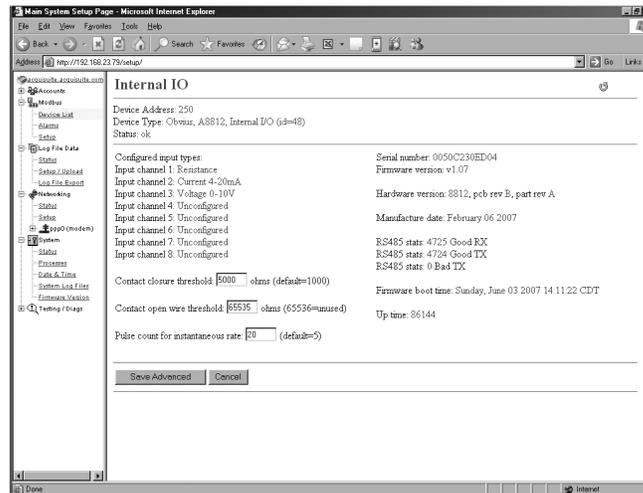


Figure 11: Edited device configuration

7. Click **Advanced** in the lower right corner of the page. For the Model 3700 server onboard I/O, there are several options:

Option	Description
Input Types	Lists the status of the 8 analog inputs (0...10V, 4...20 mA, resistance, pulse, status and so on).
Contact Closure Threshold	Allows you to set a maximum resistance to be counted as a Closed contact. This is helpful when using intrinsic barrier devices.
Contact Open Threshold	Can be used in conjunction with a 20K resistor in parallel with the contact closure. When the contact is open, the Model 3700 server reads 20K, when closed, it reads <100 Ohms. If the wire is broken, the reading goes above 20k Ohms and causes an alarm condition.
Pulse Count for Instantaneous Rate	Specifies the number of pulses to use to calculate the instantaneous rate, min, and max fields in pulse mode.

Table 8: I/O options descriptions

8. After returning to the *Device Configuration* page, click **Save** at the bottom of the page to return to the *Device Display* page.

Troubleshooting Modbus Devices

If the device you have attached does not appear in the Modbus device list, check the following:

- Verify the + (red), – (black), and Shield connections are correct on all connections. Look for any connection in the middle of the loop that may have the wires reversed or shorted together.
- Verify the address settings of every Modbus device. No two devices may have the same address.

NOTE: The Model 3700 server uses the address 250 for the internal I/O module. Do not assign this address to any other Modbus device.

- If only one device is not working, try disconnecting all the other devices on the Modbus loop to isolate the problem. If possible, bring the failed device adjacent to the Model 3700 server and attach it with a short stub of wire to eliminate possible wiring problems. If the Model 3700 server can find a device on the short stub, the problem is probably a wiring related issue on the RS-485 loop.
- Check to verify the Modbus device is supported by the Model 3700 server. Usually, the Model 3700 server locates the device and displays *Unsupported* in the device status column if the device is not recognized by the Model 3700 server firmware drivers. In the lower right corner of this screen, there is a link to a list of supported devices. Use this to verify the Modbus device in question is supported by the Model 3700 server firmware version. If not, check for firmware upgrades online with the *Firmware Update* configuration page.

- Remember, the Model 3700 server may take between 2 and 5 minutes to detect a new device that has been attached to the Modbus RS-485 loop. Rebooting the Model 3700 server, refreshing the *Device List* page, or using the console *Modbus Status* menu will not speed up the recognition process.
- Click the **Troubleshooting** link at the bottom of the Modbus *Device List* page for further diagnostics.

Modbus Setup

The *Modbus Setup* page provides several options related to the Modbus RS-485 serial port.

Option	Description
Loop Name	The name of the Model 3700 server that is present on all log file descriptors when uploaded to a central database website such as BMO. Name the Model 3700 server based on the physical location of the server or the building.
Data Logging Period	Sets the log interval for the Model 3700 server. Options range from once per minute to once per hour. All of the selections are even divisions of one hour. The Model 3700 server calculates the next log time by finding the next multiple of the log period past the start of the hour. For example, if the log period is 15 minutes, log readings will be taken at 0, 15, 30 and 45 minutes past the hour. The log period is not calculated based on 15 minutes after the last reading. When the Model 3700 server is first started, it takes an initial reading of all the Modbus devices immediately. Following that, the next log reading is calculated as a multiple of the log period after the hour. The initial reading is taken to allow the Model 3700 server to gather information for meters that require demand calculations, as well as provide accurate information starting when the Model 3700 server is booted.
Modbus/TCP Access	<p>The Model 3700 server has a Modbus TCP gateway feature that allows other servers to send queries to all attached Modbus RS-485 devices. This feature allows control of what servers have access to the Modbus TCP gateway feature. The settings include <i>No Access</i>, <i>Local Subnet Only</i> and <i>Allow Any</i>. This basic security feature only allows control based on the IP address of the server making the request. The Modbus TCP protocol does not have provisions for any authentication password or other methods of security. By default, the gateway feature is disabled and set to <i>No Access</i>.</p> <p>The Modbus TCP gateway is a feature that allows the Model 3700 server to share the attached Modbus RS-485 devices with other servers, such as PCs, with software and building control servers. The gateway receives incoming TCP requests, verifies the length of the packet does not exceed 255 bytes, and forwards the packet to the Modbus RS-485 loop. The gateway does not verify the contents of the packet, nor the target address specified in the request. If the Modbus RS-485 device sends a valid response back, the gateway returns this information to the server requesting it via TCP. If no response is received, a timeout failure is sent to the requester. Because the gateway does not process the contents of the request or reply, it is possible to query devices on the Modbus RS-485 loop that are not specifically supported by the Model 3700 server.</p>
Modbus RS 485 Baud Rate	<p>Allows the configuration of the RS-485 serial port speed that the Model 3700 server uses to communicate with Modbus devices. Options include <i>9600</i>, <i>19200</i>, and <i>Opportunistic/Multi-speed</i>. The default is <i>9600</i>—the speed at which most Modbus devices communicate. In <i>Opportunistic/Multi-speed</i> mode, the Model 3700 server automatically detects the baud rate of each Modbus device and continues to communicate with that specific device at the detected speed. This feature allows you to mix multiple devices on the same RS-485 loop with different baud rates. Modbus devices must be configured at baud rates of 9600 or 19200. Other baud rates are not supported.</p> <p>NOTE: Modbus device manufacturers usually do not officially support this configuration, however we have not seen any problems with this in any of the Modbus devices we provide drivers for. If you are experiencing Modbus communications problems, you should set the baud rate to a fixed 9600 before troubleshooting.</p>
Modbus Parity	Allows alternate parity options to be set. Default is <i>no parity</i> .
Modbus Stopbit	Allows alternate stop bit options to be set. Default is <i>one stop bit</i> .
Search for Acromag Devices	Allows Acromag brand devices to be detected with alternate serial port settings of 8 data bits, even parity and one stop bit. Leave this feature disabled unless you have Acromag brand Modbus devices attached to the 485 chain.
Modbus Debug	Records Modbus transaction data in the server debug log file. You must click the Start Log button on the server/log files page to record this information.
Modbus RS-485 Timeout	Sets the period of time the Model 3700 server waits for a response from any device on the Modbus RS-485 serial loop. The default of <i>200 ms</i> is long enough for most Modbus devices. Longer timeouts may be required if you have a very slow device, or if you have a Modbus repeater device in the serial loop. Devices such as the Model R9120-5 and the Veris H8936 Local Display, and RS-485 wireless link repeaters provide access to downstream Modbus devices with a substantial delay. Setting the delay longer than the default increases the time required to auto-detect new Modbus devices when attached to the Model 3700 server. For Model R9120-5 connections, use a minimum setting of 1.5 seconds. The allowed range is 100 ms to 5 seconds.

Table 9: Modbus setup options

Alarm Setup

Use the *Modbus Alarms* section to send messages when alarm levels are exceeded. Messages can be sent by email, SNMP or displayed on the LCD console. Alarms are processed at the end of the data logging period. For more frequent alarms, shorten the data log interval. Log readings and alarm processing can be set to as often as once per minute.

Display All Alarms on LCD Console	When checked, all alarm messages are shown on the LCD display of the Model 3700.
SNMP Trap Send Enabled	When checked, SNMP Trap messages are sent after every log period for each data point that is in an alarm state. The trap includes information about the Model 3700 server data point and alarm state. A full MIB is located on the Model 3700 server. Click the MIB link to the right of this option.
SNMP Trap Host 1 (2,3)	When SNMP traps are enabled, a trap message is sent to each of the trap host addresses. Specify the trap host by IP address, not DNS name.
Direct email on alarm	When checked, the Model 3700 server sends an email message when any data point changes its alarm state.
SMTP Mail Server Address	The IP address of the email server on the LAN that processes and forwards the email message to the recipient.
Sender Address	The address used in the <i>From:</i> line of the email. This is helpful in identifying the source of the alarm email message. If your SMTP mail server has junk filtering, you may be required to use a sender address that matches a mailbox address on the SMTP mail server; check with your mail server administrator for specific details on this issue.
Recipient Address 1 (2,3)	The Model 3700 server can send a copy of the alarm notice to multiple email addresses. Specify one, two or three email addresses in the fields provided for the recipient addresses.

Table 10: Alarm setup options

NETWORKING

Network Status

The *Network Status* page displays the current status of the Model 3700 server network connections. Several interfaces may be shown if both Ethernet and PPP dial-in/dial-out are active at the same time. Each interface reports the IP address, number of packets sent and received, and other details specific to the interface. For the Ethernet interface, the MAC address (HWaddr) is shown, as well as a network collision count.

Ethernet Network

```
eth0  Link encap:Ethernet HWaddr 00:99:99:0E:C1:CA
      inet addr:192.168.10.50 Bcast:192.168.10.255 Mask:255.255.255.0
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
      RX packets:2624171 errors:6 dropped:0 overruns:0 frame:0
      TX packets:220342 errors:0 dropped:0 overruns:0 carrier:0
      collisions:1 txqueuelen:100
      RX bytes:174674347 (166.5 Mb) TX bytes:50607122 (48.2 Mb)
      Interrupt:5 Base address:0x320
```

NOTE: The Lo or Loopback interface is the internal network and is always present, Eth0 is the Ethernet segment, and Ppp0 is the dial-out or dial-in connection. In addition, the current gateway and DNS server information is shown. These items provide information about DHCP assigned configuration information.

Ethernet Setup

The *Ethernet Setup* page has the following fields:

IP Address	The IP address of the Ethernet interface; default 192.168.40.50
Netmask	The netmask of the Ethernet network; default 255.255.255.0
Gateway Address	The gateway is the routing device that moves traffic from the LAN to the internet. The default is 192.168.40.1. If you do not have an internet connection for your LAN, or you are using a crossover Ethernet cable, leave this field blank.
DNS 1, DNS2	These are the primary and secondary DNS servers. If you are using a dial-out connection, these must be set to the DNS server provided by your dialup ISP. If you only use the Model 3700 server on a crossover cable and/or dial-in mode, leave these blank.
DHCP (enable/disable)	If your LAN has a DHCP server, you may enable this option and remove the previous options for IP, netmask, gateway, and DNS. Check with your LAN administrator first.
HTTP Proxy	If your LAN is connected to the internet using a sophisticated firewall, you may need to use the HTTP proxy feature. Check with your LAN administrator first, however if you do not have a proxy set on your computer (MSIE/Tools/Connections-tab/LAN-Settings) then you most likely do not need to configure the Model 3700 server to use a proxy. If in doubt, leave this blank first, and try the connection test. If it fails, ask your LAN administrator about proxy servers, if any.

Table 11: Ethernet setup options

After changing any of the settings on this page, reboot the Model 3700 server. Use the *Server/Status Web Configuration* page, or the LCD console to reboot the Model 3700 server.

Troubleshooting Ethernet Problems

If, after reconfiguring the Ethernet settings, you experience problems accessing the Model 3700 server with your Web browser, check the following items:

- Verify that you rebooted the Model 3700 server after making the changes to the network settings.
- Use the Model 3700 server LCD console. Check the IP address and netmask. Verify these are correct.
- Verify the Ethernet link/act LED is on. It should blink with activity.
- Verify the network connection in your computer has the proper IP address, on the same subnet, to access the Model 3700.

NOTE: One common mistake is configuring the laptop IP to the same address as the IP address of the Model 3700 server. In order for the laptop and Model 3700 server to communicate, the IP addresses should not be identical. See "*Basic Network Configuration*" on page 10 for suggested IP addresses.

- Use the LCD console to run the Network Status test, which attempts a number of things including a ping query to the gateway address. If the Model 3700 server can ping an external machine such as a gateway, the Ethernet port is most likely connected properly. If the Model 3700 server does not use a gateway, try adding a gateway address, and make it the address of your computer.

Modem Status

The *Modem Status* page shows the connection status of a dial-in/dial-out session if any is currently active. The *Modem Status* page has two buttons.

Button Name	Function
Dial-Out Now	Causes the Model 3700 server to initiate a dial-out connection if dial-out networking is enabled. Does not initiate a data upload to a webserver database such as BMO. If you manually start a connection with this button, you need to manually disconnect when you are finished.
Hangup Now	Causes the modem dial-out or dial-in connection to be disconnected immediately.

Table 12: Modem status page buttons

Modem Setup

The *Modem Setup* configuration option allows you to configure specific features in the modem, if needed. For most applications, the default settings are sufficient. The fields are as follows:

Field	Description
Modem Type	Shows the type of modem that is attached to the Model 3700 server. The MTSMC-G is the GSM/GPRS cellular modem option. MT5600SMI is the default modem on most Model 3700 servers.
Max Serial Port Speed	Allows you to specify the maximum speed at which the modem can communicate. The default is 57.6 kbps. This is useful in diagnosing noisy phone lines. You may be able to get a more reliable connection by slowing down the maximum rate of data transfer.
Modem Setup String	Allows the use of specialized modem setup strings. The default AT is sufficient for most applications.
Modem Speaker Enabled	Sets whether the speaker is ON or OFF when dialing out or answering a call.
Debug PPP Messages	Allow the server debug log to show a complete report of the PPP connection status, including the PPP session negotiation for an IP address and other connection parameters. Click the Start Log button on the <i>Server/Log Files</i> page to record this information.
Debug Modem Chat	Records information about the modem setup and call summary, including modem line quality and setup parameters. Click the Start Log button on the <i>Server/Log Files</i> page to record this information.
Modem Diagnostics	Runs a diagnostic test on the modem to verify that it is working and reports the modem firmware version number. On A8812-GSM cellular servers, this feature also reports the cell tower signal strength, SIM card status, and cellular modem serial number.

Table 13: Modem setup page fields

Modem Point-to-Point Protocol (PPP) Dial-Out

The Model 3700 server has a dial-out feature that allows the Model 3700 server to place an outbound call and upload data to a central database server. When the dial-out feature is enabled, the dial-out connection is initiated before the data upload process is started. Dial-out connections allow the Model 3700 server to connect to a generic PPP server such as a RAS server, or an ISP (such as AT&T® Worldnet®, Earthlink®, Netcom®). Internet services that require custom software such as AOL®, Juno®, and AT&T Global are not supported. To test if a dial-up service is supported, simply use the MS Windows® built-in dial-up networking feature and attempt to establish a connection. If successful, the Model 3700 server should work with the service. Test the dial-up account phone number, username and password with windows first to verify that the account works correctly.

Field	Description
Enable/Disable	Turns ON or OFF the ability to place an outbound call to an ISP. When enabling this feature, the default Ethernet gateway in the network setup webpage is removed. You must reboot after enabling or disabling dialout support to make the change take effect.
Phone Number To Dial	The phone number to call. A comma can be used to pause for 1 second, useful after dialing 9 for an outside line.
Username	The login or username of the dial-up account at your ISP.
Password	The password for the ISP account.

Table 14: Dial-out fields

Example Dial-Out to an ISP or RAS

The Model 3700 server can place phone calls to a Remote Access Server (RAS) or ISP in order to upload data that has been collected from the Modbus devices. This feature is useful when using the Model 3700 server on a phone line with the Building Manager Online (BMO) service, or with your own data collection server. Dial-out configuration is not useful if you do not have a central database server to send the data to.

1. Collect the necessary information. You will need some details about the ISP or RAS you will be calling.

Dial-Out Server Details
Dial-out prefix and long distance access code (if needed) i.e. dial 9 for an outside line: _____
ISP or RAS telephone number: _____
ISP or RAS login name: _____
ISP or RAS password: _____

Table 15: Dial-out worksheet

Plug a regular telephone into the phone line that the Model 3700 server is to use. Verify the line has dial-tone. Attempt dialing the ISP or RAS phone number, and confirm a modem answers the phone. If so, hangup, attach the Model 3700 server to the phone line and proceed to the next step.

2. Select the **Network/PPP0/ModemSetup** option from the Model 3700 server configuration webpage. Set the Setup String by clicking on the **Use Default** button. The default is simply "AT". Click **Apply Changes** to save the setting.
3. Select the **Network/PPP0/DialoutSetup** option from the Model 3700 server configuration webpage. Verify the basic configuration page is shown (the default). If the **Show Basic** button is present in the lower right, click it to reduce the number of choices to the following.
 - a. Check the box to enable dialout.
 - b. Enter the phone number in the space provided.
 - c. Enter the login name and password to the ISP dialup account in the space provided.
 - d. Click **Apply Changes** to save the settings.
5. Reboot the Model 3700 server (using the server/status page, or the console push-button menu.)
6. Use the *Connection Test* page in the *Testing/Diags* menu on the Model 3700 server for a full report of the dial-out connection progress. Even if you are not using the BMO service, you can still test dial-out with this feature. You may however receive an error that the Model 3700 server is not allowed to transfer data to the BMO server. Further information on the connection test is provided in "*Connection Test*" on page 29.

GSM/GPRS Cellular Modem (A8812-GSM only)

The Model 3700 server model number A8812-GSM includes a GSM/GPRS cellular modem. GPRS can provide the Model 3700 server a connection to the internet without using a land-based phone line or LAN connection. This is often helpful in providing communications in remote areas or in customer sites that do not allow LAN connections for security purposes.

The GSM/GPRS cellular option is very similar to the standard modem configuration. Both provide the Model 3700 server a way to place a call and get an internet connection. For the GPRS services, the cellular provider handles the internet connectivity part, so all you need to do is set up the cellular service account.

To enable your GSM/GPRS modem, you must sign up for a data-only account with your cellular provider. You may need to supply the MEI number for the cellular modem which is located on the modem section of the Model 3700. Alternatively, the modem/diagnostics section will print the modem's IMEI number as well. When requesting service, it is often easiest to explain that you need data only service for internet access. You should receive a SIM card from your service provider. Install the SIM card in the slot provided on the right side of the cellular modem inside the Model 3700.

Run the modem diagnostics test to confirm the SIM card is installed and working correctly. Also note the diagnostics page prints the current cellular provider's name, as well as the strength and quality of the cellular tower signal.

Option	Description
Enable/Disable	Turn ON or OFF the ability to place an outbound call to an ISP. NOTE: When enabling this feature, the default Ethernet gateway in the network setup webpage is removed. You must reboot after enabling or disabling dial-out support to make the change take effect.
APN	The access point name for the GPRS service provider; for Cingular, the name is "CINGULAR".
Login Name	The login or username of the dial-up account at your cellular provider; for Cingular, the name is "CINGULAR@CINGULARISP.COM".
Password	The password for the ISP account; for Cingular, the password is "CINGULAR".

Table 16: GPRS configuration

Once GPRS dial-out is configured, use the *Diagnostics / Connection Test* to confirm the cellular service provider's connection is working properly.

Modem Point-to-Point Protocol (PPP) Dial-In

The Model 3700 server allows incoming connections from any generic PPP server including MacOS, Linux, Windows® 9x, XP and 2000. The dial-in feature is disabled by default, and must be enabled from the LCD console or the dial-in options menu in order to receive calls. Dial-in options include the following:

Option	Description
Dial-in Enabled	Check this box to enable dial-in support. When checked, the Model 3700 server answers any ring on the phone line, after the first ring. When not checked, the Model 3700 server never answers a ring on the phone line.
Local IP Address	The IP address assigned to the Model 3700 server side of the dial-in connection. This address is the one that you must use on the computer in the Web browser address line when remotely accessing the Model 3700 server with a dial-in connection. The default is 192.168.238.1
Remote IP address	This is the IP address assigned to the calling computer. The default is 192.168.238.2
Netmask	The Netmask that defines the subnet for both the local and remote IP addresses. This is set to 255.255.255.0 unless you have specific requirements, the default IP, remote IP should be sufficient.

Table 17: PPP dial-in

NOTE: GSM/GPRS products do not allow dial-in communications.

Dial-In from a Computer to the Model 3700 Server

The Model 3700 server can receive and answer phone calls from a Windows computer in order to allow remote configuration or to collect data that has been logged from the Modbus devices. This feature is useful when using the Model 3700 server on a phone line and a central database server is not present. The dial-in feature supports the Windows built-in dial-up networking features and can be used as easily as a dial-up ISP service.

1. Collect the necessary information. You will need the following details about the ISP or RAS you will be calling.

Dial-in Address Worksheet

A dedicated phone line is required, and cannot be shared with a fax machine or other device.

Dial-In Server Details	
Telephone number: _____	The phone line the Model 3700 server is attached to
Static IP address: 192.168.238.1	The Model 3700 server PPP IP address
Static Netmask: 255.255.255.0	
Remote Address: 192.168.238.2	The IP address assigned to the calling computer
Admin password: _____	

Table 18: Dial-in address worksheet

2. Plug a regular telephone into the phone line that the Model 3700 server is to use. Verify the line has dial-tone.
3. Use a second telephone and dial the Model 3700 server phone number and verify the first telephone rings and can be answered.
 - a. If it does not ring, verify the telephone number dialed is actually associated with physical phone line.
 - b. If the line tests okay, hang up, attach the Model 3700 server to the phone line and proceed to the next step.
3. Select the **Network/PPP0/ModemSetup** option from the Model 3700 server configuration webpage. Set the *Setup String* by clicking on **Use Default**. Click **Apply Changes** to save the setting.
4. Select the **Network/PPP0/DialinSetup** option from the Model 3700 server configuration webpage.
 - a. Check the **Dial-in Enabled** option.
 - b. Set the IP, Netmask, and Remote Address as shown in *Table 18*. The IP addresses shown (factory default) works for most dialup connections. If you make changes to the IP address, make note of the changes for future use.
 - c. Click **Apply** to save your changes.

Example Dial-In from a WinXP Computer

The Model 3700 server allows connections from any generic PPP server including MacOS, Linux, Windows 9x, XP and 2000. Windows XP/2000 has a timeout issue that affects some computers but not others. When calling the Model 3700 server with Windows XP/2000, you may receive an error message stating that a loopback error was detected, preceded by windows hanging up promptly after connecting to the Model 3700. If that is the case, a slight delay in the dial process for Windows will correct the problem. Adding this delay in a dial script is detailed below.

1. Using notepad, create a text file called "c:\windows\server32\ras\Model 3700.scp".
In that text file, add the following script


```
proc main
delay 2
endproc
```
2. Save and close the file.
3. Create a Windows networking connection.
 - a. From the control panel, select **Network Connections**. Click **Create a New Connection**.
 - b. The Connection Wizard will appear with a welcome screen and no options. Click **Next**.
 - c. Select **Connect To the Internet** and click **Next**.
 - d. Select **Set Up My Connection Manually** and click **Next**.
 - e. Select **Connect Using a Dial-up Modem** and click **Next**.
 - f. Enter **My Model 3700** for the ISP name. You may want to name each Model 3700 server connection by the name of the building where it resides. Click **Next**.

- g. Enter the phone number of the phone line attached to the Model 3700. Click **Next**.
 - h. Enter **admin** for the username, and the **admin** password in the password field. Uncheck the option **Make This The Default Internet Connection**. Click **Next**.
 - i. The Connection Wizard will show you that the setup is complete. Click **Finish**.
4. Configure connection details:
 - a. Right-click on the **My Model 3700** connection icon you created in Step 3f. (You may also click the **Properties** button in the dial-out dialog box.)
 - b. General Tab: defaults are okay.
 - c. Options Tab: Verify the option *Include Windows® Login Domain* is not checked. Set any timeout values, if desired.
 - d. Security Tab:
Security: Use **Typical**, allow unsecured password.
At the bottom of the dialog box, in the section *Interactive Login and Scripting*, check the **Run Script** box. Click **Browse** below the script name. Select the **Model 3700.scp**. Click **Open**. The script name appears to the right of the *Run Script* checkbox.
 - e. Networking Tab: defaults are okay.
 - f. Advanced Tab: defaults are okay.
 - g. Click **Okay** to save the changes.
 5. Dial the connection:
 - a. Double-click the **My Model 3700** connection icon.
 - b. Complete the password field if it is blank. The password is the Admin password of the Model 3700.
 - c. Click **Dial**. The modem usually takes between 40 and 60 seconds to establish a connection.
 6. Once the connection is established, use your Web browser to connect to the Model 3700 server by entering `http://192.168.238.1/setup/`
Where 192.168.238.1 is the Static IP address listed in "*Dial-in address worksheet*" on page 25.

Your browser is now able to access the Model 3700 server the same way as you did in "*For LAN installations only*:" on page 5.

SYSTEM OPTIONS

System Status

The *System Status* page shows the current memory and flash disk utilization values, server up-time and load average. Also included on this page are *Reboot* and *Shutdown* options. It is important to use the *Shutdown* option prior to removing power from the Model 3700. The LCD console reports the *Reboot* or *Shutdown* status.

System Processes

The *System Process* table is shown in both tree and tabular formats. The process list is useful when contacting Badger Meter Technical Support.

Date and Time

The Model 3700 server keeps time using UTC or Universal time. All log files are recorded in UTC time as well. Time stamps shown on the Model 3700 local configuration pages are converted to local time for the convenience of the installer.

The *Date/Time Configuration* page provides the following options:

Option	Description
Date/Time	In UTC and Local time.
Date/Time	Drop-down menus to select the current (Local) time manually.
Timezone	A drop-down list of the supported time zones.
Time Sync Protocol	Select NTP or Rdate . Most Linux/Unix servers provide Rdate. Others provide NTP as well. Windows domain servers can also provide NTP. If possible, use NTP as it is a more robust protocol.
Time Server	Specify the DNS name or IP address of your time server. You may need to verify if your firewall allows NTP or Rdate packets to pass through. Generally, it is better to use a local time server, if possible.

Table 19: Date and time configuration

Universal Time is Your Friend

Log data is stored in UTC time. UTC is sometimes referred to as Greenwich Mean Time (GMT). This allows data collection services such as BMO to collect data from multiple sites in different time zones. If you are operating your own database server to store log data from the Model 3700 server, it is best to store the data in UTC time in the database as well, and only convert it to local time when generating the final report or graph for the user.

If you store data in local time, you will have the following issues.

- Local time is relative. Is local the time where the Model 3700 server exists, or local to where the data is stored? If local to the Model 3700, you must shift each Model 3700 server data set depending on its location.
- There are about 11 time zones in the US. Some observe DST, others do not. These include Alaska, Aleutian, Arizona, Central, Eastern, Hawaii, Indiana, Michigan, Mountain, Pacific, and Samoa.
- When converting to local time, there is one hour of overlapping data in the Fall when the time is adjusted for Daylight Savings time. (For instance, Log entries run 12:45, 1:00, 1:15, 1:30, 1:45, 1:00, 1:15, 1:30, 1:45, 2:00 a.m. This prevents you from sorting your data by time in your database.)
- In the Spring, there is a gap in the data from 1:59 to 3:00 am. This can cause problems if you are calculating demand values based on consumption.
- Converting local time to any other time zone usually involves converting it to UTC first.

Using UTC time solves these problems elegantly. The best practice is to store data in the database in UTC format and then convert the information when generating a report for the user.

For example, if you wish to draw a graph of KW over time, prompt the user for a date range, say Jan 1 midnight to Jan 2 midnight. Take the user-specified endpoints and convert these times from local time to UTC. Next, create an SQL query using the new UTC formatted data as your select statement. For instance:

- `SELECT * from TABLE where time > '2003-01-01 08:00:00' and time < '2003-01-02 08:00:00'`

Note the time is 8 hours ahead of local time. This example is for Pacific which is 8 hours off from UTC. This returns a list of data points between the two specified time ranges. Next, plot the data on a graph, using the UTC times for start and end points. Lastly, when drawing the Time legend on the graph, convert the values back to Local time before displaying. For instance 2003-01-01 00:00:00 to 2003-01-02 00:00:00. Any division lines on the time axis can be handled the same way. The advantage of using this technique is that it properly draws a graph across DST change boundaries. The graph axis is based on UTC time with no DST, and does not show a gap or overlap at the time of the change. The axis labeling is correct as well, matching the UTC times precisely.

Another way to handle the conversion is to query and convert all the returned time stamps to local time before drawing the graph. This is useful if you do not have detailed control over the graph legend drawing process. This technique does not properly graph across DST changes as the graph is based on local time including DST changes.

Server Logs

The Model 3700 server can keep several log files that report the general operation of the server, not related to the normal data logs. These include the following:

Log Name	Description
Debug Messages	The Model 3700 server can run a Syslog process to record more detailed information about its operations, however this log consumes vast quantities of memory quickly, and is disabled by default. Click Start Log to enable the feature. Click End Log to disable the feature. NOTE: When the Model 3700 server is rebooted, the debug log is disabled on startup.
Kernel Boot Log	Startup messages about the Linux operating server startup. This log shows what hardware items were detected and initialized.
Ftp Connection Log	Lists the files transferred by FTP on the Model 3700 server.
Last Data Upload Log	Contains a report from the last data upload attempt to remote database/web servers such as BMO. This log shows if any log files are being rejected by the database/webserver, or if the network is not allowing a connection.
Last Modem Connection Log	Shows the details of the modem operation including modem connection quality parameters. This is updated every time the modem makes a dial-in or dial-out connection.
Time Change Log	Lists the time-change events. When the Model 3700 server clock is changed either manually or by automated time sync, and the change is more than a few seconds, the event is recorded here.
Server Boot Log	Shows when the Model 3700 server was started and lists process events such as remote logins or logger process restarts. This log is most useful for detecting when the Model 3700 server was restarted, and whether there was a proper shutdown event prior to rebooting (if not, possibly a power outage).
Start/End Logging	Starts detailed logging or disables it if it is running.
Purge Log Files	Clears all the server log files listed on this page, but not the meter data log files. (Deletes kernel, boot, ftp, messages, upload log files). This does not clear the interval log data from attached meter devices.
Firmware Update	Please contact Badger Meter for firmware updates.

Table 20: Server log descriptions

The Model 3700 server can upgrade its own firmware using the *Firmware Update* page. The Model 3700 server must have an internet connection to communicate with the www.badgermeter.com website for firmware updates. If a LAN connection is present and configured, it is used by default. If the Model 3700 server uses a dial-out connection, you must first enable the dialout by clicking the **Dial-out Now** button on the *Networking/Modem-ppp/Status* page.

After you click the **Check For Updates** button, the Model 3700 server contacts the www.badgermeter.com webserver and attempts to download a list of firmware files. The list is compared to the firmware versions installed, and a listing of the files is displayed. If any firmware updates are available, an *Upgrade* button is shown to the right of the update. The firmware files are as follows:

Filename	Description
asarm.cramfs	The main Model 3700 server firmware file including the Modbus and data logging software
usrarm.cramfs	High level server support files such as FTP, and timezone information
ramdisk.gz	Low level server files and server libraries
zImage	The Linux operating server
a8812io.hex	The analog/pulse I/O co-processor firmware

Table 21: Firmware update filename descriptions

When you click **Upgrade**, the Model 3700 server again contacts the www.badgermeter.com website and downloads the requested firmware image file. The Model 3700 server takes a few seconds to verify the file checksum and prompts you with an *Install* button. Click **Install** and the Model 3700 server installs the firmware update and reboots itself to make the changes take effect.

Do not power down the Model 3700 server during any step of the firmware update process. Doing so may corrupt the server and render the Model 3700 server unusable.

DIAGNOSTICS

Host Lookup

The *Host Lookup* page provides the ability to do some basic network tests:

Test Name	Description
Ping	Send an echo request to the specified host.
Traceroute	Send an echo request to the target address and attempt to locate every router in between the Model 3700 server and that address.
Nslookup	Convert the DNS name to an IP address. Tests the functionality of the DNS server configured in the <i>Network/Setup</i> webpage.

Table 22: Network test descriptions

To run a network test, enter the IP address or DNS name in the field provided, check the box next to the test you wish to use, and click the **OK** button. Multiple tests can be specified.

Connection Test

The connection test page attempts to establish an HTTP session with the specified upload server. Click **Begin Test** to start this process. Information is printed in black. SUCCESS responses are printed in green. FAILURE responses are printed in red. A sample upload test follows:

```
Ping localhost [127.0.0.1]: Success
Ethernet IP address [192.168.10.50], mask [255.255.255.0]
Local subnet [192.168.10.0] to [192.168.10.255]
Ping Ethernet ip address [192.168.10.50]: Success
Starting server debug logger
Dialout not enabled, using Ethernet LAN connection.
Ping Ethernet gateway [192.168.10.1]: Success
Ping DNS #1 [192.168.10.1]: Success
The DNS #2 server address is not configured.
Resolving time server [time.Badger Meter.com] to an IP address: Success. Got [198.107.56.37]
Ping time server [time.Badger Meter.com]: Success
Testing time server
SyncTime: Sync server time with time.Badger Meter.com.
        16 Dec 19:49:36 ntpdate[3165]: adjust time server 198.107.56.37 offset 0.009985 sec
        new time: Tuesday, December 16 2003 19:49:36 PST, drift 1 seconds.
Processing upload url.
No proxy specified, using direct connect method.
Upload URL looks ok: http://www.buildingmanageronline.com/upload.php
Resolving web server [www.buildingmanageronline.com] to an IP address: Success. Got [198.107.56.37]
Ping web server [www.buildingmanageronline.com]: Success
Connecting to server at [198.107.56.37:80]: Success
Sending HTTP request: Success
Reading response:
Upload test completed. Got:
    HTTP/1.1 200 OK
    Date: Wed, 17 Dec 2003 03:49:38 GMT
    Server : Apache/1.3.23 (Unix) PHP/4.1.2 AuthMySQL/2.20
    X-Powered-By: PHP/4.1.2
    Connection: close
    Content-Type: text/html
    SUCCESS - Test Successful
Closing TCP connection
Shutting down server debug logger
Test complete
```

Note in the last section where SUCCESS is indicated. The failure is due to the password not being correct.

LCD Console

Main Menu

The Model 3700 server has an LCD console and push-buttons labeled *Menu* and *Select*. These can be used to configure some of the basic features of the Model 3700 server. The intended purpose of the console is to configure the Model 3700 server to a point where a computer can communicate with it for further detailed configuration.

When the Model 3700 server is running, it shows *Model 3700 Ready* and the current time alternated with the Ethernet IP address. If you choose to enable the console display of data points, the LCD also shows the selected point names and current reading values. The display changes to the next listed item about once every 10 seconds. If a data point name is longer than will fit on the 16-character wide display, it will be scrolled. Press **Select** to display the next configured item. Press **Select** quickly to skip through multiple display points.

Press **Menu** to display the main menu. Once *[Main Menu]* displays on the console, the *Menu* button will change the menu option, and the *Select* button will take action on the currently displayed option. Some options provide sub-menus, others allow you to edit the option value. The following is a tree display of the main menu and sub-menus:

```

[Main Menu]
TCP/IP Config
    [TCP/IP Config]
    IP Address
    Netmask
    Gateway
    DNS Server #1
    DNS Server #2
    (previous menu)
Network Status
Dialin
Modbus Status
Upload Data Now
Shutdown
Reboot
(previous menu)
  
```

Option	Description
TCP/IP Config	The <i>TCP/IP</i> sub-menu allows you to configure the Ethernet settings for the Model 3700 server. To edit the IP settings, use the Menu button to change options, and press the Select button to edit the option. Once selected, you will see the current value displayed and a blinking square cursor on the first character. Press Menu to change the character or digit. Press Select to use the digit and move the cursor to the right one space. If you press the <i>Select</i> button multiple times, the cursor moves right the same number of spaces, allowing you to skip over characters that may be correct based on the previous settings. When you are finished entering the IP address, select a blank space with the Menu button, and press Select . Any characters still remaining to the right of the cursor are eliminated. (For instance, if changing 128.193.100.200 to 10.0.0.1, the new IP address will be several digits shorter than the old one.)
Network Status	<i>Network Status</i> tests the Ethernet connection by attempting to ping the following addresses: localhost, Ethernet IP address, gateway, DNS1, DNS2. The localhost ping will verify the kernel IP stack is properly initialized. The Ethernet ping will verify the Ethernet card's IP address is set and communicating with the kernel. The Ethernet ping test does not send any packets over the Ethernet cable, however. The gateway ping test will verify that the gateway address responds to queries. This test is the first one that actually sends packets over the Ethernet wire. The gateway test does not verify the IP address of the gateway is correct, or that the gateway is working correctly. It only tests that the address specified as a gateway responds to a ping request. The DNS1 and DNS2 ping tests verify the IP addresses listed for DNS servers respond to ping requests. This test does not verify if the DNS servers can actually resolve DNS names to IP addresses. For a more complete test, use the <i>Connection Test</i> webpage in the Model 3700 server <i>Diagnostics</i> menu.
Dial-in	Enables or disables dial-in support. From the console, the installer can enable dial-in support and allow a remote user the ability to call the Model 3700 server and configure the options without requiring a computer on-site. For more information, see " <i>Modem Point-to-Point Protocol (PPP) Dial-In</i> " on page 24.

Option	Description
Modbus Status	This option will report the number of devices currently detected by the Model 3700. The display will show a device count for Devices OK, New, and Failed. These are as follows:
Devices OK	The number of Modbus devices that are presently working, and have been configured.
New	Devices that the Model 3700 server supports and are working, but have not yet been given a name.
Failed	The number of Modbus devices that either stopped responding, or are not supported by the Model 3700. NOTE Selecting the Modbus status option from the Model 3700 server console does not cause the Model 3700 server to search for new devices. The Model 3700 server checks for new devices in the background all the time, taking about 2.5 minutes to complete each pass through all 255 possible addresses. The Modbus test console option simply displays the number of devices the Model 3700 server presently knows about.

Table 23: Main menu options

The Model 3700 server has a built-in I/O module with 4 analog and 4 pulse inputs. This module shows up in the Modbus listing as device 250, and is counted in the number of devices *OK* or *New*. For example, if you have one Model 3700 server with a single Modbus power meter, the device count will be 2. (One for the meter and one for the Model 3700 on-board I/O.)

Upload Data Now	If the Model 3700 server is configured to upload data using HTTP/POST to a webserver /database such as BMO, this option causes the Model 3700 server to upload all stored data immediately. If the dial-out option is enabled, an outbound phone call is initiated, and disconnected after the transfer is complete.
Reboot	Reboots the Model 3700.
Shutdown	Stops the data logging processes and secures the flash memory. When secured, the console states that the power may be disconnected. It is important to shut down the Model 3700 server cleanly prior to disconnecting the power from the device.

Table 24: I/O module options

Advanced Menu

The Model 3700 server has an *Advanced* menu for performing server checks and clearing all configuration options to the default settings. To access the *Advanced* menu, wait until the LCD shows *Model 3700 Ready* and press and hold down both the **Menu** and **Select** buttons for about 10 seconds. When the *Advanced* menu displays, release the two buttons. The following is a tree display of the *Advanced* menu:

```
[Advanced Menu]
Console on COM1 (RS-485 port)
Check flash disk
Erase Log/Config
(previous menu)
```

Option	Description
Console on COM1	The <i>Enable Console</i> feature provides a shell prompt on the serial port for remote diagnostics. This is intended to be used by Badger Meter technical support only.
Check Flash Disk	The <i>Check Flash Disk</i> option forces the Model 3700 server to check the entire flash disk for file server integrity. This will require you to reboot the Model 3700 server.
Erase Log/Config	The <i>Reset Configuration</i> option removes all the user settings, data and passwords that have been configured and returns the Model 3700 server to the factory default settings. This is mainly useful when reconfiguring a server that has been used previously on a different job or project.

Table 25: Advanced menu options

LOG FILE DATA

The Model 3700 server stores data from the Modbus devices in text (*csv*) log files. One log file is created for each Modbus device on the server. On a daily basis, the log files are rotated—the current log file is renamed and compressed with *gzip* compression, and a new log file is started. This allows the Model 3700 server to make efficient use of the flash memory. When the storage capacity is beyond 95% full, the oldest log file is removed from the server.

Log File Status

The Model 3700 server can display a list of log files in the *Log File Data/Status* Web configuration page. A bar graph shows the amount of storage capacity that is used by the existing log data. Below, a list of Modbus device log file is displayed along with the file size and timestamp when the file was last modified.

Each Modbus device may have multiple log files. The log file name starts with “mb-xxx.” where xxx is the Modbus device ID number. One file, with the *.log* extension is the file where the most recent data is being stored. Other log files have a *.gz* extension. These are older log data files that have been compressed to save space.

The file name is a link that opens up a browser window to view the contents of the single log file. Clicking on the single log file only shows the contents of that log file, and not all historical data for the device. Use the *Log Export* feature if all log data is required.

Log File Format

After downloading the data from the Model 3700, you need to process it. The file is an ASCII text file with comma delimited data. One line is recorded for each log cycle. The file looks something like the following example from a 4A4P-M I/O Module:

```
'2002-01-31 18:30:00';0,0,0,-0.00,89.29,39.05,49.11,0,0,0,0
'2002-01-31 18:35:00';0,0,0x02,0.01,104.24, 39.05,49.11, 0,0,0,0
'2002-01-31 18:40:00';0,0,0,NULL,87.82,39.05,49.11,0, 0,0,0
'2002-01-31 18:45:00';139,NULL,NULL,NULL,NULL,NULL, NULL,NULL,NULL,NULL,NULL
```

In this example, the first line shows a regular log entry. The second line shows a high range alarm for data point 2. The third column shows point 1 as invalid, and the fourth line shows the Modbus device is not responding.

Notice the following columns are shown:

1. Date/Time in UTC (GMT) time. This field is quoted to handle the space in the middle.
The format is YYYY-MM-DD HH-MM-SS
2. Modbus error (if any). 0=no-error, see *Table 26 on page 33*
3. Low Range alarm bitmap (hex notation)
4. High Range alarm bitmap (hex notation)
5. Data point 1
6. Data point 2
7. ---
8. Data point N

Comments

Date/Time

The date/time column reports the time at which data was logged from the Modbus device.

NOTE: This is not necessarily the time at the start of the log cycle. Users with large number of devices may notice some of the Modbus devices at higher address numbers report 1 or 2 seconds after the first Modbus devices. This is because the 9600 baud speed of the Modbus loop is not fast enough to log all Modbus devices in less than 1 second. If a device does not respond during a log cycle, the Model 3700 server attempts to query the device several more times. If a subsequent query is successful, the time of the successful query is used in the log file but may be several seconds after the initial log cycle.

The log date/time is in Universal Time (UTC). This means that the data is logged with no shift for daylight savings time, and must be converted to local time for reporting purposes. When importing into a database, data should be kept in UTC time for ease of use. When reporting the final data, you should adjust the time to reflect the local timezone for which you are reporting. The data export option on the BMO website prompts you for a time zone when you export the data, and adjusts the log date/time accordingly.

NOTE: UTC is sometimes referred to as Greenwich Mean Time (GMT).

Modbus Errors

If the error value is not 0, the remainder of the columns for this line are reported as NULL.

1	Operation not permitted
2	No such file or directory
3	No such process
4	Interrupted server call
5	Input/output error
6	No such device or address
9	Bad file descriptor
11	Resource temporarily unavailable
12	Cannot allocate memory
13	Permission denied
16	Device or resource busy
19	No such device
23	Too many open files in server
24	Too many open files
26	Text file busy
28	No space left on device
32	Broken pipe
101	Network is unreachable
110	Connection timed out
111	Connection refused
113	No route to host
129	Illegal function (function was not allowed by the slave device)
130	Illegal data address (the data address is not allowed by the slave device)
131	Illegal data value
132	Illegal response length
139	Device failed to respond (the Modbus device may be off or disconnected)
160	Start log (entry in log file after Model 3700 server starts up)
161	Stop log (entry in log file if Model 3700 server is shut down properly)

Table 26: Modbus errors

Low/High Range Alarms

This number is a hex representation showing which data points are out of range. 0x01 shows data point 1 in alarm state. 0x04 shows data point 3 in alarm state.

Data Points

Data points are shown in the same order as the Modbus device configuration display in the *Modbus/Device List* page. Data is displayed in floating point form. When a specific point is unavailable (4A4P-M broken wire alarm) or the point is not supported as part of the configuration (phase B current on a single phase H8163 meter hookup) the point is logged as NULL. This preserves the column structure of the file, and allows notation of invalid data. SQL databases often accept NULL as a valid entry in a data table to represent invalid data.

For data exported from the BMO website, the columns that are invalid (NULL) are reported as blank fields. This makes it easier to import into MS Excel® as blank cells. At some point in the future, the Model 3700 server will be converted to report blank fields rather than “NULL” to make direct import of data from the Model 3700 server easier, as well as reduce the file size. Developers intending to use data files from the Model 3700 server should handle both the word “NULL” as well as a blank column as indications of an invalid data point.

Log Storage Capacity

The Model 3700 server uses approximately 8 Mbytes of flash disk for log file storage. As data from the Modbus meters is collected, it is appended to log files on this flash chip. Once a day (at the first call-out period for uploading data) the log files are rotated. This action renames each log file and compresses the old file using *gzip*. The net result is a smaller file for storage or modem/Ethernet transfer.

Because the files are compressed, the actual size of the data on the flash chip varies, depending on the data itself. For example, if a device is reporting 25 KWh, it uses fewer bytes than a log entry that has 9,999,999 KWh.

We have measured a typical installation with 5 H8036 power meters and 5 A8923 I/O modules, and determined the server runs for well over a hundred days with a 15 minute log cycle. Changing the number of meters, the type of log data, or the log cycle period affects your results accordingly.

When the Model 3700 server storage area on the flash starts to run out of space, the following action is taken:

- When the 8 Mbyte log file storage area is 75% full, the Model 3700 server immediately compresses the log files and attempts to upload the data to the BMO website or user-specified site. This action does not wait until the next scheduled upload time.
- When the storage area is 95% full, the Model 3700 server immediately attempts to upload the data, and if unsuccessful, purges the oldest (rotated) log data file.

Log files are deleted automatically if the Model 3700 server has successfully uploaded the log file to a database server using the HTTP/Post protocol. If you do not configure the Model 3700 server to automatically push the log files to your server, you must manually delete them. See *"Removing Data from the Model 3700 Server"* on page 37.

Uploading Data to the BMO Website

After the Model 3700 server has been configured and has logged some data, you may want to collect the data for analysis. There are several ways of collecting the data from the Model 3700 server, including the Building Manager Online (BMO) service. This section details configuring the Model 3700 server for use with the BMO service.

1. Use your browser to connect to the Model 3700 server.
2. Select **Modbus/Setup** from the menu on the left.
3. In the *Modbus Loop Name* field, enter a name for this Model 3700 server to uniquely identify it on the BMO website. Because the BMO site can show multiple Model 3700 server devices, it is important to have a descriptive name in this field.
4. Select the **Log File Data, Setup/Upload** menu option. The following features are available:

Option	Description
Model 3700 Server Serial Number	This is the serial number that uniquely identifies this Model 3700. This number cannot be changed. When uploading data to the BMO website, this serial number is used to identify the Model 3700 server to the BMO server.
Scheduled Upload Time	Allows you to control when the Model 3700 server initiates the upload process. You can select any hour of the day, and the Model 3700 server will select some time at random within that hour to start the upload. The random feature allows multiple Model 3700 server devices to share a single dial-up account or phone line by not starting the dialout at the same time for all devices. If the Model 3700 server is on a LAN connection (DSL, cable Modem, T1), an upload time of Hourly may be selected.
Upload Data on Alarm Status Change	Causes the Model 3700 server to initiate the upload process if any point on any Modbus device enters or leaves an alarm state. This allows the Model 3700 server to send data when an alarm is detected, and will upload that information to the BMO website in a timely manner. The BMO website will then send email notifications, if necessary. If this option is disabled, the BMO website may not be able to send notifications until the end of the day when the Model 3700 server calls in at its specified upload time.
Upload Data on Low Disk Alarm	Causes the Model 3700 server to attempt a data upload immediately if the log file storage area is more than 75% full.
Allow Remote Modbus Device Configuration	If enabled, users may remotely configure alarms and other Modbus device features on the BMO website. When the Model 3700 server uploads data to the BMO website, it also downloads any new configuration information as needed. If configuration changes are made to the Model 3700 server, those changes are uploaded to the BMO site. If configuration changes are made at both the Model 3700 server and the BMO website, the most recent changes are used.
Target Address to Upload Data	This is the website URL to upload data to. This should always be set to <i>http://www.buildingmanageronline.com/upload.php</i> unless you are configuring the Model 3700 server to send data to your own internal database server.
Password to Upload Data	The password used by the BMO webserver to verify the Model 3700 server device authentication before accepting the uploaded data. You should select a password other than the default, and make note of it for future reference.
Number of Times to Retry	In the event of a failure (often due to dial-up problems, busy signals and the like) this option specifies the number of retries to attempt the upload again. If all retries fail, the Model 3700 server waits until the next scheduled upload time before trying again.
Time to Wait Before Retry	In the event of a failure, the Model 3700 server can be configured to wait for a specified period of time before attempting another connection. This option specifies how long to wait before retrying.

Table 27: Log file data setup/upload options

5. Contact the Badger Meter Technical Support department. Please have the Model 3700 server serial number and password to upload data. Your tech support representative will confirm your BMO account and will add the Model 3700 server to one of your client databases.
6. Click **Upload Data Now**. Your data should be sent to the BMO webserver.

For more detailed information about the transfer process, use the *Connection Test* page in the *Testing/Diags* menu on the Model 3700 server for a full report of the data upload progress.

RETRIEVING DATA FROM THE MODEL 3700 SERVER

Now that you have installed your Model 3700 server and configured it to collect data from your meters and sensors, you will want to collect the data from your Model 3700. This section provides an overview for collecting data from the Model 3700 server. Processing the data for billing reports, summaries, and other data processing are beyond the scope of this document.

Basic ways to collect data from the Model 3700:

- HTTP download from the Model 3700 server with a browser (pull)
- FTP download from the Model 3700 (pull)
- Enertrax DL download from the Model 3700 (pull)
- HTTP Post: The Model 3700 server uploads data to a database/webserver (push)

HTTP Direct Download from the Model 3700 Server via a Browser

The Model 3700 server has the ability to export log file data to a Web browser directly from the setup webpages. To use this feature, access the Model 3700 server *Setup* menu with your web browser. Select the **Log File Export** page from the *Log File Data* menu on the left side of the page.

For each device, a separate log file will be saved. Select the device from the drop-down list provided. Specify Comma or Tab delimited data, and indicate if column headers are required. Click the download button to download the data.

The log file format is the same as is provided by FTP and by the BMO website. Note: All time stamps are in UTC.

When importing log files into Microsoft® Excel®, be sure to specify the log data is comma separated, and use a single quote mark as the text delimiter.

FTP Direct Download from the Model 3700 Server

The Model 3700 server allows inbound connections for transfer of log data files using the FTP protocol. FTP to the Model 3700 server and log in using the server admin password. Files are located in */var/log/Modbus*.

Enertrax DL Download from the Model 3700 Server

Badger Meter provides a free tool called Enertrax DL that can automate the process of downloading log data from the Model 3700 server to your Windows® PC hard drive. Enertrax DL can merge new log data into existing log files on your computer as well as provide configuration information about the Model 3700. Enertrax DL can also be configured to make LAN or dial-up call to one or more Model 3700. Enertrax DL can be obtained from www.badgermeter.com.

HTTP Post Upload to Building Manager Online

- Model 3700 server sends data to the BMO website
- The BMO Website stores the data in a SQL database
- Quick reporting from our website
- Includes remote Model 3700 server configuration service
- Includes alarm notification by email
- Data available for download in CSV/tab delimited format upon your request
- For pricing and to sign up for service, contact Badger Meter for more information

HTTP Post Upload to Your Database Server

- Model 3700 server uploads data directly to your webserver or database server
- You must supply a script to process the incoming data. Sample scripts for ASP and PHP are available upon request
- Requires Webserver, CGI Scripting and database (SQL) knowledge
- Alarm processing available by processing data on your server when data is uploaded
- Designed for integration with existing energy reporting servers
- Contact Badger Meter technical support for further details and sample scripts

Removing Data from the Model 3700 Server

When using an HTTP/Post method to allow the Model 3700 server to push data to a database server, the Model 3700 server automatically removes log files from its flash memory when the Model 3700 server has confirmed that the file was received by the database server.

If you are using the Model 3700 server with a standalone mode, you can use FTP or Enertrax DL to delete log files from the flash memory.

With Enertrax DL, simply check the *Setup* checkbox to delete log data after download.

For FTP, the process is essentially the same process as the manual FTP data download.

Steps for Microsoft® Windows® command prompt FTP.

Use the following commands:

Command	Description
ftp 192.168.40.50	Use the IP address of your Model 3700
username: root	
password: admin	The same as the admin password
cd /var/log/Modbus	
dir	view a list of log files.
mdel *.gz	remove the log file to free up flash space
bye	

Figure 12: Commands

The *mdel* command tells the FTP software to delete all files ending in *.gz* in the current directory. Some FTP clients allow you to specify a command prompt prior to using *mdel* that prevents the FTP client software from asking if you are sure you wish to delete each file.

Linking to Model 3700 Server Device Status Pages

It may be helpful to create a shortcut or a hyperlink on another web page that will direct the browser to bring up a specific *Device Status* page in your browser. To do this, right-click on the page and select **Properties**. The URL for the page will be shown on that dialog. Simply copy/paste this URL into your link.

The Model 3700 server can provide Modbus device data in XML format. This feature, coupled with browser based AJAX (Javascript) can provide a very powerful tool to allow the creation of custom web pages.

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