

# ***KOBELT***

## ***Vessel System Monitoring & Smart Alarm Device***



Owners' Operation Manual



November 2019

Kobelt Manufacturing Co. Ltd.

**NOTES:**

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<b>RECORD DATA BEFORE INSTALLATION FOR FUTURE REFERENCE</b>	
<b>Model #:</b>	
<b>Serial #:</b>	
<b>Date of Purchase:</b>	
<b>Date of Installation:</b>	

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# 1 INTRODUCTION

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This document is intended to clearly present comprehensive product data and provide technical information to assist the end user in operating Vitals. Kobelt reserves the right, without notice, to change the design, or construction, of any products and to discontinue or limit distribution of any products. Kobelt also reserves the right to change or update any technical information contained within this document without notice.

## 1.1 CONTACT

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Kobelt recommends that customers visit our website to check for updates to this Manual. Once a product has been selected for use, it should be tested by the user to ensure proper function in all possible applications. For further instructions, please contact our distributors or visit our website.

## 1.2 COMPLIANT USE

Vitals is an aid only and should not be used as the sole method of decision making. Vitals will not protect the systems that it is monitoring. Vitals utilizes digital and analog data and electronic information from the various marine electronic instruments or sensors on-board the vessel. This device is only intended for use by persons trained in operating marine systems and only as an operational aid.

The user shall:

- Only use non-defective products.
- Check the safety of operation and the condition of the device before each use.
- Verify that the product is operational at all times and keep it in good working conditions.

Only Kobelt Manufacturing Co. Ltd. Authorized Dealers or Authorized Technicians are to repair Vitals.




## 1.3 COPYRIGHTS & TRADEMARKS

All product names, logos and brands are property of their respective owners. All company, product and service names used in this manual are for identification purposes only. Use of these names, logos, and brands does not imply endorsement.



## 2 SAFETY

Throughout this manual, the following symbols are used to alert the user to special instructions concerning a service or operation that may be hazardous if performed incorrectly or carelessly. The associated risk levels are stated below.

### 2.1 SAFETY ALERTS

 <b>DANGER</b>	This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	This symbol indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
<b>NOTICE</b>	This symbol informs the reader of events not related to personal injury but which there is a risk of damage to property or equipment.
<b>SAFETY INSTRUCTIONS</b>	This symbol informs the reader of safety-related instructions or procedures.

### 2.2 PRODUCT HAZARDS

 <b>WARNING</b>	<b>Disconnect Power:</b> Turn off power at distribution panel before beginning installation to protect installer from electrical hazards.
 <b>CAUTION</b>	<b>Voltage and Current Compatibility:</b> Confirm that the power source is compatible with the maximum voltage and current ratings of is product variant. Failure to do so could result in damage or fire.

## 3 ABOUT VITALS

### 3.1 PRODUCT DESCRIPTION

Vitals by Kobelt Manufacturing Co. Ltd. is an integrated touchscreen monitor and data acquisition system that acts as an alarm hub for sensors connected to the NMEA2000 network, or directly to the multiple digital or analog inputs on back of the unit. This system is designed to monitor and provide warnings and alarms for basic vessel configurations, or to be expanded to cover a multitude of sophisticated vessel systems.

Vitals will work with analog senders such pressure sensors, temperature sensors, etc., attached to the users' engine and digitize the information and display digital gauges with the corresponding values on the screen. Vitals will raise warnings and alarms if the preconfigured warning and alarm conditions are met. It can output the acquired data of the live engine status to the NMEA2000 network to be displayed or read by other devices.

### 3.2 INTENDED USE

Vitals is designed to aid the user to quickly identify possible issues and malfunctions of systems on the vessel, thus help the user make a timely decision to protect equipment from sudden failure.

### 3.3 TECHNICAL SPECIFICATIONS

The table below lists the Technical Specifications of the Vitals device.

*Table 1: Technical Specifications*

MODEL	VT700
KOBELT PART #	6700
OPERATING VOLTAGE	9 - 32 VDC (Nominal 12 VDC or 24 VDC)
OPERATING CURRENT	<b>Sleep:</b> 160 mA / <b>Active:</b> 230 mA / <b>Alarming:</b> 530 mA @ 12 VDC <b>Sleep:</b> 80 mA / <b>Active:</b> 120 mA / <b>Alarming:</b> 270 mA @ 24 VDC
DISPLAY SIZE	7.0" [177.4 mm]
DISPLAY RESOLUTION	800 x 480 pixels
DISPLAY CONTRAST RATIO	500:1
OPERATING TEMPERATURE	-13°F to 131°F [-25°C to 55°C]
STORAGE TEMPERATURE	-22°F to 158°F [-30°C to 70°C]
OPERATING HUMIDITY	95 % (Non-Condensing)
STORAGE HUMIDITY	75 % (Non-Condensing)
IP RATING	IP66 / IP42 (Front / Back)
DIMENSIONS	8.7" x 5.28" x 2.03" [221 mm x 134 mm x 52 mm]
WEIGHT	1.42 lbs. [0.64 kg]

### 3.4 VISUAL OVERVIEW

The Front screen and back view of Vitals can be seen below with a table describing each button and connector.

#### 3.4.1 Front Screen

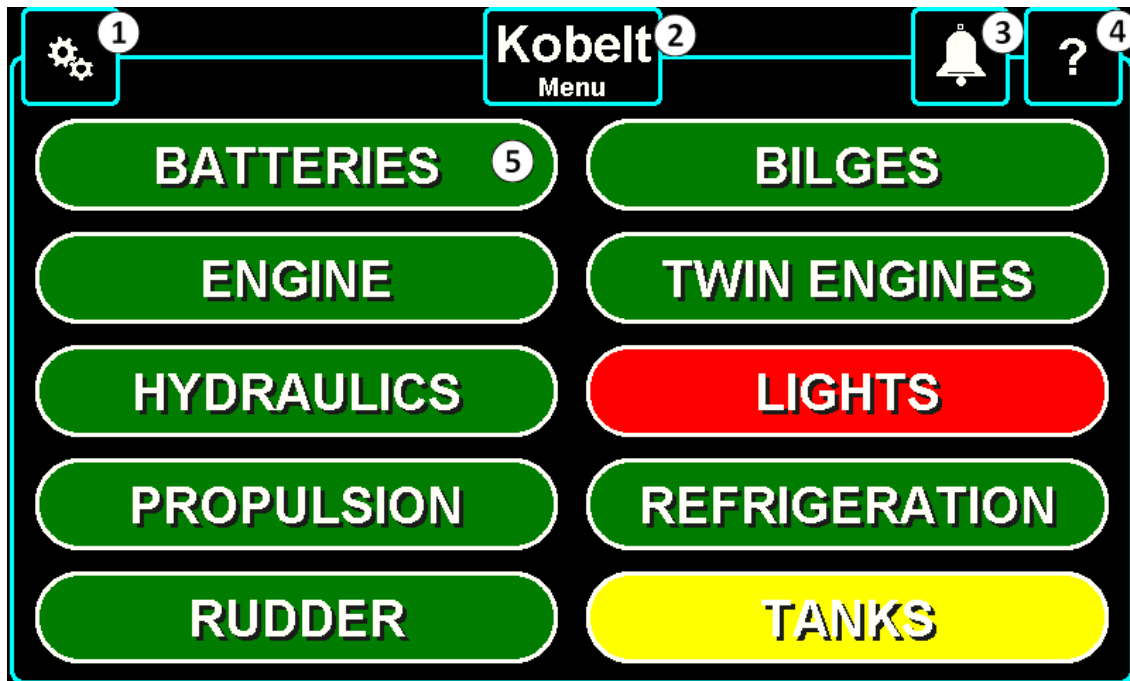


Figure 1: Vitals Front Panel View

Table 2: Panel Button Reference

NO.	NAME	DESCRIPTION
1	Settings Button	This button is visible on the Menu Screen only and provides access to system information and settings.
2	Main Panel Button	Tapping this button returns you to the Menu Screen.
3	Acknowledge Button	This button appears when there is an alarm or warning. Tapping this button will acknowledge and silence the alarm or warning.
4	Help Button	Tapping this button will display help information for the active screen.
5	Panel Button(s)	Each panel button corresponds to a specific panel, tap to open the panel.



3.4.2 Back

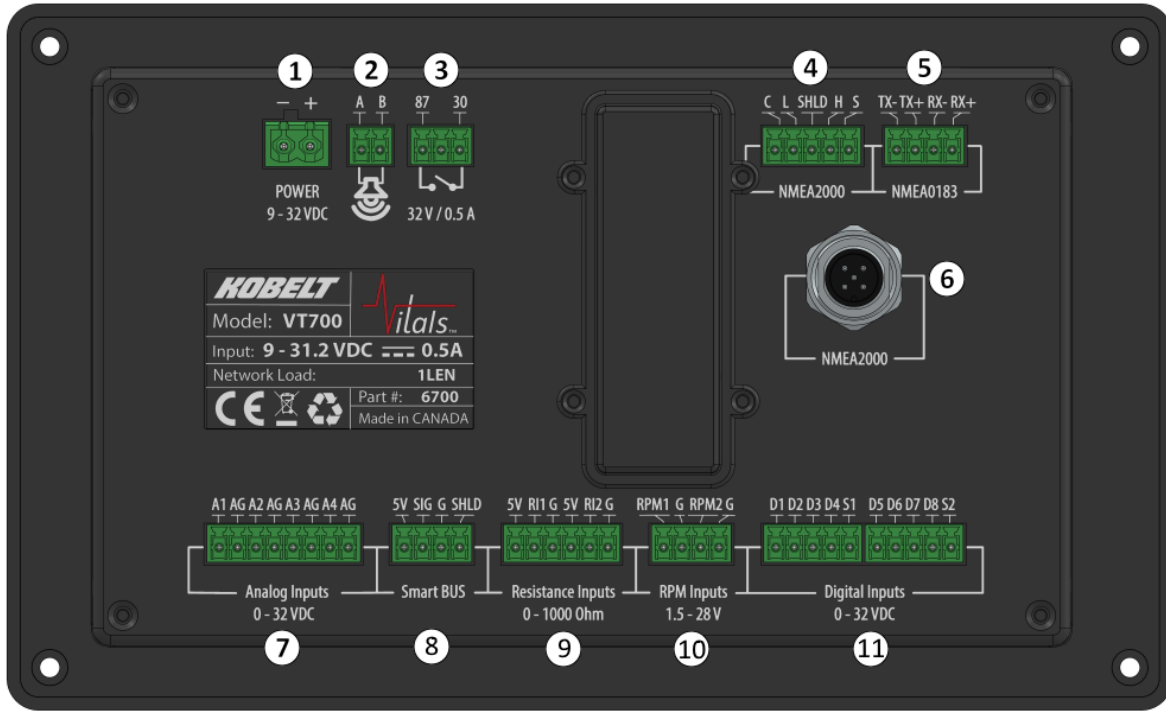


Figure 2: Vitals Back Panel View

Table 3: Vitals Back Panel Connectors

NO.	NAME
1	Power Connector
2	Speaker Connector
3	Relay Output Connector
4	NMEA2000 TB Connector
5	NMEA0183 Connector
6	NMEA2000 M12 Connector
7	Analog Inputs Connector
8	Smart BUS Connector
9	Resistance Inputs Connector
10	RPM Inputs Connector
11	Digital Inputs Connector

## 4 TERMINOLOGY AND FUNCTIONS

Before proceeding with the configuration and operation of Vitals, it is important for the user to become familiar with the terminology and basic functions used throughout this manual.

### 4.1 DISPLAY ELEMENTS

The various elements of the screen and their operation are explained below.

#### 4.1.1 Disclaimer Screen

The Disclaimer Screen is the screen that is displayed when a new device is first powered. The user must read and agree with the Terms & Conditions presented on this screen to continue to use this product. Once the user has agreed to the Terms and Conditions, the user can proceed to the Vessel Settings screen and enter the name of the vessel. By entering the name of the vessel, the user acknowledges that they have agreed with the Terms and Conditions and the Disclaimer screen will not be shown anymore during the startup of the unit.

#### 4.1.2 Touch Screen Actions

- **TAP:** A very short touch with a finger on the desired location of the screen used to select an item.
- **LONG TAP:** A prolonged **TAP** that is held for one second used to call a menu.
- **TAP AND SLIDE:** A long **TAP** while sliding finger in desired direction used to move display items around or scroll through help text or lists.

#### 4.1.3 Standard Configuration Screens

Standard Configuration Screens are screens that are used for entering general settings and/or configuration, backup and restore of configurations, System Information, etc.

#### 4.1.4 Menu Screen

The Menu Screen is the screen that holds the Panel Buttons.

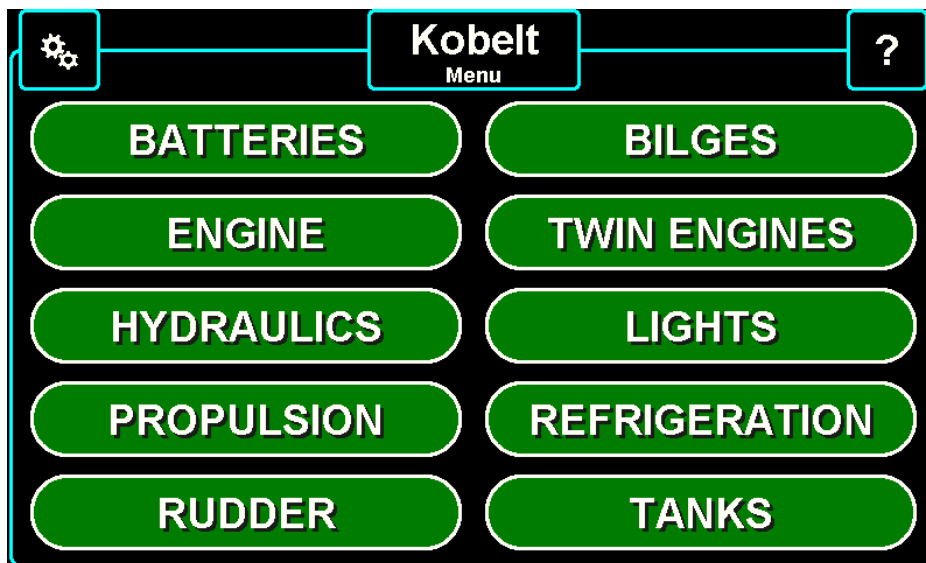


Figure 3: Menu Screen Display

#### 4.1.5 Panel Button

The Panel Buttons are created during the initial setup and located on the Menu Screen. They may differ from system to system based upon the users' preferences. The Panel Buttons have double function: to allow access to a Panel Display for the subsystem they represent and to indicate Alarm Conditions that have been triggered in the Panel they represent by changing their color and behavior.



Figure 4: 'Batteries' Panel Button

#### 4.1.6 Panels

These are screens that are created automatically when a new Panel Button is created. They are initially empty – blank with no Gauges associated with them.

#### 4.1.7 Default Screen

The Default Screen is displayed upon startup or after it wakes up from sleep. The default screen is set up from the factory to be the system's Menu Screen, but it could be changed to any other screen preferred by the user. To change the default screen **LONG TAP** on the Panel Button and **TAP Set as default screen**.

#### 4.1.8 Sleep Mode

Sleep mode occurs if the display has not been interacted with for time longer than the defined display sleep time, the display will be dark with no visual indication. Even when the Display is in a sleep mode Vitals system continues to vigilantly monitor all of the active Data Sources for abnormal conditions.

#### 4.1.9 Active Screen

Active Screen refers to the screen that the system is displaying at the current moment.

#### 4.1.10 Help Button

The Help Button is located in the upper right corner. **TAP** this button to display the Help Screen for the Active Screen.



Figure 5: Help Button

#### 4.1.11 Help Screen

The Help Screen Shows the Help Menu. The Help Screen is specific to the Active Screen. The Help Screen then overlays on the top of the Active Screen. **TAP and SLIDE** up/down to scroll through the text in the help file. To exit, **TAP** anywhere outside of Help Screen.

#### 4.1.12 Vessel Name/Current Screen Button

The Vessel Name/Current Screen Button is located at the middle top part of the screen. The Button displays the vessel name if a custom name has been entered in the Vessel Settings Screen, otherwise any new system will show **Kobelt** at this location as a place-holder. The second row displays the name of the Active Screen by **TAPPING** the Vessel Name button from any screen will bring the system back to the Menu Screen.



Figure 6: The Vessel Name/Current Screen Button

#### 4.1.13 Gauge

A Gauge is a graphical or textual representation of measured parameter.

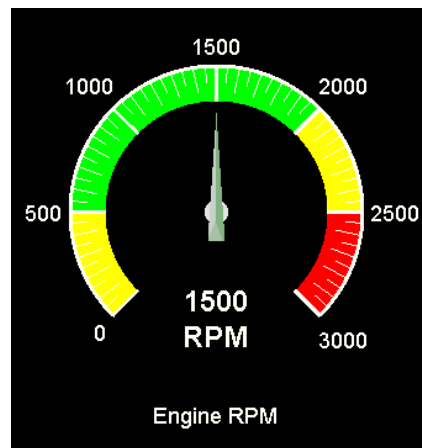


Figure 7: Gauge

A Gauge must have a Data Type associated with a Data Source and might or might not have a Label or Alarm assigned to it. During the initial setup the installer, based on the operator's input, decides what Gauges will be added to each Panel. Gauges are added to the Panels and configured to represent a Data source. Each Gauge can be configured to trigger a warning or an alarm for specific conditions.

#### 4.1.14 Label

Label is a property of the Gauges and it is the text that will show under the Gauge to describe it. E.g. Gauge “Electronic Gauge” is selected to measure Data Type “Temperature” and the desired Label could be “Refrigerator” or “Fish Hold Freezer”. In the label field the user can type any value/description they prefer.



Figure 8: Label

#### 4.1.15 Data type

Data Types are properties of Gauges and represent what data is to be displayed by each individual Gauge, e.g. select data type **temperature** to show selected temperature range with the selected gauge.

#### 4.1.16 Data Source

Data source is a property of the Gauges and it is the channel used to bring the measured parameter e.g. (oil pressure) of the (engine) to the Gauge (Electronic Gauge).

Data Sources could be:

- **Physical Data Source:** Signals connected to any of the input ports on the back of the Vitals device
- **Remote Data Source:** Any Data Sources that are coming on one of the buses e.g. NMEA2000
- **Virtual or Calculated Data Source:** More complex relationships between multiple Data Sources or results of mathematical calculations.

The difference between the physical and remote data source is that the physical sources represent a single parameter, while remote sources could represent multiple parameters, e.g. Digital Input 1 will always display the status of the switch connected to it, while NMEA200 can have multiple switches reported as parameters of NMEA2000 PGN (message).

#### 4.1.17 Range

Range is a property of the Digital Gauges that represents Voltage, Temperature and Tank Level from low to high.

#### 4.1.18 Alarm Alert

An Alarm is an audible and/or visual signal that informs the user of a potential major problem as defined by their configuration of Alarms. The Panel Button(s) will appear in red with a flashing frame to signal an Alarm.



Figure 9: Alarm Alert

#### 4.1.19 Warning Alert

A Warning Alert is an audible and/or visual signal that informs the user of a potential minor problem as defined by their configuration of Alarms. The Panel Button(s) will appear in yellow with a flashing frame to signal an Alert.



*Figure 10: Warning Alert*

#### 4.1.20 Mute Button

The Mute Button appears on the top righthand corner of the screen when an alarm is active. The Mute Button is used to acknowledge and silence the alarm for 5 minutes.



*Figure 11: Mute Button*

#### 4.1.21 Alarm Configuration Screen

Alarm Configuration is the screen from which alarms are configured to respond in a specific way to a change of parameters detected from any of the Data Sources.

#### 4.1.22 Alarm Condition

An Alarm Condition is any condition when the monitored parameters have gone outside of the limits set by warning and alarms setup. Both warnings and alarms are referred to as alarm conditions.

## 5 CONFIGURATION

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When powered, Vitals displays the current default configuration. The user has the ability to change and customize all defaults to suit their specific needs.

To begin customizing, the user must locate and **TAP** the Customization Button (displayed as a gear icon) on the upper left corner of the screen.



Figure 12: Customization Button

### 5.1 INITIAL CONFIGURATION

After **TAPPING** the Customization Button, the user is then presented with a screen offering six Panel Buttons.

The Panel Buttons are:

- System Info
- System Settings
- NMEA2000 Info
- Save/Backup/Restore
- Calculated Sources
- Logs

Below lists an explanation of each Panel Button.

#### 5.1.1 System Info

By **TAPPING** the System Info Panel Button, the user can input the current time and the time zone relative to GMT.

#### 5.1.2 System Settings

By **TAPPING** the System Settings Panel Button, the user is presented with three further Panel Buttons:

- Vessel Settings
- Display Settings
- Unit Settings

##### 5.1.2.1 Vessel Settings

By **TAPPING** the Vessel Settings Panel Button, user can input the following information:

- Vessel Name
- Home Port
- Vessel Type
- Language

### 5.1.2.3 Unit Settings

By **TAPPING** the Unit Settings Panel Button, the user can configure the following default values:

- Temperature: [Celsius (°C), Fahrenheit (°F), Kelvin (K)]
- Engine Pressure: [Kilopascal (kPa), Bar (Bar), Pounds per square inch (PSI)]
- Atmospheric Pressure: [Millibar (mBar), Millimeters of Mercury (mmHg)]
- Tank Capacity: [Liters (l), US Gallons (US gal), UK Gallons (UK gal)]
- Angle: [Degrees (°), Degrees (deg), Radians (rad)]
- Vessel Speed: [Knots (kn), Miles per hour (mph), Kilometers per hour (km/h)]
- Wind Speed: [Meters per second (m/s), Knots (kn), Miles per hour (mph), Kilometers per hour (km/h)]
- Distance: [Meters (m), Nautical miles (nm)]
- Rate of Turn: [Degrees/second (°/s), Degrees/second (deg/s), Radians/second (rad/s)]

### 5.1.2.4 Display Settings

By **TAPPING** the Display Settings Panel Button, the user can configure the screen brightness level, the time before the screen goes to sleep, as well as the alarm volume.

## 5.1.3 NMEA2000 Info

By **TAPPING** the NMEA2000 Info Panel Button, the user can view the list of NMEA2000 devices connected to the system and NMEA2000 Data. These two panels are filled with information only when NMEA2000 devices are connected to Vitals and configured to receive the data from those devices.

## 5.1.4 Save/Backup/Restore

By **TAPPING** the Save/Backup/Restore Panel Button, the user can configure the system to:

- Choose to auto save configurations or not
- Lock the configuration to avoid accidentally overwriting the established configuration
- Save the configuration
- Create, store, restore or deletes backups of configurations
- Reboot the system

## 5.1.5 Calculated Sources

Vitals provides the capability to perform mathematical calculations or logical functions between multiple sources, or sources and selected constant numbers.

Vitals can perform calculations such us:

- Calculate and display the total amount of fuel by adding the sources for three tanks on the boat.
- Setup an alarm if stuffing box temperature exceeds the temperature of the water by more that 10 deg. centigrade
- Setup an alarm if refrigeration compressor temperature is to exceed 30 degree centigrade above ambient air temperature



### 5.1.6 Logs

Logs display all of the Alarms and configurations set up by the user.

**Log File Format:** Alarm\_<DATE>\_<TIME>.log

**Format:** <DATE >T<TIME ><OFFSET>; <PANEL NAME>/<NAME OF GAUGE>; <STATUS>; <VALUE>

Each log has seven elements:

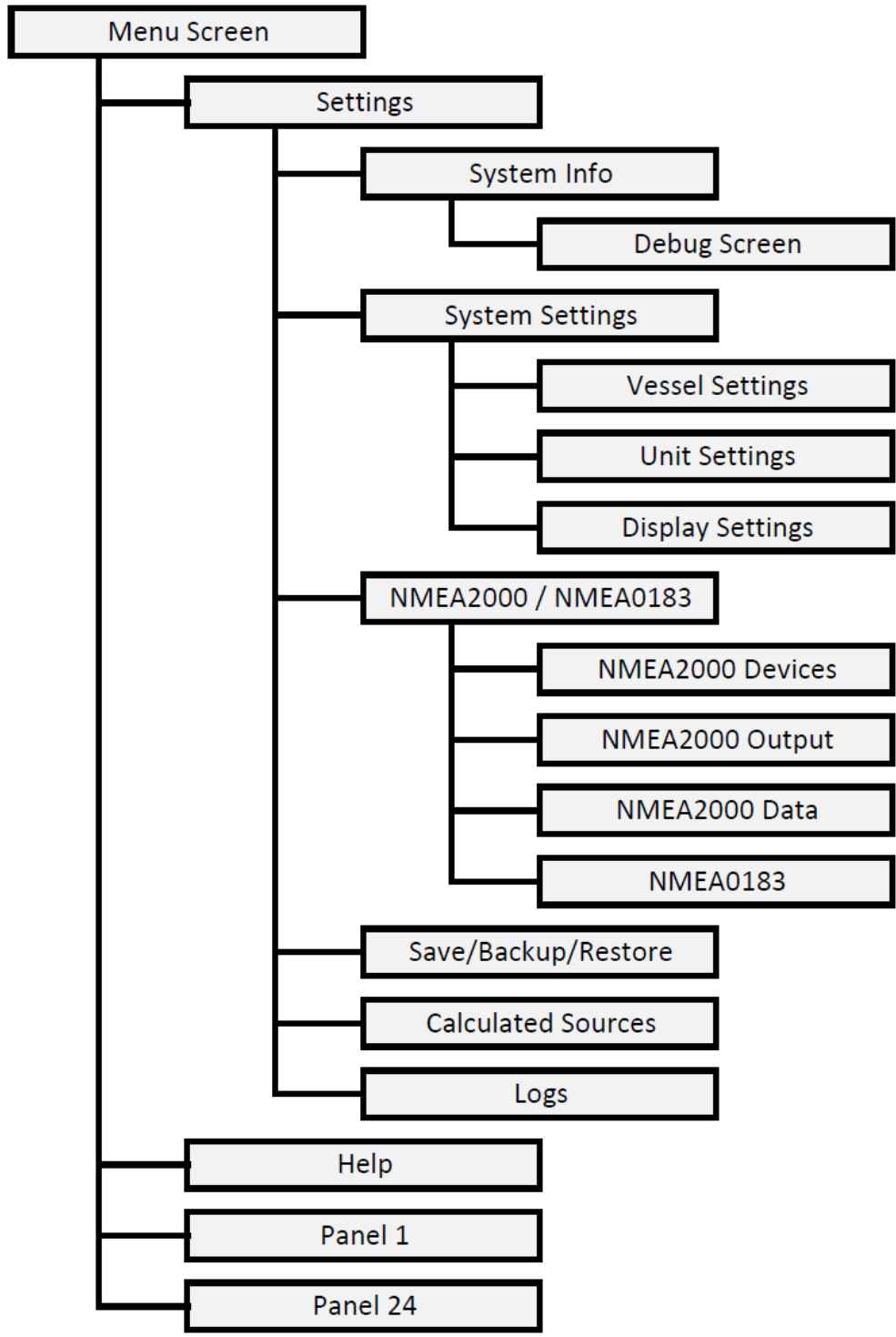
1. Date
2. Time
3. Offset
4. Panel Name
5. Name of Gauge
6. Status
7. Value

The and viewing options for each element are listed below.

- **DATE**
  - YYYY-MM-DD
    - **YYYY:** Year as four digits
    - **MM:** Month as two digits (with leading zero)
    - **DD:** Day as two digits (with leading zero)
- **TIME:**
  - HH:MM:SS
    - **HH:** Hours (with leading zero)
    - **MM:** Minutes (with leading zero)
    - **SS:** Seconds (with leading zero)
- **OFFSET**
  - Time zone offset as defined in the device, from UTC
  - Format: -HH:MM
- **PANEL NAME**
  - Name of the panel the alarm and/or warning gauge was present on
- **NAME OF GAUGE**
  - Name of the gauge or alarm element that triggered the alarm and/or warning
- **STATUS**
  - What action or event was recorded, these could include:
    - UserAcknowledge
    - Normal
    - AlarmMax
    - Unacknowledge
- **VALUE**
  - Data content value

## 5.2 MENU STRUCTURE

Below is a diagram displaying the layout of the Vitals interface.



## 5.3 MENU CONFIGURATION

Before configuring the menu, the user should determine what sensors they wish for Vitals to monitor and the information they wish to have easy access to, then create Panel Buttons, Panels and Gauges.

### NOTICE

Settings can be changed, or protected from change, using the **Lock Configuration** option in the **Settings** menu.

### 5.3.1 Identifying Which Sensors to Monitor

The best approach to setting up Vitals is to for the user create a plan on paper identifying what sensors on their vessel they wish to monitor.

The most common way will be to create Panels Buttons such as:

- **Engine:** To monitor all parameters that are engine related - RPM, oil pressure, temperature etc.
- **Batteries:** To monitor under/over voltage exceptions, temperature etc.
- **Generator:** To monitor the generator related parameters
- **Transmission:** To monitor the transmission oil pressure if equipped with such a sensor
- **Refrigeration:** To monitor the temperatures in the refrigerator, food freezer, fish hold etc.

### 5.3.2 Identifying the Needs of the Panels

The Panels will be different on every boat. Depending upon the vessel type, Panels can be configured to address a variety of very specific needs.

These needs could include:

- **Hydraulics:** Pressure, level, over temperature
- **Propulsion:** Propeller shafts RPM, stuffing box/gland seal temperature
- **Steering:** Pressure, active pump, rudder angle
- **Watertight Hatches:** Position indication

Once the user has a plan and the sensors are connected, the system can be configured relatively quickly. The user should review the steps below and apply a similar approach to their own system.

### 5.3.3 Creating Panel Buttons

After deciding what sensors are to be interfaced to the users' system and how they would like to group the information on their screen. The user can proceed to create a Panel Button to represent the respective Panels.

The Panel Buttons are most commonly named to describe the Panel they represent. Panel Buttons can be created with a **LONG TAP** at any location on the Menu Screen and then selecting **Add panel**. The Panel Buttons will automatically be re-sized and positioned to best fit the screen and can be moved at a later time. Panel Buttons cannot be re-sized by the user.



Figure 13: Long-Tapping Menu Screen

### 5.3.4 Arranging Panel Buttons

The Panel Buttons can be arranged in a different order by **LONG TAP** over the button desired to be moved, then execute **move** commands from the pop-up Panel Button Menu.

## 5.4 CREATING PANELS




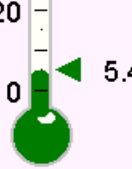
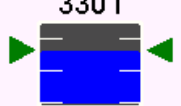


With the Panel Buttons and associated Panels created, the next step is to populate each one with sensors related to each specific Panel. When Panels are created they will be blank and can be accessed by **TAP** of the desired Panel Button.

## 5.5 CREATING GAUGES

There are many graphical Gauge Templates to help the user customize their system.

Below is a table displaying available Gauge Templates and their usage at the time of writing this manual. In the future, the list of Gauges may grow.

Table 3: Gauge Templates

GAUGE NAME	GAUGE USAGE	GAUGE APPEARANCE
<b>Electronic</b>	Display of analog values in the form of a round gauge.	 22' V
<b>Needless Electronic</b>	Display of analog values in the form of an electronic gauge.	 300
<b>Battery</b>	Display of battery voltage and current.	 12.7 V
<b>Thermometer</b>	Display of a temperature maximum, minimum, and current.	 5.4
<b>Tank Level</b>	Display of tank level maximum and current.	 330 I 500 I
<b>Light</b>	Display status of digital input.	
<b>Bilge Pump</b>	Display status of bilge pump signal including count of times activated and total ON time.	
<b>Value Display</b>	Display of printed value.	123 I
<b>Text Display</b>	Display text.	Text

### 5.5.1 Adding Gauges

To add a Gauge, there are five steps:

1. **TAP** the desired Panel Button to go to the respective Panel screen
2. **LONG TAP** anywhere on the screen. Select **Add Data Gauge** from the pop-up menu
3. From the list of Gauge Templates, the user must select the one that will the best represent the information they intend to monitor. **TAP AND SLIDE** the row of templates to the left or right to access more templates
4. **TAP** to select the desired template. (The selected Template will be highlighted with a red border)
5. **TAP OK** to place the selected Gauge Template on the Panel Screen at the location of the initial **TAP**

### 5.5.2 Resizing and Moving Gauges

The size and position of Gauges can be easily modified to suit the users' needs. When a Gauge is initially created, it will be displayed as a yellow frame representing the boundaries of the Gauge on the screen. A Gauge displayed with a yellow boundary is in **Move/Resize Mode**. The upper left and lower right corners have handles that will allow users to resize the Gauge by using the **TAP AND SLIDE** action on either corner handle. The entire Gauge can also be moved around the screen and positioned where desired by **TAP AND SLIDE** inside the yellow boundary.

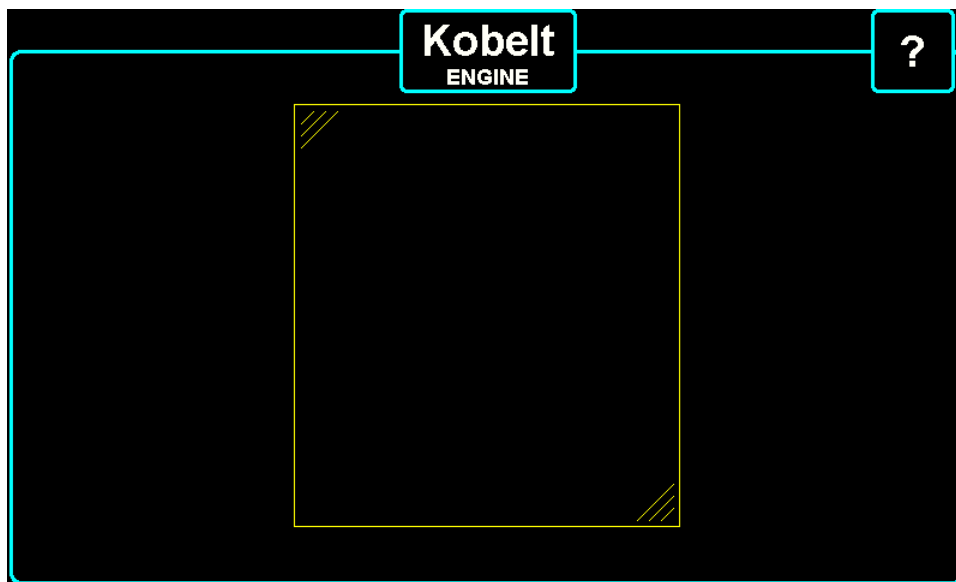


Figure 13: Move/Resize Mode

Once positioned properly, **TAP** anywhere outside of the Gauge yellow boundaries, the boundaries disappear and the system will draw the actual Gauge. The Gauge is now in **Normal Mode**.

- If more than one Gauge is present on the Panel Screen, while one element is in **Move/Resize Mode**, **TAP** the next Gauges to place it in **Move/Resize Mode** and move it / re-size it as desired. Immediately the first Gauge will be put in **Normal Mode** and the Gauge that was just **TAPPED** will be shown as a yellow boundary, ready to be moved or resized. This operation can be repeated until all Gauges are positioned and sized as required.
- **TAP** anywhere outside of the Gauges to exit **Move/Resize Mode**. All Gauges will be placed in **Normal Mode** and ready for operation after they are configured.

### 5.5.3 Configuring Gauges

Once the Gauges are created and positioned on the Panel screen, they need to be configured. The configuration requires setting the properties of each Gauge. Different Gauges have different properties depending on their functions.

Below are the three steps to configure Gauges:

1. **LONG TAP** the Gauge that needs to be configured
2. From the pop-up menu of the Gauge, select **Edit basic setting**. This will present the edit data gauge screen.
3. The selected Gauge will be highlighted with red border around it. If the user would like to change the Gauge Template, they can do so by **TAPPING** the desired new template

#### NOTICE

Selecting new Gauge Template will reset all fields and require the new Gauge to be repositioned and/or resized as described in the previous paragraph.

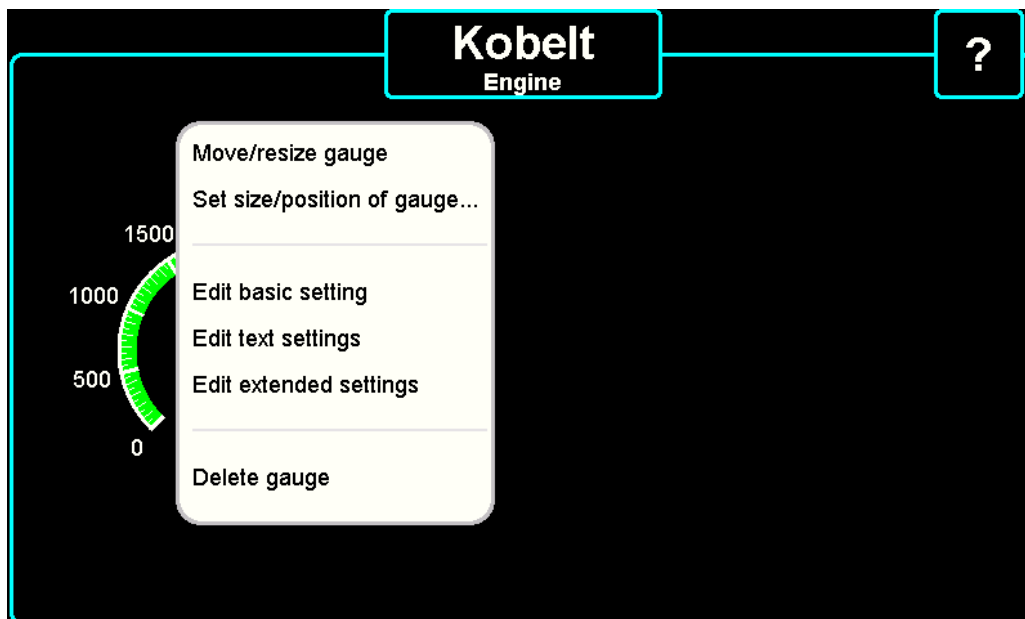


Figure 14: Long-Tapping a Gauge

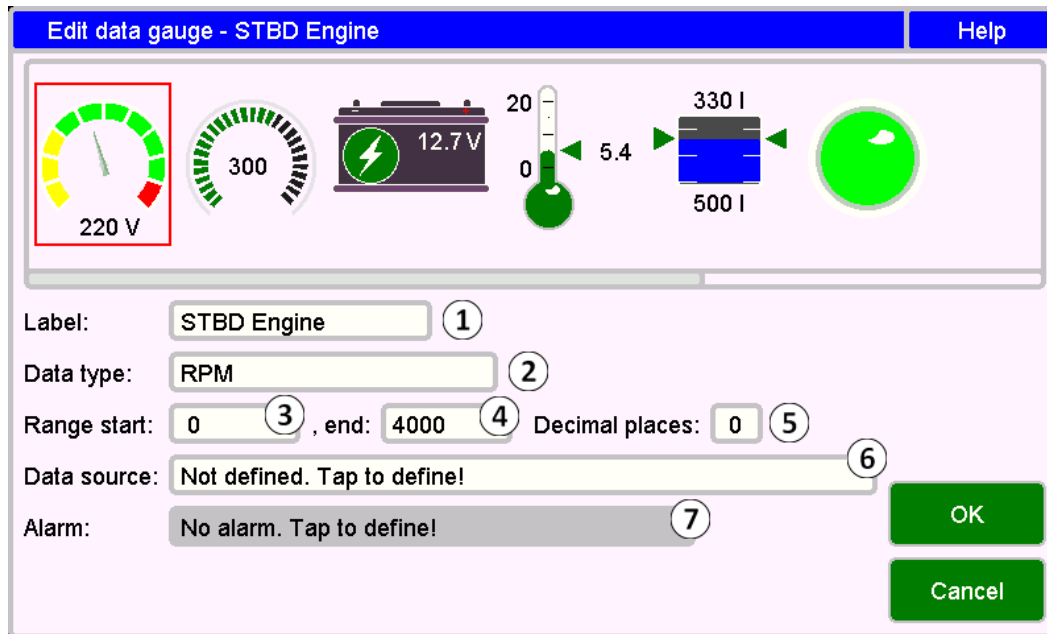


Figure 15: Gauge Configuration View

Table 4: Gauge Configuration Field Reference

NO.	NAME	DESCRIPTION
1	Label	Name of the Gauge
2	Data Type	Determines the units of the number and how it is displayed
3	Range Start	Minimum expected range of the data, this typically includes points that may be reached in alarm states
4	Range End	Maximum expected range of the data, this typically includes points that may be reached in alarm states
5	Decimal Places	Number of decimal places to be displayed on the Gauge
6	Data Source	Source of data for the Gauge, this must be configured for the Gauge to display data
7	Alarm	Alarm and Warning conditions for the Gauge, a data source must be selected before the Alarms/Warnings can be configured.

### 5.5.4 Configuring Labels

The Label is the name the user chooses to describe the Gauge.

Below are the three steps to configure Labels:

1. **TAP** the white field next to the Gauge and a keyboard will appear
2. Enter the desired name
3. **TAP OK** to confirm, or **Cancel** to go back without changing the value

## NOTICE

It is best to keep labels short, as long descriptions overcomplicate the screens and make them harder to comprehend.



### 5.5.5 Selecting the Data Type

Data Type represents what data is to be displayed by the Gauge.

**TAP** the white field to show the list of data types for the Gauge, then **TAP** the desired Data Type to select it.

<b>NOTICE</b>	Not all Gauges can support all data types. Some Gauge templates support one specific data type only. If such Gauge template is selected, the supported data type will be automatically selected and the Data Type field will be grayed out.
---------------	---

Table 5: Gauge Type and Data Type compatibility chart

Gauge Type: Data Type:	Electronic	Needless Electronic	Battery	Thermometer	Tank Level	Light	Bilge Pump	Value Display	Text Display
On/Off	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RPM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Temperature	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Tank Capacity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pressure	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Atmospheric Pressure	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Voltage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Electric Current	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Electric Capacity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Humidity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Depth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Distance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Vessel Speed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wind Speed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Number	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Percentage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Time	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Angle	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Rate of Turn	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### 5.5.6 Selecting the Range

Range is a property of the Digital Gauges that represent Voltage, Temperature and Tank Level gauges. It defines the range from low-to-high to be displayed on the gauge, e.g. for voltmeter, the user may choose range start at 0 and to end at 30. The Gauge will automatically size itself to the specified range. It is recommended that the user experiment with the range to get the results that best fit their requirements.

It is recommended that the value under normal operating condition will show in the middle of the scale (pointing in a straight upward direction). This arrangement allows the user to observe parameters that are out of range with a quick glance at a panel configured with multiple gauges.

For example, when monitoring the battery voltage in a 12 VDC system that shows 14.4 VDC while the engine is running, the user may choose the range to start at 0 and end at 26. In this configuration, 13 VDC will be the middle of the scale of the voltmeter Gauge. It is clear to the operator that when the needle is up, the system is operating normally.

As shown in the figure below, a charged battery, the hand of the Gauge will be close to the mid-scale, whereas with a discharged battery, the hand will be to the left of the mid-scale and charging battery will be shown to the right of the mid-scale.

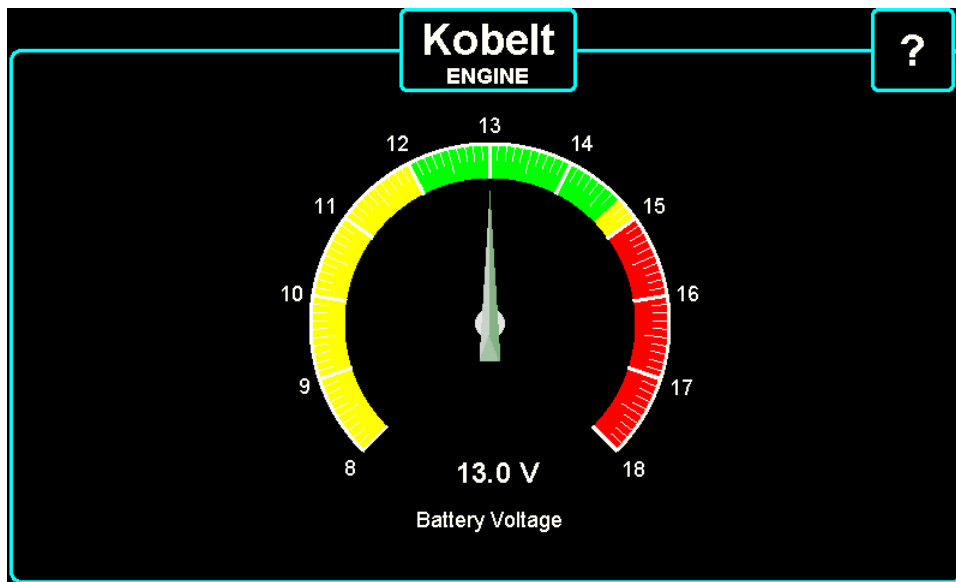


Figure 16: Gauge with hand mid-scale

### 5.5.7 Choosing the Data Source

Configuring the Data Sources is the most important setup element that the user needs to understand in order to get Vitals working properly. Selecting the wrong Data Source will make the system present inaccurate data.

Each Gauge is capable of showing dynamic data, such as the changing values of a sensor. In order to do that, the Gauge needs to know where this data will be coming from. By assigning a Data Source to a Gauge, the Gauge will know to constantly read the sensor output value and to display it properly.

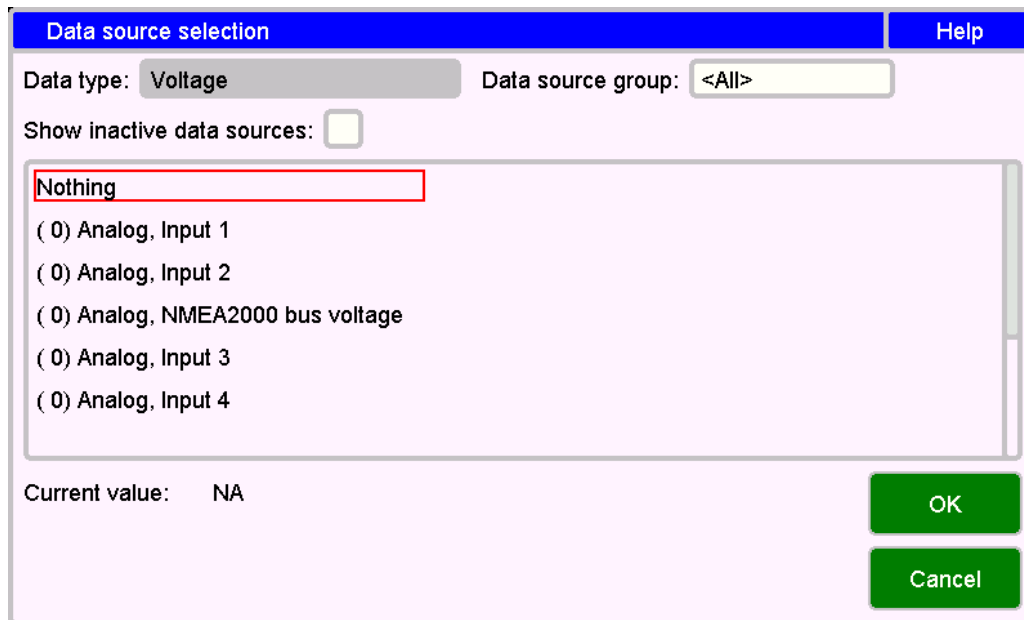


Figure 17: Data source selection

The available Data Sources are:

1. **Analog Input:** Represented by a measurable value from the Analog Inputs. These values can vary, e.g. battery voltage, pressure sensor voltage, tank sensor resistance etc.
2. **NMEA2000 Input:** Represented by measured values of different parameters sent from other NMEA2000 devices over the NMEA2000 network. Each device on the NMEA2000 network has a unique address and every value is associated with an instance number. This allows selections of similar parameters to be distinguished as separate Data Sources, e.g. engine RPM instance one, two and three may represent the RPM of port engine, starboard engine and generator engine.
3. **Smart Bus:** Represented by the values read from digital Smart Bus devices. Each Smart Bus device has unique addresses so they can report their value over the same three wires without getting misinformation.
4. **Digital Input:** Represented by the on / off (1 or 0) value read from the digital inputs
5. **Virtual Input:** calculated values created by combining one or more data source and some mathematical or logical functions

#### NOTICE

It is recommended that NMEA2000 sensors are internally calibrated as per recommended manufacturer instructions during installation. If this is not possible, then Vitals offers the ability for this calibration to be internally to ensure valid data is displayed on Vitals gauges.

### 5.5.7.1 Grouping the Available Data Sources

There are two methods of grouping the available Data Sources

1. **Automatic:** The system will automatically filter out Data Sources that are not suitable for the selected data type, e.g. if On/Off Data type is selected, the system will automatically show only the Digital inputs. If Temperature is selected, the system will show the Analog Inputs, the NMEA2000 sources, and the attached Smart Bus Temperature Sensors. Any one of these data sources could represent Temperature. If further filtering is required, use the Data Source Group selection.
2. **Manual:** The field **Data Source Group** in the upper right corner of the screen acts as a manual filter. Picking a group of sources will display only the available sources of this kind and hide the rest. Picking **All** will display all sources.

The screenshot shows a dialog box titled "Data source selection" with a "Help" button in the top right. The "Data type" is set to "RPM". The "Data source group" dropdown menu is open, showing a list of options: "<All>", "Analog", "NMEA2000", "Smart bus", "Digital", and "Calculated". The "Nothing" option is highlighted in the list below the dropdown. The "Show inactive data sources" checkbox is unchecked. The "Current value" is "NA". There are "OK" and "Cancel" buttons at the bottom right.

Figure 18: Data source grouping

## NOTICE

Automatic Filtering applies to both methods and unsuitable data sources will not show.

### 5.5.7.2 Configuring the Data Source

Once the user has chosen the correct Data Source, they must configure the Data source to the respective Gauge.

The steps to configuring the Data Source are:

1. **TAP** the desired Panel Button to go to the blank Panel screen
2. **LONG TAP** to place new Gauge. This will direct the user to the Edit Data Gauge screen
3. **TAP** the desired Gauge
4. Enter a Label
5. **TAP** the desired Data Type
6. Define the Range
7. **TAP** Data Source to define it. This will direct the user to the Data Source Selection screen
8. **TAP** desired Select Data Source to select it

### 5.5.7.3 Calibrating the Data Source

Some Data Sources provide the correct values and the user needs without any calibration. Other Data Sources are just a representation of that value. i.e. measuring voltage on the back of an old analog Gauge that represents engine oil pressure, or AC frequency signal coming from W post of an alternator that represents engine speed in RPM. In cases like these, the user will need to set some calibration points to allow Vitals to properly interpret and display correct readings so Vitals will react properly to warning and alarm parameters.

The three methods of calibrating a Data Source are:

1. Adding a **single** calibration point so the scale is shifted and calibration offset is created.

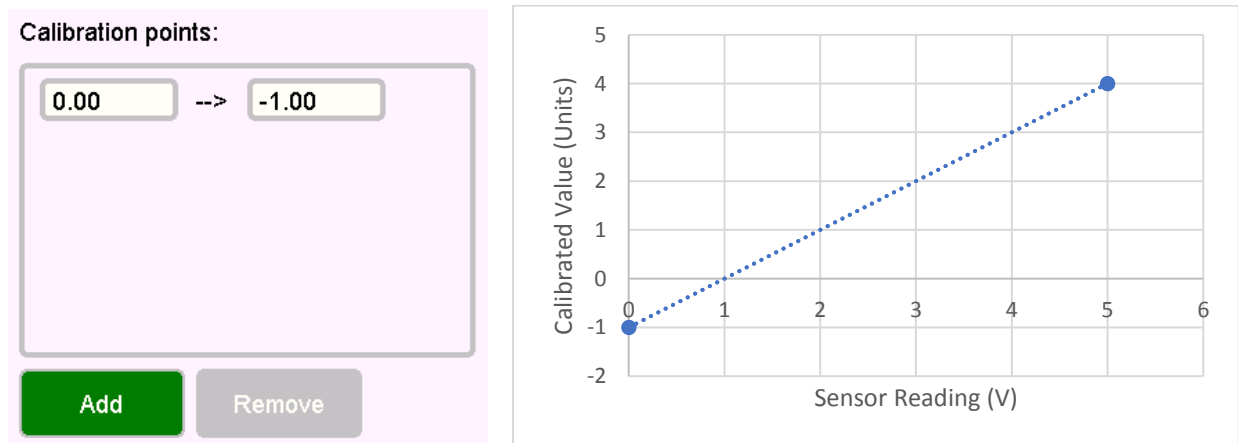


Figure 19: Calibration method one

- 2. Adding **two** calibration points so scale is interpolated linearly. Vitals will display proportionally the values calculated according to the provided two calibration points.

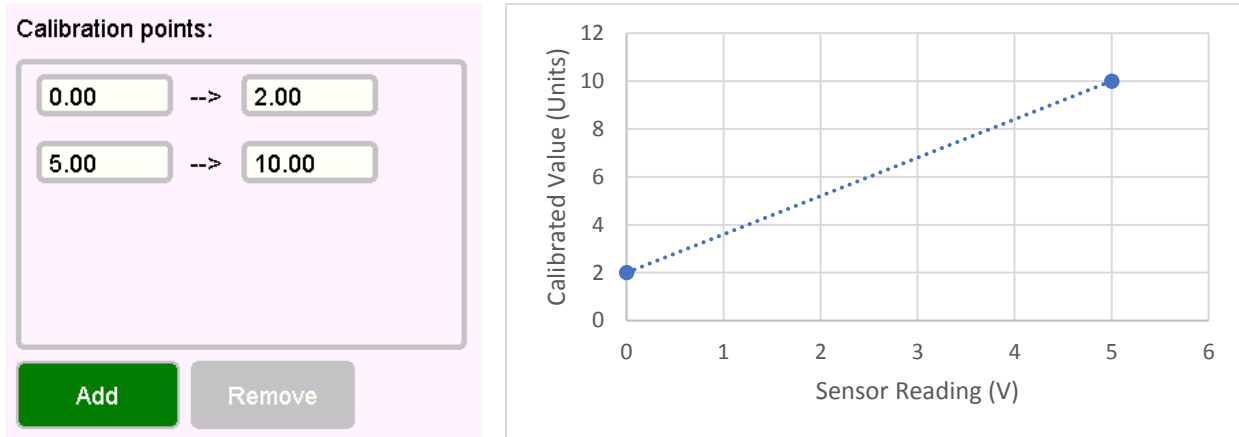


Figure 20: Calibration method two

- 3. By adding **three or more** calibration points. Vitals will display the interpolated values calculated according to the provided three or more calibration points. It is best to use this method for nonlinear sources e.g. the fuel contained in a non-symmetrical fuel tank.

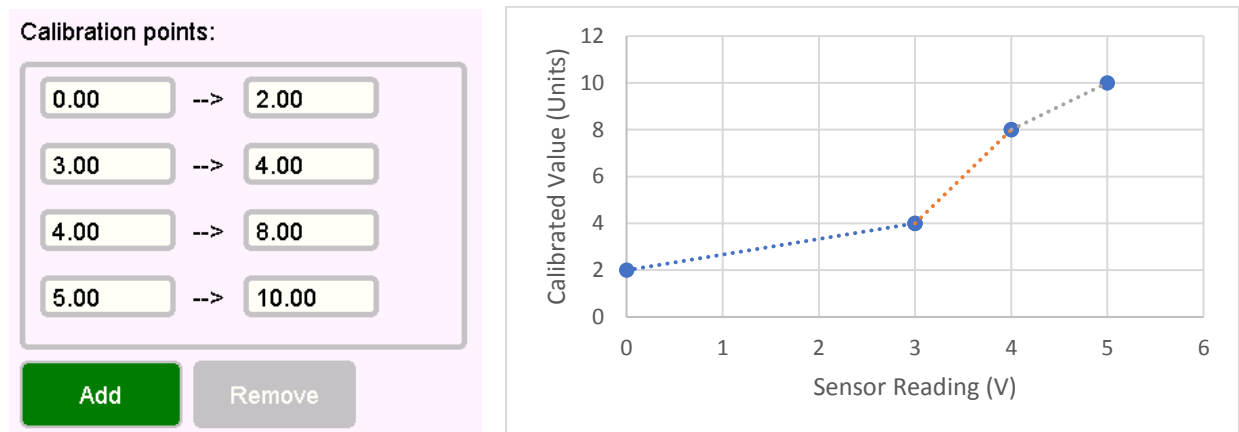


Figure 21: Calibration method three

## 5.5.7.3.1 Linear Calibration Example

**Engine Oil Pressure Calibration**

The required configurations for this example are:

- The Digital Gauge is displayed on the desired Panel
- The Digital Gauge has the proper range start and end values, e.g. 0-80 (PSI)
- The Digital Gauge is linked to the correct Data Source
- The Data Source has the signal from the existing analog Gauge for the oil pressure connected to it

Once the above pre-requisites are met, the next step is calibrating by following procedure below:

1. With the engine stopped, but the ignition key/switch to the “ON” position providing power to the existing analog Gauge, go to the **Data Source Screen** by a **LONG TAP** on the Digital Gauge and select **Edit Display Element**.
2. **TAP** Data Source field and the **TAP** the **Add** button under **Calibration points**. The first calibration point will appear in the calibration points section. The first value will be automatically added by the system. This is the voltage of the oil sender/sensor that represents 0 PSI or kg/cm<sup>2</sup> that in the picture below is 0, Leave this alone and do not change it for now. The second field should be 0. To change the field value **TAP** on the field and enter the new value, then **TAP OK**

The screenshot shows a software interface for editing a data source. The title bar reads "Edit data source - PORT Temperature" with a "Help" button on the right. The main content area is light purple and contains the following elements:

- Data source:** A text field containing "Analog, Input 3".
- Current raw value:** 0.012 V
- Calibrated value:** 0.000 PSI
- Calibration points:** A section with a "Filter" dropdown set to "Normal". Below it is a table with two columns, each containing the value "0.00".
- Buttons:** "Add" (green), "Remove" (grey), "OK" (green), and "Cancel" (green) are located at the bottom of the screen.

Figure 22: Step 2

3. Run engine with high idle, or about 80% of the maximum RPM as recommended by the manufacturer.
4. Note the reading of the existing oil pressure Gauge. **TAP Add** again and a second calibration point field will appear in the **Calibration points** section.
5. Fill in the noted reading from the oil pressure Gauge in the right value of the second calibration point. In the example below the oil pressure Gauge was reading 60 PSI and 60 was entered as a second value in the second calibration point.

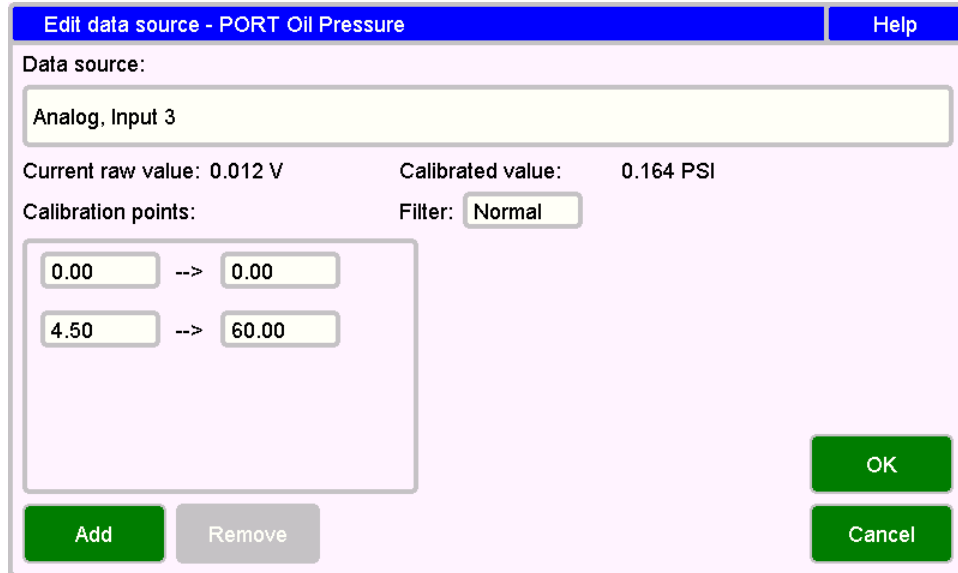


Figure 23: Step 5

**TAP OK** and **TAP OK** one more time on the next screen.

As most senders/sensor for oil pressure and temperature are linear, there is no need to enter more calibration points.

For non-linear calibrations repeat the procedure for adding more calibration points. Change the Engine RPM to different values, note the oil pressure on the Gauge, add calibration point and enter the second value of the calibration point as noted. If necessary, repeat the same procedure again with different RPM.

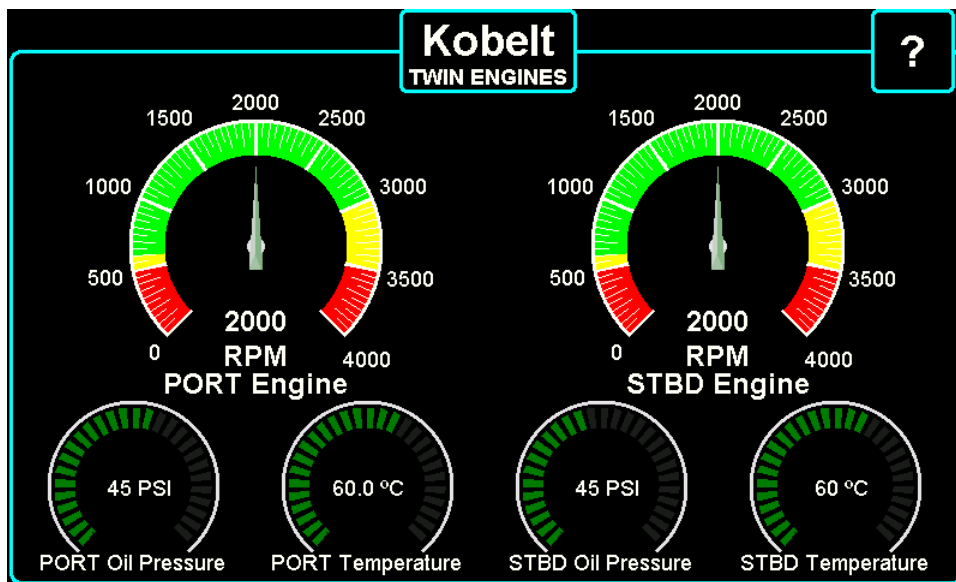


Figure 24: End result



The above calibration procedure is applicable for calibrating any Data Source. The steps are:

1. Pick a calibration point as close to the 0 value as possible. If this is impractical, enter the real value in the right field after creating the first calibration point.
2. Pick a second calibration point as close to 100% value as safely possible.
3. Enter the real value (read from the existing Gauge) in the right field of the calibration point.
4. If there is no existing Gauge, use a meter to measure the real value in the units desired. e.g. mechanical pressure gauge to see the actual pressure. Two calibration points are sufficient for most applications.
5. Add more calibration points and enter the real values at these points for non-linear Data Sources.

Follow a similar procedure to calibrate fuel or water tanks. The steps are:

1. With approximately empty tank enter the first calibration point.
2. Enter the actual value in the right field for the first calibration point. The difference from the above oil pressure example is that now the user needs to enter the approximate amount of fuel in the tank as it is not completely empty, thus the actual amount of fuel in the tank is not 0.
3. Start filling the tank. Make several stops while filling the tank
4. Note the amount of fuel shown on the fuel pump (real measured values)
5. Add a second calibration point, and enter the noted amount of fuel from the pump at the time of adding the calibration point, plus the initial amount of fuel in the tank. Most integral fuel tanks have irregular shapes. Meaning, if the tank is 90cm/35inches tall and the fuel level is shown to be at the middle – 45cm (17.5”), the tank might be only filled to 1/3 of its capacity as the bottom portion of the tank is narrower. Adding more than two calibration points will represent at any time the amount of fuel in the tank with greater accuracy.
6. Repeat that procedure for each newly added calibration point.

### 5.5.8 Determining Warning and Alarm Values

Depending on the Panel being monitored, proper warning and alarm points need to be selected. Properly configured warnings and alarms may save thousands of dollars in equipment repairs, but wrong alarm values will lead to the frustration of many false alarms or even worse, the device not alarming when something is really going wrong. Confirm with the manual or the equipment manufacturer what values are critical and so your warnings and alarms are set to points before reaching the critical values.

#### **NOTICE**

The values of warnings and alarms in this manual are for illustration purposes only and should not be used on a vessel.

### 5.5.9 Creating Simple Warnings and Alarms

Warnings and alarms can be created for every Gauge that has a valid Data Source associated with it.

The warnings and alarms represent values that are below or above the allowable limits. In principle, warnings and alarms are treated the same by the system but differ by severity. Warnings are usually set when a parameter being monitored has not reached the critical value, but it is outside of the normal working parameters of the equipment.

There are four different warnings and alarm parameters that can be defined for each Gauge being monitored. Not all four or any of them require to have a definition. Assigning a value to any of the warning parameters or alarm parameters tells the systems to start monitoring for deviation from the prescribed value for the respective parameter

### 5.5.10 Creating Complex Warnings and Alarms

Complex Warnings and Alarms can be created for every Gauge that has a valid Data Source associated with it as with simple warnings and alarms.

**Edit alarm - Engine** Help

Alarm type:  Disabled:

Enable rule:

Period (s):

Min. alarm (RPM):	Min. warning (RPM):	Max. warning (RPM):	Max. alarm (RPM):
<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="NA"/>
Absolute min. (RPM):	Normal min. (RPM):	Normal max. (RPM):	Absolute max. (RPM):
<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="NA"/>	<input type="text" value="NA"/>

OK  
Cancel

Figure 25: Cumulative Period Alarm Screen

### 5.5.11 Defining Warning Range

The warning parameters are called: Warning Min and Warning Max. If both are specified, they define the safe operating window (range) of the equipment. Vitals will raise a warning when the Gauge value gets outside of this range.

### 5.5.12 Defining Alarms Limits

The alarm parameters are called: Alarm Min and Alarm Max. If both are specified, they define the limits outside of which it is problematic for the equipment to operate and measures must be taken to rectify the root cause of the problem as soon as safely possible.

#### 5.5.12.1 Fuel Tank Example

There are two critical parameters that should be setup as alarms on a fuel tank.

1. First, if the Fuel tank falls below critical level – 15% of the tank capacity – for example
2. Secondly, before the tank is overfilled creating a fuel spill – 95% of the tank capacity

For a 1000 gallon tank, with the above requirements the Alarm Min value is to be set at 150 gallons and the Alarm Max set at 950 gallons.

The pre-requisite steps to complete for this example are:

1. Create a Panel Button for Fuel Tanks.
2. A Fuel Tank Gauge is placed on the Fuel Tank Panel Display.
3. A Fuel Tank on-board the vessel has a NMEA2000 complaint sender installed and it is connected to the same NMEA2000 network as Vitals.
4. Fuel Tank Gauge has the NMEA2000 tank sender assigned to it as a Data Source.

Once the above pre-requisites are met, follow the procedure below:

1. **LONG TAP** on the Fuel Tank Gauge

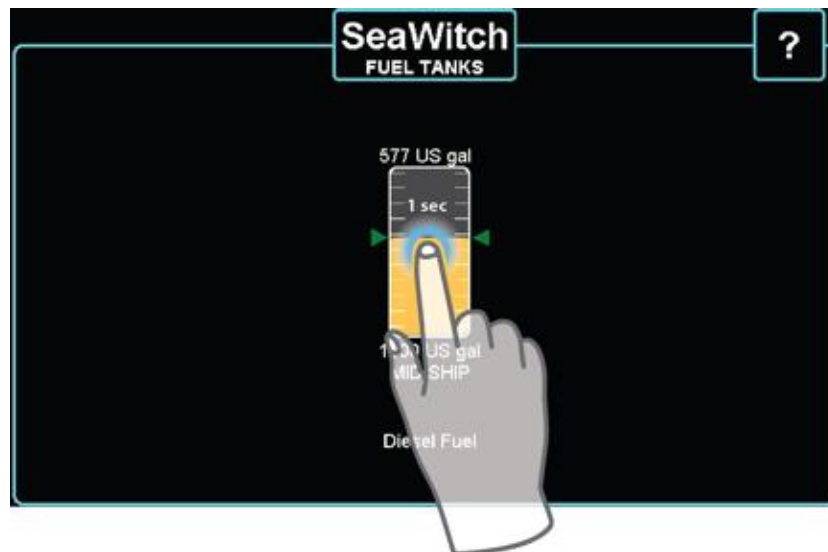


Figure 26: Step one

2. Tap on the "Alarm" field.

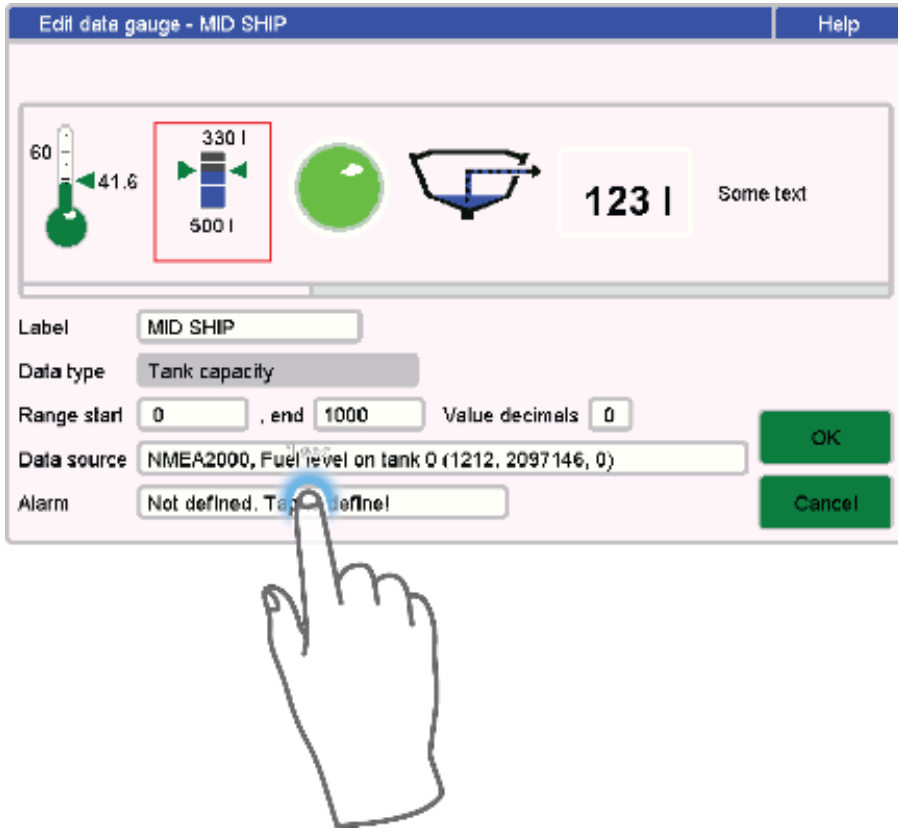


Figure 27: Step two

3. Tap on Alarm type field and select Simple min/max alarm

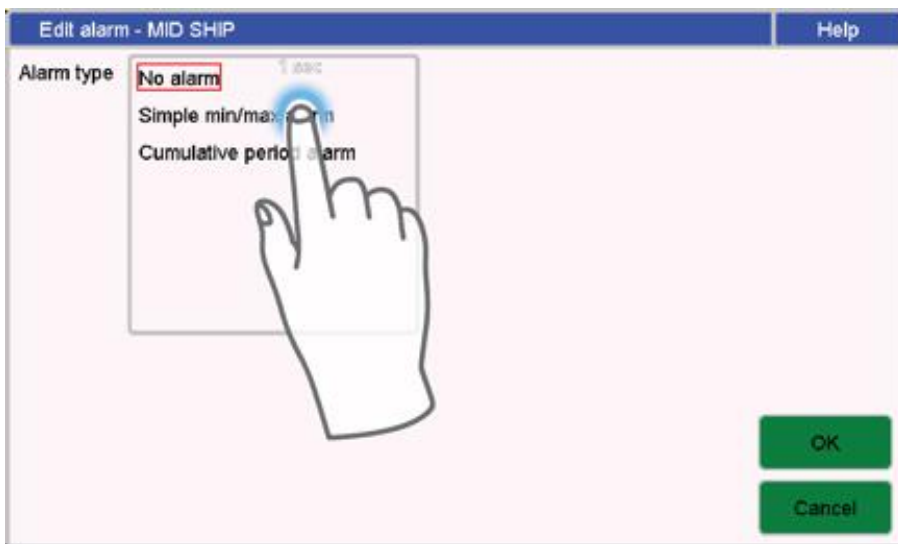


Figure 28: Step three

4. Enter the values for Alarm Min and Alarm Max

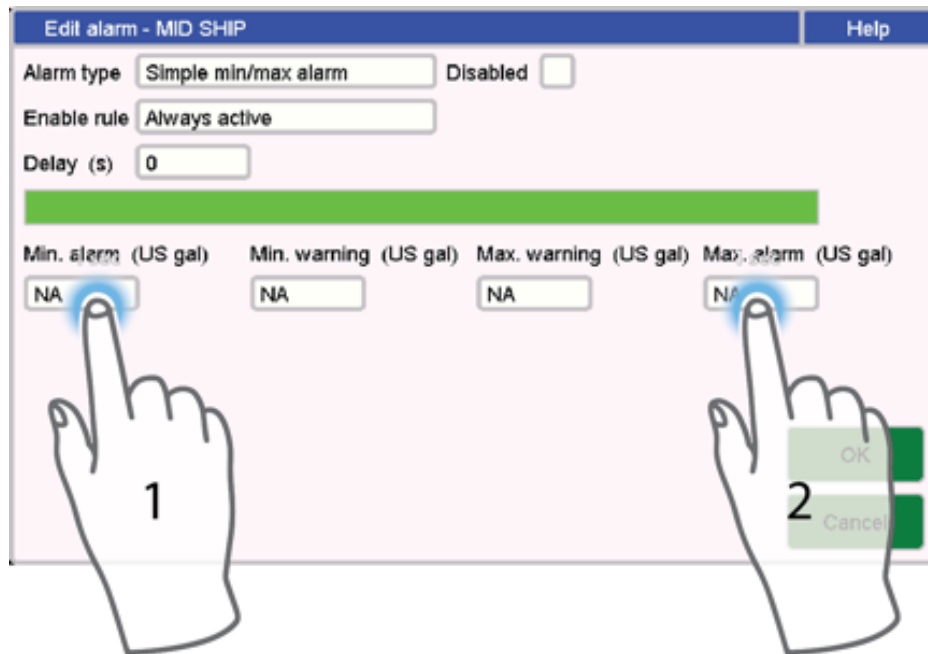


Figure 29: Step 4

The alarm parameters are entered and indicated graphically in Red on the bar that indicates the overall scale of the gauge.

The warning parameters are entered and indicated graphically in Yellow on the bar. Values 50 litres below and above the Alarm parameters have been set as shown.

5. Tap **OK** and **OK** again on the next screen to return to the Fuel Tanks Panel Display

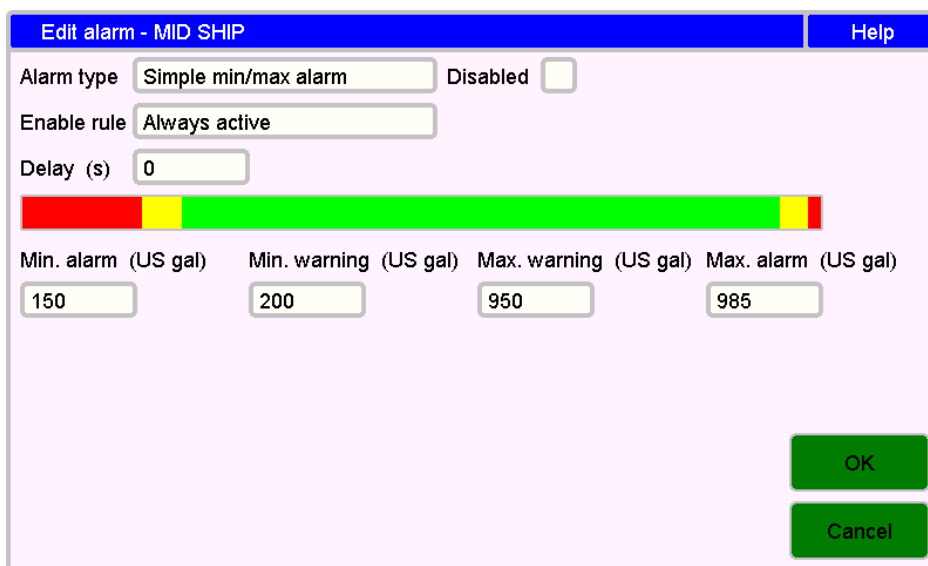


Figure 30: Step five

- 6. The gauge in Warning or Alarm state can be easily recognized by their distinctive yellow and red colours. See below as the gauge displays normal state, warning state and alarm state.

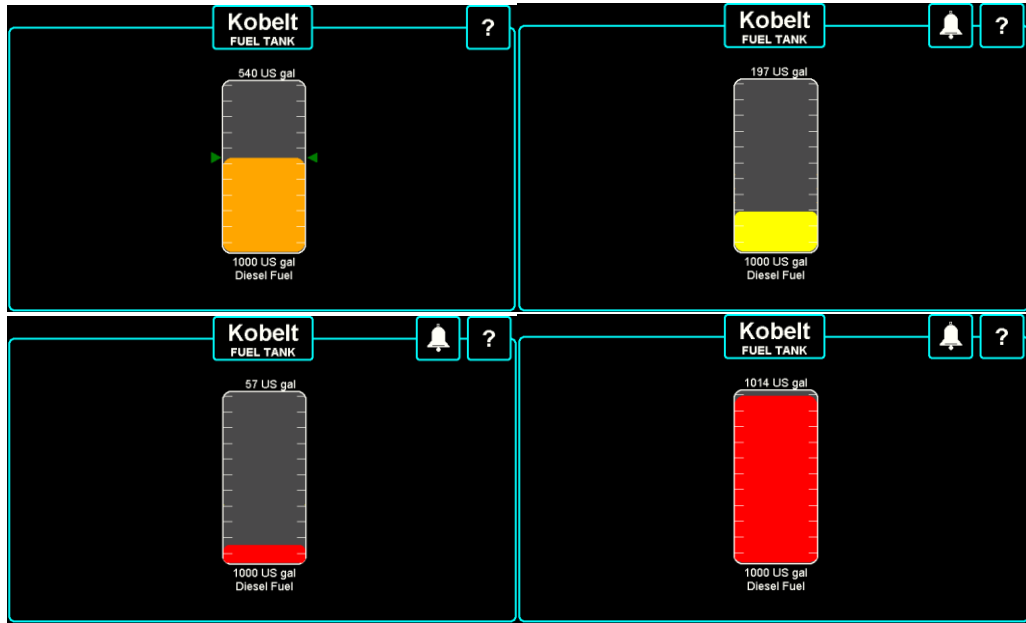


Figure 31: In the order of appearance, left to right and top to bottom: Normal Condition (No Warning or Alarm), Alarm Low, Alarm Low, and Alarm Max.

## 6 OPERATION

Vitals is a great aid to the user to make sure that the vessel's systems are operating properly. Vitals helps the user make quick determination when something goes wrong. This is very valuable and in critical situations quick informed decisions can save thousands of dollars in maintenance or repair costs as well as reducing vessel/equipment downtime.

### 6.1 NORMAL OPERATING CONDITIONS

Vitals is designed to provide visual and audible indication about a problem and its severity. When all Panels are operating properly all of the Panels Buttons are represented by steady green color with white outline.



Figure 32: 'Batteries' Panel Button in Normal Operating Condition

### 6.2 ABNORMAL OPERATING CONDITIONS

Abnormal Operating Conditions are conditions of the parameters that are monitored, which are above or below the set thresholds for a warning and/or alarm. If such thresholds are not set during the installation, the unit will not show alarms or warnings.

#### NOTICE

To get the most benefit of having Vitals, the user must make sure the warning and alarm points are correctly set during the installation and commissioning of the unit.

If abnormal operating conditions arise, Vitals presents the warning or alarm that has been triggered by visual and/or audible cues.

Warnings and alarms display differently. The Panel Button(s) corresponding to the problem(s) will appear yellow with flashing to signal a warning and the Panel Button(s) will appear in red with flashing frame to signal an alarm. A simple glance at the screen will show to the user which one of the monitored Panels is having a malfunction.



Figure 33: 'Batteries' Panel Button in Alarm Condition



Figure 34: 'Lights' Panel Button in Warning Condition

**TAPPING** on the problematic Panel Button will reveal this specific Panel Display. The user will then be able to identify the flashing Gauge that is causing the alarm or the warning. The user can then make an informed decision on how to proceed.

## 6.4 RESPONDING TO ABNORMAL CONDITIONS

When presented with abnormal conditions, the user has three options on how they wish to proceed.

The three options are:

1. **Acknowledging the Alarm:** The audible indication will be muted and the frame on the Panel button will stop to flash, but remain colored in the appropriate color for the condition that triggered it.
  - The color of the acknowledged alarm Panel is red if the trigger for the alarm still exists, e.g. if the bilge pump has started running, the alarm is triggered and then acknowledged, but after some time the pump stops running. The Bilge Pumps panel button will frame will flash in the beginning, stay red but not flash after being acknowledged until the bilge pump is running, and then turn green when the pump stops running as the operator has acknowledged this instance of the trigger already. Next cycle of the pump will turn on the alarm again.
  - If the alarm sounds in the users' absence, the alarm will sound until it either gets acknowledged or the trigger is no longer present. Acknowledging will silence the alarm.
  - If the alarm is not acknowledged, but the trigger is not present any longer, the Panel Button will turn yellow if it was red (alarm state) or stay yellow if it was yellow (warning state) to begin with. In both cases the frame around the button will stop flashing. The audible sound will continue to sound once every 30 seconds to draw the users' attention, indicating that there was a prior alarm condition. When the alarm was raised and the trigger condition does not exist any longer, holding the dormant alarm state indicates to the operator that there was an issue present even if the user was not there to witness it. As Vitals is remembering and is indicating any triggered alarm condition till it is acknowledged, the operator still needs to check what the issue was and acknowledge it to get the panel button back into the normal green state.
2. **Mute the Audible Alarm:** When audible alarm is present, the Mute Button appears in the upper right corner of the screen. Pressing the Mute Button will silence the audible alarm but the button(s) for the panel(s) in abnormal operating conditions will continue to be active and flash.
3. **Wait:** Leave the alarm condition active until the situation is dealt with - the audible indication will continue to sound and the visual flashing button frames will continue to be active.



## 7 MAINTENANCE

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The Vitals unit requires very little maintenance. If the user follows the guidelines below, Vitals will remain in peak condition for years.

### 7.1 CLEANING

The nature of the touch screen displays is such that they constantly get touched and this could cause oily fingerprints or other contamination on the screen. There is not much one can do to prevent this, but to clean the screen surface when required.

To clean the screen surface, use a soft damp cloth and wipe the screen. Do not attempt to use any chemicals, but water, for cleaning the screen or the plastic bezel. Using anything else but damp soft cloth with water, could damage the enclosure or the touch screen.

### 7.2 PREVENTATIVE MAINTENANCE

1. Quarterly (4 times per year)
  - a. Clean the unit with damp cloth
  - b. Visually inspect all wire connections for signs of wear
2. Every year
  - a. Inspect top and internal enclosure to ensure no adverse wear due to environment
  - b. Confirm all electrical connections are secure
  - c. Check calibrations against known good measurement of the parameter being calibrated

**NOTICE**

It is recommended that any required service work on a Kobelt unit be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.

## 8 TROUBLESHOOTING

In the event of an abnormal operation, check the error message against this section of the manual and try to rectify the problem as specified in the error message or in this section of the manual.

If it is not possible to locate or eliminate the problem using this section, or if the dysfunction is still present, switch off the device and contact Kobelt Manufacturing Co. Ltd. technical support department.


 <b>WARNING</b>	The user must not attempt to repair the unit themselves. It is strongly recommended that any required service work on a Kobelt unit be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.
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Table 6: Troubleshooting procedures

Problem (Issue Encountered)	Cause (What it Means)	Corrective Action (What to Do)
<b>Message: "No SD card found"</b>	The micro SD card is either not in the micro SD slot or has malfunctioned.	Replace the micro-SD card of in the unit with micro-SD card. 16GB or less is more than sufficient.
<b>The screen is dark</b>	The screen is in power saving mode.	Touch the screen to "wake" the unit.
	There is no power to the screen.	Cycle the breaker providing power to Vitals. Check for power available on the back of Vitals screen by measuring the connector marked with "+/-".
<b>There is no sound coming from the attached speaker</b>	There is no alarm or warning triggered.	Go to System Settings -> Display and try to adjust the Volume. While dragging the volume bar, there should be sound coming from the speaker.
	The mute is ON.	Turn mute OFF.
	Speaker disconnected or not working.	Check the electrical connection to the speaker. Check the speaker with Ohm meter for continuity. It should measure between 4 and 8 Ohms. Connect the external speaker back on and cycle the power to Vitals.

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## 9 WARRANTY

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Kobel Manufacturing Co. Ltd. (“Kobel”) warrants the Products and Parts manufactured by Kobel to be free from defects in workmanship or material and that said products are designed mechanically and functionally to perform to specifications.

This warranty is effective providing:

- The equipment is used within the intended operating conditions and in accordance with Kobel recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobel has provided

This warranty becomes invalid if the factory supplied serial number has been removed or altered on the product. This warranty does not cover cosmetic damage or damage caused by an act of God, accident, misuse, abuse, negligence or modification of any part of the product. This warranty does not cover damage due to improper operation or maintenance, connection to inappropriate equipment or attempted repair by anyone other than an authorized Kobel representative.

Upon identification of a potential issue or defect with a Kobel Product or Part, the Warranty Applicant (“Applicant”) must immediately contact Kobel and describe the issue in writing, by letter, fax, email or other electronic conveyance. Kobel will then assess the cause of the defect and determine warranty applicability and appropriate remediation.

If any part is found to be defective, Kobel will replace said part FOB the Kobel factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobel’s sole obligation to the Applicant will be to repair or replace the defective part with same or similar product, to a maximum value of the list price of the product or part. The Kobel warranty does not cover labour charges, travel or any other associated expenses.

All Products and Parts manufactured by Kobel, are subject to a warranty against manufacturer’s defects in materials or workmanship for a period of one (1) years from the date of purchase.

Kobel will be responsible for all Products or Parts sold by Kobel but manufactured by 3<sup>rd</sup> party manufacturing companies. However, these products and parts are subject to applicable 3<sup>rd</sup> party warranties and may not be the same as the Kobel warranty.

## 10 APPENDIX A: RECORD OF CONNECTIONS

The following table can be used to plan and record the external sensors connected to Vitals.

Table 7: Record of Connectors table

IO Name	IO Limits	Externally Connected Sensor Notes
Speaker	4-8 Ohm, <2 Watts	
Relay	32 V / 0.5 A, NO	
NMEA2000 (M12)	9-32 VDC	
NMEA2000	9-32 VDC	
NMEA0183	Version 2.0+	
Analog Input 1	0-32 VDC	
Analog Input 2	0-32 VDC	
Analog Input 3	0-32 VDC	
Analog Input 4	0-32 VDC	
Resistance Input 1	0-1000 Ohm	
Resistance Input 2	0-1000 Ohm	
RPM Input 1	1.5-28 V	
RPM Input 2	1.5-28 V	
Digital Input 1	0-32 VDC	
Digital Input 2	0-32 VDC	
Digital Input 3	0-32 VDC	
Digital Input 4	0-32 VDC	
Digital Reference 1	VDC / GND	
Digital Input 5	0-32 VDC	
Digital Input 6	0-32 VDC	
Digital Input 7	0-32 VDC	
Digital Input 8	0-32 VDC	

<b>IO Name</b>	<b>IO Limits</b>	<b>Externally Connected Sensor Notes</b>
<b>Digital Reference 2</b>	<i>VDC / GND</i>	
<b>Smart Bus – Sensor 1</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 2</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 3</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 4</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 5</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 6</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 7</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 8</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 9</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 10</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 11</b>	<i>Temperature</i>	
<b>Smart Bus – Sensor 12</b>	<i>Temperature</i>	

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## 11 APPENDIX B: NMEA2000 PROGRAM GROUP NUMBERS

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The following NMEA2000 Program Group Numbers (PGN) are supported by Vitals.

- PGN 127245 (Rudder Position)
- PGN 127251 (Rate of Turn)
- PGN 127257 (Yaw, Pitch, Roll)
- PGN 127488 (Engine Speed)
- PGN 127489 (Engine Oil Temp and Engine Coolant Temp)
- PGN 127493 (Transmission Gear, Oil Pressure, Oil Temperature)
- PGN 127505 (Fluid Type, Level, Tank Capacity)
- PGN 127506 (Battery Instance, Battery Voltage, Battery Current, Battery Temperature)
- PGN 127507 (Charger status)
- PGN 127508 (Battery Voltage, Battery Current, Battery Temperature)
- PGN 128259 (Speed Water Referenced, Speed Ground Referenced)
- PGN 128267 (Depth Below Transducer, Offset, Range)
- PGN 130311 (Temp Source, Temperature, Humidity Source, Humidity, Atmospheric Pressure)
- PGN 130312 (Temp Instance, Temp Source, Actual Temperature, Set Temperature)
- PGN 130313 (Humidity Instance, Humidity Source, Actual Humidity)
- PGN 130314 (Pressure Instance, Pressure Source, Pressure)
- PGN 130315 (Pressure Instance, Pressure Source, Set Pressure)
- PGN 130316 (Temp Instance, Temp Source, Actual Temperature, Set Temperature)
- PGN 130576 (Port Trim Tab, Starboard Trim Tab)