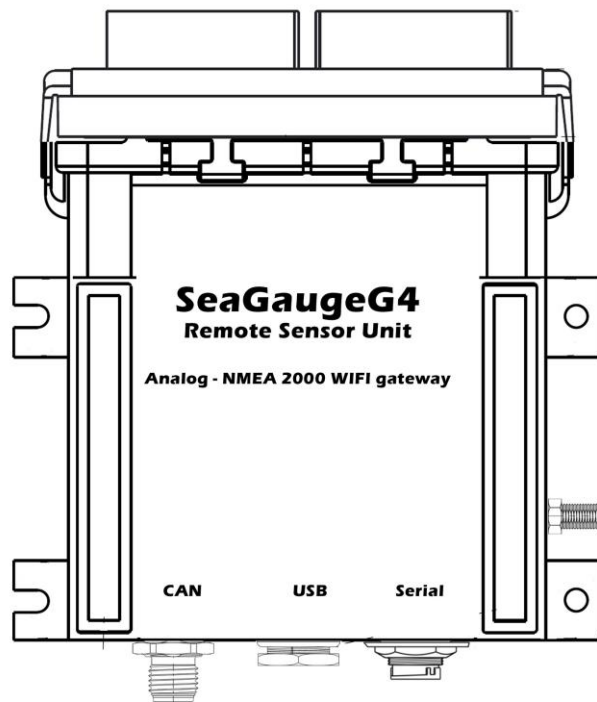# Application Note

ANSS024063001 – SeaGauge G4 Pulse Inputs

Chetco Digital Instruments, Inc

Revision 102624

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

SeaGaugeG4 also provides 4 additional indicator/status inputs (18VDC max) and 4 relay driver (12VDC) outputs

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

Chetco Digital Instruments, Inc.
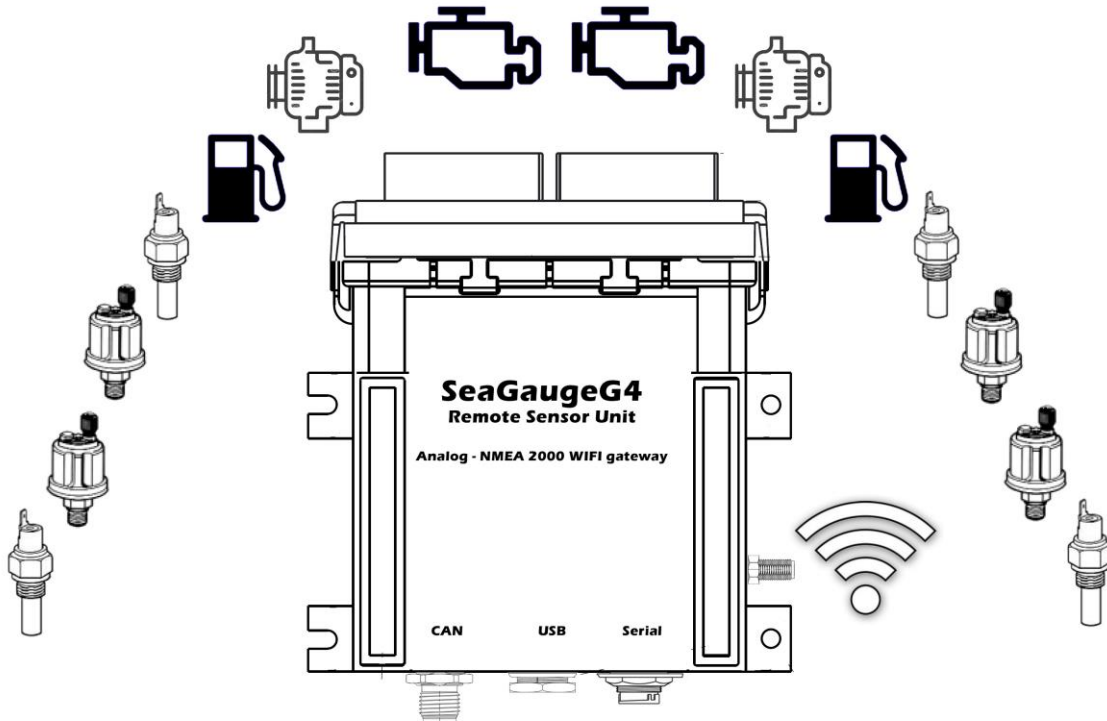
SeaGaugeG4 supports up to 3 pulse sensor inputs via a 20 pin Molex MX150 plug (white).

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

The 3 pulse inputs (P0-P2) are used to provide Tachometer, Fluid Flow, and other rotational sensor inputs.

Each pulse channel has a runtime accumulator that counts the number of seconds the channel is active up to 16,777,216 seconds

SeaGaugeG4 Header
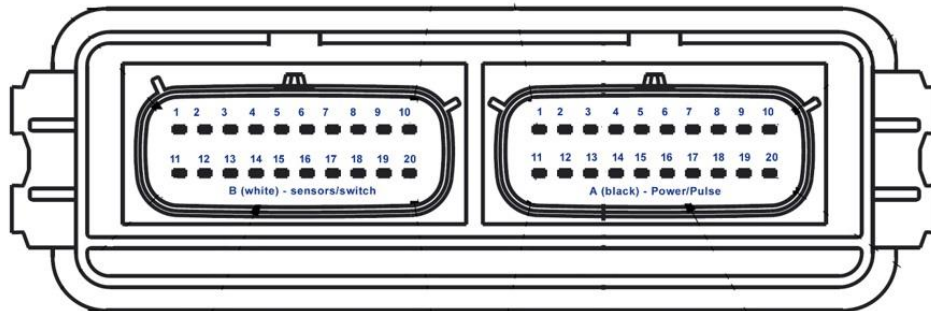
B (white) - sensors/switch		A (black) - Power/Pulse	
B1 - NC	B11 - NC	A1 - SW5	A11 – SW4
B2 - NC	B12 - NC	A2 - SW7	A12 – SW6
B3 – SEN10 (SBOOST)	B13 – SEN11 (STRAN)	A3 - NC	A13 - NC
B4 – SEN04 (STEMP)	B14 – SEN05 (SOIL)	A4 – P1 (SRPM)	A14 - GND
B5 – SEN06 (SFUEL)	B15 – SEN07 (SBAT)	A5 – P0 (PRPM)	A15 - 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

Chetco Digital
Instruments, Inc.

Two pulse inputs (P0-P1) are used to interface with common tachometer style sensors. They use a voltage clamped circuit that can accept AC signals from 1Vpp to 18Vpp commonly found in inductive pickup and spark coil style sensors
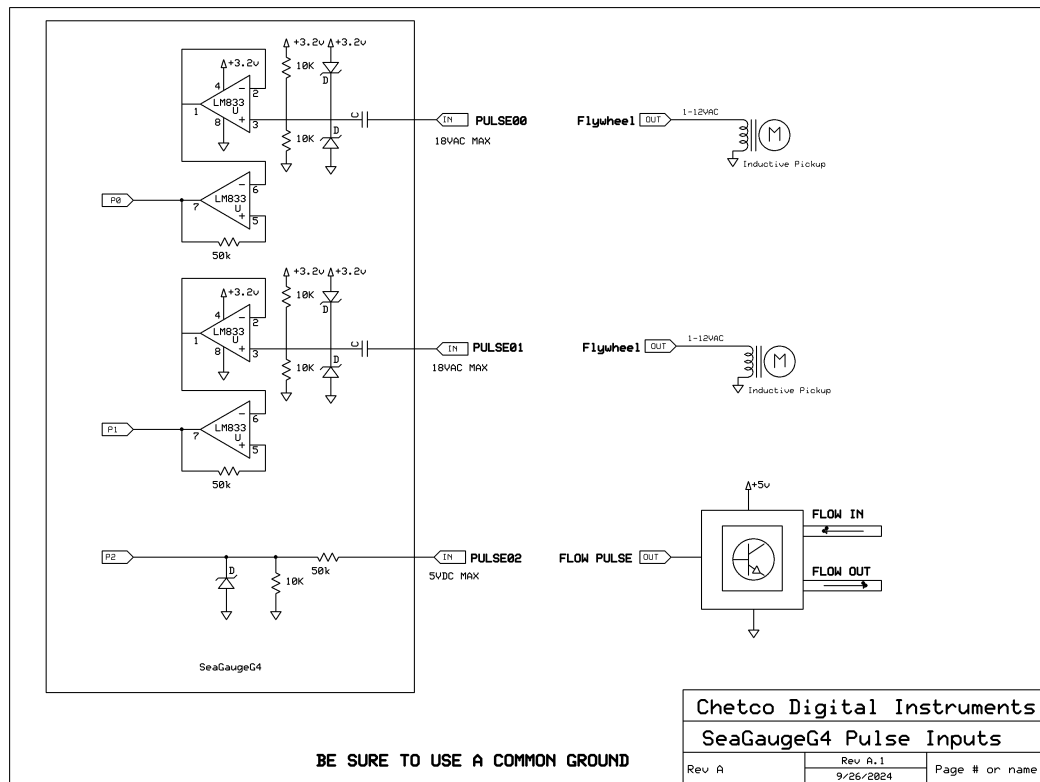
A third pulse input (P2) is used only for Hall effect style sensors such as fluid flow and is restricted to 5V ground based signals

Pulse inputs used as tachometers are mapped to CAN BUS PGN 127488 (0x01F200)

$PCDIN,01F200,DTVV3F0D,AB,00**6810**6528E17EFF*37

A 2 byte value (0x1068 in this example) transmits the RPM in 0.25 resolution (4200 /4 = 1050 RPM in this example)

Pulse inputs P0-P1 can be used both inductive style and Hall Effect sensors while P2 is Hall effect only

Chetco Digital Instruments		
SeaGaugeG4 Pulse Inputs		
Rev A	Rev A.1 9/26/2024	Page # or name

BE SURE TO USE A COMMON GROUND

Chetco Digital Instruments, Inc.

Pulse inputs (P0-P2) have individual attached runtime timers with a resolution of 1 second and range to 16,777,216 seconds (4660 hours)

A second set of accumulators are used to store total fuel used when pulse inputs are configured for fuel flow sensors. They have a range of 65532 liters

The runtime values are stored in battery backed RAM and transmitted via CAN bus and embedded Web server using PGN 127489 (0x01F201) Engine Dynamic Engine Hours

$PCDIN,01F201,DTVV3F0H,AB,006528FFFF7F60FF7FFF7F**981A0000**FFFFFFFFFFFFF0600007F7F*33

Engine hours is 8 bytes = 4294267292 seconds

The CAN bus PGNs 127488 and 127489 can be displayed using the embedded Web server pages or uploaded to the HelmSmart Cloud service.

HelmSmart: joe@chetcodigital.com

| Info | Device | Summary | **Details** |

Description	Data
Timestamp	Sat Oct 26 2024 11:17:16
PGN	01F201
Source	AB
Description	engine_parameters_dynamic
Payload	{"discrete_status_1":"","discrete_status_2":"","engine_id":0,"engine_temp":24703,"oil_pressure":10341,"raw":"006528FFFF7F60FF
total_engine_hours	5042
raw	006528FFFF7F60FF7FFF7FB2130000FFFFFFFFFFFF0600007F7F*35\\
oil_pressure	10341
engine_temp	24703
engine_id	0
discrete_status_2	
discrete_status_1	

![Chetco Digital Instruments, Inc. logo]

Engine RPM and Engine Hours can be displayed locally by using any web browser and selecting the Engine link from the main Home page
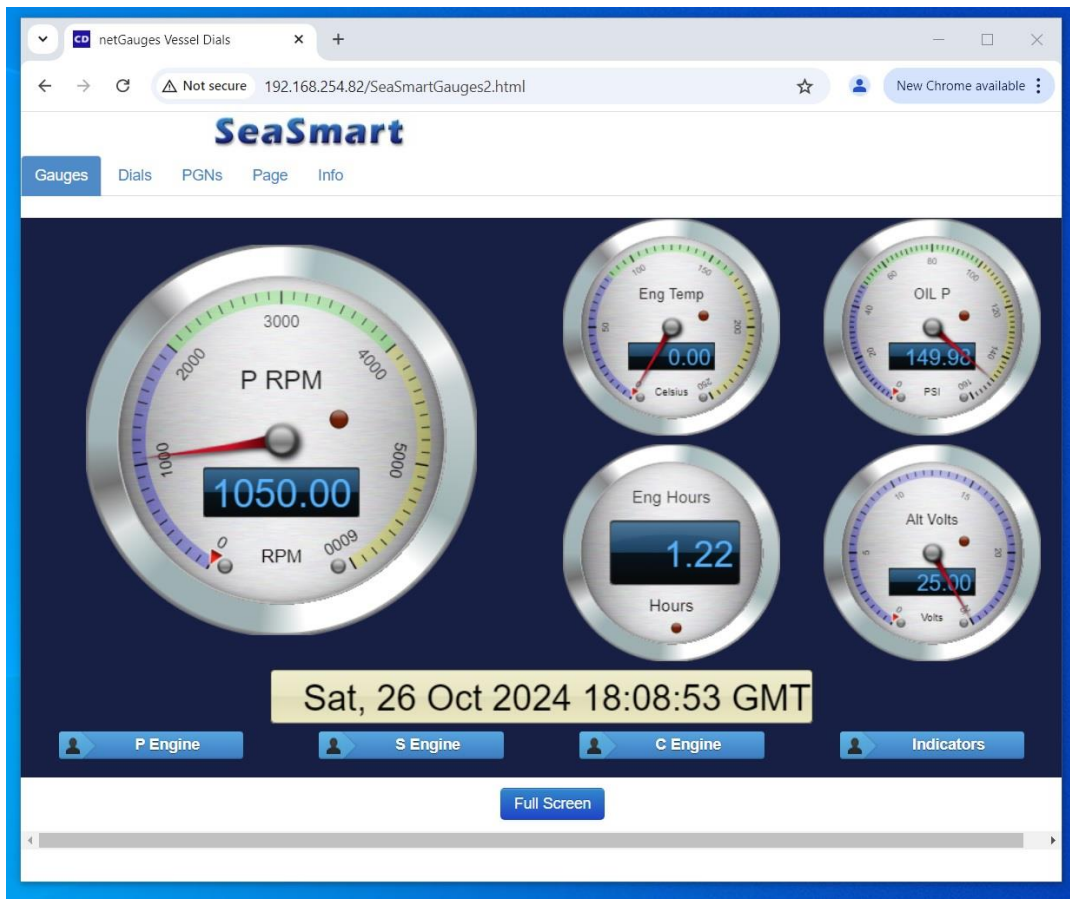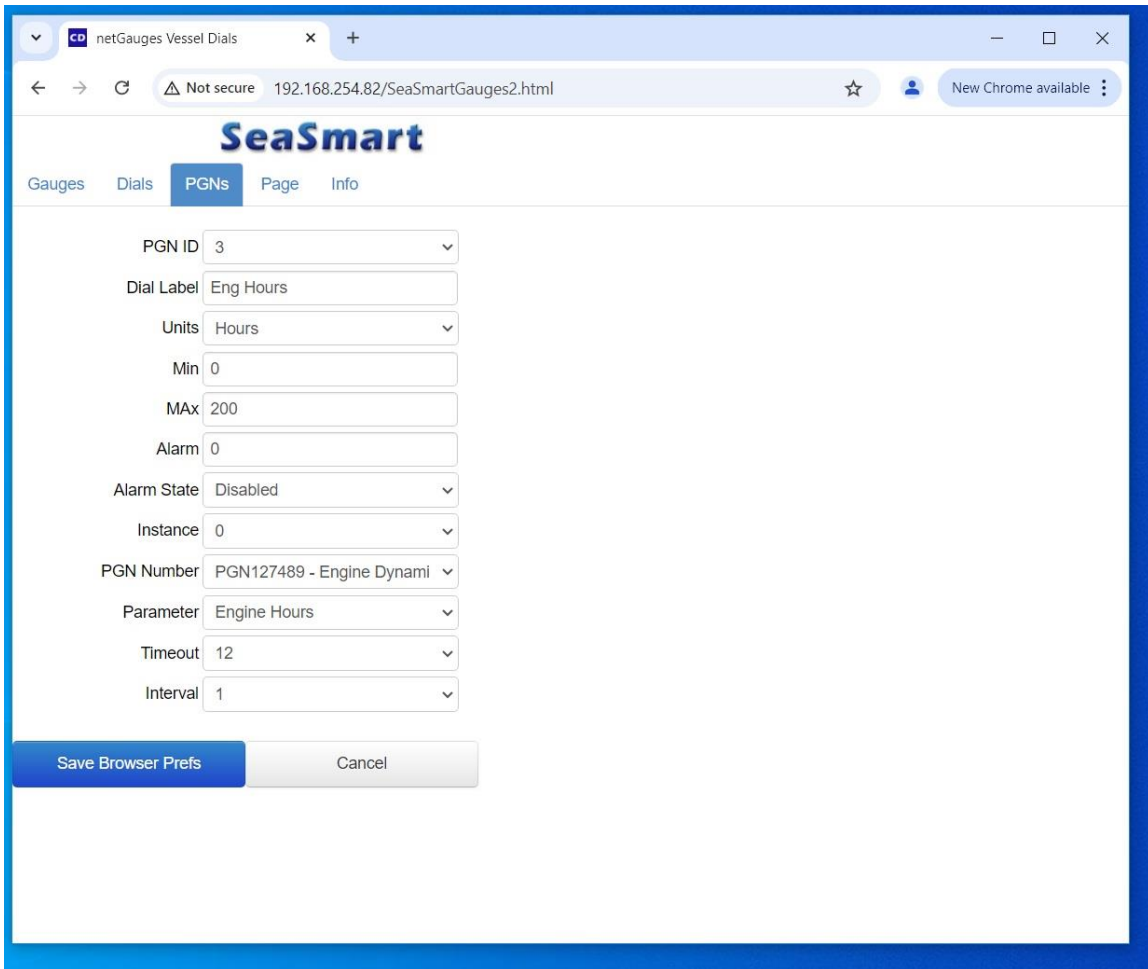
All web pages are user configurable and allow for custom gauge styles and layouts

Each individual gauge can be assigned to CAN bus PGN and parameter. Selecting a gauge and then the PGN tab will allow modification of the data displayed.

In this example, gauge 3 is configured to display ENGINE HOURS from PGN127489 that matches INSTANCE 0. It is important to match the PGN instance as that is used to determine the source engine since all engine data uses the same PGN127489

Normal convention is to use 0=PORT and 1=STARBOARD
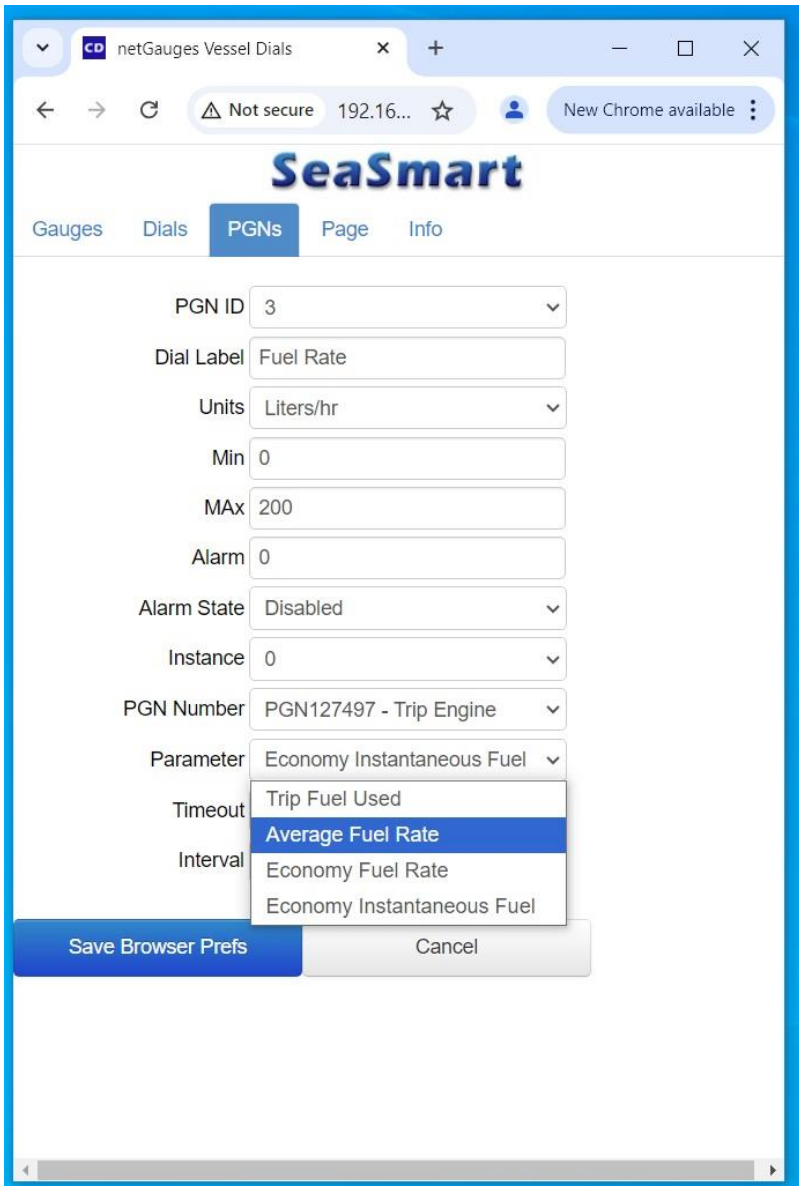
Note that the PGN Number to view Engine Status is the standard PGN127489 and RPM is PGN127488

Also be sure to set the desired UNITS and MIN/MAX values

Chetco Digital Instruments, Inc.

Fuel Flow data is displayed using a different PGN 127497 and therefore needs to be selected separately on the PGN config page.

Again, be sure to select the correct INSTANCE and PARAMETER for the desired data

You must use separate gauges for both FUEL TOTAL and FUEL FLOW
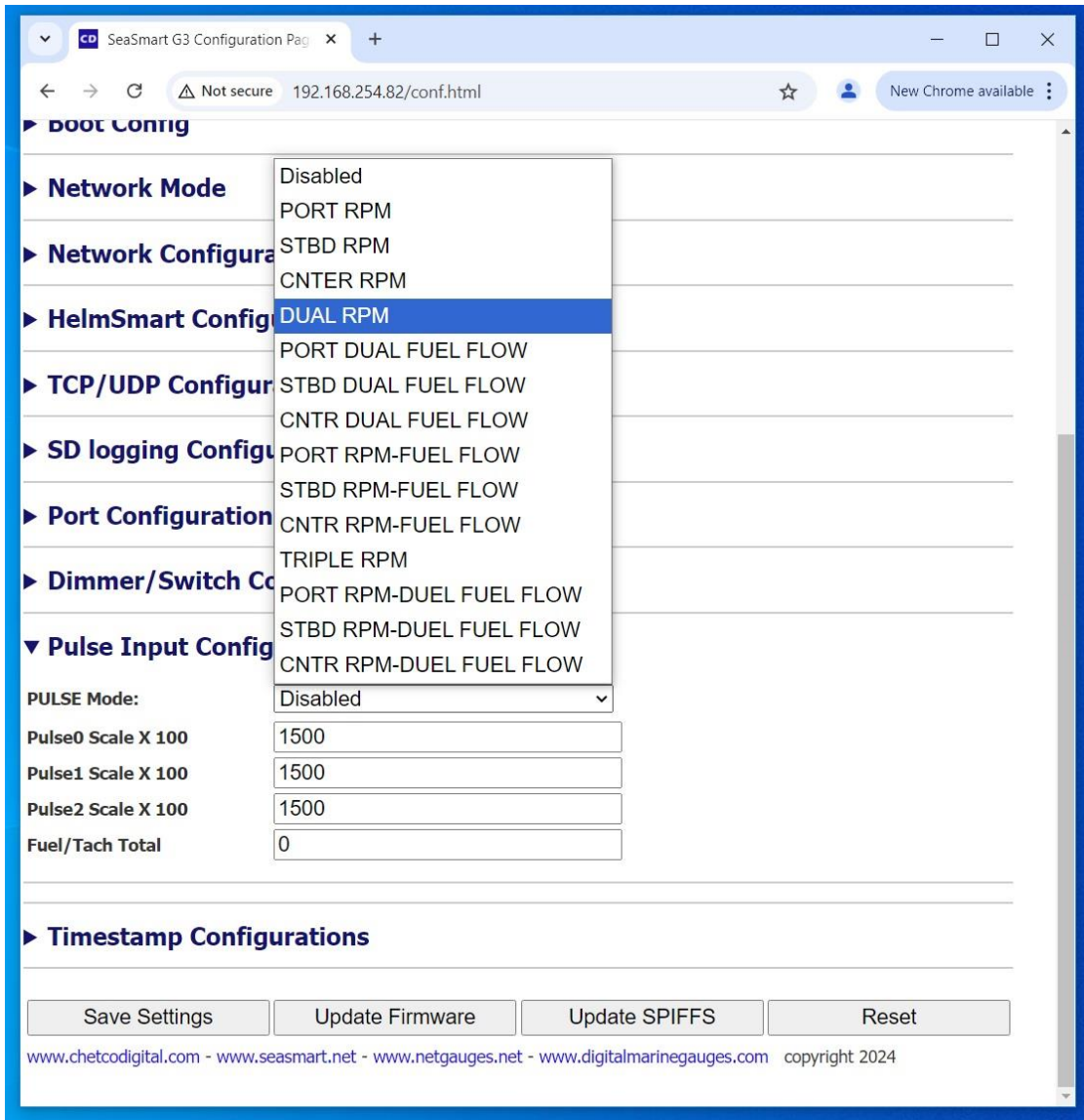
SeaGaugeG4 Pulse inputs can be configured using the embedded CONFIGURATION page under the PULSE INPUT section

Chetco Digital Instruments, Inc.
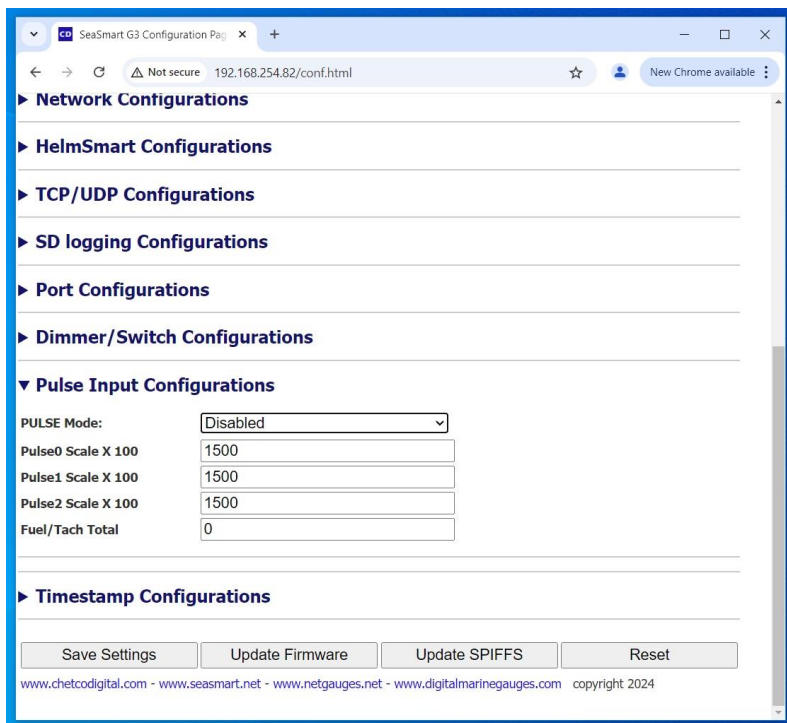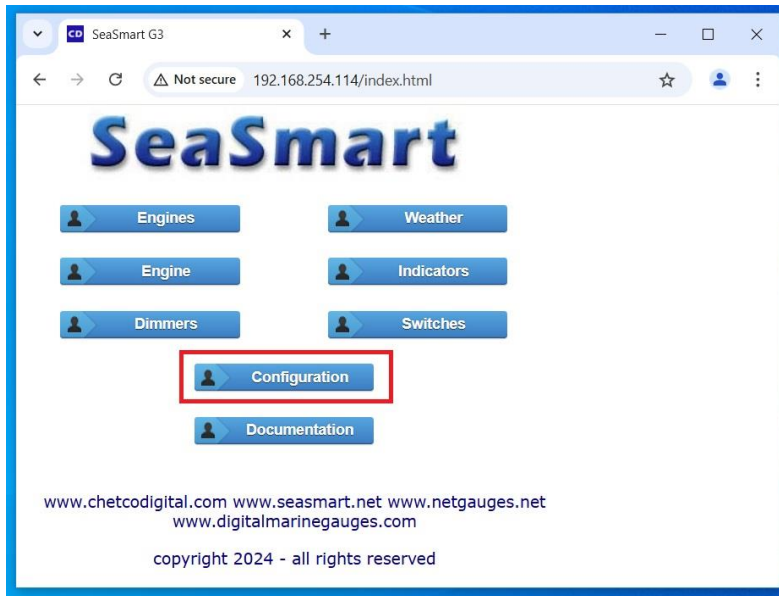
The Pulse Mode drop down will allow enabling any of the 3 pulse inputs and assignment to either RPM or fuel flow sensors.

Note that DUEL FLOW requires using two pulse inputs (P1-P2), Since P2 is only used for Hall Effect flow sensors it is always used for flow sensors only

The following table summarizes the types of pulse connections that are used for the selected Pulse Modes.

Pulse Mode	Pulse 0	Pulse 1	Pulse 2
Disabled	-	-	-
PORT RPM	P Tach	-	-
STBD RPM	S Tach	-	-
CNTER RPM	C Tach	-	-
DUAL RPM	P Tach	S Tach	-
PORT DUAL FUEL FLOW	-	Supply FLOW	Return Flow
STBD DUAL FUEL FLOW	-	Supply FLOW	Return Flow
CNTR DUAL FUEL FLOW	-	Supply FLOW	Return Flow
PORT RPM-FUEL FLOW	P Tach	Supply FLOW	-
STBD RPM-FUEL FLOW	S Tach	Supply FLOW	-
CNTR RPM-FUEL FLOW	S Tach	Supply FLOW	-
TRIPLE RPM	P Tach	S Tach	C Tach*
PORT RPM-DUEL FUEL FLOW	P Tach	Supply FLOW	Return Flow
STBD RPM-DUEL FUEL FLOW	S Tach	Supply FLOW	Return Flow
CNTR RPM-DUEL FUEL FLOW	S Tach	Supply FLOW	Return Flow

* Must be a Hall Effect type of sensor

The following table summarizes the transmitted CAN Bus PGN and instance numbers for each Pulse Mode.
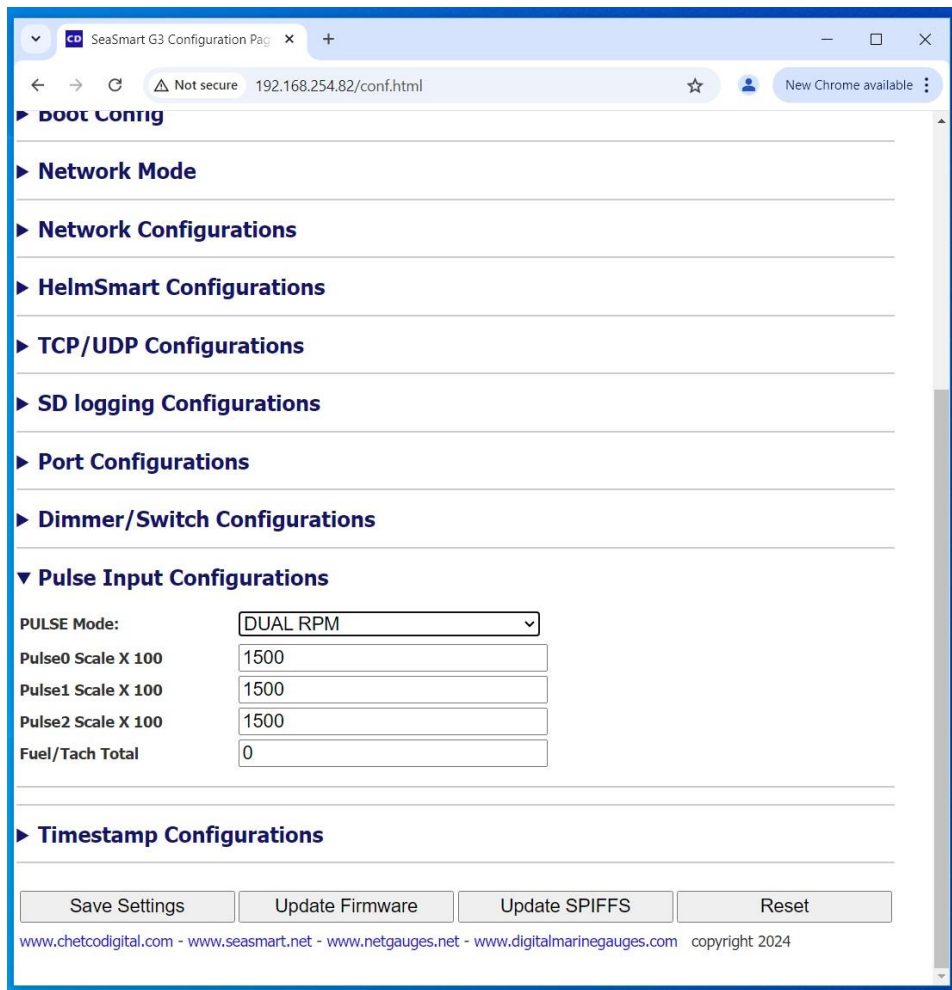
Pulse Mode	PGN127488	PGN127497
Disabled	-	-
PORT RPM	0	-
STBD RPM	1	-
CNTER RPM	2	-
DUAL RPM	0,1	-
PORT DUAL FUEL FLOW	-	0
STBD DUAL FUEL FLOW	-	1
CNTR DUAL FUEL FLOW	-	2
PORT RPM-FUEL FLOW	0	0
STBD RPM-FUEL FLOW	1	1
CNTR RPM-FUEL FLOW	2	2
TRIPLE RPM	0,1,2	S Tach
PORT RPM-DUEL FUEL FLOW	0	0
STBD RPM-DUEL FUEL FLOW	1	1
CNTR RPM-DUEL FUEL FLOW	2	2

After selecting the desired pulse mode, specify the scale factor to be used to convert pules per second (PPS) to revolutions per minute (RPM).

Each installation may require a different scale factor.

A 8 cylinder 4 cycle gasoline engine will produce 4 spark events per revolution. Therefore 1 RPM = 60 sec/4 pps = 15. Pulse scale values are entered as desired Scale * 100 = 1500

Other types of sensors like inductive flywheel for example may produce 100 PPS and therefore use a different scale factor

Chetco Digital Instruments, Inc.

SeaGaugeG4 supports combining tachometer and dual flow sensors for each engine. Diesel engines normally require a pair of flow sensors to determine the difference between the injector rail supply flow minus the return flow to calculate fuel consumed.

In this case, you will need to enter different scale factors for the RPM and FLOW sensors.

SeaGaugeG4 flow sensors generate 1.5 ml per pulse. Thus to determine scale for L/hr, use $0.0015 * 60 * 60 = 5.4 * 100 = 5400$.

The CAN bus PGN 127497 uses flow rate resolution of Liters. Conversion to GPH is done by the attached display or embedded Web page

Chetco Digital
Instruments, Inc.

SeaGaugeG4 stores total fuel consumed as calculated from attached flow sensors in a battery backed accumulator. This value is used in the PGN127489 TRIP FUEL USED.

Separate TRIP FUEL USED values are stored for each of 3 PGN instances based on the PULSE MODE selected.

All 3 stored values can be simultaneously reset by entering a non-zero value for the Fuel/Tach Total in Liters and resetting the unit.

Once reset, it is important to go back and reenter 0 for Fuel/Tach Total to avoid resetting again on next power cycle.

Once all pulse configurations are made it is important to SAVE SETTINGS and RESET device to avoid losing configuration changes

Chetco Digital Instruments, Inc.

Engine Hours and Fuel used totals can be reset by using a config.xml file loaded into the CONFIG directory of the internal SD card
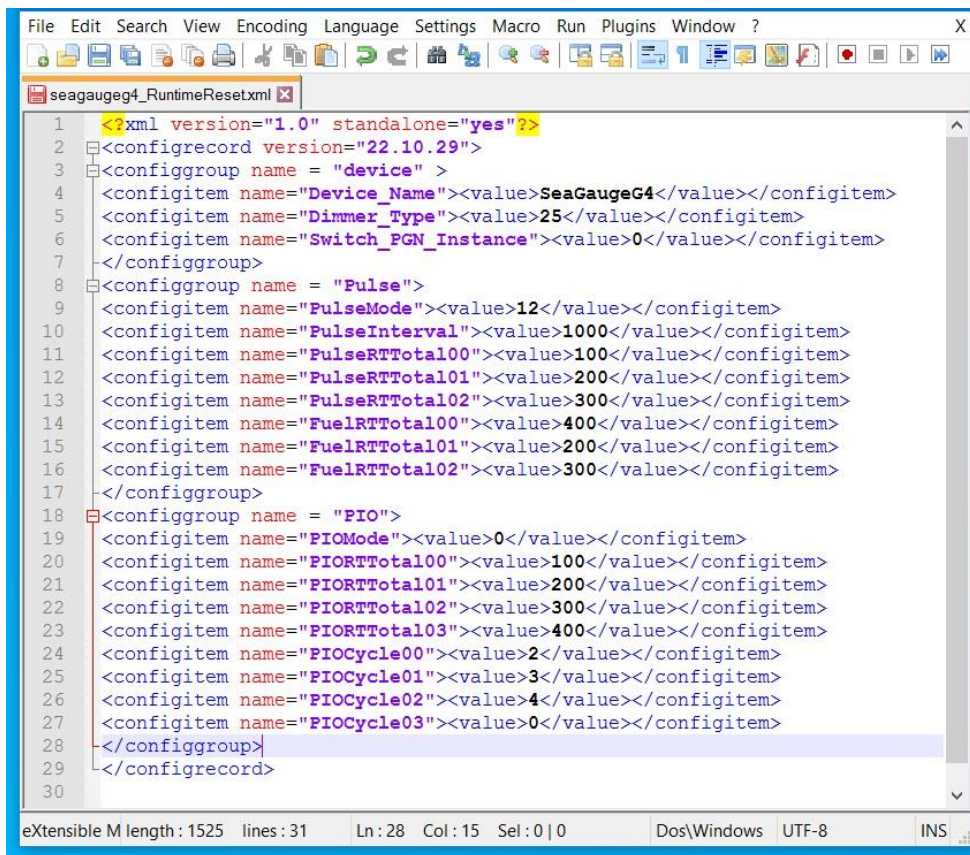
Since you can have multiple config.xml files in the directory – it is best to use a separate file just for resetting runtime values since you will need to delete the file after the unit is rebooted or else the values will reset on each power cycle.

If you do not want to reset a totalizer, remove the appropriate line from the config file

When SeaGaugeG4 is repowered, it will read the contents of the file and reset the appropriate values.

NOTE that the indicator runtime values are set in the PIO section and the RPM Hour meters/fuel flow totals are in the PULSE section.

Engine Hours values are in seconds and Fuel totals in Liters