Kurz MODBUS Client User's Guide

Introduction

The Kurz MODBUS Client program can be used to demonstrate how the Kurz MFTB and MFTA Series products can be used in a MODBUS protocol network. The program is a MODBUS master, meaning that the program initiates all requests. This demonstration program supports Local MODBUS using a RS-485 interface and Remote MODBUS using a TCP/IP to RS-485 gateway.

Local MODBUS networks can be single or multi-drop, which supports one or more MFTB or MFTA devices. The MFTA and MFTB are MODBUS slaves, meaning that they can only respond to requests. All of the devices must be connected to the RS-485 lines, either directly or in a bus configuration. Each device must have a unique MODBUS address that must be within the range of 1 to 247, inclusively. The PC, in this configuration, must have an RS-485 port or use a USB to RS-485 converter.

Remote MODBUS networks can be done using a TCP/IP to RS-485 gateway. The MFTB or MFTA devices are connected to the RS-485 port of the gateway and the TCP/IP port is connected to the PC or a hub on a Local Area Network (LAN) in which the PC is also connected. Any PC on the LAN can access the MFTB or MFTA devices connected to the gateway. Multiple PCs trying to access the same gateway may find that the data update rate is affected. See the gateway's manual for more information.

This program demonstrates reading process variables (Flowrate, Velocity, Temperature and Totalized flowrate) for each connected MFTB and MFTA device. For the MFTB Series, it can download and upload the configuration file, download the built-in trend log, send commands to start the Zero-Mid-Span, drift check cycle, or purge cleaning cycle, and for firmware version 2.00 or later, reset the accumulated totalizer. This program will allow the user to data log all the connected devices and their process variables. The file will be saved on the local disk drive in a comma separated format (csv). A Trend chart is also provided to view the process variables as time passes.

Installation

Insert the program CD into the CD drive. Browse the CD and double click the "Setup" icon. Answer the prompts during installation.

Operation

To start the program, click the **start**>**All Programs**>**Kurz Instruments** >**Kurz Modbus Client** or click the "**Kurz Modbus Client**" shortcut on the Desktop. An application window will appear as shown in figure 1. The program has 3 tabs, the first tab is used for setting up the communications and logging information, the second tab is to view the

output and select a task for the selected unit, and the third tab is used to show the process data trending.

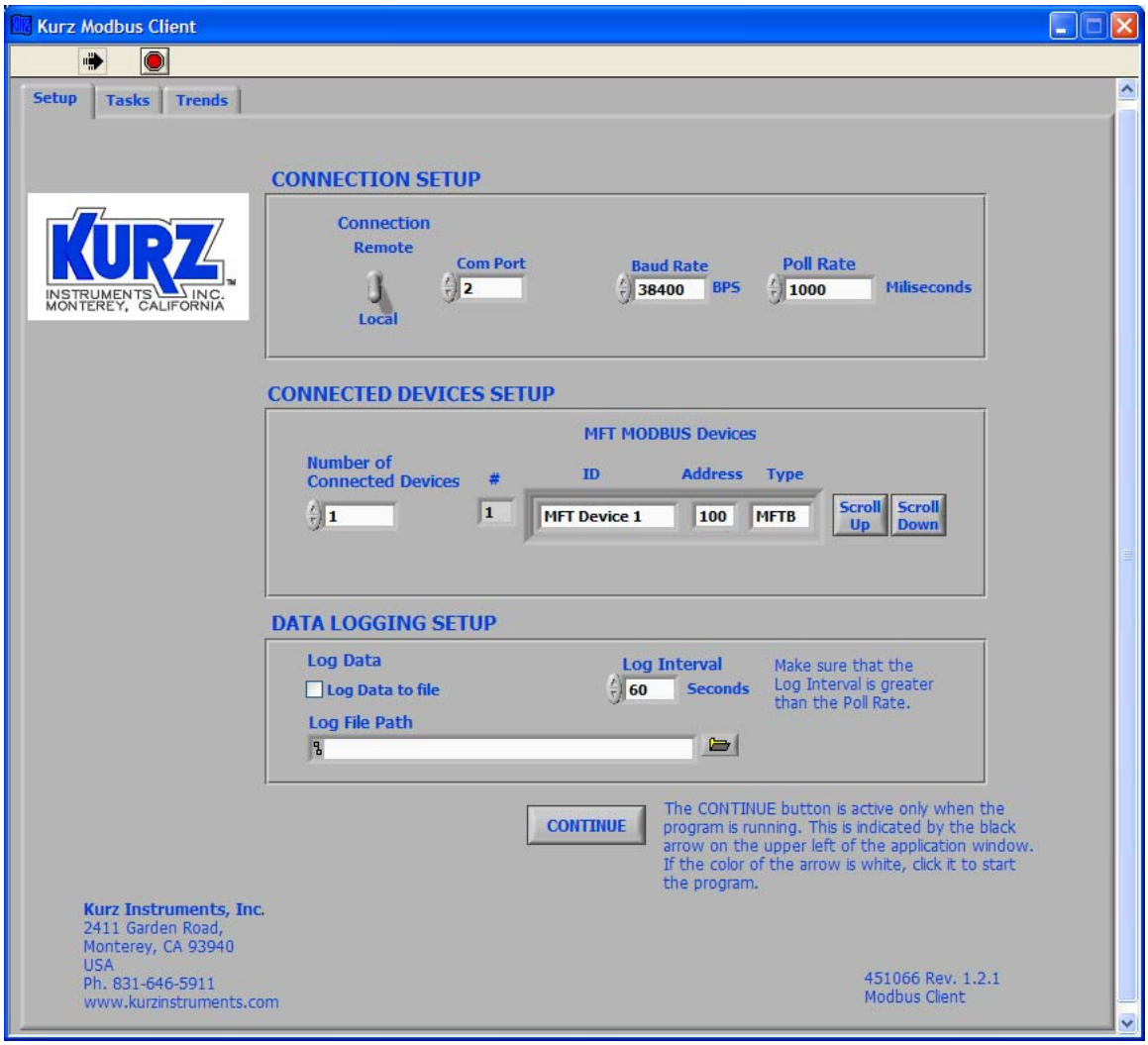


Figure 1 Program Application Window

Setup

When the program is started, it will automatically go to run mode as indicated by the black arrow on the upper left side of the application window. The first tab is labeled "**Setup**" and is the default display. On the group box entitled Connection Setup, configure the network connection. Select the "**Connection**" Switch for Local or Remote. Local uses a RS-485 interface and Remote uses a TCP/IP to RS-485 gateway. For Local connection, enter the Communication port (1,2,3….n) and communication baudrate. Make sure that the MFTB or MFTA slave devices have the same baudrate. For Remote connections, enter the IP address of the gateway in dot form (172.16.10.0). The Poll Rate is interval at which the master will query for more information, in milliseconds. The fastest recommended poll rate is 100 milliseconds per device. For example, if the number

of devices is 16 then the fastest poll rate is 1600 milliseconds (16x100). An individual devices poll rate is the poll rate entered for the master.

$$DevicePollRate = MasterPollRate$$

The poll rate can be changed while the program is already acquiring data from the devices.

The middle group box, entitled Connected Devices Setup, is used to setup the MFTB or MFTA devices connected to the network. Enter the number of connected devices to the numeric box labeled "**Number of Connected Devices**", making sure to enter only the active devices. For each device enter the device identification (ID) and corresponding Modbus address and then click the device type to select for MFTB or MFTA. Click the Scroll Up or Scroll Down buttons to navigate through the devices. The device identification can be any printable characters chosen by the user. Verify that the Modbus addresses of the connected MFTB or MFTA devices are correct.

The bottom group box, entitled Data Logging Setup, is used to enable data logging. Check the "**Log Data to File**" box, to enable data logging. Enter or browse for the filename of the data log file. Use the ".CSV" (Comma Separated Variable) file extension because the log file is saved in a Comma Separated Variable format (csv) that is easily imported into any spreadsheet program. If the file already exists, the log data will be appended to that file. The log interval is the time interval for the program to log new data to the file. The value can be changed while the program is already acquiring data from the devices. The Log Data to file checkbox can be check or uncheck while the program is acquiring data. If unchecked, it will terminate logging data to the file and if it is checked, data logging to the file is resumed.

After setup is complete, click the "**Continue"** button. The program will automatically switch to second tab, labeled "Tasks". If there a communication problem is discovered then an error message will be displayed and the program will stop.

Selecting Tasks

The default task is "**Read Process Variables**" which updates and displays the Flowrate, Velocity, Temperature and Totalized flow of the selected device. Refer to figure 2. On the output group box, there are four digital indicators: Flowrate, Velocity, Temperature and Flow Total. In addition, there is a flowrate gauge that will indicate the percent of full scale. The full scale can be change using the "**Flowrate Full Scale**" numeric box. A similar temperature gauge is provided.

The device to display can be set using the "**Selected Device**" selection box. The available selection depends on the number of devices that were setup.

In addition to "**Read Process Variables**", the following are other tasks; use the "**Select Task**" dropdown box to select other task. These tasks are only supported by the MFTB Series units.

Download Configuration

This will download the configuration file of the selected MFTB device; convert the binary file to a text file, the filename extension of the text file is ".txt" and the binary file is usually ".cf". Not supported by MFTA devices.

Upload Configuration

This will upload a configuration file to the selected MFTB device. Not supported by MFTA devices.

Download Trend Memory

This will download the Trend Memory data of the selected MFTB device with firmware version MFTB VER 1.05 and newer. The log files are saved in Comma Separated Variable format (csv) that is easily imported into any spreadsheet program. Not supported by MFTA devices.

Start Purge Cycle

This is a command to initiate a purge cycle on the selected MFTB device. The selected MFTB device must have the purge option. e.g. 454 PFTB (756058). Not supported by MFTA devices.

Start Drift Check Cycle

This is a command to initiate a drift check cycle on the selected MFTB device. Not supported by MFTA devices.

Reset Totalizer

If the connected device is MFTB with firmware version 2.00 or newer, selecting this task will reset the accumulated total flow. Not supported by MFTA devices.

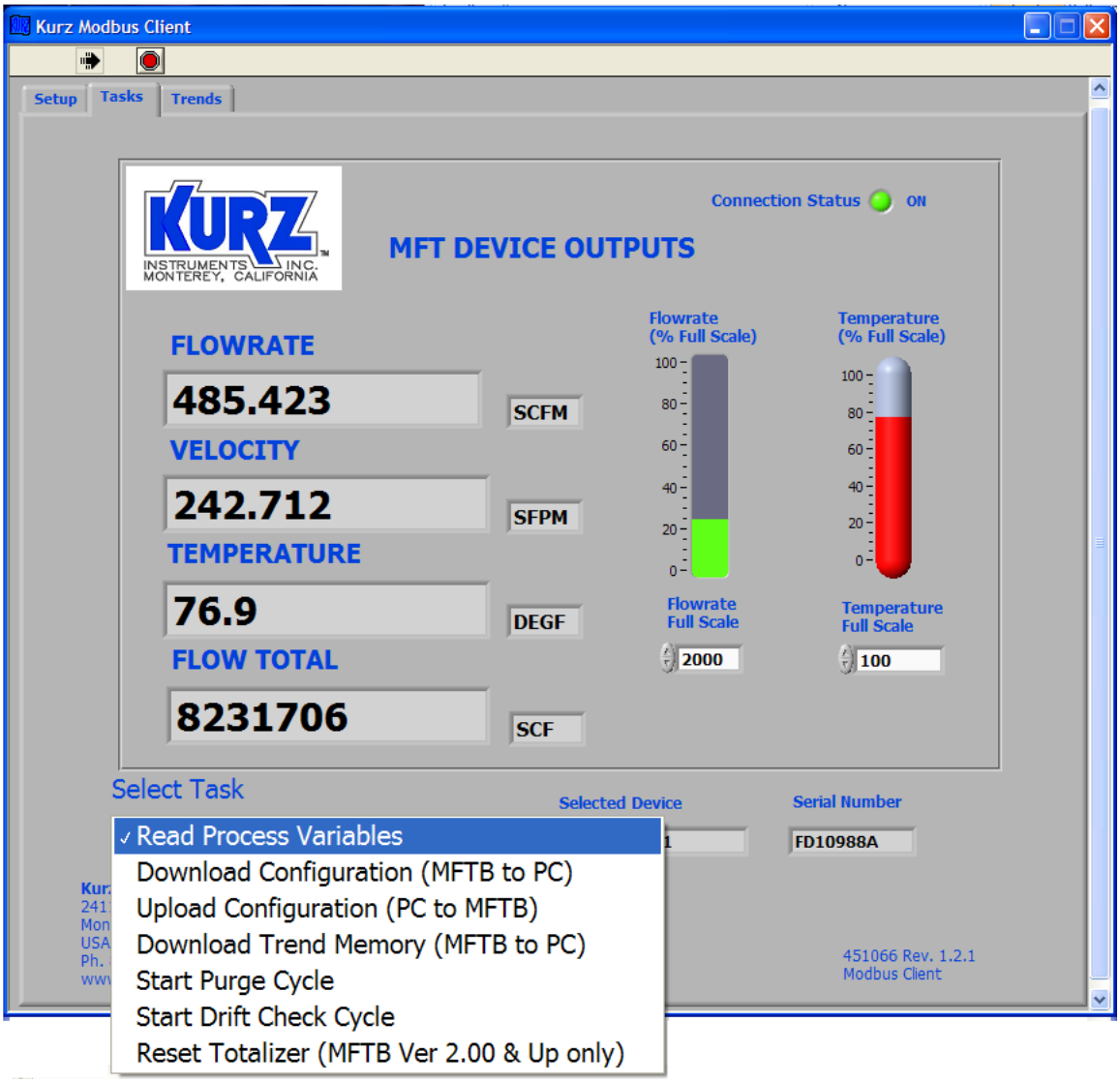


Figure 2 Tasks Window Tab

Viewing the Process Variables Trend Charts

To view the process variables trend charts, click the "**Trends**" tab to display the final tab. The tab is shown in figure 3. The top chart is Flowrate, the middle is Velocity and the bottom chart is Temperature. To set the Y-axis full scale value, double click the Y-axis upper value and type in a new value. The same can be accomplished for the minimum scale. Use the "**Zoom Out**" slider to zoom the graph in or out. Use the "**Time Scale**" slider to change the time scale. To change the device from which data is being displayed, use the "**Selected Device**" selection box. Note that the graph will start trending the data from the new device without clearing so on the graph there might be an artifact of going from one data set to another.

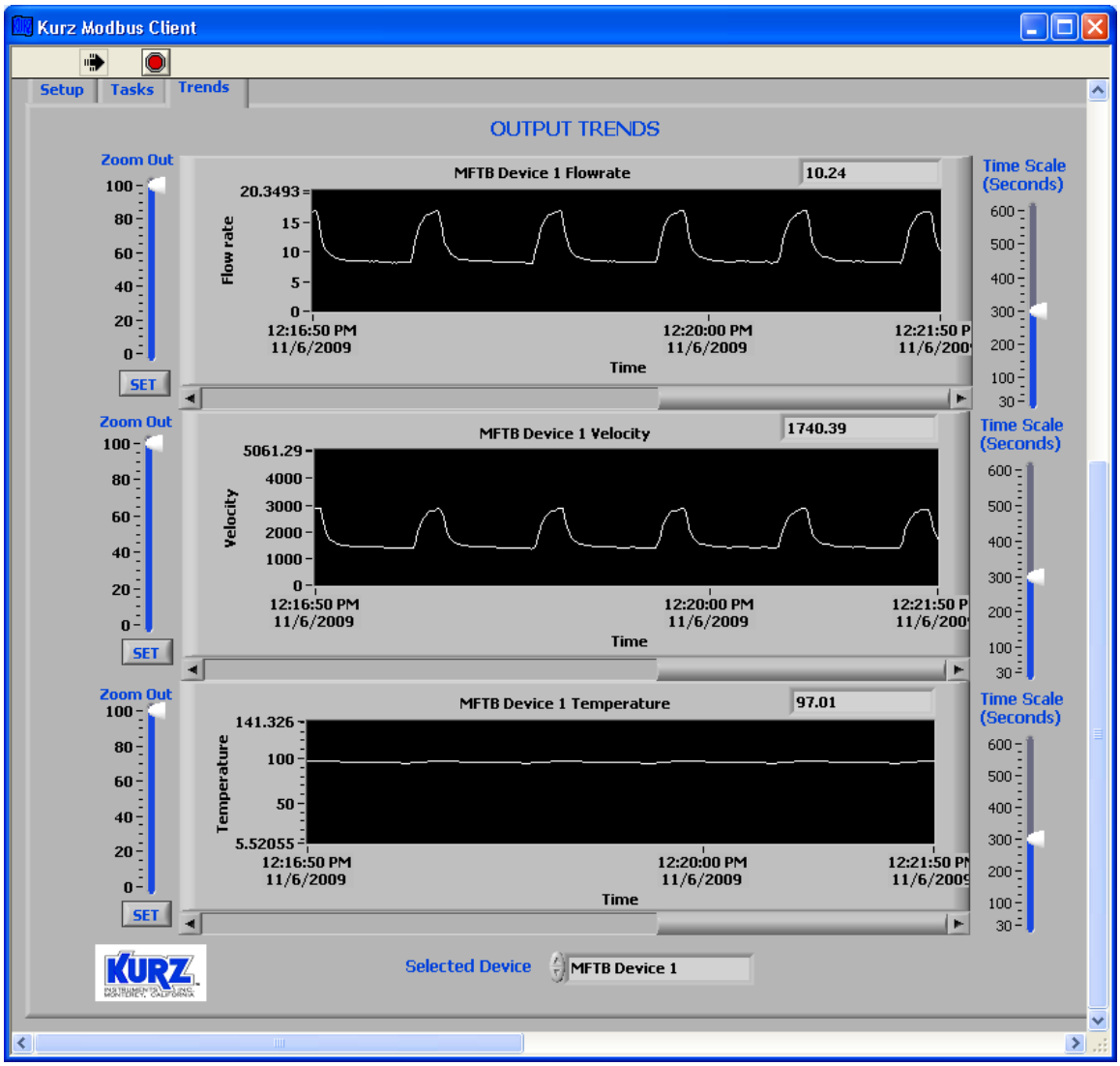
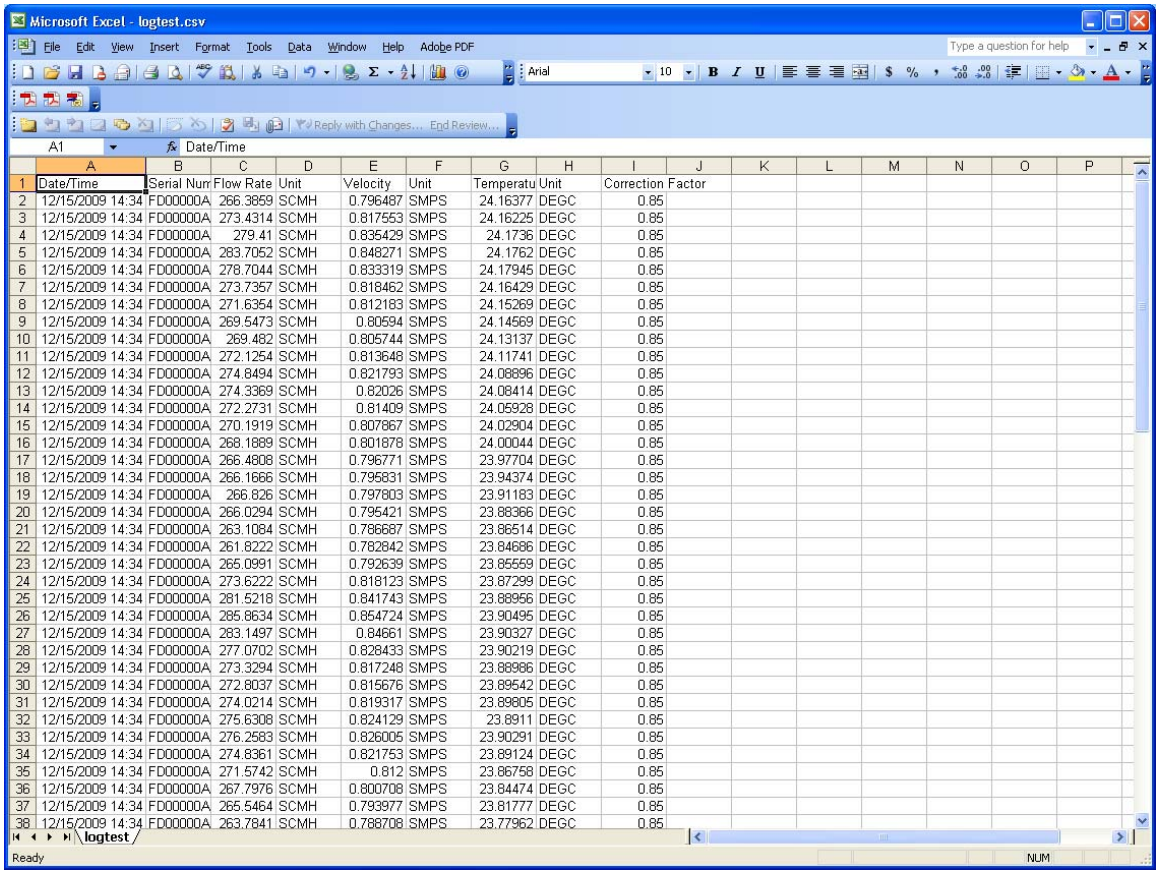


Figure 3 Process Variables Trend Charts

Data Logging

Navigate to the file chosen in the Setup tab into which the data was logged. Note that this file can be opened while it is still being logged to by this program, but any changes you make could cause issues with the logging. The first rows contain a time stamp and column names. The following rows are the data. Each row contains a time stamp, sensor serial number, flowrate, flowrate unit, velocity, velocity unit, temperature, temperature unit, and correction factor applied for that data. The correction factor is used to determine the raw velocity. If another device is connected then the second device's serial number, flowrate, etc will be added. Also, the logging will append to an existing file and will not destroy any data already in the file. Figure 4 below is the example of the logged data viewed using Microsoft Excel.



	A	B	C	D	E	F	G	H	I	J
1	Date/Time	Serial Num	Flow Rate	Unit	Velocity	Unit	Temperatu	Unit	Correction Factor	
2	12/15/2009 14:34	FD00000A	266.3859	SCMH	0.796487	SMPS	24.16377	DEGC	0.85	
3	12/15/2009 14:34	FD00000A	273.4314	SCMH	0.817553	SMPS	24.16225	DEGC	0.85	
4	12/15/2009 14:34	FD00000A	279.41	SCMH	0.835429	SMPS	24.1736	DEGC	0.85	
5	12/15/2009 14:34	FD00000A	283.7052	SCMH	0.848271	SMPS	24.1762	DEGC	0.85	
6	12/15/2009 14:34	FD00000A	278.7044	SCMH	0.833319	SMPS	24.17945	DEGC	0.85	
7	12/15/2009 14:34	FD00000A	273.7357	SCMH	0.818462	SMPS	24.16429	DEGC	0.85	
8	12/15/2009 14:34	FD00000A	271.6354	SCMH	0.812183	SMPS	24.15269	DEGC	0.85	
9	12/15/2009 14:34	FD00000A	269.5473	SCMH	0.80594	SMPS	24.14569	DEGC	0.85	
10	12/15/2009 14:34	FD00000A	269.482	SCMH	0.805744	SMPS	24.13137	DEGC	0.85	
11	12/15/2009 14:34	FD00000A	272.1254	SCMH	0.813648	SMPS	24.11741	DEGC	0.85	
12	12/15/2009 14:34	FD00000A	274.8494	SCMH	0.821793	SMPS	24.08896	DEGC	0.85	
13	12/15/2009 14:34	FD00000A	274.3369	SCMH	0.82026	SMPS	24.08414	DEGC	0.85	
14	12/15/2009 14:34	FD00000A	272.2731	SCMH	0.81409	SMPS	24.05928	DEGC	0.85	
15	12/15/2009 14:34	FD00000A	270.1919	SCMH	0.807867	SMPS	24.02904	DEGC	0.85	
16	12/15/2009 14:34	FD00000A	268.1889	SCMH	0.801878	SMPS	24.00044	DEGC	0.85	
17	12/15/2009 14:34	FD00000A	266.4808	SCMH	0.796771	SMPS	23.97704	DEGC	0.85	
18	12/15/2009 14:34	FD00000A	266.1666	SCMH	0.795831	SMPS	23.94374	DEGC	0.85	
19	12/15/2009 14:34	FD00000A	266.826	SCMH	0.797803	SMPS	23.91183	DEGC	0.85	
20	12/15/2009 14:34	FD00000A	266.0294	SCMH	0.795421	SMPS	23.88366	DEGC	0.85	
21	12/15/2009 14:34	FD00000A	263.1084	SCMH	0.786687	SMPS	23.86514	DEGC	0.85	
22	12/15/2009 14:34	FD00000A	261.8222	SCMH	0.782842	SMPS	23.84686	DEGC	0.85	
23	12/15/2009 14:34	FD00000A	265.0991	SCMH	0.792639	SMPS	23.85559	DEGC	0.85	
24	12/15/2009 14:34	FD00000A	273.6222	SCMH	0.818123	SMPS	23.87299	DEGC	0.85	
25	12/15/2009 14:34	FD00000A	281.5218	SCMH	0.841743	SMPS	23.88956	DEGC	0.85	
26	12/15/2009 14:34	FD00000A	285.8634	SCMH	0.854724	SMPS	23.90495	DEGC	0.85	
27	12/15/2009 14:34	FD00000A	283.1497	SCMH	0.84661	SMPS	23.90327	DEGC	0.85	
28	12/15/2009 14:34	FD00000A	277.0702	SCMH	0.828433	SMPS	23.90219	DEGC	0.85	
29	12/15/2009 14:34	FD00000A	273.3294	SCMH	0.817248	SMPS	23.88986	DEGC	0.85	
30	12/15/2009 14:34	FD00000A	272.8037	SCMH	0.815676	SMPS	23.89542	DEGC	0.85	
31	12/15/2009 14:34	FD00000A	274.0214	SCMH	0.819317	SMPS	23.89805	DEGC	0.85	
32	12/15/2009 14:34	FD00000A	275.6308	SCMH	0.824129	SMPS	23.8911	DEGC	0.85	
33	12/15/2009 14:34	FD00000A	276.2583	SCMH	0.826005	SMPS	23.90291	DEGC	0.85	
34	12/15/2009 14:34	FD00000A	274.8361	SCMH	0.821753	SMPS	23.89124	DEGC	0.85	
35	12/15/2009 14:34	FD00000A	271.5742	SCMH	0.812	SMPS	23.86758	DEGC	0.85	
36	12/15/2009 14:34	FD00000A	267.7976	SCMH	0.800708	SMPS	23.84474	DEGC	0.85	
37	12/15/2009 14:34	FD00000A	265.5464	SCMH	0.793977	SMPS	23.81777	DEGC	0.85	
38	12/15/2009 14:34	FD00000A	263.7841	SCMH	0.788708	SMPS	23.77962	DEGC	0.85	

Figure 4 Logged data viewed by Microsoft Excel

Restarting and Stopping the Program

The program has two states; they are the Run and Stop states. When the program is executed by double clicking the icon on the desktop or from the Start Program menu, the program will open automatically in the Run state as indicated by the black arrow on the upper left corner of the application window. In this state all the controls on the front panel are active. The program can be stop by clicking the red stop icon on the upper left corner of the application window. In this state, most of the controls on the front panel are disabled. The Stop state is also indicated by a white arrow on the upper left corner of the application window.

The program in a Stop state can be restarted by clicking the white arrow on the upper left corner of the application window or closing and reopening the application. The program will automatically stop when an error occurs.

Causes of Errors

An error will occur if the communication port number is incorrect. The program will popup an error window as shown in Figure 4.

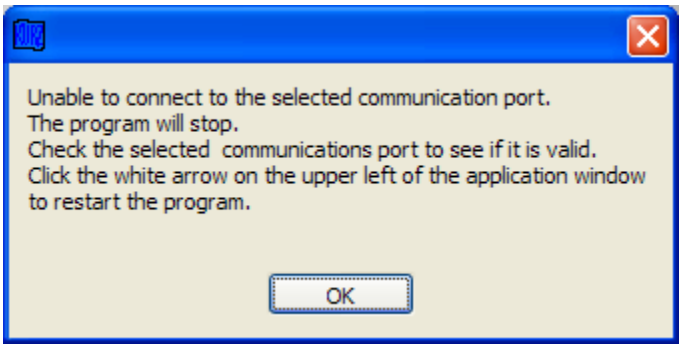


Figure 4 Communication Port Error

An error will also occur if the connected MFT devices has a different MODBUS address from what was setup. The program will popup an error window as shown in Figure 5.

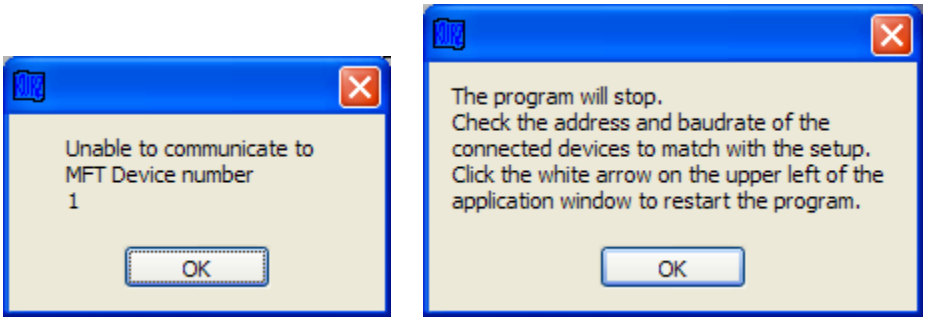


Figure 5 MODBUS Address Error