

CAS-2700-42 IKS to Modbus RTU Gateway

CAS 2700-42

IKS Gateway (Modbus RTU/TCP and HTML)

Manual

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1. IKS Gateway Description

The IKS Gateway connects to an IKS device. The IKS protocol is a serial protocol that can be transmitted via RS232 or UDP. This implementation of the IKS driver on the Gateway communicates using the IKS commands over UDP. Therefore, the IKS device that the Gateway will be communicating with must support receiving the IKS commands over UDP. The Gateway can connect to only one IKS Device.

The IKS Gateway connects to the IKS Device, reads data, and stores it internally. When a remote system requests data, the data is served in a form that is appropriate to the requesting protocol. In this case the protocols are Modbus (RTU or TCP) or HTML (REST).

This manual contains additional information about how the IKS Gateway operates as well as instructions on how to setup the connections to the Gateway and how to configure and read data from the Gateway.

The following is a brief description of the sections covered in this manual.

2. Connections

This section contains information about how to connect to the Gateway. It includes block diagrams and wiring diagrams.

3. Setting up the Gateway

This section describes how to connect to the Gateway initially and how to set the IP Address

4. Configuring the Gateway

This section has instructions and images of how to configure the Gateway through the web page interface.

5. Reading the Data

This section contains the Modbus Map for the IKS data that is stored on the Gateway and how to read the Reports Page

6. Commanding the IKS Device

This section describes how the Gateway communicates with the IKS Device to poll for data and to send commands.

7. Commissioning, Diagnostics, and Troubleshooting

This section contains details on what to bring to site when installing the Gateway, how to take diagnostics and the tools to use, and how to trouble shoot and take logs.

2. Connections

This section contains information about how to connect to the Gateway. It contains a block diagram, wiring diagrams for the Modbus RTU connection, and limitations and best practices when connecting the Gateway.

2.1 Block Diagram

Monitor and Control IKS Devices Panels using BACnet, Modbus or Web



Image 2.1 - Block Diagram of CAS 2700-42 IKS Gateway

2.2 Wiring and Connections

This section contains wiring diagrams for the various connections that are possible for this Gateway. The Gateway has 3 main ports:

Port 0

This port is a RS485 port and is used primarily for Modbus RTU. It can support full and half duplex RS485.

Port 1

This port is setup a RS232 port and is **NOT** used by the IKS Gateway.

Ethernet Port

This port is used by the TCP/IP and UDP drivers of the Gateway. Default port for accessing the internal web server of the Gateway is 80.

2.2.1 Modbus RTU Connections

Review the following image of the connector to plug into Port 0 for connecting the Gateway to a Modbus RTU device.



Image 2.2.1 – Modbus RTU connector for Port 0

In the image above, the green DB9 connector is wired with the following:

Pin 1 jumpered Pin 3 => wire connected to Pin 1 connects to the positive terminal of the Modbus Device.

Pin 2 jumpered 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 jumpered to Pin 9

Pin 7 jumpered to Pin 8.

The green DB9 connector (with no wires attached) should be included with the IKS Gateway when shipped.

2.3 Limitations and Best Practices

Maximum Number of IKS Devices per Gateway

Only 1 IKS device can be connected to a single Gateway.

3. Setting up the Gateway

This section contains information and instructions on what to do when connecting to the IKS Gateway for the first time.

3.1 Determining the IP Address

Before connecting to the Gateway, you will need to determine the IP Address of the Gateway. By default, the Gateway is assigned a Static IP Address of **192.168.1.113** when it is shipped.

To find the IP Address, look on the back of the Gateway. There should be a business card attached to the back of the Gateway that has the IP Address and Reference #. See below for an example



Image 3.1 – Business Card attached to back of CAS Gateway

Take note of the Ref# as this will be used by the support team to pull up additional information about the project.

The IP Address that is written on the business card should be the Static IP Address assigned to the Gateway.

3.2 Connecting to the Gateway

To Change the IP Address of the Gateway (Section 3.3) or to Configure the Gateway (Section 4), you use a PC and connect to the Gateway using an Ethernet cable. (The Ethernet cable should have been provided with the Gateway when shipped).

Before connecting the Ethernet cable, set your computer's IP Address to be similar to the Gateway's IP Address.

For Example, a Gateway is assigned the following IP Address by default:

IP Address – 192.168.1.113 Netmask – 255.255.255.0 Gateway – 192.168.1.1

So set your computer to the following:

IP Address – 192.168.1.100 Netmask – 255.255.255.0 Gateway – 192.168.1.1

After setting the IP Address on the computer, connect the Ethernet cable to the computer and to the Gateway.

3.3 Changing the IP Address

To change the IP Address of the Gateway, you will need to use the IP Setup Tool. The tool can be found on the blue USB stick that should have come with the Gateway.

Run the IP Setup Tool application and you will see the following window open:

NDK Settings IP 192 . 168 . 1 . 113	Select a Unit BB700EX [00-03-F4-07-AB-16] at 192.168.1.140 runr
Network Mask 255 . 255 . 255 . 0	SB700EX [00-03-F4-08-2A-29] at 192.168.1.113 runn
GateWay 192 . 168 . 1 . 1	Set->
DNS 0 . 0 . 0 . 0	
Baudrate 115200	Search Again
	Launch Webpage Advanced Help Close

Image 3.3 – IP Setup Tool

The 'Select a Unit' section will have the Gateway you purchased listed with the assigned IP Address.

To change the IP Address, change the fields list on the left side under the 'NDK Settings'

Note: Please do **NOT** change the Baudrate value.

Once you have changed all of the settings, click the 'Set \rightarrow ' button in the middle of the window. The Gateway will automatically reboot to assign the new IP Address.

After you have finished changing the IP Address, you may not see the device in the 'Select a Unit' anymore when pressing the 'Search Again' button. This is because your computer is now on another subnet than the Gateway.

Change your computer back to the original address and you should be able to see the Gateway again when you press the 'Search Again' button.

Now you can add the Gateway to the site network. Note down the new IP Address so that others will know the assigned IP Address.

3.4 Testing the Connection

After changing the IP Address, test the connection to the Gateway.

To test the connection, you can use one of two methods.

- 1. Open a Web browser and type in the IP Address of the Gateway into the address bar.
- 2. If the IP Setup Tool is still open, click on the Gateway in the 'Select a Unit' section and press the 'Launch Webpage' button. This will open a Web browser to the start page of the Gateway.

Regardless of the method, you will see the Start Here page of the Gateway. It should be similar to the following:



Image 3.4 - CAS Gateway Start Here page

If this page is visible, then the connection to the Gateway is good and you can continue to the next step – Section 4: Configuring the Gateway

4. Configuring the Gateway

To configure the IKS Gateway, refer to the following instructions:

- 1. Open a Web Browser
- 2. Browse to the following Web Page: <u>http://ip/bin/iks/config/</u> where ip is the IP Address of the IKS Gateway.

You will see the following form:

IKS Configuration

Modbus RTU Server Configuration

Configuration settings for the Modbus RTU server. This includes serial connection parameters and assigning a Modbus device ID.

Setting	Value
Baud Rate	9600 🔻
Data Bits	8 🔻
Parity	N V
Stop Bits	1 •
Device ID	1

Modbus TCP Server Configuration

Configuration settings for the Modbus TCP server. This includes TCP/IP Port and assigning a Modbus device ID.

Setting	Value
Port	502
Device ID	1

IKS Client Configuration

Parameter	Value	Description
IP Address	0.0.0.0	The IP Address of the IKS device
Port	10001	The Port on the IKS device to send messages
Timeout	3	The amount of time after sending a message to wait for a response

Save Configuration

Image 4.1 – IKS Configuration Page

There are three different sections of the form to fill out

4.1 Modbus RTU Server Configuration

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

- Baud: The baud rate for the Modbus RTU serial connection. Possible values: 1200, 2400, 4800, 9600, 19200, 38400, 76800, 115200
- Data Bits: The data bits for the serial connection. Possible values: 1, 2
- Parity: The parity for the serial connection. Possible values: None, Even, Odd
- **Stop Bits:** The stop bits for the serial connection. Possible values: 0, 1, 2
- **Device ID:** The Modbus RTU Slave ID for this Gateway. Default Value: 1

4.2 Modbus TCP Server Configuration

If using Modbus TCP, then the parameters for configuring the Modbus TCP Server are as follows:

- **Port:** The TCP/IP port for the Modbus TCP connection. Default Value: **502**
- Device ID: The Modbus TCP Slave ID for this Gateway. Default Value: 1

4.3 IKS Client Configuration

The parameters for the IKS Client Configuration are as follows:

- **IP Address:** The IP Address of the IKS Device that the Gateway will be communicating with.
- Port: The port on the IKS Device to send IKS messages over UDP
- **Timeout:** The amount of time to wait for a response from the IKS device.

When all the forms fields have been filled out, press the 'Save Configuration' button. This will save the configuration to the Gateway.

After saving the Gateway, you will be prompted to Restart the Gateway for the changes to take effect:

Configuration Successful! Please restart the CAS Gateway for the changes to take effect.

Image 4.2 – Configuration Success Message

Return to the System Page by browsing to the following IP Address: <u>http://ip/bin/system/</u> where ip is the IP Address of the Gateway and 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.

Image 4.3 – System Actions Page – Reboot System

5. Reading the Data

The IKS data read by this Gateway is made available through the Modbus Protocol. The Gateway acts as a Modbus Slave Device. This section describes how the data is formatted, what data is stored in the Modbus Registers, and what functions are supported.

5.1 Modbus Data

The IKS Gateway acts as a Modbus Slave and supports both Modbus RTU and TCP. Please refer to section 4 – Configuring the Gateway for more information on how to setup the Modbus RTU and TCP connection parameters.

For more information about Modbus in general, please read this guide:

http://www.chipkin.com/september-2010-newsletter

5.1.1 Supported Functions

The Gateway supports the following functions:

Reading Functions

- 01 (0x01) Read Coils
- 02 (0x02) Read Discrete Inputs
- 03 (0x03) Read Holding Registers
- 04 (0x04) Read Input Registers

Note: Unless Chipkin Automation Systems has provided a specific configuration for the specific project that this Gateway is being installed, then all registers are treated as holding registers. Using the other functions will result in a Modbus Error Code 02 Illegal Data Address.

Writing Functions

- 05 (0x05) Write Single Coil
- 06 (0x06) Write Single Register
- 15 (0x0F) Write Multiple Coils
- 16 (0x10) Write Multiple Registers

Note: As with the above note, these registers are holding registers, so the functions writing to coils will result in a Modbus Error Code 02 Illegal Data Address.

5.1.2 Modbus Map

The following is a list of the read and write registers that will be on the Gateway after it has been configured. The table contains the Modbus Register, the name of the Data Point, any units or notes.

Note1: All data points in Modbus are treated as 16-bit Unsigned Integers. Please review the Notes column of the table to see valid data ranges.

Note2: Negative values are served as Two's Complement. This means that when viewing the raw value on the Gateway Webpages you will see the proper number, but when polling for the value over Modbus, you may see a different value. For example: Register 40032 has a value range of -50 to 120. On the webpages, you will see values from -50 to 120. However, when polling using Modbus, -1 = 65535, -2 = 65534, etc.

Read Only Registers

The Read Only Registers are the data points received from the IKS device when sending the 03h Command – Inquiring of a State.

Modbus	Data Point Name	Units	Notes	
40011	EV Connection Status	see notes	0 = Initializing	
			1 = Standby	
			2 = Processing for connection	
			3 = Connected	
			4 = Processing for disconnection	
			5 = System Abnormal	
40012	Battery Connection Status	see notes	0 = Initializing	
			1 = Standby	
			2 = Processing for connection	
			3 = Connected	
			4 = Processing for disconnection	
			5 = System Abnormal	
40013	Power Source Status	see notes	0 = Off Line	
			1 = Stop	
			2 = Discharge	
			3 = Charge	
			4 = Independent RUN Mode	
			5 = PV Power Generage	
			6 = PV Power Regeneration	
			7 = System Abnormality	
			9 = Processing STOP Procedures	
			11 = Maintenance + Preparation	
			12 = Maintenance + Discharging	
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			13 = Maintenance + Charging
			16 = Maintenance + END
40014	Error Code	see notes	See Error Codes
40015	Relay Status	see notes	bit0 = Grid Relay
			bit1 = Independent Relay
			bit2 = EV Connection Relay
			bit3 = Battery Connection Relay
			bit4 = PV Connection Relay
40016	Grid RS Voltage	V	Value Range: 0 – 300
40017	Grid R Current	А	Value Range: 0 – 100
40018	Grid ST Voltage	V	Value Range: 0 – 300
40019	Grid S Current	А	Value Range: 0 – 100
40020	Grid TR Voltage	V	Value Range: 0 – 300
40021	Grid T Current	А	Value Range: 0 – 100
40022	Grid Effective Power	0.1 kW	Value Range: -199 – 199
			+ Direction: Grid Supplied
			- Direction: Grid Tie
40023	Grid Ineffective Power	0.1 kW	Value Range: -199 – 199
40024	Grid Power Factor	percent	Value Range: -100 – 100
40025	Grid Reverse Power	0.1 kW	Value Range: -199 – 199
			+ Direction: Grid Supplied
			- Direction: Grid Tie
40026	EV Voltage	V	Value Range: 0 – 420
40027	EV Current	А	Value Range: -99 – 99
			+ Direction: EV Charging
			- Direction: EV Discharging
40028	Battery Voltage	V	Value Range: 0 – 300
40029	Battery Current	А	Value Range: -99 – 99
			+ Direction: Battery Charging
			- Direction: Battery Discharging
40030	PV Voltage	V	Value Range: 0 – 400
40031	PV Current	А	Value Range: 0 – 99
40032	Equipment Temperature 1	degrees C	Value Range: -50 – 120
40033	Equipment Temperature 2	degrees C	Value Range: -50 – 120
40034	Equipment Temperature 3	degrees C	Value Range: -50 – 120
40035	Equipment Temperature 4	degrees C	Value Range: -50 – 120
40036	Equipment Temperature 5	degrees C	Value Range: -50 - 120

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40037	EV Battery Residual Percent	0.1 percent	Value Range: 0 – 1000
40038	EV Batter Total Capacity	0.1 kWh	Value Range: 0 – 999
40039	EV Residual kWh	0.1 kWh	Value Range: 0 – 999
40040	Battery Residual Percent	0.1 percent	Value Range: 0 – 1000
40041	Battery Capacity	10 mAh	Value Range: 0 – 4000
40042	Last State In Error	no units	
40043	Last Error	no units	

Commandable Registers (Read/Write)

These registers are writeable registers that are used to set settings on the IKS device or to trigger sets of commands to be sent to the IKS device. Please refer to section 6 – Commanding the IKS Device for a detailed description of which each of these registers do.

Modbus	Data Point Name	Units	Notes
40001	Operation Start	see notes	Write to this register to start the Start
			sequence.
			Value must be set to 1 to run commands
40002	Operation Change	see notes	Write to this register to start the Change sequence.
			Value must be set to 1 to run commands
40003	Operation Stop	see notes	Write to this register to start the Stop sequence.
			Value must be set to 1 to run commands
40004	Operation Mode	see notes	Write to this register to set the mode of
			Possible values:
			I = Grid Tie (with PV Input)
			2 = Grid Tie (Discharging)
			3 = Grid Tie (Charging)
			4 = Independent Mode
			5 = Grid Tie (Discharging, Peakcut)
			6 = PV Charging
40005	Change Operation Mode	see notes	Write to this register to set the change of operation mode.
			Possible Values:
			0 = Continue Connecting Status
			1 = Both Disconnected
			$2 = $ Switch to EV_MODE
			3 = Switch to Battery_MODE

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40006	Direction of Discharge	see notes	Write to this register to set the Direction of Discharge. Value must be 0 – 100
40007	Direction of Charge	see notes	Write to this register to set the Direction of Charge. Value must be 0 – 100
40008	Direction of Input	see notes	Write to this register to set the Direction of Input. Value must be 0 – 100
40009	Direction of Regenerative Power	see notes	Write to this register to set the Direction of Regenerative Power. Value must be 0 – 100
40010	Display Max Grid Power	see notes	Write to this register to set the Display Max Grid Power. Value must be 0 – 1000
40044	Operation EV Disconnect	see notes	Write to this register to start the EV Disconnect sequence. Value must be set to 1 to run commands
40045	Operation Write Settings	see notes	Write to this register to start the Write Settings sequence. Value must be set to 1 to run commands

6. Commanding the IKS Device

This section describes how the Gateway works when sending commands to the IKS device. As described in the previous section, after being configured the Gateway has some Commandable (Read/Write) Registers.

This section describes what occurs within the Gateway when the various "Operations" are triggered.

There are two sets of Commandable Registers: Setting registers and Operation registers.

Setting Registers

The Setting Registers are Modbus Registers that are used as parameters for two of the IKS Commands that are used to configure settings on the IKS Device. The commands that use these parameters are the 11h – Setting Mode of Operation, and the 13h – Writing Setting Values.

40004	Operation Mode	see notes	 Write to this register to set the mode of operation. Possible Values: 1 = Grid Tie (with PV Input) 2 = Grid Tie (Discharging) 3 = Grid Tie (Charging) 4 = Independent Mode 5 = Grid Tie (Discharging, Peakcut) 6 = PV Charging
40005	Change Operation Mode	see notes	 Write to this register to set the change of operation mode. Possible Values: 0 = Continue Connecting Status 1 = Both Disconnected 2 = Switch to EV_MODE 3 = Switch to Battery_MODE

40006	Direction of Discharge	see notes	Write to this register to set the Direction of Discharge. Value must be 0 - 100
40007	Direction of Charge	see notes	Write to this register to set the Direction of Charge. Value must be 0 - 100
40008	Direction of Input	see notes	Write to this register to set the Direction of Input. Value must be 0 - 100
40009	Direction of Regenerative Power	see notes	Write to this register to set the Direction of Regenerative Power. Value must be 0 - 100
40010	Display Max Grid Power	see notes	Write to this register to set the Display Max Grid Power. Value must be 0 - 1000

13h – Writing Setting Values uses the following registers as parameters:

Operation Registers

These registers are used to trigger the various sets of commands that are sent to the IKS Device. These registers when not in use will have a value of 0. To send the sets of commands, write to the specific register with a value of 1. When the Gateway is finished and the operations are successful, the value is reset to 0.

Available Operations Registers are as follows:

40001	Operation Start	Write a '1' to this register to start the Start sequence
40002	Operation Change	Write a '1' to this register to start the Change sequence
40003	Operation Stop	Write a '1' to this register to start the Stop sequence
40044	Operation EV Disconnect	Write a '1' to this register to start the EV Disconnect sequence
40045	Operation Write Settings	Write a '1' to this register to start the Write Settings sequence
40046	Operation Reset Abnormality	Write a '1' to this register to star the Reset Abnormality sequence

The following sections describe what occurs when the different Operations are triggered.

For all of the registers listed in this section, please refer to section 5.1.2 – Modbus Map for more information about valid data ranges.

6.1 Operation Start

Operation Start uses the following Setting Registers:

40004 – Sets Operation Mode
40005 – Sets Change Operation Mode
40006 – Sets Direction of Discharge
40007 – Sets Direction of Charge
40008 – Sets Direction of Input
40009 – Sets Direction of Regenerative Power
40010 – Sets Display Max Grid Power

Operation Start uses the following Operation Register:

40001 – Operation Start

Operation Start – Procedure

First write to the Setting Registers listed above to set the parameters used by the 11h – Setting Mode of Operation and 13h – Writing Setting Values commands.

Then write a value of 1 to register 40001.

The Gateway will then send the following commands to the IKS Device in the following order:

03h – Inquiry of a Status 21h – EV Connection Command 03h – Inquiry of a Status

The Gateway will wait until the EV connection has completed. If, after 90 seconds the EV still has not connected, the Gateway will error out of this sequence.

11h – Setting Mode of Operation
13h – Writing Setting Values
03h – Inquiry of a Status
19h – Start Operation Command

Once everything is completed, the Gateway will automatically reset the value of register 40001 to 0.

6.2 Operation Change

Operation Change is used primarily when switching the Setting Operation Mode between Charge and Discharge, or whenever a change needs the Stop Command to be run first.

Operation Change uses the following Setting Registers:

40004 – Sets Operation Mode
40005 – Sets Change Operation Mode
40006 – Sets Direction of Discharge
40007 – Sets Direction of Charge
40008 – Sets Direction of Input
40009 – Sets Direction of Regenerative Power
40010 – Sets Display Max Grid Power

Operation Start uses the following Operation Register:

40002 – Operation Change

Operation Change – Procedure

First write to the Setting Registers listed above to set the parameters used by the 11h – Setting Mode of Operation and 13h – Writing Setting Values commands.

Then write a value of 1 to register 40002.

The Gateway will then send the following commands to the IKS Device in the following order:

18h – Stop Command
03h – Inquiry of a Status
11h – Setting Mode of Operation
13h – Writing Setting Values
03h – Inquiry of a Status
19h – Start Operation Command

Once everything is completed, the Gateway will automatically reset the value of register 40002 to 0.

6.3 Operation Stop

Operation Stop uses the following Operation Register:

40003 – Operation Stop

Operation Stop – Procedure

Since there are no Setting Registers associated with this Operation, you only need to write a value of 1 to register 40003 to trigger the Operation Stop

The Gateway will then send the following command to the IKS Device:

18h – Stop Command

Once everything is completed, the Gateway will automatically reset the value of register 40003 to 0.

6.4 Operation EV Disconnect

Operation EV Disconnect uses the following Operation Register:

40044 – Operation EV Disconnect

Operation EV Disconnect- Procedure

Since there are no Setting Registers associated with this Operation, you only need to write a value of 1 to register 40044 to trigger the Operation EV Disconnect

The Gateway will then send the following command to the IKS Device:

23h – EV Disconnection Command

Once everything is completed, the Gateway will automatically reset the value of register 40044 to 0.

6.5 Operation Write Settings

Operation Write Settings is used to change a power setting. This is different than 6.2 Operation Change, as the 13h – Write Setting Values command is sent without needing the Stop Command.

Note: The Setting Registers will contain whatever values were used in previous operations. Only write to the registers that need to change and keep the other ones the same.

Operation Change uses the following Setting Registers:

40006 – Sets Direction of Discharge
40007 – Sets Direction of Charge
40008 – Sets Direction of Input
40009 – Sets Direction of Regenerative Power
40010 – Sets Display Max Grid Power

Operation Start uses the following Operation Register:

40045 – Operation Write Settings

Operation Write Settings – Procedure

First write to the Setting Registers listed above to set the parameters used by the 13h – Writing Setting Values command.

Then write a value of 1 to register 40045.

The Gateway will then send the following command to the IKS Device:

13h – Writing Setting Values

Once everything is completed, the Gateway will automatically reset the value of register 40045 to 0.

6.6 Operation Reset Abnormality

Operation Reset Abnormality uses the following Operation Register:

40046 – Operation Reset Abnormality

Operation Reset Abnormality

Since there are no Setting Registers associated with this Operation, you only need to write a value of 1 to register 40046 to trigger the Operation Reset Abnormality.

The Gateway will then send the following command to the IKS Device:

1Fh – Reset Abnormality Command

Once everything is completed, the Gateway will automatically reset the value of register 40046 to 0.

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7. Commissioning, Diagnostics, and Troubleshooting

7.1 What to Take for Site for Installing and Commissioning the Gateway

- 1. The gateway and other supplied components.
- 2. USB->232 Converter and / or USB->RS485 Convertor

Any will do. This will allow you run tests using the 232 or 485serial connection. Connect to the device and find out which COM port is now available, use CAS Modbus Scanner to retrieve data.

- 3. Laptop
- 4. Gateway IP Address Allocation Tool

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

- 5. Wireshark packet sniffer software free download <u>http://www.wireshark.org/download.html</u>
- 6. 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

7. Serial Mini Tester



8. DB9 and DB25 male and female connector make-up kits (Solder free)

Always useful but not required if you have tested your cable prior to attending the site.

9. Rx / TX cross over.

Always useful but not required if you have tested your cable prior to attending the site.

It is useful to be able to swap the conductors connected to pins 2 and 3. Take a module with you. It is easier than changing the wires.

For example, the Ziotek Null Modem Adapter DB25

<u>http://www.cyberguys.com/product-</u> details/?productid=751&rtn=750&core_cross=SEARCH_DETAIL_SIMILAR#page=page-1





10. Gender Benders

Always useful but not required if you have tested your cable prior to attending the site.

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- 11. Ethernet Patch cables
- 12. 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-networkpackets

7.2 Diagnostics

Gateway Hardware Diagnostics

- 1. Power Led: Green Solid = Normal Condition.
- 2. RJ45 LED: Green to show link.

IKS Driver or General Gateway Software Diagnostics

Open a Web Browser

Type in the following address: <u>http://ip/bin/system/info</u> Example of the Stats Page

Stats

Name	Value
Http.requests	8
IKS.System.errors	197
IKS.init.success	1
IKS.messages.sent	197
IKS.messages.sent.inquiring_of_a_state	197
IKS.task.1.read	197
IKS.task.1.read.error.timeout	197
IKS.task.1.read.status	Timeout
IKS.udp.sent	6304
Modbus RTH init success	1

Stats Page contains statistics of the various components of the driver and tasks of the Gateway. All errors are colored red. When calling Chipkin Automation Systems for Support, please take a screen shot of the Stats Page to give to Technical Support.

7.3 Trouble-Shooting

7.3.1 Taking Logs

Debugging and Error messages from the Gateway are sent on UDP port 514 to the broadcast IP address: {255.255.255} as plain ASCII text.

You can use Wireshark to take a log of these messages.

A Wireshark log is also very useful for any TCP (like Modbus TCP) or UDP (like BACnet IP or IKS) protocols as the bytes and messages that are sent and received from the Gateway will also be logged.

Note: To properly take a log, a hub (not a switch) is required.

For more help with taking logs, please feel free to contact us.

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7.3.2 Testing Modbus - Use Modbus Scanner

You can test the Modbus TCP or Modbus RTU data using free test software provided by Chipkin Automation Software.

This is a link to the download page. <u>http://www.chipkin.com/cas-modbus-scanner</u>.

Configure the scanner as follows

- 1. Add a connection specify the IP address of the gateway
- 2. Add a device to the connection. Set the device=1
- 3. Add a Request to the device: Read Holding register offset=1 Length=45

SCAS Modbus Scanner				
File Help				
\odot	Chip	kin n Systems		
TCP 192.168.1.133:502 timeout: 3	Select a task and cl	ick poll	Po	oli 🛛 🗖 Auto upd
Device: 1	Offcot	Standard address	6 diait addross	Yalua
Read Holding registers starting at 40001 for 68	Urrset	Scandard address	6 algic address	value
]			
[13:51:23] Ready				
[13:51:23] Starting up				

The result should be like this.

- 4. Click the Poll Button
- 5. Use the values found in the 'int16 column and the data map table to review the data.

S CAS Modbus Scanner											
File Help											
						-					
We Sell, Support, Customize, Configure,											
,,	,	install E	oldCom	0.00							
Chipkin	anu	Install F	leiuserv	ers							
Automation Systems		Change -	Click for m	ore info							
E-TCP 192.168.1.104:502 timeout: 3	Last update: Thu N	ov 04 16:29:04 2010	Poll		uto undate						
Device: 1	J										
Read Holding registers starting at 40001 fo	Offset	Standard address	6 digit address	Hex	char	uint16	int16	uint32	int32	float32	^
	1	40001	400001	0×0041	A	65	65				
	2	40002	400002	0x0044	D	68	68	4456	4456	0.000000	
	3	40003	400003	0x0056	v D	86	86	5242	5242	0.000000	_
	5	40004	400004	0×0032	2	00 50	00 50	5242	5242	0.000000	
	6	40005	400005	0x0032	'n	30	30	1966	1966	0.000000	
	7	40007	400007	0x006F	0	111	111	1900/11	1000111	0.000000	
	8	40008	400008	0x0026	8.	38	38	2490	2490	0.000000	
	9	40009	400009	0x0000		0	0				
	10	40010	400010	0x0000		0	0	0	0	0.000000	
	11	40011	400011	0×0013		19	19				
	12	40012	400012	0x0028	(40	40	2621	2621	0.000000	
	13	40013	400013	0x0026	8.	38	38				
	14	40014	400014	0x0006		6	6	393254	393254	0.000000	
	15	40015	400015	UXUUUB		11	11	0/0155	000155	0.000000	
	10	40010	400015	0×0009		4	4	202155	202155	0.000000	
	11/	10017	400017	0,0000		11	11				
[16:29:04] <= Response: 01 03 C8 00 41 00 44 00 56 0	0 50 00 32 00 1E 00 I	5F 00 26 00 00 00 00 00	00 13 00 28 00 26	00 06 00 NB	00 04 00 0	B 00 5A 0	0 10 00 02	2 00 01 00	00 00 D0 0	0 07 00 9B 00 1	c 🔼
00 00 00 57 00 00 00 12 00 23 00 1C 00 06 00 0B 00 04	00 12 00 23 00 1E 00	0 00 00 64 00 48 00 0	1 00 00 00 00 00 0	00 00 00 4	1 00 74 00	74 00 74	01 CF 01 (CA 01 CC 0	01 01 01 02	01 03 00 00 00	
00 00 00 01 03 00 00 00 00 4E 01 90 02 8C 01 02 00	00 00 00 FF FF FF FF	FF FF FF FF FF FF FF FF	F FF FF FF FF FF FI	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	F FF FF FF	00 00 00	00 00 00 0	00 00 00 00	00 00 00 00	00 00 00 00 00 00 0	10
	00 00 00										
[16:29:03] => Poil: 01:03:00:00:00:64 [16:29:45] <= Response: 01:03:88:00:41:00:44:00:56:0	0 50 00 22 00 15 00 /	E 00 26 00 00 00 00	00 12 00 29 00 11	00.06.00.08	00.04.00.0	e 00 5 4 0	0.10.00.03	2 00 01 00	00.00.00.0	0.07.00.08.00.1	
00 00 00 57 00 00 00 12 00 23 00 1C 00 06 00 08 00 04	00 12 00 23 00 1E 00 1) NN NN 64 NN 48 NN N		1 00 00 00 08	1 00 74 00 0	74 00 74	01 CE 01 (2 01 03 00 00 00 0	-
00 00 00 01 03 00 00 00 00 00 4E 01 90 02 8C 01 02 00	00 00 00										~
· ·											

7.4 Additional Functionality

7.4.1 Another Method for Changing the IP Address - DHCP

This device supports DHCP, but when shipped, usually a Static IP Address is assigned.

IP = 192.168.1.113 Netmask = 255.255.255.0 Gateway = 192.168.1.1

To enable and to set the Gateway to DHCP, follow these instructions:

1. Download the tool to change the IP address of the gateway. The tool can be downloaded from:

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

2. 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.

- NDK Settings	Select a Unit
IP 0.0.0.0	SB700EX [00-03-F4-07-AB-16] at 192.168.1.140 runr
Network Mask 0 . 0 . 0 . 0	
GateWay 0 . 0 . 0 . 0	Set>
DNS 0 . 0 . 0 . 0	
Baudrate 115200	Caush éasin 1
	Search Again
	Launch Webpage Advanced Help Close

3. To set it to DHCP, simply put all fields to 0.0.0.0 and click the 'Set' button as displayed in the image above.

7.4.2 Downloading New Firmware

During support, it is sometimes required to download new firmware with bug fixes or additional debugging details.

If you are sent new firmware, you will be provided with specific instructions on how to load it. The following instructions are generic:

A tool is provided. It can be downloaded from

<u> http://www.chipkin.com/articles/cas-gateway-firmware-download-to</u>	http://www.ahialia.com/auticles/acc.cotoway.finawaya.dowalacd.t
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Screenshot from the Firmware update tool.

Paddress:	192	125	168	\$ 1	8	104	Find
ileName: [Browse
🔽 Reboo	t when c	omp	lete	Г	Up	date	Dismiss

7.5 Support Contact Information

This driver was developed by Chipkin Automation Systems (CAS). CAS is proud to provide support for the driver. For support please call CAS at +1 (866) 383-1657 or contact by email at support@chipkin.com

8. Hardware Specification

- UL and ULc approved
- 10/100BaseT with RJ-45 connector
- 1x RS232 Port
- 1x RS485 Port
- 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

9. Revision History

Date	Resp	Driver Ver.	Doc. Rev.	Comment
21 Aug 2014	ACF	0.01	0	Document Created
16 Dec 2014	ACF	0.04	1	Updated data based on New Firmware updates
14 Jul 2014	ACF	0.06	2	Updated Document Added Additional details about how the Gateway works
08 Mar 2016	ACF	0.12	3	Fixed Typos Added Reset Abnormality information