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WARNINGS

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SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D HAZARDOUS LOCATIONS, OR NONHAZARDOUS LOCATIONS ONLY.

CET APPAREILLAGE EST UTILISABLE DANS LES EMPLACEMENTS DE CLASSE I, DIVISION 2, GROUPES A, B, C ET D, OU DANS LES EMPLACEMENTS NON DANGEREUX SEULEMENT.

WARNING: EXPLOSION HAZARD

- DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.
- SUBSTITUTION OF ANY COMPONENT MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT: RISQUE D'EXPLOSION

- AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.
- LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

Stride[®] MB Gateway User Manual Revision History



Please include this Manual Number and the Manual Issue, both shown below, when communicating with AutomationDirect Technical Support regarding this publication.

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1st Edition, Revision A	06/29/2018	Clarified input voltage range, clarified supported web browsers.	
1st Edition, Revision B	10/26/2018	Updated IP addresses in Application Examples.	
1st Edition, Revision C	09/09/2019	Updated screenshots, minor clarifications.	
1st Edition, Revision D	02/12/2020	Added Appendix D: Security Considerations for Control Systems Networks.	
1st Edition, Revision E	08/17/2020	Clarified imported configuration filenames.	
1st Edition, Revision F	04/01/2021	Corrected terminating resistor on RS-485 wiring diagrams.	
1st Edition, Revision G	10/21/2021	Corrected RS-232 Flow Control options.	

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GETTING STARTED



IN THIS CHAPTER...

User Manual Overview
Introduction
Product Overview
Hardware
Hardware Reset Button
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Installation, DIN Rail Mounting
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Power
Ethernet Wiring
Serial Port Wiring
Operation
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USER MANUAL OVERVIEW

THE PURPOSE OF THIS USER'S MANUAL

Thank you for purchasing our *STRIDE*[®] Modbus Gateway. This User Manual describes the gateway and its specifications, and guides you in the installation, configuration, and methods of operation of the *STRIDE*[®] Modbus gateway.

WHO SHOULD READ THIS MANUAL

This manual contains important information for those who will install, maintain, and/or operate a *STRIDE*[®] Modbus Gateway.

TECHNICAL SUPPORT

By Telephone: 770-844-4200 (Mon.-Fri., 9:00 a.m.-6:00 p.m. E.T.)

On the Web: www.automationdirect.com

Our technical support group is glad to work with you in answering your questions. If you cannot find the solution to your particular application, or, if for any reason you need additional technical assistance, please call technical support at **770-844-4200**. We are available weekdays from 9:00 a.m. to 6:00 p.m. Eastern Time.

We also encourage you to visit our web site where you can find technical and non-technical information about our products and our company. Visit us at <u>www.automationdirect.com</u>.

SPECIAL SYMBOLS



NOTE: When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a special note.



SECURITY NOTE: When you see the "padlock" icon in the left-hand margin, the paragraph to its immediate right will be a security-related suggestion or note.



WARNING: When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a warning. This information could prevent injury, loss of property, or even death (in extreme cases).

INTRODUCTION

Modbus is one of the most popular communication protocols in the automation industry because it supports both traditional RS-232/422/485 devices and industrial Ethernet devices. Many industrial devices, such as PLCs, HMIs, instruments and meters use Modbus as their standard communication protocol. However, the Modbus protocols running over serial and Ethernet are so different that a communication gateway is needed as a bridge for integrating devices from these two networks. The *STRIDE*[®] Modbus Gateway provides that bridge between Modbus RTU (Serial) products and Modbus TCP (Ethernet) products.

The gateway converts bidirectionally between Modbus RTU or Modbus ASCII protocols and Modbus TCP. In addition to its compact size, the gateway features up to two 10/100 Mbps Ethernet ports and up to four RS232/422/485 serial ports.



SECURITY NOTE: When implementing any method of remote access to your equipment, you need to consider the security exposure in order to minimize the risks to your processes and your equipment. Security should always be carefully evaluated for each installation. Refer to "Appendix D: Security Considerations for Control Systems Networks" for more information.

PRODUCT OVERVIEW

Key features include:

- ✓ Industrial 1, 2, or 4 serial port, and 1 or 2 Ethernet port Modbus Gateways (Modbus RTU/ASCII <-> ModbusTCP)
- ✓ Automatic read function "Agent Mode"
- ✓ Ethernet ports each support up to 16 TCP devices, client or server
- ✓ Serial ports each support up to 128 slave devices or 1 master device
- ✓ DIP switch selectable termination resistor for RS-485 2-wire mode
- ✓ High Serial Isolation Voltage (2kV)
- ✓ UL61010 with Class 1 Division 2 hazardous location rating
- ✓ Metal housing with wide temperature rating (-40 to +75°C)

HARDWARE

STRIDE Modbus Gateway Models			
Part Number Ethernet Ports Serial Por RJ45, 10/100Mbps D-sub 9 p			
SGW-MB1511-T	1	1	
SGW-MB1512-T	1	2	
SGW-MB1524-T	2	4	

Ethernet Interface			
Port	Shielded RJ45		
Speed	10/100 Mbps		
Protection	Built-in 1.5 kV magnetic isolation		
Protocol Supported	Modbus TCP/IP client and server		
Modbus TCP devices supported	16 simultaneous Modbus TCP connections per Ethernet port		
Cable Type	Autodetects Ethernet cable types (MDI/MDIX)		
Default IP address	192.168.0.249 192.168.1.249 (Ethernet Port 2, SGW-MB1524-T)		

Serial Interface			
Port	D-sub 9-pin male port		
Interface mode	RS-232, RS-485 and RS-422, software selectable		
Supported Baud Rates	300, 600, 1200, 4800, 9600, 14.4k, 19.2k, 38.4k, 57.6k, 115.2k , 230.4k, 460.8k		
Parity	Odd, Even or None		
Data Bits	7 or 8 bits		
Stop Bits	1 or 2		
Flow control	RTS or None		
Termination	DIP switch to enable/disable 120Ω matching resistor for RS-485 2-wire		
ESD Protection	15kV for all signals		
Isolation Protection	2kV		
Serial Devices Supported	128 slaves or 1 master per port		
Protocols Supported	Modbus RTU, Modbus ASCII		

Note: Default values are shown in **bold** text.

Power Details			
	SGW-MB1511-T	1.8 W	
Power Consumption	SGW-MB1512-T	1.8 W	
	SGW-MB1524-T	3.2 W	
Power Input	Redundant input terminals		
Input Voltage	12 / 24 / 48 VDC		
Max. Input Voltage Range	9.6 – 60 VDC		
Appliance Class	Class III, SELV power source		
Reverse Power Protection	Yes		
Overload Protection	Yes		

Environmental			
Operating Temperature Range	-40 to +75 °C [-40 to +167 °F]		
Storage Temperature Range	-40 to +85 °C [-40 to +185 °F]		
Humidity	5 to 95% RH (non-condensing)		
Maximum Altitude	2000m		
Environmental Air	For use in Pollution Degree 2 Environment		
Protection level	Metal case, IP40		
Agency Approvals	UL61010-1, UL61010-2-201, Class I Div 2 12.12.01- 2015; CSA C22.2 No. 213-16; CAN/CSA No. 61010-1-12; CAN/CSAC22.2 No. 61010-2-201:14, CE, FCC		
EMI	EN 55032 Class A		
	FCC Part 15 Subpart B Class A		
	IEC 61000-4-2 (ESD): ±6kV (contact), ±8kV (air)		
	IEC 61000-4-3 (RS): 10V/m (80MHz–2GHz)		
FMS	IEC 61000-4-4 (EFT): Power Port: ±2kV; Data Port: ±1kV		
	IEC 61000-4-5 (Surge): PowerPort: ±1kV/DM, ±2kV/CM; Data Port: ±1kV		
	IEC 61000-4-6 (CS): 10V (150KHz-80MHz)		
	IEC 60068-2-6 (Vibration)		
Mechanical Standards	IEC 60068-2-27 (Shock)		
	IEC 60068-2-32 (Free Fall)		

HARDWARE RESET BUTTON

The Hardware Reset Button is a small recessed button located on the top of the device. Pressing the button will reset all settings to their default values.

DIP Switches

A 120Ω termination resistor for each serial port configured for RS485 2-wire is enabled (ON) or disabled (OFF) by the corresponding DIP switch.

LEDS

The front panel provides status via the following LEDs:

PWR1 (GREEN)

LED ON indicates voltage is applied to Power 1 terminals.

PWR2 (GREEN)

LED ON indicates voltage is applied to Power 2 terminals.

RUN (GREEN)

Blinking Indicates the device is functioning normally. Steady on indicates power is on and device is booting up.

SPEED (RJ45 YELLOW)

There is one yellow SPEED LED for each Ethernet port. LED ON indicates Ethernet speed is 100 Mbps. LED OFF indicates Ethernet speed is 10 Mbps.

LINK/ACTIVITY (RJ45 GREEN)

There is one green LINK/ACTIVITY LED for each Ethernet port. The LINK/ACTIVITY LED is ON

when a valid link is established, and flashes to indicate that the gateway sees data traveling on the Ethernet network. If any network device is sending or receiving data, the LINK/ACTIVITY LED will be flashing. During heavy communication loads, this indicator will be steady ON. If the LED is OFF, then a problem with the Ethernet connection has been detected.

T (SERIAL PORT TRANSMIT, GREEN)

The T or TRANSMIT DATA LED flashes to indicate that the gateway is sending data through the serial port.

R (SERIAL PORT RECEIVE, GREEN)

The R or RECEIVE DATA LED flashes to indicate that the gateway is receiving data through the serial port.



INSTALLATION, DIN RAIL MOUNTING

NOTE: The gateway can also be panel mounted with purchase of accessory mounting bracket (part #SE2-PM1 for SGW-MB1511-T and SGW-MB1512-T, part #SE2-PM3 for SGW-MB1524-T).

These devices are open-type and are meant to be installed in an enclosure which is only accessible with the use of a tool and suitable for the environment when installed in Class 1, Division 2 Hazardous Locations. The gateway can be snapped onto a standard 35mm x 7.5 mm height DIN rail (Standard: CENELEC EN50022) and can be mounted either vertically or horizontally. Allow 20mm [0.79"] of clearance between the gateway and other equipment on the DIN rail, side-to-side and top-to-bottom.

DIN rail mounting steps:

- 1) Hook top back of unit over the DIN rail.
- 2) Push bottom back onto the DIN rail until it snaps into place.

DIN rail removal steps:

- 1) Push the unit down to free the bottom of the DIN rail.
- 2) Rotate the bottom of the unit away from the DIN rail.
- 3) Unhook top of unit from DIN rail.



DIMENSIONAL DRAWINGS





Dimensions				
Davit Ma	Weight	Width (A)	Depth (B)	Height (C)
Part No.		mm [inches]		
SGW-MB1511-T	0.17 kg [0.36 lb]	20 0 [1 1 9]	69 0 12 691	115 0 [4 52]
SGW-MB1512-T	0.17 kg [0.36 lb]	50.0 [1.16]	00.0 [2.00]	113.0 [4.55]
SGW-MB1524-T	0.32 kg [0.71 lb]	54.0 [2.13]	106 [4.17]	135.0 [5.32]

WIRING

Power

The switch can be powered from the same DC source that is used to power your other devices. To maintain the UL listing, this must be an SELV (Safety Extra Low Voltage) power supply. A DC voltage in the range of 12 to 48VDC needs to be applied between the P1+ terminal and the P1- terminal as shown below. The chassis screw terminal should be tied to panel or chassis ground. To reduce down time resulting from power loss, the switch can be powered redundantly with a second power supply as shown below. A recommended DC power supply is AutomationDirect.com part number PSL-24-010.

Terminal block connector is Degson 2EDGK-5.08-04P-14-1000AH or equivalent.



Optional Dual DC Supplies

BEFORE PERFORMING ANY WIRING TO THESE SWITCHES MAKE SURE...

- The Area is currently nonhazardous (especially when working in Class 1, Div 2 or Zone 2 hazardous locations).
- Power is off to the switch
 - The screw terminal block is unplugged. This is especially important due to the aluminum housing. Connecting or disconnecting wires to the screw block when it's in place and power is turned on can allow the screwdriver to short the power to the case.

ETHERNET WIRING

Use data-quality (not voice-quality) twisted pair cable rated category 5e (or better) with standard RJ45 connectors. Straight-through or crossover Ethernet cable can be used for all devices the switch is connected to because all the ports are capable of auto-MDI/MDIX-crossover detection.

The RJ45 Ethernet port connector bodies on these products are metallic and connected to the Chassis GND terminal. Therefore, shielded cables may be used to provide further protection. To prevent ground loops, the cable shield should be tied to the metal connector body at one end of the cable only. Electrical isolation is also provided on the Ethernet ports for increased reliability.

ETHERNET CABLE WIRING

Ethernet Port			
Pin	MDI-X Signal	MDI Signal	
1	Receive Data + (RD+)	Transmit Data + (TD+)	
2	Receive Data – (RD–)	Transmit Data – (TD–)	
3	Transmit Data + (TD+)	Receive Data + (RD+)	
6	Transmit Data – (TD–)	Receive Data – (RD–)	
4, 5, 7, 8	Unused	Unused	
Note: + and – indicate level polarities.			

Straight-thru Cable Wiring			
Pin 1	Pin 1		
Pin 2	Pin 2		
Pin 3	Pin 3		
Pin 4	Pin 4		
Pin 5	Pin 5		
Pin 6	Pin 6		
Pin 7	Pin 7		
Pin 8	Pin 8		

Cross-over Cable Wiring				
Pin 1	Pin 3			
Pin 2	Pin 6			
Pin 3	Pin 1			
Pin 4	Pin 4			
Pin 5	Pin 5			
Pin 6	Pin 2			
Pin 7	Pin 7			
Pin 8	Pin 8			



NOTE: For reference only. Either cable wiring will work.

SERIAL PORT WIRING

SERIAL PORT PINOUT



Serial Port				
Pin	RS-232	RS-422/485 4-wire	RS-485 2-wire	
1	-	RXD –	-	
2	RXD	RXD +	-	
3	TXD	TXD –	Data –	
4	RTS	TXD +	Data +	
5	GND	GND	GND	
6	_	-	-	
7	-	-	-	
8	-	-	-	
9	_	_	-	

RS232 WIRING



Recommended Cable - AutomationDirect L-19772 shielded cable or equivalent



RS422/RS485 4-WIRE WIRING

Recommended Cable - AutomationDirect L-19773 shielded cable or equivalent

RS485 2-WIRE WIRING



Recommended Cable - AutomationDirect L-19954 shielded cable or equivalent

OPERATION

The *STRIDE*[®] Modbus Gateway may be configured to function in Transparent Mode or Agent Mode.

Transparent Mode is a simple protocol bridge. Modbus TCP packets that arrive at the gateway Ethernet port will be translated to Modbus RTU or Modbus ASCII and transmitted out the appropriate serial port. Likewise, communications arriving at the serial port will be translated to Modbus TCP and transmitted out the Ethernet port. Data simply passes across the gateway.

Agent Mode is a valuable feature of the *STRIDE*[®] Modbus Gateway. The Agent can be configured to poll specific Modbus data addresses at the serial or Ethernet nodes and store that data into gateway shared memory. If a Modbus query comes in for one of those data points, the gateway will immediately respond with the data it has stored and thereby respond much faster than it would if it had to forward that request and wait for the response.

TRANSPARENT MODE





SUMMARY OF MODBUS MODES



IN THIS CHAPTER...

Introduction
Mode 1: Transparent, RTU Master mode: Modbus TCP Client/Master Device to Gateway to Modbus RTU Slave Devices
Mode 2: Agent, RTU Master mode: Modbus TCP Client/Master Device to Gateway Memory. Gateway Talks Directly to Modbus RTU Slave Devices
Mode 3: Transparent, RTU Slave mode: Modbus RTU Master Device to Gateway to Modbus TCP Server/Slave Devices
Mode 4: Agent, RTU Slave mode: Modbus RTU Master Device to Gateway Memory. Gateway Talks Directly to Modbus TCP Server/ Slave Devices.

INTRODUCTION

As mentioned in the previous chapter, the STRIDE[®] Modbus Gateway may be configured to operate in four distinct modes:

- Mode 1: Transparent mode, with serial port functioning as a master device
- Mode 2: Agent mode, with serial port functioning as a master device
- Mode 3: Transparent mode, with serial port functioning as a slave device
- Mode 4: Agent mode, with serial port functioning as a slave device

Operation under each of the four modes is discussed in this chapter. For simplicity, the discussion uses RTU protocol for the serial port. The operations would be essentially identical if the serial port used ASCII protocol.

MODE 1: TRANSPARENT, RTU MASTER MODE: MODBUS TCP CLIENT/MASTER DEVICE TO GATEWAY TO MODBUS RTU SLAVE DEVICES

In this mode, the Current Working Mode is set to "Transparent" and the Serial Port Mode is set to "RTU Master". These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

Device Information					
Device Name	SGW-MB1524-T	SN	K10A0004A180100036		
Model Type	MB-Gateway	Firmware Version	V3.5.019		
IP(E1)	192.168.0.249	MAC(E1)	00:1E:CD:1B:FA:15		
IP(E2)	192.168.1.249	MAC(E2)	00:1E:CD:1B:FA:16		

Transparent Mode

Agent Mode

Operating Settings				
S1		S2	S3	S4
Serial Port Mode	RTU Master 🔻			
Filter Enable				
Filter ID Start	1			
Filter ID End	247			
Protocol	TCP V			
Gateway Modbus TCP Port	502			

A typical network using the gateway to connect a Modbus TCP client device to multiple Modbus RTU slave devices is illustrated below. The Modbus messages are simply translated in the gateway from Modbus TCP framing to Modbus RTU framing and then sent on to the serial network. Addressing a specific slave device is handled by the Unit Identifier (Slave ID) contained in the Modbus message.



MODE 2: AGENT, RTU MASTER MODE: MODBUS TCP CLIENT/MASTER DEVICE TO GATEWAY MEMORY. GATEWAY TALKS DIRECTLY TO MODBUS RTU SLAVE DEVICES

In this mode, the Current Working Mode is set to "Agent" and the Serial Port Mode is set to "RTU Master". These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

Device Information					
Device Name	SGW-MB1524-T	SN	K10A0004A180100036		
Model Type	MB-Gateway	Firmware Version	V3.5.019		
IP(E1)	192.168.0.249	MAC(E1)	00:1E:CD:1B:FA:15		
IP(E2)	192.168.1.249	MAC(E2)	00:1E:CD:1B:FA:16		

Transparent Mode

Agent Mode

Operating Settings					
S1 S2 S3 S4					
Serial Port Mode	RTU Master 🔻				
Filter Enable					
Filter ID Start	1				
Filter ID End	247				
Protocol	TCP T (Note: In Agent	mode, you can moo	lify the Modbus port on the 'Gateway Se	ettings' page.)	
Gateway Modbus TCP Port	502	(Note: In Ager	t mode, you can modify the Modbus po	rt on the 'Gateway Settings' page.)	

In Agent mode, the gateway must be assigned a Modbus ID, as shown below, since the Modbus TCP Client will query the gateway memory using that Unit ID rather than querying the slave devices directly.

	Gateway Settings				
Gateway Modbus ID	220				
Protocol	TCP •				
Gateway Modbus Port	502				
Default Timeout(ms)	1000				
Inter-packet TX Delay(ms)	100				

A list of messages must be created defining the data to be collected from various RTU slave devices connected to the serial port, and the addresses within the gateway at which to store the collected data.

						Add Message	Delete Message	Modify Message
Display 50	▼ per page	Refresh					Search:	
Item 🔶	Serial Port 🔶	Slave ID 🔶	Alias	Function +	Data Address	Data Length 🔶	Mapping Addres Head	SS 🔶 Status 🔶
1	1	1	Device_Alias	3	0	1	0	•
2	1	2	Device_Alias	3	100	1	1	•
						firstpage	e prev 1	next lastpage

Refresh to get latest status.

In Agent mode, the Gateway sends messages created by the Slave list to the Modbus RTU slave devices. The response data from these messages are stored in local memory of the Gateway for access by the Modbus TCP Client device. The data is stored in 4 different memory blocks depending upon the Function Code used.

Coils (0x)	Inputs (1x)	Holding Registers (4x)	Input Registers (3x)
Data stored from	Data stored from	Data stored from	Data stored from
Function Code 1	Function Code 2	Function Code 3	Function Code 4

The Gateway generates the serial messages from the slave list items. It stores the data from the responses in its local memory that is available to Modbus TCP devices. Modbus TCP client devices query the gateway using its Unit ID, and the gateway responds immediately with its cached data.



NOTE: Modbus writes sent from the Modbus TCP client go across directly to the Modbus RTU slave devices as if the gateway were in Transparent mode. When the gateway is in Agent mode, addresses that devices will use to WRITE data into must be configured in the Message List even though conceptually this is a list of data that is READ from connected devices.

MODE 3: TRANSPARENT, RTU SLAVE MODE: MODBUS RTU MASTER DEVICE TO GATEWAY TO MODBUS TCP SERVER/SLAVE DEVICES

In this mode, the Current Working Mode is set to "Transparent" and the Serial Port Mode is set to "RTU Slave". These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

Device Information					
Device Name	SGW-MB1524-T	SN	K10A0004A180100036		
Model Type	MB-Gateway	Firmware Version	V3.5.019		
IP(E1)	192.168.0.249	MAC(E1)	00:1E:CD:1B:FA:15		
IP(E2)	192.168.1.249	MAC(E2)	00:1E:CD:1B:FA:16		

Transparent Mode

Agent Mode

		Operating 9	Settings					
S1		S2 S3 S4						
Serial Port Mode	RTU Slave 🔻							
Slave ID	Remote IP	Remote Port	Protocol	Local Port	Ethernet Port Bind			
1	192.168.0.226	502	TCP V	NA	E1 🔻	+ -		
2	192.168.0.227	502	TCP V	NA	E1 🔻	+ -		

In RTU Slave mode, each TCP server device must be configured in the gateway with an IP address, remote port, and Unit ID (Slave ID). A unique local port is set only when the protocol is UDP.

A typical network using the gateway to connect a Modbus RTU master device to multiple Modbus TCP server devices is illustrated below. The gateway reads the Slave ID from the message of the Modbus RTU master device and does a lookup in the table to find the target IP address. It also places the Slave ID value into the Unit ID field of the Modbus TCP frame.





NOTE: Remember that only one master may be connected to each serial port.

MODE 4: AGENT, RTU SLAVE MODE: MODBUS RTU MASTER DEVICE TO GATEWAY MEMORY. GATEWAY TALKS DIRECTLY TO MODBUS TCP SERVER/SLAVE DEVICES

In this mode, the Current Working Mode is set to "Agent" and the Serial Port Mode is set to "RTU Slave". These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

		Device Information				
Device Name	SGW-MB1524-T	SN	K10A0			
Model Type	MB-Gateway	Firmware Version	V3.5.0			
IP(E1)	192.168.0.249	MAC(E1)	00:1E:			
IP(E2)	192.168.1.249	MAC(E2)	00:1E:			

Transparent Mode

Agent Mode

		Operating S	Settings					
S1		S2 S3 S4						
Serial Port Mode	RTU Slave 🔻							
Slave ID	Remote IP	Remote Port	Protocol	Local Port	Ethernet Port Bind			
1	192.168.0.226	502	TCP •	NA	E1 🔻	+ -		
2	192.168.0.227	502	TCP •	NA	E1 🔻	+ -		

In Agent mode, the gateway must be assigned a Modbus ID, as shown below, since the Modbus RTU Master will query the gateway memory using that Unit ID rather than querying the slave devices directly.

	Gateway Settings						
Gateway Modbus ID	220						
Protocol	TCP •						
Gateway Modbus Port	502						
Default Timeout(ms)	1000						
Inter-packet TX Delay(ms)	100						

A list of messages must be created defining the data to be collected from various TCP server devices connected to the Ethernet port specified in the Operating Settings, and the addresses within the gateway at which to store the collected data.

						Add Message	Delete Message	Modify Message
Display 50	▼ per page	Refresh					Search:	
Item 🔶	Serial Port	Slave ID 🔶	Alias	Function	Data Address	Data Length 🔶	Mapping Addres Head	ss Status
1	1	1	Device_Alias	3	0	1	0	•
2	1	2	Device_Alias	3	100	1	1	•
						firstpag	e prev 1	next lastpage

Refresh to get latest status.

In Agent mode, the Gateway sends messages created by the Slave list to the Modbus TCP server devices. The response data from these messages are stored in local memory of the Gateway for access by the RTU master device. The data is stored in 4 different memory blocks depending upon the Function Code used.

Coils (0x)	Inputs (1x)	Holding Registers (4x)	Input Registers (3x)
Data stored from	Data stored from	Data stored from	Data stored from
Function Code 1	Function Code 2	Function Code 3	Function Code 4

The Gateway generates the Modbus TCP messages from the Slave list items. It must first reference the table in the Operating settings to do a lookup from the Slave ID of the Slave list message to find the corresponding IP address. It stores the data from the responses in its local memory that is available to Modbus RTU devices. The Modbus RTU master device queries the gateway using its Unit ID, and the gateway responds immediately with its cached data.



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NOTE: Modbus writes sent from the Modbus RTU master go across directly to the Modbus TCP server devices as if the gateway were in Transparent mode. When the gateway is in Agent mode, addresses that devices will use to WRITE data into must be configured in the Message List even though conceptually this is a list of data that is READ from connected devices.

WEB CONSOLE CONFIGURATION



IN THIS CHAPTER...

Initial Connection
Device Info Page
Network Settings
Operating Settings
For Modbus RTU/ASCII Master to Modbus TCP Servers (Slaves)
For Modbus TCP Master (Client) Device to Modbus RTU/ASCII Slave Devices
Serial Settings
Agent Settings
Gateway Settings
Message List
Data in Gateway Memory
Import/Export
Export
Import
Upgrade Firmware
Change Password
Load Factory Default
Reboot

INITIAL CONNECTION

The gateway is configured through a web console, which is accessed using any web browser.

The default management interface access is:

- IP address: 192.168.0.249 (if connecting at port E1) or 192.168.1.249 (if connecting at port E2)
- Port: 80
- Username: admin
- Password: admin



NOTE: SGW-MB1511-T and SGW-MB1512-T have one Ethernet port (E1); SGW-MB1524-T has two Ethernet ports (E1 & E2).

For initial setup, the PC used to connect to the *STRIDE*[®] Modbus Gateway must have an IP address that allows it to connect to the device's default IP address. The Modbus gateway's IP address can be changed later within the web console.

NOTE: The Modbus gateway's web console supports the latest version of all modern browsers.

In your browser, type the gateway's IP address (192.168.0.249 or 192.168.1.249) in the address field and press Enter. When prompted by a dialog box, enter the default Username and Password.

Ē	-5 💌	Gateway	web manager	· × +	\sim			-		×
\leftarrow	\rightarrow	Ö	192.168.0.24	19 /login_v3.	5.html	□ ☆	₽	l_	È	
										^
				C	1					
				Sti	X CI	e				
		7	User Name : ad	min						
			Password : ad	min		0				
						Sign in				
					_					

After logging in, you will be presented with the device's overview page.



SECURITY NOTE: We recommend that you change the login password and enable HTTPS ecryption for additional security. These settings are found on the Change Password page as described later in this chapter.

DEVICE INFO PAGE

The Device Information page displays a summary of information to identify the gateway.

The device name is configured on the Network Settings page. The device name helps users distinguish between multiple gateways.

The serial number ("SN"), model type and MAC address(es) are not configurable. These are characteristics of the individual gateway and may help distinguish between multiple gateways. The values that display on this page may be compared to the values printed on the device label.

The IP address(es) are configured on the Network Settings page. IP addresses must be unique on the network.

You can switch the device between Agent mode and Transparent mode by clicking the "Agent Mode" (or "Transparent Mode") button. The button toggles the gateway immediately between the two operating modes without requiring further confirmation. The menu in the left column will update to reflect options relevant to the current mode of operation.

			Stride			Exit	
Device Information	Device Information						
Network Settings Operating Settings Serial Settings Import/Export Upgrade Firmware	Device Name Model Type IP(E1)	SGW-MB1524-T MB-Gateway 192.168.0.249		SN Firmware Version MAC(E1)	K10A0004A180100036 V3.5.019 00:1E:CD:1B:FA:15		
Change Password Load Factory Default System Reboot Data Diagnostics	IP(E2)	192.168.1.249 Transparent Mode		MAC(E2)	00:1E:CD:1B:FA:16		
	4						

Device Info screen with gateway in Transparent mode:

Device Info screen with gateway in Agent mode:

		S	tride		Exit
					Help
Device Information			Device Information		
Network Settings Operating Settings	Device Name	SGW-MB1524-T	SN	K10A0004A180100036	
Serial Settings	Model Type	MB-Gateway	Firmware Version	V3.5.019	
Agent Settings	IP(E1)	192.168.0.249	MAC(E1)	00:1E:CD:1B:FA:15	
Gateway Settings Message List	IP(E2)	192.168.1.249	MAC(E2)	00:1E:CD:1B:FA:16	
Data in Gateway Memory					
 Import/Export 	(Transparent Mode			
Upgrade Firmware	(Agent Mode			
Change Password					
Load Factory Default					
System Reboot					
Data Diagnostics					

NETWORK SETTINGS

The Network Settings page allows selection between DHCP and static network settings for the Ethernet port(s), with the following requirements:

- IP addresses must be unique on the network.
- On models with two Ethernet ports, the two ports may be configured on the same subnet or different subnets.
- A Default Gateway must be configured if any devices will be configured as Modbus TCP servers on a subnet different than that of the *STRIDE* gateway Ethernet port.

Click Save to save the current changes to the unit before leaving this screen.

\leftrightarrow \rightarrow Ö 192.16	8.0.249/index_v3.5.html				□ ☆	ృ	h e	<u></u> ≩
			Stride				Exi	t
							Hel	p
Device Information			Network Settings					
Network Settings Operating Settings		E1		E2				
Serial Settings	IP Mode	Static ~		Static ~				
Agent Settings Gateway Settings	IP Address	192.168.0.249		192.168.1.249				
Message List	Subnet Mask	255.255.255.0		255.255.255.0				
Data in Gateway Memory	Default Gateway	Default Gateway		Default Gateway				
Upgrade Firmware								
Change Password								
Load Factory Default System Report			Device Name					
Data Diagnostics	Device Name	SGW-MB1524-T						
			Save					
	5						_	`

Default Network Settings:

- IP configuration: Static
- IP address: E1 192.168.0.249; E2 192.168.1.249
- Subnet Mask: 255.255.255.0
- Default Gateway: no value

NOTE: SGW-MB1511-T and SGW-MB1512-T have one Ethernet port; SGW-MB1524-T has two Ethernet ports.



NOTE: You may lose communications with the STRIDE Gateway module if you configure an IP address and/or Subnet Mask that is not compatible with the subnet of your PC's Network Interface Card. You may be required to change the subnet settings of your PC.

Device Name:

• The default gateway name is the model number. You can set the name, limited to 16 alphanumeric characters or special characters dash (-) or underline (_). The gateway name is used for reference and identification when managing several different gateway modules on a network.



NOTE: Remember to click the SAVE button before you leave this page. Leaving the page before saving changes will cancel changes.

OPERATING SETTINGS

The Operating Settings page is where each serial interface's operation mode is configured.

The Serial Port Mode field describes the function of each serial port on the Gateway.

Each serial port can independently function as a master (communicating with up to 128 serial slave devices) or as a slave (communicating with a serial master device), using either RTU or ASCII protocols.

The Operating Settings page exposes different settings depending on whether each port is operating as a master (with Modbus TCP master device (client) and Modbus RTU/ASCII slave devices) or as a slave (with a Modbus RTU/ASCII master device and Modbus TCP slave devices (servers)).

FOR MODBUS RTU/ASCII MASTER TO MODBUS TCP SERVERS (SLAVES)

To connect a Modbus RTU or ASCII master device to one or more Modbus TCP server (slave) devices, the gateway serial port will function as an ASCII or RTU slave.

Up to 16 Modbus TCP server devices can be configured. Devices can be added or removed from the list using the green + or red - buttons, respectively. The Slave ID, IP address and remote port of each Modbus TCP server device on the Ethernet ports must be configured. Additionally, the Ethernet protocol, TCP or UDP, of each Modbus TCP server device must be configured. A Default Gateway must be configured on the Network Settings page if any devices will be configured as Modbus TCP servers on a subnet different than that of the STRIDE Gateway Ethernet port.

For SGW-MB1524-T, which has two Ethernet ports, when the gateway's serial port is operating as an RTU or ASCII slave the Ethernet port through which each TCP server can be reached must be selected in the Ethernet Port Bind field.

\leftrightarrow \rightarrow O	192.168.0	18.0.249/index_v3.5.html						<u>⊨</u> <i>L</i>	Ŕ	
				Stride					Exit	
								[Help	
Device Information				Operating	Settings					
Network Settings Operating Settings Serial Settings		S1		S2	\$3		S4			
		Serial Port Mode	RTU Slave \vee							
Upgrade Firmware		Slave ID	Remote IP	Remote Port	Protocol	Local Port	Ethernet Port Bind			
Change Password		148	192.168.0.226	502	TCP 🗸	NA	E1 ~	+ -		
Load Factory Default System Reboot		149	192.168.0.226	502	TCP 🗸	NA	E1 ~	+ -		
Data Diagnostics		150	192.168.0.226	502	TCP 🗸	NA	E1 ~	+ -		
		151	192.168.0.226	502	TCP 🗸	NA	E1 ~	+ -		
				Sav	re				_	

Gateway Operating Settings:

- Serial Port Mode: RTU Slave or ASCII Slave
- Slave ID: set the ID to match each Modbus TCP server (slave)
- Remote IP: enter the IP address of each Modbus TCP server (slave). A Default Gateway must be configured on the Network Settings page if any devices will be configured as Modbus TCP servers on a subnet different than that of the STRIDE gateway Ethernet port.
- Remote Port: enter the port number for each Modbus TCP server (slave). Each server must have a unique port number. This is a TCP or UDP port that will identify the server in the Modbus TCP packet.
- Protocol: select TCP or UDP
- Local Port: For UDP, this is the source port that will identify communication traffic for each slave ID. For TCP traffic the source port is automatically determined.

• Ethernet Port Bind: select Ethernet port E1 or E2 (model SGW-MB1524-T only). The Ethernet Port Bind is used by the Gateway when the Modbus TCP device IP address is not on the same subnet as the Gateway IP address.

NOTE: Remember to click the SAVE button before you leave this page or switch to another serial port tab. Leaving the page or selecting another serial port before saving changes will cancel changes.

FOR MODBUS TCP MASTER (CLIENT) DEVICE TO MODBUS RTU/ASCII SLAVE DEVICES

To connect a Modbus TCP client (master) device to one or more Modbus RTU or ASCII slave devices, the gateway serial port will function as an ASCII or RTU master.

In that case, the Ethernet Protocol (TCP or UDP) and Gateway Modbus TCP Port to associate with the serial port must be configured. When multiple serial ports are set as RTU Masters, a unique Gateway Modbus TCP port must be assigned to each serial port in order to differentiate the serial networks. For SGW-MB1524-T, a Modbus TCP client attached to either Ethernet port can communicate to RTU/ASCII slaves on the serial port using the configured Modbus TCP Port.

The Filter option will eliminate Slave ID numbers from the processed traffic when enabled. To enable the filter feature, check the Filter Enable box and enter the starting number and ending number of the nodes that should never appear in messages that will be processed.

\leftrightarrow \rightarrow (D) 192.168.0.249/index_v3.5.html						1= l~	È		
Stride 🔤									
							Help		
Device Information	Operating Settings								
Network Settings Operating Settings	S1	S2		S3	S4				
Serial Settings	Serial Port Mode	RTU Master 🗸							
Gateway Settings	Filter Enable	Filter Enable							
Message List	Filter ID Start	1							
Data in Gateway Memory Import/Export	Filter ID End	247					Operatin	g	
Upgrade Firmware Change Password	Protocol	TCP \checkmark (Note: In Agent mode, you can modify the		S1		S2		L	
	Gateway Modbus TCP Port	502	(Note: In Agent mode		RTU Master 🔻				
Load Factory Default System Report		1		Filter Enable					
Data Diagnostics				Filter ID Start	1				
			Save	Filter ID End	247				
	Protocol	TCP •							
				Gateway Modbus TCP Port	7002				

Gateway Operating Settings:

- Serial Port Mode: RTU Master or ASCII Master
- Filter Enable: eliminate a range of Slave IDs from communication
- Filter ID Start: set lowest Modbus Slave ID to ignore (0-247, must be \leq Filter ID End)
- Filter ID End: set highest Modbus Slave ID to ignore (0-247, must be \geq Filter ID Start)
- Protocol: select TCP or UDP (When the Modbus Gateway is in Agent Mode, the protocol is set on the Gateway Settings page.)
- Gateway Modbus TCP Port: set the TCP port number to communicate with RTU/ASCII slaves on this serial port. (When the Modbus Gateway is in Agent Mode, the Gateway Modbus TCP Port is set on the Gateway Settings page.)



NOTE: Remember to click the SAVE button before you leave this page or switch to another serial port tab. Leaving the page or selecting another serial port before saving changes will cancel changes.
SERIAL SETTINGS

The Serial Setting page is where each serial port's communication parameters are configured.

		Str ide	Exit
Device Information Network Settings Operating Settings Serial Settings Import/Export Upgrade Firmware Change Password Load Factory Default System Reboot Data Diagnostics	Allas Allas Baudrate Databits Stopbits Parity RTS Control RTS On Delay(ms)	Serial Settings S1 UART_1 115200 ~ 8 ~ 1 ~ None ~ Assert during transmit ~ 0	Help
	RTS Off Delay(ms)	0	
	Hardware Interface	RS-232 🗸	
	Protocol(selected on Operating Settings page)	Disabled V	
		Save	

Serial Parameters:

• Alias: serial port alias name. This is a convenience for your reference.

The following settings must match the settings in all connected devices:

- Baudrate: 300–460800bps, the default value is 115200bps
- Databits: 7 or 8 bits. The value is locked to 8 bits for RTU or 7 bits for ASCII serial modes.
- Stopbits: 1 or 2, the default value is 1
- Parity: Odd, Even or None, the default value is None
- RTS Control: On, Assert during Transmit, or Off; the default value is On. In version 3.5.019 and newer, RTS control behaves as follows:
 - RTS Off (default) After the Gateway is powered up, the RTS signal goes false and stays false.
 - RTS On After the Gateway is powered up, the RTS signal goes true and stays true all the time.
 - Assert during transmit Although flow control is rarely required by Modbus RTU or Modbus ASCII networks, RTS control is occasionally needed for devices such as media converters and radio modems. In version 3.5.019 and newer, RTS control behaves as follows:



In this mode, the RTS signal goes to false when the Gateway is powered up. When the Gateway is ready to transmit, the RTS signal will go true. The Gateway will then wait the specified amount of time from the "RTS On Delay(ms)" field before transmitting. After transmitting all the data in that packet, the Gateway will wait the specified amount of time from the "RTS Off Delay(ms)" field before setting the RTS signal to false. This cycle is repeated every time the Gateway transmits: no matter whether the Gateway is transmitting a request (in RTU/ASCII Master mode) or transmitting a response (in RTU/ASCII Slave mode).

- Hardware Interface: RS-232, RS-485 or RS-422; the default value is RS-232
- Protocol (selected on Operating Settings Page): RTU Slave, ASCII Slave, RTU Master, ASCII Master

NOTE: In some situations, such as a high amount of electrical noise, poor cabling, etc., it may be necessary to reduce the baud rate on the gateway module AND serial devices on the network.

NOTE: Remember to click the SAVE button before you leave this page. Leaving the page before saving changes will cancel changes.

AGENT SETTINGS

The pages grouped in the navigation tree under Agent Settings configure the gateway to work in Agent mode, and are visible only when that mode is selected.

GATEWAY SETTINGS

Configure the gateway Modbus ID, timeout, and inter-packet transmit delay.

\leftarrow \rightarrow O	192.168.	0.249/index_v3.5.html	19/index_v3.5.html 🔟 📩 🏂 💪 🖒 🕑										
			(Str,	X de	<u>)</u>						Exit	
												Help	
Device Information					Gatev	vay Settings							
Network Settings Operating Settings		Gateway Modbus ID	1]									
Serial Settings		Protocol	TCP 🗸										
Agent Settings Gateway Settings		Gateway Modbus Port	502]									
Message List		Default Timeout(ms)	1000]									
Oata in Gateway Memo	ory	Inter-packet TX Delay(ms)	100]									
Import/Export Upgrade Firmware				-									
Change Password													
Load Factory Default					[Save							
System Reboot Data Diagnostics													

Gateway Settings:

- Gateway Modbus ID: Unique Modbus ID assigned to the gateway to allow clients to request data from the gateway's local cache, 1–247.
- Protocol: TCP or UDP.
- Gateway Modbus Port: set the TCP port number to communicate with RTU/ASCII slaves on this serial port.
- Default timeout (ms): default timeout before retrying a data request; default is 1000ms.
- Interpacket TX delay (ms): Poll Time setting for the delay between requests polling slave devices to populate local cache; default is 100ms.



NOTE: Remember to click the SAVE button before you leave this page. Leaving the page before saving changes will cancel changes.

MESSAGE LIST

The Message List page displays a table that summarizes the data stored locally in the gateway's memory. Modbus client devices may request this data from the gateway's local cache.



NOTE: When the gateway is in Agent mode, addresses that devices will use to WRITE data into must be configured in the Message List even though conceptually this is a list of data that is READ from connected devices.

Configure and manage the message request list. A summary of configured messages is displayed, which can be filtered to display a subset of the list using the "Search" field.

From this page, messages can be added, deleted or modified.

\leftrightarrow \rightarrow \circlearrowright 192.16	58.0.249/index_v3.	5.html						□ ☆	∑≣ <i>l</i> ~ ⊔	2
				St	ride				Ex	cit
									He	lp
Device Information Network Settings							Add Message	Delete Message	Modify Message	
Operating Settings Serial Settings	Display 50	$^{\vee}$ per page						Search:		
Agent Settings Gateway Settings Message List	Item 🔶	Serial Port	Slave ID 🔶	Alias 🔶	Function \diamond	Data Address	Data Length 🔶	Mapping Address He	ad 🔶 Status 🔶	
Data in Gateway Memory	1	1	1	Device_Alias	3	0	4	0	•	
Upgrade Firmware	2	2	1	Device_Alias	3	4	4	4	•	
Change Password Load Factory Default System Reboot	Refresh to g	et latest status.					firstpa	ge prev 1	next lastpage	
Data Diagnostics										

Each parameter of the Message List is explained in the Add Message section to follow.

A green dot in the Status column indicates that the message is successfully connected to its target device. A red dot indicates that it is not successfully connected. The web page must be manually refreshed to update the status indicator.

ADD MESSAGE

Clicking the "Add Message" button brings up a Message Configuration dialog box to configure a new message.

\leftrightarrow \rightarrow O	192.168.0.249/index_v3	5.html		□ ☆	r∕≣	l~	Ŀ	
			Str ide				Exit	
						I	Help	
Device Information			Message Configuration					
Network Settings		Slave Alias	Device_Alias					
Operating Settings		Serial Port	S1 ~					
Serial Settings Agent Settings		Slave ID	1					
Gateway Settings		Function	03 Holding Register(4x) V					
Message List Date in Cotourou Ma		Data Start Addr	Setup slave data start addr					
Import/Export	mory	Data Length	Setup slave data length					
Upgrade Firmware		Mapping Addr	Assign next available address					
Change Password								
System Reboot			Cancel					
Data Diagnostics								

Add New Message Settings:

- Slave alias: name for each device to help users recognize it more easily
- Serial port: the gateway serial port number to which the device is attached
- Slave ID: the device's Modbus node ID on the communication network
- Function: the Modbus protocol function code. Function codes are listed in the table below.
- Data Start Address: the address in the target device from which the gateway will read the data
- Data Length: the data block size the gateway will read
- Mapping Address: the location in the gateway's shared memory (cached data) from which the data will be retrieved when a Modbus TCP query is received. Ensure that this memory block does not overwrite a block configured for another message.
- Assign next available address: conveniently assigns the next available address to this request, to ensure data blocks do not overlap (overwrite).

Modbus Functions									
Modbus Function Code	Туре	Address Range	Equivalent Modicon Style Addressing	Number of Elements					
1	Read Coil	0-65535	0001-065536	1-2000					
2	Read Discrete Input	0-65535	100001-165536	1-2000					
3	Read Holding Registers	0-65535	400001-465536	1-125					
4	Read Input Registers	0-65535	300001-365536	1-125					

There are several different ways of addressing when communicating to Modbus devices. **The STRIDE®** gateways use the method of specifying a Function Code and start address as **addresses.** Another way that is very common and is seen often in AutomationDirect products is the use of the Modicon style addressing. This method employs a PLC style address that contains a Modbus memory type in the highest digit of the address followed by the offset from 1. The table above shows comparable addresses for both of these addressing styles.

DELETE MESSAGE

To delete a message from the list, click anywhere within the row of the message in the list, then click the "Delete Message" button. The message will be deleted immediately.

MODIFY MESSAGE

To modify an existing message from the list, click anywhere within the row of the message in the list, then click the "Modify Message" button. The Message Configuration dialog box will open, with the same options as presented when adding a new message.

DATA IN GATEWAY MEMORY

The Data in Gateway Memory page is available under Agent Settings when the gateway is in Agent mode. On the Data in Gateway Memory page, you may query the real-time data stored in the gateway's local cache as configured on the Message List page.

\leftrightarrow \rightarrow \circlearrowright 192.	68.0.249/index_v3.5.html		
		Stride	Exit
Device Information Network Settings Operating Settings Serial Settings	03 Holding Register(4x)	v 0	4 Data Query
Agent Settings Gateway Settings	Gateway Memory Address	Value (decimal)	Value (hexadecimal)
Message List	0	16	0×10
Import/Export	1	5	0×05
Upgrade Firmware Change Password	2	8315	0x207B
Load Factory Default System Reboot	3	132	0×84
 Data Diagnostics 			

To query the Modbus data stored in gateway memory:

- 1) Enter the Modbus function code (shown in the previous table).
- 2) Enter the starting address to query within the selected region. The Starting Address refers to the gateway internal address (0–65535) as shown in the previous table.
- 3) Enter the number of records to retrieve (data block size). Ensure that all addresses in that block are configured in the table on the Message List page. Querying data outside of those ranges will result in invalid values displaying on this page.
- 4) Click the "Data Query" button.

The results of the data query are displayed on the Data in Gateway Memory page, and are automatically updated in realtime. This page may be useful for troubleshooting the communications network.

IMPORT/EXPORT

The gateway configuration settings may all be stored to or loaded from a text file as a convenience when replacing the gateway or configuring multiple gateways with identical or similar settings.

Import/Export Screen

\leftarrow \rightarrow O	192.168	3.0.249/index_v3.5.html		□ ☆	r∕≣	l~ Ľ	<i>≩</i>
			Str ide			Ex	tit
						He	lp
Device Information			Import/Export				
Network Settings Operating Settings		Export Config File		Export			
Serial Settings		Import Config File	Choose File No file chosen	Import			
Agent Settings Gateway Settings		Upload Status	0%				
Message List							
• Data in Gateway Mer	mory						
Import/Export Upgrade Firmware							
Change Password							
Load Factory Default							
System Reboot							

EXPORT

Export the configuration file to a connected PC for backup or for configuring additional gateways. The exported file can be edited by any text editor, such as Notepad++.

IMPORT

An exported configuration file can be used to format a replacement gateway, to format additional gateways, or the exported file can be modified and re-imported to the same gateway to revise device settings. The filename must be [the part number].txt which is the same as an exported configuration filename: SGW-MB1511-T.txt or SGW-MB1512-T.txt or SGW-MB1524-T.txt

UPGRADE FIRMWARE

Occasionally firmware revisions are released to make new features available or to fix bugs.

Upgrade Firmware Screen

$\leftarrow \ \rightarrow \ \heartsuit$	192.168.0.	249/index_v3.5.html				7	Ē	l_	Ŀ	
			Str ide						Exit	
									Help	
Device Information			Upgrade Firmware							
Network Settings Operating Settings		Upgrade Firmware	Choose File No file chosen		Upgrade					
Serial Settings		Upload Status	0%]						
Agent Settings										
Gateway Settings Message List										
Data in Gateway Mem	nory									
 Import/Export 										
Upgrade Firmware										
Change Password										
 Load Factory Default 										
System Reboot										

To update the firmware, click Browse to locate and select the new firmware file on your PC, then click Upgrade.

The gateway must be rebooted after firmware is upgraded in order for the new firmware to take effect.

CHANGE PASSWORD

The *STRIDE*[®] gateways allow browser management access for the username "admin". The default password is admin. To provide an additional level of security, the password may be changed.

\leftrightarrow \rightarrow \circlearrowright 192	.168.0.249/index_v3.5.html								ృ	l~	Ŕ	
			S	Str	de	,)					Exit	
											Help	
Device Information					Chang	e Password						
Network Settings Operating Settings	User Name	admin										
Serial Settings	Old Password	Old Password										
Agent Settings Gateway Settings	New Password	New Password	7									
Message List	Retype Password	Retype Password										
Data in Gateway Memory	Management Security	HTTPS										
Import/Export Upgrade Firmware	L											
Change Password												
Load Factory Default						Save						
System Reboot Data Diagnostics												



SECURITY NOTE: HTTPS may be selected to encrypt the traffic between the browser and the gateway. When HTTPS is selected, the IP address in the browser address bar must be preceded by "https://".

For example, "https://192.168.0.249".

When a new password is entered here or HTTPS is selected, the browser will log you out of the current session and return you to the login page to login using the new password.



NOTE: Make sure to record the new password. If the password is lost, the gateway must be reset to factory defaults using the hardware reset button.



NOTE: Remember to click the SAVE button before you leave this page. Leaving the page before saving changes will cancel changes.

LOAD FACTORY DEFAULT

In addition to the hardware Reset Defaults button on the top of the gateway, default settings may be loaded from the browser interface. Upon clicking the "Load Factory Default" button, the gateway will ask for confirmation of the changes then reboot in order for the change to defaults to take effect.

\leftrightarrow \rightarrow O	192.168	.0.249/index_v3.5.html	r∕≣	h Ŀ										
		Stricle		Exit]									
				Help										
Device Information		Load Factory Default												
 Network Settings 		This function will report all pattings to the factory default values. Be aware that previous pattings will be lest												
 Operating Settings 		This function will reset all settings to the factory default values. Be aware that previous settings will be lost.	This function will reset all settings to the factory default values. Be aware that previous settings will be lost.											
 Serial Settings 														
 Agent Settings 														
Gateway Settings														
Message List		Load Factory Default												
Oata in Gateway Mer	mory													
 Import/Export 														
Upgrade Firmware														
 Change Password 														
 Load Factory Default 														
 System Reboot 														
Data Diagnostics														

\leftrightarrow \rightarrow \circlearrowright 192.16	58.0.249/index_v3.5.html					${\bf y}_{\rm int}^{\rm A}$	h e	
		Str	ide				Exit	
Device Information Network Settings Operating Settings Serial Settings Agent Settings Gateway Settings Message List Device In Control Memory		This site says Do you want to restore the gate configuration? OK	eway to the Factory Default Cancel	× vious settings	will be lost.		Help	
Import/Export Upgrade Firmware Change Password Load Factory Default System Reboot Data Diagonastics				Ę	è			

NOTE: This will reset the IP address(es), the password and the HTTPS access. If the device IP address had been previously changed, its default IP address after loading factory defaults may not be accessible by your current PC settings.

REBOOT

The Reboot option will reboot the gateway. Rebooting here, or cycling power at the gateway itself, is required after a firmware upgrade to make the new firmware take effect. All other configuration changes are implemented without requiring a reboot.

$C \ \ \leftarrow \ \ \rightarrow \ \ C$	192.168.0.249/index_v3.5.html	•	r∕≣	h &	
	Stride			Exit]
				Help]
Device Information Network Settings Operating Settings	System Reboot				
Serial Settings Agent Settings					
Gateway Settings Message List	Reboot				
	lory				
Change Password Load Eactory Default					
System Reboot Data Diagnostics					

APPLICATION EXAMPLES



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EXAMPLE 1:

USING MODBUS POLL TO STRIDE MODBUS GATEWAY WITH BRX SLAVE

This example will illustrate how to use Modbus Poll, which is a PC-based Modbus master simulator tool, to connect through the *STRIDE*[®] Modbus Gateway to a BRX PLC via 2-wire RS-485. For simplicity in this example, the gateway will be configured in Transparent Mode.

ITEMS NEEDED FOR THIS EXAMPLE:

- STRIDE Modbus Gateway
- BRX PLC (any model)
- PC with Modbus Poll installed (free demo is available at www.modbustools.com)
- AutomationDirect ZL-DB9F-CBL-2P D-sub 9-pin pigtail cable, or small length of AutomationDirect L-19954 RS-485 cable or equivalent and D-sub 9-pin socket (female) connector
- Ethernet switch and cables to connect from the PC to STRIDE Modbus Gateway

STEP 1: CONNECT THE STRIDE MODBUS GATEWAY SERIAL PORT TO THE BRX MPU SERIAL PORT.

Using the ZL-DB9F-CBL-2P cable, or D-sub 9-pin connector and a short length of RS-485 cable, connect Serial Port 1 of the *STRIDE* Modbus Gateway to the BRX serial port as shown:

RS-485 2-wire Wiring Diagram



The Gateway contains a DIP switch selectable 120Ω Termination Resistor between TX+ and TX- for each serial port on RS485 2-wire, when the Gateway is wired at one end of the serial network

STEP 2: CONFIGURE THE BRX MPU SERIAL PORT.

Connect to the BRX MPU with BRX Do-more! Designer software using either the BRX serial or USB Pluggable Option Module.

N A A A A A A A A A A			
Do-more Designer 2.0.3 - Scratchpad - [Dashboard]			- U X
File Edit Search View Tools PLC Debug Windor	w Help		-#×
Open Save New Backup Dashboard Edit Mo	ode Accept Undo Cut Copy Paste Fin	d Find Next Browse Previous Next Output	Options On The Web Tip Help
Read PLC Write PLC New Online Do-more/Sim Data	Debug Trend Memory Status All Status No Statu	us Forces Value Mode Info Configure Devices	Check PID Overview PID View -
Project Browser	2 SMain 💽 Dashboard		4 Þ ×
Programs Program Pr	Documentation Documentation Documentation Add PRC modpy Version: 2.0 ory used: <1% RX Orboard UO	On Decommentation Cyused: <1%	I/O Etherner (I) Matter DISARED I/O Salveter 0 I/O Salveter 0 I/O Salveter 0 I/O System Status: COOO Interrupts Enabled: 0
4 5 5 6 6 7 7 PC is nNo 9 0 10 5 5 0 6 3 7 PC is nNo 9 0 0 2.3.3: 11 Sca Three IS	IBDDemo Ch D23-0 (00 E0 62 30 04-43) Ch DGRAM mode Mode switch: TERM S5 255, 255, 255, 255, 255, 255, 255, 25	1emory Terrer environ Terrer terrer Verw Ferent fun FC and dak Terrer terrer verw Ferent fun FC and dak Terrer terrer terrer forces active forces active forces active forces active	Devices Add/edit devices 3 devices present Device status: OK
rorriep, press ri	Run lerm Stop	P D Devs OK PLC OK Unline/Derault Oser/BKADemo	Flogram comprosisio by by the flocb25-b

Click on the built-in serial port on the image of the BRX MPU within the Do-more! Designer software. From the dialog box that pops up, select "Edit Protocol and Port Type"

System Configuration			×
System Configuration Configuration Entries CPU Configuration B I/O Configuration B I/O Configuration C Configuration D C C C C C C C C C C C C C C C C C C C	BX OM IE-x CPU Configuration Serial Port Configuration Protocol C Do-more Protocol (For Programming, HMIs, etc) (For Programming, HMIs, etc) C Kapeunen Server (Emulates DirectLogic PLCs) Modus RTU Server (Slave) Modus RTU Clent (Master) Program Control C Lues STREAMULYSTREAMOUT for ASCII and Custom Protocols) C Anage @IntSerial Device Settings Port Type C RS232 (Pin1:0V, Pin2:0+, Pin3:D-) F Enable 120 Ohm Termination POM Configuration Setup POM Default Watchdog Timeout Setu POM Default Timeout: Interval for some state state some state state some state state some state some state some state some state some some some state some some some some some some some som	Internal Ethernet Port Configuration IP: 255.255.255 Configure Net Madx: 255.255.255 CPUs with Ethernet can enable a second programming connection on a different UOP port number. ID: Enable Secondary Ethernet Connection UDP Port Number: 5000 0x1388 TimeSync Configuration Do-more CPUs equipped with Ethernet ports can automatically synchronize their internal docks. Select: Doable' to Lurn off this feature Clent to liten for TimeSync messages 'Alternate' for a clent that reverts to server if server is offline. For servers or alternates, you may specify the time in minutes between updates. IP: Disabled Clent Clent Clent Server' to goater Imaging means and the server if server is offline.	Ethernet I/O Master OPLis with an internal Ethernet port can use that port to connect to compatible Ethernet I/O slave devices. Imable Ethernet I/O Master Modbus/TCP Server Configuration Do-more CPUs equipped with Ethernet ports can provide a Modbus/TCP Server. Server can support a maximum of 16 concurrent sessions to reduce scan time and improve scan consistency. Imakimum Concurrent Sessions: Imakimum Concurrent Sessions: Collent Inactivity Timeout: EtherNet/IP Explicit Message Server CPUs with an Ethernet port can provide an EtherNet/IP Explicit Message Server CPUs with an Ethernet port can provide an EtherNet/IP Settings Imakimum Concurrent Sessions: EtherNet/IP Settings
	ОК	Cancel Help	

In the Serial Port Configuration column, select "RS-485" under "Port Type" and select "Modbus RTU server (slave)" under "Protocol". Then click "Change @IntSerial Device Settings..."

Edit Serial Port Settings	\times
Device Name: Continue Modbus Protocol Settings Unit ID 1 0 - 255	
Port Settings	
Baud Rate: 38400	•
Data Bits: 8	-
Stop Bits: 1	
Parity: Odd	
Transmit Control: Unconditional	
RTS Control: Follows Transmitter	-
OK Cancel	

Setup the port as shown for 38400 baud rate, Odd parity, 1 Stop bit and Unit ID 1. Match everything else as shown. Note the Unit ID configured in the PLC. Once this has been done, click "OK" to close this dialog then "OK" again to close the preceding dialog.

STEP 3: CONFIGURE THE STRIDE MODBUS GATEWAY

Open up a web browser, such as Internet Explorer, enter in the IP address of the *STRIDE* Modbus Gateway, and log into the *STRIDE* Modbus Gateway web console as described in the Initial Connection section of Chapter 3 to access the Device Information as shown:

		St	tride		Exit
Device Information	_		Device Information		Help
Network Settings Operating Settings Serial Settings Import/Export Upgrade Firmware Change Password Load Factory Default System Reboot Data Diagnostics	Device Name Model Type IP(E1) IP(E2)	SGW-MB1524-T MB-Gateway 192.168.0.249 192.168.1.249 Transparent Mode Agent Mode	SN Firmware Version MAC(E1) MAC(E2)	K10A0004A180100036 V3.5.019 00:1E:CD:1B:FA:15 00:1E:CD:1B:FA:16	

Set the gateway to Transparent Mode.

On the Operating Settings page, set Serial Port 1 to RTU Master mode as shown below and click Save.

$\leftarrow \ \rightarrow \ \heartsuit$	192.168.0	0.249/index_v3.5.html						l~	Ŕ	
			St	ride					Exit	
									Help	
Device Information				Operating	g Settings					
 Network Settings Operating Settings 		S1	S2		\$3	S	4			
Serial Settings Agent Settings		Serial Port Mode	RTU Master 🗸							
Gateway Settings		Filter Enable								
Message List		Filter ID Start	1							
 Data in Gateway Men Import/Export 	nory	Filter ID End	247							
Upgrade Firmware		Protocol	TCP \checkmark (Note: In Agent me	ode, you can moo	lify the Modbus port on the 'Gateway S	ettings' page.)				
 Change Password Load Factory Default 		Gateway Modbus TCP Port	502	(Note: In Ager	t mode, you can modify the Modbus po	ort on the 'Gateway S	Settings' p	oage.)		
System Reboot										
Data Diagnostics				Sa	ve					

Click "Serial Settings" from the navigation menu

\leftrightarrow \rightarrow O	192.168.0.	249/index_v3.5.html				★ ☆ ル	<u>è</u>
			Stric	e		E	xit
						He	elp
Device Information			Si	erial Settings			
Network Settings Operating Settings			S1	S2	S3	S4	
Serial Settings		Alias	UART_1	UART_2	UART_3	UART_4	-
Import/Export Ingrade Eirmware		Baudrate	38400 🗸	115200 ~	115200 ~	115200 ~	-
Change Password		Databits	8 ~	8 ~	7 ~	8 ~	-
Load Factory Default Sustem Deheet		Stopbits	1 ~	1 ~	1 ~	1 ~	
Data Diagnostics		Parity	Odd 🗸	None 🗸	None ∨	None 🗸	
		RTS Control	Off ~	Off ~	Off ~	Off ~	
		Hardware Interface	RS-232 ~	RS-232 ~	RS-232 ~	RS-232 ~	
		Protocol(selected on Operating Settings page)	RTU Master $~ \lor$	RTU Slave \sim	Disabled \checkmark	RTU Master $~ \lor$	
				Save			

Set the serial port parameters to match the configuration of the BRX MPU, and set the hardware interface to RS-485 2-wire.

Click "Save" to store and apply the settings.

STEP 4: CONNECT TO THE STRIDE MODBUS GATEWAY USING THE MODBUS POLL SIMULATOR SOFTWARE.

Once the software has been obtained from www.modbustools.com and installed according to the directions provided from their website, open up the Modbus Poll software.

Click on the Setup pulldown menu and select Read/Write Definition as shown:

육립 Modbus Poll - Mb	poll1			
File Edit Connection	Setup Functions Display	View Window	Help	
D 🖻 🖬 🎒 🗙	Read/Write Definition	F8 22	23 101 🤋 🎀	
📅 Mbpoll1	✓ Read/Write Disabled	Shift+F6		
Tx = 0: Err = 0: ID	Excel Log	Alt+X BL	.ED)	
No Connection	Excel Logging Off	Alt+Q		
Alias	Log	Alt+L		
0	Logging Off	Alt+O		
1	Reset Counters	F12		
2	Use as Default			
3				
4				
5				
/				
0				
2				
Read/write definition			Port 1: 9600-8	B-E-1

Configure the Read/Write definition for a simple read of the register 400001, which equates to MHR1 (16 bit word, decimal data type) in the BRX MPUs.

Read/Write	e Definition 🛛 🔀
Slave ID:	1 ОК
Function:	03 Read Holding Registers (4x) 🗸 Cancel
Address:	1
Quantity:	1 Apply
Scan Rate:	1000 ms
Disable Read/ Disable	Write Disabled
Display:	20 50 100 ☐ Hide Alias Columns ☐ Address in Cell Signed ♥ PLC Addresses (Base 1)

Enter 1 for the Slave ID. This matches the Unit ID in the protocol that will determine which Modbus Serial slave will be targeted on the serial side of the STRIDE Modbus Gateway. Entering 1 here will match up to the Station Number configured above in Do-more! Designer for the BRX MPU.

Choosing Function 3 sets up the read for 4xxxxx registers. Checking the "PLC Addresses (Base 1)" in the lower right corner matches the addressing to the cross reference chart mentioned above. Once this windows has been configured as shown above, click on OK.

Now click on the Connection pulldown menu and select Connect:

월 Modb	us Poll - Mbpoll1		
File Edit	Connection Setup Fu	nctions Display View Window Help	
D 🗳	Connect F3 Disconnect F4	📋 .L 05 06 15 16 22 23 101 💡 隆	
<mark>) Mbpe</mark> Tx = 0:	Auto Connect Quick Connect F5): SR = 1000ms (DISABLED)	
No Con	nection	-	
	Alias 4×000	ס	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Connect		Port 1: 9	600-8-E-1

In the Connection Setup window, choose the Modbus TCP/IP connection type. Enter the IP address of your *STRIDE* Modbus Gateway module in the lower left hand corner. Match everything else as shown:

Connection Setup	X
Connection	ОК
Modbus TCP/IP	
Serial Settings	Lancel
Communications Port (COM1)	Mode
9600 Baud 👻	RTU O ASCII
8 Data bits 🕑	Response Timeout 1000 [ms]
Even Parity 💟	Delay Between Polls
1 Stop Bit 🐱 Advanced	10 [ms]
Remote Server	
IP Address Port Conn	ect Timeout
192.168.0.249 502 3000	[ms]

Click on OK to connect to the STRIDE Modbus Gateway.

If everything has been configured correctly, the counter next to "TX =" will increment rapidly and the counter next to "Err =" will not increment. If the Error counter is incrementing, go back and verify that all the steps prior to this one have been followed. If you get an error that says, "Modbus TCP connection failed", verify that the IP address of the PC and the IP address of the *STRIDE* Modbus Gateway are in compatible subnets and can communicate.

Nodbus Poll - Mbpoll1	
File Edit Connection Setup Functions Display View Window Help	
🗋 🖻 🖨 🖨 🗙 🔚 🗒 🔀 🗂 🗒	101 🦞 隆
👺 Mbpoll1	
Tx = 60: Err = 0: ID = 1: F = 03: SR = 100ms	
Alias 4x0000	
2	
3	
4	
5	
6	
7	
8	
9	
10	
For Help, press F1.	192.168.0.249: 502

Once Modbus Poll is communicating to the PLC, go into Do-more! Designer, open a Data View window and enter MHR1. Change the display type to "Decimal" to match the Modbus Poll

Change the value in data view for MHR1 to various values and watch the value change in Modbus Poll to match.

EXAMPLE 2:

USING MODBUS POLL TO STRIDE MB GATEWAY WITH CLICK SLAVE

This example will illustrate how to use Modbus Poll, which is a PC based Modbus master simulator tool, to connect through the *STRIDE* Modbus Gateway to a CLICK PLC via 2 wire RS-485.

ITEMS NEEDED FOR THIS EXAMPLE:

- STRIDE Modbus Gateway
- CLICK PLC (any CO-01xx-x or CO-02xx-x PLC with 3 pin terminal RS-485 port)
- PC with Modbus Poll installed (free demo is available at www.modbustools.com)
- Small length of AutomationDirect L-19954 RS-485 cable or equivalent
- Ethernet switch and cables to connect from the PC to STRIDE Modbus Gateway

STEP 1: CONNECT THE STRIDE MODBUS GATEWAY SERIAL PORT TO PORT 3 OF THE CLICK PLC.

Using the short length of RS-485 cable, connect the STRIDE Modbus Gateway to CLICK's Port 3 as shown:



STEP 2: CONFIGURE THE CLICK SERIAL PORT.

Connect to the CLICK PLC with CLICK programming software. Go to the Setup pulldown and select Com Port Setup... as shown:

CLICK Programming Software - NewProject1.ckp - [Main Program]	>	×
🔄 File Edit View Setup Program Instruction PLC Monitor Window Help	- 8	×
🗋 📸 🛃 🖂 🔯 System Configuration 🥙 😓 🛛 🍕 🔍 💭 🎘 🙆 🙀 👘 👘 👘 🔚	🐀 🚯 🛯	
PLC Mode PLC Error Nicknames Address Comments	Rung Comments	à
Navigation O Scan Time C D E F AF	Instruction List	×
Program Function P 🔦 Watch Dog Timer	Instruction	•
- A Ladder Program O Password Setup Ctrl+Shift+P	Edge Contact	
The Main Program in Battery Backup Setup	Compare	
- Subroutine	Coil	
Interrupt Pro Interrupt Sectors. (NOP.)	Hunni Out	
- Address Pic Salter IVO Setup	() mi Set	
Edit Rung C Software Setup	(ini) Reset	
Local Program and market and a rest of the second sec	Timer/Counter	
Orins Ories	Int Counter	
	Advanced	
Status Monitor	tath Math	
b-T Data View	Dium Drum	
- VIII DataView1 5	SR Shift Register	
Text View	Copy/Search	
WOR)	Copy	
System Monitor	skoll Search	
	Program Control	
7 (NOP)	Even For	
	NAT Next	
	END End	~
→F		
Com Port S 🖪 Bit 🚺 Integer 🔟 Integer(2 words) 📳 Floating point 📔 Hex 🎹 Text 🛕 Ascii Offline 🛛 0000/8000 🛛 CO-02DD1-D	1:1:AF	:

Click the Port 3: Setup... button to configure Port 3 of the PLC.

COM Port Setup	×
COM Port Setup There are only 3 ports on C0-02DD1-D CPU Module	Port 1: The setup of this port is fixed. It works as a network slave only. This port is used for programming and maintenance only. Learn More Setup Port 2: This port is used for general purpose communication that uses RS-232. This port can be a network master or slave. Learn More Setup Port 3:
PORT2 AD21 PORT3 RS-485 DATV TX3 + DATV DATV DATV	This port is used for general purpose communication that uses RS-485. This port can be a network master or slave.
R.3 LG DA21	OK Cancel Help

Configure the port for 38400 baud rate, Odd parity, 1 Stop Bit and Node Address 1. Leave the other settings as shown below. Note the Node Address number configured here. Once the settings are configured, Click on the Ok button.

t Setup Details				
Port3 v Protocol: Mo	dbus	\sim		
Configuration			Wiring Details	
Node Address (1-247):	1			
Baud Rate (bps):	38400	~	Port3 RS-485 (Non isolation)	
Parity:	Odd	\sim	3 pin Removable Terminal Block	
Stop Bit:	1	\sim	book	
Communication Data (bit):	в	\sim		
ced Configuration				
Time-out Setting:	500 ms	\sim		
aracter Time-out (2-1000ms):	2	▲ ▼		
RTS ON Delay (0-5000ms):	0	*		
RTS OFF Delay (0-5000ms):	0	A.		
onse Delay Time (0-5000ms):	0	▲ ▼		
RTS OFF Delay (0-5000ms):	0	▼ ▼ OK	Cancel	Help

Next, transfer the project to the PLC for the Port 3 settings to take effect. Select the PLC pulldown menu and choose Write Project into PLC...

CLICK Programming Software - NewProject1.ckp - [Main Program]		– 🗆 X
🖼 File Edit View Setup Program Instruction	PLC Monitor Window Help		_ 8 ×
🗅 🧉 🖬 🏼 🖾 🔲 👘 👘	<mark>∲∳</mark> <u>C</u> onnect	📐 🥝 🕑 🚳 🛛 🚧 🐘 🕷	i 🛍 🚯 🖬 🏊 🐞
🔳 🔞 🛛 🥏 🖉 📃 📕	PJ Disco <u>n</u> nect	Nicknames Address Comment	s Rung Comments
CLICK Programming Software - NewProject1.ckp - [Main Program] - C File Edit View Setup Program Instruction File Edit View Setup Program Instruction PC Connect Discognect Navigation F AF Navigation F AF Navigation F AF Navigation F AF Instruction F AF Instruc		Instruction List	
Program Function PLC	Write Data into PLC		Instruction
Ladder Program 1	Read Project from PLC Ctrl+F9	(END)	🚯 Edge Contact 🔺
Main Program Subroutine Program	Write Project into PLC Shift+F9		Compare
Interrupt Program	Ut Online Project Information		Cut Out
- Address Picker	PLC Modes Ctrl+Shift+R	(Nor)	(inf) Set
			Timer/Counter
- Vintax Check	Lerror History	(Nor)	THE Timer
Cross Reference View	Update Firmware		CNT Counter
Katus Monitor	Parat to Easton: Default		taransou taransou taransou
Data View	Reset to ractory berault		Drum Drum Shift Degister
TXT Text View		(Nor)	Copy/Search
Override View			сору Сору
System Monitor		(1101)	Starch Program Control
7			tall Call
		(1101)	FOR For
		¥	
		>	. <u> </u>
-1 - -1 - <t< td=""><td></td><td></td><td></td></t<>			
Write Projec 🖪 Bit 🚺 Integer 🔟 Integer(2 words) 📭 F	loating point 📔 Hex 🏋 Text 🛕 Ascii Offline	0000/8000 C0-02DD1-D	1:1:AF

Choose Ok and follow the steps when prompted to transfer the project to the PLC.

Read/Write Program		
PC		PLC
Project Name: MBGATEWAY1		Project Name: MBGATEWAY1
Program Size (Total: 8,000 steps)		Program Size (Total: 8,000 steps)
Program Size: 3 steps (0.03 %)	Program Size: 3 steps (0.03 %)
Free Area: 7,997 steps (99.97 %)	Free Area: 7,997 steps (99.97 %)
0	8,000	8,000
Save Project to PLC Memory		Project File (Total: 256,000 bytes)
Recovery data is written with the project.		Project File Size 964 bytes (0.37 %)
The project cannot be read from the PLC		Free Area: 255,036 bytes (99.63 %)
without this option being selected.		
		0 256,000
Last Update: Mar 22,20	11, 15:15:37	Last Update: Mar 20,2011, 12:10:2
		OK Cancel Help

STEP 3: CONFIGURE THE STRIDE MODBUS GATEWAY

Open up a web browser, such as Internet Explorer, enter in the IP address of the *STRIDE* Modbus Gateway, and log into the *STRIDE* Modbus Gateway web console as described in the Initial Connection section of Chapter 2 to access the Device Information as shown:

		S	Str ide			Exit
Device Information			Device Informa	ation		Help
Network Settings Operating Settings	Device Name	SGW-MB1524-T	SN		K10A0004A180100036	
Serial Settings	Model Type	MB-Gateway	Firm	ware Version	V3.5.019	
Import/Export Import/Export	IP(E1)	192.168.0.249	MAC	C(E1)	00:1E:CD:1B:FA:15	
Change Password	IP(E2)	192.168.1.249	MAC	(E2)	00:1E:CD:1B:FA:16	
Load Factory Default System Reboot Data Diagnostics	(Agent Mode				, ,

Set the gateway to Transparent Mode.

On the Operating Settings page, set Serial Port 1 to RTU Master mode as shown below and click Save.

\leftrightarrow \rightarrow O	192.168.	0.249/index_v3.5.html				□ ☆	∑≞	l~	È	
				Stride).				Exit	
								ł	Help	
Device Information				Opera	ing Settings					
Network Settings Operating Settings		S1		S2	\$3	S4	4			
Serial Settings Import/Export		Serial Port Mode	RTU Master	\checkmark						
Upgrade Firmware		Filter Enable								
Change Password		Filter ID Start	1							
 Load Factory Default System Reboot 		Filter ID End	247							
Data Diagnostics		Protocol	TCP 🗸							
		Gateway Modbus TCP Port	502							
			•							
					Save					

Click "Serial Settings" from the navigation menu

\leftarrow \rightarrow \circlearrowright 192.	168.0.249/index_v3.5.html				★ 烽 ル	<i>è</i>
		Str ic	e			<mark>Exit</mark>
					F	lelp
Device Information		S	erial Settings			
Network Settings Operating Settings		S1	S2	S3	S4	
Serial Settings	Alias	UART_1	UART_2	UART_3	UART_4	
Import/Export Ingrade Eirmware	Baudrate	38400 ~	115200 ~	115200 ~	115200 ~	
Change Password	Databits	8 ~	8 ~	7 ~	8 ~	
Load Factory Default	Stopbits	1 ~	1 ~	1 ~	1 ~	
Data Diagnostics	Parity	Odd ~	None 🗸	None ∨	None 🗸	
	RTS Control	Off ~	Off ~	Off ~	Off ~	
	Hardware Interface	RS-232 ~	RS-232 ~	RS-232 ~	RS-232 ~	
	Protocol(selected on Operating Settings page)	RTU Master $~\sim~$	RTU Slave \sim	Disabled \sim	RTU Master $~ \lor ~$	
						_
			Save			

Set the serial port parameters to match the configuration of the CLICK PLC, and set the hardware interface to RS-485 2-wire.

Click "Save" to store and apply the settings.

STEP 4: CONNECT TO THE STRIDE MODBUS GATEWAY USING THE MODBUS POLL SIMULATOR SOFTWARE.

Once the software has been obtained from *www.modbustools.com* and installed according to the directions provided from their website, open up the Modbus Poll software.

Click on the Setup pulldown menu and select Read/Write Definition as shown:

원을 Modbus Poll - Mi	opoll1		
File Edit Connection	Setup Functions Display	View Window He	łp
D 🖻 🖬 🎒 🗙	Read/Write Definition Read/Write Once	F8 22 23	i 101 🤋 🎀
🔛 Mbpoll1	✓ Read/Write Disabled	Shift+F6	
T× = 0: Err = 0: ID No Connection	Excel Log Excel Logging Off	Alt+X BLED]
Alias 0	Log Logging Off	Alt+L Alt+O	
1 2	Reset Counters Use as Default	F12	
3 4			
5			
7			
8			
9			
Read/write definition			Port 1: 9600-8-E-1

Configure the Read/Write definition for a simple read of the register 400001, which equates to DS1 in the CLICK PLC as shown.

CLICK Programming Softw	are - NewProject1.ckp - [Main Program]	– 🗆 X
🖼 File Edit View Setup	Program Instruction PLC Monitor Window Help	_ & ×
🗅 🧉 🔙 🎯 🞑	🙀 Add New Subroutine Program Ctrl+U 🛛 🔍 🖉 🝈 🐁 🥥 报 🙀 👘 📲 🦉 👔	in 🐂 🚯 💵 🏊 📹
🔳 🖬 🛛 🖉 🏓 🔈	Add New Interrupt Program Ctrl+1	ts Rung Comments
Navigation		Instruction List ×
Program Function PLC	Pedit Runa Comments Ctrl+K	Instruction +
🖃 🧀 Ladder Program	Local Program Information END	Edge Contact 🔥
🔛 Main Program		🛒 Compare
Subroutine Program		Coil
- P Address Picker	Cross Reference View (NOP)	ing Out
- Edit Rung Comment:	IS	(m) Reset
	mation 3 (NOP)	Timer/Counter
Cross Reference Vie	ew	CNT Counter
🖻 🖾 Monitor	4 (NOP)	Advanced
Status Monitor		<u>a</u> t Math nam Drum
DataView1	5(NOP)	SR Shift Register
Text View		Copy/Search
System Monitor	6 (NOP)	Copy Search
Und Oystein Montor		Program Control
	7 (NOP)	Call
		FOR FOR
	· · · · · · · · · · · · · · · · · · ·	END End 🗸
		<u>.</u>
F2 F3 F2 F3 5	1TF 14F 1=F 1≠F 1≥F 1≤F 5 ₩F2 5 ₩F2 5 ₩F2 = ! > ≤	
Address Pic 🖪 Bit I Integer 🛽	😰 Integer(2 words) 📘 Floating point 📙 Hex 頂 Text 🛕 Ascii Offline 🛛 0003/8000 🛛 CO-02DD1-D	1:1:AF

<i>@</i> /	Address Pie	cker : Edit Mode							\times
	Fill Down ((Nickname) Find:	∠ ✓ ⊻ Exact	Match Find					_
All	Address	Data Type	MODBUS Address (Function code)	Nickname	Used	Initial Value	Retentive	Address Comment	<u>^</u> ا
	DS1		400001 (03,06,16)		No	Disable	Yes		- 1
X	DS2		400002 (03,06,16)		No	Disable	Yes		-
Y	053		400003 (03,06,16)		NO	Disable	res		-
c	054		400004 (03,06,16)		NO	Disable	res		-
т	DSS		400005 (03,06,16)		NO	Disable	res		-
CT I	DS6		400006 (03,06,16)		No	Disable	res		-
	DS7		400007 (03,06,16)		No	Disable	res		-
SC	DS8		400008 (03,06,16)		No	Disable	res		-
De	DS9		400009 (03,06,16)		No	Disable	Yes		-
03 no 1	DS10		400010 (03,06,16)		No	Disable	Yes		-
טט	DS11		400011 (03,06,16)		No	Disable	Yes		-
DH	DS12		400012 (03,06,16)		No	Disable	Yes		-
DF	DS13		400013 (03,06,16)		No	Disable	Yes		-
	DS14	RW	400014 (03,06,16)		No	Disable	Yes		-
XD	DS15	RW	400015 (03,06,16)		No	Disable	Yes		-
YD	DS16	RW	400016 (03,06,16)		No	Disable	Yes		-
TD	DS17	RW	400017 (03,06,16)		No	Disable	Yes		-
CTD	DS18	RW	400018 (03,06,16)		No	Disable	Yes		-
SD	DS19	RW	400019 (03,06,16)		No	Disable	Yes		-
TVT	DS20	RW	400020 (03,06,16)		No	Disable	Yes		-
	DS21	RW	400021 (03,06,16)		No	Disable	Yes		~
	Data Typ Displ	pe Filter lay All Data Types integer 12 Intr IEX FOR Sit T Tes	eger (2Words) ating Point ct	ress sed and unused sed nused	Display MC MODBUS	DBUS Address 984 Addressin HEX Addressin Export	g		
						OK	Cance	el Help	

Enter 1 for the Slave ID. This matches the Unit ID in the protocol that will determine which Modbus Serial slave will be targeted on the serial side of the **Stride** Modbus Gateway. Entering 1 here will match up to the Station Number configured above in the CLICK software.



Choosing Function 3 sets up the read for 4xxxxx registers. Checking the "PLC Addresses (Base 1)" in the lower right corner matches the addressing to the cross reference chart mentioned above. Once this window has been configured as shown above, click on OK.

Now click on the Connection pulldown menu and select Connect:

21 N	lodbi	us Poll -	Mbpoll1													
File	Edit	Connectio	on Setup	o Fun	ctions	Display	/ Viev	v Win	ndow	Help						
D	2	Conne Discon	nect 😽	F3 F4	<u>i</u>	Π. 05	06 1	5 16	22	23	101	ę	₩?			
Tx	Mbpd = 0:	Auto C Quick (Connect Connect	F5): SR	= 100	Oms	(DIS	ABL	ED)						
NU	COIII	lecuoli														
	J	Alias	4	×0000												
1				0												
2																
3																
4																
5																
6																
7																
8																
9																
10																
Conne	ect											Port	1:96	00-8	-E-1	

In the Connection Setup window, choose the Modbus TCP/IP connection type. Enter the IP address of your *STRIDE* Modbus Gateway module in the lower left hand corner. Match everything else as shown:

Connection Setup	×
Connection	ОК
Modbus TCP/IP	
Serial Settings	Cancel
Communications Port (COM1)	Mode
9600 Baud 💌	RTU OASCII
8 Data bits 💽	Response Timeout 1000 [ms]
Even Parity 👻	Delay Between Polls
1 Stop Bit 💉 Advanced	10 [ms]
Remote Server	
IP Address Port Conne	ct Timeout
192.168.0.249 502 3000	[ms]

Click on OK to connect to the *STRIDE* MB Gateway.

If everything has been configured correctly, the counter next to "TX =" will increment rapidly and the counter next to "Err =" will not increment. If the Error counter is incrementing, go back and verify that all the steps prior to this one have been followed. If you get an error that says, "Modbus TCP connection failed", verify that the IP address of the PC and the IP address of the *STRIDE* Modbus Gateway are in compatible subnets and can communicate.



Once Modbus Poll is communicating to the PLC, go into the CLICK programming software, open up a Data View window and enter in DS1 as shown.

🔠 Da	ta View -[Dat	taView1]					
Ē	lit Fill (<u>own</u>	谢 <u>W</u> rite A	ll New Values		View Override	VR OFF
No.	Address	Nickname	Current Value	New Value	Write	Viewing Format	~
001	DS1	400001	0			Integer	
002							
003							
004							
005							
006							
007							
008							~
	xport					Close	Help

Change the value in data view for DS1 to various values and watch the value change in Modbus Poll to match.

EXAMPLE 3:

USING P3000 AS MASTER (CLIENT) TO STRIDE MODBUS GATEWAY WITH CLICK SLAVE.

STEP 1: CONNECT CLICK TO THE STRIDE MODBUS GATEWAY AS SHOWN IN EXAMPLE 2.

STEP 2: CONNECT P3000 CPU (P3-550) TO STRIDE MODBUS GATEWAY VIA ETHERNET SWITCH AND TWO ETHERNET CABLES.

Configure the IP address of the P3000 or P3-550 CPU and the *STRIDE* Modbus Gateway to be compatible subnets. Steps to configure the IP address of the P3-550 CPU areas follows:

Click on Setup on the top menu bar and choose "Hardware Configuration".

Pro Productivity Suite Programming Software, Version 3.1.0 (11) [No Name] -
File Edit Setup CPU Tools Window Help
🗋 🕼 🛃 🔗 Hardware Config 🔪 🔹 📲 🦉 🖉 Offine 🖉 Online 🧟 Choose CPU 🍓 Run 🍓 Stop 🔤 🖓 🐼 🔹 📲 🍓 🖄 🍓 象 🤹 🖷 🔹
Application 1 1/0 Overview Hardware Config
Setu Comm Adapter Config > 1 🛛 🗨 🛶 🛶 Run Every Scan 🗸 🖘 Monitor 👻 🕂 Favorites
H ⊗ Set CPU Time/Date 2 3 4 5 6 7 8 9 10 11
Data Logger
S S Security Accounts (END)
Set CPU Time/Date
Here rogani
I/O Overview 3 (END) The Contract (NO)
Rung Comments
Compare Project 4 (END)
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Pointor a Debug 5 (END) (ES) Flasher
KNM No Operation
Task Management
(END)
Tasks
Run First Scan Only 8 EST Reset Coll
Run Every Scan
Run Every Second 9 (END) (MC) Timed Coll
Run When Called III (FIG) Toggle Coll
Uisable Task
User No Security Task New Task Rung 1 Column 1 CPU Offline Project File Status Saved CPU Project Status Run Time Transfer

Double click on the image of the P3-550 in the center of the hardware configuration.



Click on the "Ethernet Ports" tab and configure the IP address in the "Use the Following:" IP address field. Once the correct IP address and Subnet Mask is entered, click on the OK button and close the hardware configuration window.

P3-550 ×
P3-530 CPU Module Options Ethernet Ports Remote Access Serial Ports Image: CPU ETH-Ext Port Security Option: Read Only Image: CPU/ETH-Ext Port Security Option: Read Only Image: CPU/ETH-Ext Image: CPU/ETH-Ext Port Security Option: Read Only Image: CPU/ETH-Ext Image: CPU/ETH-Ext Port Security Option: Read Only Image: CPU/ETH-Ext Image: CPU/ETH-Ext Image: CPU/ETH-Ext Port Security Option: Read/Write Image: CPU/ETH-Ext Image: CPU/ETH-Ext Port Security Option: Read/Write Image: CPU/ETH-Ext Image: CPU/ETH-Ext Port Security Option: Read/Write Image: CPU/ETH-Ext Image: CPU/ETH-Ext Image: CPU/ETH-Ext Image: CPU/ETH-Ext Image: CPU/ETH-Ext <t< th=""></t<>
Module Info OK Cancel Help

Transfer the project to the PLC in order to have the new settings take effect. To do this, select File from the pulldown menu and then Transfer Project >To PLC...

File Edit Setup CPU Tools Window Help New Project Image: Choose CPU Run Stop Image: Choose CPU Run Image: Choose CPU Run Image: Choose CPU	•
New Project Image: Choose CPU image: C	•
Open Project ew Task Close Project E I I I I I I I I I I I I I I I I I I I	•
Close Project	5
Save Project Ctrl+S 1 2 3 4 5 6 7 8 9 10 11 M ASCII In	
Save Project As	
🗞 Import >	er
Export > END) USE Custom Protocol Eth END)	rnet
Compile Project F8	
Transfer Project > To CPU Shift+F9 (END) (CPU Custom Protocol Out	
Page Setup 🐼 From CPU Ctrl+F9	
🕒 Print Ctrl+P 🏂 To Removable Media (END)	le
Project Properties Trom Removable Media (END)	
Sorres with Sorres and Sorres a	
6 (END) (With SWite	
Task Management	
Larkes (END) [Hill Send Email	
e- Run Every Scan	
New Task Scond Scond	
Run When Called	
Ling Disable Task	~
Liese Na Searchy Task New Task Dure 1 Column 1 COLI Office Desiret File Status Nat Saved COLI Desiret Status	

STEP 3: CONFIGURE THE MRX INSTRUCTION TO READ DATA FROM THE STRIDE MODBUS GATEWAY.

Double click on the instruction MRX Read to configure the MRX instruction as shown.

Modbus Read (MRX)				>
	U:	e Structure		~
Ethernet Port CPU-ETH-Ext	~	In Progress	Click1_Read1_InProg	~
IP Address 192.168	3.0.249	Complete	Click1_Read1_Comp	~
TCP Port Number 502		Success	Click1_Read1_Success	~
Slave Node Number	1 (Default=255)	Error	Click1_Read1_Err	~
O Serial Port CPU-232 V		Timeout	Click1_Read1_TimeOut	~
Slave Node Number	1 (Default=1)	Exception sponse String	Click1_Read1_ExResp	×
Addressing and Polling	Options			
Automatic Polling	very 100 msec	poll off	set 0 msec	5
Skip execution if buffer is g	reater than 75	% full		
Map 16 bit data to 32 bit Tagname Mapping	Modbus Decim Zero Based Model	al Addressing odbus Address	ing	
Modbus Function Code 3: Rea	ad Holding Registers \smile			
Non-Array	Tag			
Number of Tags 1	1 CLICK DS	1 🗸		
O Array Array Name	~	. Starting I	ndex 1 End Inde	x 1
O String String Name	~ .	. Number o	f Characters 2	
Byte Swap		(Even Nur	mber Only)	
Show Instruction Comment				
Monitor		O	Cancel	Help

IP Address: address of the *STRIDE* Modbus Gateway.

TCP Port Number: Leave at default 502.

- **Slave Node Number:** This should match the Node address of Port 3 of the CLICK PLC. Leave at 1 in this case.
- **Slave Modbus Starting Address:** Set to 1 to read address DS1 in the CLICK PLC.

Tag Name Mapping: Create a Tag called CLICK_DS1 as an Signed Int 16 Tag to read in DS1 from the CLICK PLC.

Use the status bits and Exception Response String to verify whether communications were successful or not. If the Error bit comes on, look at the Exception Response String to see which error occurred. If the Timeout Bit comes on, check the IP address settings of the P3-550 and the *STRIDE* Modbus Gateway and make sure that they are in compatible subnets.

If the Successful Status bit comes on, add the CLICK_DS1 tag to the Data View at the bottom of the Productivity Suite Programming Software and check the values. Change the values in the CLICK data view for DS1 and verify that the CLICK_DS1 tag matches.

STRIDE MODBUS GATEWAY OPERATING MODE EXAMPLES



I٨	<u>I THIS CHAPTER</u>
	Example 1: TRANSPARENT Mode, with Modbus TCP Master (Client) Devices to Modbus RTU/ASCII Slave Devices
	Example 2: TRANSPARENT Mode, with Modbus RTU/ASCII Master Devices to Modbus TCP Slave (Server) Devices
	Example 3: AGENT Mode, with Modbus TCP Master (Client) Devices to Modbus RTU/ASCII Slave Devices
	Example 4: AGENT Mode, with Modbus RTU/ASCII Master Devices to Modbus TCP Slave (Server) Devices

EXAMPLE 1: TRANSPARENT MODE, WITH MODBUS TCP MASTER (CLIENT) DEVICES TO MODBUS RTU/ASCII SLAVE DEVICES



Provide power to the *STRIDE* Modbus Gateway, connect to an Ethernet port and log on to the gateway configuration interface.

Our example assumes default values in the gateway. Click Load Factory Default.

Set the operation mode to Transparent Mode.

Browse to "Operating Settings" to select S1 and set its parameters, as shown in Figure 1.

\leftrightarrow \rightarrow O	192.168.0.2	249/index_v3.5.html					□ ☆	r∕≣	h is	›
				Strid	e				Exit	
									Help	
Device Information				Op	erating Settings					
 Network Settings Operating Settings 		S1		S2		\$3	S	4		
Serial Settings		Serial Port Mode	RTU Master	~						
Upgrade Firmware		Filter Enable								
Change Password		Filter ID Start	1							
 Load Factory Default System Reboot 		Filter ID End	247							
Data Diagnostics		Protocol	TCP 🗸							
		Gateway Modbus TCP Port	502							
					Save					

Figure 1. STRIDE Modbus Operating Settings.

Click Save.

Then browse to "Serial Settings" to configure serial port S1 as shown in Figure 2.

\leftrightarrow \rightarrow O	192.168.0	.249/index_v3.5.html					∿≣	l~	È	
			Stric	e					Exit	
									Help	
Device Information			S	erial Settings						
Network Settings Operating Settings			S1	S2	S3	S4				
Serial Settings		Alias	UART_1	UART_2	UART_3	UART	4			
Import/Export Upgrade Firmware		Baudrate	115200 ∨	115200 🗸	115200 ~	11520	0 ~			
Change Password		Databits	8 ~	8 ~						
Load Factory Default System Report		Stopbits	1 ~	1 ~	1 ~	1 ~				
Data Diagnostics		Parity	None 🗸	None 🗸	None 🗸	None				
		RTS Control	Off ~	Off ~	Off ~	Off				
		Hardware Interface	RS-232 V	RS-232 ~	RS-232 ~	RS-23	2 ~			
		Protocol(selected on Operating Settings page)	RTU Master $~ \lor ~$	RTU Slave \sim						
				Save						

Click the Save button to save and apply the changes.

Figure 2. STRIDE Modbus Serial Settings.

Connect the *STRIDE* Modbus Gateway serial port S1 to your PC's serial port (possibly requiring a USB to serial converter), and run Modbus Slave software on the PC. The Modbus Slave parameters must be configured as shown in Figure 3.

Connection	_	
Serial Port	~	OK Cancel
Serial Settings		
Prolific USB-to-Serial Comm Port (CO)	(14) ~	
115200 Baud V Mode © RTU \OAS	CII	
8 Data bits V		
None Parity 🗸 🗌 DSR 🗌 C	TS 🗹 RTS Tog	gle
1 Stop Bit V [ms] R	TS disable delay	
TCP/IP Server		
IP Address	P	ort
192.168.0.226	× 5	502
Any Address IPv4		
Ignore Unit ID O IPv6		

Figure 3. Modbus Slave Configuration.

Click OK button (shown in Figure 3) to return to the data window shown in Figure 4.

Modbus Slave -	[Mbslave1] nnection Setup 크 브 直 💡	Display	View	Window	Help	_	× - 8 ×
Alias	00000						^
0	315						
1	232						
2	423						
3	0						
4	0						
5	0						
6	0						
7	0						~
For Help, press F1.		Port 4: 1152	200-8-1	N-1			

Figure 4. Modbus Slave.

Open Modbus Poll on your PC and set the parameters as shown in Figure 5.

Connection Setup	\searrow	>
Connection		OK
Modbus TCP/IP	~	
Serial Settings		Cancel
Prolific USB-to-Serial Co	omm Port (COM4)	Mode
115200 Baud $ \smallsetminus$		● RTU ○ ASCII
8 Data bits \sim		Response Timeout
None Parity \sim		- Delau Between Polls
1 Stop Bit 👘 🖂	Advanced	10 [ms]
Remote Modbus Server		
IP Address or Node Nar	me	
192.168.0.249		~
Server Port	Connect Timeout	IPv4
502	3000 [ms]	O IPv6

Figure 5. Modbus Poll Configuration.

Click OK button (shown in Figure 5) to return to the data window shown in Figure 6.

🛍 Modbus Poll - [Mbpoll1] — 🗆 🗙									
200	File Edit Co	nnection Setup	Functions Display View Window Help 🗕 🗗 🗙						
🗅 🚅 🖬 🎒 🗙 🛅 🗒 🏨 🎰 🕮 05 06 15 16 17 22 23 TC 🕺 🤋 😢									
Tx = 38: Err = 0: ID = 1: F = 03: SR = 1000ms									
	Alias	00000	^						
0	71103	315							
1		232							
2		423							
3		0							
4		0							
5		0							
6		0							
7		0							
8		0	¥						
For Help, press F1.			[192.168.0.249]: 502						

Figure 6. Modbus Poll.

Now let's experiment with our master reading data from our slave. Enter data in address 1 and address 2 in Modbus Slave and watch as Modbus Poll reads that data, as shown in Figure 7.

📲 Modbus Slave - [Mbslave1]		화] Modbus Poll - [Mbpoll1]			
📴 File Edit Connection Setu	p Display View Window	📴 File Edit Co	onnection Setup	Functions Display	View
D 📽 🖬 🎒 🛅 🗒 🎰 I	? №?	🗅 🖻 🖥 🎒	× 🗖 🖳 🏚	. 05 06 15	16 17
ID = 1: F = 03		Tx = 224: Err = 0: ID = 1: F = 03: SR = 1000ms			
Alias 0000	0	Alias	00000		
0 50		0	500		
1 15)	1	150		
2 2	5	2	25		
3)	3	0		
4)	4	0		
5)	5	0		
6)	0	0		
7)	8	0		
For Help, press F1.	Port 4: 115200-8-N-1	For Help, press F1.		[192.168.0.249]: 502	

Figure 7. Data Test Result.
EXAMPLE 2: TRANSPARENT MODE, WITH MODBUS RTU/ASCII MASTER DEVICES TO MODBUS TCP SLAVE (SERVER) DEVICES



Provide power to the *STRIDE* Modbus Gateway, connect to an Ethernet port and log on to the gateway configuration interface.

Our example assumes default values in the gateway. Click Load Factory Default.

Set the operation mode to Transparent Mode. Browse to "Operating Settings" to configure serial port S1 as shown in Figure 9. Note that the Remote IP Address is your PC's IP address, since the PC (Modbus Slave) is the slave device for this example.

Click Save.



Figure 9. STRIDE Modbus Gateway Serial Settings.

Browse to *STRIDE* Modbus "Serial Settings" to select S1 and set its parameters, as shown in Figure 10. Click Save to save and apply the changes.

\leftarrow \rightarrow O	192.168.0.249/index_v3.5.html				🗆 🛨 🖕 🗠	<u>e</u>							
		Strid	e		Ex	cit							
		2			Не	lp							
Device Information		Serial Settings											
Network Settings Operating Settings		S1	S2	S3	S4								
Serial Settings	Alias	UART_1	UART_2	UART_3	UART_4								
Import/Export Upgrade Firmware	Baudrate	115200 ~	115200 ~	115200 ~	115200 ~								
Change Password	Databits	8 ~	8 ~										
Load Factory Default System Dehast	Stopbits	1 ~	1 ~	1 ~	1 ~								
Data Diagnostics	Parity	None 🗸	None 🗸	None 🗸	None 🗸								
	RTS Control	Off ~	Off ~	Off ~	Off ~								
	Hardware Interface	RS-232 ~	RS-232 V	RS-232 ~	RS-232 ~								
	Protocol(selected on Operating Settings page	RTU Slave V	RTU Slave V										
			Save										

Figure 10. STRIDE Modbus Gateway Serial Settings.

Connect the *STRIDE* Modbus Gateway serial port S1 to your PC's serial port (possibly requiring a USB to serial converter), and run Modbus Poll software on the PC. The Modbus Poll parameters must be configured as shown in Figure 11.

[]	Connection Setup	×
This value is the COM port assigned by your PC. It can be found in the Device Manager.	Connection Serial Port Serial Settings Prolific USB-to-Serial Comm Port (COM4) 115200 Baud 8 Data bits None Parity 1 Stop Bit Advanced	OK Cancel Mode RTU ASCII Response Timeout 1000 [ms]
	Remote Modbus Server IP Address or Node Name 192.168.0.249 Server Port Connect Timeout 502 3000 [ms]	 IPv4 IPv6

Figure 11. Modbus Poll Configuration.

Click OK in Figure 11 to return to the Modbus Poll main window.

Select Setup - Read/Write Definition.

Read/Write	Definition	×
Slave ID:	1	OK
Function:	03 Read Holding Registers (4x) \smallsetminus	Cancel
Address:	0 Protocol address. E.g. 400	11 -> 10
Quantity:	10	
Scan Rate:	1000 [ms]	Apply
Disable	Write Disabled	
🗌 Disabl	e on error Re	ad/Write Once
View Rows		antitu
Hide A	Alias Columns DLC Addressessin Cell Enron/Daniel	is (Base 1) Mode

Figure 12. Modbus Poll Read/Write Definition.

Enter the Slave ID of the Gateway as shown in Figure 12. This is the Slave ID you assigned to the Gateway in its "Operating Settings" configuration.

Click OK shown in Figure 12 to return to the application interface shown in Figure 13.

Ľ	Modbus Poll - [Mbpoll1]		×
.	File Edit Co	onnection Setup	Functions Display View Window Help	e ×
) 🖻 🖪 🎒 🛛	× 🗖 🖳 🌢	1 Л 05 06 15 16 17 22 23 TC 🖭 🤋	N ?
Tx Tir	= 14: Err = 14 neout Error	4: ID = 1: F = 03	3: SR = 1000ms	
	Alias	00000		^
0		0		
1		0		
2		0		
3		0		
4		0		
5		0		
6		0		
7		0		
8		0		~
For	Help, press F1.		Port 4: 115200-8-N-1	

Figure 13. Modbus Poll Initial Connection.

The Modbus Poll software will indicate a Timeout Error until the Modbus Slave software is connected in the next step.

Run the Modbus Slave software on your PC and set the parameters shown in Figure 14.

Modbus TCP/IP	~	UN
		Cancel
Serial Settings		
Prolific USB-to-Seri	ial Comm Port (COM4) 👘 🖂	
115200 Baud \smallsetminus	Mode RTU O ASCII	
8 Data bits \sim	Flow Control	
None Parity 🔍 🗸	DSR CTS RTST	oggle
None Parity 🛛 🖂 1 Stop Bit 🚽 🖂	DSR CTS RTST	oggle IV
None Parity V 1 Stop Bit V ICP/IP Server	DSR CTS RTST	oggle V
None Parity V 1 Stop Bit V I CP/IP Server P Address	DSR CTS RTST	Port
None Parity 1 Stop Bit I CP/IP Server P Address 192.168.0.226	DSR CTS RTST	Port 502
None Parity 1 Stop Bit I CP/IP Server P Address 192.168.0.226 Any Address	OSR CTS ♥ RTS T 1 [ms] RTS disable dela	Port 502

Figure 14. Modbus Slave Configuration.

Click OK shown in Figure 14 to return to the Modbus Slave main window.

Select Setup - Slave Definition.

Slave Definition	<
Slave ID: 11 OK Function: 03 Holding Register (4x) Cancel Address: 0 Quantity: 10 View Rows ① 10 0 20 0 50 0 100 0 Fit to Quantity	
Hide Alias Columns PLC Addresses (Base 1)	
Error Simulation Skip response (Not when using TCP/IP) (ms] Response Delay Return exception 06, Busy	

Figure 15. Modbus Poll Read/Write Definition.

Enter the Slave ID as shown in Figure 15. This is the Slave ID you assigned to the Modbus TCP Client in the "Operating Settings" configuration.

Click OK shown in Figure 15 to return to the application interface shown in Figure 16.

5	Modbus Slave	- [Mbslave1]					\times
	File Edit Co	onnection Setup	Display View Wi	indow	Help		- 8 ×
Ē) 🖻 🖬 🎒	- 1 🗄 👜 💡	№?				C2
ID	= 1: F = 03						
	Aller	00000					^
	Allas	00000					
0		0					
1		0					
2		0					
3		0					
4		0					
5		0					
6		0					
7		0					~
For	Help, press F1.		[Any IP Address]: 502	2			

Figure 16. Modbus Slave.

Now let's experiment with our master reading data from our slave. Enter data in address 2 and address 3 in Modbus Slave and watch as Modbus Poll reads that data, as shown in Figure 17.

📲 Modbus Slave	- [Mbslave1]				😼 Modbus Poll - [Mbpoll1]								
🛒 File Edit O	Connection Setup	Display View	Window	Help	📴 Fi	le Edit	Connection	Setup	Functions	Display	View	Wind	
🗅 🖻 🖬 🎒	1 🗄 👜 💡	k?				ê 🛛 🖨	X 🗖		05	06 15 10	6 17	22 23	
ID = 1: F = 03					Tx = 1	197: Err	= 642: ID	= 1: F =	= 03: SR =	1000ms	S		
Alia	s 00000					Ali	as	00000					
0	0				0			0					
1	322				1			322					
2	46				2			46					
3	0				3			0					
4	0				5			0					
5	0				6		_	0					
6	0				7			0					
7	0				8			0					
For Help, press F1.		[Any IP Address]	: 502		For He	p, press F1.			Port 4: 1152	00-8-N-1			

Figure 17. Data Test Result.

EXAMPLE 3: AGENT MODE, WITH MODBUS TCP MASTER (CLIENT) DEVICES TO MODBUS RTU/ASCII SLAVE DEVICES



Provide power to the *STRIDE* Modbus Gateway, connect to an Ethernet port and log on to the gateway configuration interface.

Our example assumes default values in the gateway. Click Load Factory Default.

Set the operation mode to Agent Mode. Browse to "Operating Settings" to configure serial port S1 as shown in Figure 18. Click Save.

\leftrightarrow \rightarrow \circlearrowright 192.16	8.0.249/index_v3.5.html				□ ☆	ৌ	r b	·
		St	de				Exit	
							Help	1
Device Information			Operating	Settings				
Network Settings Operating Settings	S1	S2		\$3	S4	S4		
Serial Settings	Serial Port Mode	RTU Master 🗸						
Agent Settings Gateway Settings	Filter Enable							
• Message List	Filter ID Start	1						
Oata in Gateway Memory Import/Export	Filter ID End	247						
Upgrade Firmware	Protocol	TCP $ \smallsetminus $ (Note: In Agent m	de, you can mod	ify the Modbus port on the 'Gateway S	ettings' page.)			
Change Password Load Factory Default	Gateway Modbus TCP Port	502	(Note: In Agen	t mode, you can modify the Modbus po	ort on the 'Gateway Se	ettings' pa	ge.)	
 System Reboot Data Diagnostics 								
-			Sav	ve				

Figure 18. STRIDE Modbus Operating Settings.

Browse to "Serial Settings" to select S1 and set its parameters, as shown in Figure 19.

Click Save to save the changes.

\leftrightarrow \rightarrow Ö 192.168.0	249/index_v3.5.html	* v		∑ ≣	h	Ŕ							
			Exit										
					Help								
Device Information	Serial Settings												
Network Settings Operating Settings		S1	52	53	54								
Serial Settings	Alias	UART_1	UART_2	UART_3	UART	_4							
Agent Settings Gateway Settings	Baudrate	115200 ∨	115200 ~	115200 ~	11520	- a							
Message List	Databits	8 ~	8 ~	8~	8 ~								
Data in Gateway Memory	Stopbits												
Upgrade Firmware	Parity	None 🗸	None 🗸	None 🗸	Niome	~							
Change Password	Flow Control	None ~	None ~	None ~	Niome	~							
Load Factory Default System Reboot	Hardware Interface	RS-232 ~	RS-232 ~	RS-232 ~	Rt8-21	2 ~							
	Protocol(selected on Operating Settings page)	RTU Master $$	Disabled V	Disabled ~	Disabl								
			*										
			Save										

Figure 19. Serial Settings Configuration.

Browse to "Gateway Settings" and configure the parameters as shown in Figure 20.

Click Save to save and apply the changes.

\leftrightarrow \rightarrow O	192.168	3.0.249/index_v3.5.html	249/index_v3.5.html									
				Stric	le					E	Exit	
										H	lelp	
Device Information				(Gateway Settings							
Network Settings Operating Settings		Gateway Modbus ID	1]								
Serial Settings		Protocol	TCP V									
Agent Settings Gateway Settings		Gateway Modbus Port	502]							-	
• Message List		Default Timeout(ms)	1000]								
• Data in Gateway Me	mory	Inter-packet TX Delay(ms)	100]								
Upgrade Firmware												
Change Password												
Load Factory Default System Reboot					Save							

Figure 20. STRIDE Modbus Gateway Operating Settings.

Browse to Message List-Add Message to add a message, shown in Figure 21.

\leftarrow \rightarrow D	192.168.0.2	249/index_v3.5.html							Ń	h	Ŕ	
				S	tride						Exit	₽
Device Information							Add Message	Delete Message	Modify	Message	Help	
Network Settings Operating Settings Serial Settings Agent Settings		Display 50 V per page	Refresh				¥	Search:				
Gateway Settings		Item Serial Port Slave ID Alias Message Configuration										
·····● Message List ·····● Data in Gateway Men	nory				Slave Alias	Device_Alias					T	
Import/Export Lingrade Firmware					Serial Port	S1 ~					}	
Change Password		Refresh to get latest status.			Slave ID	1						
 Load Factory Default System Reboot 					Function	03 Holding Regis	ster(4x) ∨					
					Data Start Addr	0]	
					Data Length	10						
					Mapping Addr	0	Assign	n next available add	ress			
						OK		Cance			1	

Figure 21. Add Message.

Connect the *STRIDE* Modbus Gateway's serial port S1 to PC's serial port (possibly requiring a USB to serial converter), and run the Modbus Slave software on PC. The Modbus Slave parameters must be configured as shown in Figure 22.

	Connection Setup X
This value is the COM port assigned by your PC. It can be found in the Device Manager.	Connection OK Serial Port Cancel
	Serial Settings
	Prolific USB-to-Serial Comm Port (COM4) V
	115200 Baud V
	8 Data bits V
	None Parity ✓ DSR CTS ☑ RTS Toggle
	1 Stop Bit V Ims in 1's disable delay
	TCP/IP Server
	IP Address Port
	192.168.0.226 🗸 502
	Any Address IPv4
	Ignore Unit ID O IPv6

Figure 22. Modbus Slave Configuration.

Click OK as shown in Figure 22 to return to the application interface shown in Figure 23.

-	Modbus Slave -	- [Mbslave1]						×
200	File Edit Co	onnection Setup	Display	View	Window	Help		- 8 ×
j E) 🖻 🖥 🎒 🛛	T 🖳 👜 🤋	▶?					
ID	= 1: F = 03							
	Alias	00000						
0		315						
1		232						
2		423						
3		0						
4		0						
5		0						
6		0						
7		0						~
For	Help, press F1.		Port 4: 11	5200-8-	N-1			

Figure 23. Modbus Slave.

Open Modbus Poll on your PC and set the parameters as shown in Figure 24.

Connection Setup	\searrow	2
Connection		OK
Modbus TCP/IP	\sim	
Serial Settings		Cancel
Prolific USB-to-Serial Co	omm Port (COM4)	Mode
115200 Baud \smallsetminus		● RTU ○ ASCII
8 Data bits \sim		Response Timeout 1000 [ms]
None Parity $-\sim$		- Delau Between Polls
1 Stop Bit 👘 🖂	Advanced	10 [ms]
Remote Modbus Server		
IP Address or Node Nar	me	
192.168.0.249		~
Server Port	Connect Timeout	IPv4
502	3000 [ms]	

Figure 24. Modbus Poll Configuration.

Click the OK button shown in Figure 24.

Now let's experiment with watching data as it is read from Modbus Slave by the gateway then read from the Gateway by Modbus Poll. Enter data in address 1 and address 2 in Modbus Slave and watch the values change in Modbus Poll, as shown in Figure 25.

📲 Modbus Slave - [Mbslave1]		📲 Modbus Poll - [[Mbpoll1]	
📴 File Edit Connection Setu	p Display View Window	📴 File Edit Co	onnection Setup	Functions Display View
D 📽 🖬 🎒 🛅 🗒 🎰 '	8 №?	🗅 🖻 🖥 🎒	× 🗖 🖳 🏚	
ID = 1: F = 03		Tx = 224: Err = (0: ID = 1: F = 0	3: SR = 1000ms
Alias 0000		Alias	00000	
0 500		0	500	
1 150)	1	150	
2 2		2	25	
3)	3	0	
4)	4	0	
5)	5	0	
6		7	0	
7)	8	0	
For Help, press F1.	Port 4: 115200-8-N-1	For Help, press F1.		[192.168.0.249]: 502

Figure 25. Data Test Result.

Now let's take a look at the data as it's stored in the gateway.

In the gateway User Interface, browse to the Data in Gateway Memory page.

Enter the Mapping Address (found on the "Message List" page) and the quantity of values you'd like to view. For our example, these values are 0 and 4, respectively.

\leftrightarrow) \circlearrowright	(i) 192.168.0.249/index_v3.5.html		
		Str icle	Exit
Device Information Network Settings Operating Settings Serial Settings Agent Settings	03 Holding Register(4x) * Gateway Memory Address	✓ 0 4 Value (decimal)	Help
• Message List	0	500	0x1F4
Import/Export	1	150	0×96
Upgrade Firmware Change Password	2	25	0×19
Upgrade Firmware Change Password Load Factory Default System Reboot	2 3	25	0x19 0x00

Figure 26. STRIDE Modbus Data in Gateway Memory.

Make changes in the Modbus slave user interface and watch the values change in the gateway's memory.

EXAMPLE 4: AGENT MODE, WITH MODBUS RTU/ASCII MASTER DEVICES TO MODBUS TCP SLAVE (SERVER) DEVICES



Provide power to the *STRIDE* Modbus Gateway, connect to an Ethernet port and log on to the gateway configuration interface.

Our example assumes default values in the gateway. Click Load Factory Default.

Set the operation mode to Agent Mode. Browse to "Operating Settings" and select S1. Setup parameters for one Modbus TCP server as shown in Figure 27. Note that the Remote IP Address is your PC's IP address, since the PC (Modbus Slave) is the slave device for this example. Remember the Slave ID you assign here.

Click Save.

\leftarrow \rightarrow \circlearrowright 192	168.0.249/index_v3.5.html					🗆 🛨 🖍	∎ <i>l</i> ~	\$ ···
			Stride					Exit
								Help
Device Information			Operating	Settings				
Network Settings Operating Settings	S1		S2	\$3		S4		
Serial Settings Agent Settings	Serial Port Mode	RTU Slave 🗸						
- • Gateway Settings	Slave ID	Remote IP	Remote Port	Protocol	Local Port	Ethernet Port Bir	d	
- • Message List	2	192.168.0.226	502	TCP 🗸	NA	E1 🗸	+]
• Data in Gateway Memory Import/Export • Upgrade Firmware • Change Password • Load Factory Default • System Reboot	Remember this Slave ID number	This is you IP addre	r PC SS	2				

Figure 27. STRIDE Modbus Operating Settings.

Browse to "Serial Settings" to configure the gateway shown in Figure 28.

Click Save to save the changes.

\leftrightarrow \rightarrow \circlearrowright 192.168.0	0.249/index_v3.5.html				🛛 🛨 🌿	h e	
		Strid	e			Exit	
						Help	
Device Information			Serial Settings				
Network Settings Operating Settings		S1	S2	S3	S4		
Serial Settings	Alias	UART_1	UART_2	UART_3	UART_4		
Agent Settings Gateway Settings	Baudrate	115200 ~	115200 ~	115200 ~	115200 ~		
- • Message List	Databits	8 ~	8 ~				
• Data in Gateway Memory	Stopbits	1 ~	1 ~	1 ~	1 ~		
Upgrade Firmware	Parity	None ~	None 🗸	None 🗸	None 🗸		
Change Password	RTS Control	Off ~	Off ~	Off 🗸	Off 🗸 🗸		
Load Factory Default System Reboot	Hardware Interface	RS-232 ~	RS-232 ~	RS-232 ~	RS-232 ~		
Data Diagnostics	Protocol(selected on Operating Settings page)	RTU Slave V	RTU Slave 🗸				
			Save				

Figure 28. Serial Settings Configuration.

Browse to the "Gateway Settings" page to configure the gateway as shown in Figure 29. Click Save to save and apply the changes.

\leftarrow \rightarrow O	192.168	.0.249/index_v3.5.html					□ ☆	r∕≣	l~	È	
				Strid	e					Exit	
									H	lelp	
Device Information				G	Gateway Settings						
Network Settings Operating Settings		Gateway Modbus ID	1								
Serial Settings		Protocol	TCP 🗸							-	
Agent Settings		Gateway Modbus Port	502							-	
Message List		Default Timeout(ms)	1000]						-	
• Data in Gateway Memo	ory	Inter-packet TX Delay(ms)	100]						-	
Importexport Upgrade Firmware Change Password Load Factory Default System Reboot					Save						

Figure 29. Gateway Settings Configuration.

Browse to Message List-Add Message to add a message, shown in Figure 30. The Slave ID is the ID you assigned to the slave device in the Operating Settings configuration in Figure 27.

\leftarrow \rightarrow O	192.168.0.249/index_v3.5.html		∑	l l	<u>a</u>
	Stride			E	xit 🕞
Device Information			NA116 - N	He	əlp
Network Settings Operating Settings		le Message	woalty h	lessage	_
Serial Settings Agent Settings	Display 50 V per page Refresh Si	earch:]
Gateway Settings	Item Serial Port Slave ID Alias Message Configuration				
Message List Data in Gateway Mer	Slave Alias Device_Alias				
Import/Export	Serial Port S1 V				-
Change Password	Refresh to get latest status. Slave ID 2				
 Load Factory Default System Reboot 	Function 03 Holding Register(4x) V				
	Data Start Addr 0]			
	Data Length 10]			
	Mapping Addr 0 Assign next av	vailable add	ress		
	OK	Cancel			

Figure 30. Add Message.

Connect the *STRIDE* Modbus Gateway serial port S1 to your PC's serial port (possibly requiring a USB to serial converter), and run Modbus Poll software on the PC. The Modbus Poll parameters must be configured as shown in Figure 31.

[]	Connection Setup	×
This value is the COM port assigned by your PC. It can be found in the Device Manager.	Connection Serial Port Serial Settings Prolific USB-to-Serial Comm Port (COM4) 115200 Baud 8 Data bits None Parity 1 Stop Bit Remote Modbus Server	OK Cancel Mode TU ASCII Response Timeout 1000 [ms] Delay Between Polls 10 [ms]
	IP Address or Node Name	
	192.168.0.249	~
	Server Port Connect Timeout	IPv4
	502 3000 [ms]	O IPv6

Figure 31. Modbus Poll Configuration.

Click OK in Figure 29 to return to the application interface shown in Figure 32.

뷥	Modbus Poll - [Mbpoll1]	- □ >	<
Dec	File Edit Co	onnection Setup	Functions Display View Window Help 🗕 🗗	×
C) 🖻 🖬 🎒	× 🗂 🗏 🗴	1 Л 05 06 15 16 17 22 23 TC 🗵 💡 🎀	1
Тх	= 4: Err = 0: I	D = 1: F = 03: \$	SR = 1000ms	
	Alias	00000		~
H	Allds	00000		
1		0		
2		0		
3		0		
4		0		
5		0		
6		0		
7		0		
8		0		~
For	Help, press F1.		Port 4: 115200-8-N-1	

Figure 32. Modbus Poll Initial Connection.

The Modbus Poll software will return zero values for all data from the Modbus Gateway Agent until the Modbus Slave software is connected to the gateway in the next step.

Run the Modbus Slave software on your PC and set the parameters shown in Figure 33.

onnection Setup	×
Connection Modbus TCP/IP ~	ОК
Serial Settings	Cancel Slave Definition
Prolific USB-to-Serial Comm Port (COM4)	Slave ID: 2
115200 Baud V OASCII	Function: 03 Holding Register (4x) V
8 Data bits V	Address: 0
None Parity DSR CTS RTS 1	iggle View
1 Stop Bit V [ms] RTS disable del	Nows ● 10 ○ 20 ○ 50 ○ 100 ○ Fit to Quantity
TCP/IP Server	Hide Alias Columns PLC Addresses (Base 1)
192.168.0.226	502 Ever Simulation
Any Address IPv4 Ignore Unit ID IPv6	Error Simulation Skip response Insert CRC/LRC error (Not when using TCP/ [ms] Response Delay

Figure 33. Modbus Slave Port Configuration.

Figure 34. Modbus Slave Definition.

Click OK shown in Figure 33 to return to the Modbus Slave main window.

Select Setup - Slave Definition.

Enter the Slave ID of the Gateway as shown in Figure 34. This is the Slave ID you assigned to the Gateway in its "Operating Settings" configuration.

Click OK shown in Figure 34 to return to the application interface shown in Figure 35.

1	Modbus Slave -	[Mbslave1]					- <u></u>	×
Doc C	File Edit Co	onnection Setup	Display	View	Window	Help		- 8 ×
E) 🖻 🖬 🎒 🛛	- 1 🗄 👜 💡	N?					
ID	= 2: F = 03							
L								
	Alias	00000						^
0		0						
1		0						
2		0						
3		0						
4		0						
5		0						
6		0						
7		0						~
For	Help, press F1.		[Any IP Ad	dress]:	502			

Figure 35. Modbus Slave.

Now let's experiment with watching data across our network. Enter data in address 2 and address 3 in Modbus Slave and watch as that data is stored in the Agent then read by Modbus Poll, shown in Figure 36.

📓 Modbus Slave - [Mbslave1]					Modbus Poll - [Mbpoll1]											
📴 File Ed	dit Co	nnection Setup	Display	View	Window	Help	**	File	Edit	Connecti	on Set	up	Function	s Display	Viev	v Win
🗅 🚔 🖪	6	- <u> </u> ?	N ?				Ľ	i 🖻 [- 6	$ \mathbf{X} $		a		06 15	16 17	22 2
ID = 2: F =	ID = 2: F = 03						Тх	= 119	7: Err	= 642:	D = 1:	F =	03: SR	= 1000n	าร	
	Alias	00000						_	Ali	as	0000	0				
0	Anda	0					0					0				
1		322					1				32	2				
2		46					2				4	6				
3		0					3					0				
4		0					5					0				
5		0					6					0				
0		0					7					0				
Ear Help, pro	cc E1	0	[Any ID A	ddrocel	. 502		8 For	Help p	ross E1	£			ort /1 115	200. 0. N. 1		

Figure 36. Agent Test Result.

Now let's take a look at the data as it's stored in the gateway.

In the gateway User Interface, browse to the Data in Gateway Memory page.

Enter the Mapping Address (found on the Gateway Settings page) and the quantity of values you'd like to view. For our example, these values are 0 and 4, respectively.

\leftrightarrow) \diamond) \diamond	(i) 192.168.0.249/index_v3.5.html		
		Str ide	Exit
Device Information Network Settings Operating Settings Serial Settings	03 Holding Register(4x) ∨	0 [4_	Help
Gateway Settings	Gateway Memory Address	Value (decimal)	Value (hexadecimal)
• Message List • Data in Gateway Memory	0	0	0×00
Import/Export Lingrade Firmware	1	322	0×142
 Import/Export Upgrade Firmware Change Password 	1	322 46	0x142 0x2E
Import/Export Upgrade Firmware Change Password Load Factory Default System Reboot	1 2 3	322 46 0	0×142 0×2E 0×00

Figure 37. Data Stored in Gateway Modbus Registers.

Make changes in the Modbus slave user interface and watch the values change in the gateway's memory.



MODBUS ERROR CODES

MB-GATEWAY Modbus Error Codes								
Error Code	Name	Explanation						
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the slave. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.						
02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for the slave.						
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for the slave.						
04	SLAVE DEVICE FAILURE	An unrecoverable error occurred while the slave was attempting to perform the requested action.						
05	ACKNOWLEDGE	The slave has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a timeout error from occurring in the master. The master can next issue a Poll Program Complete message to determine if processing is completed.						
06	SLAVE DEVICE BUSY	The slave is engaged in processing a long–duration program command. The master should retransmit the message later when the slave is free.						
07	NEGATIVE ACKNOWLEDGE	The slave cannot perform the program function received in the query. This code is returned for an unsuccessful programming request using function code 13 or 14 decimal. The master should request diagnostic or error information from the slave.						
08	MEMORY PARITY ERROR	The slave attempted to read extended memory, but detected a parity error in the memory. The master can retry the request, but service may be required on the slave device.						

SECURITY CONSIDERATIONS FOR CONTROL SYSTEMS NETWORKS

<u>IN THIS CHAPTER</u>	
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Manufacturers are realizing that to stay competitive, their Automation and Control Systems need to be more integrated within their plant. The systems often need to be integrated with upstream Enterprise Data Systems, and even further integrated to allow information to be accessible across multiple plants, or even through the Internet. This convergence of the IT world with the Automation World creates challenges in maintaining secure systems and protecting your investments in processes, personnel, data and intellectual property.

While Automation Networks and Systems have built-in password protection schemes, this is only one very small step in securing your systems. Automation Control System Networks need to incorporate data protection and security measures that are at least as robust as a typical business computer system. We recommend that users of PLCs, HMI products and SCADA systems perform your own network security analysis to determine the proper level of security required for you application. However, the Department of Homeland Security's National Cybersecurity and Communications Integration Center (NCCIC) and Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) has provided direction related to network security and safety under an approach described as "Defense in Depth", which is published at <u>https://www.us-cert.gov/sites/</u> <u>default/files/recommended_practices/NCCIC_ICS-CERT_Defense_in_Depth_2016_S508C.pdf</u>.

This comprehensive security strategy involves physical protection methods, as well as process and policy methods. This approach creates multiple layers and levels of security for industrial automation systems. Such safeguards include the location of control system networks behind firewalls, their isolation from business networks, the use of intrusion detection systems, and the use of secure methods for remote access such as Virtual Private Networks (VPNs). Further, users should minimize network exposure for all control system devices and such control systems and these systems should not directly face the internet. Following these procedures should significantly reduce your risks both from external sources as well as internal sources, and provide a more secure system.

It is the user's responsibility to protect such systems, just as you would protect your computer and business systems. AutomationDirect recommends using one or more of these resources in putting together a secure system:

- ICS-CERT's Control Systems recommended practices at the following web address: <u>https://ics-cert.us-cert.gov/Recommended-Practices</u>
- Special Publication 800-82 of the National Institute of Standards and Technology Guide to Industrial Control Systems (ICS) Security <u>https://csrc.nist.gov/publications/detail/sp/800-82/rev-2/final</u>
- ISA99, Industrial Automation and Control Systems Security <u>http://www.isa.org/MSTemplate.cfm?MicrositeID=988&CommitteeID=6821</u> (please note this is a summary and these standards have to be purchased from ISA)

The above set of resources provides a comprehensive approach to securing a control system network and reducing risk and exposure from security breaches. Given the nature of any system that accesses the internet, it is incumbent upon each user to assess the needs and requirements of Security Considerations for Control Systems Networks their application, and take steps to mitigate the particular security risks inherent in their control system.