

**MODBUS OPC Device Driver**

# MODBUS OPC Device Driver Manual

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## Overview

ReLab's Modbus OPC Device Driver was designed to support Serial and Ethernet Modbus protocols. This manual will assist you in configuring communications between Modbus compatible devices and ReLab OPC Server.

## Trademarks

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## Operating System and Hardware Requirements

### Operating System (OS)

- Windows® 7
- Windows 8, 8.1
- Windows® Server 2003
- Windows® Server 2008, 2008 R2

### Hardware

- CPU – 1GHz (minimum)
- Memory – 500MB (minimum)
- Hard Drive Storage – 500MB (minimum)

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## Modbus Protocol

### Modbus Registers

Address Type	Decimal Range	Hex Range	Data Type	Client Access	OPCItem
Output Coils	000001 - 065536	H000001 - H0FFFF	Boolean	Read/Write	1 to 65536
Input Coils	100001 - 165536	H100001 - H1FFFF	Boolean	Read Only	100001 to 165536
Internal Registers	300001 - 365536	H300001 - H310000	Word	Read Only	300001 to 365536
Holding Registers	400001 - 465536	H400001 - H410000	Word	Read/Write	400001 to 465536

Address Type	OPC Item
Internal Registers Bits	300001-1 to 365536-16
Holding Registers Bits	400001-1 to 465536-16

### Modbus Registers Data Type

Address Type	Data Type	Notes
Output Coils / Input Coils	Boolean	
Internal Registers / Holding Registers	Byte	
Internal Registers / Holding Registers	Word	
Internal Registers / Holding Registers	Short	
Internal Registers / Holding Registers	DWord	
Internal Registers / Holding Registers	Integer	
Internal Registers / Holding Registers	Float	
Internal Registers / Holding Registers	Double	
Internal Registers / Holding Registers	Byte	
Internal Registers / Holding Registers	Char	

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Internal Registers / Holding Registers	String	
Internal Registers / Holding Registers	UString	Unicode string

## Configuring MODBUS OPC Device Driver

Follow these steps to configure the MODBUS Device Driver:

1. Open ReLab OPC Console and select **Configure | Load Driver** from the main menu

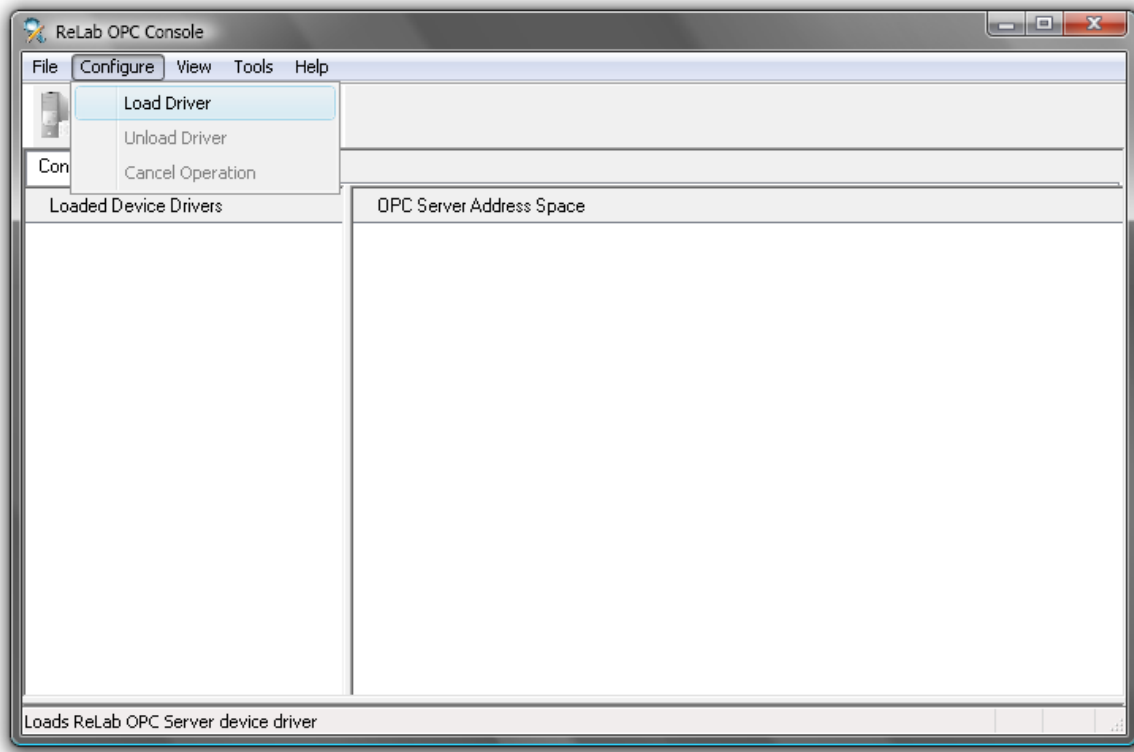


Figure 1

2. On the ReLab OPC Console: Select **Load Driver** and then select **ReLab MODBUS OPC Device Driver**

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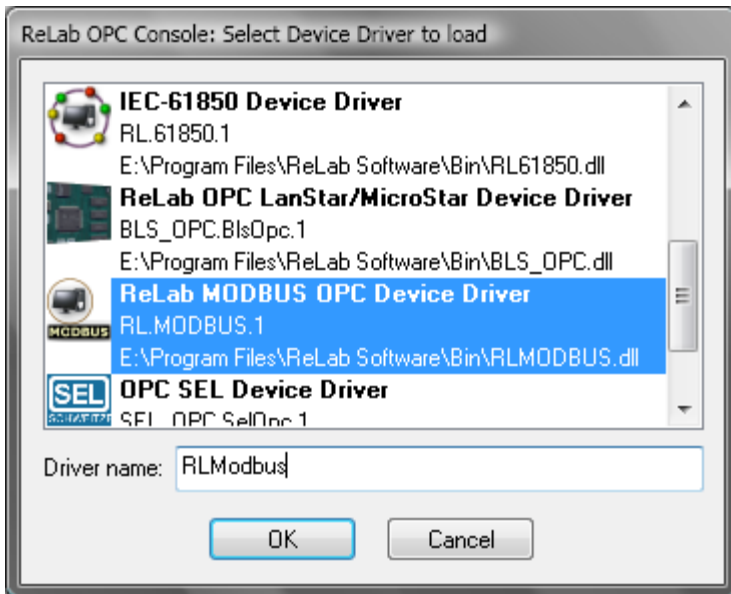


Figure 2

3. Specify the **Drive name** and click **OK** button. The MODBUS Driver Configuration dialog will appear.

## Main Tab

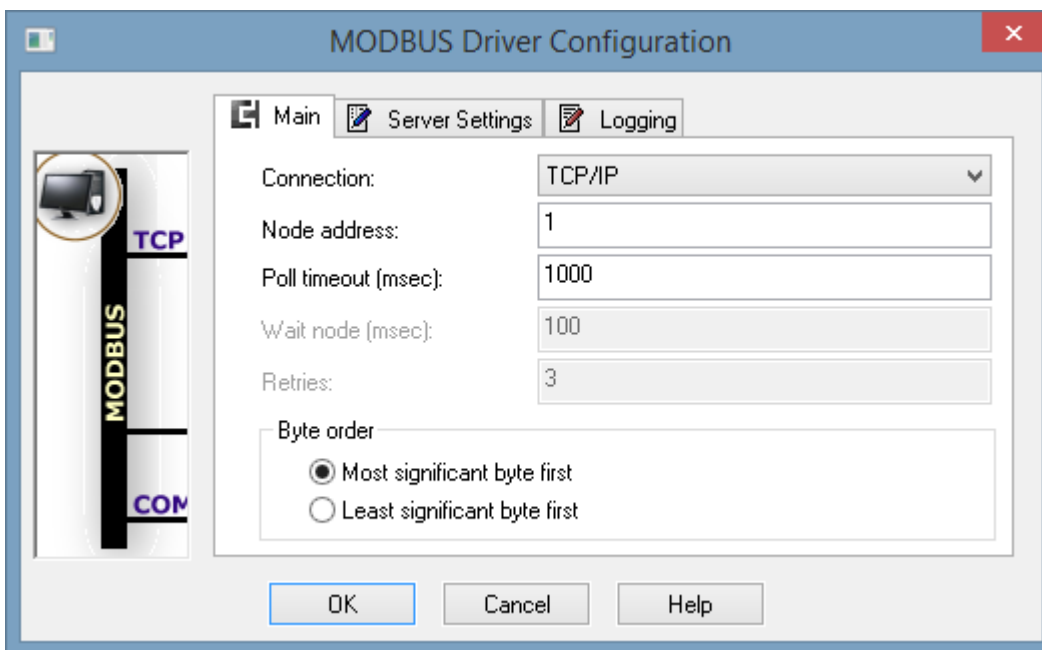


Figure 3

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Parameter	Description	Default
Connection	Specifies Connection Type: TCP/IP, Serial, TCP/IP(Multiple nodes), Serial (Multiple nodes)	TCP/IP
Node Address	Specifies Node address (Integer), not applicable for Multiple nodes connection type.	1
Poll Timeout (msec)	Specifies Poll timeout (Integer) in milliseconds.	1000
Wait Node (msec)	Waiting time in milliseconds for a node response. Applicable only for Multiple nodes connection type.	100
Retries	Number of retries of sending requests to a node. Applicable only for Multiple nodes connection type.	3
Most significant byte first	Messages sent/received with most significant byte first	Yes
Least significant byte first	Messages sent/received with least significant byte first	No

## Server Settings Tab

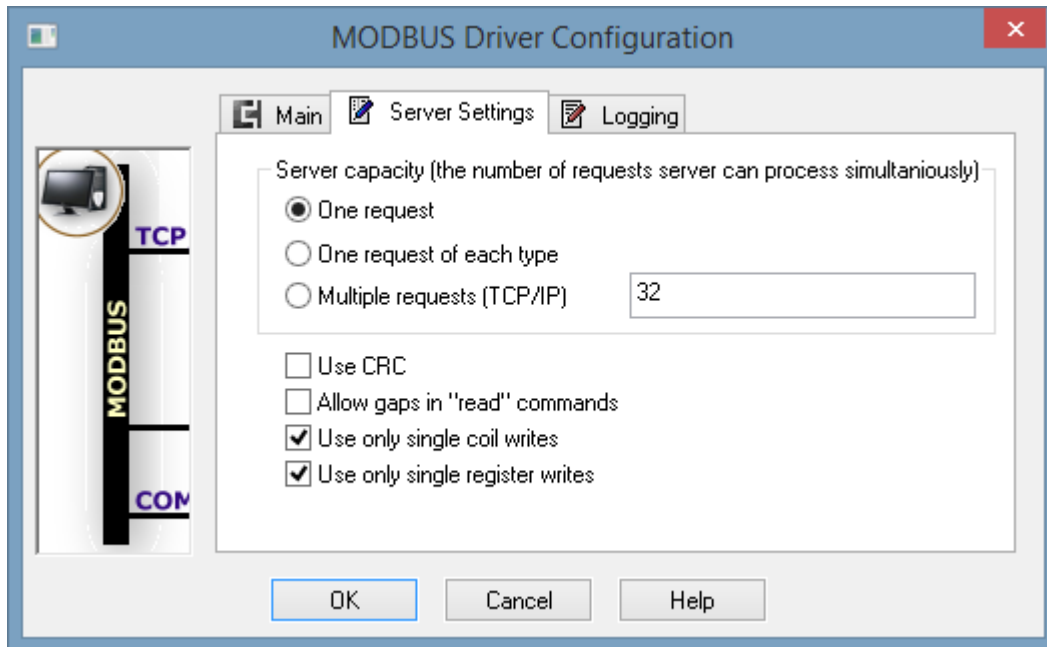


Figure 4

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Parameter	Description	Default Value
One request	The server will process one request at a time	Yes
One request for each type	The server will process one request of each type at a time	No
Multiple requests (TCP/IP)	The server will process no more than a specified number of requests at a time	32
Use CRC	The driver will receive and transmit CRC for each message, applies to serial communication ONLY.	No
Allow gaps in "read" commands	Depending on this parameter the driver will either read a block of registers (parameter is set to Yes) or read only the mapped registers (parameter is set to No).	No
Use only single coil write	If set to Yes the driver will send a separate message for each coil write.	Yes
Use only single register write	If set to Yes the driver will send a separate message for each register write.	Yes

## Logging Tab

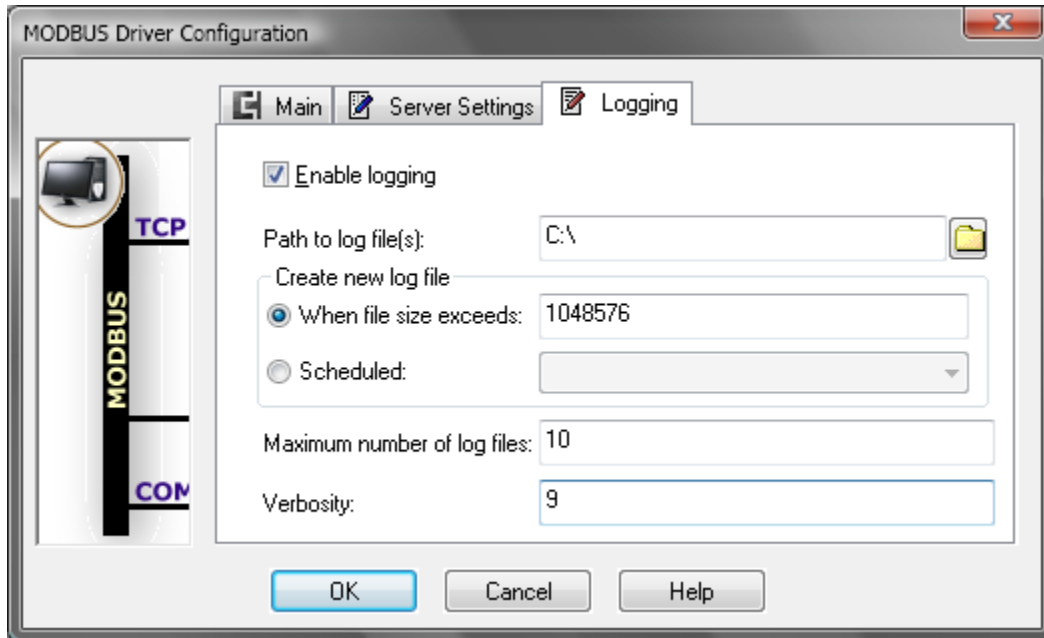


Figure 5



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Parameters	Description	Type	Default
Enable logging	Enables or disables driver logging	Boolean Checkbox	False
Path to log file(s)	Specifies location of the log file(s)	String Textbox	Empty
When file size exceeds	Specifies when the new file will be created based on file size entered (in bytes)	Long Textbox	1048576
Scheduled	Specifies when the new file will be created based on user selectable schedule   Daily (every 24 hours)   Every 12 hours   Every 8 hours   Every 6 hours   Every 4 hours   Every 2 hours   Hourly	Enumeration Dropdown	Empty
Maximum number of log files	Specifies maximum number of log files before the files are overwritten	Integer Textbox	10
Verbosity	Specifies verbosity level of the log files (Valid entry is 1 – 9)	Integer Textbox	1

4. Click "OK" button, the connection dialog will appear (Figure 6)

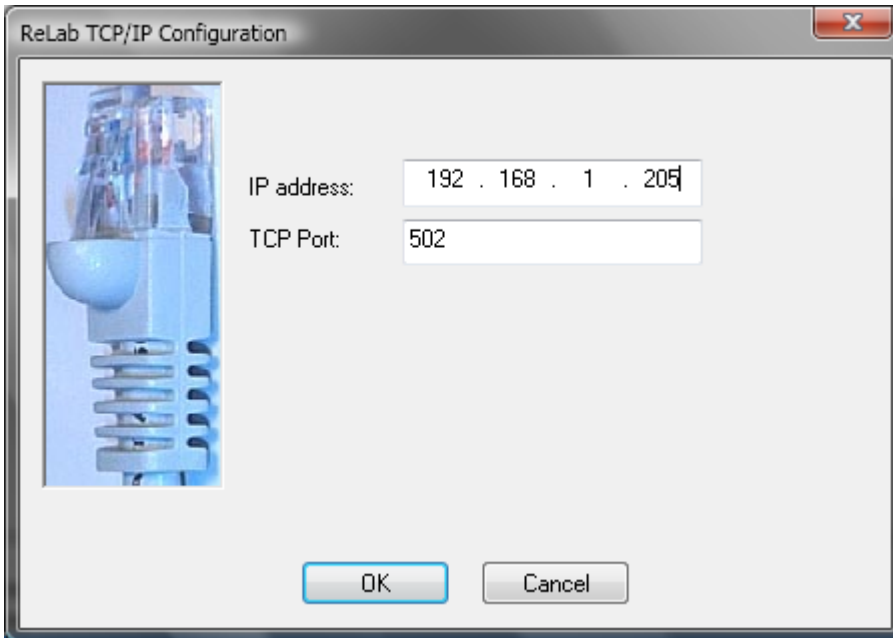


Figure 6

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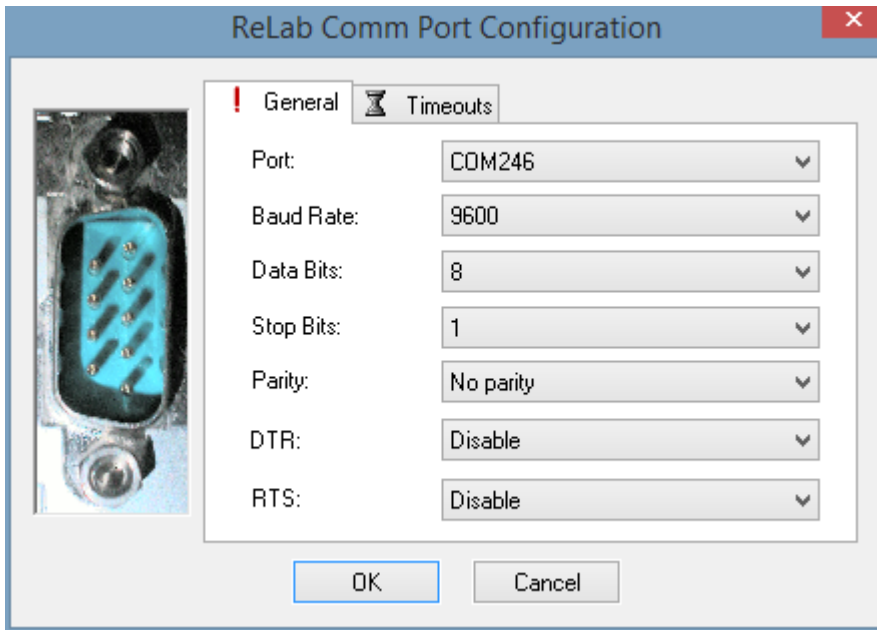


Figure 7

Parameter	Description
Port	Port number (1 to 100)
Baud Rate	Bits per second (300 to 256000)
Data Bits	Data Bits (4,5,6,7,8)
Stop Bits	Stop Bits (1, 1.5, 2)
Parity	Parity (No Parity, Even, Odd)
DTR	DTR (Disable, Enable, Handshake)
RTS	RTS (Disable, Enable, Handshake)

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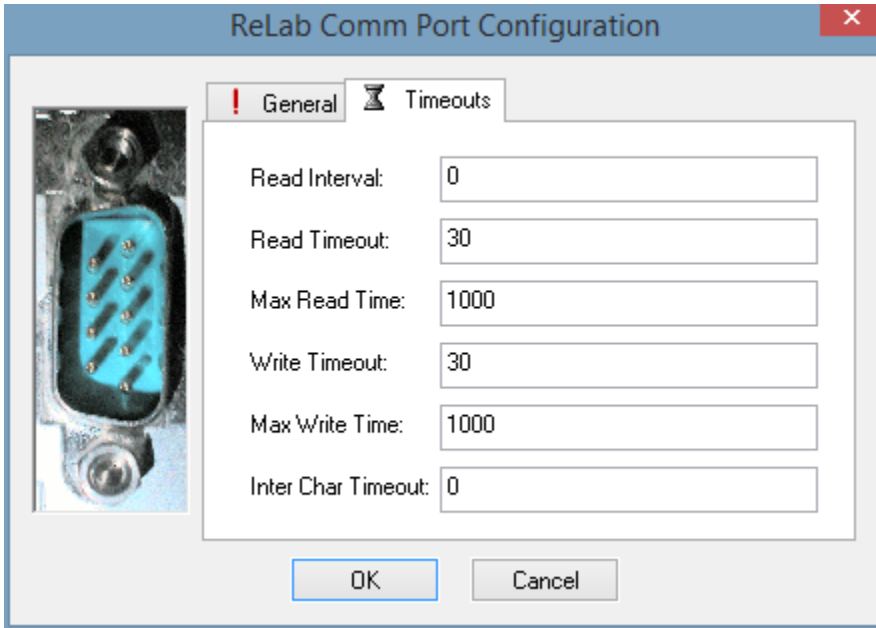


Figure 8

Parameter	Description	Default Value
Read Interval	Specifies the maximum time, in milliseconds, allowed to elapse between the arrival of two characters on the communications line. During a ReadFile() operation, the time period begins when the first character is received. If the interval between the arrival of any two characters exceeds this amount, the ReadFile operation is completed and any buffered data is returned. A value of zero indicates that interval time-outs are not used. A value of MAXDWORD, combined with zero values for both the ReadTotalTimeout constant and ReadTotalTimeoutMultiplier members, specifies that the read operation is to return immediately with the characters that have already been received, even if no characters have been received.	0
Read Timeout	Specifies the constant, in milliseconds, used to calculate the total time-out period for read operations. For each read operation, this value is added to the product of the ReadTotalTimeoutMultiplier member and the requested number of bytes. A value of zero for both the ReadTotalTimeoutMultiplier and ReadTotalTimeoutConstant members indicates that total time-outs are not used for read operations.	30
Max Read Time	Specifies the multiplier, in milliseconds, used to calculate the total time-out period for read operations. For each read operation, this value is multiplied by the requested number of bytes to be read.	1000
Write Timeout	Specifies the constant, in milliseconds, used to calculate the total time-out period for write operations. For each write operation, this value is added to the product of the WriteTotalTimeoutMultiplier member and the number of bytes to be written.	30

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Max Write Time	Specifies the multiplier, in milliseconds, used to calculate the total time-out period for write operations. For each write operation, this value is multiplied by the number of bytes to be written.	1000
Inter Char Delay	Delay between ASCII characters.	0

## Mapping MODBUS Items to ReLab OPC Server

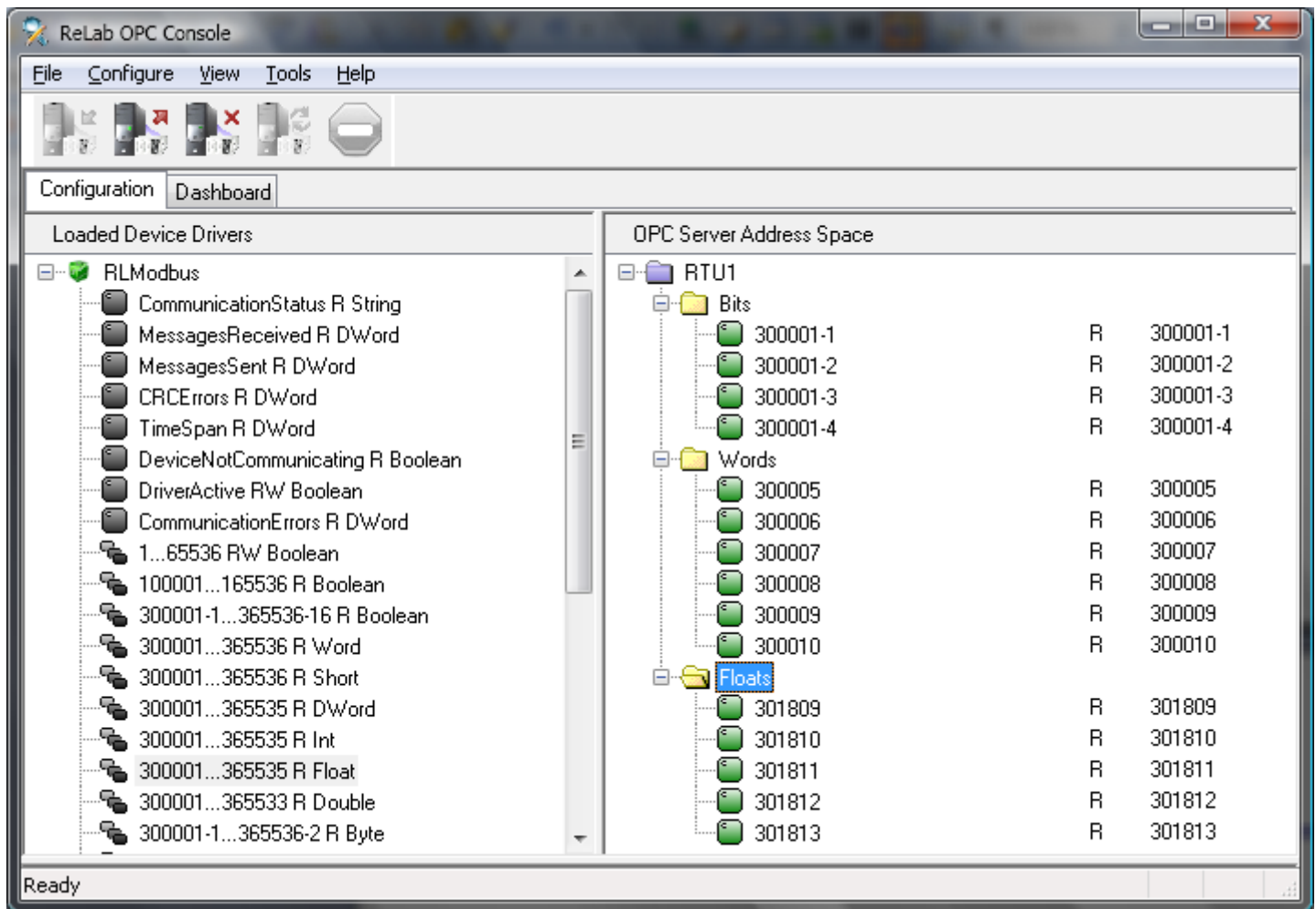




Figure 9

### Mapping Registers

Add Tag names and addresses from the loaded drivers to the OPC Server by mapping the registers.

1. In the **Loaded Device Driver** area of the **ReLab OPC Console**, expand your device driver to show the addresses and address arrays.

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2. Select the address icon(s)  or address array icon(s)  of the datatype(s) to be mapped
3. Right-click on your address selection to display the popup menu.

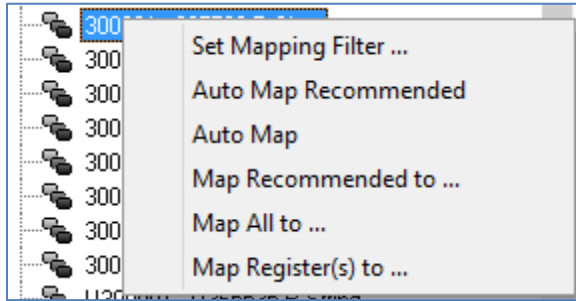


Figure 10

4. If you select **Set Mapping Filter** the Set Mapping Filter dialog box appears.

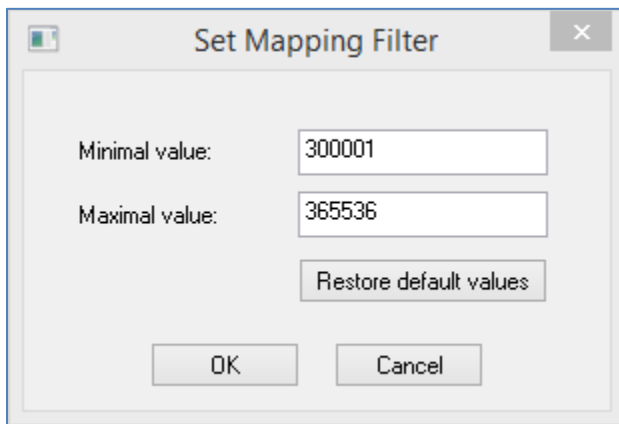


Figure 11

You can specify the range of the registers' values to appear on the Map Registers dialog, see below.

5. Select one of the mapping command options.
  - If you select **Auto Map**, all selected registers will be mapped:
  - Selecting **Auto Map Recommended** will automatically map recommended registers, not applicable for MODBUS driver
  - If you select **Map All To...**, the Map Registers dialog box appears.

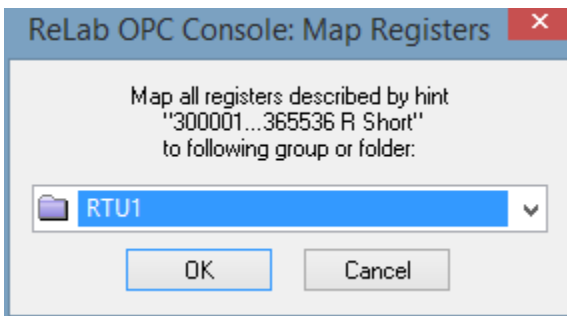


Figure 12

- From the dropdown list, select the Group/Folder to map to, then click **OK**.

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- If you select **Map Register(s) To...**, the Map Registers to dialog appears.

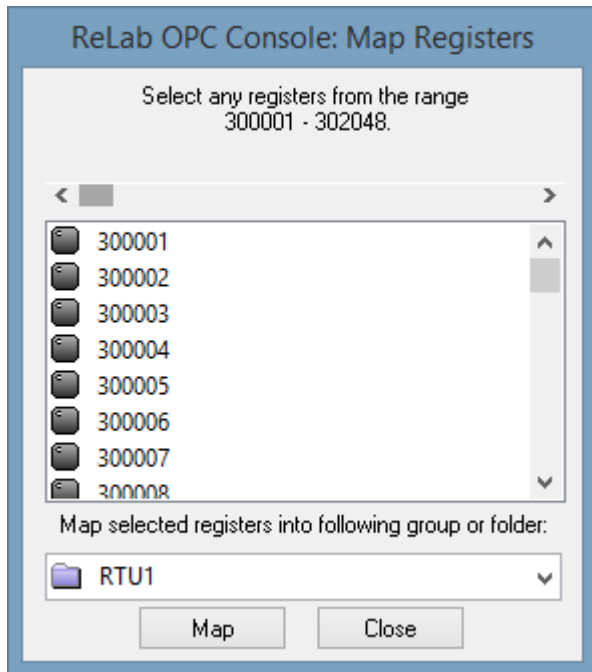


Figure 13

- Select the register(s) to be mapped, the destination Group/Folder, and then click **Map**.
- Selecting **Map Recommended to** will map recommended registers to the selected Group/Folder. This action is not applicable for MODBUS driver.

**NOTE** By default, mapped registers are named with their corresponding address. To change the Tag name, follow the [Renaming a Tag](#) procedure below.

No descriptions are created as addresses are mapped. To provide a description, using the [Dashboard](#), follow the [Enter/Edit Tag Description](#) procedure below.

Select a range of registers by pressing **Shift + Mouse-Click**. Select individual registers by pressing **Ctrl + Mouse-Click**.

## Renaming a Tag

By default, mapped Tags match their driver's address. To change the Tag name, follow these steps:

1. In the **OPC Server Address Space** of the ReLab OPC Console, right-click on the Tag name to be renamed.
2. From the popup menu, select **Rename**.
3. In the **Tag** field, type a unique Tag name, then click **Enter**.

## Enter/Edit Tag Description

No description is provided when a register is mapped. Tag descriptions can be changed on the **Dashboard** tab.

1. Click the **Dashboard** tab in the ReLab OPC Console.
2. Right-click on the Tag address, then select **Edit Description** from the popup menu.

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3. Type a description in the **Description** field, then click **Enter**.

**TIP:** If you need to edit a large number of Tag Name and Description fields, open the comma separated configuration file (\*.CSV) associated with each driver using Microsoft Excel.

**WARNING** Do not use commas in any of the entry fields. This causes an error in the OPC Server and prevents the configuration files (\*.CSV) from opening properly.

## Deleting a Tag

1. In the OPC Server Address Space of the ReLab OPC Console, select a Tag by right clicking on its name.
2. On the popup menu, click Delete.

**NOTE:** Delete multiple items by using **Shift + Mouse-click** (range select) and **Ctrl + Mouse-click** (individual selection) to select the items to delete. Right-click the mouse over one of the selected names to be deleted, then, from the popup menu, click **Delete Selected Items**.

## Checking Tag Quality

The quality of each Tag is monitored and displayed in the **Quality** column of the **Dashboard** tab.

1. After adding drivers and Tags to the OPC Server Address Space, click the Dashboard tab on the ReLab OPC Console.
2. View the quality column as you scroll through the Tags configured.

**NOTE:** If the quality is "Bad" on all Tags for a particular driver, check your driver configuration and/or port connections.

## Saving Your Configuration

The last saved configuration file becomes the default configuration for the ReLab OPC Server when it starts.

The configuration files consist of two types of files: a driver configuration file (\*.CVD), and a Tag information file (\*.CSV) for each driver in your configuration. The \*.CVD file consists of information and references to the loaded driver(s) such as: Driver(s) class Ids (CLSID), Port(s) setup parameters and special driver characteristics.









Always use the ReLab OPC Console to create/modify the driver configurations.

1. On the File menu of the RLOPC Console, click **Save Configuration As**.  
If **Save Configuration As** is not enabled on the File menu, click Save Configuration instead.
2. In the **Save As** dialog box, select a location and type a file name, then click **Save**.

**WARNING:** If you select New Configuration on the File menu, create a configuration, and then click Save Configuration, you will overwrite the previous configuration file opened before pressing new.

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## RLModbus Device Driver System Tags (Items)

System Tag	System Tag Description	Data Type
 CommunicationStatus R String	Device Connection status	String
 MessagesReceived R DWord	Messages received from the device	DWord
 MessagesSent R DWord	Messages sent from to the device	DWord
 CRCErrors R DWord	Modbus CRC errors received by the driver	DWord
 TimeSpan R DWord	Time in seconds after driver initialization	DWord
 DeviceNotCommunicating R Boolean	Value <i>True</i> means that the connection to a Device is lost	Boolean
 DriverActive R/W Boolean	Reserved	Boolean
 CommunicationErrors R DWord	Communication errors received by the driver	DWord



## APPENDIX A - REGISTERING MODBUS OPC DEVICE DRIVER

1. In ReLab OPC Console navigate to **Tools | Register Driver**

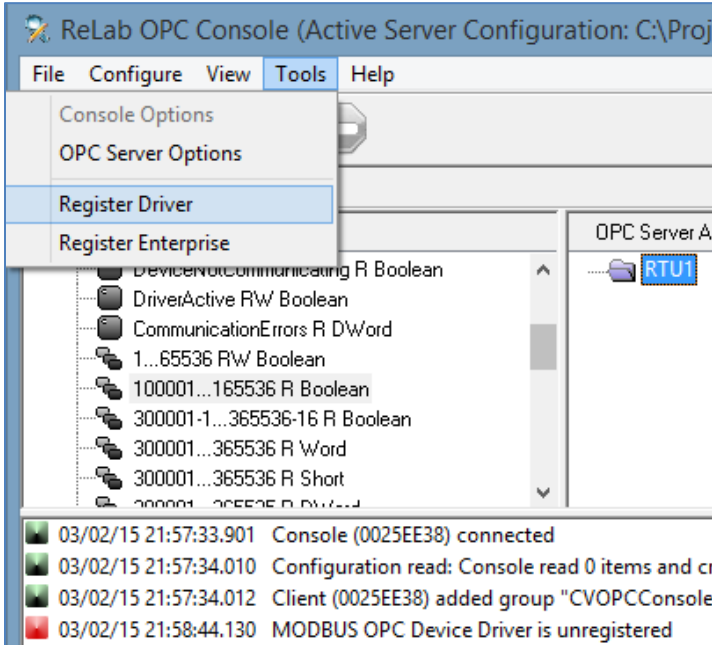


Figure 14

2. Select **ReLab MODBUS OPC Device Driver**

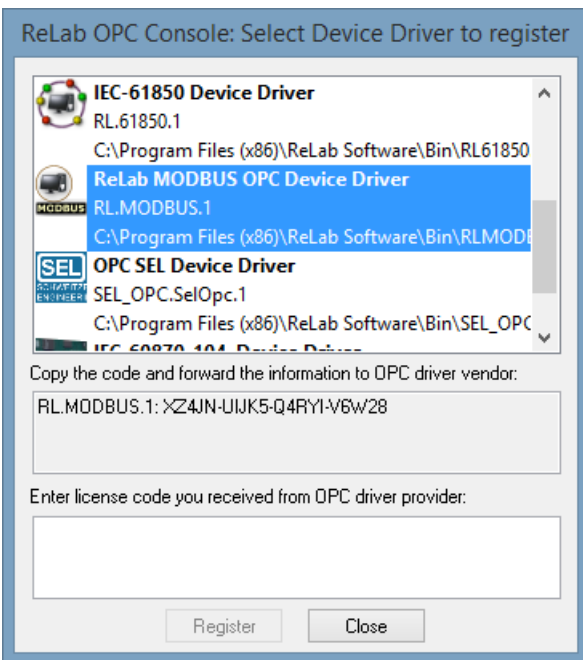


Figure 15

3. Copy the code from the textbox below

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4. Navigate to ReLab web site <http://www.relabsoft.com> and then - to **Support | License Registration** and enter the information required including the code generated on Step 3.
5. Within few minutes you will receive an email with registration acknowledgement and within few hours - the license code.
6. Enter the received license code and click **Register**.

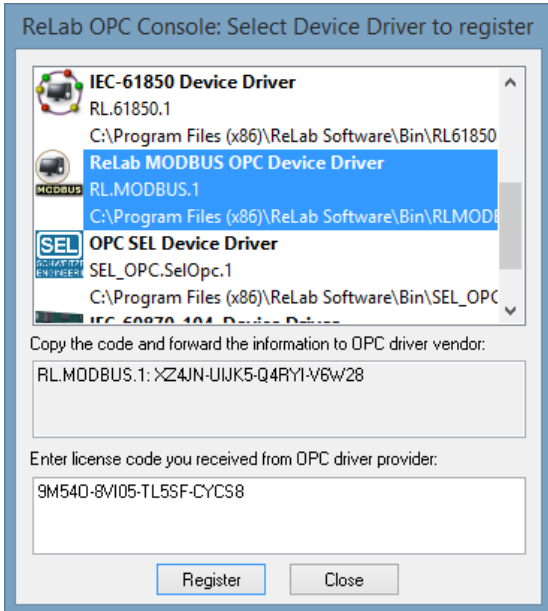


Figure 16

7. Click **Close** after successful registration

The driver registration status is shown in the lower pane of the OPC Console as on the Figure 17 below.

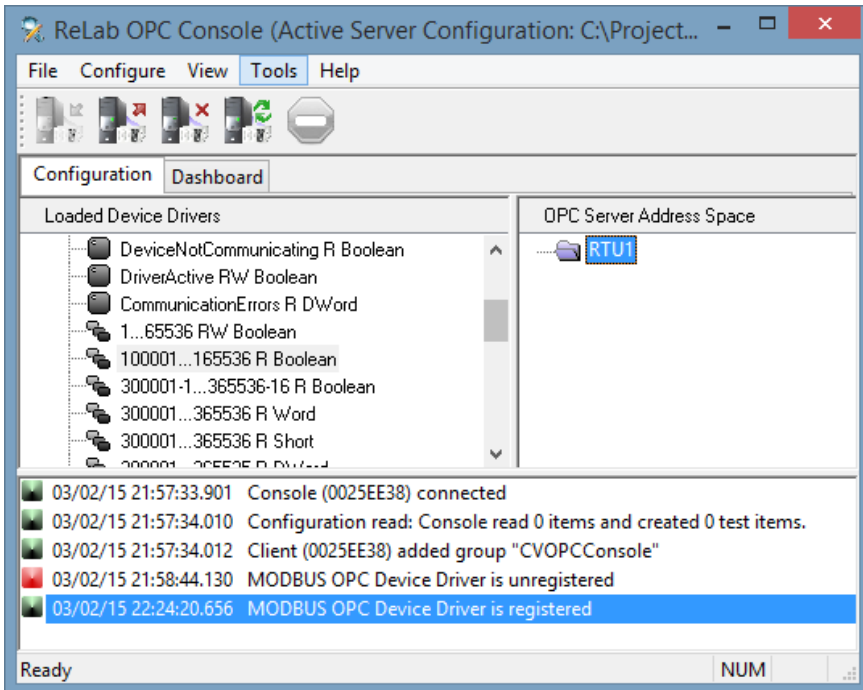


Figure 17