

Device Server
Modbus TCP to RTU Gateway
Supplement



Document number 80-001082-9

Revision 1-E

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Modbus Gateway

The NDS supports a Modbus TCP to Modbus RTU gateway. Using this feature, the NDS will accept connections from Modbus TCP clients and convert them to Modbus RTU connections to devices on the NDS serial ports.

The Modbus Gateway listens for Modbus TCP connections on TCP port 502 by default. It then translates these to Modbus RTU communications on one or more serial ports. Up to 16 clients may simultaneously connect to the gateway.

Configuration

Select the Modbus Settings link in the NDS menu to bring up the Modbus configuration page. This page selects which TCP port to use, which serial ports to use, the TCP to RTU translation and optional network filtering.

Modbus TCP Gateway Settings

Modbus TCP Port ⓘ

TCP port for Modbus connections

Modbus TCP to Modbus RTU Translation ⓘ

Serial Port	Min ID	Max ID	Offset
<input type="checkbox"/> Port1	0	0	0
<input type="checkbox"/> Port2	0	0	0
<input checked="" type="checkbox"/> Port3	1	10	0
<input checked="" type="checkbox"/> Port4	11	20	0

Note: Modbus translation is disabled if no serial ports are selected.

Permit List ⓘ

IP Address	Mask
172.16.4.0	255.255.255.0
172.16.2.0	255.255.255.0

NOTE: You must [reboot](#) for these changes to take effect.

A reboot is required following any change in configuration settings.

Modbus TCP Port

The default TCP port number for a Modbus TCP socket connection is 502. You may specify a different port. The gateway listens on a single TCP port for all Modbus TCP connections.

The following TCP ports are used by other services running on the server and are invalid for Modbus TCP use:

80, 515, 8000 to 8028*, 9000 to 9028* and 9096.

* The actual upper limit depends on the number of serial ports on the product.

TCP port 0 is an invalid entry.

Serial Ports

Select the serial ports for use with Modbus RTU. Checking a serial port here dedicates it for use with Modbus; other Port Services may not be configured on that port.

(Configure the electrical interface and serial parameters for the ports in the Serial Settings page. The Modbus specification recommends using 8 data bits, even parity and one stop bit.)

Modbus TCP to Modbus RTU Translation

The Modbus protocol allows accessing multiple devices on a single interface (TCP or RTU) and uses ID's to direct requests to specific devices. If only one serial port is being used for Modbus, all Modbus TCP ID's are sent out that port. However, if more than one serial port is being used, the translation table shows which ID's are on which ports.

For each port, enter the range (Min ID and Max ID) of Modbus TCP IDs that you want to send on that port.

Example:

- Serial 1 has Modbus RTU devices with ID's 1-10
- Serial 2 has Modbus RTU devices with ID's 11-20

Your translation table could be:

Serial Port	Min ID	Max ID	Offset
<input checked="" type="checkbox"/> Port1	1	10	0
<input checked="" type="checkbox"/> Port2	11	20	0

A translation entry with Min and Max of "0" is the default translation. Any ID that does not match any other translation entries will use this entry. If there is a not a default

translation entry and a request arrives for a Modbus TCP ID that is not in the table, the gateway will close the TCP connection from the client.

Port Offsets

By default, the ID's used on the Modbus RTU ports are the same as the Modbus TCP ID's, but the NDS can use the "Offset" field to alter the ID's depending on the port they are used on.

Example:

- Serial 1 has 10 Modbus RTU devices with ID's 1-10
- Serial 2 has 10 different Modbus RTU devices with ID's 1-10 as well.

Under Modbus RTU, since these ID's are on separate serial ports, these don't conflict. But for Modbus TCP to address these we must have unique ID's for each device. To accomplish this, the "Offset" field is applied to all ID's coming and going on the serial port. In the example above, use:

Serial Port	Min ID	Max ID	Offset
<input checked="" type="checkbox"/> Port1	1	10	0
<input checked="" type="checkbox"/> Port2	11	20	10

The Modbus TCP client will access ID's 1-20. ID's 1-10 will go out serial port 1 without modification. The offset 10 will be subtracted from Modbus TCP ID's as they are sent out serial port 2, and will be added back to ID's coming in the port. For example, Modbus TCP ID 12 will go out serial port 2 as ID 2.

Network Filtering

Network Filtering controls access to the Modbus TCP port by providing simple IP filtering. If there are no entries in the table, then filtering is disabled (that is, all clients may access the Modbus gateway). But if any entries are in the table, then only the ranges of IP addresses specified in the table may connect to the port.

Example:

IP Address	Mask
192.2.3.55	255.255.255.255
10.1.0.233	255.255.255.0

In the example above the NDS server will allow connections from IP address 192.2.3.55 and IP addresses in the range of 10.1.0.0 to 10.1.0.255. No IP above 223.255.255.255 is accepted as a valid entry.

Modbus Status

Select the Modbus Status link in the NDS menu to bring up the Modbus status page. This page identifies current Modbus TCP clients and devices in use.

Modbus TCP Status

Modbus Clients

Client Connection	TX	RX	TCP IDs
::ffff:172.16.2.4:58396	6842	7464	6
::ffff:172.16.2.4:58397	6842	7464	6
::ffff:172.16.2.4:58395	6853	7476	6
::ffff:172.16.2.4:58398	6842	7464	6
::ffff:172.16.2.4:58399	6842	7464	6

Modbus Devices

TCP ID	RTU ID	Port	Mode	TX	RX
6	6	Port1	RS485, 19200-8N2	1083280	947870
15	15	Port2	RS422, 9600-8N2	32	0
16	16	Port2	RS422, 9600-8N2	106224	92883
21	21	Port1	RS485, 19200-8N2	128	0

Clear Statistics

Operation Notes

Multiple Clients

The Modbus gateway allows up to 16 Modbus TCP clients to connect simultaneously. If these clients are accessing the same serial ports, pending requests may be queued until the serial port is available. The client requests are handled on a first-come, first-served basis.

The gateway is interfacing from a relatively fast network environment (the Modbus TCP side) to a relatively slow, sequential environment (the Modbus RTU side). You may need to adjust the timeouts in the Modbus TCP client to accommodate slower RTU devices and coordination with other clients accessing the same devices.

Modbus Gateway Timeouts

The gateway uses two internal timers to manage communication with the Modbus RTU devices.

No answer from the Modbus RTU device

When the gateway polls a Modbus RTU device, it expects a response within one second. If the RTU device does not respond within one second, the gateway silently discards the Modbus TCP request.

Serial Port Not Available

When multiple clients are accessing the same port on the gateway, requests are queued as described above. In the event that the gateway is unable to obtain access to the serial port within 30 seconds, the gateway will close the TCP connection from the client.