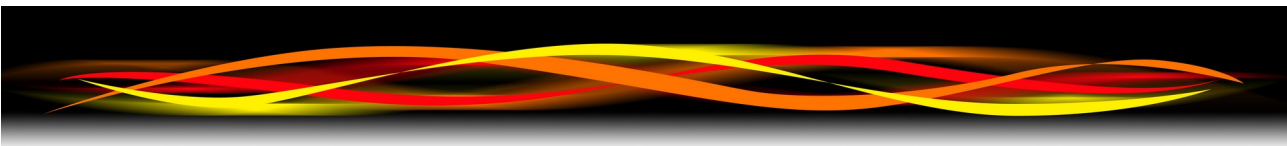


**Newflow**

**Modbus Master  
Simulator**

**User Manual**





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4					

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# 1 Introduction

The Newflow Modbus Master Simulator program can be used for exercising or validating a Modbus Slave device, such as a Coriolis meter, a Gas Chromatograph or a flow computer slave port. The program can run on a Windows or Linux PC and supports both serial and Ethernet Modbus/TCP communications.

The simulator can issue a sequence of polls. Each poll can be a read or write to one or multiple registers and coils. Function codes 01, 02, 03, 04, 05, 06, 15 & 16 are supported. All the items in any one poll will be of the same data type, which can be uInt16, uInt32, Int64, Float32, Double64, or a String. Each item in a poll can be given a description for the convenience of the operator.

Live values are displayed in decimal format in the data table and the raw hexadecimal message data is also displayed in the message log window. A facility to store the messages into a file on the PC is provided in the Professional Version.

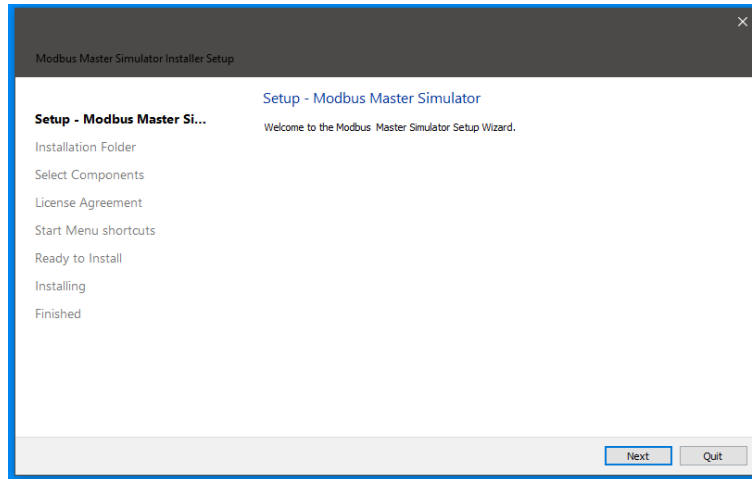
The simulator can handle up to 99 individual polls, and the polls can be saved to the PC disk and loaded again for subsequent use. The files are in XML format and can be edited in the PC if required.

A sequence engine is included which allows multiple polls to be linked together, and control the rate that the polls are transmitted.

## 2 Installation

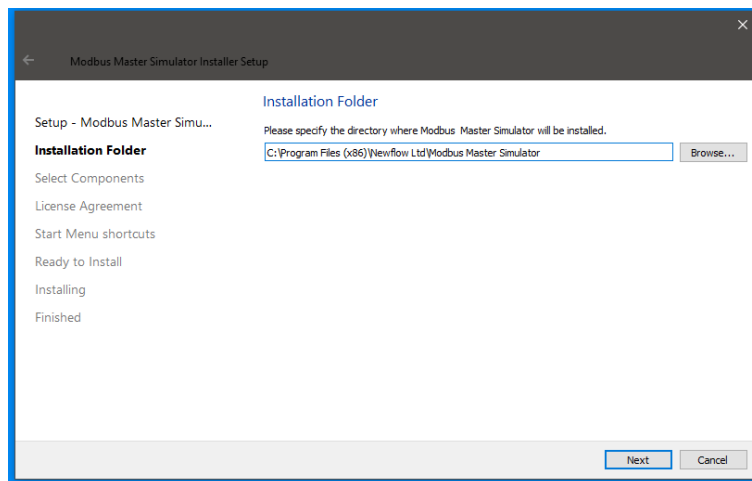
Locate the setup file and open it. This is called *ModbusMasterSimulator-1v9-Installer.exe* for this version.

The installer will then open and show the steps to complete installation on the PC. At any time click on the Quit/Cancel button to abort the installation.



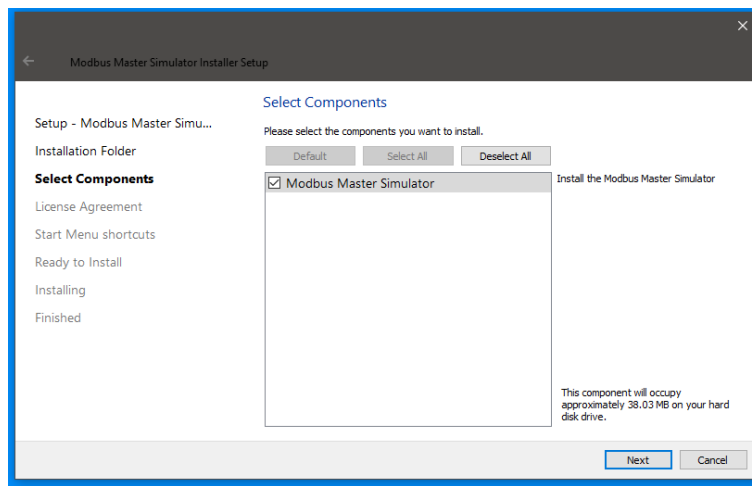
Click Next to continue.

Choose the Installation Folder.



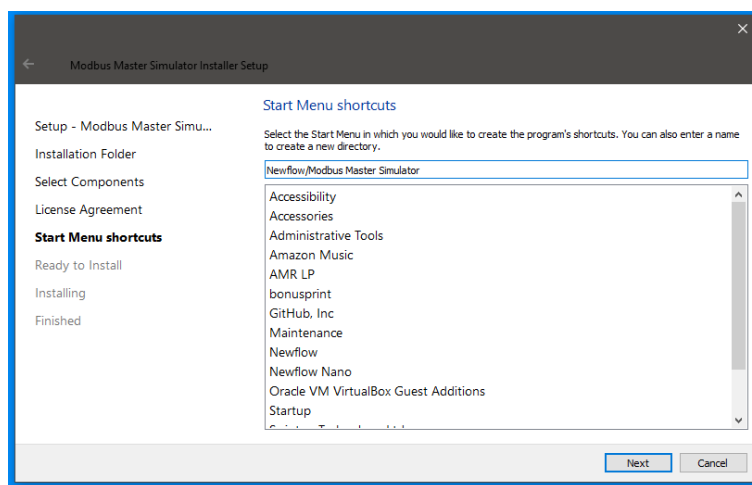
Click Next to continue.

For The Modbus Master Simulator there is only one component, so just make sure it is selected.

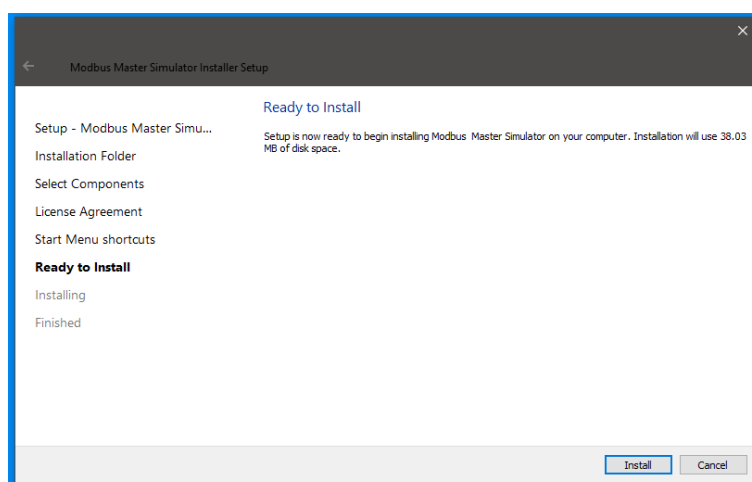


Click Next to continue.

Choose the Start Menu shortcut path.

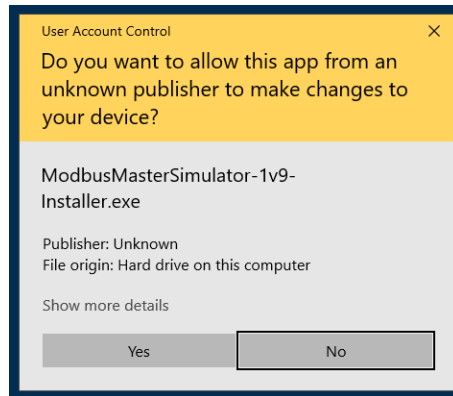


Click Next to continue.

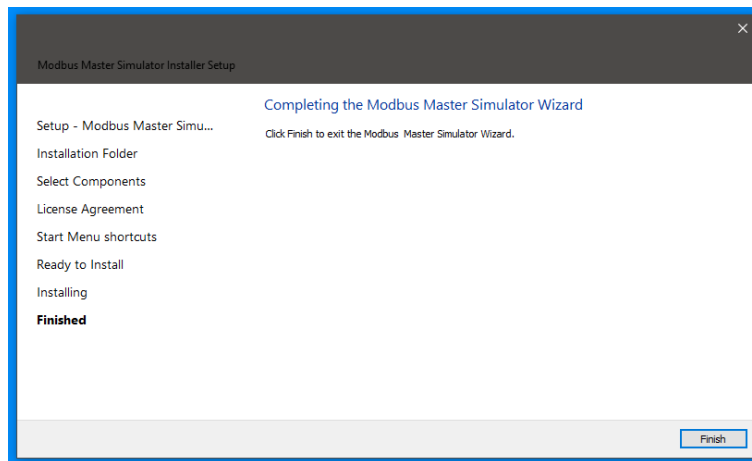


Click Install to start the installation.

As Newflow is not certified by Microsoft, if the User Account Control dialog appears click Yes to allow the program to be installed.



Once complete, click Finish to close the installer.

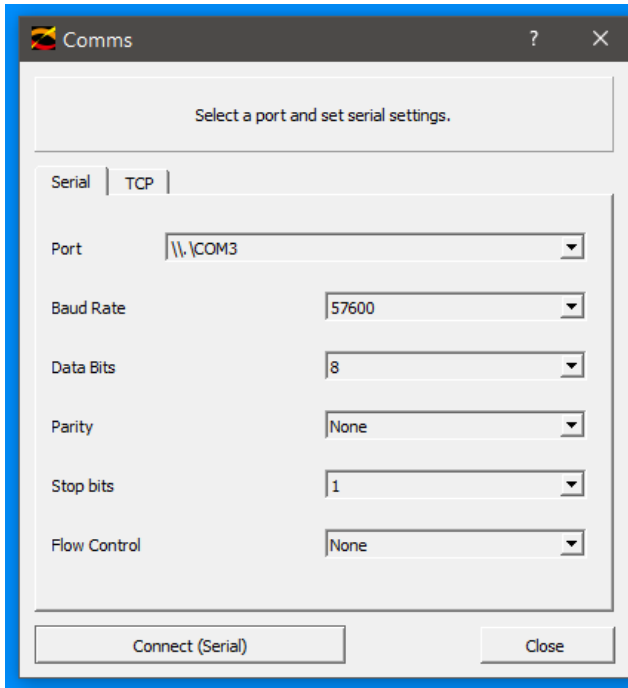




## 3 Launching the Program

When the application first loads, the Comms setup box is presented in front of the main window. Depending on the transport mechanism required choose the required tab, between Serial (for Serial Communications) or TCP (for Ethernet TCP communications). Screenshots are shown for both options below

### SERIAL

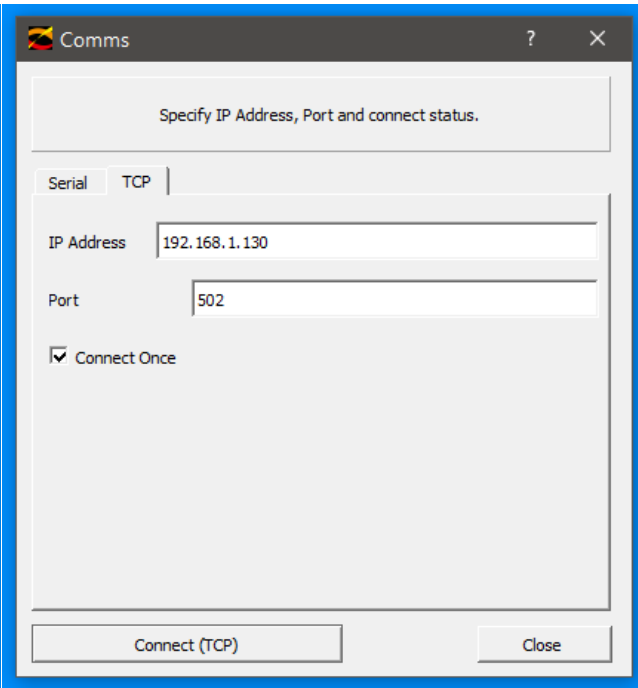


The screenshot shows the 'Comms' dialog box with the 'Serial' tab selected. The title bar reads 'Comms'. The main heading is 'Select a port and set serial settings.' Below this, there are two tabs: 'Serial' and 'TCP'. The 'Serial' tab is active. The settings are as follows:

Parameter	Value
Port	\\\\.\\COM3
Baud Rate	57600
Data Bits	8
Parity	None
Stop bits	1
Flow Control	None

At the bottom, there are two buttons: 'Connect (Serial)' and 'Close'.

### TCP



The screenshot shows the 'Comms' dialog box with the 'TCP' tab selected. The title bar reads 'Comms'. The main heading is 'Specify IP Address, Port and connect status.' Below this, there are two tabs: 'Serial' and 'TCP'. The 'TCP' tab is active. The settings are as follows:

Parameter	Value
IP Address	192.168.1.130
Port	502
Connect Once	<input checked="" type="checkbox"/>

At the bottom, there are two buttons: 'Connect (TCP)' and 'Close'.

The settings are as follows;

#### In Serial mode;

Select the Serial Port of the PC from the pulldown list given, then choose the Baud Rate, number of Data Bits, Parity, number of Stop Bits and Flow Control as required by the Modbus Slave device.

#### In TCP mode;

Enter the IP Address and Port of the Modbus Slave device. The port number defaults to 503, this is the commonly used Modbus TCP port number.

The Connect Once tickbox defaults to showing a tick, this configures the simulator to open the port on the Modbus Slave device and keep it open until the simulator is closed.

If the tick is removed, the simulator will open and close the port on the Modbus Slave device for each poll.

Clicking the Connect (TCP) or Connect (Serial) button will prompt the simulator to attempt to connect to the Modbus Slave device.

Clicking the Close button will close the Modbus Master Simulator program.

## 4 The Main Window

The screenshot shows the Modbus Master Simulator interface. Key components are labeled as follows:

- Title Bar:** Modbus Master Simulator v1.0
- Menu Items:** File, Comms
- Status:** 10.0.98.110/502 Ready
- Sequence Control:** Includes 'GO' and 'STOP' buttons, 'Poll Time' (0.50) and 'Repeat' (0.0) fields, and a 'NEXT:' field.
- Poll Format Controls:** Includes 'Poll' (1), 'Desc' (P572 Scaled 32 Bit integers), 'Slave Addr' (1), 'Reg Addr' (2000), 'Addresses / item' (2), 'Function' (03 - Read Holding Reg), and '# of Items' (50).
- Display Controls:** Includes 'Message Log' and 'Display Table' checkboxes.
- Data Table:** A table with columns 'Address', 'Value', and 'Description'. It lists various poll addresses and their corresponding values and descriptions.
- Raw Data Message Logs:** A section at the bottom showing hex and ASCII data for poll responses and sends.

The title bar shows the name of the program and the version running. Below there are two menu items, File & Comms.

The Comms selection has a single option, this is to open a New Connection, as described in [3 Launching the Program](#). This closes the existing connection and opens the Comms Setup Box, as when the program is launched.

As when the program is first launched, clicking the Close button will close the Modbus Master Simulator program.

The File menu has four options, these allow the saving and loading of poll files and sets options for logging. See [4.1 Loading/Saving Polls](#) and [4.2 Report Logging](#).

The Status box is used to indicate the connection state.

The Polls are constructed for each poll message in the Edit Polls section. Full details including the format are described in [4.3 Creating a New Poll](#).

The Sequence Control area is used to configure multiple polls, and is explained in detail in [4.4 Sequence Control](#).

**NOTE:** Polls must be set up before setting up the polling sequence

## 4.1 Loading/Saving Polls

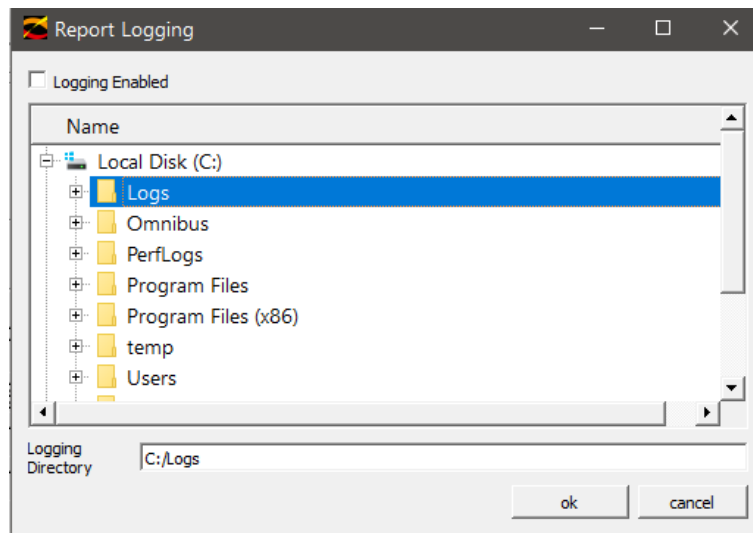
To save the work in building these polls, in the File menu, choose either Load Polls or Save Polls. Select the folder that the polls are to be saved to or loaded from. If loading, select the file and if saving type the name of the file.

A shortcut is also provided under the File menu to quickly load Recent Poll Files.

**NOTE:** files are stored with a .xml suffix

## 4.2 Report Logging

**NOTE:** This is not available in the Free Version.



Enable logging by ticking the tickbox, then choose the folder to store the log.

### 4.3 Creating a New Poll

Each poll can be just one data point or multiple consecutive addresses. The options are detailed below.

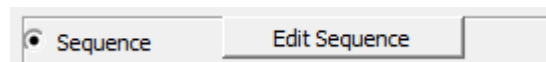
<b>Edit Polls</b>	This is a radio button. Selecting <b>Edit Polls</b> deselects the Sequence editing function and vice-versa.
<b>POLL</b>	The Newflow Modbus Master simulator can support up to 99 different poll messages for any one instance, and all of these poll messages can be saved, for subsequent use. Each Poll message is given a number, and a description can be added for each poll, to identify each poll if a polling sequence is generated.
<b>Desc</b>	This is the Description field allowing a name to be associated with each poll. Keeping the name to less than 20 characters will ensure the whole name can be displayed in the Sequence Editor
<b>Slave Addr</b>	This can be 1 to 256. There are up and down arrows in to increment and value can be typed in directly.
<b>Reg Addr</b>	This is the Modbus Slave register Address which data is being read or written to.
<b>Addresses/Item</b>	The addresses per item field is used to resolve the difference in addressing modes between Modicon and Logical addressing. Whereas a uInt16 is always one address in either mode, a uInt32 could be one or two physical addresses depending upon addressing mode being used.
<b>Function</b>	This the Modbus function code. The Newflow Modbus Master simulator supports Functions 01, 02, 03, 04, 05, 06, 15 & 16
<b>Number of Coils or Items</b>	This is the number of item requested by each poll.
<b>Data Type</b>	This is a pull down box, which defaults to uInt16, but can be chosen from uInt32, Int64, Float32, Double64, SpecialInt or String

<b>Data Format</b>	The data format options depend upon the <b>Data Type</b> selected, For example a uInt16 only has two bytes of data, so there are only two options, 10 (Big-Endian) or 01 (Little-Endian)
<b>Single Poll</b>	Clicking this button causes the simulator to request the currently selected poll once, and the data table and/or Raw Data Message Logs will be populated.

**NOTE:** The Modbus Function, Data Type and Format will be the same for all registers within any one poll.

To add additional polls, increment the **POLL** number, and repeat the process above.

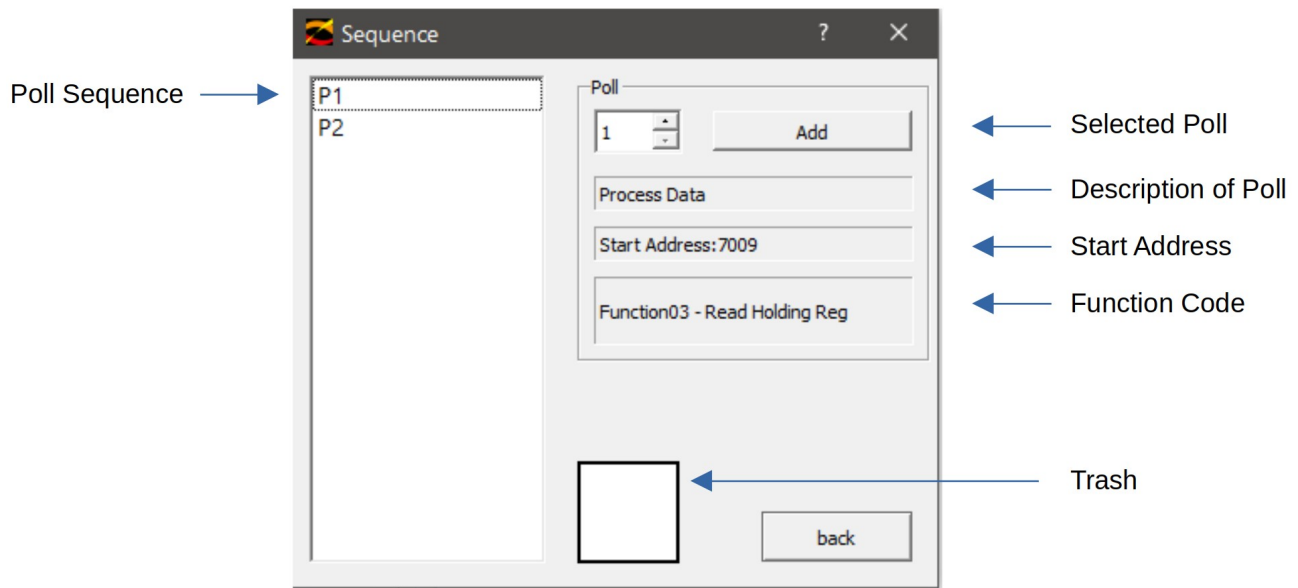
## 4.4 Sequence Control



The sequence section allows the user to poll a number of register addresses in sequence.

To enter the sequence mode the “Sequence” radio button must be pressed. If there is no current sequence defined, the Sequence window will be automatically opened.

If a sequence has already been defined or the user wants to change the sequence, the Edit Sequence button should be pressed, this will also open the sequence window.



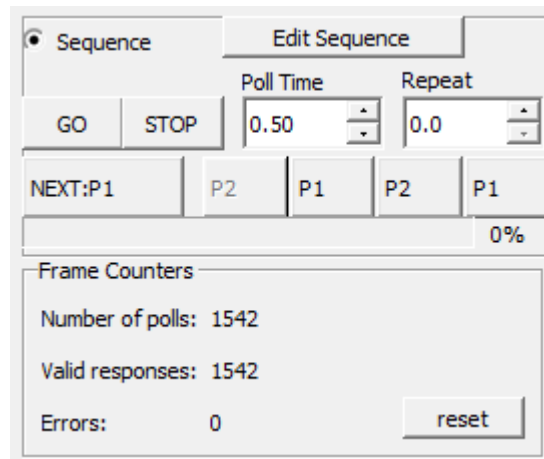
The left hand pane shows the polls that are already in the sequence (an empty list signifies that no sequence is currently defined).

To add polls to the sequence use the up and down arrows to increment the value (or the value can be typed in directly to the number field). The poll description, start address and function code is shown to assist identification. Press the Add button to add the poll into the sequence.

If the poll sequence is in the incorrect order, each poll can be dragged up or down the list. Duplicate polls are also allowed so the user could define, as an example; P1, P2, P1, P3.

No longer required polls can also be dragged to the white Trash box to remove them from the sequence.

Once the polling sequence is as required or the user wants to exit the edit area, the Back button should be pressed.



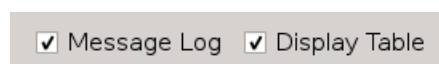
In the main window, when there is a current sequence defined, the polling can be started/stopped with the “GO” and “STOP” buttons. The “Poll Time” number editing box contains the time between polls. The “Repeat” box is the time after a sequence has completed till it is started again.

Under the “GO” button, “STOP” button and timers, a diagnostic is provided to show the polls that are due to be performed and a progress bar to show when the next poll will be performed (scaled 0-100%).

The Frame Counters show the number of polls that have been performed, how many valid responses have been received and how many errors have been recorded. A Reset button is also provided so that the values can be reset to aid diagnostics.

## 4.5 Disabling Message Logs and the Display Table

To resize the window and remove the display or message logs part of the application, tick the relevant tickbox found just below the Edit Poll section.



Disabling both of these two features will decrease the CPU load of the application, however little diagnostics are then available.

Decreasing the CPU load also allows polls to be performed quicker, with poll rates in excess of 100 per second achievable.

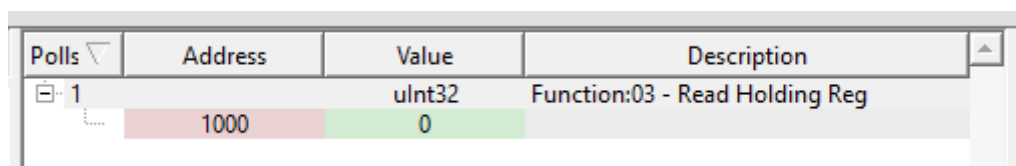
## 4.6 Message Logs

```
-----Poll: 1-----  
(13:14:36) Response: 00 01 00 00 00 1F 01 03 1C 00 00 00 01 00 00 00 01 00 00 00 01 00 00 00 01 00 00  
00 01 00 00 00 01 00 00 00 01 00 00 00 01  
(13:14:36) Sent: 00 01 00 00 00 06 01 03 13 88 00 07
```

This displays the sent and received Modbus Messages in their Hexadecimal form with timestamps. The Poll number is displayed above the message and response.

## 4.7 Display Table

The Display Table looks as shown below:



Polls	Address	Value	Description
1	1000	ulnt32	Function:03 - Read Holding Reg

The top row shows the headings, Polls, Address, Value and Description

On the second row, under Polls it shows both the POLL number and an expand/collapse box. Clicking the box toggles this between a + and a – to hide or show the registers in the poll

Under the Value heading, the data type is shown and the Modbus function code is displayed under the Description heading.

The third row shows the register information. The Addresses will start at the Register Address selected (**Reg Addr**) and will increment by the addresses per item (**Addresses/Item**) for each subsequent register.

If the Number of items (in each poll) is increased, addition registers will be shown

The Value fields will show as zero and the Descriptions will be blank. Double clicking in the description field allow the user to add and edit the description text for each item addressed.

If the poll is a read poll, the value field will show the value retrieved from the Modbus Slave device. If however, the poll is a write type poll, the value can be double clicked and the value set to the value required to be sent to the slave device.