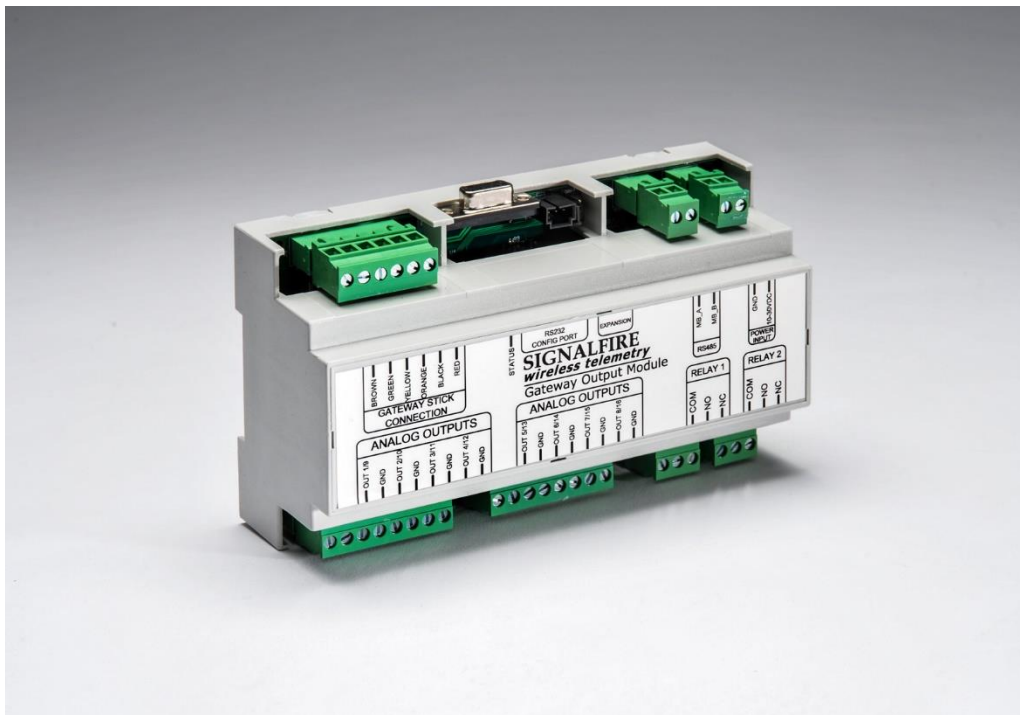


# Interface Manual

## Analog Output Module

*SignalFire Number: Analog Output Module Manual*



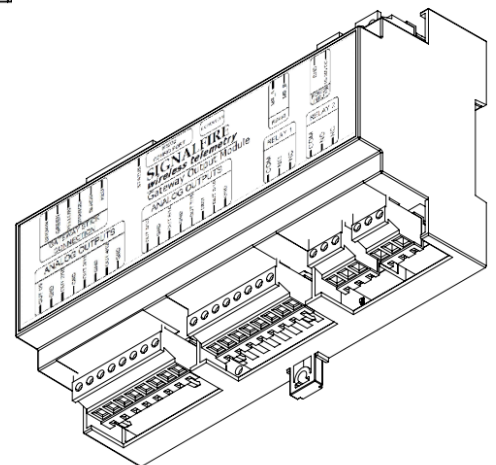
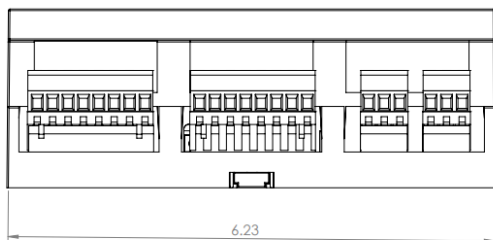
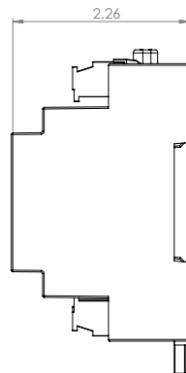
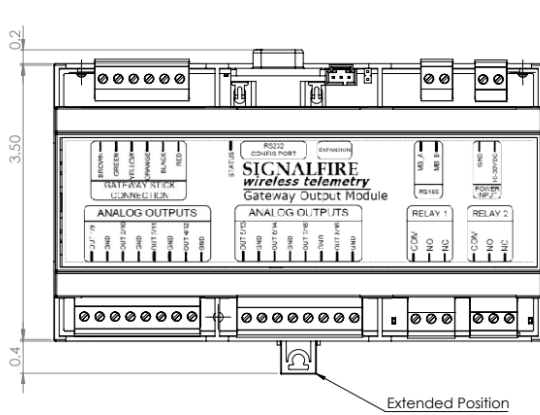
The SignalFire Analog/Relay Output Module has the following features:

- 8 Analog outputs (0-20mA or 0-5V)
- 2 Digital Relay outputs
- Wide range DC power input. 10 to 30VDC
- Easy configuration with the SignalFire ToolKit
- Expansion connector to connect second output module
- DIN Rail Mount
- Status LED
- DB9 connector for ToolKit connection to the Gateway

## Specifications

Power	10-30 VDC (17mA + analog output current)
Temperature Rating	-40°C to +85°C
Relay Outputs	2 DPDT Relays 30 VDC @ 2 Amps 250 VAC @ 0.25 Amps

## Dimensions



## Connections

The module provides screw terminals for connection to a SignalFire Gateway. Connect the 6 wires to the Gateway stick following the labeled colors. For the DIN Gateway only the Black and Orange wires are required to be connected to the Output Module terminals on the Gateway.

Wire Color	Connection
RED	Positive Power (10 to 30 VDC)
BLACK	Ground
GREEN	RS-485
BROWN	RS-485
ORANGE	RS-232 Debug/Programming TX, 9600 Baud
YELLOW	RS-232 Debug/Programming RX, 9600 Baud

Power must be provided by the Power Input screw terminals (10-30VDC). The Module power requirements at 12VDC is a maximum of 17mA plus an average of 25mA for the attached Gateway. This does not include the current to drive the configured analog outputs.

The RS485 terminals provide access to the Gateway for Modbus communication from an RTU.

To connect a second module for additional outputs, use the provided expansion cable and connect the second module to the first. The secondary module must have a jumper installed on the "SLAVE" pins near the expansion connector.

### Status LED

The module has a single green LED available for communication diagnostics. In addition, there is a green LED near each output that turns on while the output is energized.

LED	Description
Slow Flash (3 second pause)	System is running and at least one remote node is connected.
Fast Flash (0.5 second pause)	System is running but no remote nodes have connected.
Solid On	No communication with Gateway

## Configuration

To begin configuration, open the SignalFire Toolkit. The SignalFire Toolkit application can be downloaded at [www.signal-fire.com/customer](http://www.signal-fire.com/customer). After installation, launch the software and the main toolkit window will open:



Select the COM port associated with the GW and click "Auto-Detect Device on COM Port." This will open the Gateway configuration window, where all device settings can be configured.

The module requires only simple configuration using the SignalFire ToolKit to map remote data to a given output.

## Analog/Relay Output Module Connections

The Analog/Relay module provides screw terminals for connection to a SignalFire Gateway Stick. Connect the 6 wires to the Gateway stick following the labeled colors.

Wire Color	Connection
<b>RED</b>	Positive Power
<b>BLACK</b>	Ground
<b>GREEN</b>	RS485
<b>BROWN</b>	RS485
<b>ORANGE</b>	RS-232 Debug/Programming TX
<b>YELLOW</b>	RS-232 Debug/Programming RX

Power must be provided by the Power Input screw terminals (10-30VDC). The Module power requirements at 12VDC at 17mA plus an average of 25mA for the Gateway stick. In addition, if any outputs are used as current outputs, 20mA must be available for each current output used.

The RS485 terminals provide access to the Gateway Modbus interface for an alternate data connection to the Gateway.

To connect a second module for additional outputs, simply use the provided expansion cable and connect the second module to the first. The secondary module must have a jumper installed on the "SLAVE" pins near the expansion connector. On the secondary module only the two analog output and two relay output connectors may be used.

## Status LEDs

The Analog/Relay output module has a single green LED available for communication diagnostics.

Status LED	Description
<b>Slow Flash (3 second pause)</b>	System is running at least one remote node is connected.
<b>Fast Flash (1 second pause)</b>	System is running but no remote nodes have connected
<b>Solid On</b>	No communication with the Gateway

In addition, there is a green LED near each relay output that turn on while the relay is energized.

## Operation

The SignalFire Analog/Relay output module is connected to a Gateway. The Gateway is configured to map node data to the analog outputs. When a node reports an updated value to the gateway the configured output will reflect that value. All configuration is stored in the Gateway

If a node times out of the gateway the analog output will fail a pre-configured fail value (the default fail value is 0).

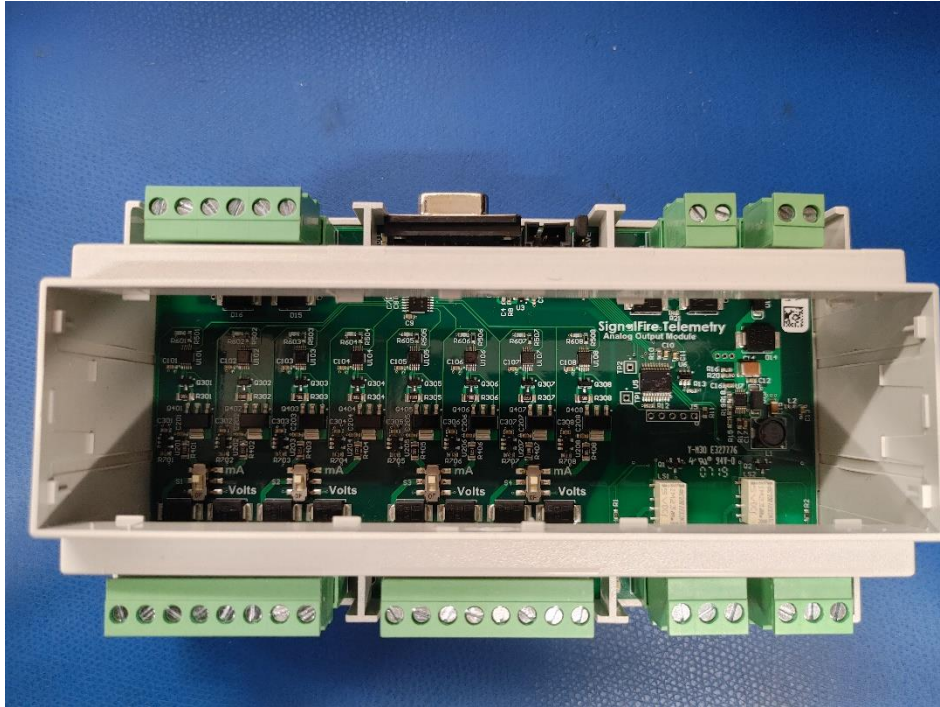
In addition, if the analog/relay output module stops receiving updates from the gateway for 5 minutes, all outputs will be set to 0 and both relays will de-energize.

## Configuration

The Analog/Relay output module requires only simple configuration using the SignalFire ToolKit to map/scale the remote data to a given output.

The analog outputs may operate in either current (0-20mA/4-20mA), or voltage (0-5V/1-5V). The output mode must be set by slide switches inside the module.

To do this first remove the cover using a small flathead screwdriver, the cover is held on by clips.



*Analog/Relay Module with cover removed*

Each switch controls a pair of outputs. For example, the switch all the way to the left (S1) sets both output 1 and output 2 to either mA or Volts. See table below for switch mapping.

Switch	Outputs
S1	1 and 2
S2	3 and 4
S3	5 and 6
S4	7 and 8

To configure the Analog/Relay outputs in the SignalFire ToolKit first connect to the DB9 port of the module connected the Gateway stick to your PC. Open the ToolKit and connect to the gateway.

In the Gateway configuration window, go to the 'File' menu and select 'Analog/Relay Output Module'. This will open the configuration window below.

Analog/Relay Output Module

Output Module 1

	Source Node					Output Module 1 Analog Settings					
	Slave ID	Node Type	Register Address	Register Type	Current Register Value	Output Mode	Low Register Value	equals Low Output of...	High Register Value	equals High Output of...	Fail with Output Value...
▶ A1	1	Sentinel A...	3001-Curr...	16bit UINT	15393	mA	4000	4	20000	20	3.5
A2	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
A3	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
A4	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
A5	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
A6	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
A7	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
A8	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0

	Source Node					Output Module 1 Relay Settings				
	Slave ID	Node Type	Register Address	Register Type	Current Register Value	Energize Relay when...	Value	De-energize Relay when...	Value	Fail with Output State...
▶ D1	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	De-energized
D2	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	De-energized

Output Module 1  Output Module 2

Temporarily Override Output Settings (5 minute timeout)

Output  Value   mA  V

For each output a rule to control that output must be defined. For example, in the configuration window above analog output 1 is defined to be controlled by Modbus ID 1 which is a Sentinel-Analog source node. The uA register 3001 is selected. This register is then scaled so that 4000uA is equal to an output of 4mA and 20000uA is equal to an output of 20mA. In addition, the 'Fail with Output Value' is set to 3.5mA.

The current register value column displays the latest register value the gateway has for the defined source node/register. Hitting the refresh button will update the current register values.

After editing any of the rules, click on the 'Write Output Settings to Gateway' to store the rules in the gateway.

Any rules that are not defined (Node Type set to 'none') will cause those channels to be set to 0.



## Temporary Output Overrides

It is possible to temporarily override an output to a defined value for testing. At the bottom of the window simply select the output channel to override, enter the override value and click the 'Set Output' button. This will force the selected output channel to the set value for 5 minutes or until the 'Clear Output Overrides' button is pressed. This is useful for testing. Note that the channel will be highlighted in yellow when the override is active.

Analog/Relay Output Module

Output Module 1

Source Node						Output Module 1 Analog Settings						
	Slave ID	Node Type	Register Address	Register Type	Current Register Value	Output Mode	Low Register Value	equals Low Output of...	High Register Value	equals High Output of...	Fail with Output Value...	
▶	A1	1	Sentinel A...	3001-Curr...	16bit UINT	Override	mA	4000	4	20000	20	3.5
	A2	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
	A3	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
	A4	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
	A5	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
	A6	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
	A7	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0
	A8	0	None	0	16bit UINT	Unknown	mA	0	0	0	0	0

Source Node						Output Module 1 Relay Settings					
	Slave ID	Node Type	Register Address	Register Type	Current Register Value	Energize Relay when...	Value	De-energize Relay when...	Value	Fail with Output State...	
▶	D1	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	De-energized
	D2	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	De-energized

Output Module 1  Output Module 2

Read Output Settings from Gateway

Write Output Settings to Gateway

Temporarily Override Output Settings (5 minute timeout)

Output  Value   mA  V

### Temporarily Override Output

## Remote Shutdown Settings

Remote Shutdown settings with the same Destination Relay will ALL need to meet the Run System (Energize) condition in order to run the system

	Source Value					Relay Control Logic				Destination Relay			
	Slave ID	Node Type	Register Address	Register Type	Current Register Value	Run System (Energize Relay) when...	Value	System (De-energize Relay) when...	Value	Number of Readings	Slave ID	Relay Channel	Current Relay State (readonly)
1	1	Sentinel Analog	3001-Current(uA)	16bit UINT	9773	Greater than	9000	Less than	8000	1	247	DOut Mod 1 Output 1	Energized
2	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	1	0	1	Unknown
3	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	1	0	1	Unknown
4	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	1	0	1	Unknown
5	0	None	0	16bit UINT	Unknown	Greater than	0	Less than	0	1	0	1	Unknown

Failsafe Enabled - Missing Slave or Register results in Relay being De-energized  

 Latch De-energize - Requires RTU to Re-energize Relay via Modbus Coil Write

In addition to the Analog/Relay Output module settings, the two relays can optionally be controlled using the Gateway RSD table. From the Gateway configuration window, select 'Settings > Remote Shutdown Settings' on the top toolbar. This will open the configuration window below.

The relay control should be configured in either the Analog/Relay Output module settings OR the RSD table not both.

For each output, define one or more rules to toggle the analog output. Configure each rule left to right, starting with the source node that you would like to control the output, then the logic for toggling on and off, and then the intended output. To use the outputs on the Analog Output module the "Destination Slave ID" must be configured to the Gateway's Slave ID which is 247 by default.

For example, in the configuration window above, Relay 1 on Analog Output Module 1 will turn on when slave ID 1's analog input is above 9000uA (9mA) and turns off when the analog input drops below 8000uA (8mA). The 1000uA difference is to prevent the output from repeatedly turning on and off if the analog input is in the 9000uA range.

When an output is defined by multiple sources, it will only turn on if all its Energize conditions are met. However, once it turns on, it will turn off if any one of its De-Energize conditions are met. In other words, the Energize conditions are Boolean AND logic, while the De-Energize conditions are Boolean OR logic.

After editing any of the rules, click on the 'Write Output Settings to Gateway' to store the changes in the gateway.

If the Analog Output Module loses the wired communication with the Gateway, it will automatically turn off all outputs after 5 minutes. For more information on the Remote Shutdown Window, please see the Gateway manual.