



# Model 3010 Dual Analog Output Board

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***User Manual***

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## **Description:**

Electrolab's Model 3010 Dual Analog Output Board is designed to provide two analog outputs from either a Model 1000 or Model 2100 Digital Level Sensor (DLS). These two, 4-20mA signal outputs are used in applications that require monitoring of dual fluid levels in a tank. The 3010 Dual Analog Output board reads ASCII data from the sensor, parses the level from the data string, and assigns the channel output based on the number of floats or levels in the message.

### **Example:**

- A single float or single level sensor will have the output assigned to analog output channel 1.
- A dual float or dual level sensor will have the outputs assigned as follows:
  - Level 1 (total product ) = analog loop 1
  - Level 2 (interface) = analog loop 2.

The Model 3010 board replaces the fuse board in explosion proof housing assembly on the top of the sensor and provides the same electrical protection. The Model 3010 board operates off of 12Vdc – 30Vdc and controls power to the sensor. It powers the sensor on a pre-programmed interval and polls the sensor for levels, powers the sensor down and outputs the analog signal. The configurations for polling and scaling are stored in the DLS EEPROM, allowing for easy board replacement, if required, without the need for reprogramming. By default the polling period is 30 seconds and the scaling is 240 inches.

## **Configuration:**

The 3010 is designed to interface with the following reporting firmware versions:

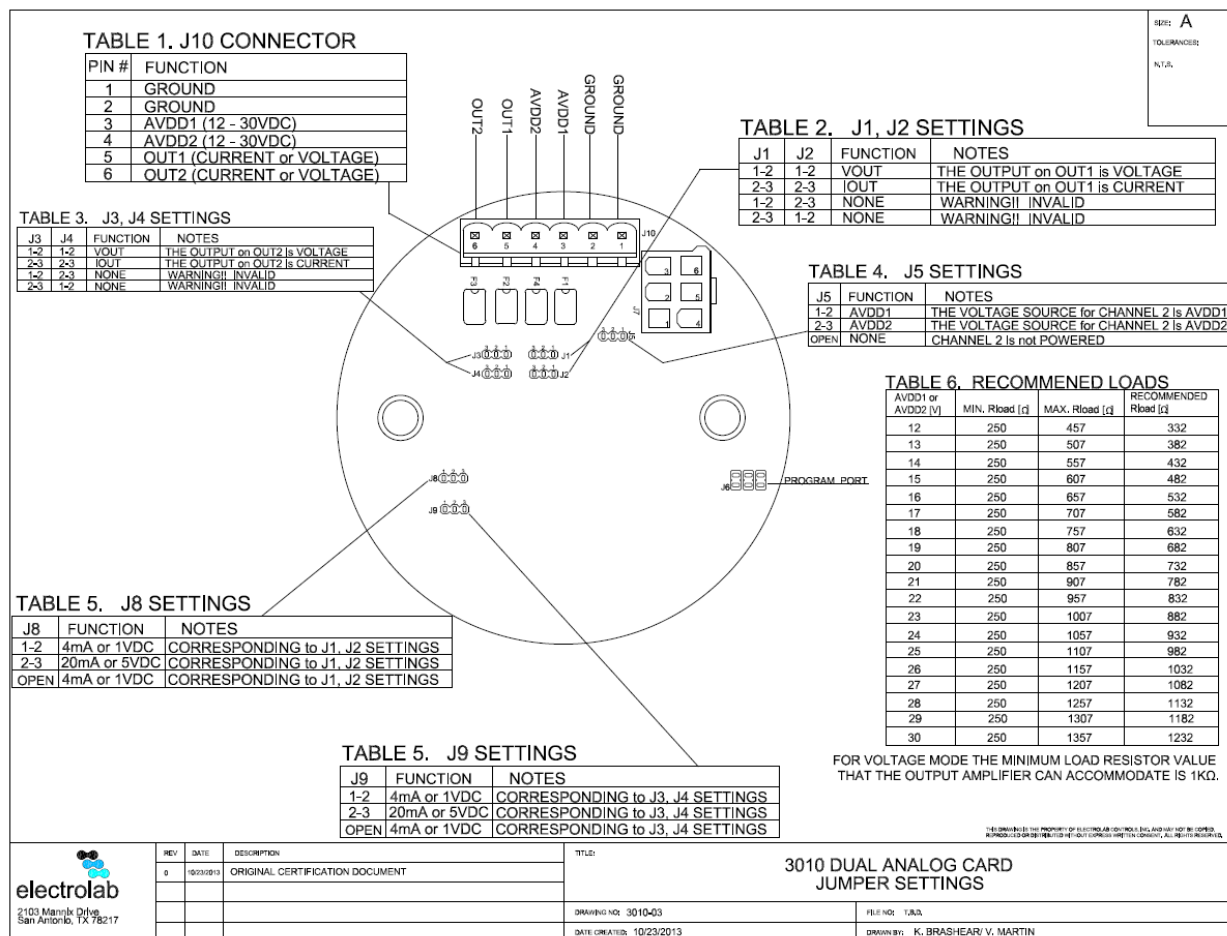
- Version 2.08 or higher for DLS1000
- Version 3.13 or higher for DLS2100

The sensor must be configured to communicate at 9600n81. The board has two output modes, 1-5v and 4-20mA. The board has 7 jumper selectable settings (see *Figure 1, 3010 Dual Analog Card Jumper Settings*):

- J1 and J2 work together to select the output mode for analog loop 1 of either current or voltage (by default the outputs are set to 4-20mA).
- J3 and J4 also work together to select the output mode for analog loop 2 of either current or voltage (by default the outputs are set to 4-20mA).
- J5 selects the input voltage source for the analog loops. By default the Model 3010 board is configured to operate both loops and the board from the same power source.

Re-configuring J5 allows for a secondary power source to power analog loop 2 (this may be necessary for cases when loop isolation or intrinsic safety barrier devices are used).

- J8 selects the default error output for analog loop 1 (default setting is 4mA).
- J9 selects the default error output for analog loop 2 (default setting is 4mA).



**Figure 1. 3010 Dual Analog Card Jumper Settings**

## Operation:

When the board is powered up, the LED will blink 5 times every 0.4 seconds and stop. The outputs will be set according to the jumpers. See Figure 1. *3010 Dual Analog Card Jumper Settings* above.

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**Note:**     *If the converter core temperature exceeds the safe value, or if the 3010 is in current mode and the loop is open, the output is set to 0 and the LED blinks 2 times for loop 1 and 3 times for loop 2. This is a visual indication of a problem. You should check your connections or disconnect the board and allow it to cool down.*

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After the sensor is powered up, the Model 3010 Dual Analog Card waits 500 ms and polls the sensor for the sensor configuration with the command, **U\*\*MC?**. If the configuration is read, the configuration values are set for the loops.

- If there is no data or no valid data, the power cycles once and the analog board attempts to read the configuration again. If, on the second attempt, there is still no data or the data is invalid, the power is turned off to the sensor and the LED blinks indefinitely every 1 second.

If there is no data, there may be an incorrect communications setting on the sensor or a problem with the 3010. If there is no valid data, the float or floats may be off or installed incorrectly; or the number of floats programmed in the sensor do not match the number of floats actually installed on the sensor.

If valid data is received, the board will begin polling for levels at intervals set in the sensor configuration data (30 seconds is the default value) using the command, **U\*\*?**. When valid data is received, the output is set accordingly.

- If there is no valid data the power cycles and the board will attempt to read the sensor for level again. If there is still no data or no valid data, the outputs are set accordingly and the LED blinks indefinitely every 1 second. The board will power down the sensor and wait until the next polling period.

Depending on whether this is a new installation or if the sensor and board have been operating for a while, the trouble shooting is different. **New installations** only require that all communications settings and wiring are correct and the floats match the number programmed. **In-service** troubleshooting, involves checking the power applied along with connections. If all are fine, the sensor should be tested to isolate it from the 3010. If the sensor is the problem, replace it. If the board is the problem, replace it.

## **Setup:**

### **Required Equipment**

The following equipment and components are required to set up the Model 3010:

- Model 3010 analog output board
- Computer running terminal emulation software with a RS232/RS485 converter **or** a HHC1000 with cable
- Fuse board, 2217R2 or R3 to connect to the DLS
- DLS1000 with v2.08 or later firmware **or** DLS2100 with v3.13 or later firmware
- 12vdc – 30vdc power source for 3010 board
- 12vdc power source for the DLS (HHC1000 will provide this)
- 250 ohm resistor to test the 4-20mA analog loop when the DLS is not connected to a SCADA system
- Digital Volt Meter

## **Establishing Communications:**

Use the following steps to establish communication with the fuse board and begin set up of the Model 3010 board. You may use the Hand-Held Communicator or a Computer with Terminal Emulation software. Both procedures follow.

### ***Using the Hand-Held Communicator (HHC1000)***

1. Connect the HHC1000 to the sensor via the fuse board to ensure the sensor is configured correctly at 9600n81.
2. If there is no communications, go to **SEARCH FOR SENSOR** and scan.
3. If communication with the sensor is established, go to the 4\_20mA menu and verify or configure the 4-20mA settings.

Please refer to the *HHC-1000 User Manual* available online at [www.electrolabcontrols.com](http://www.electrolabcontrols.com), for additional information.

### ***Using a Computer with Terminal Emulation Software***

1. Connect the sensor via the fuse board to the RS485/RS232 converter (the sensor requires 12v and may not be provided via the converter).
2. Launch the terminal emulation software and configure the port to the proper settings, **9600n81 (default)**.
3. If the sensor doesn't respond, verify that all connections are secure, the port settings are correct, and that the port is open. If all appear correct, begin switching baud rates

and parities on the terminal emulation program (1200e71, 1200n81, 9600n81, 9600e71, 38400n81 and 38400e71) to see if one of these will work. These additional baud rates and parities are supported, but not normally used.

4. When communication is established, configure the sensor to 9600n81 by typing **U\*\*B9600N81** and pressing **Enter**. If the command is accepted, the sensor will respond with UnnBOK.
5. Configure the computer to 9600n81 and verify the sensor has the proper firmware version by typing **U\*\*MV** and pressing **Enter**. The sensor will respond with the firmware version of UnnMV2.xx for Model 1000 and UnnMV3.xx for Model 2100 sensors where nn = unit number and xx = extension of the version number.

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**Note:** *If you don't have the proper firmware the board will not work. You will need to acquire a sensor that has the proper firmware.*

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6. Set the scaling of the channel by typing **U\*\*MAXnnn** where nnn = the max scale in inches. The default is 240 inches. If the response is successful, the terminal will display "OK" in the reported message.

### **Connecting the Model 3010 Analog Board to the Sensor:**

1. Disconnect the fuse board from the sensor and connect the 3010 according to the wiring diagram in Figure 1.
  - a. Connect power to VDD1 and ground to GND.
  - b. Connect the 250 ohm resistor to OUT 1 and GND (this is the signal loop).
 

**Note:** This is for **test purposes only**. Most SCADA equipment will have the resistors pre-installed on the circuit board.
  - c. Connect the digital volt meter to the legs of the resistor and set for DC voltage.
  - d. Ensure the float is installed correctly on the sensor and matches the number of floats programmed in the sensor.
  - e. Apply power and verify the LED pulses and the voltage output from the board across the resistor.

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**Note:** *The voltage should be proportional to the scaled level at the float. If you are using 2 floats, you will either need to move the resistor for the second output to OUT 2 and GND or get a second resistor for this. If only one float is configured on the sensor, the 3010 will only output signal on OUT 1.*

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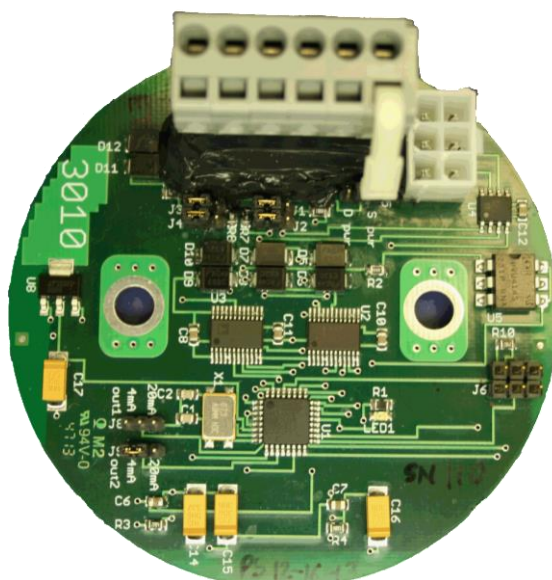


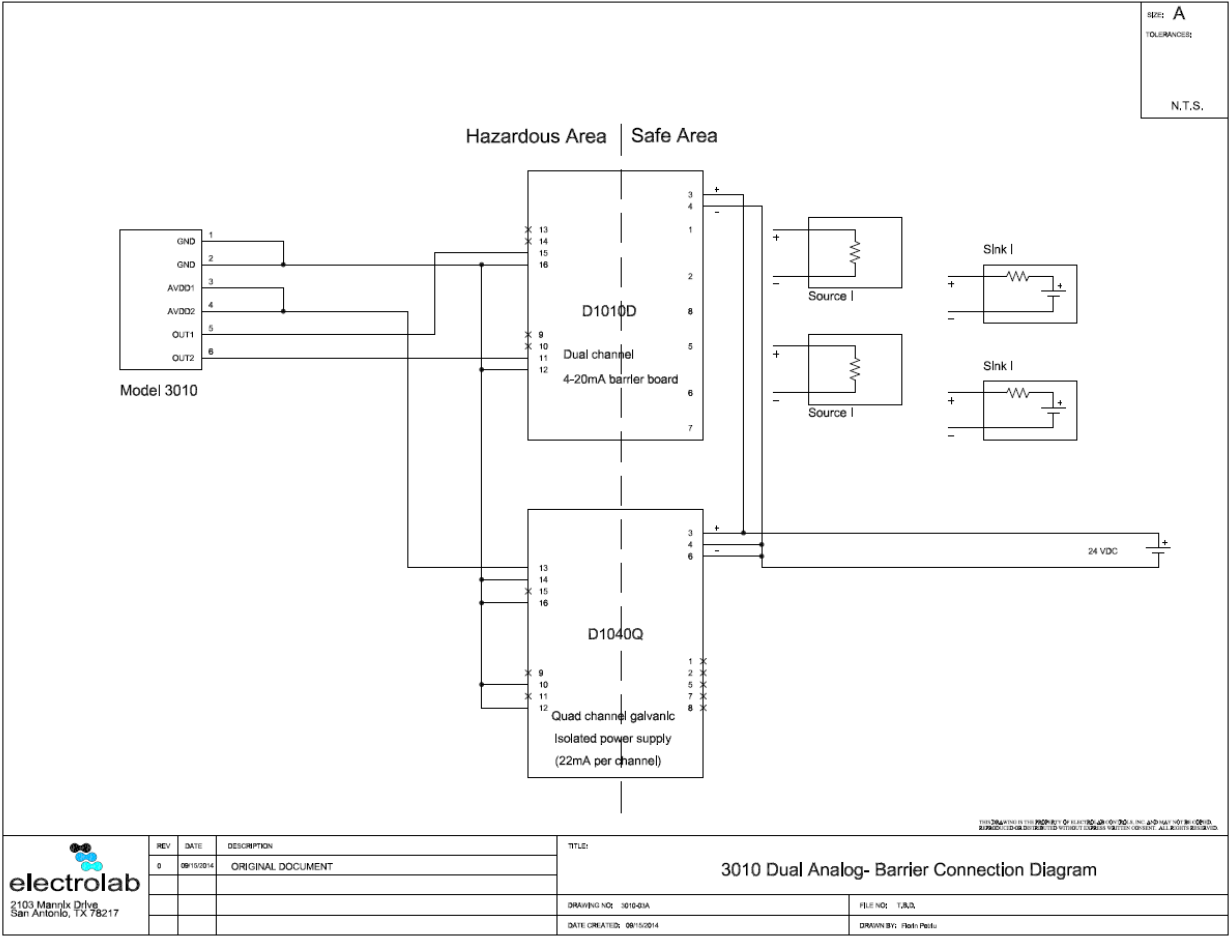
**Operating Specifications:**

The table below shows operating specifications for the Model 3010 Dual Analog Output Board.

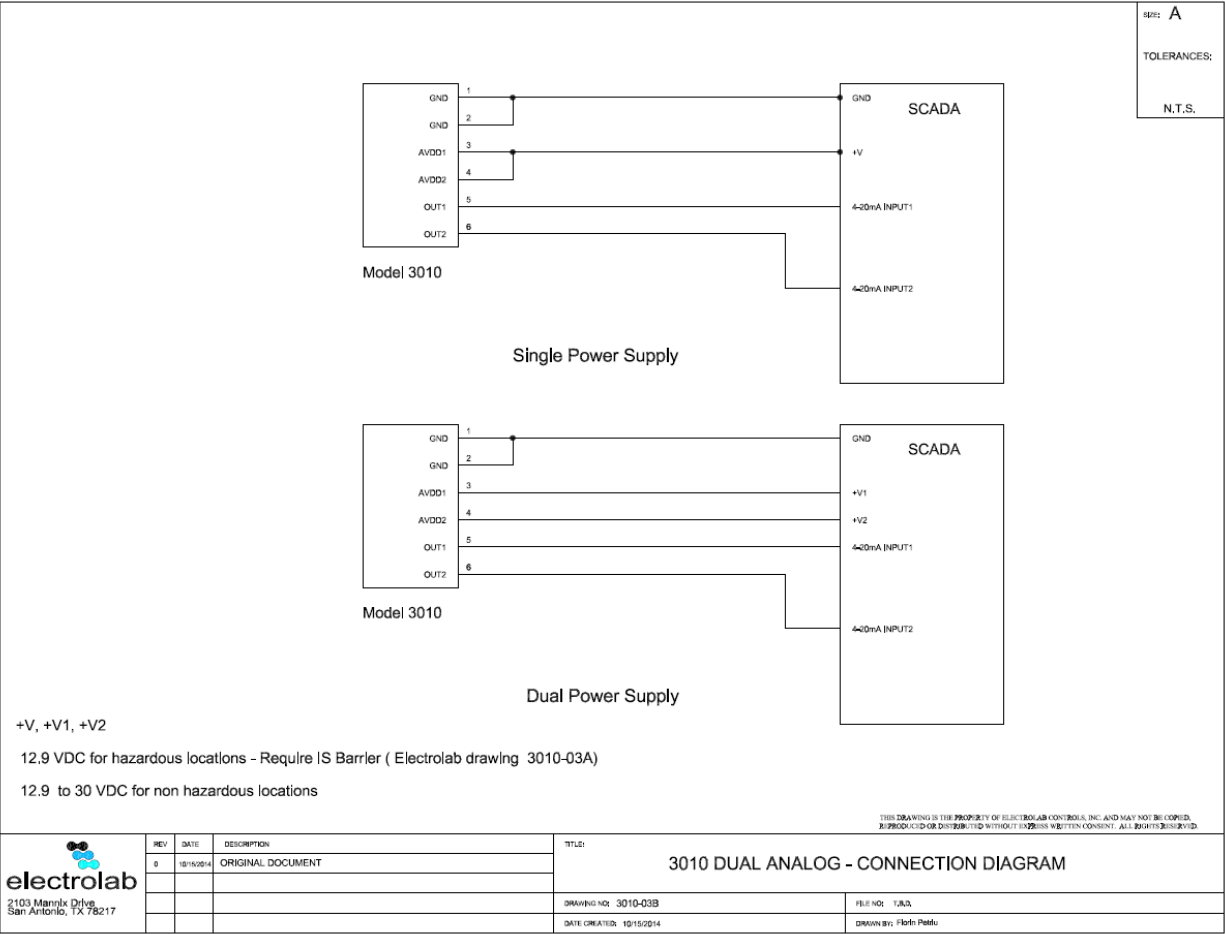
<b>Minimum Input Voltage</b>	11 VDC
<b>Maximum Intrinsically Safe Voltage*</b>	12.9 VDC
<b>Maximum Current Draw @ 12.9 V</b>	75 mA
<b>Minimum Current Draw @ 12.9 V</b>	15 mA
<b>Operating Temperature Range</b>	-20 to +70 degrees Celsius
<b>Storage Temperature Range</b>	-20 to +70 degrees Celsius

\* If the sensor is employed in an environment that does not require intrinsically safe devices, then the maximum voltage can exceed 12.9 V, up to 36 V in.





**Figure 2. 3010 Dual Analog – Barrier Wiring**



**Figure. 2A** 3010 Dual Analog Wiring

## **NOTES**

## **NOTES**

### **Technical Assistance:**

Specific information about the HHC-1000, Model 1000 Level Sensor and DLS 2100 can be found in the User Manuals for each product on the manufacturer's website, [www.electrolabcontrols.com](http://www.electrolabcontrols.com). Further technical assistance for the Model 3010 Dual Analog Output Board may be obtained by contacting the manufacturer:

### **For further information or for assistance, please contact:**

Electrolab, Inc.  
159 Enterprise Parkway  
Boerne, Texas 78006  
Phone: +1 (888) 301-2400 or +1 (210) 824-5364  
Email: [sales@electrolabcontrols.com](mailto:sales@electrolabcontrols.com).