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# User Manual ModGate

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## 1 Overview

The ModGate devices are designed to connect serial connection lines running Modbus protocol to networks running Modbus/TCP. The network interface of ModGate is implemented as Fast Ethernet 100Mbit/s with Auto-MDI(X). The subfamily of WLAN Gateway devices provide a second network interface as WLAN (as of 802.11g) with 54Mbit/s transfer rate, this will be used in parallel with the standard Ethernet.

The network transport is implemented via TCP/IP protocol. Therefore control is available via WLAN, Ethernet, Intranet and Internet. The serial data transmission uses Modbus/RTU and Modbus/ASCII, physical on RS232 and RS485 connection lines.

## 2 Introduction

This manual covers several models of ModGate devices, in particular the ModGate 113. In general the operation is the same on all models, except where explicitly noted otherwise.

The devices come with a steel case well suited for industrial environments.

The ModGate Gateways support serial speed up to 115200 bps, which is a restriction of Modbus. In RS232 mode the technical limit is 921 kbps, used as RS485 the serial port can operate up to 3.6 Mbps. In RS485 mode the serial ports use the Automatic Receive Transmit (ART) control logic to follow the RS485 specifications for transmitting data.

### 2.1 Features

- Single power supply  
DC 9-30V, 200-600 mA@12V
- Wireless LAN 802.11b/g for 54Mbit/s on WLAN models
- Ethernet 10/100BaseTx/Auto-MDI(X) for auto-configuration
- Serial port interfaces: RS232 and RS485
- Max. 115.200 bps, half- and full-duplex
- TCP/IP configuration fixed or by DHCP
- Easy remote configuration via HTTP (browser)

### 2.2 Product Specifications

Most of the hardware characteristics are common for all models. However some must differ from model to model, they are shown in dedicated sections.

### 2.2.1 Common characteristics

Processor	ARM9 (KS8695P)	
Memory	16MB SDRAM 2MB Flash	
WLAN antenna	SMA-reverse	
Ethernet connector	RJ45 10BaseT/100BaseTx	
Serial connector	DB9 male (similar to PC)	
Serial Speed	1 bps up to 3.69 Mbps	
Parity	None, Even, Odd	
Data bits	7, 8	
Stop bits	1, 2	
Serial signals	RS232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND
	RS485	Data+/Data-, GND
Protocols	TCP/IP, UDP, DHCP, ICMP, ARP, HTTP, SSDP	
Serial operation	RS232 or RS485 configured by software	
Management	Web browser	
Operating temp.	0° to 55°C	
Approval	CE, FCC	

Table 1: Specifications, common

### 2.2.2 Device specific Characteristics

The characteristics of certain ModGate models are shown as a short overview for comparison.

#### ModGate 113

Power requirement	DC 9V to 30V, 300 mA@12V
Dimensions	73×115×27 mm <sup>3</sup> (W×D×H) 101×121×27 mm <sup>3</sup> with connectors
Weight	250 g
Power LED	Red, blinks once when ready
Serial LED	Green for Transmit, Yellow for Receive

Table 2: Characteristics of ModGate 113



Figure 1: ModGate 113 Top, Front and Rear Side

This is the ModGate 113 with the serial connector and the configuration switches. The rear side holds the power connector, Reset hole and the Ethernet RJ45.

### 2.3 Packing List

- ModGate Modbus Gateway
- Power supply 12V 0.8A
- WLAN Antenna for WLAN Models
- CD-ROM with documentation

### 2.4 About this Manual

This manual covers many configuration options of the ModGate Modbus Gateways. The vast majority of these are set by software, sometimes in alternative methods. To emphasize these in the text, special character styles are used.

**Bold Face** is used for the names of configuration options or buttons, as they are displayed in menus or dialogs.

*Slanted* denotes text as displayed by the software. These are the names of parameter options, as well as special values for multiple-choice parameters. Such values may appear in drop-down lists, as radio buttons or just as clickable words.

`Typewriter` is used for sample User Input.

The version of the firmware described in this manual is 1.0.1.

### 3 Hardware Description

This section focuses on the options provided by the hardware of ModGate Modbus Gateways.

#### 3.1 Configuration by DIP Switch

The ModGate are configured using a webbrowser with JavaScript enabled. The DIP switches on the ModGate Gateways control special configuration options.

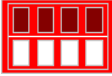
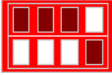
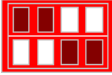
Function	S1	S2	S3	S4	Switch Positions
Configuration IP 192.168.254.254	Off	Off	Off	Off	
Factory settings	Off	Off	Off	On	
Standard Operation	Off	Off	On	On	

Table 3: Switch Configurations

By default the ModGate Gateway uses DHCP to get a valid IP Address. When the Gateway is configured for a static but unknown address, **Configuration IP** temporarily sets it to 192.168.254.254.

For Factory Settings the DIP switch is first set to the defined configuration. The parameters are restored on Power-Up/Reset of the ModGate Gateway. Wait until the Power LED blinks once. Then change the DIP switch to **Standard Operation** and reboot the Gateway.

**Standard Operation** is the configuration to use for operating in Gateway mode.

#### 3.2 Signal Assignment

It is very important to know the exact location of the serial signals in the configured mode. Here is the table for the DB9 male connector.

Pin	RS232	RS485
1	DCD	Data- (A)
2	RxD	Data+ (B)
3	TxD	
4	DTR	
5	GND	GND
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 4: Signal Assignment DB9 male

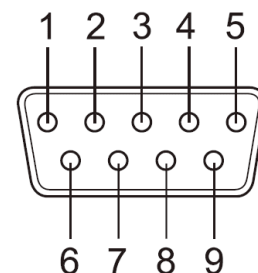


Figure 2: Connector DB9 male



For RS232 the assignment is the same as on any PC (Com1/2). This is required by RS232.

Please note the GND signal in RS485 mode. This signal must also be connected between the serial devices. So in reality there is not a 2-wire connection. With the exception of very special configurations, a serial cable without GND violates the specifications for RS485.

### 3.3 RS485 Electrical Configuration

In typical RS485 installations certain electric conditions have to be configured. Simply connecting cables is not enough to fulfill the specifications or RS485.

For ease of installations the ModGate Gateways provide these functions for often used parameters. They are activated by placing certain jumpers, internal of the ModGate. There is one block of jumpers near the serial port. Place a connection cap to activate the function.

Pins	Function of Signals
1-2	Place 120Ω to terminate Data±
3-4 5-6	Add BIAS-ing function to Data±
7-8, 9-10, 11-12	Not used in ModGate

Table 5: RS485 Jumper Configuration

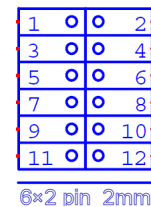


Figure 3: RS485 Option Jumper

*Warning:* All jumpers are unconnected by default. This is important for use in RS232 mode. Never close any jumper, otherwise communication errors or damage of devices is possible.

#### 3.3.1 Termination Resistors

The use of long communication lines in RS485 mode requires the installation of termination resistors. These must match the impedance of the cable. Typical cables in Twisted-Pair configuration have an impedance of about 120Ω. In RS485 the typical configuration requires one resistor at each end of the cable.

#### 3.3.2 BIAS Function

RS485 requires a BIAS option for the communication lines. This will guarantee stable electrical levels on the cables, even at times when no station is transmitting data. Without BIAS there will be noise on the cable, and sometimes receivers can not detect the first characters of a beginning communication.

### 3.4 Network

The ModGate connects to Ethernet, while the ModGate WLAN may use WLAN or Ethernet at customers choice. Both interfaces are enabled and configured, a ModGate WLAN accepts connections in parallel.

### 3.4.1 WLAN Configuration

The pre-defined operation mode is Ad-hoc, which means you do not need an Access Point to get access to the ModGate WLAN. Any computer with WLAN equipment may contact the ModGate WLAN.

However the Ad-hoc mode is not encrypted by definition of the IEEE 802.11 standard. As one result any station can read the data transferred to the ModGate WLAN. This also includes the passwords. Further in case of problems, it is harder to find the source of the problems. Therefore the recommended method is to use the Ethernet connector for the first configuration.

The configuration of the WLAN parameters should follow in a later step. This is especially the case, if encryption or certain other parameters require special configuration.

### 3.4.2 WLAN Antenna

The connector used for the WLAN Antenna is known as SMA-Reverse. This is a standard type to allow for simple connection of different equipment. Just fit the supplied antenna by carefully screwing it to the connector. You are free to connect a cable and a different antenna of your choice, as long as it is designed for WLAN. When the ModGate WLAN detects an operational WLAN it can connect to, the Blue LED lights.

### 3.4.3 Ethernet

The connector for Ethernet is the usual RJ45. Simply connect it to your (switching) Hub. Because the Ethernet has Auto-MDI(X) function, a direct cable or a cross-over cable may both be used.

When the connect is done the Link LED on ModGate (yellow) will light. When data traffic occurs on the network, this LED will blink. It depends on your network whether a 100Mbit or a 10Mbit connect will be established. A 100Mbit net causes the Speed LED on ModGate (green) to light, otherwise it will remain dark.

Red LED	Yellow LED	Green LED	Status
Off	–	–	Device off, no power
On	Off	Off	No connection
On	On	Off	10Mbit connection established
On	Blink	Off	10Mbit data transfer (traffic)
On	On	On	100Mbit connection established
On	Blink	On	100Mbit data transfer (traffic)

Table 6: LED Function

## 3.5 Power Supply

The ModGate device is powered by a single 9-30V power supply. It requires 200 mA up to 1500 mA of current, depending on the device type and voltage supplied. A suitable power supply adapter is part of the packaging. Connect the cable to the power jack (Terminal Block) at the rear side of ModGate, and put the adapter into the socket.

You may connect a power supply of your choice, providing the technical requirements are met.

## 4 Configuration

The ModGate provide a webinterface for configuration. The IP Address of ModGate is used as the location to open by the web browser. Typically the IP Address is known to the user, so this is an easy step. But this is not always the situation.

The ModGate may use DHCP, which is also the default configuration. If a DHCP server is available, it will assign an IP Address from a configured pool. At first this address is not known to the user, since he can not access the DHCP servers log file. To solve this problem the ModGate uses UPnP. This mechanism announces the existence of ModGate, so it will appear in the **Network Places** of Windows. It is required to “*Show icons for networked UPnP devices*”, which will enable this function in Windows.

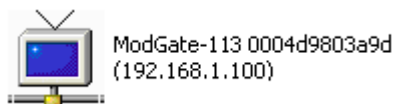


Figure 4: UPnP Device Display

Next to the icon the detected model is shown. The Ethernet MAC address (without colons) is shown as well, so users can identify the device they wish to configure. The text displays the IP Address in parentheses, so the access is possible. More easy, a double-click will open the browser with the configuration.

If no DHCP server is available, ModGate uses the configured fixed IP Address. If this address matches the configuration of the PC, UPnP is functional in the same way for getting access. If the fixed address does not match the PC configuration, the user can either reset the ModGate to factory settings, or switch the ModGate to the temporary configuration address **192.168.254.254** (see 3.1).

Accessing the configuration requires username and password, by default they are **admin** and **vscom**.



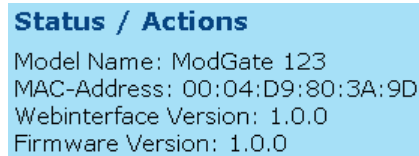
Figure 5: Navigation Bar

The navigation is done in the field on top of the parameters. Select the **Home** page, the **General Settings** or the **ModbusGateway Configuration**. The option of **Manual Edit** is reserved for special purposes, and not a supported user configuration so far. It is documented below (4.5).

### 4.1 Home

The **Home** page provides some **Status** information about the ModGate to configure, as well as some **Actions** the user can perform. Also a link to the VScom website is available, to get access to later information.

### 4.1.1 Status



**Status / Actions**  
Model Name: ModGate 123  
MAC-Address: 00:04:D9:80:3A:9D  
Webinterface Version: 1.0.0  
Firmware Version: 1.0.0

Figure 6: Status information

The type of ModGate is shown as the **Model Name**. For identification the **MAC-Address** is also given. Since such an address must be unique for all devices on the world, this is suitable to check if the configuration starts on the correct device.

The software on ModGate is basically divided in two parts. There is the basic **Firmware**, which is responsible for operating the serial ports and the network, transport the Modbus data and convert between the protocols. Then there the **Webinterface**, used for configuration of the device and for display of status. The version numbers of these two components are shown.

### 4.1.2 Actions

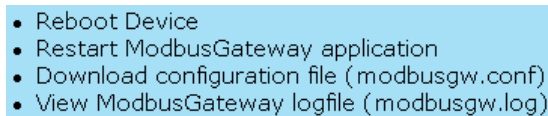
- 
- Reboot Device
  - Restart ModbusGateway application
  - Download configuration file (modbusgw.conf)
  - View ModbusGateway logfile (modbusgw.log)

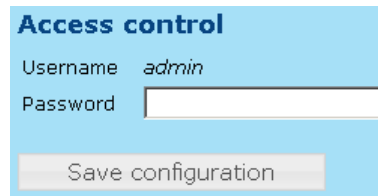
Figure 7: Possible Actions

These Actions are required later, so they will be referenced in below sections. Here is only basic information.

- *Reboot* Device  
This will restart the complete ModGate, thus cancelling all current operations and connections.
- *Restart* application  
The application is the Firmware part of the software, as mentioned above (4.1.1).
- *Download* configuration file  
The file is shown in a separate browser window. The download is performed by just saving the 'page'. For service requests it is useful to send this saved configuration.
- *View* logfile  
The log displays the operations performed recently. It is also shown in a separate window, and can be saved in the same way as the configuration. Also useful for service requests.

## 4.2 General Settings

### 4.2.1 Access Control



**Access control**

Username *admin*

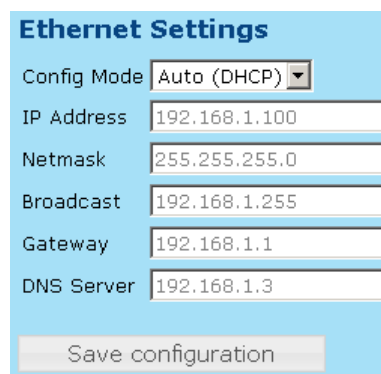
Password

Save configuration

Figure 8: Access Control

It is recommended to change the password for the webinterface for security reasons. The username is fixed as *admin*. The factory password is *vscom*. Note: You have to reboot the device for the changes to take effect.

### 4.2.2 Ethernet (IP) Settings



**Ethernet Settings**

Config Mode

IP Address

Netmask

Broadcast

Gateway

DNS Server

Save configuration

Figure 9: Ethernet Settings

Ethernet is considered the most often used network connection of ModGate. Therefore the default configuration is created for automatic acquire of suitable parameters.

**Config Mode** provides the choice between *Auto (DHCP)* and *Manual*. DHCP acquires the configuration from a certain server in the network, no need to define the other parameters. Selecting *Manual* requires to configure all following parameters, except of **Gateway** and **DNS Server**, if they are not known. Ask your Network Administrator for proper parameters.

**IP Address** is the fixed IP Address as given.

**Netmask** is the required Netmask.

**Broadcast** is the target address to use for sending out IP Broadcasts packages. Ask your Administrator.

**Gateway** This is the address of a Router, giving access to other networks (e.g. the Internet).

**DNS Server** This server translates Domain names like `vscom.de` to IP Addresses.

Note: You have to reboot (see 4.1.2) the device for the changes to take effect.

### 4.2.3 WLAN Settings

Certain models of ModGate provide Wireless LAN as of IEEE 802.11g. This network can operate in parallel to the Ethernet.

Wireless Settings	
SSID	ModGate803A9D
Operation Mode	Ad-hoc
Wireless Mode	11 b+g
CountryRegion	ETSI (1-13)
Channel	7
Encryption Type	Off
Encryption Key	

Figure 10: WLAN Radio Cell Settings

**WLAN Radio Cell Parameters** These are the parameters to configure the radio operation, so ModGate will connect to the WLAN.

**SSID** is the name selected for the Radio Cell. The SSID has to be the same for devices to communicate with each other. It is initialized with a unique string, generated from the last characters of the Ethernet MAC Address.

**Operation Mode** provides the choice between *Ad-hoc* and *Infrastructure*. The Ad-hoc mode is used for direct communication between stations, e.g. a PC and the ModGate. In Infrastructure Mode all communication is sent via an Access Point, which operates as the central hub of the Radio Cell. In general this also enhances signal quality, security and bandwidth.

**Wireless Mode** may be selected as *11b* for 11 Mbit/s or *11b+g* for up to 54 Mbit/s. Please note, 802.11 specifications define the Ad-hoc mode to use 11b.

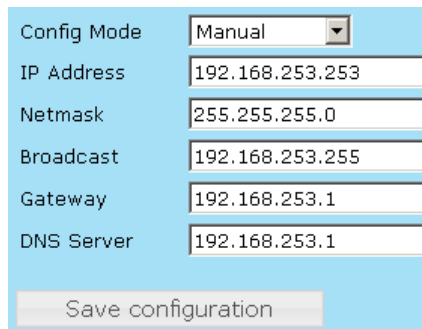
**CountryRegion** WLAN is a Radio technique, so local regulations apply. These are selected by country. *FCC(1-11)* is valid in North America, and *ETSI(1-13)* generally in Europe. *SPAIN(10-11)* and *FRANCE(10-13)* are special European configurations, finally *MKK(14)* is required for Japan.

**Channel** selects the frequency the cell shall operate on. The previous parameter of *CountryRegion* may restrict the possible configurations.

**Encryption Type** is used to restrict access to the radio cell. The possible selections *Off*, *WEP*, *WPA-PSK TKIP* and *WPA2-PSK AES*, where WPA2 is the most secure variant.

**Encryption Key** This is the secret key which provides access to the radio cell. Without this key no station can join the Wireless network. The length of the string defines the strength of the key.

- WEP with 5 characters: WEP-40/64 with 40 bit text key
- WEP with 10 characters: WEP-40/64 with 40 bit binary key (hexadecimal)
- WEP with 13 characters: WEP-114/128 with 114 bit text key
- WEP with 26 characters: WEP-114/128 with 114 bit binary key (hexadecimal)
- WPA/WPA2 with 8 to 63 characters: The 256 bit key is generated from this text and the SSID
- WPA/WPA2 with 64 characters: The 256 bit binary key (hexadecimal) is directly given



The image shows a configuration form for WLAN IP settings. It has a light blue background. At the top, there is a 'Config Mode' dropdown menu set to 'Manual'. Below it are six input fields: 'IP Address' (192.168.253.253), 'Netmask' (255.255.255.0), 'Broadcast' (192.168.253.255), 'Gateway' (192.168.253.1), and 'DNS Server' (192.168.253.1). At the bottom of the form is a 'Save configuration' button.

Figure 11: WLAN IP Settings

**WLAN IP Settings** When ModGate has access to the WLAN radio cell, this network interface operates similar to Ethernet. Meaning all IP traffic operates exactly the same on Ethernet or WLAN. This results in a configuration parallel to Ethernet. Please ask your Network Administrator for a correct configuration, and compare the parameter meanings with Ethernet (see 4.2.2).

Note: You have to reboot (see 4.1.2) the device for the changes to take effect.

### 4.3 ModbusGateway Configuration

The ModGate use a versatile but powerful concept of mapping target interfaces for incoming Modbus frames. The decision where an incoming frame has to be transferred to is chosen on few information, so the configuration stays quite simple.

Modbus uses a Master/Slave concept of communication. Each slave device has an address, which is unique on the line where it is connected to. The Master sends commands and requests, which contain this address in the frame header. ModGate knows which communication line (serial port, TCP connection) the address is connected to. So it is easy to send the received frame to that interface. Of course responses are identified and sent to the Master which requested them. This is the *DirectMappingMode*.

However in many installations there is a ModGate with only a single serial port. This Gateway is contacted by only one Master via TCP. So it is clear all data coming from TCP must be sent to the serial port, and vice versa. It is not necessary to define all the Modbus addresses for just this simple task. The configuration is easy in the *PromiscuousMode*.

Note: Changes in this section do not need a complete reboot of the device, its sufficient to restart the ModbusGateway application (see 4.1.2) once the configuration is finished.

### 4.3.1 ModbusGateway Settings

Figure 12: Gateway Settings

**ListenAddress** Specifies the IP Address the modbus gateway application listens on. The default value is 0.0.0.0, which means ModGate accepts connections on all interfaces (Ethernet and WLAN) in parallel. Enter the IP Address of either Ethernet or WLAN to restrict the Gateway function to this interface.

**ListenPort** Specifies the TCP port number the Modbus gateway application listens on. The default value is 502, which is the reserved port for Modbus/TCP protocol.

**GatewayMode** Lets you specify the mode which the gateway operates in. *DirectMappingMode* (Mapping of Modbus devices to serial ports or TCP connections) or *PromiscuousMode* (Mapping of serial ports to TCP connections).

**Allow unknown clients** Enables all stations to connect to ModGate, without prior configuration as an allowed target for data.

**Verbose** When enabled the Modbus gateway application writes more debug output in the logfile (/var/log/modbusgw.log). Don't enable this, unless you want to resolve problems!

### 4.3.2 Configuration of serial ports

Serial Port ID	Device	Modbus	RSMode	Baudrate	Databits	Parity	Stopbits	Action
1	/dev/ttyS1	rtu	rs232	115200	8	even	1	

Figure 13: Serial Settings

You configure the serial ports here, where your serial Modbus devices are connected to. **Baudrate**, **Databits**, **Parity** and **Stopbits** can be set for each serial port individually.



Serial Port ID **1**

Device /dev/ttyS1

Modbus  (Default: rtu)

RSMODE  (Default: rs232)

Baudrate  (Default: 115200)

Databits  (Default: 8)



Parity  (Default: even)

Stopbits  (Default: 1)

Figure 14: Edit Serial Parameters

By default they are set to the values specified in the Modbus standard. The serial interface can be set to RS232 (standard) or RS485 (Automatic Receive Transmit control, 2-wire without echo). You have the choice between the *Modbus/ASCII* and the *Modbus/RTU* protocol.

### 4.3.3 Configuration of TCP connection

Configuration of TCP connections				
TCP Connection ID	Host/IP	Port	Connect	Action
1	192.168.1.42	0	auto	 

Save configuration      Add TCP connection

Figure 15: TCP Settings

You can add, edit and delete TCP connections here.

TCP Connection ID  (Default: 1)

IP/Host  (Default: -)

Port  (Default: 502)

ConnectMode  (Default: auto)

Figure 16: Edit TCP Connections

Its necessary to add a new connection for each Modbus TCP device you want to communicate with. Modbus TCP packets from unknown sources are dropped. Please note that each entry needs an unique number called **TCP Connection ID**. The **IP/Host** field can be either a numeric IP Address or a hostname. The **Port** can be set to 0 if the remote host establishes the TCP connection. There are two types of **ConnectMode** available.

- *Startup*: establishes the TCP connection to the remote host when the Modbus gateway application starts.
- *Auto*: does not connect to the remote host until the first packet for that destination should be delivered.

## 4.4 Mapping table

Modbus Device ID	Destination Type	Destination ID	Action
1	serial	1 (/dev/ttyS1)	🗑️ ✎
66	tcp	1 (192.168.1.42:0)	🗑️ ✎
127	serial	1 (/dev/ttyS1)	🗑️ ✎

Save configuration      Add mapping entry

Figure 17: Mapping Table

The mapping table is the main part of the gateway. It specifies where the Modbus packets should be delivered to. The type of the mapping table depends on the mapping mode specified under "Modbus Gateway Settings" (see 4.3.1).

### 4.4.1 Devices to serial or TCP (Direct Mapping)

Modbus Device ID  (Default: 1)  
 Destination Type  (Default: serial)  
 Destination ID (TCP/Serial)  (Default: 1)

Figure 18: Edit Direct Mappings

In *DirectMappingMode* each mapping entry consists of three fields:

- **Modbus Device ID:** The (unique) Modbus ID of the device.
- **Destination Type:** The destination can be either a Modbus device on a serial port (*serial*) or a remote Modbus device connected via TCP (*tcp*).
- **Destination ID:** Depending on the **Destination Type** this is either a **Serial Port ID** or a **TCP Connection ID**.

Every time a valid Modbus packet is received (over TCP or serial line) the application checks if the mapping table contains an entry where the destination Modbus device ID of the packet matches the **Modbus Device ID** specified in the table. If there is such an entry the packet will be forwarded to the destination specified, otherwise the packet will be dropped. The main advantage of this mode is that you can specify an individual mapping for each Modbus device ID.

### 4.4.2 Serial to TCP (Promiscuous)

TCP Connection ID  (Default: 1)  
 Serial Port ID  (Default: 1)

Figure 19: Edit Promiscuous Mappings

In *PromiscuousMode* each mapping entry consists only of two fields, the **Serial Port ID** and the **TCP Connection ID**. Every valid Modbus packet received on the serial port is forwarded to the TCP connection and vice versa. This mode has the advantage that it is very basic and easy to set up, but it does not allow a complex mapping depending on the destination addresses. Its only possible to define 1-to-1 mappings, which means for instance that one serial port cannot be mapped to two TCP connections.

If **unknown clients** are allowed (4.3.1) on a single port device, there is no need to configure a mapping.

### 4.5 Manual Edit (Advanced)

In this section it is possible to upload a previously used '*modbusgw.conf*' file (via copying and pasting the old file into the text-box). You may also edit the configuration file manually here. The configuration file consists of key-value pairs. There are also flags like "*promisc*" and "*verbose*" which are off by default if they are not specified in the config file. In the sections "*Serial Ports*", "*TCP Connections*" and "*Mappings*" *ALL* available options have to be specified for each entry. The valid mapping table is selected depending on the *promisc* flag, the settings belonging to the currently inactive mode are ignored (e.g. when in *PromiscuousMode* all mappings that were specified for *DirectMappingMode* are ignored). ModGate treats lines as comments when they start with the hash character "#".

#### 4.5.1 General options (general options for this program)

**listenaddr** IP to listen on (default=0.0.0.0)

**listenport** Port to listen on (default="502")

**promisc** Promiscuous mode (default=off)

**verbose** Verbose output (default=off)

**response-timeout** Modbus response timeout (in milliseconds, default=1000 for 1 second)

**allow-unknown-clients** Allow connections of IPs which have not been specified (default=off)

**log-file** Log file (default=/var/log/modbusgw.log)

#### 4.5.2 Serial Ports (configuration of serial ports)

**serial** Unique Identifier, numeric, sequentially (1, 2, ...)

**device** Serial Port (e.g. /dev/tty1)

**baudrate** Baudrate (e.g. 115200)

**databits** Databits (e.g. 8)

**parity** Parity (none, even or odd)

**stopbits** Stopbits (1 or 2)

### 4.5.3 TCP Connections (configuration of allowed TCP connections)

- tcp** Unique Identifier, numeric, sequentially (1, 2, ...)
- ip** IP Address or hostname of the remote Modbus TCP device (e.g. 192.168.1.50)
- port** Port of the remote Modbus TCP device (e.g. 502)
- connect** ConnectType (auto or startup)

### 4.5.4 Mappings - DirectMappingMode

Mapping of Modbus devices to either serial ports or TCP connections

- devid** Modbus device ID
- type** Destination type (tcp, serial or tcpgateway)
- destid** Identifier of the destination

### 4.5.5 Mappings - PromiscuousMode

Mapping of TCP connections to serial ports

- tcpid** Identifier of the TCP connection
- serialid** Identifier of the serial port