

# App Note: FloBoss 103 Integration with ET-12001 Controllers

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*Integration Guide*



**Revision 1.0**

**November 21, 2017**

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### *Revision History*

Revision	Date	Author	Changes
1.0	11/21/2017	Yaw Agyekum	Created publishable draft of the document



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## 1 Introduction

### 1.1 Purpose

This document will cover the basic steps needed to setup Modbus communication between a FloBoss and an ET-12001 Controller (Controller). This integration allows users to utilize the flow calculation abilities of the FloBoss in tandem with the well control capabilities of the Controller.

## 2 Fisher FloBoss 103 Setup

### 2.1 ROCLINK 800 Installation

In order to configure the internal software settings within the FloBoss, you will need Emerson's ROCLINK 800 (ROCLINK) software. This allows users to modify settings in the FloBoss, as well as monitor its performance. If you require a copy of ROCLINK, contact your nearest Emerson reseller. Once you acquire the software, run the installer on your computer to setup the program.

When you start up the application, you are going to be asked for a username and password. There should be dialog box that appears as follows:

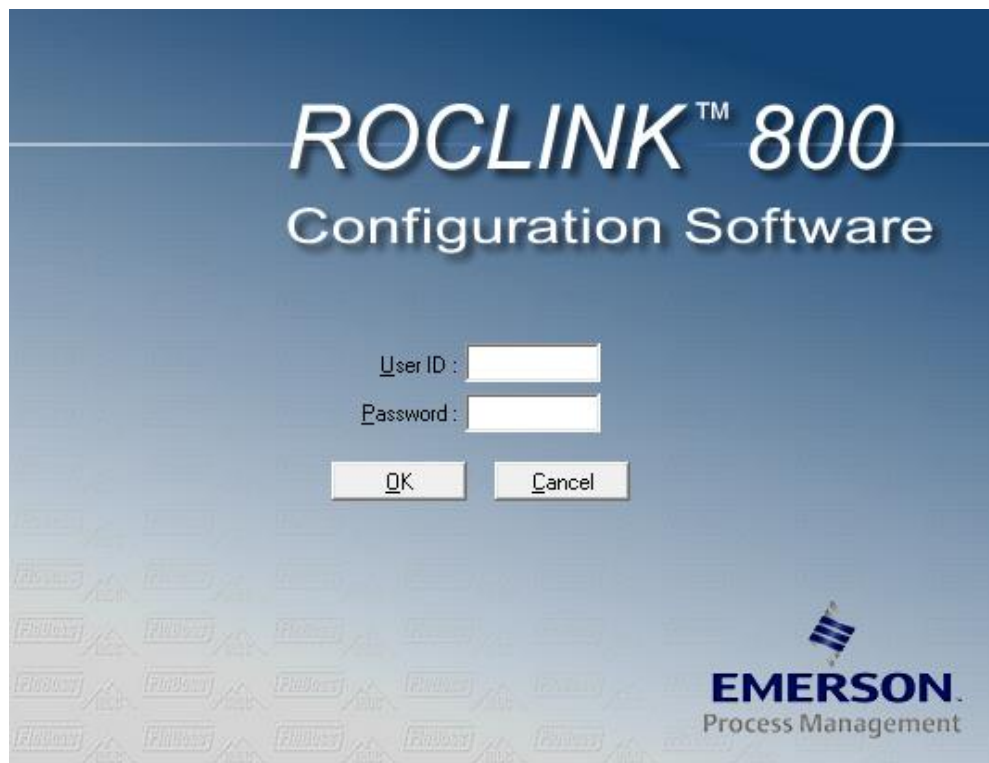


Figure 2-1 – ROCLINK 800 Login Screen



For new installations, the default user credentials should be as follows:

- User ID: LOI
- Password: 1000

This information should allow a user access into the program, assuming there has not been any changes made to the login settings.

## 2.2 Connecting the FloBoss 103 to ROCLINK 800

### 2.2.1 Electrical Wiring

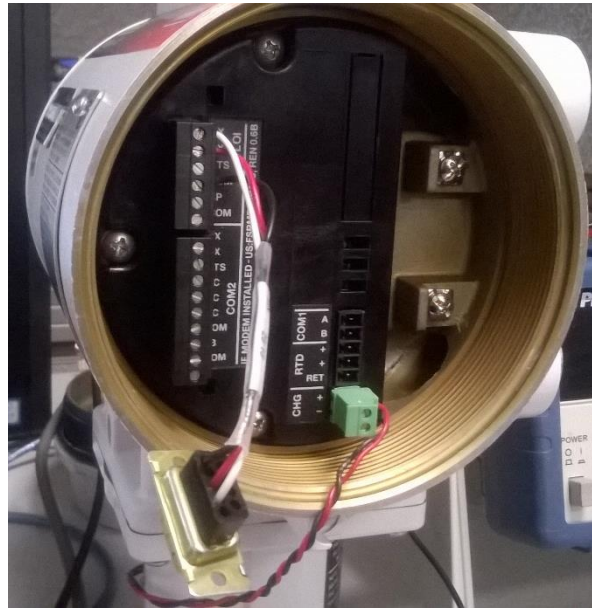


Figure 2-2 – FloBoss with Connection Ports Shown

To power up the FloBoss, you will need to connect positive and negative wires to the green connector plugged into the CHG port. The FloBoss takes in an input of 8 - 28 V through its CHG port.



Figure 2-3 – FloBoss CHG port with connector

The FloBoss 103 features both an RS-232 and RS-485 port for communication to a PC. To allow for configurability while the FloBoss 103 is connected to the Controller, it is recommended to use a RS-232 connection for communication to a PC. The FloBoss should have a RS-232 connector attached to its LOI connector block as shown below:



**Figure 2-4 – FloBoss with RS-232 Connector Wired to LOI Port**

If the plug is not found, then you will have to wire the TX, RX and COM to a suitable RS-232 plug or adapter.

Using an appropriate RS-232 serial cable, simply connect one end to the serial plug on the LOI connector, and the other to the PC. A USB RS-232 converter is recommended for this task.

### **2.2.2 Communication Settings**

After the user credentials have been accepted, the ROCLINK Device Directory should appear as follows:

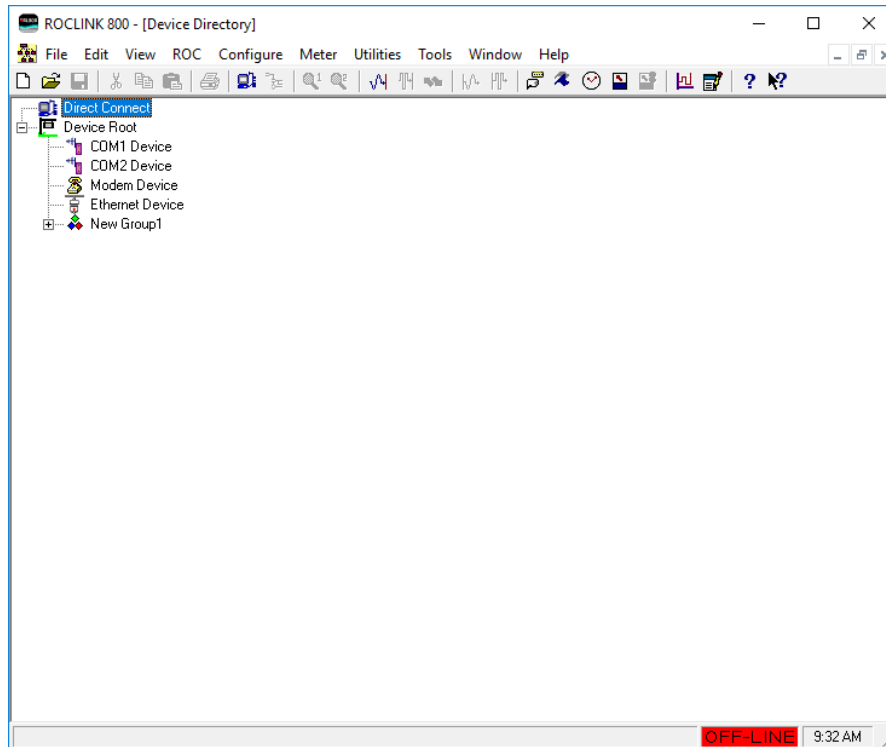


Figure 2-5 – ROCLINK 800 Device Directory

To connect to the FloBoss, you can simply use the Direct Connect feature. This causes ROCLINK to attempt to connect to the FloBoss through different ports, applying different communication settings until it is able to connect successfully.

You can also attempt to configure the settings for either the COM1 or COM2 Device shown in the screen. Neither of these devices correspond to the physical ports on the FloBoss, and are simply settings that can be configured for either port. To configure a COMx device, you will need to right-click the one you wish to configure and select Properties.

ROCLINK 800 Communication Parameters

General Advanced

Tag : COM1 Device Connect

Destination  
Device Address : 240  
Device Group : 240

Source  
Host Address : 3  
Host Group : 1

Use  
☒ Comm Port ☐ Modem ☐ TCP/IP

PC Comm Port  
Comm Port : 1 - Communications Port Baud Rate : 9600

Modem Parameters  
Modem :  
Phone Number :  
☐ Override Default TAPI Init String with :

TCP/IP Addressing  
IP Address :  
Port Number : 0

Refresh Comm Port List OK Cancel Apply

Figure 2-6 – ROCLINK 800 Communication Parameters window

When you do this, the ROCLINK 800 Communication Parameters window should come up. You should be able to set up both RS-232 and RS-485 connections with the following settings:

- Device Address and Device Group: 240
- Use: Comm Port
- PC Comm Port: The port that the PC recognizes when you connect your RS-485/RS-232 adapter. If you don't know what it is:
  - Open your Device Manager on your PC
  - Expand the Ports category, and unplug your device from your PC while watching for any changes in the list.
  - Whatever disappears (and reappears from plugging the device back in) is the port ROCLINK should use for the device.

**Note:** The COM1 and COM2 devices don't necessarily correspond to the ports on your computer – they are simply identifiers of each device. The settings for the RS-232 and RS-485 Comm Ports in each case should be configured accordingly (e.g., if your RS-232 adapter shows up as COM2 in your computer, then select the option with the number 2 as your Comm Port).

Once your settings are configured, double-click COM1 Device or COM2 Device to connect to the FloBoss.

### 2.3 Verify the Modbus Settings

When you have connected your FloBoss to ROCLINK successfully, the window should now look like this:

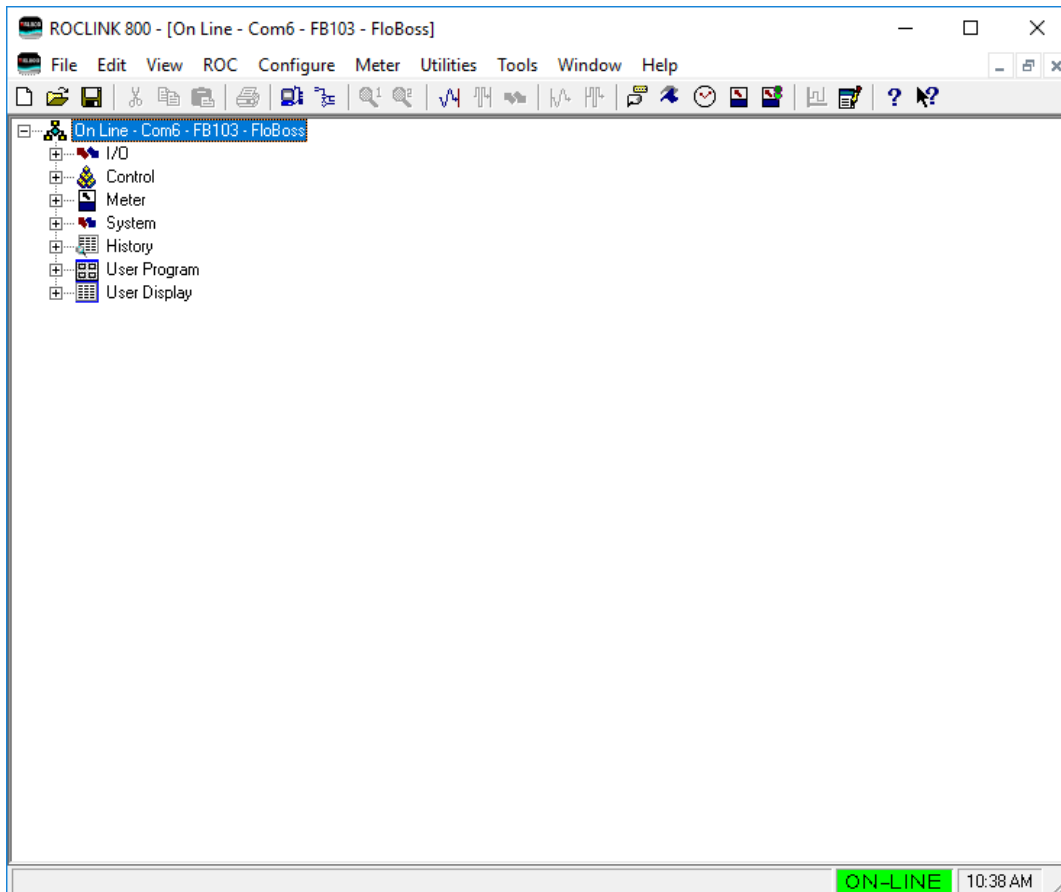


Figure 2-7 – Configuration Screen for the FloBoss 103

Before we connect the FloBoss to the Controller, we must verify that the Modbus settings are configured properly. To do this, we must first look at the Modbus communication settings. This can be done by going into Configure -> MODBUS -> Configuration.

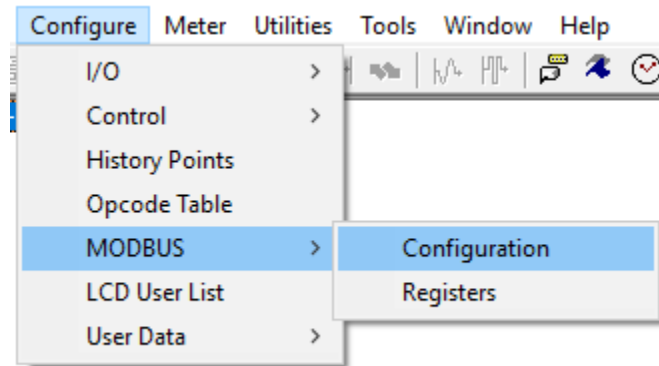


Figure 2-8 – Entering the Modbus Configuration Window for the FloBoss 103

The Modbus Configuration window should appear in following picture:

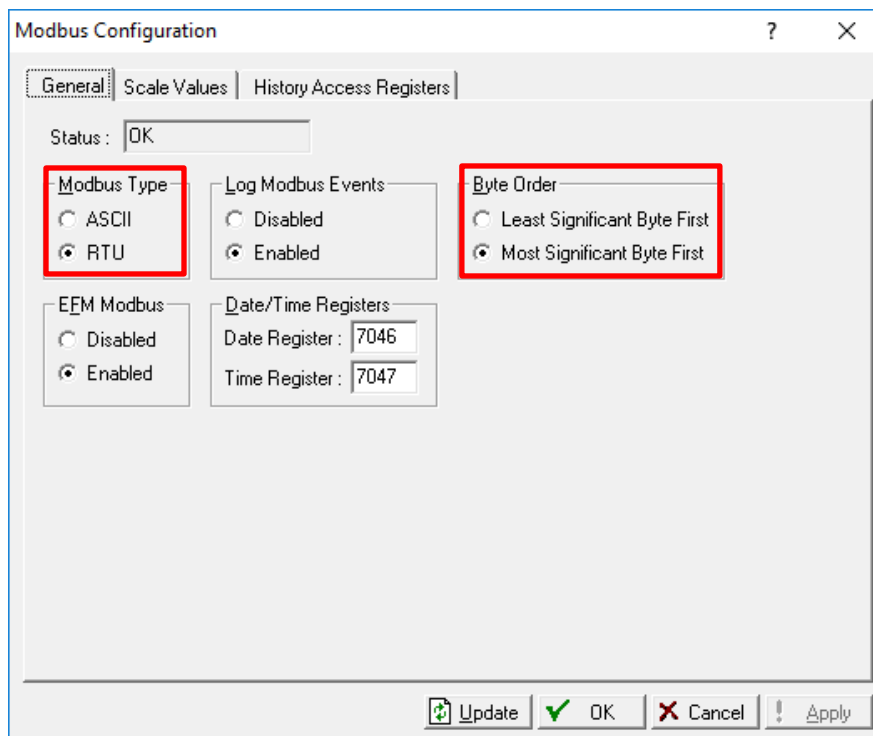
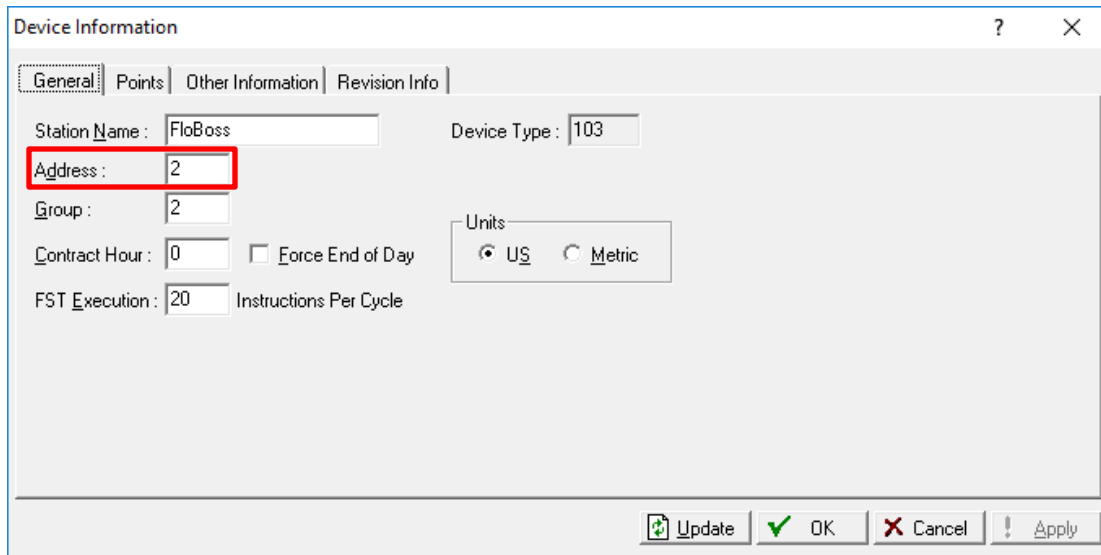


Figure 2-9 – ROCLINK 800 Modbus Configuration Window for the FloBoss 103

Verify that the Modbus Type is set to RTU, and that the Byte Order is set to Most Significant Byte First.

Next, go into ROC -> Information, and verify in the window that shows up that the Address is at 2. This is necessary, as the controller is configured to pull data from this address.



The image shows a software window titled "Device Information" with a standard Windows-style title bar (minimize, maximize, close buttons). The window has four tabs: "General", "Points", "Other Information", and "Revision Info". The "General" tab is selected. Inside the "General" tab, there are several input fields and checkboxes. The "Station Name" field contains "FloBoss". The "Device Type" field contains "103". The "Address" field, which is highlighted with a red rectangle, contains the number "2". The "Group" field contains "2". The "Contract Hour" field contains "0", and there is an unchecked checkbox for "Force End of Day". The "FST Execution" field contains "20", and there is a label "Instructions Per Cycle". To the right of these fields, there is a "Units" section with two radio buttons: "US" (which is selected) and "Metric". At the bottom of the window, there are four buttons: "Update" (with a refresh icon), "OK" (with a green checkmark icon), "Cancel" (with a red X icon), and "Apply" (with a document icon).

Figure 2-10 – ROCLINK 800 Device Information Window for the FloBoss 103

### 2.3.1 Setting up the Modbus Register Mappings

The FloBoss Modbus Register Map can be defined using ROCLINK by going to Configure -> MODBUS -> Registers. This register map will define the registers that the controller will read data from.

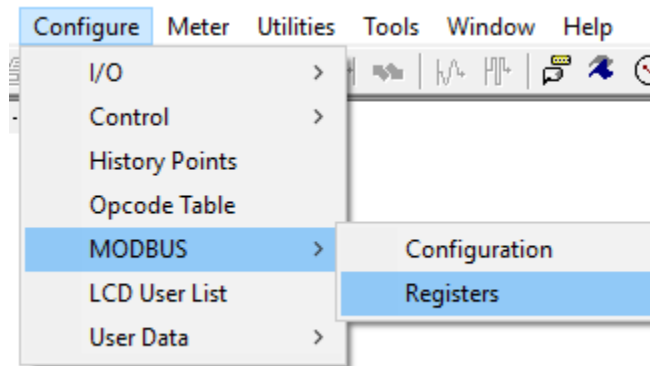


Figure 2-11 – Entering the Modbus Registers Window for the FloBoss 103

A window should appear, which should have fifteen entries in a chart.

	Starting Register	Ending Register	Device Parameter(s)		Indexing	Conversion
1	1099	1100	AIN A2, EU	<input type="checkbox"/> Point <input checked="" type="radio"/> Param	67	
2	1101	1102	AIN A3, EU	<input type="checkbox"/> Point <input checked="" type="radio"/> Param	67	
3	1103	1104	AIN A2, EU	<input type="checkbox"/> Point <input checked="" type="radio"/> Param	67	
4	1105	1106	FLW 1, CURFLO	<input type="checkbox"/> Point <input checked="" type="radio"/> Param	67	
5	1107	1108	AIN A1, EU	<input type="checkbox"/> Point <input checked="" type="radio"/> Param	67	
6	1109	1110	AIN E2, EU	<input type="checkbox"/> Point <input checked="" type="radio"/> Param	67	
7	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
8	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
9	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
10	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
11	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
12	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
13	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
14	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	
15	0	0	Undefined	<input checked="" type="radio"/> Point <input type="radio"/> Param	0	

Update OK Cancel Apply

Figure 2-12 – ROCLINK 800 Modbus Registers Window for the FloBoss 103

Each entry is meant to tie a register (or set of registers) to data stored in the FloBoss. Each function index corresponds to a specific Modbus function code. Each function index corresponds to a specific Modbus function code. From the drop-down menu labeled Function Index, select the option “5 – Function 4”, as the controller will only send requests with the function code 04.

Function Index : 5 - Function 4 Function Name : Function 4

Figure 2-13 – Function Index Drop-Down Menu in the Modbus Registers Window

Populate the entries with the settings as shown in Figure 2-12. These are the recommended Modbus mappings for the integration. The settings can be found in Appendix B - FloBoss Modbus Register Mapping for quick reference. Directions for setting up the device parameters can be found in Appendix A – FloBoss Register Setup .



### 2.3.2 Virtual Sensor Master Configuration File

If desired, there is also a configuration file that provides a populated Modbus register map with the recommended mappings. The Virtual Sensor Master configuration file sets up the register maps needed to configure the FloBoss to send the relevant data to the controller. This zipped configuration file is named “FloBoss Integration with ETC Controllers – Configuration File” and can be found in Vision under the Resources tab. To start, extract the file into an easily accessible directory. For more details on how to load configuration files onto a FloBoss, go to Section 2.5.

**Note:** Using the configuration files provided will overwrite the existing configuration of the FloBoss device. It is recommended to load the configuration file before further configuring the FloBoss.

## 2.4 Saving the FloBoss Configuration

To save the settings you have set in a configuration file, first go to File -> Save Configuration. There, you will see a window pop up that will allow you to choose a directory for your file. It is recommended that you save your configuration in a folder outside of C:/Program Files (x86)/ROCLINK800. Saving it in this folder will only make it accessible through ROCLINK. This can be an problem if one wishes to backup configuration files.

Upon saving the configuration file, a loading screen will come up. Saving a configuration file should only take a few minutes to complete. You can find the configuration file in the previously specified directory.

## 2.5 Loading a FloBoss Configuration

To load configuration files, with FloBoss connected to ROCLINK, start by going into Window in the main panel of the window, and select the menu option with the “On-Line” label.

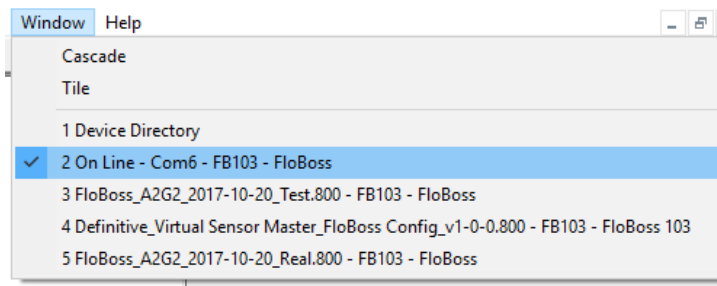


Figure 2-14 – Selecting the Configuration Window for the connected FloBoss 103

Load the file into the FloBoss by going into File -> Download, navigating to where the file is stored, and open the file. Select OK for the following dialog boxes that come up. After going through all of the dialog boxes, the Download Configuration window should show up as shown:

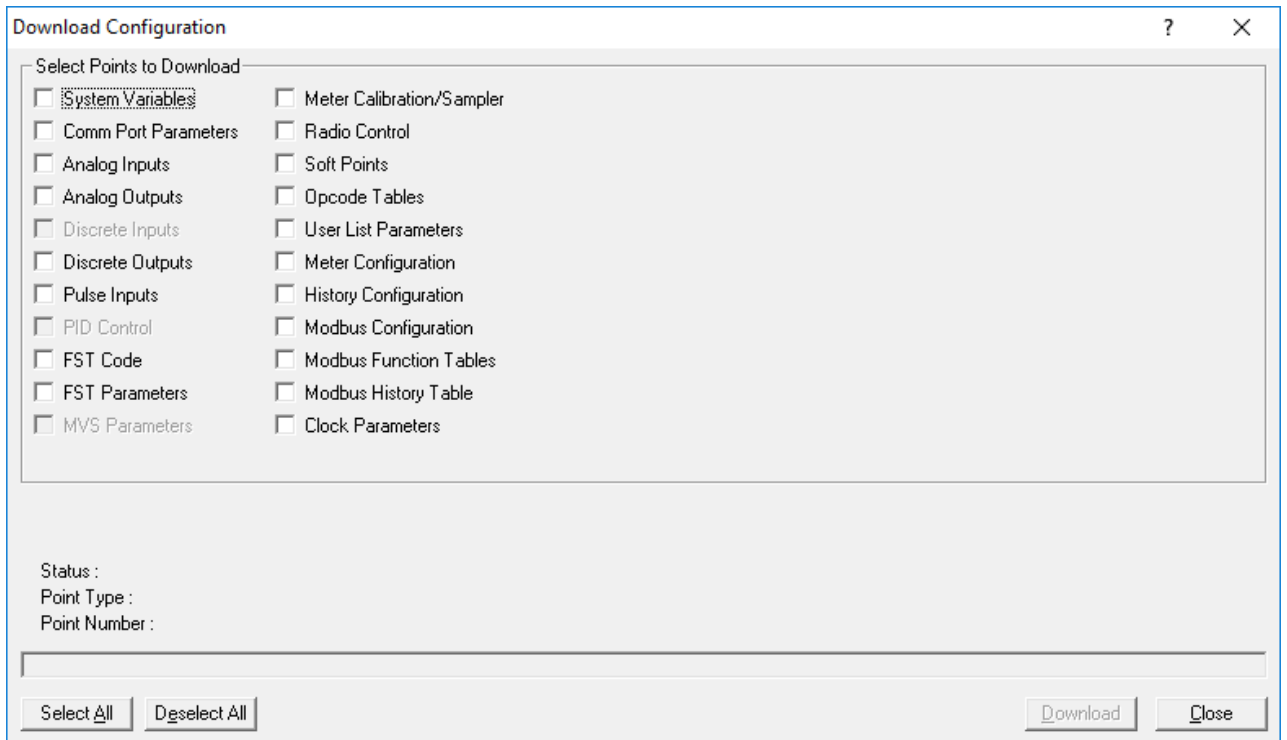


Figure 2-15 – ROCLINK 800 Download Configuration Window

Check every checkbox except for the History Configuration box. This can be done easily by clicking Select All and then deselecting the History Configuration box. Then, click Download on the window. Keep in mind that the screen of the FloBoss may refresh as the program writes to its memory during the download.

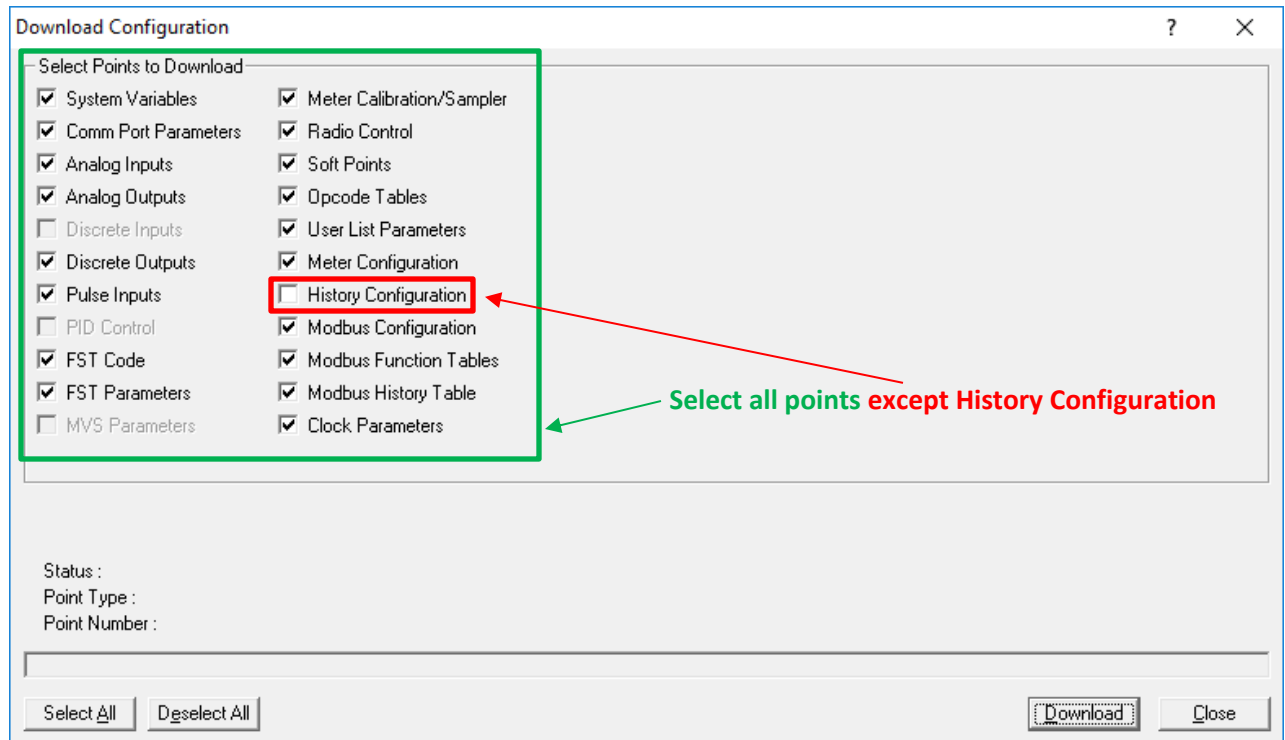


Figure 2-16 – Selecting Necessary Points Before Downloading a Configuration to a FloBoss 103

The Virtual Sensor Master configuration file sets up the register maps needed to configure the FloBoss to send the relevant data to the controller. This zipped configuration file is named “FloBoss 103 Integration with ET-12001 Controllers – Configuration Files” and can be found in Vision under the Resources tab.

### 3 Controller Setup

#### 3.1 Downloading the Virtual Sensor Master firmware to the Controller

If you do not have ETC Vision, you will need to download and install it before proceeding, to do so, you can find it on the following link:

<http://etcorp.ca/engineered-solutions/device-management/>

To start upgrading, simply follow this procedure:

1. Hold the Install button down.
2. Plug the battery into the controller.
3. Release the Install button.
4. Follow the prompts on the screen to erase the current firmware (if there are any prompts).
5. When prompted to do so, download the firmware (The Controller should just say “Download” on the screen when it’s ready).

- a. On your PC, open ETC Vision and go to the Setup tab.
- b. Select the appropriate COM port for your RS485 adapter.
- c. The files should show up in the Software File drop-down menu. The file name should contain 'VirtualSensorsMaster' in the filename. It is recommended to use version 2.1.5 or newer.
- d. Click Connect.
- e. Select Download.
6. The display on the controller should change to show the status of the download (i.e., You should be seeing "xxx bytes received" on the controller as it downloads the firmware, with the number counting upwards).
7. When the download is complete, the controller should start normally.

### 3.2 Connecting the Controller to the FloBoss 103

To connect the FloBoss 103 to the Controller, you will need to connect the wires from your COM1 block on the FloBoss to a COM2 connector for the Controller.

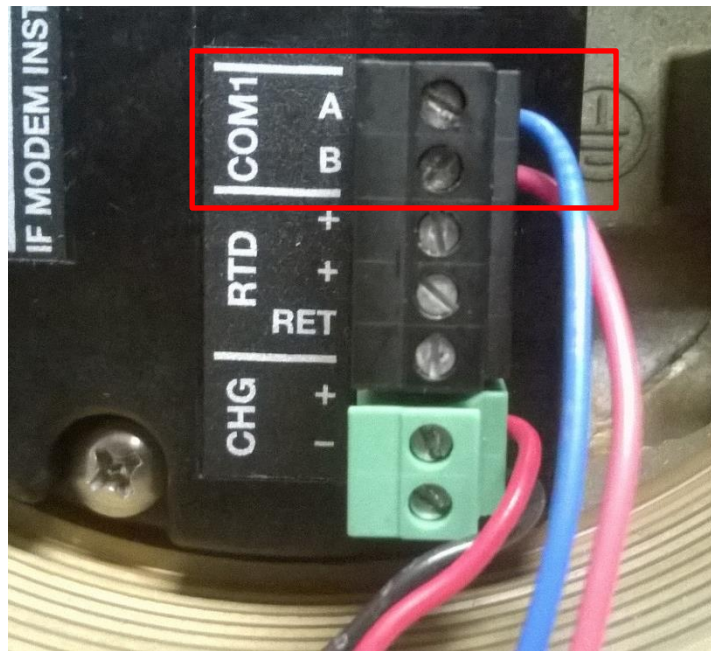


Figure 3-1 – Points That Should be Selected Before Downloading a Configuration to a FloBoss 103

The A port on the FloBoss' COM1 connector should go to B on the controller's COM2, and vice versa for the FloBoss' B port. This connector will then plug into COM2 on the controller as shown in the following figure.

Extreme Telematics Corp.  
Model: ET-12001-1007-0002

Serial Number:

**INTRINSICALLY SAFE:**  
Exia, T3, -40 °C ≤ Ta ≤ +70 °C, X  
Class 1, Zone 0, Group IIB

**ASSOCIATED EQUIPMENT:**  
[Exia], T3, -40 °C ≤ Ta ≤ +70 °C, X  
Class 1, Zone 0, Group IIB

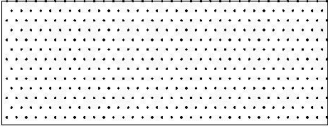
**RATINGS:**  
Battery Power 6Vdc nom.  
Solar Panel 8Vdc nom.

SOLAR
COM
+

BATTERY
---------

B	COM1
A	
COM	
B	COM2
A	
COM	
PWR	Cr/Dp
SIG	
COM	
PWR	LP
SIG	
COM	
PWR	PAS
SIG	
COM	

**WARNINGS: REFERENCE CONTROL DRAWING ET-12001-1012-0000 FOR PROPER INSTALLATION. USE ONLY INTRINSICALLY SAFE BATTERY PACK ET-12001-1008-0001 OR ET-12001-1008-0002. DO NOT REMOVE COVER UNLESS AREA KNOWN TO BE SAFE.**



AUTO
CATCH

VALVE
B

SALES
VALVE

Label P/N: ET-12001-1010-0102-REV3

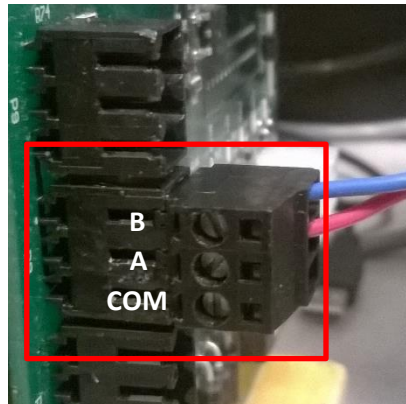


Figure 3-2 – Port Used to Connect the FloBoss 103 to the ETC Controller

### 3.3 Setting Up the Virtual Sensor Master Configuration

First, press the Install button and use the directional buttons to navigate to the Inputs option. Press the Select button when your cursor is at the Inputs option.

When in the Inputs menu, use the directional buttons to cycle through the screens until you get to the VirSnsMst screen. It should be showing that the Virtual Sensor Master feature is enabled. If not, then enable the feature by pressing Select, pressing the Up button, and then pressing Select again once you see “enabled” on the screen.



Figure 3-3 – Entering the Modbus Configuration Window for the FloBoss 103

If you navigate to the next screen afterwards, you will reach the VirSnsAdr screen. This denotes where the controller will start pulling values from the FloBoss. The default address is 1100, and corresponds to a starting register of 1099 on the FloBoss.



Figure 3-4 – Entering the Modbus Configuration Window for the FloBoss 103

You can change this value by pressing Select, and entering the corresponding value to the first starting register in your FloBoss table. To illustrate this further, if X is your first starting register, then X+1 is the address written into the controller.

## 4 Verifying Modbus Communication

### 4.1 Controller Settings

To ensure that the controller is communicating properly through Modbus with the FloBoss, we will take a look at the FloBoss' communication status. This can be done in ROCLINK by entering Configure -> MODBUS -> Configuration.

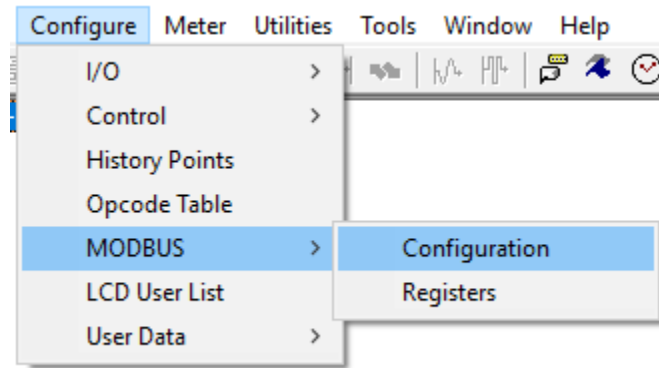


Figure 4-1 – Entering the Modbus Configuration Window for the FloBoss 103

When the Configuration window shows up, the status of the communication can be seen. Two states that have been known to show up include:

- **OK:** Communication is occurring between the Controller and Modbus, and data is being transferred. If the FloBoss was setup properly as denoted in the previous sections, then the values that are stored in the controller should be correct to what is in the FloBoss.
- **Invalid Data Address:** This usually means that your register map is outside the range of values that the controller will read in the FloBoss. You will need to go into your register table on ROCLINK, find the smallest starting address in the Function Index for function code 04, and verify that it corresponds with the VirSnsAdr in the controller.

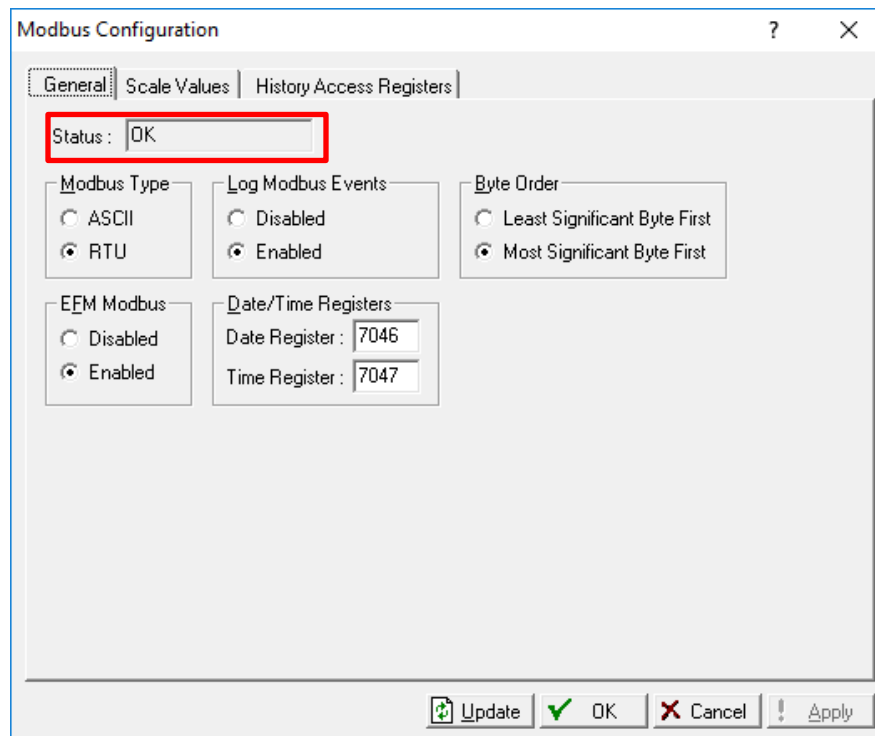


Figure 4-2 – Checking the Modbus Communication Status in the Modbus Configuration Window

You can also verify the register map to ensure that the right values are being sent to the controller. There is a screen capture of the recommended register map in Appendix B of this document. Simply compare the register map configured in FloBoss to that in the Appendix.

## 4.2 Verification through the Controller

To verify the values stored by the FloBoss, simply turn on the virtual sensor input to the controller. This can be done through the Inputs menu. You will be able to see these values on the status screen as pertain to line pressure (LP), differential pressure (DP) and flow rate (FR), and yesterday's flow (FLVYs).



Figure 4-3 – Controller Status Screens Showing Values Pulled from the FloBoss 103

### 4.2.1 Accessing FloBoss Values through the Controller's Modbus Registers

The following verification process is relevant for ensuring the correct reporting of Modbus data when using cloud-based platforms (i.e., NetFlow, Cygnet, etc.).

To verify the values stored by the FloBoss, simply access the controller's Modbus values through ETC Vision, either through Modbus Master or through SCADA Viewer. You can also use any Modbus interfacing programs available to read from these registers.



The following chart displays each of the registers on the controller where the values will be stored.

	Integer Values	Float (Decimal) Values	FloBoss Starting Register/Ending Register
Line Pressure	3:0032	4:0501- 4:0502	1100/1101
Casing Pressure	3:0033	4:0503- 4:0504	1102/1103
Tubing Pressure	3:0036	4:0505- 4:0506	1104/1105
Flow Rate	3:0035	4:0507- 4:0508	1105/1106
Different Pressure	3:0034	4:0509- 4:0510	1107/1108
Yesterday's Flow	3:0061	4:0511- 4:0512	1109/1110

Figure 4-4 – Overview of Modbus Registers where FloBoss Values are Stored

## 5 Appendix

### 5.1 Appendix A –FloBoss Register Setup

One of the more involved aspects of the register map setup in the FloBoss are the device parameters. They essentially denote the data being pulled out of the FloBoss' memory. Clicking the button next to the device parameter in an entry opens up the Select TLP window.

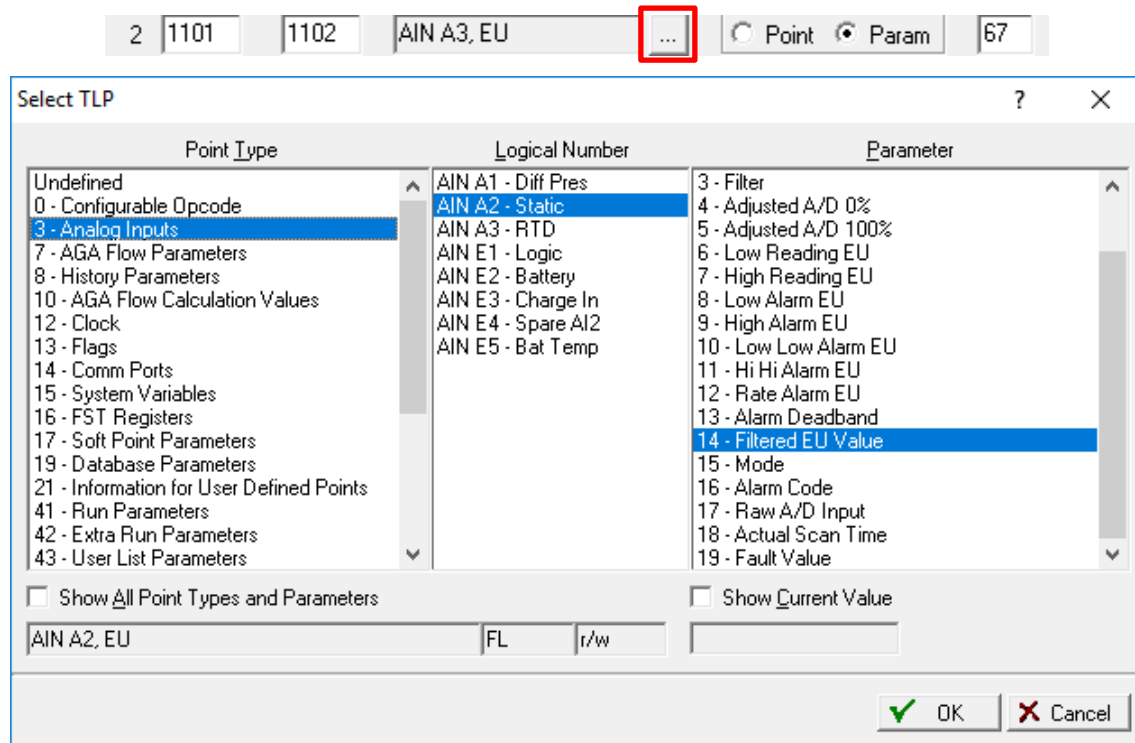


Figure 5-1 – Entering the Select TLP Window to Configure the FloBoss 103 Modbus Registers

To setup the FloBoss' registers to be consistent with the register mapping, select the following options under Point Type, Logical Number, and Parameter respectively. As you select each setting for each register, click OK to save them and move on to the next register.

Register Entry	Point Type	Logical Number	Parameter
1	10 – AGA Flow Calculation Values	FLW 1	1 – Static Pressure
2	17 – Soft Point Parameters	SFP 1 – Soft Pt 1	2 – Data #1
3	17 – Soft Point Parameters	SFP 1 – Soft Pt 1	2 – Data #1
4	10 – AGA Flow Calculation Values	FLW 1	3- Instantaneous Flow
5	10 – AGA Flow Calculation Values	FLW 1	0 – Differential Pressure   Uncorrected Flow
6	10 – AGA Flow Calculation Values	FLW 1	7 – Flow Yesterday

Figure 5-2 – Recommended TLP Settings to be selected in the Select TLP Window for each Register Pair

When selecting each value, it may be useful to verify the values coming from the sensors connected to the FloBoss. This can be done by checking off the “Show Current Value” checkbox and observing the value in the box nearby.

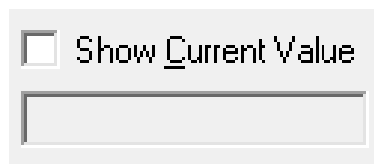


Figure 5-3 – Checking the Value of a Parameter in the Select TLP Window

You should do this when setting the registers that are using soft point parameters denoted above, as the values for those registers should be zero. If they do not come up as zero, try selecting a different Soft Point under Logical Number, and/or a different data point under Parameter.





Once you finish, compare the device parameters you have set to the parameters shown in the register mapping on Appendix B - FloBoss Modbus Register Mapping.

## 5.2 Appendix B - FloBoss Modbus Register Mapping

**Modbus Registers** ? X

Function Index : **5 - Function 4** Function Name : **Function 4**

	Starting Register	Ending Register	Device Parameter(s)		Indexing	Conversion
1	1099	1100	FLW 1, CURFP	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	67
2	1101	1102	SFP 1, DATA1	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	67
3	1103	1104	SFP 1, DATA1	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	67
4	1105	1106	FLW 1, CURFLO	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	67
5	1107	1108	FLW 1, CURDP	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	67
6	1109	1110	FLW 1, YDYFLO	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	67
7	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
8	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
9	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
10	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
11	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
12	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
13	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
14	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0
15	0	0	Undefined	...	<input checked="" type="radio"/> Point <input type="radio"/> Param	0

 Update
  OK
  Cancel
  Apply