Getting Started

In This Chapter...

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 www.automationdirect.com.

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.

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 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 RJ45, 10/100Mbps***	***Serial Ports D-sub 9 pin***
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/CTS, XON/XOFF or **None**
Termination	DIP switch to enable/disable 120Ω matching resistor for RS-485
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

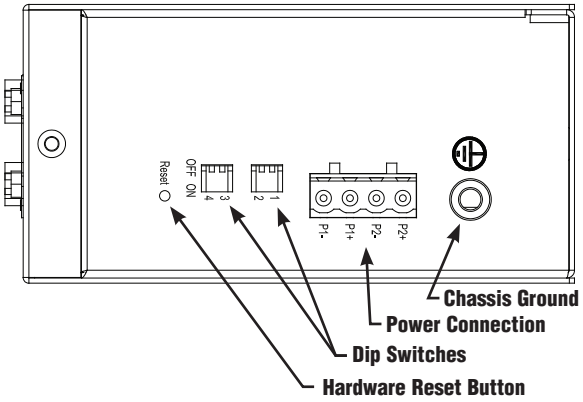
*Note: Default values are shown in **bold** text.*

Power Details		
Power Consumption	SGW-MB1511-T	1.8 W
	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
EMS	IEC 61000-4-2 (ESD): ±6kV (contact), ±8kV (air)
	IEC 61000-4-3 (RS): 10V/m (80MHz–2GHz)
	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)
Mechanical Standards	IEC 60068-2-6 (Vibration)
	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.

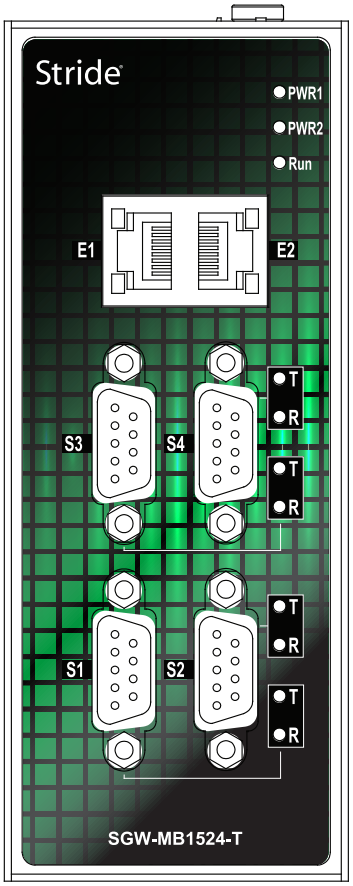


DIP Switches

A 120Ω termination resistor for each serial port 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.

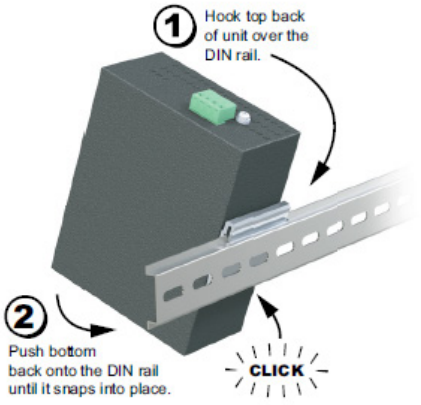
DIN rail mounting steps:

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

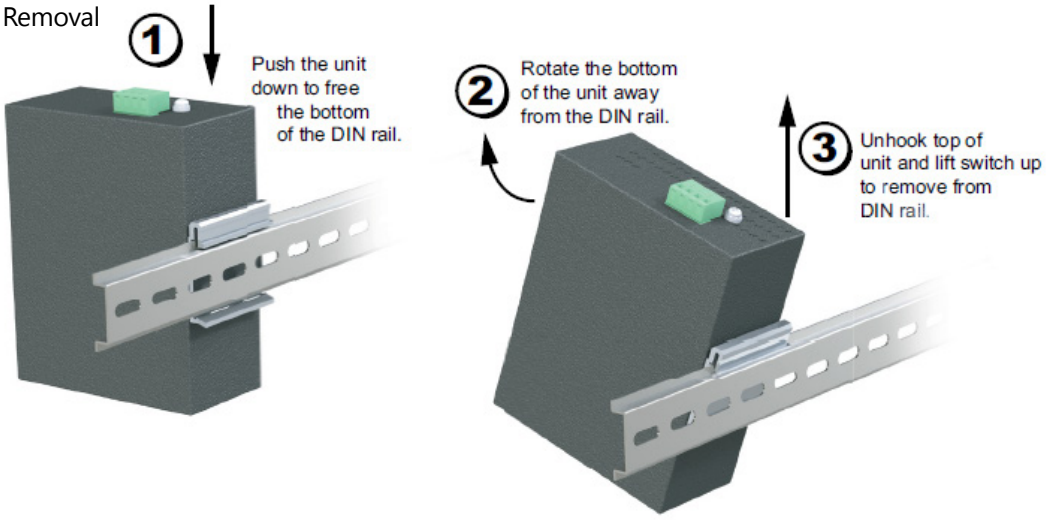
DIN rail removal steps:

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.

Mounting

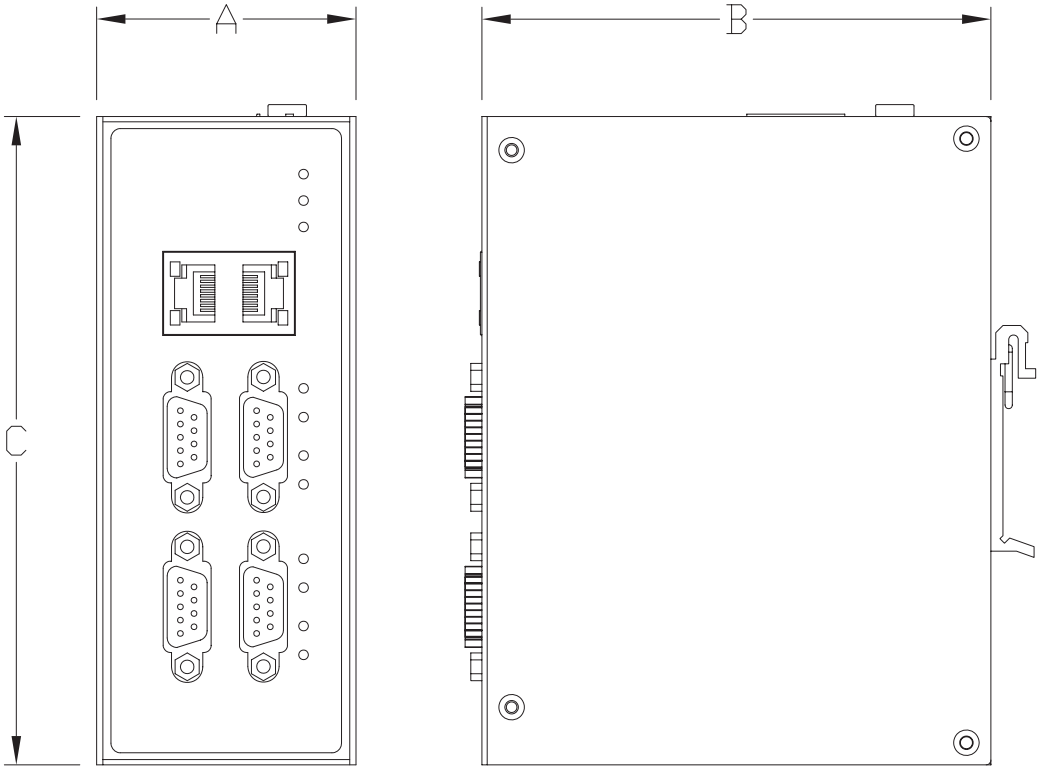


Removal



Dimensional Drawings

NOTE: Allow 20mm [0.79”] clearance around each gateway for proper cooling.



Dimensions				
Part No.	Weight	Width (A)	Depth (B)	Height (C)
		mm [inches]		
SGW-MB1511-T	0.17 kg [0.36 lb]	30.0 [1.18]	68.0 [2.68]	115.0 [4.53]
SGW-MB1512-T	0.17 kg [0.36 lb]			
SGW-MB1524-T	0.32 kg [0.71 lb]	54.0 [2.13]	106 [4.17]	135.0 [5.32]

Wiring

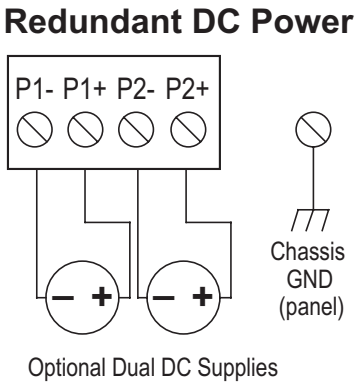
Power

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.

Maximum terminal screw torque is 4.43 lb-in (0.5 N·m).

Ferrule required for stranded wire.
Wire Size Range: 24 – 12 AWG
Wire Strip Length: 7mm



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.

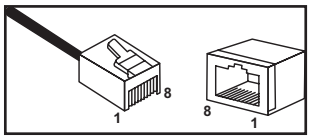
The RJ45 Ethernet port connector bodies on these products are metallic and connected to the Chassis GND terminal. Therefore, shielded cables may be used to provide further protection. To prevent ground loops, the cable shield should be tied to the metal connector body at one end of the cable only. Electrical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

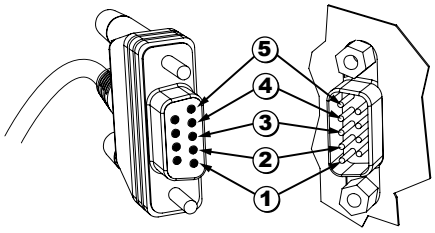


Ethernet Plug & Connector Pin Positions

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

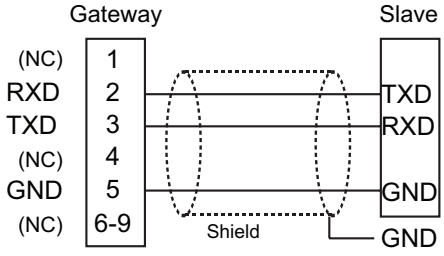
Serial Port Wiring

Serial Port Pinout



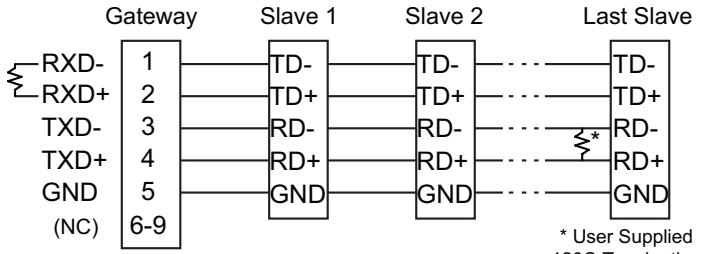
Serial Port			
Pin	**RS-232**	**RS-422/485 4-wire**	**RS-485 2-wire**
1	CTS	RXD – (B)	–
2	RXD	RXD + (A)	–
3	TXD	TXD – (Z)	Data – (B)
4	RTS	TXD + (Y)	Data + (A)
5	GND	GND	GND
6	–	–	–
7	–	–	–
8	–	–	–
9	–	–	–

RS232 Wiring



Recommended Cable - AutomationDirect L-19772 shielded cable or equivalent

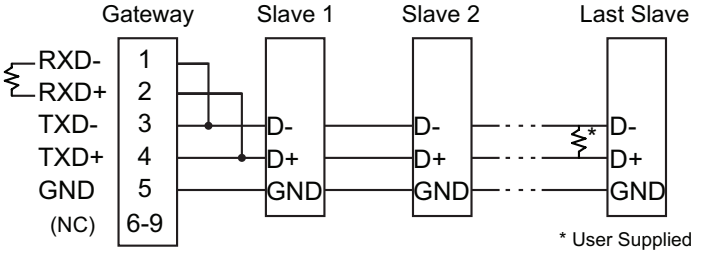
RS422/RS485 4-wire Wiring



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

Recommended Cable - AutomationDirect L-19773 shielded cable or equivalent

RS485 2-wire Wiring



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

Recommended Cable - AutomationDirect L-19954 shielded cable or equivalent

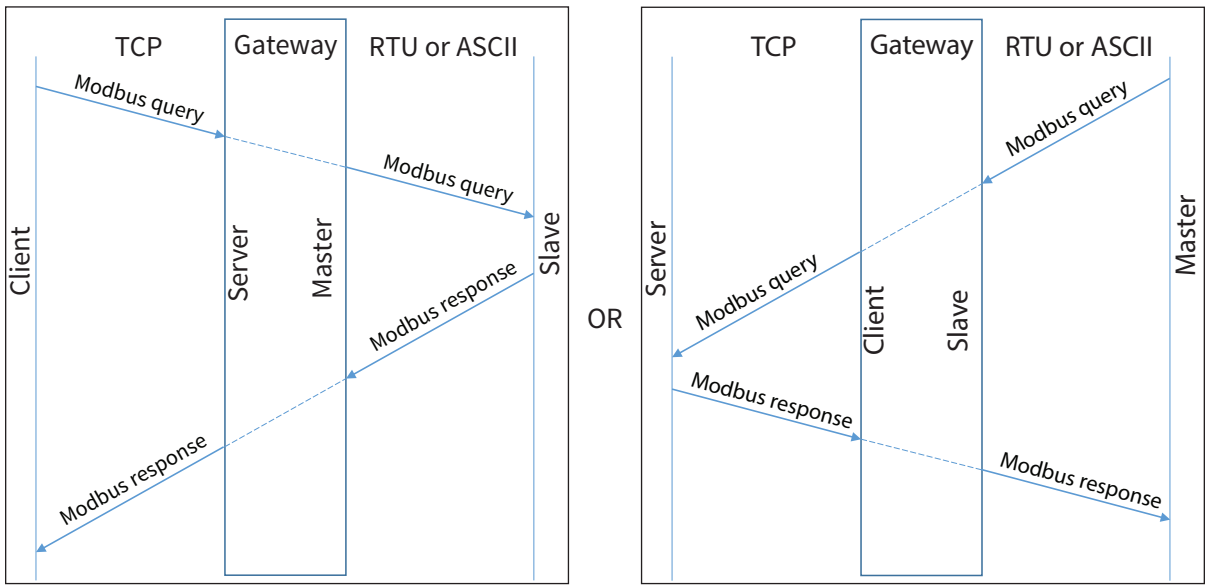
Operation

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



Agent Mode