

CAS 2500-01 & CAS 2500-01-UL
Modbus RTU Data Client
(Hardware and Software Solutions)
Manual

Blank Page

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1. Modbus RTU Data Client Description

The Modbus RTU Data Client (CAS 2500-01 and CAS 2500-01-UL) can connect to one or more Modbus RTU devices (on the same network) and poll for data registers stored on those devices. To poll multiple Modbus RTU devices, the devices must be on the same wired network as the Data Client (the devices are usually daisy-chained).

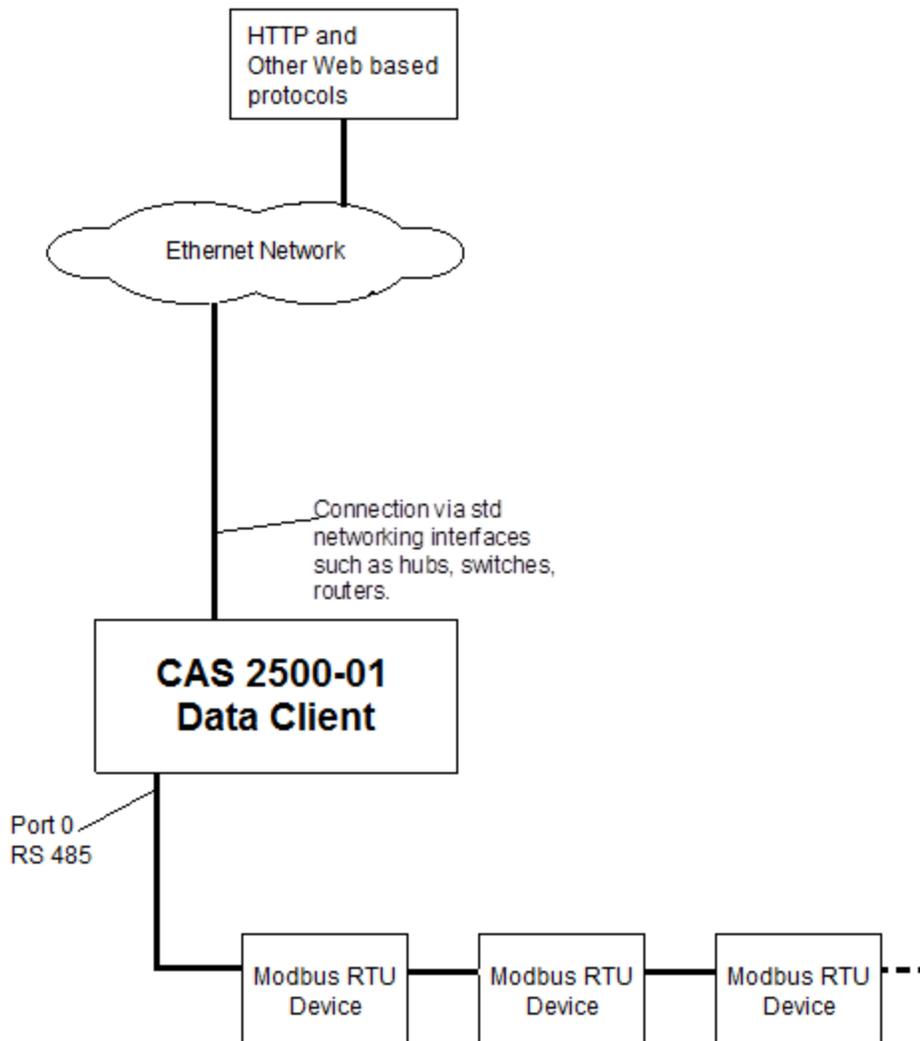
The Data Client connects to the Modbus RTU Devices, reads data and stores it internally. Users can view the current values of the points they have configured. Users can also set up a historical data store to use as trending data. These values, both current and historical, can be acquired from the Data Client through its Rest Server as XML, CSV, or JSON.

The Data Client requires minimal configuration in order to start polling for values.

2. Connections

2.1. Block Diagram

Monitor and View Modbus RTU Data



2.2. Wiring / Connections

Port 0 – RS 485 Mode Terminals

Port 0 Connector on CAS 2700-03	Modbus Device
Pin 1 -> Pin 3	+ve
Pin 2 -> Pin 4	-ve
Pin 5	Ground
Pin 6 -> Pin 9	
Pin 7 -> Pin 8	

2.3. Limitations and Best Practices

Maximum Number of Points polled per Data Client

The Data Client can currently support polling up to 500 Modbus RTU registers and values. Should you require polling more points, please feel free to contact us.

3. Configuration

3.1. Modbus RTU Configuration

To configure the Modbus RTU Points, first open a web browser and browse to the following webpage:

- If CAS 2500-01 Modbus RTU Data Client (Software Version) browse to <http://localhost:8080/bin/modbusrtuclient/config/>
- If CAS 2500-01-UL Modbus RTU Data Client (Hardware Version) browse to <http://ip/bin/modbusrtuclient/config/> where ip is the IP Address of the Data Client

You will see the following page:

Modbus RTU Client

Modbus RTU Device Configuration

Setting	Value
Baud Rate	9600 ▼

Save Port Settings

Modbus RTU Devices

No Modbus RTU devices have been configured yet.

ModbusRTU_tasks

Actions: [Insert](#)

Error: Table is empty

First, set the Baud Rate. You can select from the range of predefined Baud Rates in the drop-down box. Click “Save Port Settings” to save the Baud Rate.

To begin configuring a Modbus Task, click on the “Insert” link under ModbusRTU_tasks. You will see the following form:

Insert new record in to 'ModbusRTU_tasks'

Name	Value	Description										
Name	<input type="text"/>	The name of the task. This can be anything and is used to help identify the task.										
Slave ID	<input type="text"/>	The address of the Modbus slave device. Valid addresses are in the range 1..247.										
Modbus Address	<input type="text"/>	<table border="1"> <thead> <tr> <th>Function</th> <th>Address</th> </tr> </thead> <tbody> <tr> <td>(0x01) Read Coils</td> <td>0-10000</td> </tr> <tr> <td>(0x02) Read Discrete Inputs</td> <td>10001-30000</td> </tr> <tr> <td>(0x03) Read Holding Registers</td> <td>30001-40000</td> </tr> <tr> <td>(0x04) Read Input Registers</td> <td>40001+</td> </tr> </tbody> </table>	Function	Address	(0x01) Read Coils	0-10000	(0x02) Read Discrete Inputs	10001-30000	(0x03) Read Holding Registers	30001-40000	(0x04) Read Input Registers	40001+
Function	Address											
(0x01) Read Coils	0-10000											
(0x02) Read Discrete Inputs	10001-30000											
(0x03) Read Holding Registers	30001-40000											
(0x04) Read Input Registers	40001+											
Number Of Registers	<input type="text" value="1"/>	The number of elements that will be requested in this task.										
Scan	<input type="text" value="30"/>	How often in seconds to run this task. (Seconds)										

Here is a description of the fields:

Name: The name of the task. This can be anything and is used to help identify the task.

Slave ID: The address of the Modbus slave device. Valid address are in the range 1 - 247

Modbus Address: The number of the register you wish to poll.
 0-10000 are accessed using the Read Coils Function (0x01)
 10001-30000 are accessed using the Read Discrete Inputs Function (0x02)
 30001-40000 are accessed using the Read Input Registers Function (0x04)
 40001+ are accessed using the Read Holding Registers Function (0x03)

Number Of

Registers: The number of elements that will be requested in this task.

Scan: How often to poll for this object in seconds.

Enter the values into the Fields and click Insert to save them. To cancel changes simply close the page without submitting.

If successful you will see the following page:

Modbus RTU Client**Modbus RTU Device Configuration**

Setting	Value
Baud Rate	9600 ▾

Success, Record #1 has been added

Modbus RTU Devices

ID	Slave ID
1	1

ModbusRTU_tasks

Actions: [Insert](#)

Displaying 30 records from 0-1 of a total 1

Action	Id	Number Of Registers	Device ID	Function	Name	Modbus Offset	Scan
Edit Delete	1	10	1	03 Read Holding Registers (4xxxx)	Read40001-40010	0	30

Tips: You can edit a task that was just created by clicking on the “Edit” Link after inserting a task. In a like manner, you can also delete a task by clicking on the “Delete” Link.

3.2. Historical Settings

To Setup the Data Client to store historical values, open a web browser and go to the following page:

- If CAS 2500-01 Modbus RTU Data Client (Software Version) browse to <http://localhost:8080/bin/history/>
- If CAS 2500-01-UL Modbus RTU Data Client (Hardware Version) browse to <http://ip/bin/history/> where ip is the IP Address of the Data Client

You will see the following form:

History config

Name	Options
Enabled	<input type="checkbox"/>
Format	On Change ▼
Timeout	3600
Max records count	5000
Archiving Method	Single File ▼
Archive to disk	<input type="checkbox"/>

Total records: 0

Database Archived: 0

Here is a description of the fields:

- Enabled:** Check this box to enable history logging. (Default is Disabled)
- Format:** **Full** – Stores the result of every poll of your device. Note this will fill up the database rather quickly and is not recommended.
On Change – Stores the result of a poll when the values changes or the time expires. Recommended.
- Timeout:** Used with the On Change format. Stores a key frame in the database on a timeout. This value is in seconds. (Default is 3600 = 1 hour)
- Max Record Count:** How many records to keep active in the database before archiving the oldest records. (Default is 1000)
- Archiving Method:** **Single File** – Archives data to a single file
Hourly – Archives data into separate files based on the hour.
Daily – Archives data into separate files based on the day.
Monthly – Archives data into separate files based on the month.
- Archive to Disk:** Check this box to enable archiving to disk. When the max records count is reached, the bottom 20% of records are removed from the database and can be stored to disk if enabled or deleted if disabled. (Default is Disabled)

4. Viewing and Retrieving Data

4.1. Reports Page

Browse to the following web address:

- If CAS 2500-04 BACnet IP Data Client (Software Version) browse to <http://localhost:8080/bin/reports/>
- If CAS 2500-04-UL BACnet IP Data Client (Hardware Version) browse to <http://ip/bin/reports/> where ip is the IP Address of the Data Client

The reports page shows the current value of the configured points. It also lists the timestamp of the most recent data and which drivers act upon that one data point. For example:

Reports

This table shows the flow of data within the CAS Gateway.
It will also show the current values of the datapoints as well as the timestamp of when the data was last updated.

Displaying 30 records from 1-2 of a total 2

Actions	Data			Read		Passive		Serve		Write		Mods	
	ID	Value	Modified	Driver	Task	Driver	Task	Driver	Task	Driver	Task	Read from	Stored to
Edit XML CSV JSON	1	0	Never Updated										
Edit XML CSV JSON	2	26.389	2013-07-10T19:16:35+00:00	BACnetIP	Test								

Displaying 30 records from 1-2 of a total 2

4.2. Historical Data

If history is enabled, you can look at all the historical data currently stored internally. To view this data, browse to the following web address:

- If CAS 2500-04 BACnet IP Data Client (Software Version) browse to http://localhost:8080/bin/system/tables?table=da_data_history/
- If CAS 2500-04-UL BACnet IP Data Client (Hardware Version) browse to http://ip/bin/system/tables?table=da_data_history/ where ip is the IP Address of the Data Client

Here is an example of what you could see on this webpage:

da_data_history

Actions: [Insert](#)

Displaying 30 records from 0-3 of a total 3

Action	Id	Data_id	Modified	Name	Value
Edit Delete	1	2	1373488510	Test	26.389
Edit Delete	2	2	1373488540	Test	26.389
Edit Delete	3	2	1373488570	Test	26.389

This table will display all of the currently stored historical values and their timestamps.

If Archive to Disk is enabled, then once this data store fills up, the bottom 20% of the records will be written to a file based on the Archive Method selected.

This file can be found in the file system of the Data Client in the “history” directory.

For the CAS 2500-04 BACnet IP Data Client (Software Version) the history directory can be found in the My Documents/CAS Gateway/history

For the CAS 2500-04-UL BACnet IP Data Client (Hardware Version) the history directory can be found in the root directory. **Note:** You can access these files either through a HTTP Request or through FTP.

4.3. Rest Server Functionality

All the data, including historical values that have not been archived, can be acquired using REST functions. This data is available as XML, JSON, or CSV.

There are two ways to see the data in this manner.

- 1) Browse to the reports page as instructed in Section 4.1 Reports Page. Next to each entry there is a link for XML | CSV | JSON|. Click on one of these options to view the data in that particular format. The example below is for the XML version of the data:

```
▼<HttpXML>
  ▼<query>
    <act>current</act>
    <id>2</id>
  </query>
  ▼<response status="OK" count="1">
    <data id="2" modified="1373489260">26.222</data>
  </response>
</HttpXML>
```

- 2) Type in a web browser the REST function with the correct parameters to get the requested data.

Here is an example of a request for the current XML data of a point:

<http://ip/bin/xml?act=current&id=2>

In this request here are the parameters:

- **ip** is the IP Address of the data client. (If this is the CAS 2500-04 BACnet IP Data Client – Software Version, then the ip will be localhost:8080).
- **xml** the response will be in XML format. Change this to json or csv if you require those formats
- **act=current** is requesting for the current data
- **id=2** is requesting for the data of point with id 2. To find out what the id is of various points, please refer to the Reports Page (See Section 4.1 Reports Page) and look under the ID column to find the ID of the point you wish to request the data.

A successful request will have a response in the format requested. For example, XML:

```
▼<HttpXML>
  ▼<query>
    <act>current</act>
    <id>2</id>
  </query>
  ▼<response status="OK" count="1">
    <data id="2" modified="1373489260">26.222</data>
  </response>
</HttpXML>
```

You can also request all the historical values of a point:

http://ip/bin/xml?act=current&table=da_data_history&data_id=2

This request is a little more complicated, but here are the parameters used:

- **ip** is the IP Address of the data client. (If this is the CAS 2500-04 BACnet IP Data Client – Software Version, then the ip will be localhost:8080).
- **xml** the response will be in XML format. Change this to json or csv if you require those formats
- **act=current** is requesting for the current data
- **table=da_data_history** is requesting data from the history records
- **data_id=2** is requesting for the data of point with id 2. To find out what the id is of various points, please refer to the Reports Page (See Section 4.1 Reports Page) and look under the ID column to find the ID of the point you wish to request the data.

A successful request will have a response in the format requested. For example, XML:

```
▼<HttpXML>
  ▼<query>
    <act>current</act>
    <data_id>2</data_id>
    <table>da_data_history</table>
  </query>
  ▼<response status="OK" count="9">
    <data data_id="2" id="37" modified="1373489590" name="Test">26.000</data>
    <data data_id="2" id="38" modified="1373489620" name="Test">26.000</data>
    <data data_id="2" id="39" modified="1373489650" name="Test">26.111</data>
    <data data_id="2" id="40" modified="1373489680" name="Test">26.111</data>
    <data data_id="2" id="41" modified="1373489710" name="Test">26.000</data>
    <data data_id="2" id="42" modified="1373489740" name="Test">26.000</data>
    <data data_id="2" id="43" modified="1373489770" name="Test">26.111</data>
    <data data_id="2" id="44" modified="1373489800" name="Test">26.111</data>
    <data data_id="2" id="45" modified="1373489830" name="Test">26.111</data>
  </response>
</HttpXML>
```

5. Commissioning, Diagnostics and Trouble Shooting

5.1. What to Take to Site for Commissioning

1. The data client and other supplied components.
2. RS 485 to USB Convertor

Any will do. This will allow you run tests using the rs485 serial connection. Connect to the device and find out which COM port is now available, use CAS Modbus Scanner to retrieve data.

3. Serial Cables

A Null Modem cable is used to connect to the Data Client diagnostic port. Take one with you.

4. Laptop
5. Data Client IP Address Allocation Tool

Download from
<http://www.chipkin.com/articles/cas-gateway-ip-address-tool>

6. Wireshark packet sniffer software – free download

<http://www.wireshark.org/download.html>

7. CAS Modbus Scanner – free download

CAS Modbus Scanner is a utility to retrieve coils, inputs, holding registers, and input registers from a Modbus enabled device. Values retrieved from the device can be viewed in many different formats including Binary, HEX, Uint16, Int16, Uint32, Int32, and Float32.

<http://www.chipkin.com/cas-modbus-scanner>

8. DB9 and DB25 male and female connector make-up kits (Solder free)
9. Ethernet Patch cables
10. Hub

Used as a last resort if there are problems on Modbus or BACnet

A hub is not a switch. A hub can be used for trouble-shooting whereas only a 'supervised' switch can. Most switches are not supervised.

<http://www.chipkin.com/articles/hubs-vs-switches-using-wireshark-to-sniff-network-packets>

5.2. Data Client Status

Browse to <http://ip/bin/reports> and you will see the present values of the data points. (See Section 4.1 Reports Page)

If all of the data values are displayed as “-1” (or whatever the configured default value is) then it could mean one of two things.

- 1) The Data Client has just been configured and has begun to poll for values. Wait for a little while for the first couple of scan intervals to finish, and then refresh the page. Current correct values should be displayed.
- 2) The Data Client is not connected to the network. Either the Data Client was never connected, or the Data Client got disconnected from the device.

You must manually refresh this page to get the updated values.

5.3. Data Client Diagnostics

Power Led: Green Solid = Normal Condition.

RJ45 LED: Green to show link.

5.4. Data Client Stats

The stats webpage of the Data Client displays many useful statistics regarding the operation of the Data Client. There are stats recorded for BACnet Bytes Sent, Modbus RTU Messages Received, and many more. Please refer to the stats page to see if there are any errors currently occurring on the Data Client.

The stats page can be found at the following web address:

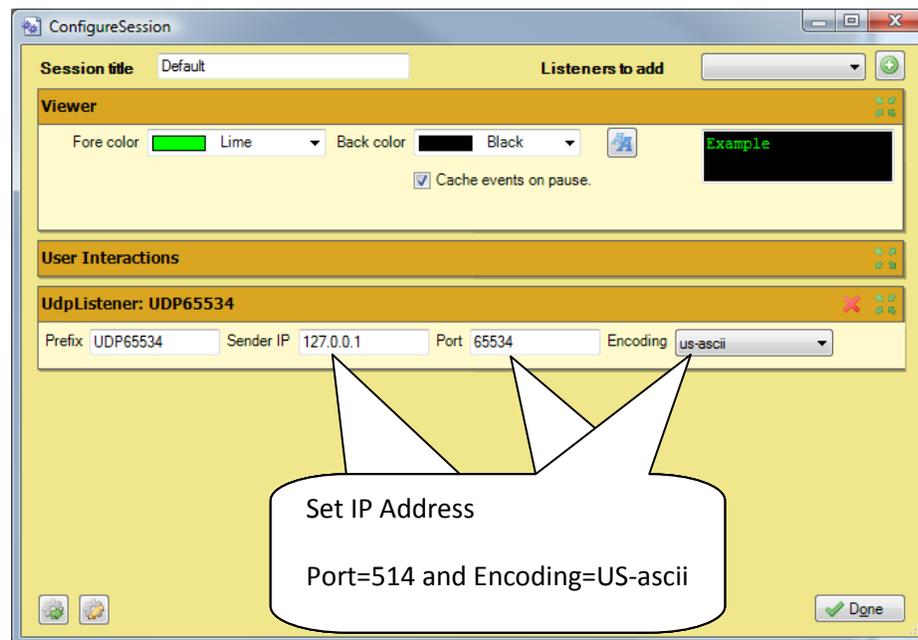
<http://ip/bin/system/info> where ip is the IP Address of the Data Client. (If using the CAS 2500-01 Modbus RTU Data Client – Software Version, the ip will be “localhost:8080”).

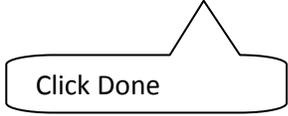
5.5. Debug log.

The debug messages are sent on UDP port 514 to the broadcast IP address: {255.255.255.255} as plain ASCII text. You can use "logview4net" tool to view and recorded the debug messages as they are sent from the device.

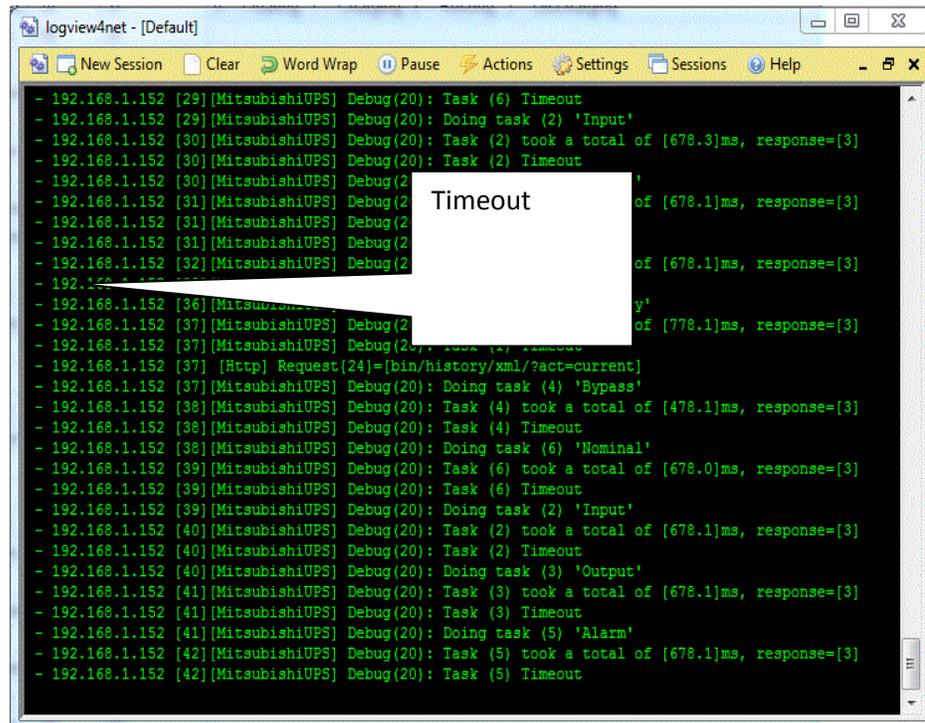
Logview4net

Free and open source tool built to viewing and monitoring logs. It works with many different file formats and protocols including UDP. This tool can be download for "free" from the publishers website <http://logview4net.com/>



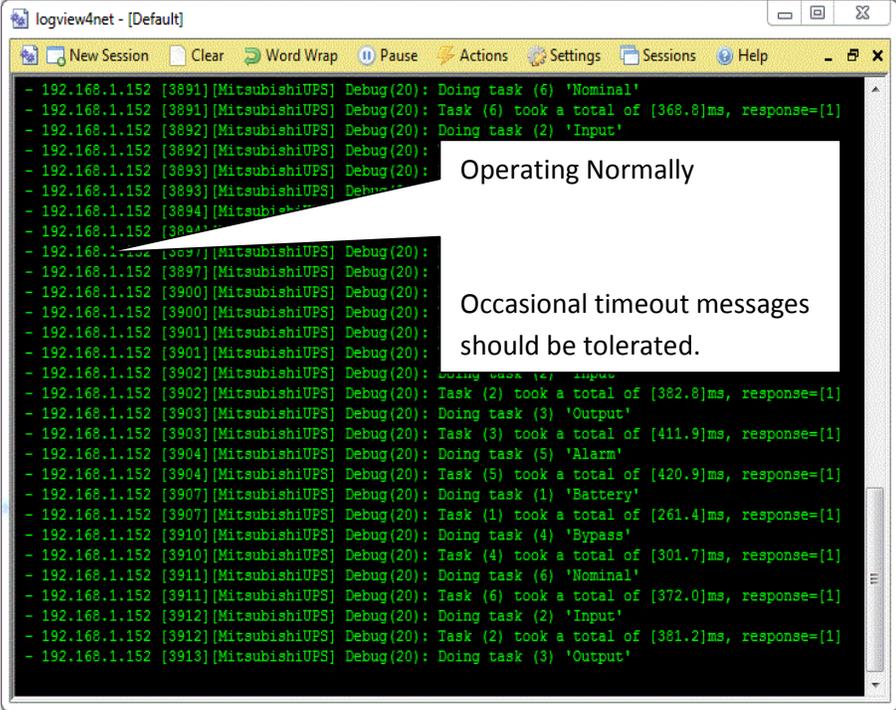


Click Done



```
logview4net - [Default]
New Session Clear Word Wrap Pause Actions Settings Sessions Help
- 192.168.1.152 [29][MitsubishiUPS] Debug(20): Task (6) Timeout
- 192.168.1.152 [29][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [30][MitsubishiUPS] Debug(20): Task (2) took a total of [678.3]ms, response=[3]
- 192.168.1.152 [30][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [30][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [31][MitsubishiUPS] Debug(20): Task (2) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [31][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [31][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [32][MitsubishiUPS] Debug(20): Task (2) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [32][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [36][MitsubishiUPS] Debug(20): Task (2) took a total of [778.1]ms, response=[3]
- 192.168.1.152 [37][MitsubishiUPS] Debug(20): Task (2) took a total of [778.1]ms, response=[3]
- 192.168.1.152 [37][MitsubishiUPS] Debug(20): Task (2) took a total of [778.1]ms, response=[3]
- 192.168.1.152 [37] [Http] Request(24)=[bin/history/xml/?act=current]
- 192.168.1.152 [37][MitsubishiUPS] Debug(20): Doing task (4) 'Bypass'
- 192.168.1.152 [38][MitsubishiUPS] Debug(20): Task (4) took a total of [478.1]ms, response=[3]
- 192.168.1.152 [38][MitsubishiUPS] Debug(20): Task (4) Timeout
- 192.168.1.152 [38][MitsubishiUPS] Debug(20): Doing task (6) 'Nominal'
- 192.168.1.152 [39][MitsubishiUPS] Debug(20): Task (6) took a total of [678.0]ms, response=[3]
- 192.168.1.152 [39][MitsubishiUPS] Debug(20): Task (6) Timeout
- 192.168.1.152 [39][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [40][MitsubishiUPS] Debug(20): Task (2) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [40][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [40][MitsubishiUPS] Debug(20): Doing task (3) 'Output'
- 192.168.1.152 [41][MitsubishiUPS] Debug(20): Task (3) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [41][MitsubishiUPS] Debug(20): Task (3) Timeout
- 192.168.1.152 [41][MitsubishiUPS] Debug(20): Doing task (5) 'Alarm'
- 192.168.1.152 [42][MitsubishiUPS] Debug(20): Task (5) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [42][MitsubishiUPS] Debug(20): Task (5) Timeout
```

Abnormal operation. No communication with device. Perform Veeder Device Connection Diagnostics.



```
logview4net - [Default]
New Session Clear Word Wrap Pause Actions Settings Sessions Help
- 192.168.1.152 [3891][MitsubishiUPS] Debug(20): Doing task (6) 'Nominal'
- 192.168.1.152 [3891][MitsubishiUPS] Debug(20): Task (6) took a total of [368.8]ms, response=[1]
- 192.168.1.152 [3892][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [3892][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3893][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3894][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3894][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3897][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3897][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3900][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3900][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3901][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3901][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3902][MitsubishiUPS] Debug(20): Doing task (4) 'Bypass'
- 192.168.1.152 [3902][MitsubishiUPS] Debug(20): Task (2) took a total of [382.8]ms, response=[1]
- 192.168.1.152 [3903][MitsubishiUPS] Debug(20): Doing task (3) 'Output'
- 192.168.1.152 [3903][MitsubishiUPS] Debug(20): Task (3) took a total of [411.9]ms, response=[1]
- 192.168.1.152 [3904][MitsubishiUPS] Debug(20): Doing task (5) 'Alarm'
- 192.168.1.152 [3904][MitsubishiUPS] Debug(20): Task (5) took a total of [420.9]ms, response=[1]
- 192.168.1.152 [3907][MitsubishiUPS] Debug(20): Doing task (1) 'Battery'
- 192.168.1.152 [3907][MitsubishiUPS] Debug(20): Task (1) took a total of [261.4]ms, response=[1]
- 192.168.1.152 [3910][MitsubishiUPS] Debug(20): Doing task (4) 'Bypass'
- 192.168.1.152 [3910][MitsubishiUPS] Debug(20): Task (4) took a total of [301.7]ms, response=[1]
- 192.168.1.152 [3911][MitsubishiUPS] Debug(20): Doing task (6) 'Nominal'
- 192.168.1.152 [3911][MitsubishiUPS] Debug(20): Task (6) took a total of [372.0]ms, response=[1]
- 192.168.1.152 [3912][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [3912][MitsubishiUPS] Debug(20): Task (2) took a total of [381.2]ms, response=[1]
- 192.168.1.152 [3913][MitsubishiUPS] Debug(20): Doing task (3) 'Output'
```

Operating Normally

Occasional timeout messages should be tolerated.

Normal Operation.

5.6. Another Method for Changing the IP Address – DHCP (CAS 2500-01-UL Only)

This device supports DHCP and DHCP is disabled.

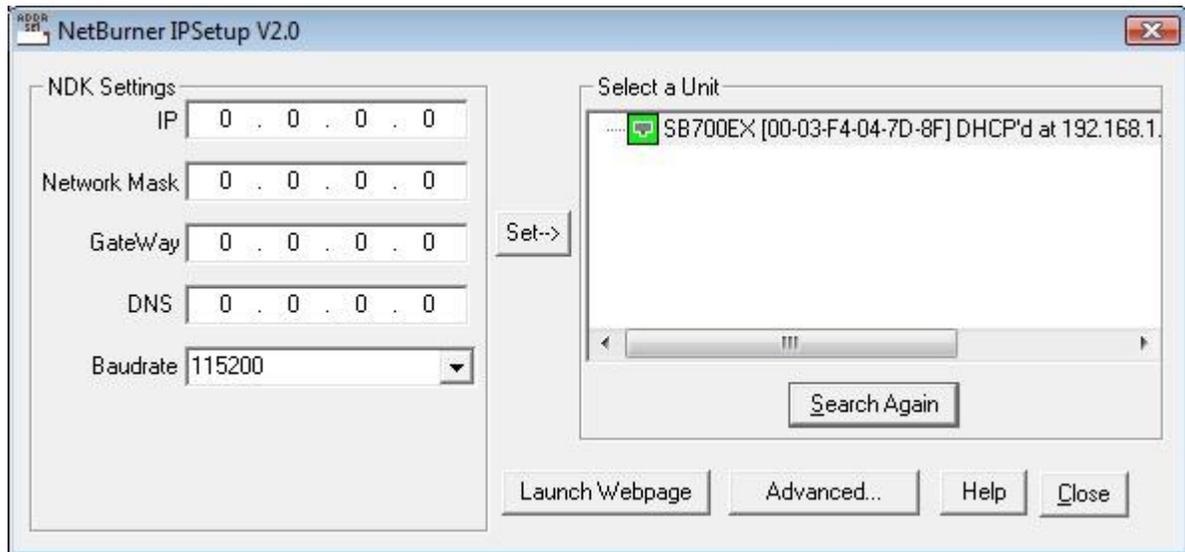
When shipped the device

IP:	192.168.1.113
Mask:	255.255.255.0
Default Gateway:	192.168.1.1

A tool is provided to change the IP address of the gateway. The tool can be downloaded from:

<http://www.chipkin.com/articles/cas-gateway-ip-address-tool>

When you start this tool it discovers gateways and list them in the right had side ‘Select a Unit’ area. If the area is blank then click the ‘Search Again’ button. If it remains blank check that the Ethernet connection is made – is there a green link LED on the RJ45 and on the hub/switch you are connected to.



To change the IP address complete the Fields and click the 'Set' button.

To set it to DHCP, simply put all fields to 0.0.0.0 and click the 'Set' button.

5.7. Discovering the Data Client

Use the tool provided to change the IP address to discover the gateway and learn what its pre-allocated IP address is. See section 5.5 Another Method for Changing the IP Address

5.8. Downloading New Firmware

If you are sent new firmware you will be provided with specific instructions. These are generic – i.e. folder and file names may be different.

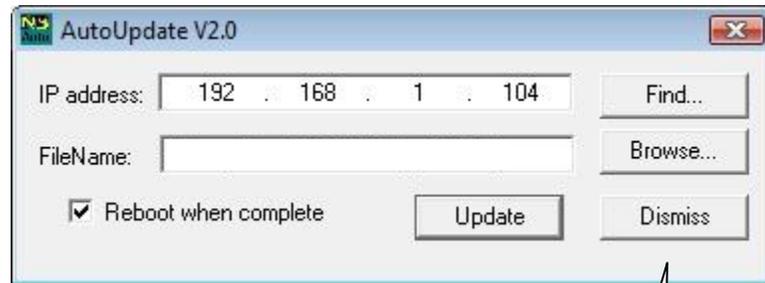
A tool is provided. It can be downloaded from

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■ Tel: (866) 383-1657, ■ Fax: (416) 915-4024 ■

<http://www.chipkin.com/articles/cas-gateway-firmware-download-tool>

Screen Shot from the Firmware update tool.



File name and path may change. You will be provided with specific instructions.

Click to find a gateway (discover)

6. Specifications

- **UL and ULc approved**
- 10/100BaseT with RJ-45 connector
- 1x RS232 Port
- 1x RS485 Port (Different Models have additional ports)
- 2MBytes flash memory, 8MBytes of SDRAM
- Power: 5-24VDC
- Operating Temperature: 0 to 70 C
- Dimensions: 4.2" x 3.25" x 1"
- LEDs: Link, Speed/Data, Power

7. Additional Support

Should you require any additional support, please feel free to contact us by:

Email: support@chipkin.com

Or

Phone: 1-866-383-1657 extension 208

Revision History

Date	Resp	Format	Driver Ver.	Doc. Rev.	Comment
18 Jul 2013	ACF		0.11	0	Document Created