

# Chipkin™ HTTP JSON Gateway USER MANUAL



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## DOCUMENT REVISION HISTORY

REVISION	DATE	AUTHOR	NOTE
1	2019-May-03	ACF	- Document created

*Table 1 - Document Revision History*

# 1. PREFACE

## 1.1 WELCOME

As a new owner of Chipkin Automation Systems'™ (CAS) Gateway you have joined thousands of satisfied customers who use Chipkin's protocol gateways, data clients and integration services to meet their building and industrial automation requirements. Our configuration expertise in this field combined with free BACnet and other tools ensure your success; and our customer support via phone, email and remote desktop tools means that we're there when you need us. Thank you for choosing Chipkin's products.

## 1.2 CHIPKIN

Chipkin offers expert solutions for your building and industrial automation requirements. We develop, configure, install and support gateways (protocol converters), data loggers, and remote monitor and controlling applications. Founded in October 2000, Chipkin provides expert solutions for converting BACnet®, Modbus®, and Lonworks®—to name just a few—and enabling interfaces for HVAC, fire, siren, intercom, lighting, transportation and fuel systems. The high-quality products we offer (including those from other vendors) interface with Simplex™, Notifier™, McQuay™, GE™ and many others—so you can rest assured that Chipkin will select the most appropriate solution for your application.

## 1.3 SAFETY WARNINGS

The CAS Gateway User Manual provides information on how to install and configure the gateway and is intended for engineers, project management consultants and building management services. Before you install the device, please observe the safety warnings described in in this manual.

## 1.4 CUSTOMER SUPPORT

Chipkin is a small responsive company, and we live or die by the quality of our service—and with offices in two time-zones—we can provide support when you need it. For information on sales, service, obtaining documentation or submitting a service request, please call us toll free at 1-866-383-1657. Thanks for choosing Chipkin's protocol gateways, data clients and integration services to meet your building and industrial automation requirements.



**SALES AND CUSTOMER SUPPORT**

TOLL FREE: 1-866-383-1657

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## 2. OVERVIEW

### 2.1 PRODUCT SUMMARY

The CAS 2700-79 HTTP JSON Gateway is a protocol converter that converts data from one protocol and makes it available to devices that support a different protocol. The gateway typically sends polling messages, extracts any data values, and stores the values in an internal database. The data is then made available via other protocol specific formats.

For this device, the gateway polls for data using the HTTP protocol over TCP/IP. The data is then served via Modbus (TCP or RTU) or BACnet IP. All these options are available simultaneously.

### 2.2 OPTIONAL EXPANSION MODULES

The CAS 2700-79 HTTP JSON Gateway does not have any optional expansion modules.

### 2.3 INSTALLATION AND CONFIGURATION SUMMARY

For more information on how to install and setup the CAS 2700-79 HTTP JSON Gateway please refer to the CAS Gateway Quick Start Guide. For instructions on configuring this device, please refer to [Configuration and Settings Section](#) of this document. Configuration of the device is completed primarily through a web interface.

### 2.4 DEVICE WIRING REQUIREMENTS

For more information on how to wire up the CAS 2700-79 HTTP JSON Gateway, please refer to the [Connections Section](#) of this document. The [Connections Section](#) contains wiring pictures and diagrams as well as port pin-outs.

## 3. CONNECTIONS

### 3.1 NETWORK CONNECTIONS

This block diagram lists common network connections that can monitor from HTTP JSON webservers using BACnet IP and Modbus (TCP or RTU protocols).



#### Monitor

**JSON data from webservers via HTTP**

Using BACnet IP and Modbus (TCP or RTU) protocols

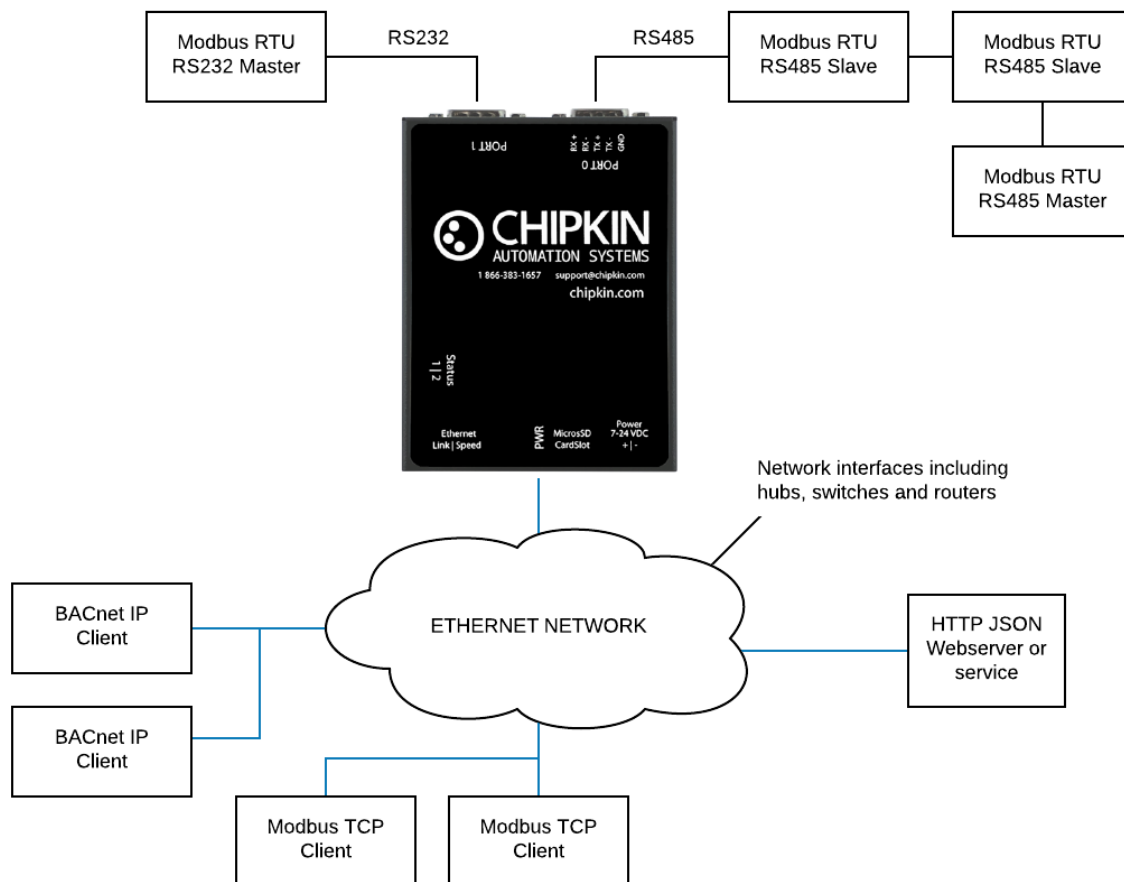


Figure 3.1-1. Network Connections Block Diagram

## 3.2 COMUNICATION PORTS

The Gateway uses the following ports for communication over the ethernet port.

Protocol	Port	Notes
HTTP	TCP 80	Web server.
Syslog	UDP 514	Can be disabled.
FTP	TCP 21	Can be disabled.

Table 2 - Communication Ports

## 3.3 WIRING CONNECTIONS

The following sections describe the wiring connections used by the various ports of the CAS 2700-79 HTTP JSON Gateway. This includes the pin-outs of the ports for the protocols that are used.

## 3.4 CABLES

The following cable(s) are shipped with the device.

- Cat5 ethernet cable
- Db9 breakout connector

### 3.4.1 Modbus RTU RS485 Terminal Block

The following picture shows the connector needed if using Modbus RTU on RS485. See the following section for a description of the Pin-out

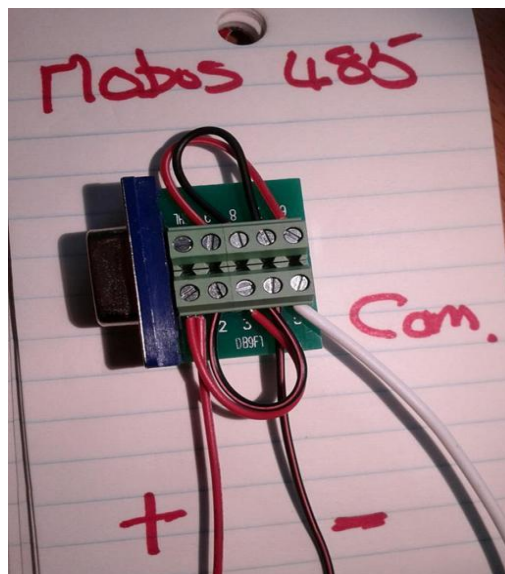


Figure 3.4-1 - Modbus RTU 485 Terminal Block

## 3.5 PIN-OUT

The CAS 2700-79 has two serial ports. This section describes the pin-out for using the port with a specific protocol.

### 3.5.1 Port 0 – RS485 – Modbus RTU

Pin-out for the DB9 Terminal Block for Modbus RTU RS485 communication – See Figure above (Figure 3.4-1) for a visual of what it should look like.

- Pin 1 jumped to Pin 3 => wire connected to Pin 1 connects to the positive terminal of the Modbus Device.
- Pin 2 jumped to Pin 4 => wire connected to Pin 4 connects to the negative terminal of the Modbus Device.
- Pin 5 connects to the ground or common terminal of the Modbus Device.
- Pin 6 jumped to Pin 9
- Pin 7 jumped to Pin 8.

### 3.5.2 Port 1 – RS232 – Modbus RTU

Pin-out for the DB9 Terminal Block for Modbus RTU RS232 communication

- Pin 2 – RX
- Pin 3 – TX
- Pin 5 – GND

## 4. CONFIGURATION AND SETTINGS

This section contains instructions and screenshots on how to configure this device

### 4.1 HTTP JSON Configuration

To access the configuration webpage, open a web browser and type in the following:

- <http://{ipAddress}/bin/httpjsonpath/config> where {ipAddress} is the IP Address of the CAS Gateway.

Or, from the main system page of the CAS Gateway, click on the “HTTP JSON Path Config” link in the System sidebar menu, as shown in the image below:

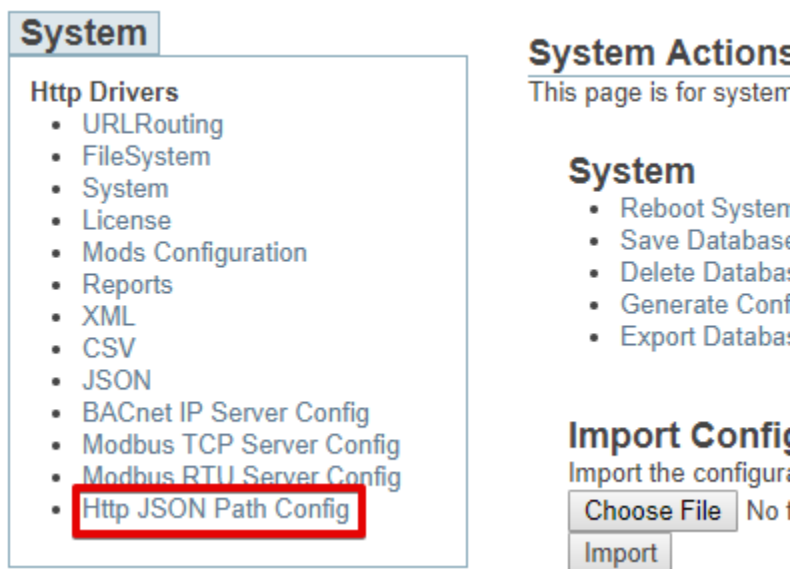


Figure 4.1-1 - HTTP JSON Path Config Link

#### 4.1.1 Configuration Page

The configuration page looks like the following image:

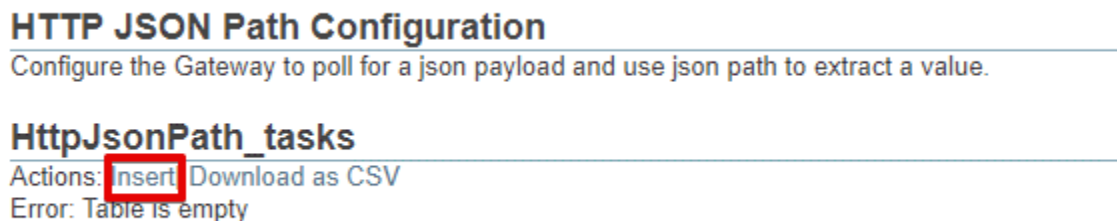


Figure 4.1-2 - HTTP Json Path Configuration Page

Click on the “Insert” link to add a HTTP JSON task and fill out the form:

## HTTP JSON Path Configuration

Configure the Gateway to poll for a json payload and use json path to extract a value.

### Insert new record in to 'HttpJsonPath\_tasks'

Name	Value	Description
Task Name	<input type="text"/>	The name of this tasks.
URL	<input type="text"/>	The full url of the json endpoint. Must include https:// or http:// prefix.
JSON Path	<input type="text"/>	The json path to extract the value.
Data Offset	<input type="text" value="1"/>	The offset in the database where to store the value.
Data Length	<input type="text" value="1"/>	The number of datapoints to store, this should usually be 1.
Data Table	<input type="text" value="da_data"/>	The data table to store the value. Default is da_data.
Scan Interval	<input type="text" value="30"/>	How often in seconds to poll for the data.

Figure 4.1-3 - HTTP Json Path Add Task Form

The fields of the form are:

- **Task Name:** The name of this task.
- **URL:** The full url of the json endpoint to poll. Must include https:// or http:// prefix, see example below
- **JSON Path:** The Json path to extract the value. See below for examples.
- **Data Offset:** The offset in the database where to store the value.
- **Data Length:** The number of datapoints to store, this should usually be 1.
- **Data Table:** The data table to store the value. Default is da\_data.
- **Scan Interval:** How often in seconds to poll for the data.

After filling out the form, click the “insert” button to add the new task.

#### 4.1.2 Example URL

The following is an example of a full url used to extract weather data using the [Dark Sky Weather API](#).

https://api.darksky.net/forecast/[key]/[latitude],[longitude]

**Note:** [key] is an api key that is provided by Dark Sky. [latitude] and [longitude] are parameters to determine which city's weather data to use.

The url can also contain query string parameters. The CAS Gateway will simply use whichever url is provided.

For example: https://api.darksky.net/forecast/[key]/[latitude],[longitude]?units=si&exclude=minutely

### 4.1.3 JSON Path Format

The JSON path format that the CAS 2700-79 uses is as follows:

Here is an example of a Dark Sky forecast payload:

```
{
  "latitude": 49.246292,
  "longitude": -123.116226,
  "timezone": "America/Vancouver",
  "daily": {
    "summary": "No precipitation throughout the week, with high temperatures rising to 24°C next Friday.",
    "icon": "clear-day",
    "data": [
      {
        "time": 1556866800,
        "summary": "Mostly cloudy until evening.",
        "icon": "partly-cloudy-day",
        "sunriseTime": 1556887709,
        "sunsetTime": 1556940759,
        "moonPhase": 0.96,
        "precipIntensity": 0.0152,
        "precipIntensityMax": 0.0559,
        "precipIntensityMaxTime": 1556895600,
        "precipProbability": 0.14,
        "precipType": "rain",
        "temperatureHigh": 16.69,
        "temperatureHighTime": 1556928000,
        "temperatureLow": 8.94,
        "temperatureLowTime": 1556971200,
        "apparentTemperatureHigh": 16.69,
        "apparentTemperatureHighTime": 1556928000,
        "apparentTemperatureLow": 8.44,
        "apparentTemperatureLowTime": 1556971200,
        "dewPoint": 6.62,
        "humidity": 0.69,
        "pressure": 1019.39,
        "windSpeed": 0.3,
        "windGust": 3.1,
        "windGustTime": 1556884800,
        "windBearing": 193,
        "cloudCover": 0.73,
        "uvIndex": 4,
        "uvIndexTime": 1556913600,

```

```

        "visibility": 16.09,
        "ozone": 352.2,
        "temperatureMin": 9.89,
        "temperatureMinTime": 1556884800,
        "temperatureMax": 16.69,
        "temperatureMaxTime": 1556928000,
        "apparentTemperatureMin": 8.83,
        "apparentTemperatureMinTime": 1556884800,
        "apparentTemperatureMax": 16.69,
        "apparentTemperatureMaxTime": 1556928000
      }
    ],
    "offset": -7
  }
}

```

To get the latitude:

- /latitude

To get the daily icon:

- /daily/icon

To get the daily data temperature high:

- /daily/data/0/temperatureHigh
- **Note:** the “0” after data is because the data node is an array, and the 0 represents the 0<sup>th</sup> index in the array (or the first element). If other data is required from a different index, then replace 0 with the required array index.

#### 4.1.4 Configured Task

After pressing the “insert” button the task should be saved. If successful, the task will appear in the configuration page as shown below:

##### HTTP JSON Path Configuration

Configure the Gateway to poll for a json payload and use json path to extract a value.

Success, Record #1 has been added

##### HttpJsonPath\_tasks

Actions: Insert| Download as CSV

Displaying 30 records from 0-1 of a total 1

action	id	Data Length	Data Offset	Data Table	JSON Path	Task Name	Scan Interval	URL
Edit   Delete	1	1	1	da_data	/daily/data/0/temperatureHigh	GetHighTemperature	3600	https://api.darksky.net/forecast/1...?exclude=currently,minutely,hourly,alerts,flags&units=si

Figure 4.1-4 - Tasks saved successfully



## 4.2 BACnet IP Configuration

To configure the application as a BACnet IP Server, please follow these instructions:

- Browse to the following Web Page: <http://{ipAddress}/bin/bacnetipserver/config/>

Or by clicking on the BACnet IP Server Config link highlighted in the image below:

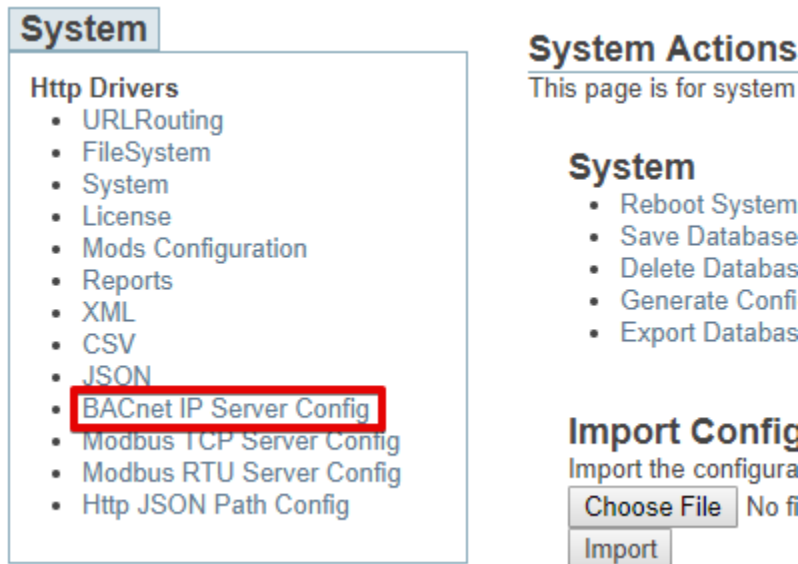


Figure 4.2-1 - BACnet IP Server Config Link

You will see the following form:

### BACnet IP Server

#### BACnet IP Device Configuration

Setting	Value	Description
Port	47808	The port for the BACnet IP connection. <b>Default: 47808</b>
Device Instance	389001	The Device instance for this BACnet server object
Device Name	Device (389001)	The Device name this BACnet server object

Figure 4.2-2 - BACnet IP Server Configuration Form

The parameters for the BACnet IP Server Configuration are as follows: (Default values are **Bolded**)

- **Port:** The port for the UDP connection for BACnet IP. Default Value: **47808**
- **Device Instance:** The BACnet Device ID for the Gateway. Default Value: **389001**
- **Device Name:** The name of this BACnet Device. Default Value: **Device (389001)**

Click on the 'Save BACnet Device'. If successful, you will see the following message banner.

Saved BACnet IP Device Configuration successfully. When finished with the complete configuration, please restart the CAS Gateway for any changes to take effect

Figure 4.2-3 - BACnet IP Server Configuration Successful

Next, add BACnet server objects by clicking on the “Insert” link as shown below:

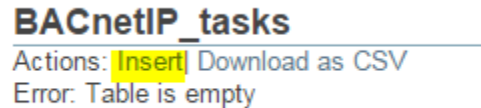


Figure 4.2-4 - Insert BACnet IP Object

Clicking the “Insert” Link will display the following form:

Insert new record in to 'BACnetIP\_tasks'

Name	Value	Description
Name	<input type="text"/>	The name of the BACnet object. This name will be displayed to the BACnet clients polling this device
Object Type	Analog Input ▼	The type of the BACnet object. <b>Default:</b> Analog Input
Object ID	<input type="text"/>	The instance number of the BACnet object. The instance number should be unique amount all other objects of the same type.
Property	present_value ▼	The property that this data point is serving. Normally this will be present_value, <b>Default:</b> present_value
Units	no_units ▼	This is the units of the present_value property. Only used when Property is present_value. <b>Default:</b> no_units
Data Point	1 ▼	This is a pointer to the data table. Should be non zero and less then the length of the database. You can resize the database from the System actions page.

Figure 4.2-5 - Insert BACnet IP Object Form

The parameters for this form are as follows:

- **Name:** The name of the BACnet Object
- **Object Type:** The type of the BACnet Object. For example, Room Temperature would be an Analog-Input, and Room Occupancy would be a Binary-Input.
- **Object Instance:** The BACnet Instance number assigned to the BACnet Object. This combined with the Object Type must be unique on the device.
- **Property:** The property associated with the data point for this object. This will usually be Present-Value.
- **Units:** Any units associated with the data point.
- **Data Point:** The data point in the data table to serve.

After filling out the form, press the “insert” button. Repeat this process for all BACnet Objects.

If successful, the object and server task will be added to the table. See image below for an example.

Success, Record #1 has been added

### BACnetIP\_tasks

Actions: Insert | Download as CSV

Displaying 30 records from 0-1 of a total 1

action	id	Data Point	name	object_id	object_type	object_units	property
Edit   Delete	1	1	TestAI1	1	analog_input	no_units	present_value

Figure 4.2-6 - BACnet IP Object Successfully Added

## 4.3 Completing the Configuration

Once the configuration process has finished, either using the Standard or Advanced configuration, you will need to reboot the system for the new configuration to take effect.

First, return to the main system page by typing in the follow URL into a web browser:

- <http://{ipAddress}/bin/system/> where {ipAddress} is the IP Address of the gateway.

From this page, under the System actions, first click the “Save Database” link to save all changes.

### System Actions

This page is for system wide actions that effect all the drivers.

#### System

- [Reboot System](#) - Use this link to send a reboot REST request to the system.
- [Save Database](#) - Use this link to send a save database REST request to the system.
- [Delete Database](#) - Use this link to send a delete database REST request to the system.
- [Generate Configuration File](#) - Use this link to generate a configuration file.

Figure 4.3-1 - Save Database Link

Click “Ok” when prompted and you will see the following XML, check that the response status is OK.

```

▼<HttpXML rest_version="0.20" version="0.09">
  ▼<query>
    ▼<Accept>
      text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8
    </Accept>
    <Accept-Encoding>gzip, deflate</Accept-Encoding>
    <Accept-Language>en-US,en;q=0.9</Accept-Language>
    <Connection>keep-alive</Connection>
    <Host>192.168.1.202</Host>
    <Referer>http://192.168.1.202/bin/system/</Referer>
    <Upgrade-Insecure-Requests>1</Upgrade-Insecure-Requests>
  ▼<User-Agent>
    Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/63.0.3239.132 Safari/537.36
  </User-Agent>
  <act>set</act>
  <query_string>act=set&save=1</query_string>
  <save>1</save>
  <uri>bin/xml/</uri>
</query>
▼<response status="OK" count="1">
  <save>OK</save>
</response>
</HttpXML>

```

Figure 4.3-2 - Save Database Successful

Click the back button in your web browser and then click the “Reboot System” link:

## System Actions

This page is for system wide actions that effect all the drivers.

### System

- **Reboot System** - Use this link to send a reboot REST request to the system.
- Save Database - Use this link to send a save database REST request to the system.
- Delete Database - Use this link to send a delete database REST request to the system.
- Generate Configuration File - Use this link to generate a configuration file.

Figure 4.3-3 - Reboot System Link

Click “Ok” when prompted and you will see the following screen with a timer counting up:

### Restarting device

The device is restarting, this may take a few minutes.

Status: Checking ... 2

Figure 4.3-4 - Reboot System Count

The system page will refresh once the device has been properly rebooted.

## 4.4 Resetting the Gateway or Deleting the Configuration

Sometimes you want to delete the entire configuration and begin again. To do this, return to the system page as described in the [Completing the Configuration](#) section above. Then click on the “Delete Database” Link:

## System Actions

This page is for system wide actions that effect all the drivers.

### System

- [Reboot System](#) - Use this link to send a reboot REST request to the system.
- [Save Database](#) - Use this link to send a save database REST request to the system.
- [Delete Database](#) - Use this link to send a delete database REST request to the system.
- [Generate Configuration File](#) - Use this link to generate a configuration file.

Figure 4.4-1 - Delete Database Link

Click “Ok” when prompted and verify that the result XML has a response status of OK:

```
<HttpXML rest_version="0.20" version="0.09">
  <query>
    <Accept>
      text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8
    </Accept>
    <Accept-Encoding>gzip, deflate</Accept-Encoding>
    <Accept-Language>en-US,en;q=0.9</Accept-Language>
    <Connection>keep-alive</Connection>
    <Host>192.168.1.202</Host>
    <Referer>http://192.168.1.202/bin/system/</Referer>
    <Upgrade-Insecure-Requests>1</Upgrade-Insecure-Requests>
  </User-Agent>
  Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/63.0.3239.132 Safari/537.36
  </User-Agent>
  <act>set</act>
  <delete_database>1</delete_database>
  <query_string>act=set&delete_database=1</query_string>
  <uri>bin/xml/</uri>
</query>
  <response status="OK" count="1">
    <delete_database>OK</delete_database>
  </response>
</HttpXML>
```

Figure 4.4-2 - Delete Database Successful

Click the back button in the web browser and then follow the instructions in the [Completing the Configuration](#) section.

## 4.5 Exporting the Configuration

To save a copy of the configuration, return to the system page as described in the [Completing the Configuration](#) section above. Then click on the “Generate Configuration File” Link:

## System Actions

This page is for system wide actions that effect all the drivers.

### System

- [Reboot System](#) - Use this link to send a reboot REST request to the system.
- [Save Database](#) - Use this link to send a save database REST request to the system.
- [Delete Database](#) - Use this link to send a delete database REST request to the system.
- [Generate Configuration File](#) - Use this link to generate a configuration file.

Figure 4.5-1 - Generate Configuration File Link

After a while, a link to “Export Configuration” will appear. Click on the link to download the config.csv file which is the configuration of the gateway.

## 4.6 Importing the Configuration

Sometimes Chipkin will send you a configuration file to load onto the Gateway, or you would like to load an older configuration file that you may have saved. To do this, return to the system page as described in the [Completing the Configuration](#) section above.

Then find the section titled “Import Configuration”:

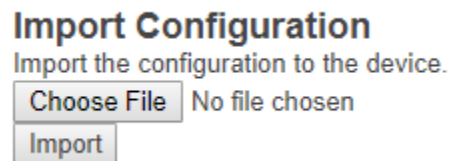


Figure 4.6-1 - Import Configuration

Click the “Choose File” button to open a file browser. Browse to the csv configuration file you wish to import and Click “Open”.

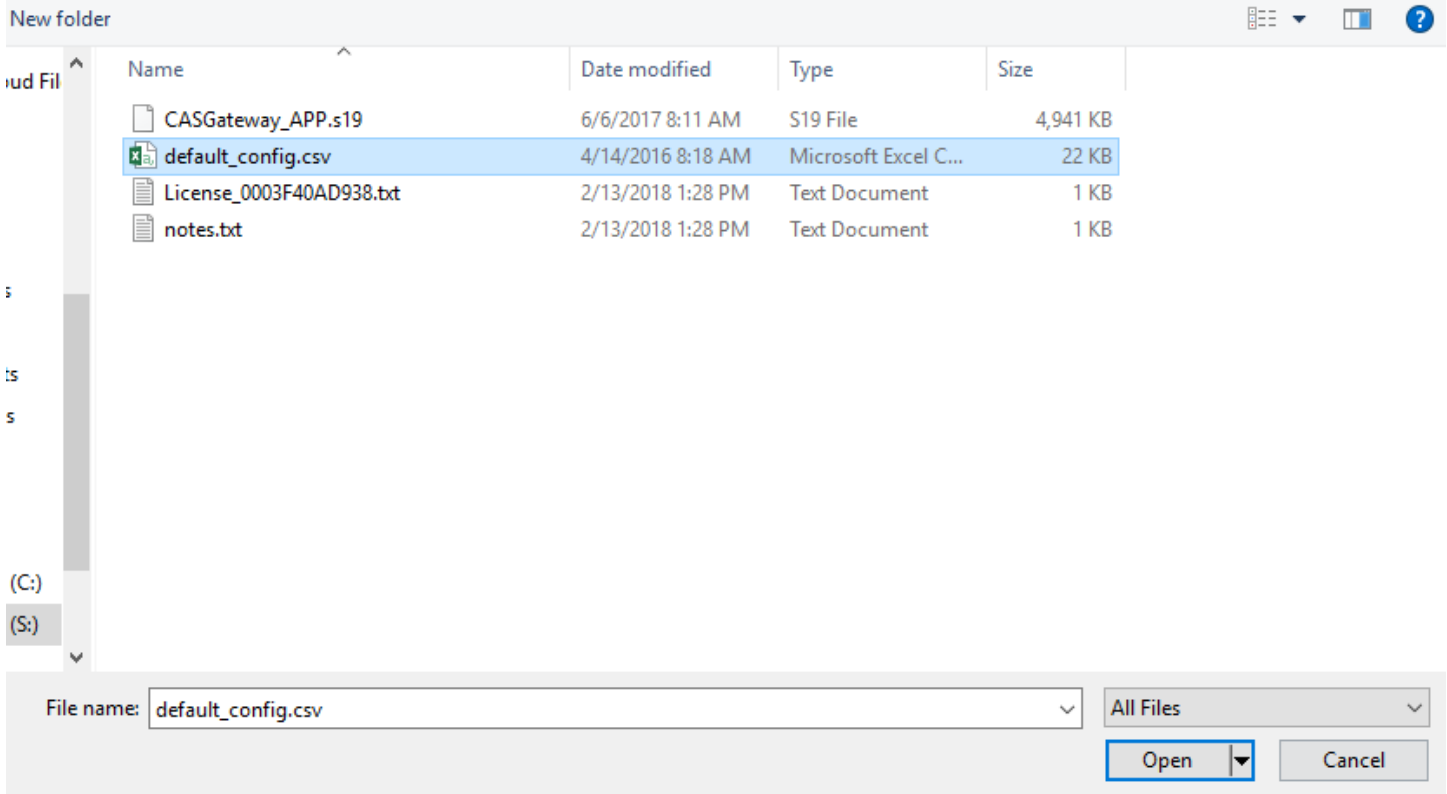


Figure 4.6-2 - Import File Browser

The file should now be displayed next to the “Choose File” button.

### Import Configuration

Import the configuration to the device.



Figure 4.6-3 - Configuration File Ready for Import

Finally, click the “Import” Button. The file will be parse and the output will be displayed. Here is an example of the output:

### Importing configuration

```
Starting import... ~tmp\default_config.csv
Opening the config file... OK
Get the database... OK
Deleting old tables... OK
Creating mods tables... OK
Creating configuration table... OK
```

Starting to parse the configuration file

```
Parsing line: table_name=da_data_mod
New table found. Table name=da_data_mod
```

Figure 4.6-4 - Importing the Configuration File

Scroll to the bottom of the page to see if the Import was successful. You should see the following:

Parsing line: 02,64,32,210,da\_data,1,8,,Tank03\_TankAlarms,1,03,passive  
Importing data in to table. Table=[VeederRoot\_tasks]... OK

Parsing line: 02,96,32,310,da\_data,1,9,,Tank04\_TankAlarms,1,04,passive  
Importing data in to table. Table=[VeederRoot\_tasks]... OK  
Finished parsing the configuration file  
Saving the database...OK

**Import Successful - Please restart the Gateway**

Figure 4.6-5 - Import Successful

After this, return to the system page and follow the instruction in the [Completing the Configuration](#) section to finish and apply the new configuration.

## Generating Configuration File

The configuration file is currently being generated. This may take some time.

**Status:** Generate Config File has completed.  
**Elapsed Time:** 3

Please download the configuration file from the following link: [Export Configuration](#)

Figure 4.6-6 - Export Configuration



## 5. READING DATA AND TEST PROCEDURE

### 5.1 READING DATA USING HTML / WEB Browser

To view the data on the device's webpage, enter the following URL into a web browser:

<http://{ipaddress}/bin/reports>

The link will open a web page containing a table of the stored values as well as the tasks that are acting upon that data value. See the image below for an example of the data.

#### 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 1-1 of a total 1

Actions	Data			Read		Passive		Serve	
	ID	Value	Modified	Driver	Task	Driver	Task	Driver	Task
Edit   XML   CSV   JSON	1	16.78	2019-May-03 12:07:32 -0700	HttpJsonPath	GetHighTemperature			BACnetIP	Daily High Temperature

Displaying 30 records from 1-1 of a total 1

Figure 5.1-1 - Example Report page data

### 5.2 READING MODBUS DATA

You can access Modbus register data from the gateway by using a Modbus RTU or TCP client. To find out what registers exist on the device, please refer to the [Modbus Register Map](#). For some guides on Modbus, please refer to the following links:

- [Modbus For Field Technicians](#)
- [Modbus FAQ](#)
- [What is Modbus?](#)
- [Testing Modbus Communication](#)

#### 5.2.1 Interpreting Modbus Data

Modbus does not have a mechanism for reporting the validity of data. If the gateway loses its connection to the device (or a data point cannot be read), it will disregard previous data as unreliable.

Unreliable data will be tagged with the value 65535 (-1, configurable) in the registers.

Some values have been encoded as IEEE754 format floating point numbers. These values use 2x16-bit registers and are clearly identified in the Modbus map. Since Modbus does not support floating point numbers, all values are served as whole numbers.

#### 5.2.2 Modbus Functions Supported (RTU and TCP)

This device supports the following functions:

- 01 (0x01) Read Coils
- 02 (0x02) Read Discrete Inputs

- 03 (0x03) Read Holding Registers
- 04 (0x04) Read Input Registers

Most masters should be configured to use function 3, read holding registers.

### 5.2.3 Test Procedure Using the CAS Modbus Scanner

You can test the Modbus TCP data using the free test software provided by Chipkin Automation Software. The software can be downloaded at <http://www.chipkin.com/cas-modbus-scanner>.

#### To Configure the CAS Modbus Scanner:

1. Add a connection (specify the IP address of the gateway)
2. Add a device to the connection (specify the configured slave ID)
3. Add a request to the device (read holding register offset=1 Length=100)
4. Click the Poll button
5. Use the values found in the int16 column and the data map table to review the data.

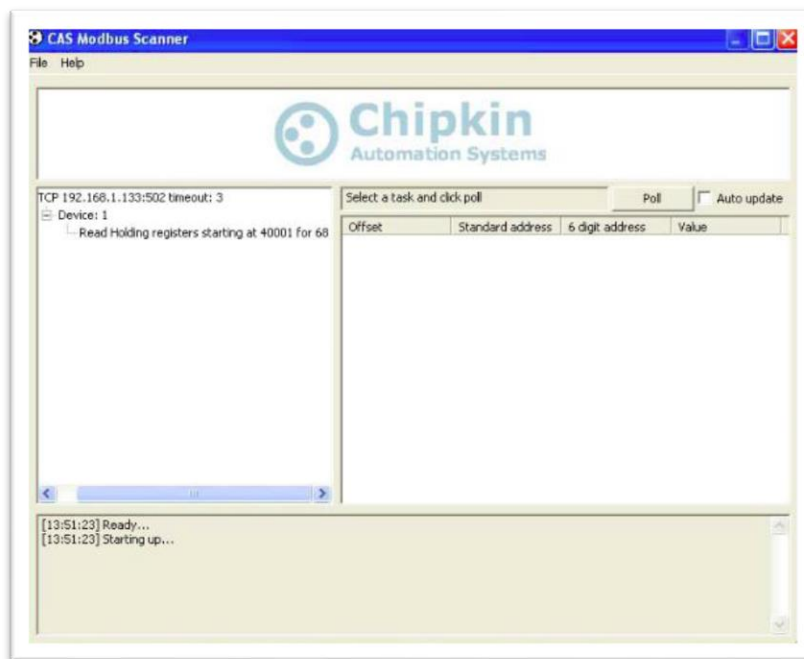


Figure 5.2-1 - Configuring the CAS Modbus Scanner

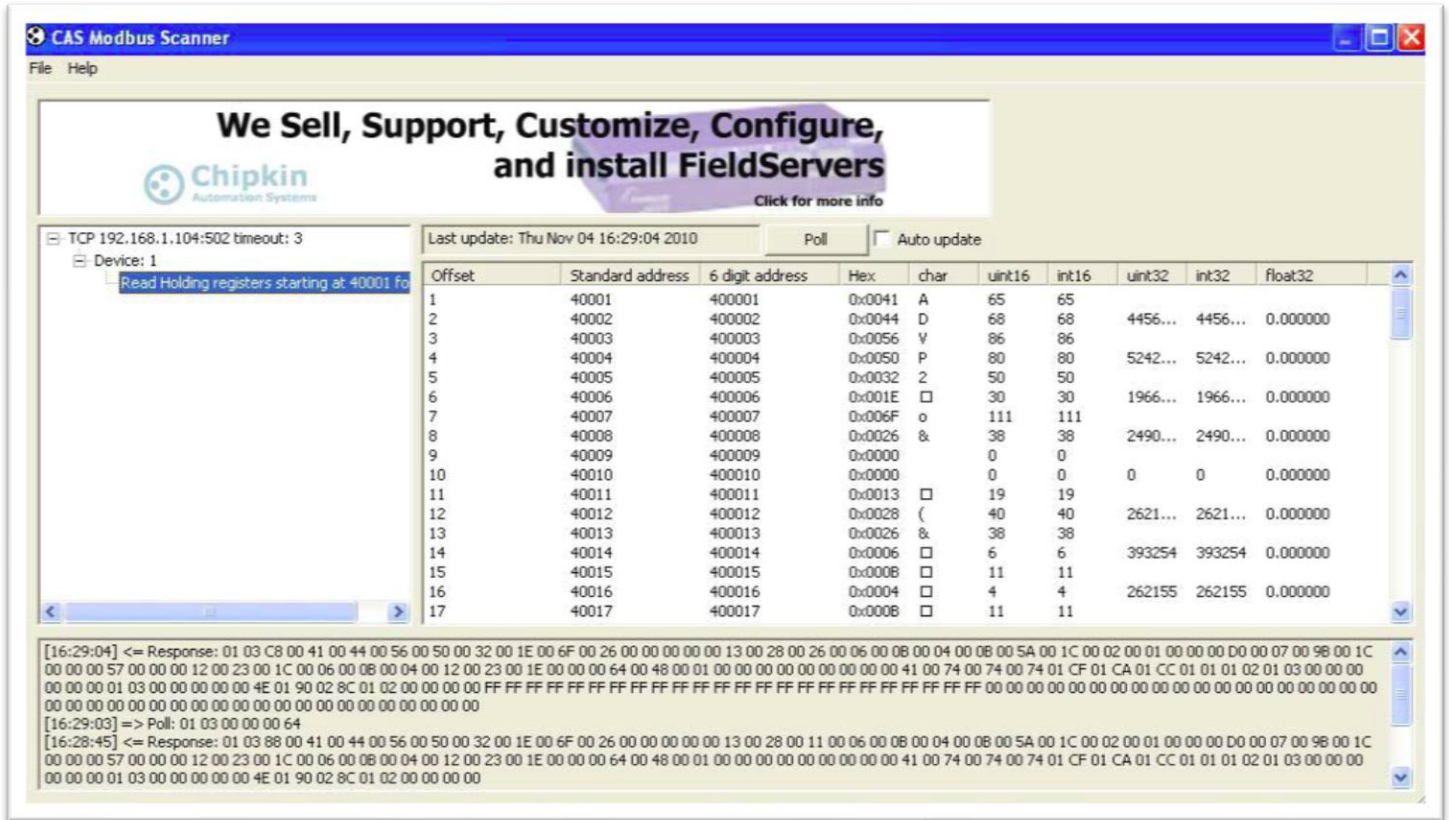


Figure 5.2-2 - Reviewing Data with the CAS Modbus Scanner

## 5.3 READING BACNET DATA

You can access BACnet report data by using discover to detect gateway objects and their properties. Although each BACnet device (including the gateway) needs to have a unique instance number, discovery does not require the number to be known in advance. Discovery will not occur if the device or application reading the data is on another subnet. This can be resolved by changing the gateway's IP address to match the subnet or by installing BBMD. It's the responsibility of the company installing the BAS system to provide BBMD. For more information about reading BACnet data or installing BBMD, please refer to these guides:

- <http://www.chipkin.com/bacnet-solutions>
- <http://www.chipkin.com/articles/bacnet-bbmd>

You can discover the device and poll for values using the CAS BACnet Explorer. For more information about the CAS BACnet Explorer, please visit: <http://store.chipkin.com/products/tools/cas-bacnet-explorer>

### 5.3.1 Interpreting BACnet Data

BACnet has a mechanism for reporting the validity of data. If the gateway loses its connection to the Veeder-Root device (or a data point cannot be read), the data object's out of service property is set to

true and it will disregard previous data as unreliable. The value of the present value property is not changed, so the last good value will be shown.

### 5.3.2 BACnet Test Procedure

CAS BACnet Explorer is a software application that can discover, test and document objects and properties on a network system. You can download the software at [http://www.chipkin.com/files/resources/Installer\\_CAS%20BACnet%20Explorer.exe](http://www.chipkin.com/files/resources/Installer_CAS%20BACnet%20Explorer.exe) and use the USB key to activate the application. If you don't have a key, the software can also be activated through an internet connection.

Perform the set-up procedure below, or refer to the video and these articles for more information:

- <http://store.chipkin.com/articles/cas-bacnet-explorer-software-activation>
- <http://store.chipkin.com/articles/bacnet-how-to-overcome-cas-bacnet-explorer-usbsoftware-activation-problems>
- <http://store.chipkin.com/products/tools/cas-bacnet-explorer/license-agreement>

#### To Set-up BACnet Explorer:

1. Start the application
2. Click **Settings**
3. Check **IP** and uncheck **MSTP** and **Ethernet**
4. Click on the network card you will use
5. Click **OK**
6. Click **Discover**
7. Click **Send**



Figure 5.3-1 – CAS BACnet Explorer - Devices were discovered.

8. Click on the '+' icon to see the list of discovered devices.



Figure 5.3-2- CAS BACnet Explorer – Device Selection

9. Select the device you wish to further discover and click the **Discover** button.

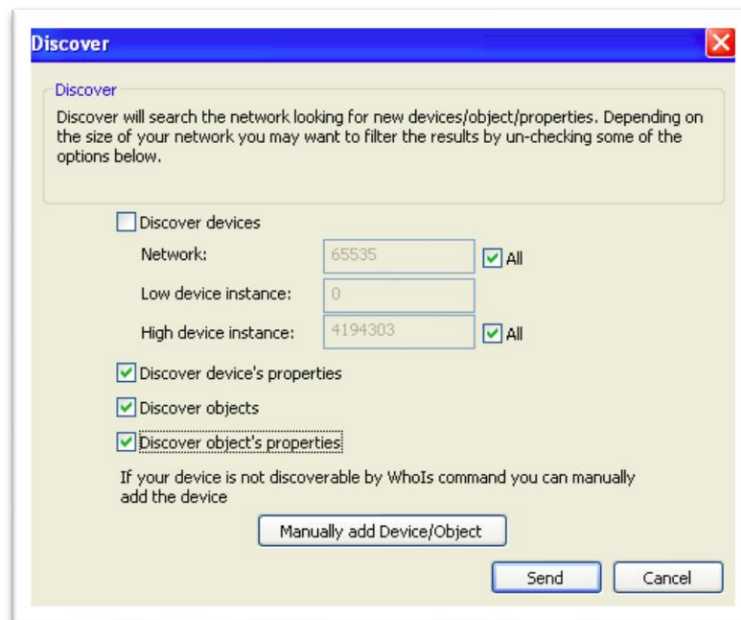


Figure 5.3-3 - CAS BACnet Explorer - Discover Dialogue

10. Check the **Discover device's properties**, **Discover object**, and **Discover object's properties** check boxes and click the **Send** button.

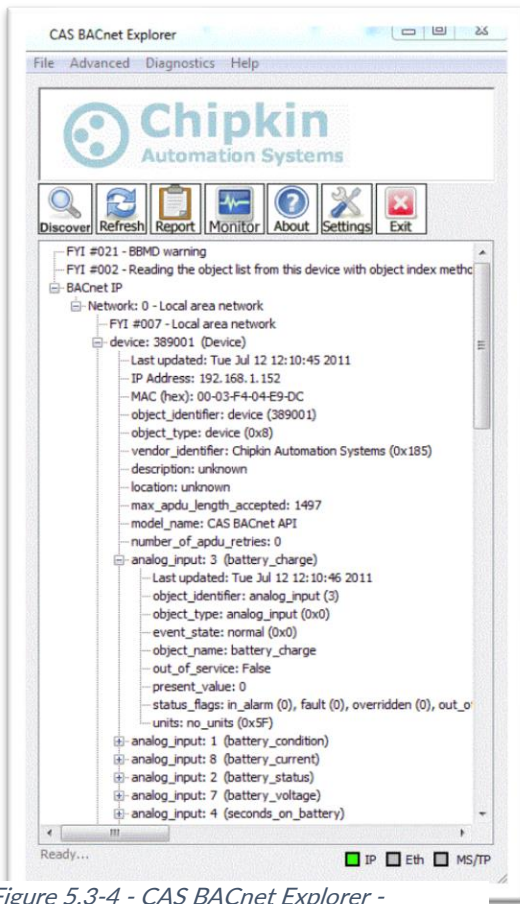


Figure 5.3-4 - CAS BACnet Explorer - Discovered Objects

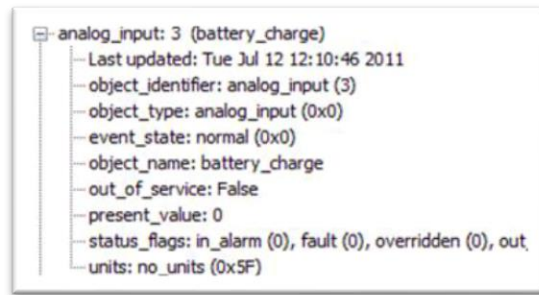


Figure 5.3-5 - CAS BACnet Explorer - Single Object

11. **Read** the BACnet object properties Present-Value is the current value of the data point. Here is a list of some the important properties:

- **Present Value:** The current value of the object
- **Reliability:** On the CAS Gateway or Data Client, represents the validity of the data
- **Status Flags:** Various flags that show the state of the object.
- **Units:** If the object has units, this will show the unit type.



## 6. COMMISSIONING, DIAGNOSTICS, AND TROUBLE-SHOOTING

### 6.1 WHAT TO TAKE TO SITE FOR COMMISSIONING

Below is a list of software and hardware tools that should be taken to site for the install installation. Some of these tools are depend on the type of installation and drivers on the gateway. Most of the software tools can be found on the included USB drive.

#### 6.1.1 Software

- **IP Setup Tool** - Used to update the IP address of the CAS Gateway. Free <http://www.chipkin.com/cas-gateway-ip-address-tool>
- **Auto Update Tool** - Used to update the firmware on the CAS Gateway. Free <http://www.chipkin.com/cas-gateway-firmware-download-tool/>
- **Wireshark** - Used to capture and log network traffic. Free <https://www.wireshark.org/>
- **CAS BACnet Explorer** – Used to test BACnet IP configurations. Trial <http://www.chipkin.com/products/software/bacnet-software/cas-bacnet-explorer/>
- **CAS Modbus Scanner** – Used to test Modbus TCP and Modbus RTU configurations. Free <http://store.chipkin.com/articles/modbus-scanner-what-is-the-cas-modbus-scanner>

#### 6.1.2 Hardware

- **A laptop** –Used to configure and diagnose the gateway. The laptop should include a ethernet port.
- **RS232 to USB converter** – Used when communicating with drivers that use RS232 such as VeederRoot serial.
- **RS485 to USB converter** – Used when communicating with drivers that use RS485 such as Modbus RTU or BACnet MSTP.
- **Ethernet patch cable** – Useful for connecting the gateway to your laptop or into a local switch. Included in the accessory kit.
- **Micro screw driver set** – Useful for securing wires into screw terminals. Included in the accessory kit.
- **Ethernet hub** - Use a hub (and not a switch) as a last resort for troubleshooting problems with Modbus TCP or BACnet IP. A **hub is not a switch**, that most switches are not supervised and that only a supervised switch can be used as an alternative. For more information about hubs and switches, please refer to this article: <http://www.chipkin.com/articles/hubs-vs-switches-using-wireshark-to-sniff-networkpackets>
- **Db9 gender changer** - Connector make-up kits are always useful but not required if you have tested your cable prior to attending the site.

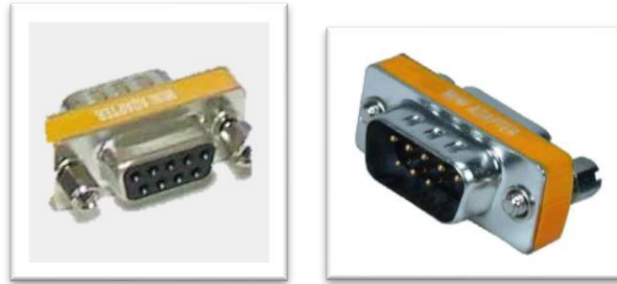


Figure 6.1-1 - DB9 Gender Changers

- **Serial RS232 mini-tester** – Useful for testing to ensure that a serial cable has the correct pinout.



Figure 6.1-2 - RS232 Mini-Tester

- **Serial cable** – A Null modem or crossover serial cable can be useful when communicating with drives that use serial connections such as Modbus RTU and VeederRoot serial

## 6.2 DISCOVER GATEWAY'S IP ADDRESS

By default, the gateway is shipped with an IP address of 192.168.1.113. The IP address may have been changed since being installed on site. The following techniques can be used to discover the new gateway's IP address.

### 6.2.1 Setup reference card

By default, the gateways are shipped with a setup reference card attached to the bottom of the gateway. This setup reference card will show the configured IP address as well as the job reference number.





Figure 6.2-1 Setup reference card

### 6.2.2 Using the IP Setup tool

1. Download the IP Setup tool from chipkin's website <http://www.chipkin.com/cas-gateway-ip-address-tool>
2. Run the IP Setup Tool application and you will see the following window

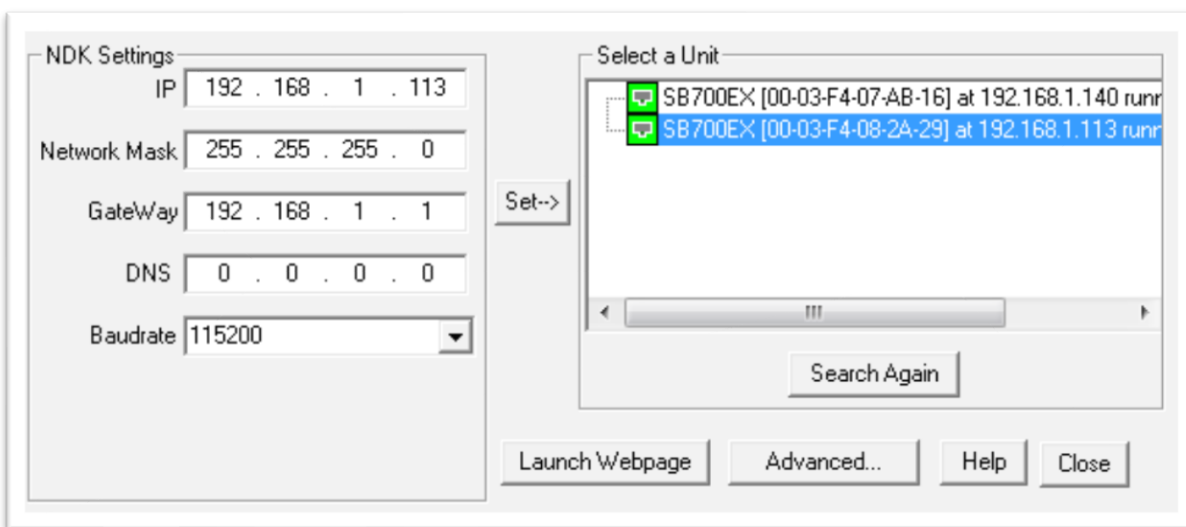


Figure 6.2-2 IP Setup tool

3. The IP address of the CAS Gateway will be shown on the right-hand side.

## 6.3 DEFAULT USERNAME AND PASSWORD

To view or change the settings on the gateway, a username and password will need to be entered. By default, the username and passwords are

Username: admin

Password: admin

The default password can be changed on the system page. <http://<IPAddress>/bin/system>

## 6.4 DEBUG LOG OR WIRESHARK LOG

If a problem is discovered on site, you may be asked to take a debug log, or a Wireshark log.

### 6.4.1 Debug logging

By default, the gateway has a debug logging level of 10 (important messages only) and logs messages to the syslog port (514). These settings can be changed on the system page.

<http://<IPAddress>/bin/system>

#### *Settings*

- **Log to file** - Logs the system and driver messages to a log file on the SD card of the gateway. This log file can be viewed and downloaded by going to “log messages” page <http://<IPAddress>/bin/system/log>. The log file will automatically be disabled if the free space on the SD card is less than 10% of the total. **Default:** Disabled.
- **Log to Syslog** – Sends syslog (UDP 514) message for each system and driver log message. These log messages can be viewed by taking a Wireshark log. **Default:** Enabled.
- **Logging level** – The logging level that messages will be created. The higher the number the more messages that will be created. Logging levels higher than NORMAL (50) may impact the performance of the gateway. **Default:** IMPORTANT (10)

### 6.4.2 Wireshark log

Wireshark is a free utility used for capturing and logging network traffic. This tool can be instrumental in resolving local network issues. Wireshark can be downloaded for free from

<https://www.wireshark.org/>

## 6.5 CHANGE THE GATEWAY IP ADDRESS

By default, the gateway is shipped with a static IP address of 192.168.1.113. The default IP address can be changed using the IP setup tool.

4. Download the IP Setup tool from chipkin’s website <http://www.chipkin.com/cas-gateway-ip-address-tool>

5. Run the IP Setup Tool application and you will see the following window

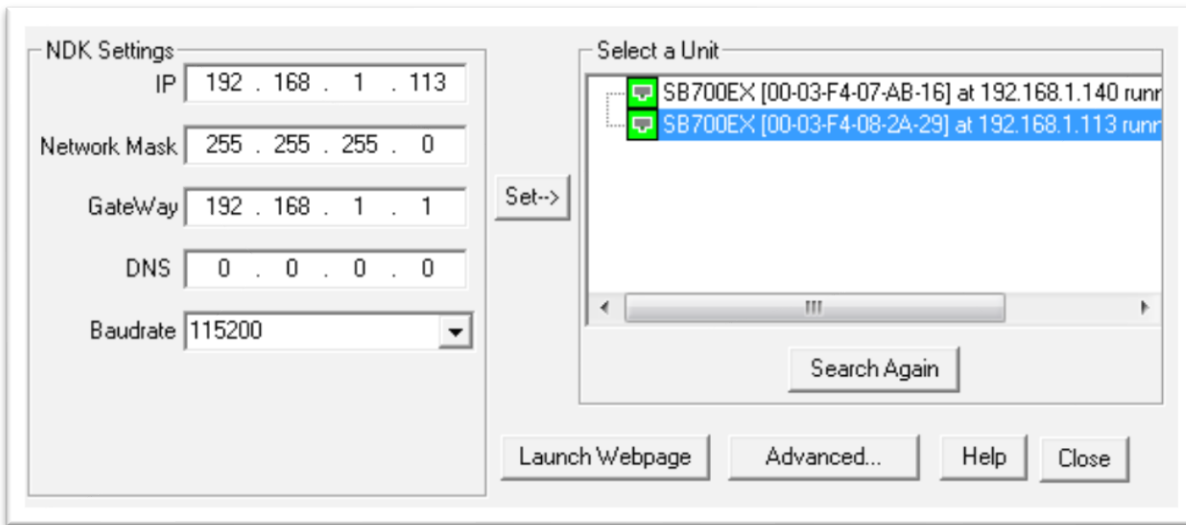


Figure 6.5-1 IP Setup tool

6. Select the Gateway from the list on the left.
7. Change the “NDK Settings” as required.  
**Note:** Please do **NOT** change the Baudrate value.
8. Click the “Set -->” button to apply the new changes to the CAS Gateway. The gateway will automatically reboot with the new assigned IP address.

## 6.6 UPDATE FIRMWARE

This document assumes that you have successfully connected to the gateway and can see the gateway in the IP Setup Tool.



**Note:** Usually, the firmware is already loaded on the CAS Gateway when it is shipped. However, if there was a specific requirement that was developed or a bug fix, you may have to download an updated firmware which you will receive from Chipkin Automation Systems (CAS). All updated firmware files should come from CAS.

**Do Not** upload any other firmware files with this tool unless CAS specifically advises to do so.

To download the firmware to the gateway, follow the steps below:

1. Download the CAS Gateway AutoUpdate tool from the following link:  
<http://www.chipkin.com/cas-gateway-firmware-download-tool/>

2. Running the AutoUpdate application will display the following window:

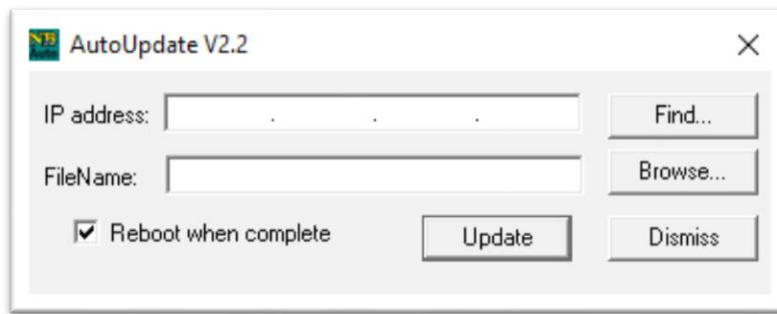


Figure 6.6-1 AutoUpdate tool window

The IP Address of the gateway should be filled out in the “**IP address**” section. If not, or if the IP address is wrong, then click the “**Find**” button and it will display the IP addresses of gateways on the network. Select the IP address of the gateway to download the firmware.

3. Click the “**Browse...**” button. This will open a file explorer. Navigate to the firmware file and click the “**Open**” button. The file path will be inserted into the “**FileName**” field.

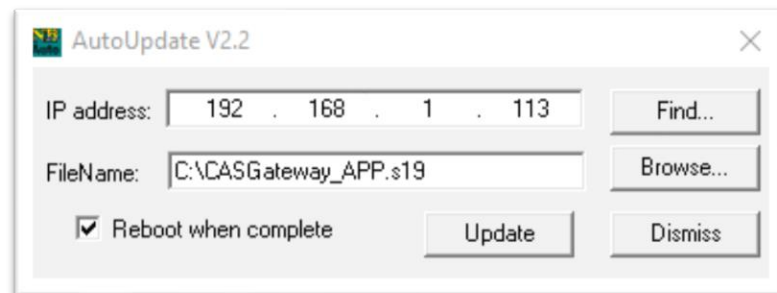


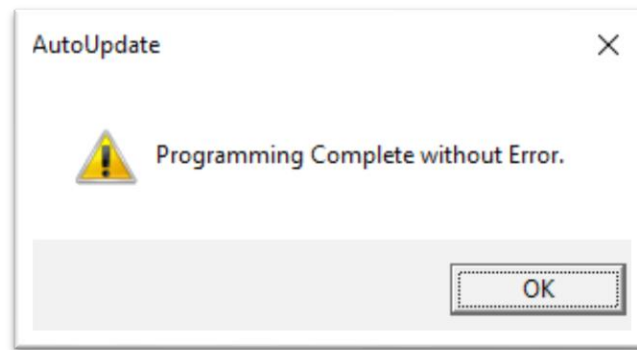
Figure 6.6-2 AutoUpdate tool window

Image 2 – AutoUpdate tool with firmware file name

4. Verify that “**Reboot when complete**” is checked, as shown above.
5. **Before** pressing the “**Update**”, disconnect the Power from the gateway. Then reconnect the power.
6. As the gateway is booting, press the “**Update**” button. You will see a progress bar begin to fill up.

**Note:** If the progress bar does not fill after 60 seconds, there may be an issue with other Network adapters being enabled. Go to the Network and Sharing Center and disable all network adapters except for the Local Area Connection.

7. If the update was successful, you will see the following message:



*Figure 6.6-3 Firmware update success*

If the update fails, you will see either “Update Failed” or “Updated Timeout”. If either of these messages appear, please contact us for support.

If a message appears stating that “The Gateway does not have enough RAM”, please return to step 5 and repeat.

# LIMITATIONS AND BEST PRACTICES

CAS 2700-79 HTTP JSON Gateway best practices:



**Tip:** We recommend a 10 m. maximum length for the RS232 cable (a well-made cable in a clean environment can run up to 30 m. and provide satisfactory performance).

# APPENDIX A: SAFETY WARNINGS

BEFORE YOU INSTALL THE DEVICE, OBSERVE THE IMPORTANT SAFETY INSTRUCTIONS IN THIS SECTION.



This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Save these instructions.



**WARNING:** Ultimate disposal of this product should be handled according to all national laws and regulations



**WARNING:** Read and understand all instructions in the documentation that comes with the gateway before connecting it to a power source.



**WARNING:** Do not install or use this gateway near water or when you are wet



**WARNING:** Install the gateway securely on a stable surface.



**WARNING:** Install the gateway in a protected location where no one can step or trip over the connecting cables or power cords.



**WARNING:** Install the Gateway where the cables and power cords can't be damaged.



**WARNING:** There are no user serviceable parts inside. Refer servicing to qualified servicing personnel.



**IMPORTANT:** If the gateway doesn't operate normally, please contact Chipkin's Engineer Services, Development and Support

# APPENDIX B: HARDWARE SPECIFICATIONS

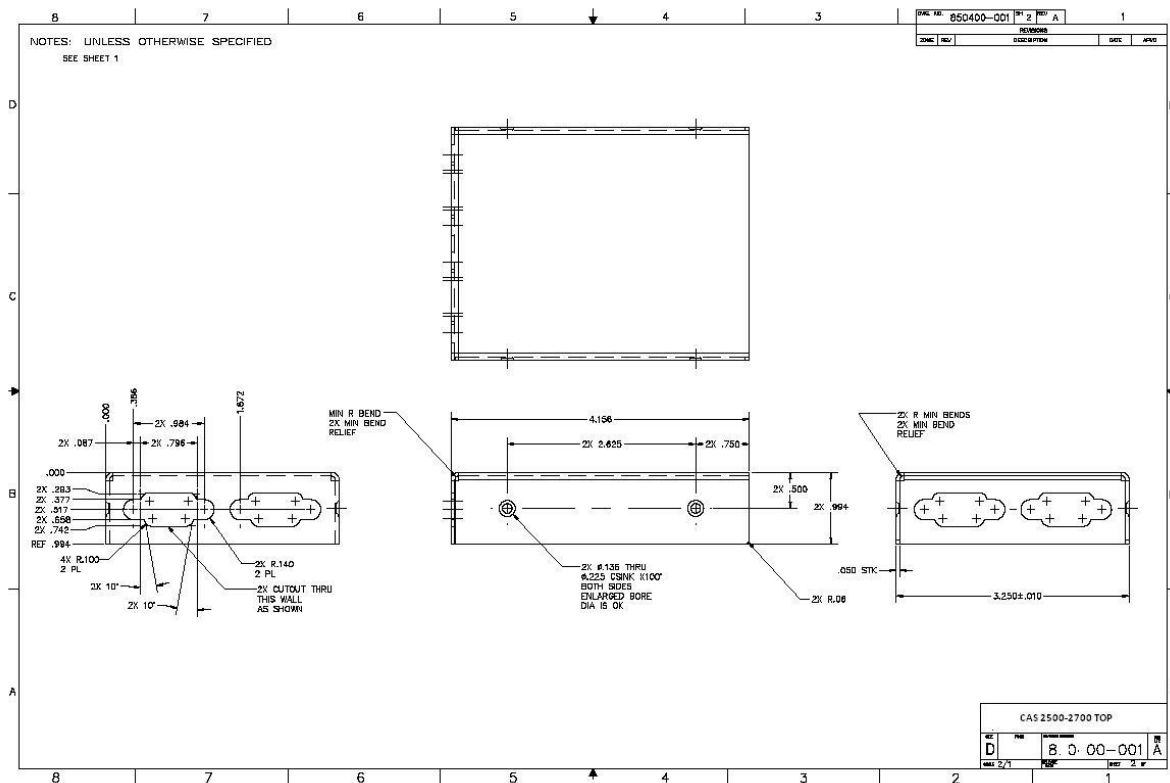
The following specifications for the CAS gateway are common to all Chipkin Gateways.

- UL, C/UL, CE, FCC approved
- 10/100BASE-T with RJ-45 connector
- 1x RS232 port
- 1x RS485 port (different models have additional ports)
- Power: 7 – 24 VDC @90 mA
- Operating temperature: 0 – 70 °C (32 – 158 °F)
- LEDs: link, speed/data, power
- Dimensions (LxWxH): 107 x 83 x 25 mm (4.2 x 3.25 x 1 in.)

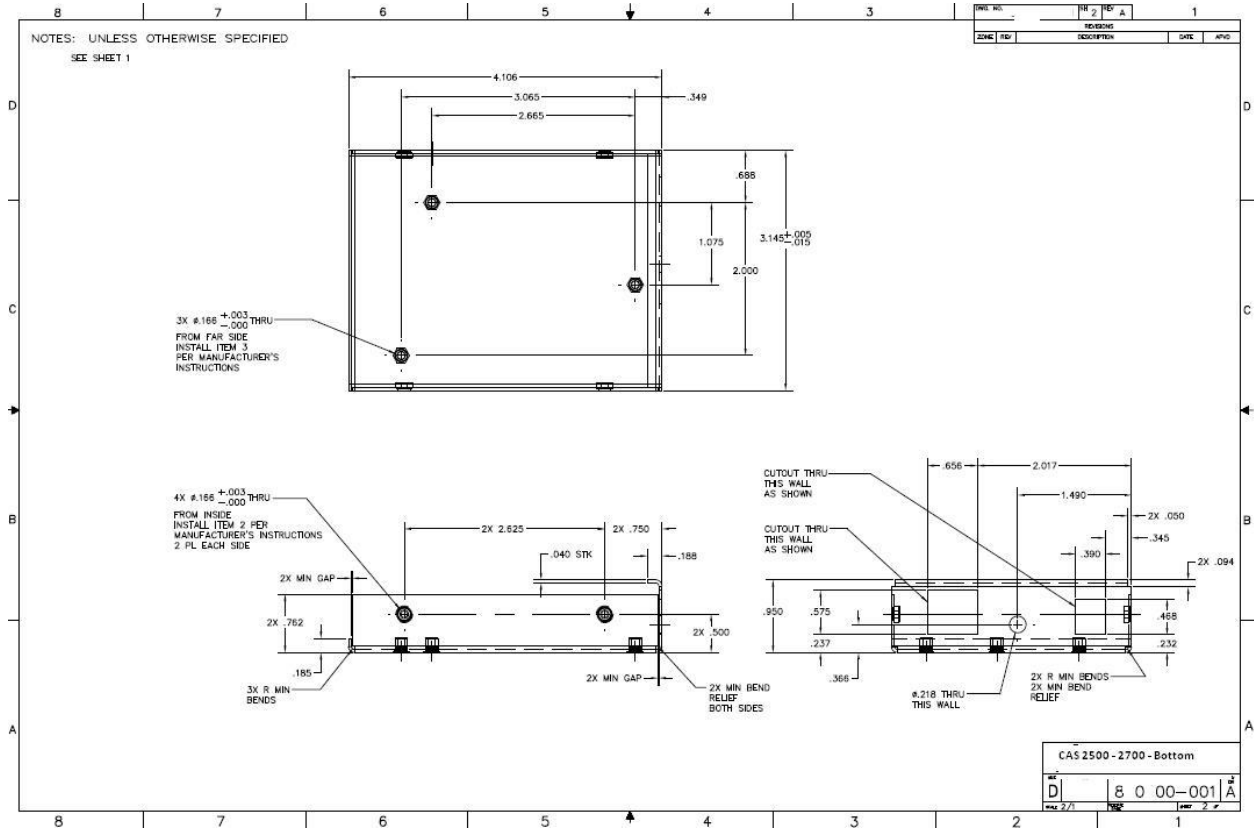
## MECHANICAL DRAWINGS

Applies to all CAS2500 and CAS2700 products.

### Top View







Front Panel



Back Panel

## Serial Protocols Supported

RS-232, RS-422, and RS-485

## Serial Configurations

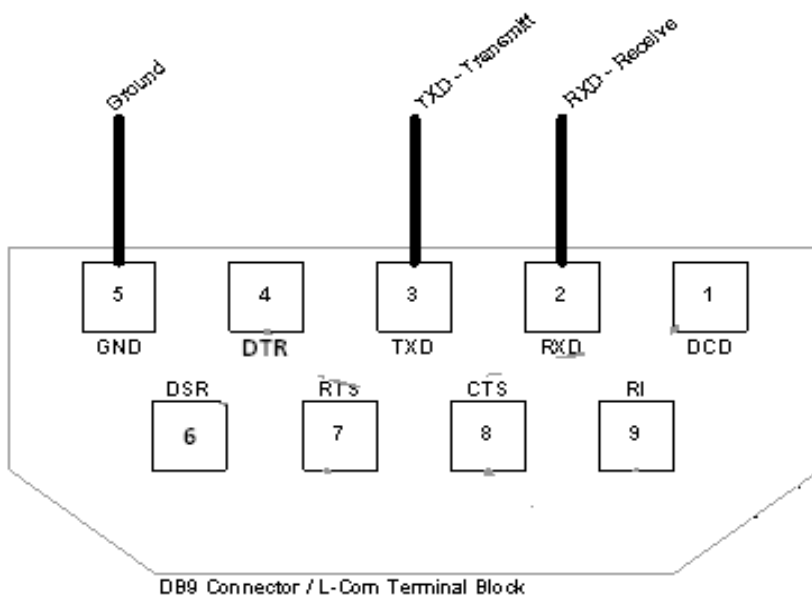
The two UARTs can be configured in the following ways:

- Two RS-232 ports
- One RS-232 port, one RS-485/422 port

## DB9 Pinout

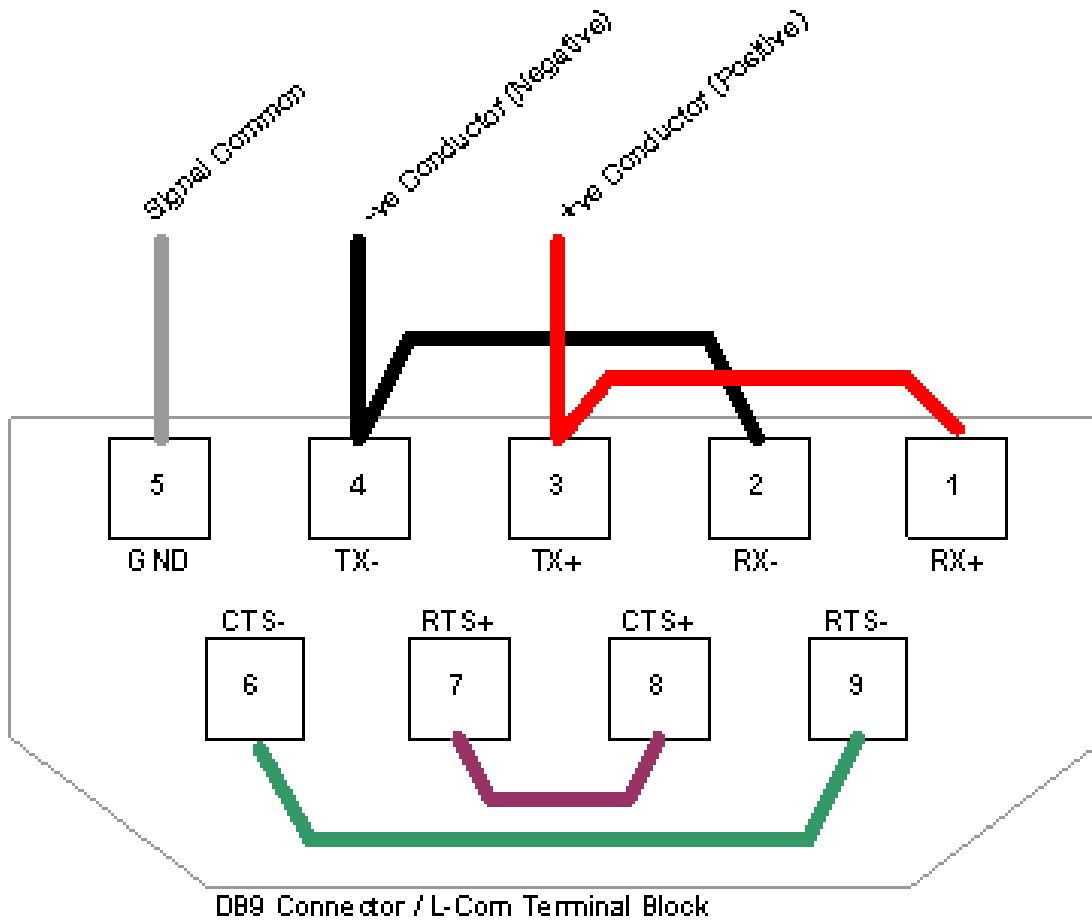


## RS232- 3 Wire [No Handshaking]



### RS485 – Half Duplex also known as 2 Wire

All 4 jumpers required for 2 wire operation.  
CAS recommends the use of 3 conductors for so called 2-Wire RS485.  
The signal common is there for purpose.



## APPENDIX C: LIMITED WARRANTY

### LIMITED WARRANTY

Chipkin Automation Systems provides a 30-Day Return Window (see Return of Non-Defective Products below) and the following limited warranty. This limited warranty extends only to the original purchaser.

Please note that any warranty services or questions must be accompanied by the order number from the transaction through which the warranted product was purchased. ***The order number serves as your warranty number and must be retained.*** Chipkin Automation Systems will offer no warranty service without this number.

Chipkin Automation Systems warrants this product and its parts against defects in materials or workmanship for *three years labor and one year parts* from the original ship date. During this period, Chipkin Automation Systems will repair or replace defective parts with new or reconditioned parts at Chipkin Automations Systems option, without charge to you. Shipping fees incurred from returns for under-warranty service in the first 30-days will be paid by Chipkin Automation Systems. All shipping fees both to and from Chipkin Automation Systems following this 30-day period must be paid by the customer. All returns, both during and following the 30-day period, must be affected via the Procedures for Obtaining Warranty Service described below.

All original parts (parts installed by Chipkin Automation Systems at the original system build) replaced by Chipkin Automation Systems or its authorized service center, become the property of Chipkin Automation Systems. Any after-market additions or modifications will not be warranted. The gateway system owner is responsible for the payment, at current rates, for any service or repair outside the scope of this limited warranty.

Chipkin Automation Systems makes no other warranty, either express or implied, including but not limited to implied warranties of merchantability, fitness for a particular purpose, or conformity to any representation or description, with respect to this computer other than as set forth below. Chipkin Automation Systems makes no warranty or representation, either express or implied, with respect to any other manufacturer's product or documentation, its quality, performance, merchantability, fitness for a particular purpose, or conformity to any representation or description.

Except as provided below, Chipkin Automation Systems is not liable for any loss, cost, expense, inconvenience or damage that may result from use or inability to use the gateway. Under no circumstances shall Chipkin Automation Systems be liable for any loss, cost, expense, inconvenience or damage exceeding the purchase price of the gateway.

The warranty and remedies set forth below are exclusive and in lieu of all others, oral or written, expressed or implied. No reseller, agent or employee is authorized to make any modification, extension or addition to this warranty.

## WARRANTY CONDITIONS

The above Limited Warranty is subject to the following conditions:

1. This warranty extends only to products distributed and/or sold by Chipkin Automation Systems. It is effective only if the products are purchased and operated in Canada or the USA. (Within the USA including US 48 States, Alaska and Hawaii.)
2. This warranty covers only normal use of the gateway. Chipkin Automation Systems shall not be liable under this warranty if any damage or defect results from (i) misuse, abuse, neglect, improper shipping or installation; (ii) disasters such as fire, flood, lightning or improper electric current; or (iii) service or alteration by anyone other than an authorized Chipkin Automation Systems' representative; (iv) damages incurred through irresponsible use, including those resulting from viruses or spyware, overclocking, or other non-recommended practices.
3. You must retain your bill of sale or other proof of purchase to receive warranty service.
4. No warranty extension will be granted for any replacement part(s) furnished to the purchaser in fulfillment of this warranty.
5. Chipkin Automation Systems and its Authorized Service Center accepts no responsibility for any software programs, data or information stored on any media or any parts of any products returned for repair to Chipkin Automation Systems.
6. All pre-installed software programs are licensed to customers under non-Chipkin Automation Systems software vendor's term and conditions provided with the packages.
7. This warranty does not cover any third party software or virus related problems.
8. Chipkin Automation Systems makes no warranty either expressed or implied regarding third-party (non-Chipkin Automation System) software.
9. Thirty-day Return Window does not include opened software, parts, special order merchandise and shipping and handling fees.

## RETURN OF NON-DEFECTIVE PRODUCTS

A non-defective product may be returned to Chipkin Automation Systems within thirty (30) days of the invoice date for a refund of the original purchase price with the following amendments/fees:

1. Chipkin Automation Systems will refund neither the original shipping cost nor the shipping and handling fees incurred from the products return. If the original purchase was made under a "Free Shipping" promotion then a standard \$40 fee will be deducted from any return in counter to that offer.
2. No refund will be granted for software which has been opened, used, or tampered with in any way which jeopardized Chipkin Automation Systems ability to remarket or resell the product. Chipkin Automation Systems maintains full discretion in decisions regarding a products fitness for return.
3. Any non-defective returns are subject to a 15% restocking fee, which percentage is taken from the final purchase price less any shipping or handling charges.
4. Quantity purchases of five systems or more are not eligible for return.

To return a defective product, please contact our Customer Service Department for a Return Merchandise Authorization (RMA) number and follow the Return of Products Instructions below. The RMA is valid for 10 days from date of issuance. **Returns will not be accepted without an RMA.** Manufacturer restrictions do apply. Any item missing the UPC on the original packaging may not be returned.

## PROCEDURES FOR OBTAINING WARRANTY SERVICE

RMA (Returning Merchandise Authorization) Policy:

If repairs are required, the customer must obtain an RMA number and provide proof of purchase. RMA and services are rendered by Chipkin Automation Systems only. Any shipping costs after 30 days (starting from the original date of purchase) on any item returned for repair is the customers' responsibility. All returned parts must have an RMA number written clearly on the outside of the package along with a letter detailing the problems and a copy of the original proof of purchase. No COD packages will be accepted. No package will be accepted without an RMA number written on the outside of the package. RMA numbers are only valid for 30 days from the date of issue.

Should you have any problems with your gateway, please follow these procedures to obtain the service:

1. If you have purchased our on-site warranty, please find your warranty# (the order number from the transaction through which the warranted product was originally purchased) and contact Chipkin Automation Systems Customer Service by phone at 1-866-383-1657 (Toll free) or 1-647-557-3330.
2. If the gateway must be repaired, an RMA number (Return Merchandise Authorization Number) will be issued for shipment to our repair department. Please follow the instructions given by Chipkin Automation Systems technical support staff to ship your gateway. Chipkin Automation Systems will not accept any shipments without an RMA number.
3. Pack the gateway in its original box or a well-protected box, as outlined in the Return Shipping Instructions. Chipkin Automation Systems will not be responsible for shipping damage/loss of any product outside the original 30-day Chipkin Automation Systems-paid service period. It is very important that you write the RMA number clearly on the outside of the package. Ship the gateway with a copy of your bill of sale or other proof of purchase, your name, address, phone number, description of the problem(s), and the RMA number you have obtained to:

Chipkin Automation Systems RMA# \_\_\_\_\_  
3381 Cambie St., #211  
Vancouver, B.C. Canada, V5Z 4R3

4. Upon receiving the gateway, Chipkin Automation Systems will repair or replace your gateway (at Chipkin Automation Systems discretion) and will ship it back to you within 2 weeks (dependent on parts availability) via UPS.

5. Cross-exchange (Parts only): You will need to provide a valid credit card number as a deposit guarantee when the RMA number is issued. Once approval has been obtained on your credit card, the part(s) will be shipped UPS. You will need to ship defective part(s) back to Chipkin Automation Systems within 15 days to avoid charges to your credit card. If such charges are incurred, the shipped part(s) will be billed at the then current price.
6. Chipkin Automation Systems will pay for shipping to and from the customer only within the first thirty days following the original product ship date. Following this 30-day period all shipping fees both for under warranty and post warranty repairs are the sole responsibility of the customer. The customer also assumes full liability for losses or damages resulting from shipping as well as all responsibility to pursue remuneration for such issues with their selected carrier.

#### **AFTER ONE-YEAR WARRANTY – POST WARRANTY REPAIR**

For post warranty repair, the procedure is the same as outlined above for RMA and shipping. However, you are responsible for shipping charges both ways, current labor (\$75 per hour if not under warranty), and the current price of part(s) used in repair.

# THANK YOU

Thanks for choosing Chipkin's protocol gateways, data clients and integration services to meet your building and industrial automation requirements!

Chipkin Automation Systems™ (Chipkin) is a building and industrial automation protocol expert. We develop, configure, install and support gateways (protocol converters), data loggers and remote monitor and controlling applications.

Founded in October 2000, Chipkin provides expert solutions for converting BACnet®, Modbus®, and Lonworks®—to name just a few—and enabling interfaces for HVAC, fire, siren, intercom, lighting, transportation and fuel systems. The high-quality products we offer (including those from other vendors) interface with Simplex™, Notifier™, McQuay™, GE™ and many others—so you can rest assured that we will select the most appropriate solution for your application.

With Chipkin you are buying a solution. Our configuration expertise in this field combined with free BACnet tools and other tools ensure your success; and our customer support via phone, email and remote desktop tools means that we're there when you need us. Chipkin is a small responsive company, and we live or die by the quality of our service—and with offices in two-time zones—we can provide support when you need it. Give us a call now!

## Sales and Customer Service

**Toll free: 1-866-383-1657**

**Email: [salesgroup1@chipkin.com](mailto:salesgroup1@chipkin.com)**