Application Note

Configuring a Sentinel-Modbus or Sentinel-Modbus/2DI with an Electrolab DLS2100

OVERVIEW

The Electrolab DLS2100 is a popular float stick found ubiquitously in upstream oil & gas. SignalFire provides a simple solution to make this sensor completely wireless with minimal setup. The Sentinel Modbus and Sentinel Modbus/2DI have a one-click option that automatically pulls in the core parameters needed to get a system up and running in no time. **This option requires SignalFire ToolKit v2.2.34.00 or higher.**

SETUP

First, wire the Electrolab to the 4 terminals of the Sentinel (Power, Ground, Modbus-A, Modbus-B) and set up the Electrolab for 2-wire Modbus as specified by its wiring diagram. For units with the Electrolab junction box the wiring is as follows:

Electrolab Terminal	Sentinel Terminal
TX/RX+	MB_A
TX/RX-	MB_B
12V	PWR
GND	GND

If the Electrolab is the OEM version with flying leads the connections are as follows

Electrolab Wire Color	Sentinel Terminal
GREEN/WHITE	MB_A
BLACK/BLACK	MB_B
RED	PWR
Black	GND

The RS-485 serial communication should be set to the default of 9600 baud rate, 8 data bits, no parity bit, and 1 stop bit (**9600 8N1**).

CONFIGURE SENTINEL TO READ SENSOR

Set the Sentinel Modbus ID to match the Electrolab sensor Modbus ID (default 1), configure the Sentinel as normal to join the network and connect to the Gateway. (If the sensor Modbus ID is unknown, see section FIND SENSOR MODBUS ID.)

To automatically populate the Sentinel with the pre-set registers, select **Settings → Configure Sentinel for Electrolab DLS2100**, then click **Yes** in the message box that appears to set parameters and registers listed in the window.
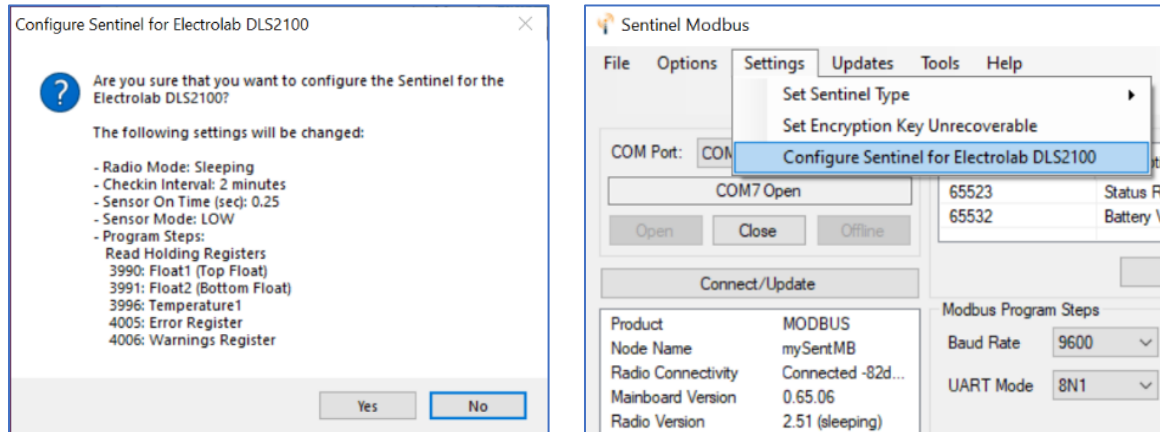

The Electrolab DLS2100 is now fully configured for wireless communication. When using **SignalFire ToolKit v2.2.34.00 or higher**, the program steps are set based on the register mode configured in the Electrolab. Otherwise, the program steps assume the default register mode of 16-bit unsigned integers. To set the register mode, see section CONFIGURE ELECTROLAB SETTINGS.

The following requires the following minimum firmware revisions: Gateway version 8.24, Sentinel-Modbus version r66, Modbus/2DI version r59. If the Sentinel is already connected to a Gateway, but not configured to read an Electrolab, the parameters can be set from the Gateway using the remote configuration feature. Enable remote configuration as normal and again go to **Settings → Configure for Electrolab DLS2100** and click **Yes**.

CONFIGURE ELECTROLAB SETTINGS

More options can be read and set either when connected locally or while in remote configuration mode through the Gateway. Select **Tools → Configure Electrolab DLS2100**.
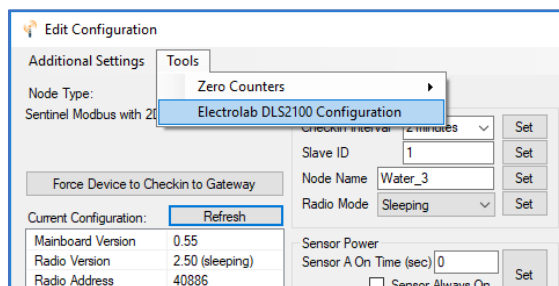
The Sensor Modbus ID to Temperature Offset fields are settable, while the Serial Number to Errors fields are read-only. Control the sensor power as described in section SENSOR POWER CONTROL.
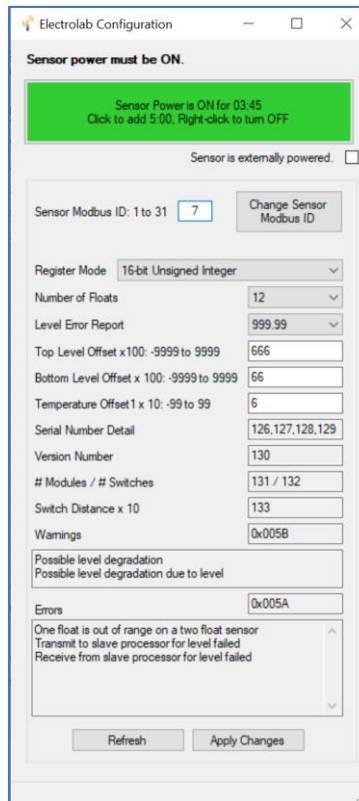
Sensor Modbus ID: To change the Sensor Modbus ID, type a number between 1 and 31. If it is different than the current Sensor Modbus ID, the button to *Change Sensor Modbus ID* will be enabled. Clicking it will change both the Sensor Modbus ID and the Sentinel Modbus ID.
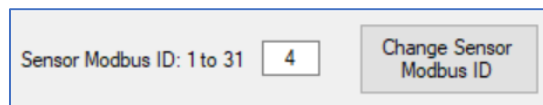
To change the settings, type or select from the pull-down menu a new value(s) and click *Apply Changes*. If a desired setting is out of range (such as setting the Temperature Offset to 150), the Sentinel will throw a warning.

Register Mode: This setting configured the register mode to read from the Electrolab. The options are:

16-Bit Unsigned Integer (default)
32-Bit Floating Point Enron
2 x 16-Bit Floating Point

This setting determines the register format that the Electrolab will use. After changing this setting, you must select the 'Configure Sentinel for Electrolab 2100" so that the Sentinel will be reconfigured to read the correct registers from the Electrolab.

Number of Floats: This configures the Electrolab Number of Floats setting. The options are:

1 or 2 – Standard; 11 or 12 – 1/8" Resolution; 11 – Single Float; 12 – Dual Float

Level Error Report: This setting configures the Electrolab to respond with either 999.99 or 000.00 values for the float readings in the event of an error condition within the Electrolab device

Top Level Offset: This applies an offset to the Electolab that it will apply to the Top Level float values. This is in 1/100th of an inch so to apply a +0.5" offset you would enter 50.

Bottom Level Offset: This applies an offset to the Electolab that it will apply to the Bottom Level float values. This is in 1/100th of an inch so to apply a -1.5" offset you would enter -150.
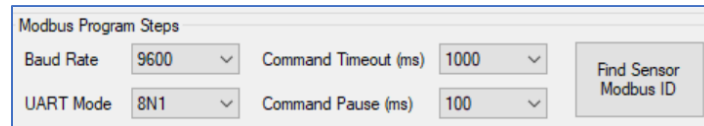
Temperature Offset: This apples an offset to the Electrolab temperature readings. This is in 1/10th of a degree so to apply a +2° offset you would enter 20.

FIND SENSOR MODBUS ID

If the Electrolab Modbus ID is unknown, it can be found using the Electrolab HHC-1000 Handheld Communicator connected directly to the sensor or the SignalFire Toolkit connected to the Sentinel's serial port.

If using the Electrolab HHC-1000 Handheld Communicator, take note of the Electrolab sensor's Modbus ID (i.e., the sensor unit number). Keep in mind that if there are multiple units, they will each have to be configured with a unique ID and the Sentinel Modbus ID must match that of the attached Electrolab.
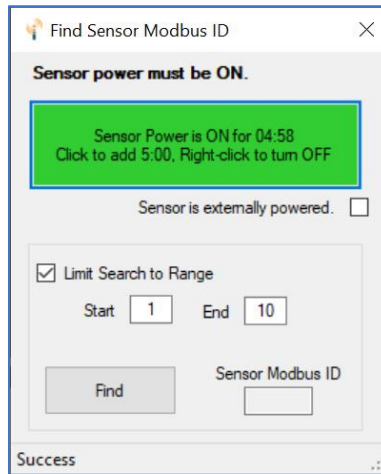
If using the SignalFire Toolkit, click **Find Sensor Modbus ID**.

Control the sensor power as described in section SENSOR POWER CONTROL, select a limited search range or search the entire Modbus ID range (1 to 31), then click **Find**.

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If the Sensor Modbus ID is found but does not match the Sentinel Modbus ID, click **Yes** in the pop-up message box to change the Sentinel Modbus ID.
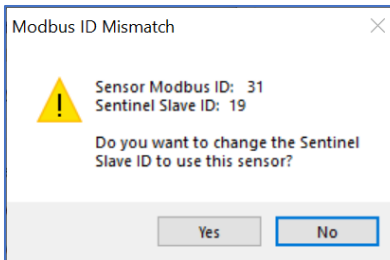
SENSOR POWER CONTROL

If the power is not on, either check the box indicating that the sensor is externally powered or click the button to turn it on for 5 minutes. Once the power is on, additional mouse clicks will extend the on time in 5-minute increments. A right-click will turn the power off.

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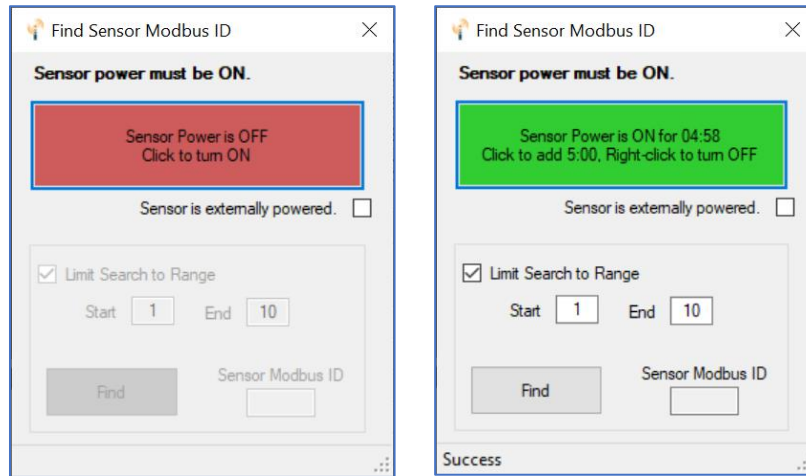
For further assistance, call SignalFire at (978)-212-2868 x2 or email support@signal-fire.com.

Electrolab Register Reference

The registers below are from the DLS2100 manual and are the registers that the Sentinel will read by default. Users may configure the Sentinel to read additional registers from the DLS2100 if needed.

16-Bit Unsigned / 32-Bit Enron

Sensor Data	Address	Type
Float 1 (Top Float)	3990	Total Fluid Level in Tank 16 bit Unsigned integer or 32 bit floating point
Float 2 (Bottom Float)	3991	Water Interface Level in Tank 16 bit Unsigned integer or 32 bit floating point
Temperature1	3996	Temperature1 16 bit Unsigned integer or 32 bit floating point
Error Register	4005	16 bit Unsigned integer (See Table 5)
Warnings Register	4006	16 bit Unsigned integer (See Table 4)

2 x16-Bit Float

Sensor Data	Address	Type
Float 1 (Top Float)	5000	Total Fluid Level in Tank. Floating point upper two bytes
	5001	Total Fluid Level in Tank Floating point lower two bytes
Float 2 (Bottom Float)	5002	Water Interface Level in Tank Floating point upper two bytes
	5003	Water Interface Level in Tank Floating point lower two bytes
Temperature1	5012	Temperature1 Floating point upper two bytes
	5013	Temperature1 Floating point lower two bytes
Error Register	5030	Floating point upper two bytes (See Table 5)
	5031	Floating point lower two bytes
Warnings Register	5032	Floating point upper two bytes (See Table 4)
	5033	Floating point lower two bytes

Table 4. Warning Codes

Binary Value (for 16 bit Unsigned)	Warning Code	Indication
	0	No warnings
Bit 0	1	Possible level degradation
Bit 1	2	Possible level degradation due to level

Table 5. Error Codes

Binary Value (for 16 bit Unsigned)	Error Code	Indication
	0	No errors
Bit 0	1	Can't resolve level reading or no float is detected
Bit 1	2	One float is out of range on a two float sensor
Bit 2	4	Too many groups
Bit 3	8	Not used
Bit 4	16	Transmit to slave processor for level failed
Bit 5	32	Transmit to slave processor for temperature failed
Bit 6	64	Receive from slave processor for level failed
Bit 7	128	Receive from slave processor for temperature failed
Bit 8	256	No slave processor responding

For the full register map please see the Electrolab DLS2100 Manual.