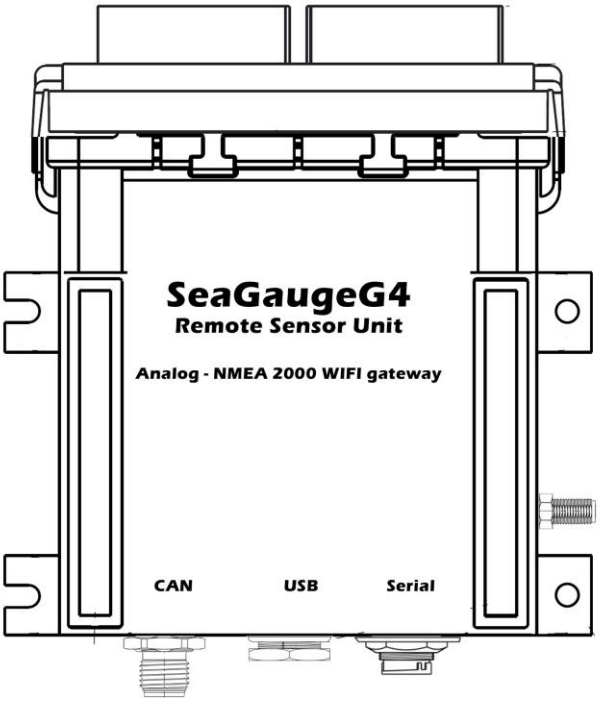
Application Note

ANSS024063001 – SeaGauge G4 configure analog alarms



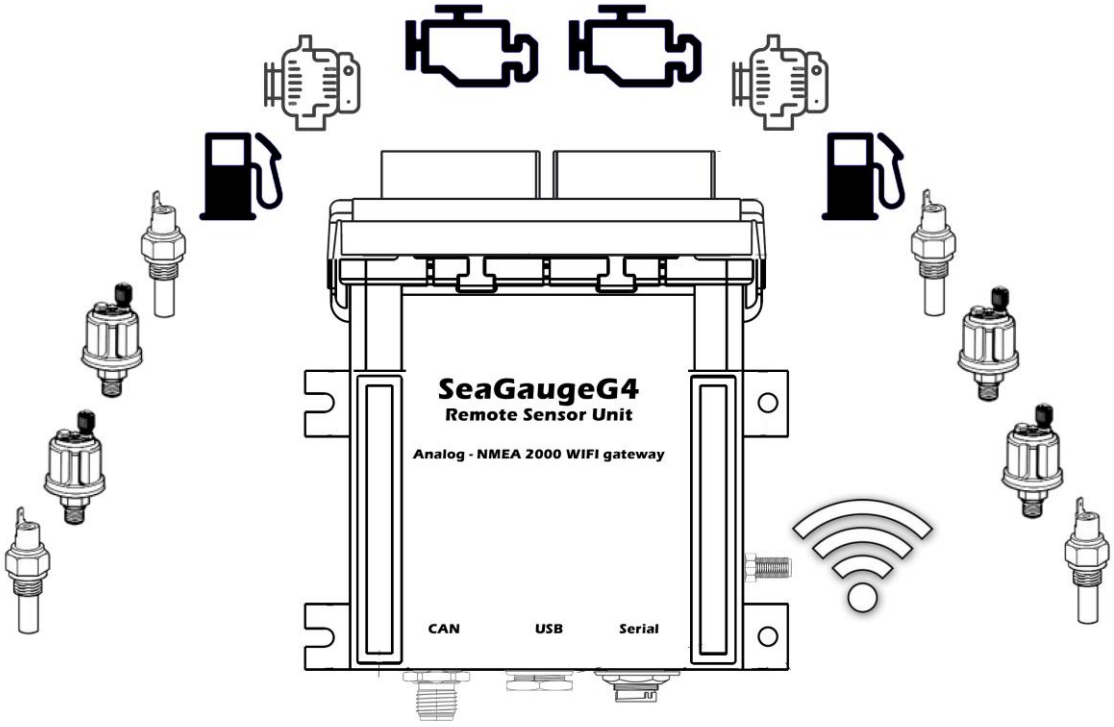
Chetco Digital Instruments, Inc

Revision 100324

SeaGaugeG4 supports up to 12 resistive or voltage style sensor inputs and 3 pulse style inputs.

Sensors are connected to the dual 20 pin Molex style connectors and analog voltages converted to digital protocol compatible with CAN bus and WIFI interfaces.

SeaGaugeG4 can trigger multiple alarms based on sensor voltages from any of the 12 analog inputs and 3 pulse inputs



SeaGaugeG4 supports up to 12 analog sensor inputs and 8 indicator/relay drive via a 20 pin Molex MX150 plug (black) and 3 pulse style inputs via separate 20 pin Molex MX150 plug (white).

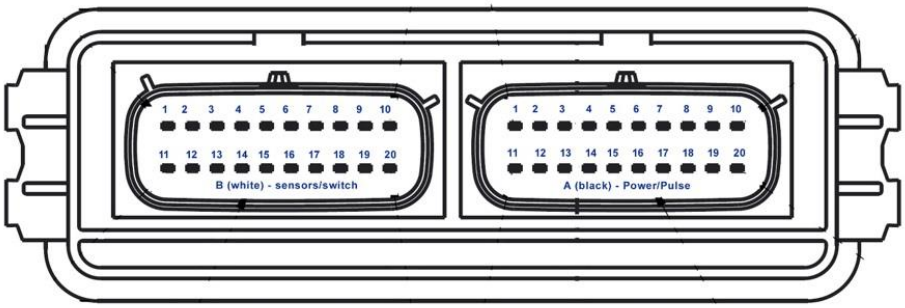
Molex style crimp pins are provided to attach 18 gauge tinned wire and insert into appropriate locations in supplied plugs.

The 12 analog inputs (SEN00-SEN11) are compatible with resistive and voltage style sensors using user configurable internal switches to select operating ranges.

Three pulse inputs are compatible with inductive and hall effect sensors with an AC range of 1Vpp to 18Vpp

Four relay drive (12VDC) outputs (SW4-SW7) can be used as alarm drivers based on user configurable triggers. Alarm outputs are capable of sinking up to 470mA to ground when active - suitable for driving 12VDC relays, indicator lights, or audio buzzers.

SeaGaugeG4 Header

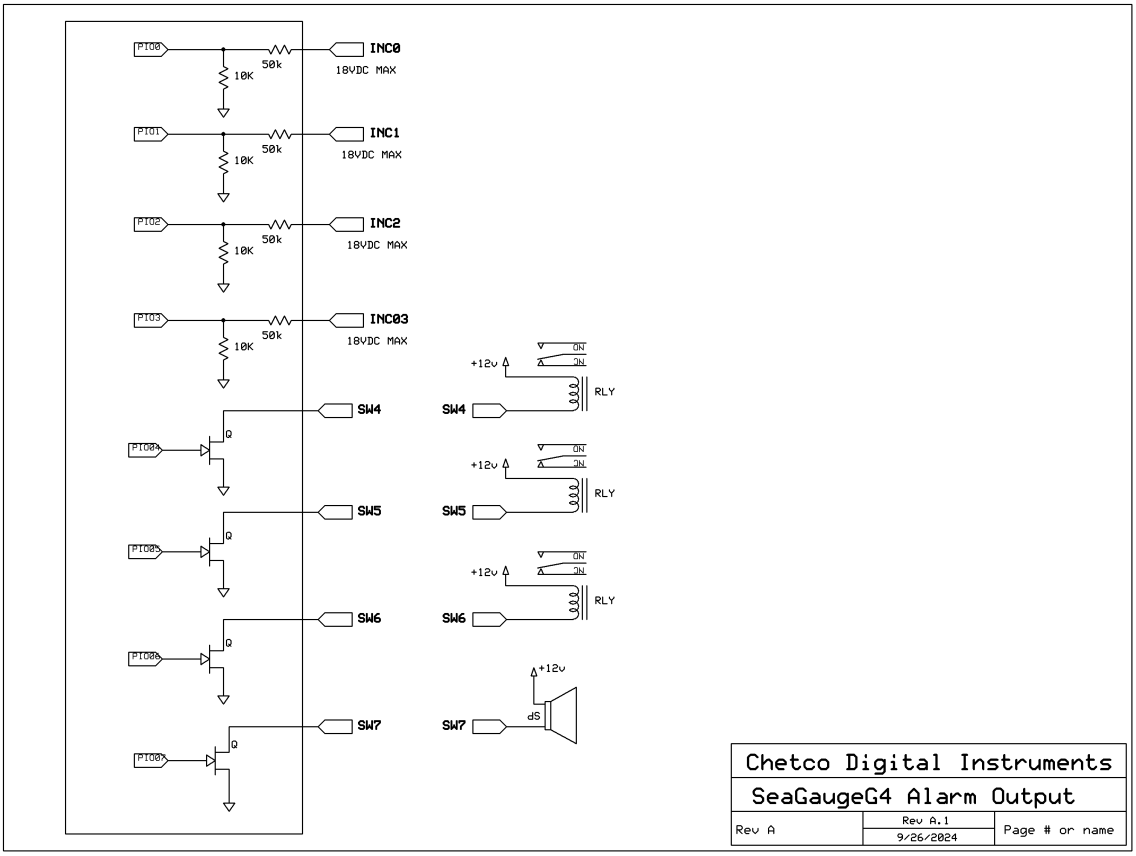


B1 - NC	B11 - NC	A1 - SW5	A11 – SW4
B2 - NC	B12 - NC	A2 - SW7	A12 – SW6
B3 – SEN10 (SBOOST)	B13 – SEN11 (STRAN)	A3 - NC	A13 - NC
B4 – SEN04 (STEMP)	B14 – SEN05 (SOIL)	A4 – P1 (SRPM)	A14 - GND
B5 – SEN06 (SFUEL)	B15 – SEN07 (SBAT)	A5 – P0 (PRPM)	A15 - GND
B6 – SEN00 (PBAT)	B16 – SEN01 (PFUEL)	A6 – P2	A16 - GND
B7 – SEN02 (PTEMP)	B17 – SEN03 (POIL)	A7 – 5VOUT	A17 – 5VOUT
B8 – SEN08 (PBOOST)	B18 – SEN09 (PTRAN)	A8 - GND	A18 - GND
B9 – INC03	B19 – INC02	A9 – 12VIN	A19 = 12VIN
B10 – INC01	B20 – INC00	A10 - NC	A20 - NC

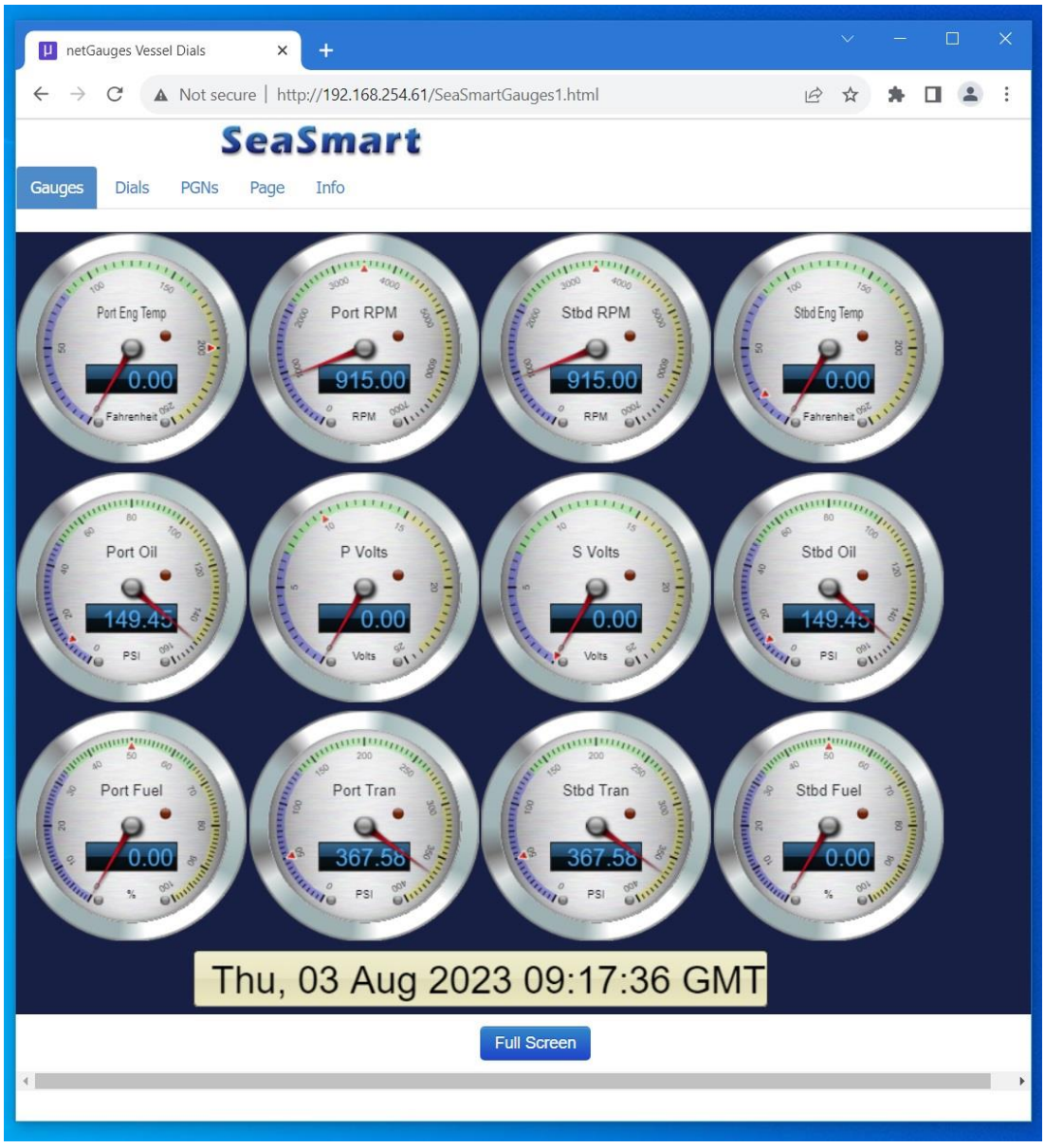
Each of the four alarm outputs provide ground for externally connected devices such as 12VDC relays or Buzzers/Lights.

The 4 indicator inputs (INC0-INC3) can also be used as alarm triggers based on user configuration

Be sure that connected devices use the same common ground as supplied to SeaGaugeG4



SeaGaugeG4 contains an embedded WEB page interface for configuring the analog inputs to transmit NMEA 2000 or J1939 style messages via its CAN bus interface. These messages are also passed to its embedded Web Server to enable viewing using the local browser interface



Start configuration be connecting to the SeaGaugeG4 WIFI interface via Access Point (AP) mode or Station mode (STA).

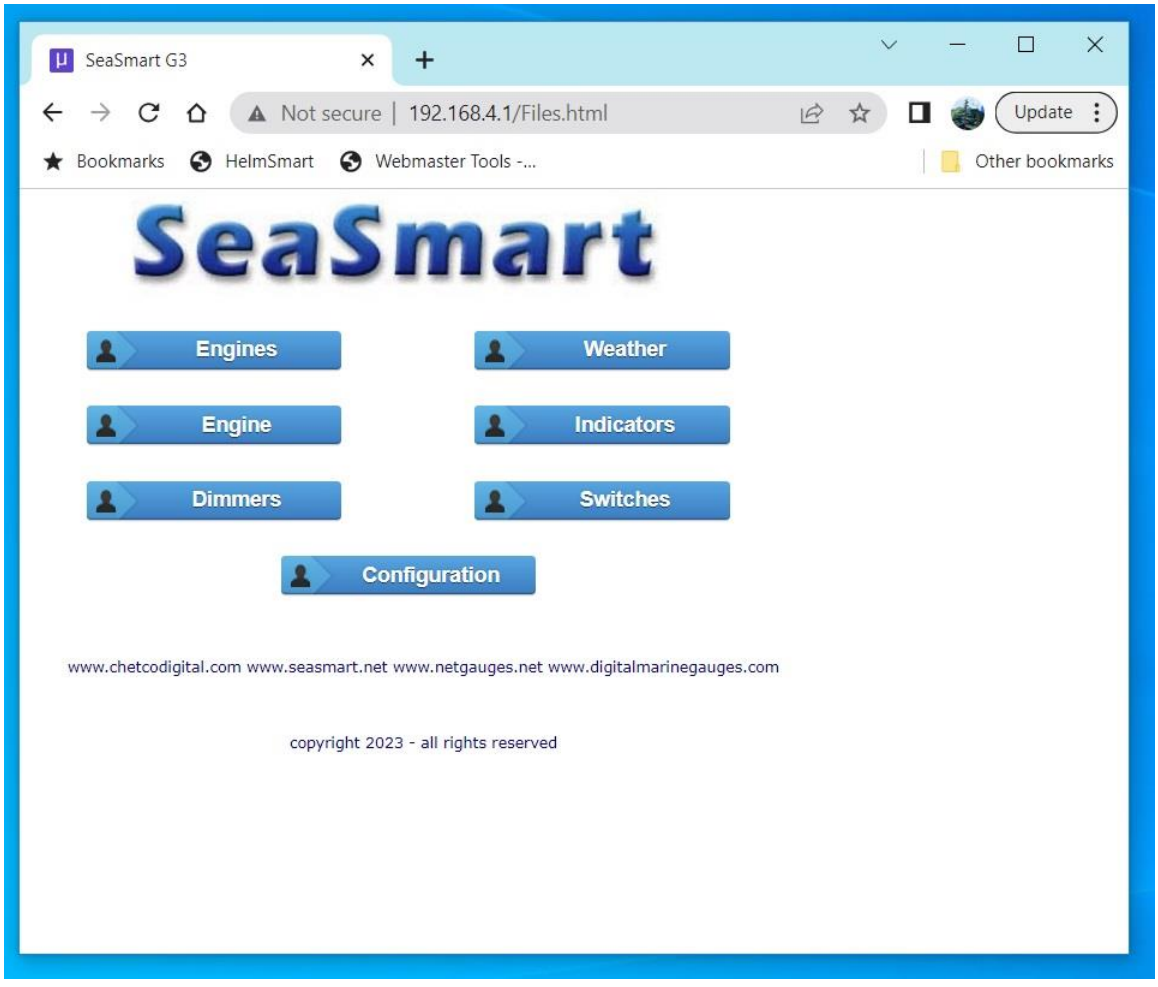
AP mode is used when connecting directly to SeaGaugeG4 without using a local router or internet connection. Full CAN bus function can still be enabled and configured in AP mode.

Station mode is used fen joining and existing local WIFI network and requires entering the SSID and password of the local network.

Once connected, enter the default IP http://192.168.4.1 for AP.

For station mode the default protocol is DHCP enabled which means the local router will automatically assign the IP address for SeaGaugeG4. If mDNS is enabled and supported by your browser you can use the default url printed on the SeaGaugeG4 network label.

For example http://seagaugeg4-XXX.local where XXXX is the last 4 digits of the device MAC address



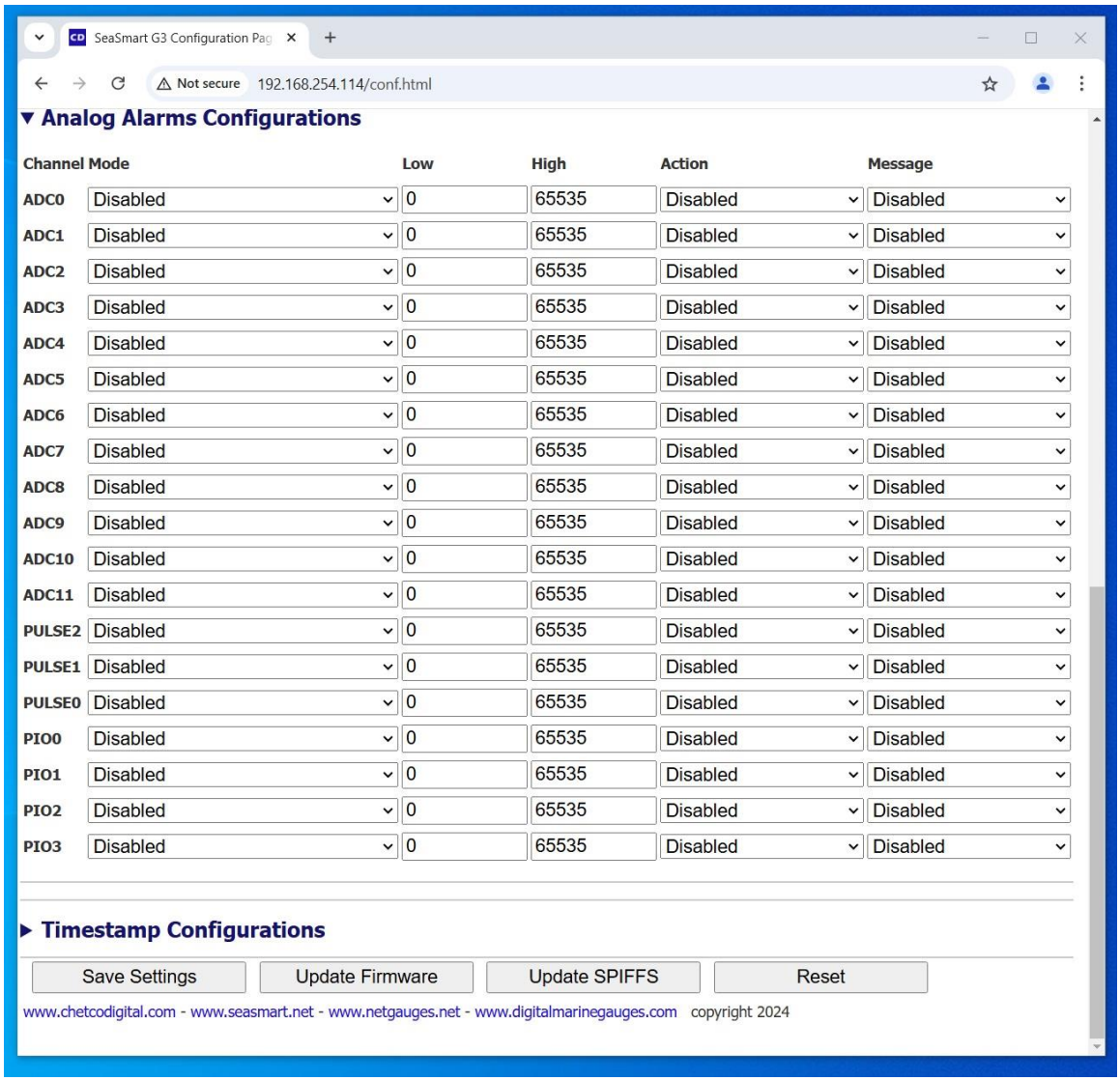
Once connected to the SeaGaugeG4 Home page you can navigate to the CONFIGURATION page

The CONFIGURATION page will have two additional sections for SeaGaugeG4 only - Analog Input Configuration and Analog Alarms Configurations.

Expand the Analog Alarms Configuration by clicking the arrow on the left

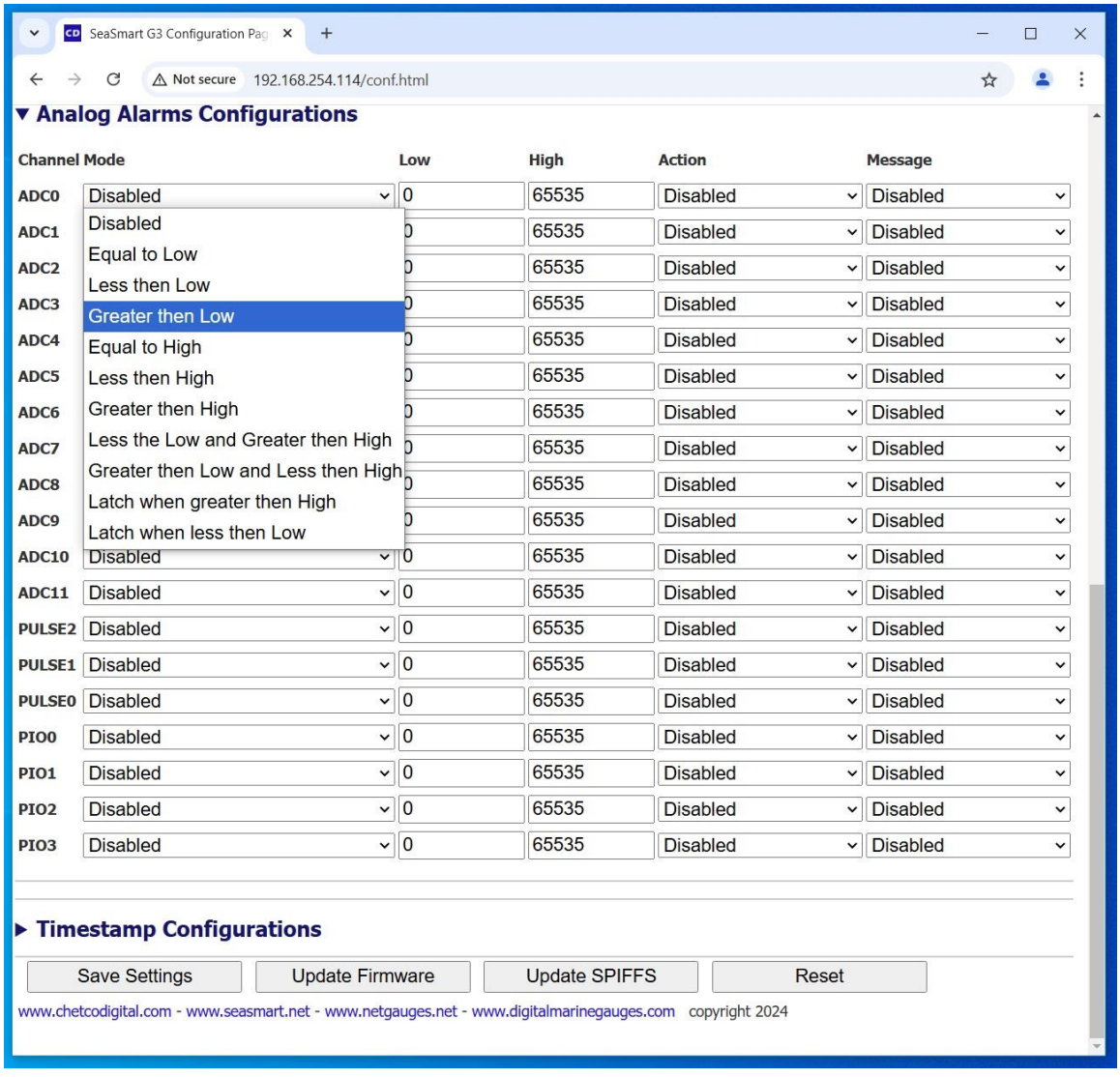
You will now see a list of options for each of the 12 analog inputs, 3 pulse inputs, and 4 indicator channels.

The options will allow assignment of alarm triggers and CAN bus messages to be created for each sensor input.



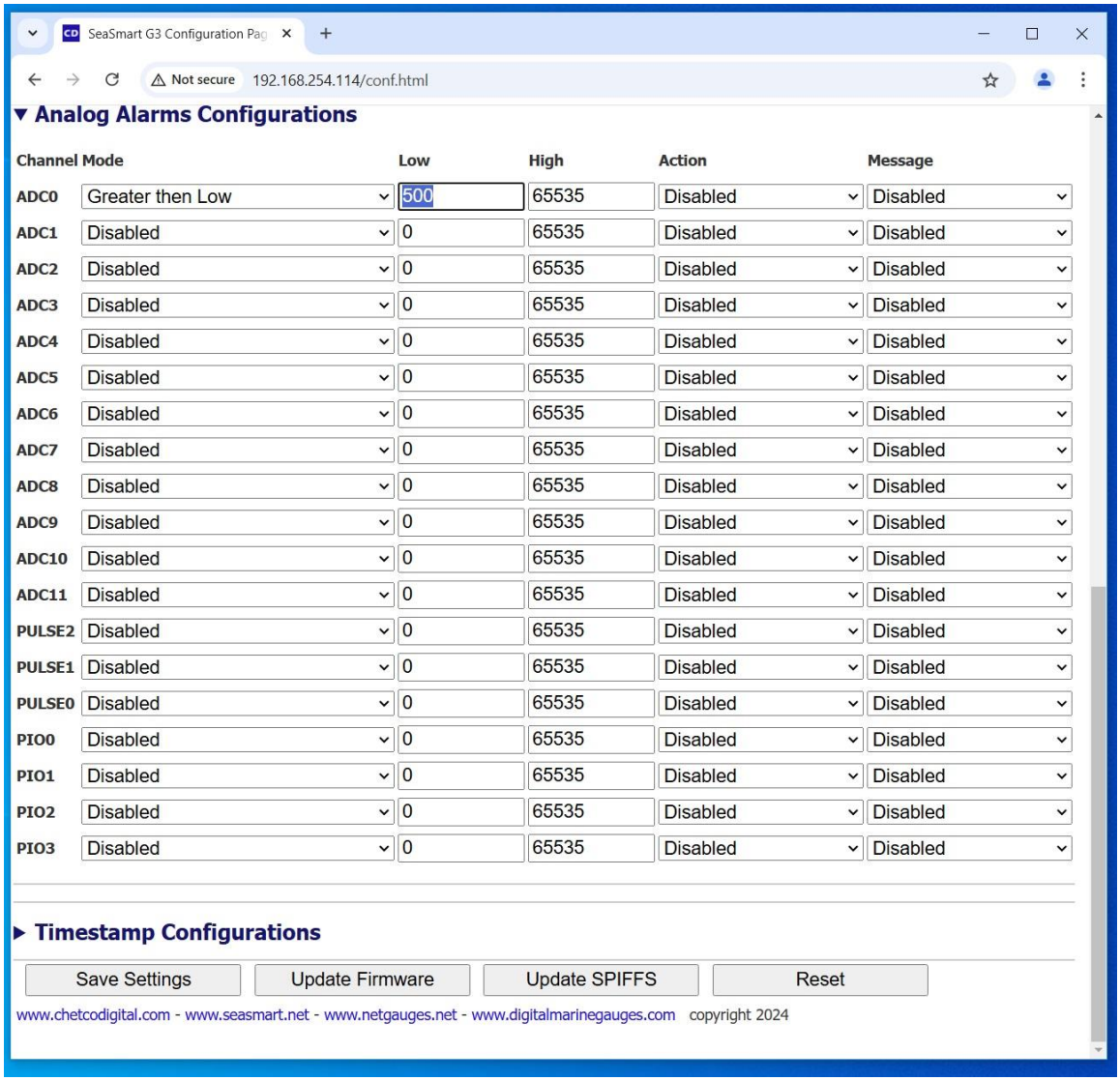
The ALARM MODE can be selected for each sensor which will use the entered LOW and HIGH threshold values to trigger a alarm ACTION or CAN bus MESSAGE.

Since ADC0 in this example has bee assigned as a BATTERY VOLTS input – selecting LESS THEN LOW will allow setting a alarm trigger then battery voltage is less then LOW value threshold.



The LOW and HIGH threshold values can be set for each input based on the selected calibration units. Since Battery Volts has a resolution of 0.01V – setting the LOW value to 500 will set trigger voltage of 500 * 0.01V = 5.0 volts.

Not all trigger options require both a LOW and HIGH values - in which case use 0 for unused LOW and 65535 for unused HIGH values



Use the following table to determine the proper resolution to use when setting trigger thresholds

PGN	PGN HEX	Description	Parameter	Units	Parameter Index
127489	0X1F201	Engine Dynamic	Oil Pressure	0.1 kPa	0
			Oil Temp	0.1 K	1
			Engine Temp	0.01 K	2
			Alt Volts	.001 V	3
			Fuel Rate	.0001 cu m/hr	4
			Engine Hours	1.0 sec	5
			Coolant Pressure	0.1 kPa	6
			Fuel Pressure	1.0 kPa	7
			Check Engine	indicator	8
			Over Temp	indicator	9
			Low Oil Pres	indicator	10
			Low Oil Level	indicator	11
			Low Sys Volt	indicator	12
			Low Coolant Level	indicator	13
127508	0X1F214	Battery Status	Battery Volt	0.01V	0
			Current	0.1 A	1
			Temperature	0.01 K	2
127505	0x1F211	Fluid Level	Fuel Level	0.004 %	0
			Fresh Water Level	0.004 %	1
			Waste Water Level	0.004 %	2
			Live Well Level	0.004 %	3
			Oil Level	0.004 %	4
			Black Water	0.004 %	5
127493	0x1F205	Transmission	Pressure	0.1 kPa	0
			Temperature	0.1 K	1
130314	0x1FD0A	Pressure	Atmospheric Pressure	0.1 Pa	0
			Water Pressure	0.1 Pa	1
			Steam Pressure	0.1 Pa	2
			Compressed Air	0.1 Pa	3
			Hydraulic Pressure	0.1 Pa	4
			Fuel Filter Pressure	0.1 Pa	5
			Pressure 6	0.1 Pa	6
			Pressure 7	0.1 Pa	7
130311	0x1FD07	Environmental	Sea Temp	0.01 K	0
			Outside	0.01 K	1
			Inside	0.01 K	2
			Engine Room	0.01 K	3

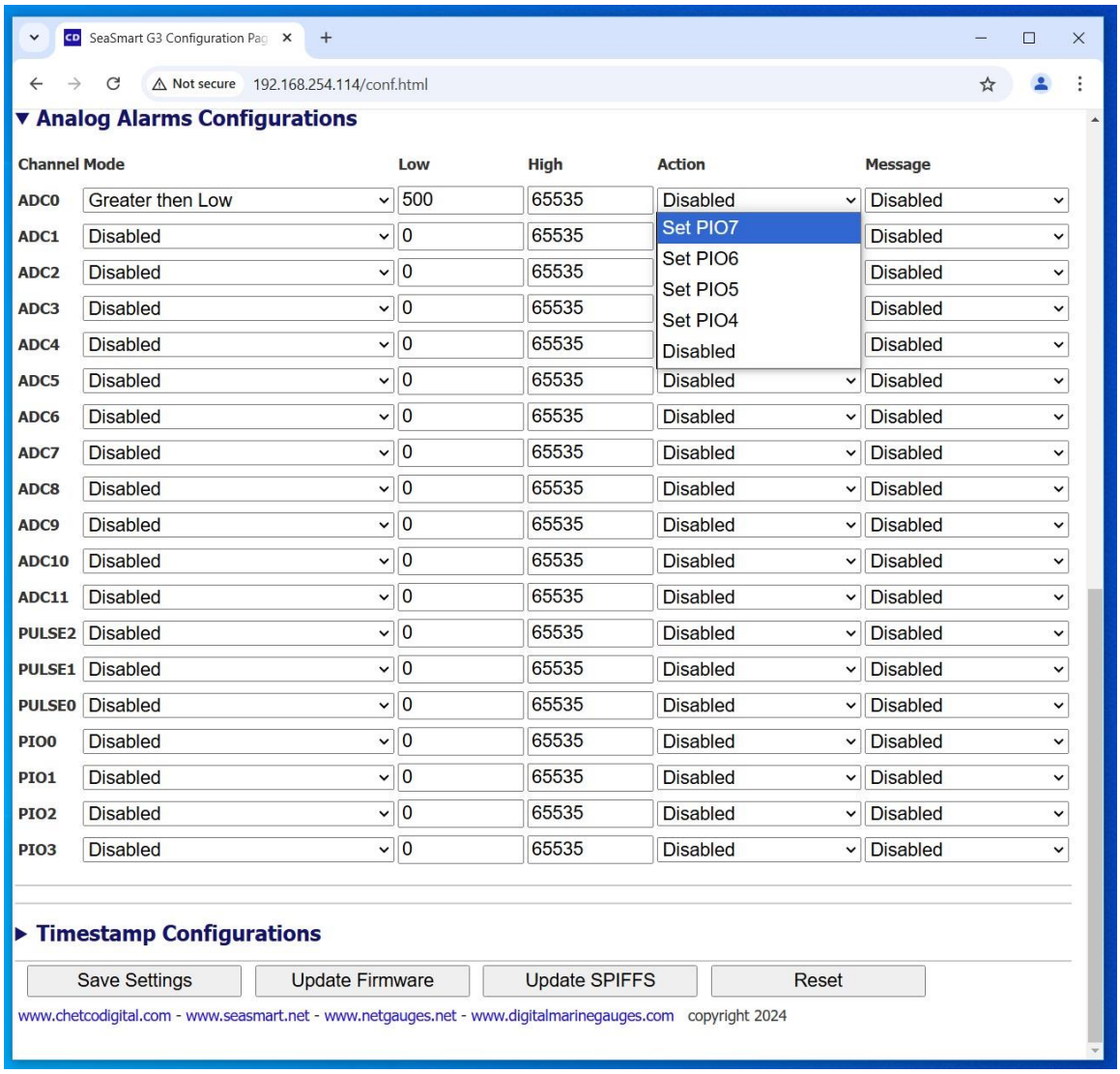
			Cabin	0.01 K	4
			Live Well	0.01 K	5
			Bait Well	0.01 K	6
			Refrigeration	0.01 K	7
			Heating	0.01 K	8
			Dew Point	0.01 K	9
			Wind Chill A	0.01 K	10
			Wind Chill T	0.01 K	11
			Heat Index	0.01 K	12
			Freezer	0.01 K	13
130312	0x1FD08	Temperature	Sea Temp	0.01 K	0
			Outside	0.01 K	1
			Inside	0.01 K	2
			Engine Room	0.01 K	3
			Cabin	0.01 K	4
			Live Well	0.01 K	5
			Bait Well	0.01 K	6
			Refrigeration	0.01 K	7
			Heating	0.01 K	8
			Dew Point	0.01 K	9
			Wind Chill A	0.01 K	10
			Wind Chill T	0.01 K	11
			Heat Index	0.01 K	12
			Freezer	0.01 K	13
1303161	0x1FD0A	Temperature Extended	Sea Temp	0.001 K	0
			Outside	0.001 K	1
			Inside	0.001 K	2
			Engine Room	0.001 K	3
			Cabin	0.001 K	4
			Live Well	0.001 K	5
			Bait Well	0.001 K	6
			Refrigeration	0.001 K	7
			Heating	0.001 K	8
			Dew Point	0.001 K	9
			Wind Chill A	0.001 K	10
			Wind Chill T	0.001 K	11
			Heat Index	0.001 K	12
			Freezer	0.001 K	13
			EGT	0.001 K	14
127245	0x1F10D	Rudder	Angle	0.0001 rad	0

The alarm ACTION determines which of the 4 PIO outputs, if any, to set when alarm is active.

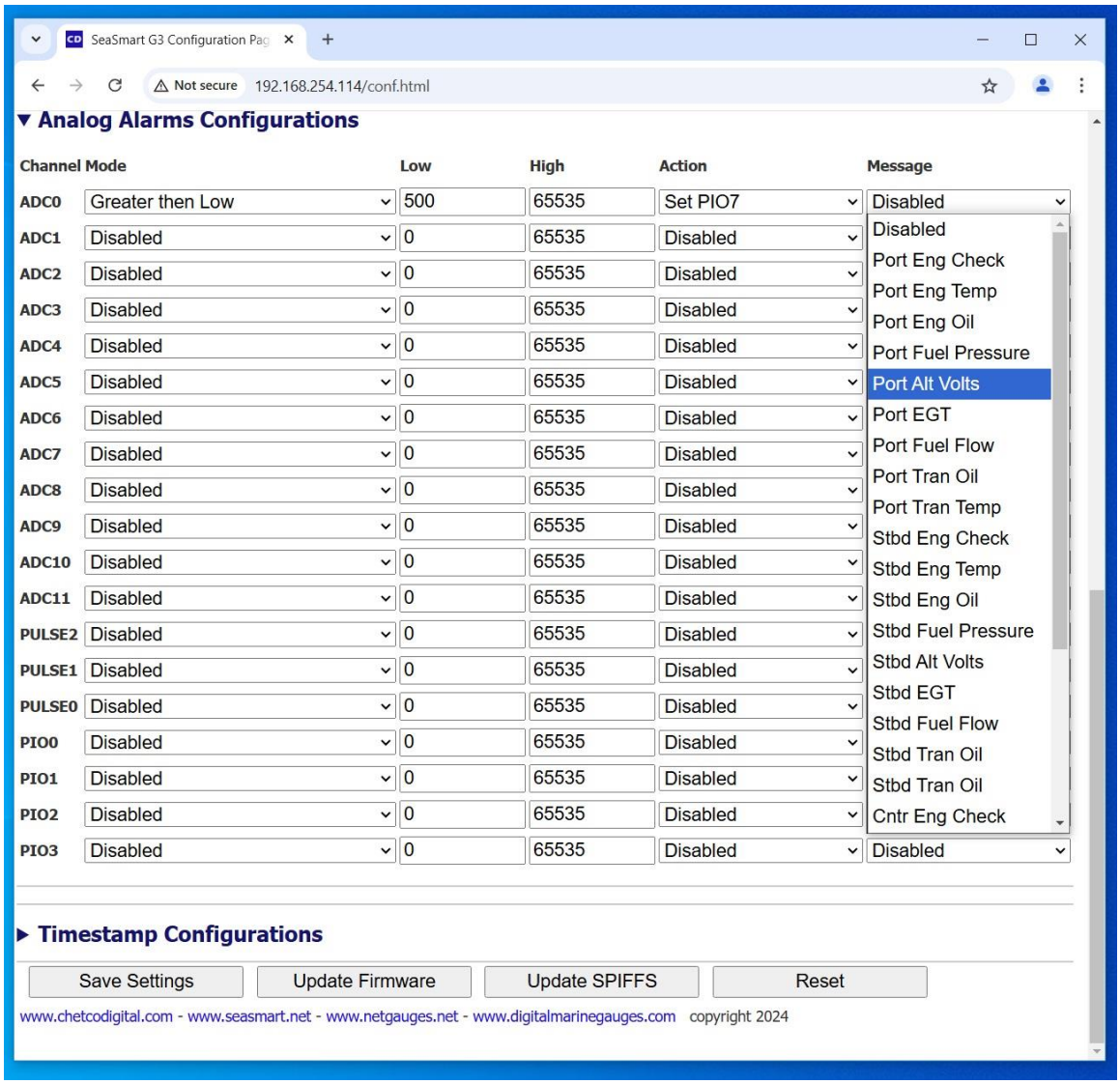
PIO4-PIO7 are relay driver outputs which can provide a ground to 12VDC relay coils or ground to a 12VDC buzzer.

You can select up to 4 independent alarm outputs for any of the 20 sensor inputs.

Setting a ACTION to disabled will allow a active alarm to still trigger a CAN BUS MESSAGE without setting a physical alarm output PIO

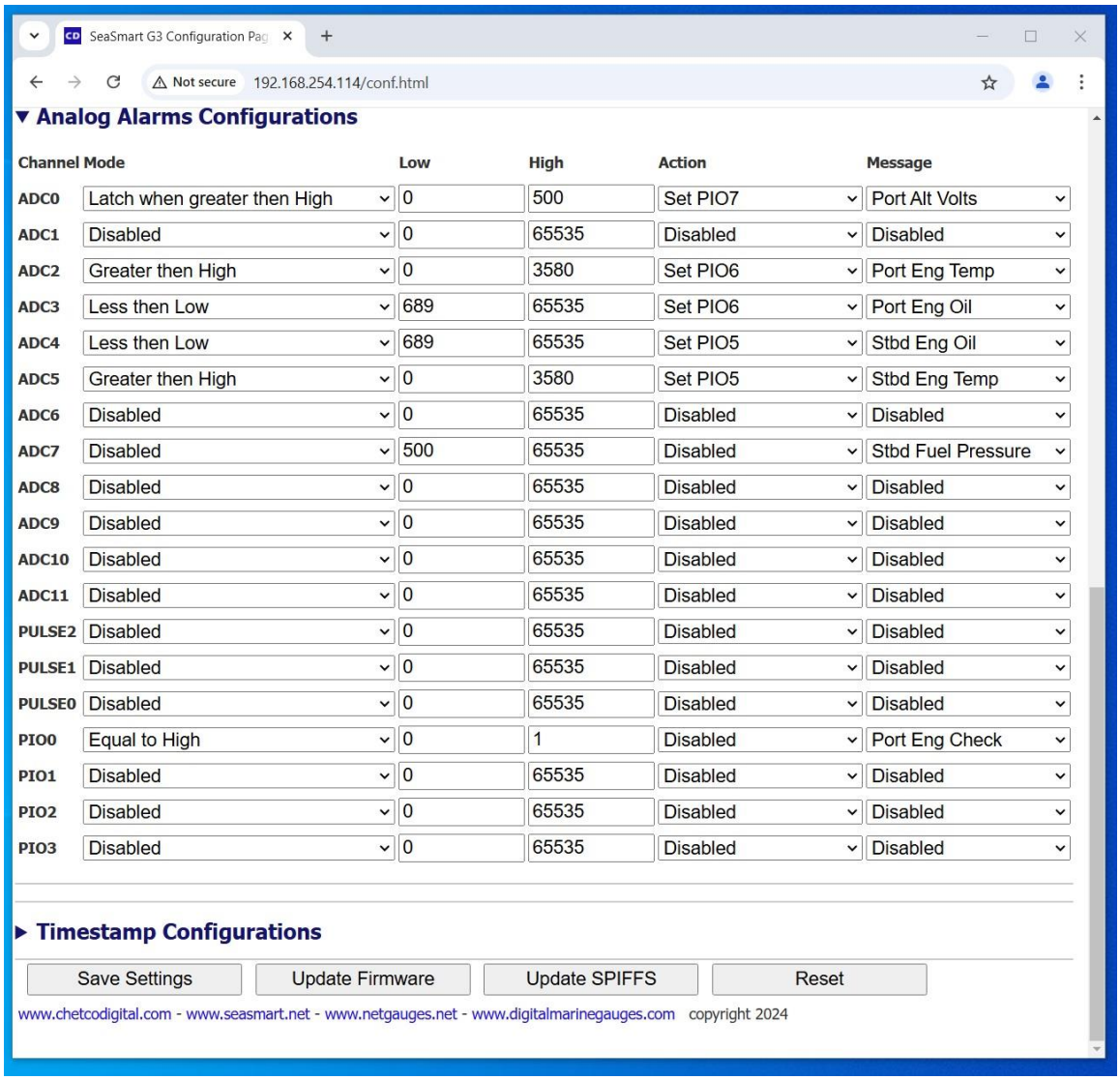


Active alarms can also trigger a CAN BUS MESSAGE that may used by compatible connected MFDs to display warning messages when alerts are active



Up to 19 individual sensor alarm triggers can be set.

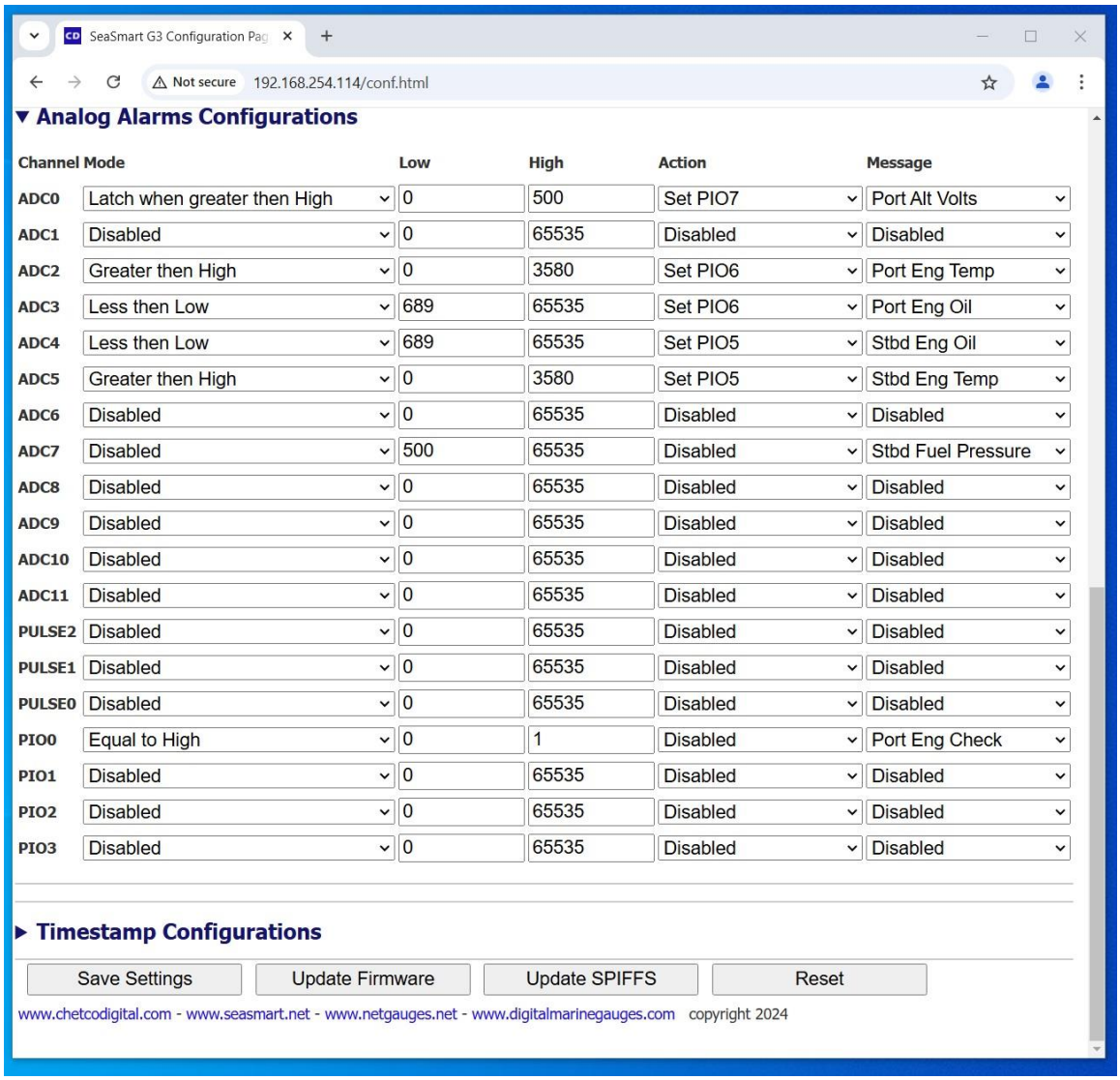
In this example ADC2 has been assigned as a PORT ENG TEM sensor so we are setting a high temperature alarm based on 180F. Since the sensor calibration value is in degrees K (kelvin) * 0.01 – 180F = 358 kelvin / 0.01 = 3580



Channel	Mode	Low	High	Action	Message
ADC0	Latch when greater then High	0	500	Set PIO7	Port Alt Volts
ADC1	Disabled	0	65535	Disabled	Disabled
ADC2	Greater then High	0	3580	Set PIO6	Port Eng Temp
ADC3	Less then Low	689	65535	Set PIO6	Port Eng Oil
ADC4	Less then Low	689	65535	Set PIO5	Stbd Eng Oil
ADC5	Greater then High	0	3580	Set PIO5	Stbd Eng Temp
ADC6	Disabled	0	65535	Disabled	Disabled
ADC7	Disabled	500	65535	Disabled	Stbd Fuel Pressure
ADC8	Disabled	0	65535	Disabled	Disabled
ADC9	Disabled	0	65535	Disabled	Disabled
ADC10	Disabled	0	65535	Disabled	Disabled
ADC11	Disabled	0	65535	Disabled	Disabled
PULSE2	Disabled	0	65535	Disabled	Disabled
PULSE1	Disabled	0	65535	Disabled	Disabled
PULSE0	Disabled	0	65535	Disabled	Disabled
PIO0	Equal to High	0	1	Disabled	Port Eng Check
PIO1	Disabled	0	65535	Disabled	Disabled
PIO2	Disabled	0	65535	Disabled	Disabled
PIO3	Disabled	0	65535	Disabled	Disabled

Complete all alarm trigger/action setting for each of the desired sensor inputs.

Multiple sensor triggers can be assigned to the same PIO action. In this example we have separated the port (PIO6) and starboard (PIO5) engine alarms to separate alarm outputs which may be used to drive separate relays or indicator lights.



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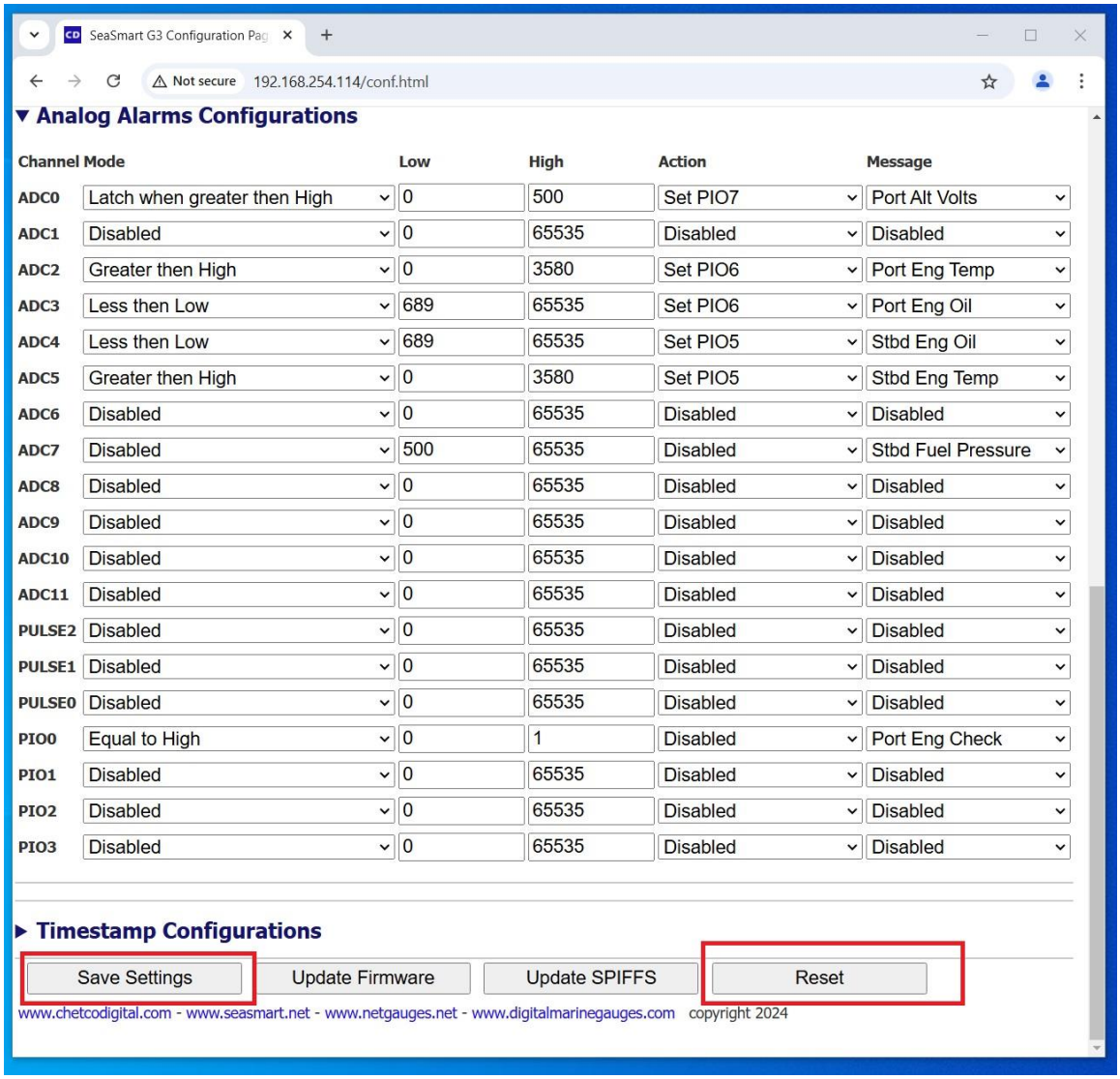
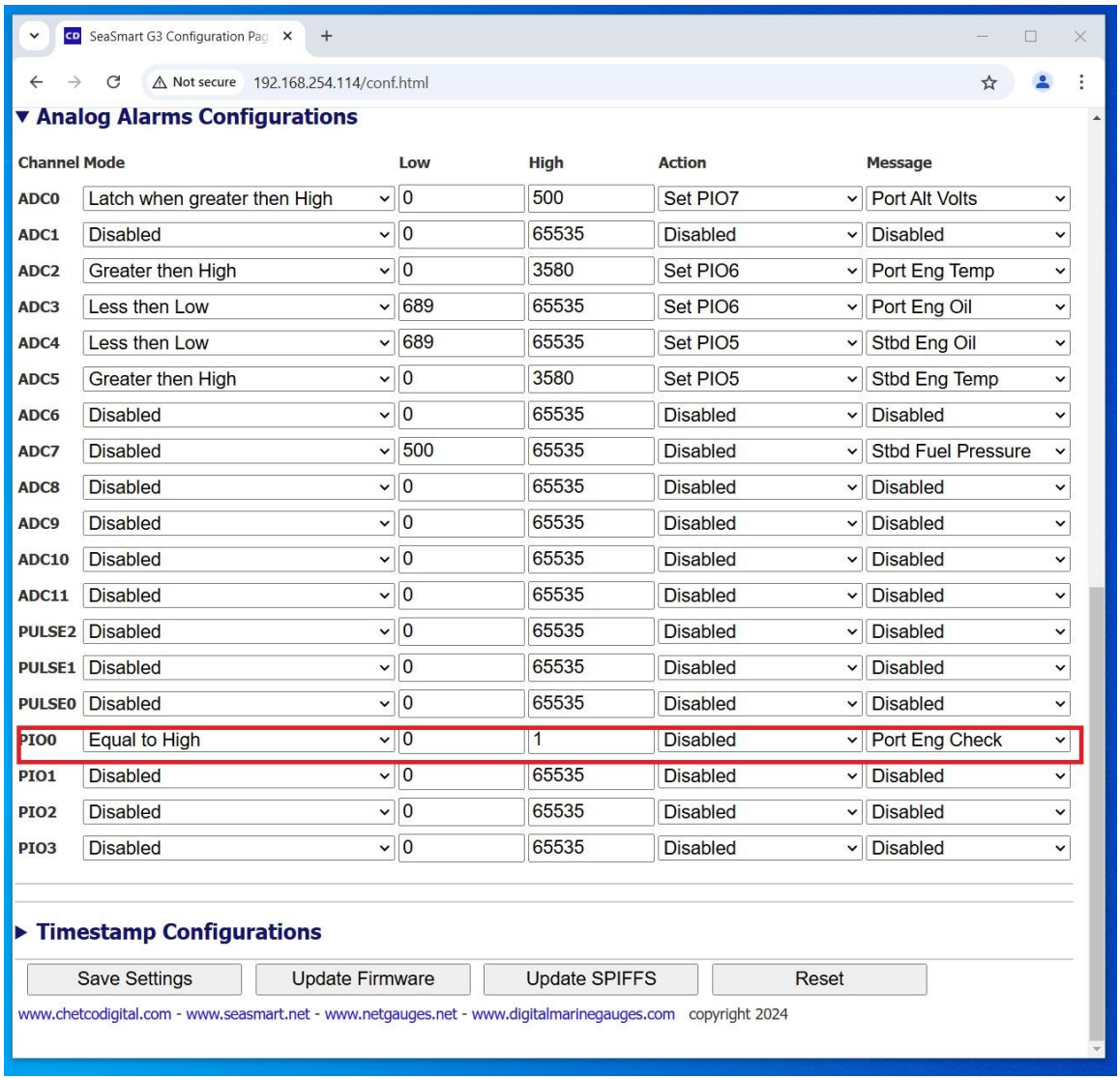
ADC3	Less then Low	689	65535	Set PIO6	Port Eng Oil
ADC4	Less then Low	689	65535	Set PIO5	Stbd Eng Oil
ADC5	Greater then High	0	3580	Set PIO5	Stbd Eng Temp
ADC6	Disabled	0	65535	Disabled	Disabled
ADC7	Disabled	500	65535	Disabled	Stbd Fuel Pressure
ADC8	Disabled	0	65535	Disabled	Disabled
ADC9	Disabled	0	65535	Disabled	Disabled
ADC10	Disabled	0	65535	Disabled	Disabled
ADC11	Disabled	0	65535	Disabled	Disabled
PULSE2	Disabled	0	65535	Disabled	Disabled
PULSE1	Disabled	0	65535	Disabled	Disabled
PULSE0	Disabled	0	65535	Disabled	Disabled
PIO0	Equal to High	0	1	Disabled	Port Eng Check
PIO1	Disabled	0	65535	Disabled	Disabled
PIO2	Disabled	0	65535	Disabled	Disabled
PIO3	Disabled	0	65535	Disabled	Disabled

Be sure to SAVE SETTINGS before proceeding else you will lose all changes.



Any of the 4 indicator inputs (PIO0-PIO4) can be used to trigger alarms. Since these inputs are just OFF (0) and ON (1) be sure to use these values for the LOW/HIGH trigger thresholds.

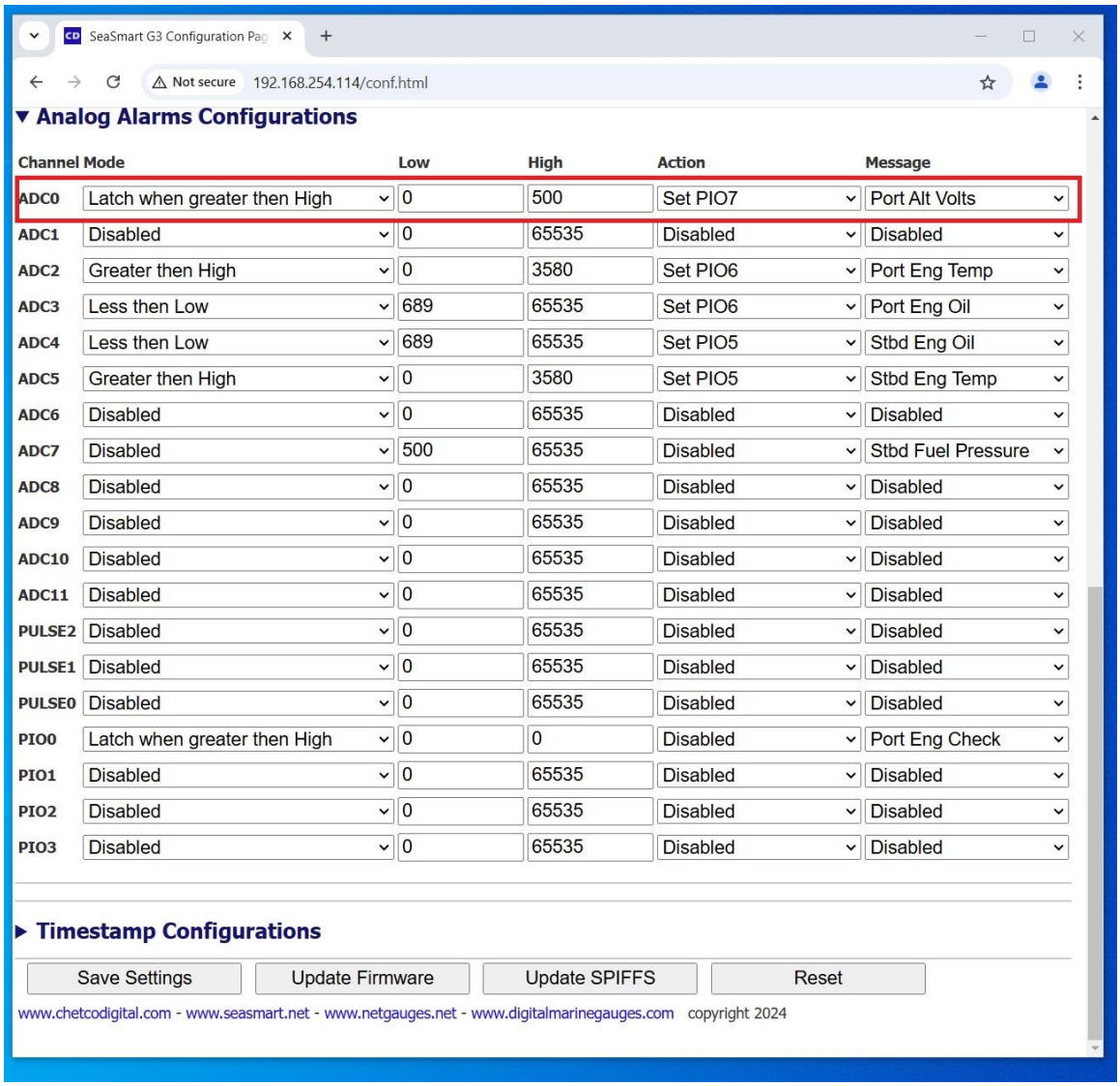
In this example we are using indicator input PIO0 to send a Port Engine Check status message via the CAN Bus when 12VDC is applied to PIO0



Alarm triggers can be set as LATCHING which hold the alarm state when they first occur and then are cleared by using switch command functions built into SeGaugeG4

In this example we are going to latch an alarm on PIO7 when the voltage exceeds 5VDC.

This will cause PIO7 to ground a relay coil when active



Channel	Mode	Low	High	Action	Message
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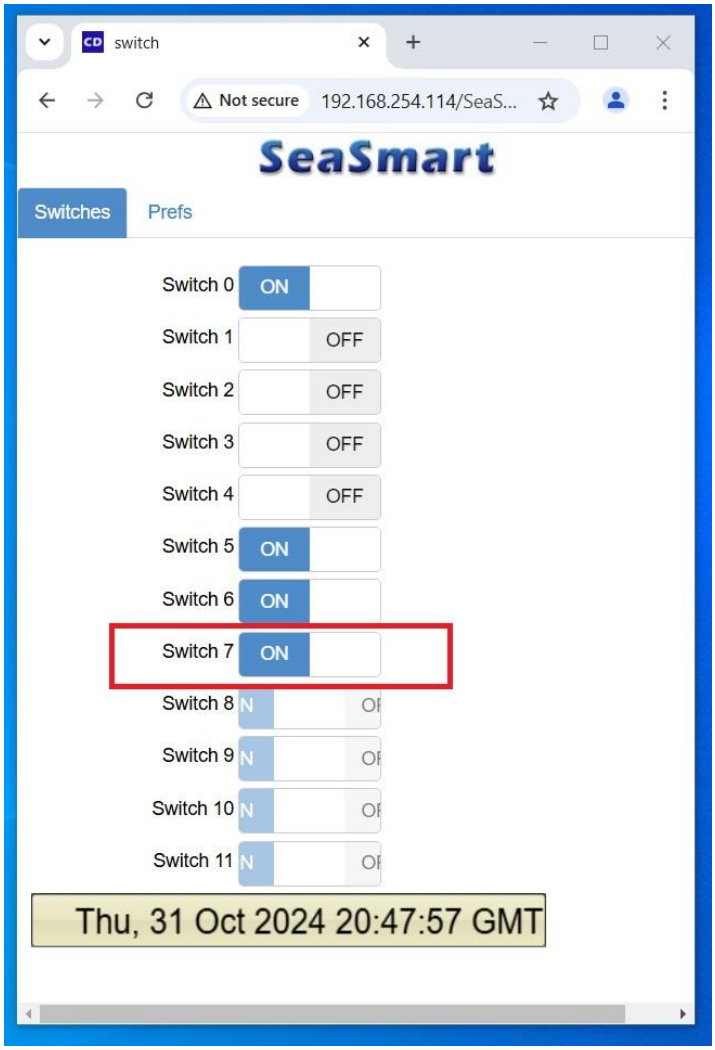
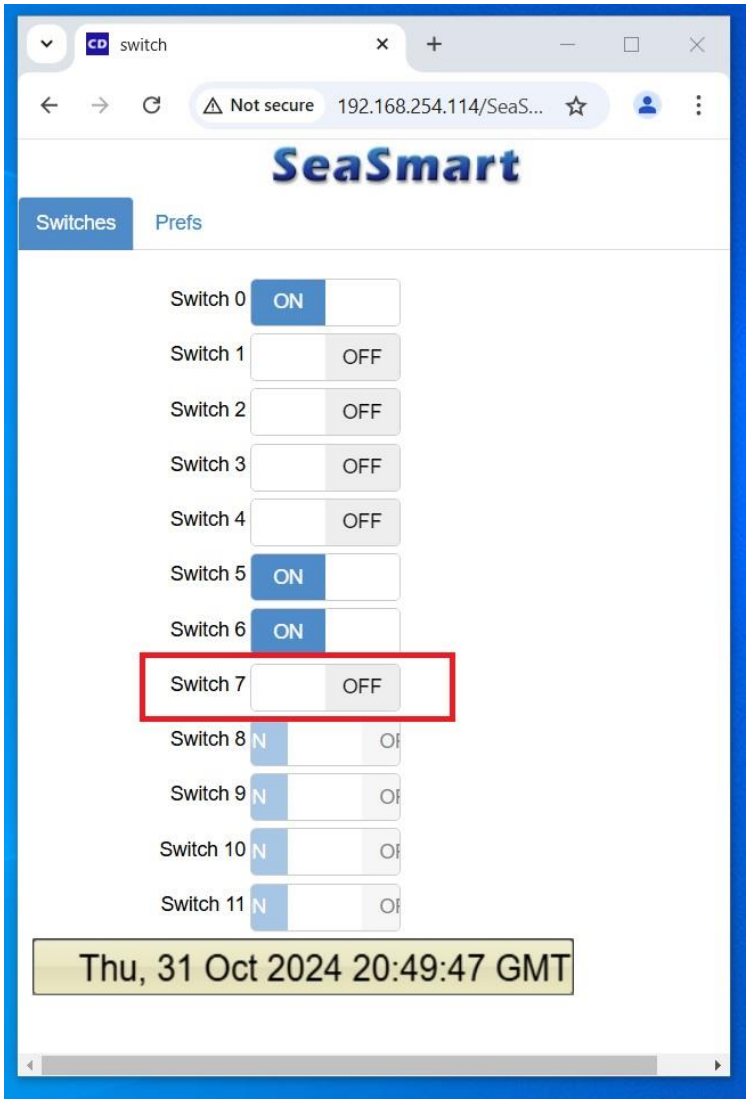
ADC1	Disabled	0	65535	Disabled	Disabled
ADC2	Greater then High	0	3580	Set PIO6	Port Eng Temp
ADC3	Less then Low	689	65535	Set PIO6	Port Eng Oil
ADC4	Less then Low	689	65535	Set PIO5	Stbd Eng Oil
ADC5	Greater then High	0	3580	Set PIO5	Stbd Eng Temp
ADC6	Disabled	0	65535	Disabled	Disabled
ADC7	Disabled	500	65535	Disabled	Stbd Fuel Pressure
ADC8	Disabled	0	65535	Disabled	Disabled
ADC9	Disabled	0	65535	Disabled	Disabled
ADC10	Disabled	0	65535	Disabled	Disabled
ADC11	Disabled	0	65535	Disabled	Disabled
PULSE2	Disabled	0	65535	Disabled	Disabled
PULSE1	Disabled	0	65535	Disabled	Disabled
PULSE0	Disabled	0	65535	Disabled	Disabled
PIO0	Latch when greater then High	0	0	Disabled	Port Eng Check
PIO1	Disabled	0	65535	Disabled	Disabled
PIO2	Disabled	0	65535	Disabled	Disabled
PIO3	Disabled	0	65535	Disabled	Disabled

Using the SeaGaugeG4 Switch status browser page, we can view the latched alarm on PIO7 as well as any other active alarms



By clicking on the Switch 7 button, we can clear the active alarm as long as the trigger threshold is no longer active.



SeaGaugeG4 Analog Inputs can also be configured by using a .xml file stored in the CONFIG directory of the internal SD card.

The .xml file will contain a configitem line entry for each of the 20 alarms which lists the MODE, LOW, HIGH, ACTION, and MESSAGE for each alarm

seagaugeg4_pgn12_alarms.xml

```
<?xml version="1.0" standalone="yes"?>
<configrecord version="22.10.29">
<configgroup name = "device" >
<configitem name="Device_Name"><value>SeaGaugeG4</value></configitem>
</configgroup>
<configgroup name = "N2KPGNLists">
<configitem name="N2KPGN00"><value>0x01F214,0x00,0x00,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN01"><value>0x01F211,0x00,0x00,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN02"><value>0x01F201,0x00,0x02,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN03"><value>0x01F201,0x00,0x00,0xFFFFFFFF</value></configitem>
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<configitem name="N2KPGN05"><value>0x01F201,0x01,0x02,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN06"><value>0x01F211,0x01,0x00,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN07"><value>0x01F214,0x01,0x00,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN08"><value>0x01F200,0x00,0x02,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN09"><value>0x01F200,0x00,0x01,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN10"><value>0x01F200,0x01,0x02,0xFFFFFFFF</value></configitem>
<configitem name="N2KPGN11"><value>0x01F200,0x01,0x01,0xFFFFFFFF</value></configitem>
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<configitem name="N2KCAL01"><value>FUEL_180to10.xml</value></configitem>
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<configitem name="N2KCAL05"><value>VDO_TEMP_250FMAX.xml</value></configitem>
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<configitem name="N2KCAL11"><value>VDO_PSI_150MAX.xml</value></configitem>
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<configitem name="ADCALARM01"><value>0x00,0x0000,0xFFFF,0x04,0x00</value></configitem>
<configitem name="ADCALARM02"><value>0x06,0x0000,0x0DFC,0x01,0x02</value></configitem>
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<configitem name="ADCALARM16"><value>0x04,0x0000,0x0001,0x04,0x01</value></configitem>
<configitem name="ADCALARM17"><value>0x00,0x0000,0xFFFF,0x04,0x00</value></configitem>
<configitem name="ADCALARM18"><value>0x00,0x0000,0xFFFF,0x04,0x00</value></configitem>
<configitem name="ADCALARM19"><value>0x00,0x0000,0xFFFF,0x04,0x00</value></configitem>
</configgroup>
</configrecord>
```

eXtensible Markup Language file | length : 4094 | lines : 56 | Ln : 39 | Col : 2 | Sel : 0 | 0 | Dos\Windows | UTF-8 | INS

Each channel entry starts with the tag name=”ADCALARMXX” followed by 5 comma separated values

<configitem name="ADCALARM00"><value>0x03,0x8ACF,0xFFFF,0x04,0x00</value></configitem>

Field 1 is Alarm mode number in 2 digit Hexadecimal
Field 2 is Alarm Low value in 4 digit Hexadecimal
Field 3 is Alarm High value in 4 digit Hexadecimal
Field 4 is Alarm Action index number in 2 digit Hexadecimal
Field 5 is Alarm Message index in 2 digit Hexadecimal

Alarm Mode Table

Index	Mode	Function
0x00	Disabled	-
0x01	Equal to Low	Value = Low
0x02	Less then Low	Value < Low
0x03	Greater then Low	Value > Low
0x04	Equal to High	Value = High
0x05	Less then High	Value < High
0x06	Greater then High	Value > High
0x07	Less the Low and Greater then High	Value<LOW & Value > High
0x08	Greater then Low and Less then High	Value>Low & Value < High
0x09	Latch when greater then High	Value>High & Alarm Set
0x010	Latch when less then Low	Value<Low & Alarm Set

Alarm Action Table

Index	Action
0x00	Set PIO7 (Ground relay coil)
0x01	Set PIO7 (Ground relay coil)
0x02	Set PIO7 (Ground relay coil)
0x03	Set PIO7 (Ground relay coil)
0x04	Disabled

Alarm Message Table

Index	CAN Message	Message ID/Source
0x00	Disabled	-
0x01	Port Eng Check	PGN127489 EDS1 Bit0 – Instance 0
0x02	Port Eng Temp	PGN127489 EDS1 Bit1 – Instance 0
0x03	Port Eng Oil	PGN127489 EDS1 Bit2 – Instance 0
0x04	Port Fuel Pressure	PGN127489 EDS1 Bit4 – Instance 0
0x05	Port Alt Volts	PGN127489 EDS1 Bit5 – Instance 0
0x06	Port EGT	PGN127489 EDS1 Bit6 – Instance 0
0x07	Port Fuel Flow	PGN127489 EDS1 Bit7– Instance 0
0x08	Port Tran Oil	PGN127493 EDS1 Bit1 – Instance 0
0x09	Port Tran Temp	PGN127493 EDS1 Bit2 – Instance 0
0x0A	Stbd Eng Check	PGN127489 EDS1 Bit0 – Instance 1
0x0B	Stbd Eng Temp	PGN127489 EDS1 Bit1 – Instance 1
0x0C	Stbd Eng Oil	PGN127489 EDS1 Bit2 – Instance 1
0x0D	Stbd Fuel Pressure	PGN127489 EDS1 Bit4 – Instance 1
0x0E	Stbd Alt Volts	PGN127489 EDS1 Bit5 – Instance 1
0x0F	Stbd EGT	PGN127489 EDS1 Bit6 – Instance 1
0x10	Stbd Fuel Flow	PGN127489 EDS1 Bit7– Instance 1
0x11	Stbd Tran Oil	PGN127493 EDS1 Bit1 – Instance 1
0x12	Stbd Tran Temp	PGN127493 EDS1 Bit2 – Instance 1
0x13	Cntr Eng Check	PGN127489 EDS1 Bit0 – Instance 2
0x14	Cntr Eng Temp	PGN127489 EDS1 Bit1 – Instance 2
0x15	Cntr Eng Oil	PGN127489 EDS1 Bit2 – Instance 2
0x16	Cntr Fuel Pressure	PGN127489 EDS1 Bit4 – Instance 2
0x17	Cntr Alt Volts	PGN127489 EDS1 Bit5 – Instance 2
0x18	Cntr EGT	PGN127489 EDS1 Bit6 – Instance 2
0x19	Cntr Fuel Flow	PGN127489 EDS1 Bit7– Instance 2
0x1A	Cntr Tran Oil	PGN127493 EDS1 Bit1 – Instance 2
0x1B	Cntr Tran Temp	PGN127493 EDS1 Bit2 – Instance 2

The use of an Analog Input Config.xml file will overwrite any other web based config values so that if changes are made via WEB interface page and device is reset, all values will be revert back to the values contained in the stored config.xml file