Alba-Combi

Analogue to NMEA2000 converter

AlbaCombi

NMEA2000 Analog Converter

USER MANUAL

V1.0.5, Rev A

Alba-Combi

Analogue to NMEA2000 converter

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The information provided in this document concerning capacity, suitability and performance shall not be considered commercially binding.

Please note that all capacity figures and dimensioning methods are based on EMMI Network's SL own models of how devices behave in a network. The document is intended to be used by professionally trained personnel. It is strongly recommended to involve EMMI Network SL in discussions covering the contents of this document.

Any feedback that may help EMMI Network SL improve the documentation and information methods is welcome.

CE

The AlbaCombi has been certified to comply with the European directive for Electromagnetic Compatibility (EN60945) and is appropriately CE marked. Operation of the unit should be in conjunction with appropriate CE approved shielded connectors and cabling used in accordance with the CE directive EN60945. Any EMC related issues should be reported to Emmi Network S.L. immediately to allow the company to rectify or resolve EMC related problems in accordance with its obligations under EN60945.

Product Disposal
Please dispose of this product in accordance with the WEEE Directive. The product should be taken to a registered establishment for the disposal of electronic equipment.

PRODUCT OVERVIEW

The new AlbaCombi is a second generation device, built following our successful Alba line of converters, that translate analogue signals from all over the boat to an NMEA2000 bus.

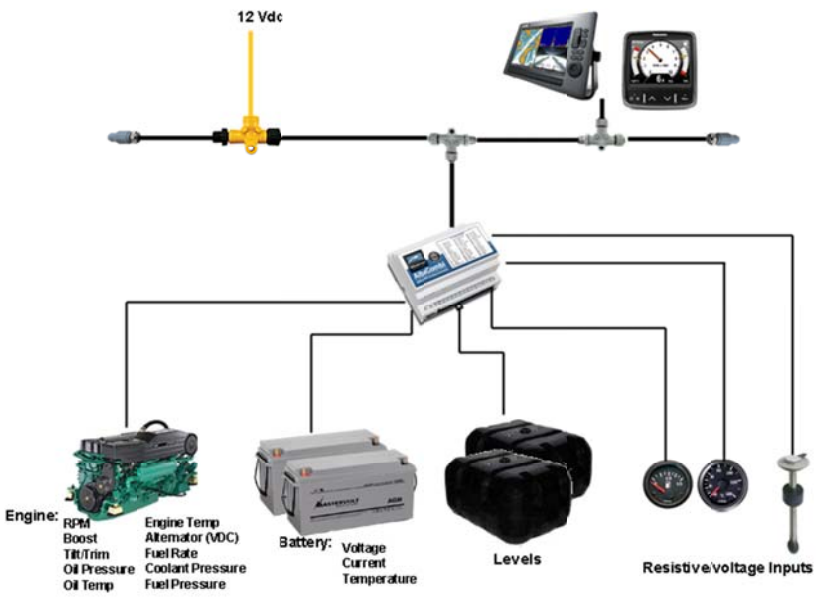
The unit has been designed to connect in parallel to an existing gauge, so existing instruments can still be used.

The AlbaCombi can be used to get engine data, tank levels, alarm status, generic pressure and temperature indications from any 4-20mA sensor. You get twelve 0V to 32V inputs that can be used for anything from reading voltages of batteries to interfacing with any analogue gauges. Six channels can be configured to measure resistance from any industry standard engine sensor. Also there are two RPM inputs, one PTC temperature input, one shunt and two relay outputs.

All twelve resistance and voltage channels have comprehensive calibration that allow you to create an 8 point calibration table or select a predefined industry standard calibration table for most common sensors and gauges.

The AlbaCombi has an Ethernet port that will allow web based calibration. Just connect your laptop to the AlbaCombi via Ethernet and you will get to the calibration and testing page . No calibration tools or special interfaces are required. This device is future proof and can be upgraded in the field via its ethernet port.

See the configuration instructions to find which senders and PGNs are supported. The instructions can be found on the website at www.albacombi.com.



1. Select mounting location: Ensure the AlbaCombi can be mounted in a suitable location between the NMEA2000 bus and the senders or gauges.
2. Connect the AlbaCombi to the NMEA2000 network
3. Connect the Gauge inputs
4. Connect the Power to the AlbaCombi
5. Configure the AlbaCombi

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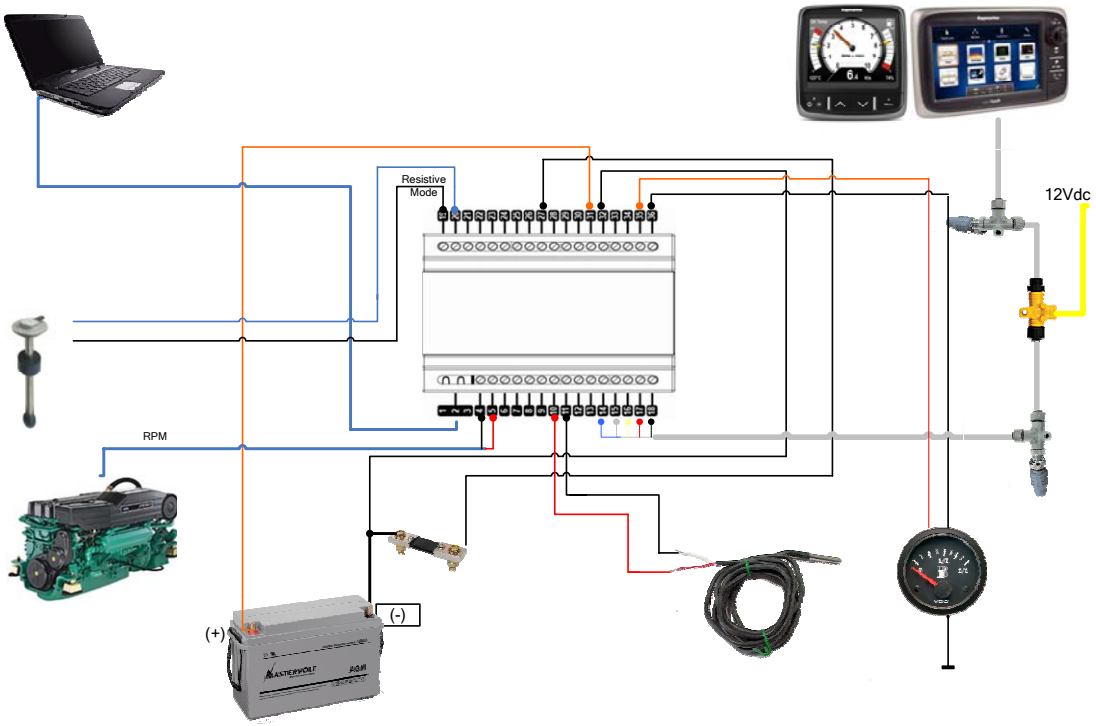
INSTALLTION

1.1 Selecting a Mounting Location

The following figure shows an example installation. This gives an idea of the connections that need to be made to install the AlbaCombi. All these connections need to be considered before selecting an installation location.



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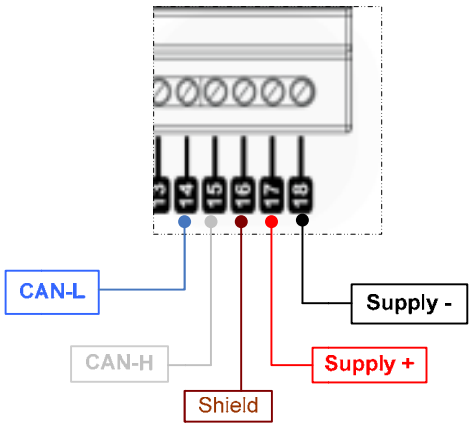
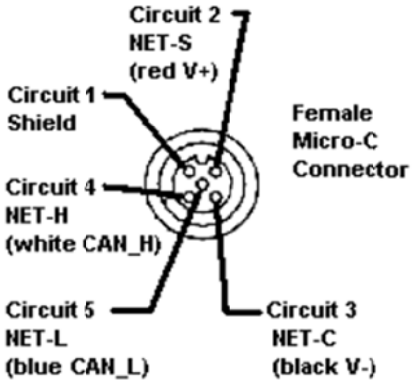
1.2 CAN connection





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2. MOUNTING THE ALBACOMBI UNIT

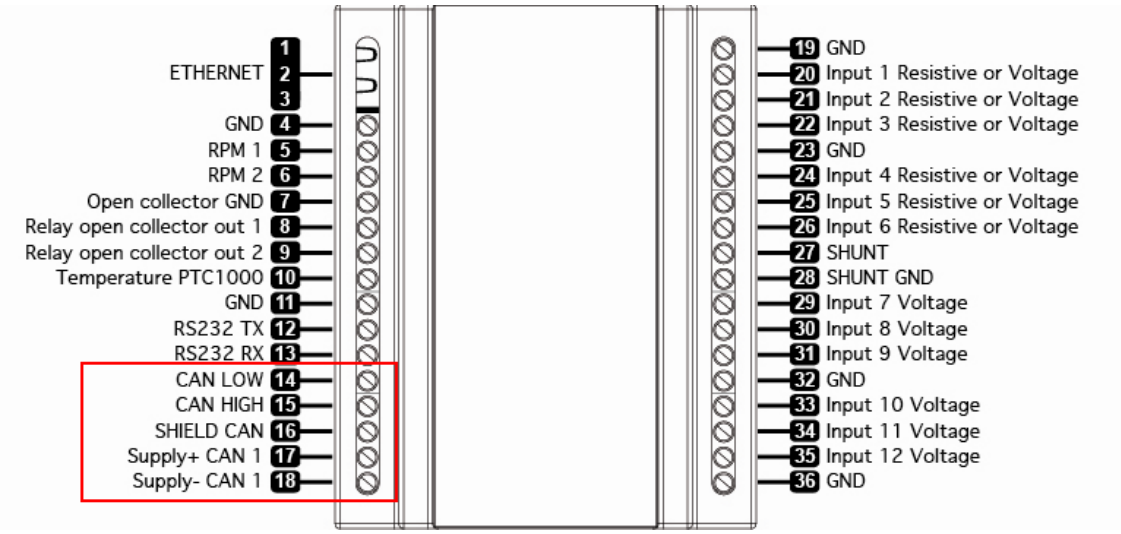
2.1 DIN Rail Mounting

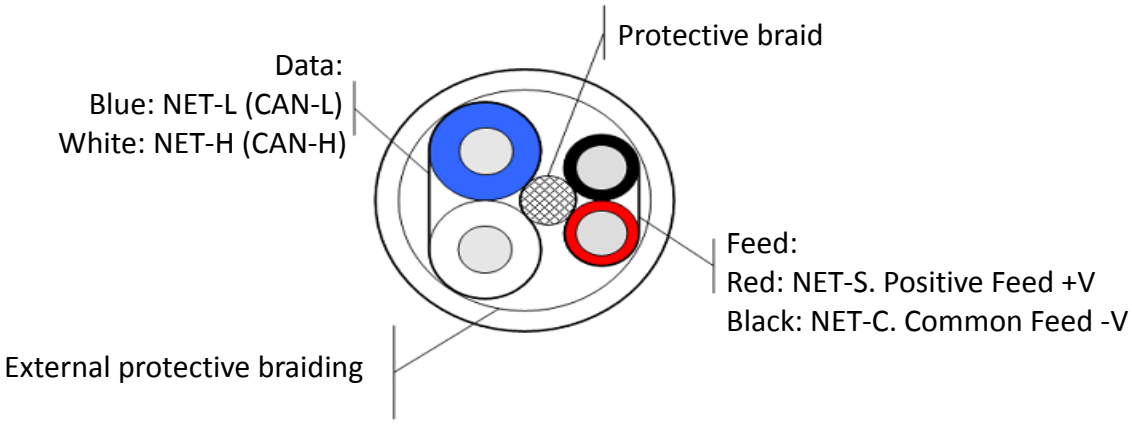
Requirements:

- A top hat rail, type EN 50 022 or a G section rail, type EN 50 035.

Mounting using a different rail type or an alternative mounting kit may breach the terms and conditions of the guarantee.

2.2 Connecting to a NMEA2000 Network





2.2.1 NMEA2000 Networks

NMEA2000 devices will only communicate with each other when connected to a powered and correctly terminated NMEA2000 network.

All networks need to be powered and terminated correctly to allow data to be transmitted reliably on the network. T-Pieces are needed to connect each device to the network. Additional cable lengths can be used between any of the connectors to extend the length of the network. Ensure the NMEA2000 rules for cable length are adhered to.

Cable Type	Max Length
Per drop cable	6 m
Sum of all drop cables	72 m
Micro Backbone (terminator to terminator)	100 m
Mini Backbone (terminator to terminator)	200 m

2.2.2 NMEA2000 Minimum Network Requirements

All NMEA2000 networks require a 12 V DC supply.

In addition, a correctly functioning network will require the following components :

- 1 x Power-T
- 2 x Terminating Resistors
- 2 x T-Pieces (one per connected device)
- 1 x NMEA2000 compatible display

All the required network parts can be supplied by Emmi Network S.L

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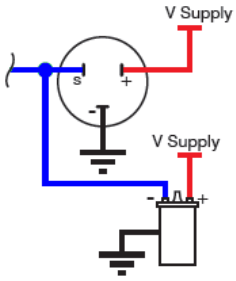
3. TACHO INPUT CONNECTIONS



Ignition Coil

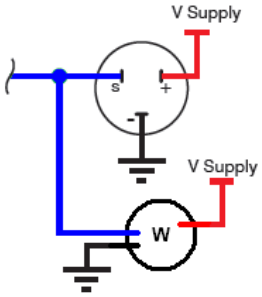
Connect the negative of the ignition coil to the positive RPM input of the AlbaCombi.

Connect GND to input GND of the AlbaCombi

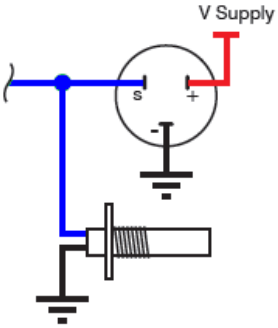
Alternator

Connect the ‘w’ connection of the alternator to the positive input of the AlbaCombi (input (input 5 or

Connect GND input of the alternator to the input 4



AlbaCombi RPM 6).



Hall Effect and Electronic Pulse Senders

Connect the signal line of the sender to the positive input on the AlbaCombi

Connect GND to GND input of the AlbaCombi

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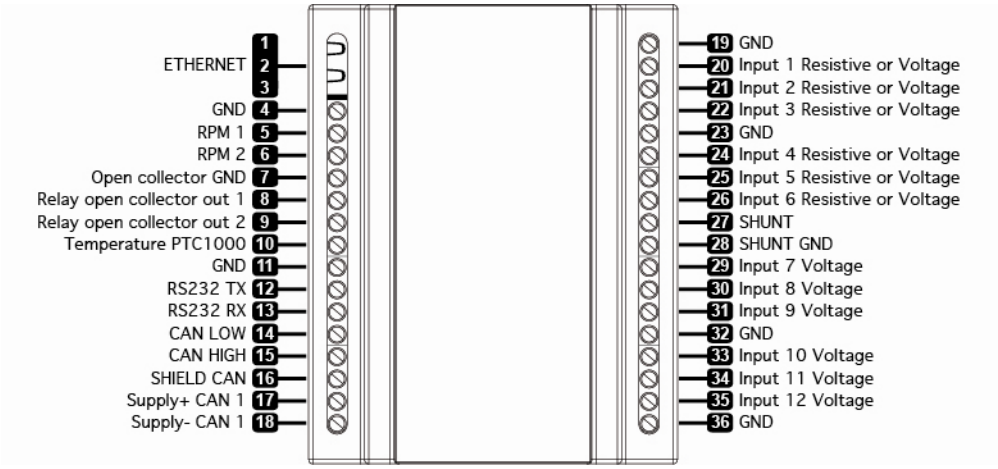
4. CONFIGURING THE ALBACOMBI DEVICE

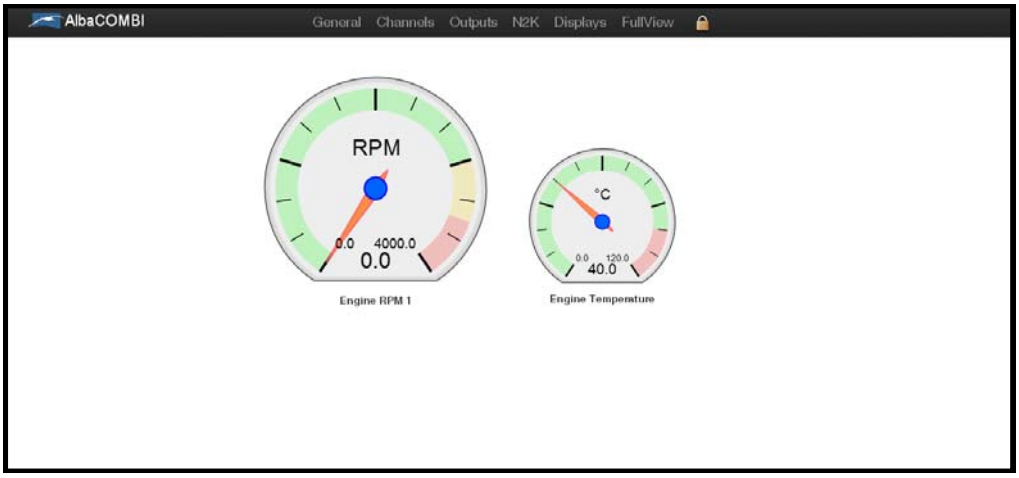
Make all connections. See the pin out of your device:



Configure your AlbaCombi: Connect your laptop to Ethernet port.

Open the browser navigator, preferred Chrome and go to the following address: http://192.168.0.50/

The first windows that you will see are the “FullView” page:

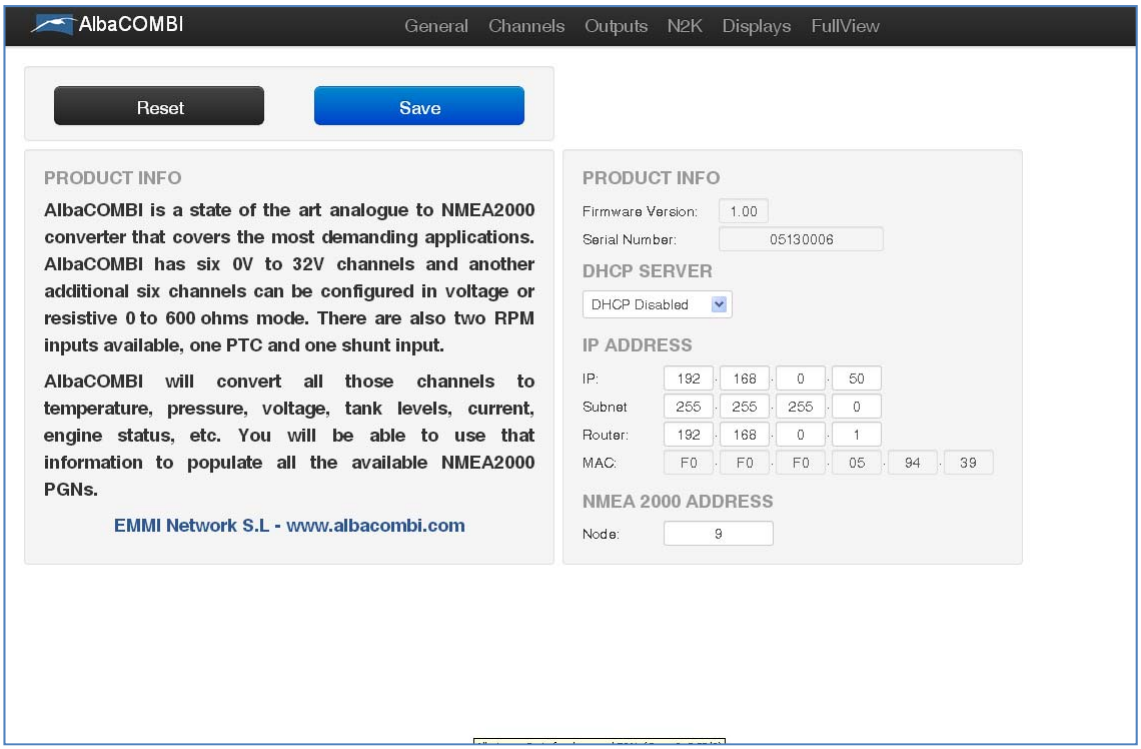


The gauges that you will see are an example

4.1 General Option

In this option you can change the Ethernet configuration from the AlbaCombi, enable/disable the DHCP server and configure the IP address.

The default configuration is DHCP server disabled and IP address 192.168.0.50.



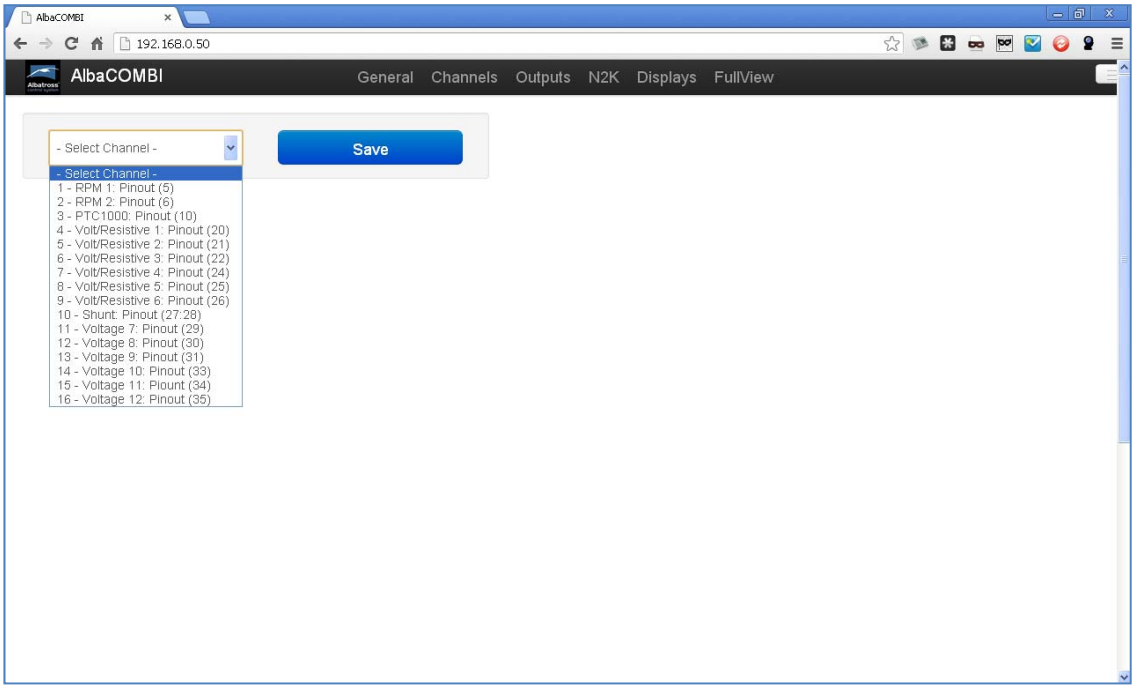
The default NMEA address is 9.

Note that if you connect two or more AlbaCombi, you must change the NMEA address, for example: you have two AlbaCombi connected on your NMEA network. One will have the NMEA Address 9 and other will be configured with NMEA Address 10.

If you make any change, press “Save” button and then press “Reset”

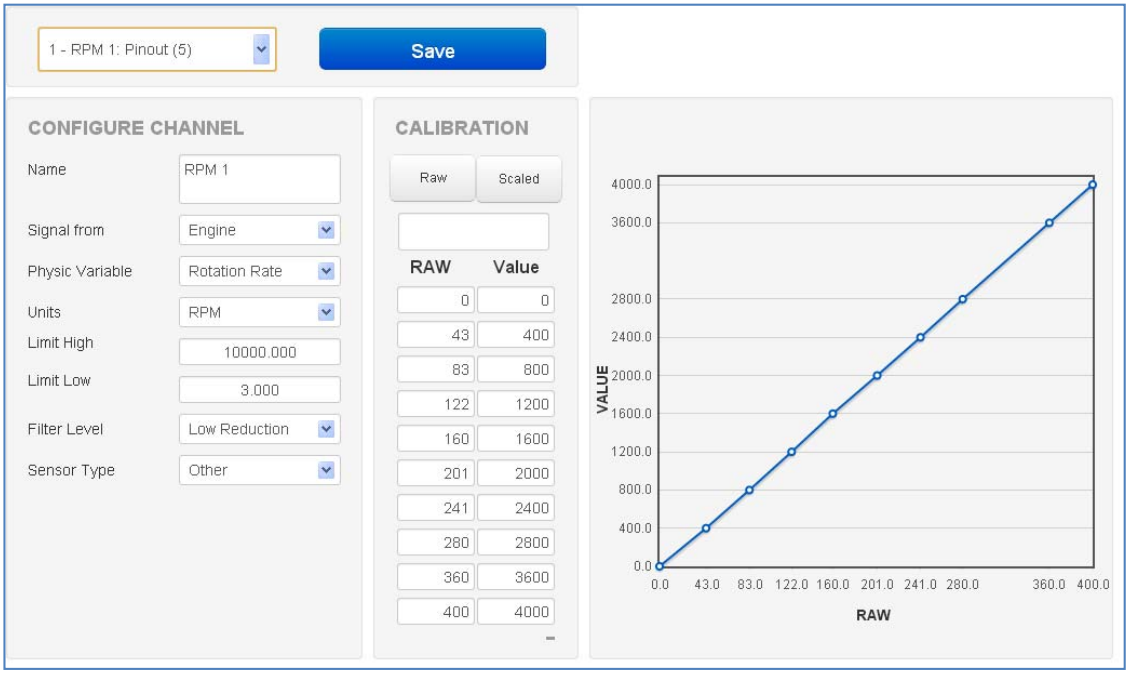
4.2 Channel Options

In order to configure each connected input, please select the channel, as shown on the following screen. Once selected please configure it.



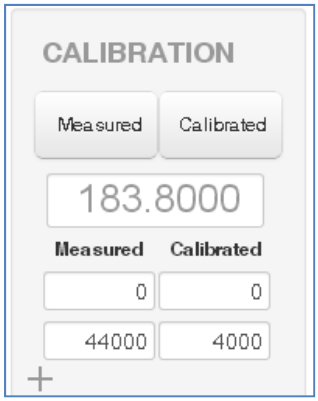
4.2.1 RPM Channel

You must configure all fields:



- Name: the name of the channel.
- Signal from: In case of RPM signal, the signal is sent by one engine.
- Physic Variable: In case of RPM, the only option is “Rotation Rate”.
- Units: RPM
- Limits high and Low: these limits will be used to set an alarm.
- Filter Level: Please indicate if the level measurement has been made with low, medium or high level.
- Sensor Type: you count with some predefined sensors. You can choose a sensor type and make some changes.

If you press on **“Measure”**, the current value of the input will be shown.



You can click on RAW and see the current value or you can write the theoretical value of the sensor output which corresponds to the measurement.

The **"Calibrated"** button is used to test if your calibration table is correct. Note that you must click on "Save" before doing the test.

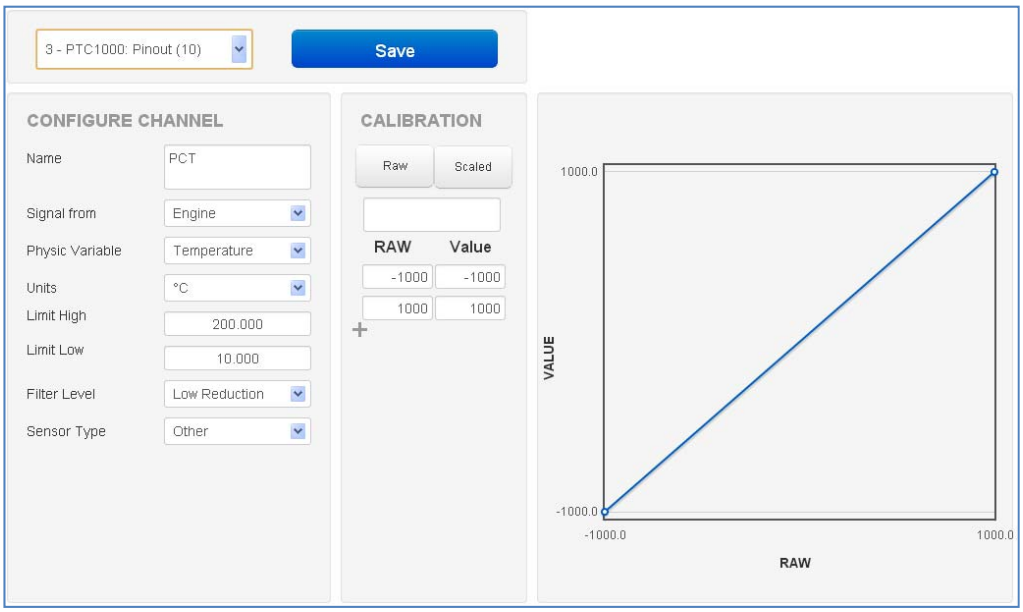
Example: If you have saved the following calibration table:

Measured (pulse per cycle)	RPM
0	0
600	6000

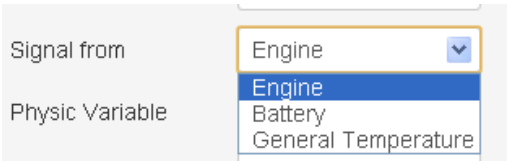
We assume that the sensor manufacturer indicates these values, therefore 3000 rpm we should have a measure of 300 pulses per cycle. You can accelerate to see that you have 300 cycles per second (by pressing on Raw until that value appears), then press "Calibrated" and see the value, if it is about 3000 rpm, the calibration table is correct.

Press "SAVE" when all changes have been made.

4.2.2 PTC1000 Option



- Signal from: you can select if the sensor measures the temperature from the engine, battery or it's a general temperature. It is important to select the correct sensor because otherwise when configuring the corresponding PGN you won't have the choice to select this parameter, for instance, if you choose Engine, the value will be sent to the NMEA network though the PGN127488 and PGN127489.



- Physic Variable: In this case, the PTC sensor only works with temperature parameters.
- Units: Select between ºC or K.
- Limits high and low: these limits will be used to set an alarm.
- Filter Level: Please indicate if the level measurement has been made with low, medium or high level.
- Sensor Type: you have some predefined sensors. You can choose a sensor type and make some changes on calibration table.

If you press on "Measured" you will see the current value:

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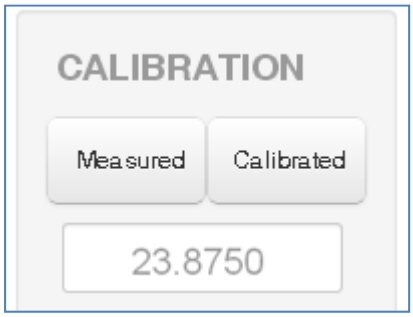
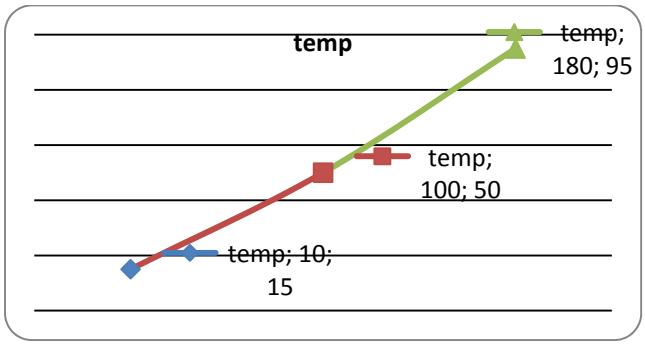


You can click on RAW and see the current value or you can write the theoretical value of the sensor output corresponding to the measurement.

The **"Calibrated"** button is used to test if your calibration table is correct. Note that you must click on "Save" before make the test.

Example: You has saved the following calibration table:

MEASURED (Ohms)	VALUE (Tª) (ºC)
10	15
100	50
180	95

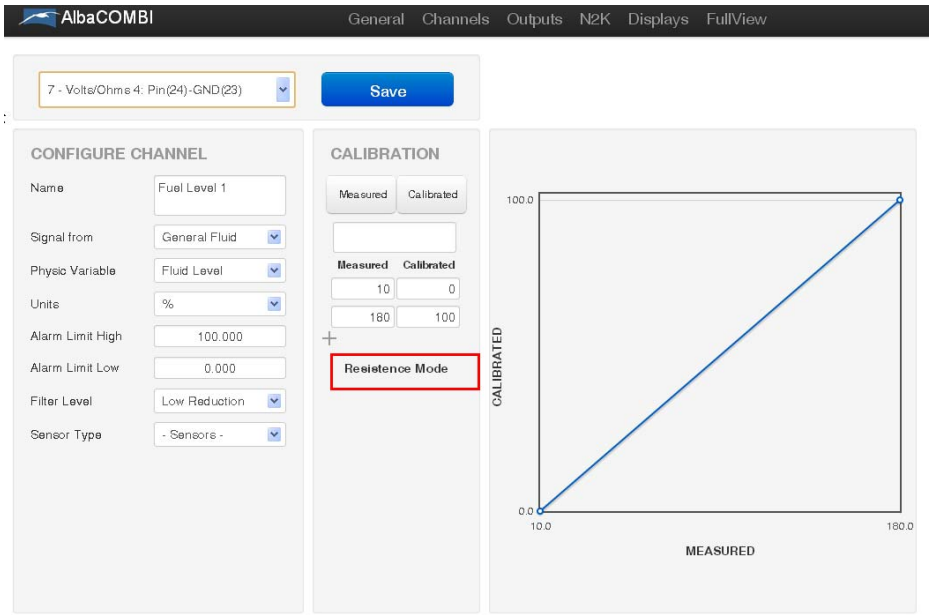


We assume that the sensor manufacturer indicates these values. In this way to 70 ºC we must have a measure of 140 Ohms. You switch on the engine that you have 140 Ohms (you pressing on Measured until that value), then press "Calibrated" and see the value, if it is about 70ºC, the calibration table is correct.

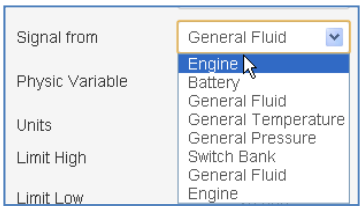
Note that X-axis values (MEASURE) must increase, from smallest to largest value

4.2.3 Volt/Resistive Input

You have six inputs like this. In the Channel screen you will see if the input has been configured on voltage o resistive mode



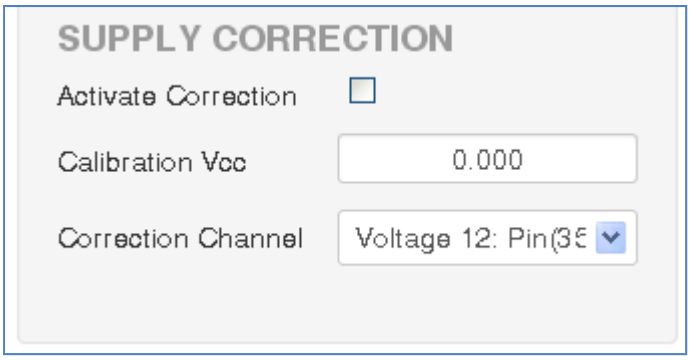
- Signal from: You can select the parameter that the input will measure; engine, battery, general fluid, general temperature, general pressure, switch bank or general fluid.



Signal from	Physic Variable
Engine	Rotation Rate
	Pressure
	Engine Tilt
	Temperature
	Voltage
	Fluid flow
Battery	Temperature
	Voltage
	Current
General Fluid	General fluid
General Temperature	General temperature
General Pressure	General Pressure
Switch Bank	Binary

- Limits high and low: these limits will be used to set an alarm.
- Filter Level: please indicate if the level measurement has been made with low, medium or high level.

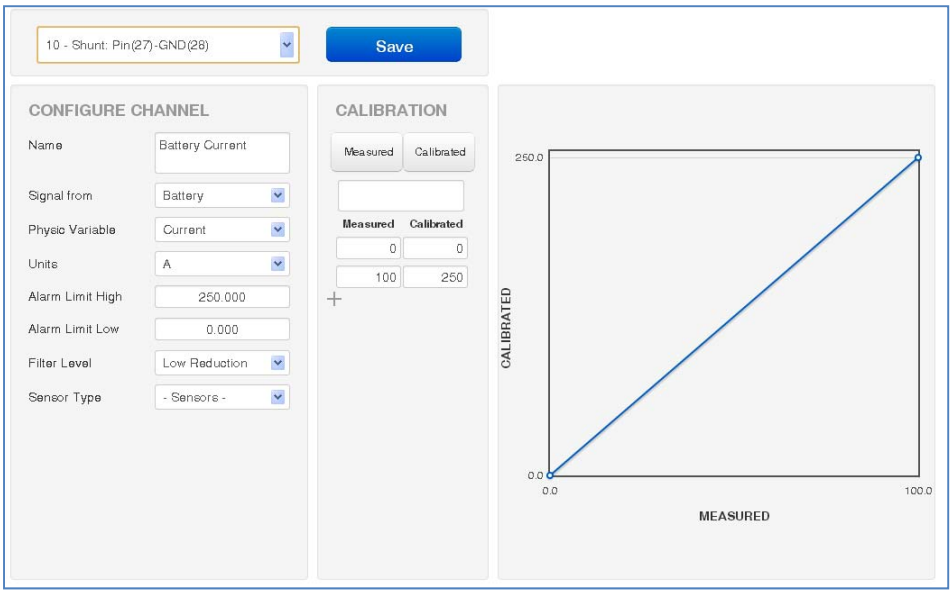
- Sensor Type: You have some predefined sensors. You can choose a sensor type and make some changes.
- Supply Correction (only on voltage input, not available on resistance mode):



You can activate the supply correction using a voltage input (Correction Channel)

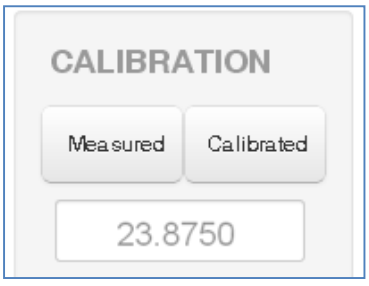
4.2.4 Shunt Input

The shunt is a sensor that measures the load or unload current in a battery, and it must have the right dimensions to stand the maximum current it it supposed to measure.



- Signal from: This parameter can only be obtained from the battery, therefore, will be the only option in the drop-down.
- Physic Variable: the only option is current.
- Units: mA or A
- Limits high and low: these limits will be used to set an alarm.
- Filter Level: Indicate if the measures filter has been made with a low, medium or high level.
- Sensor Type: You have some predefined sensors. You can choose a sensor type and make some changes.

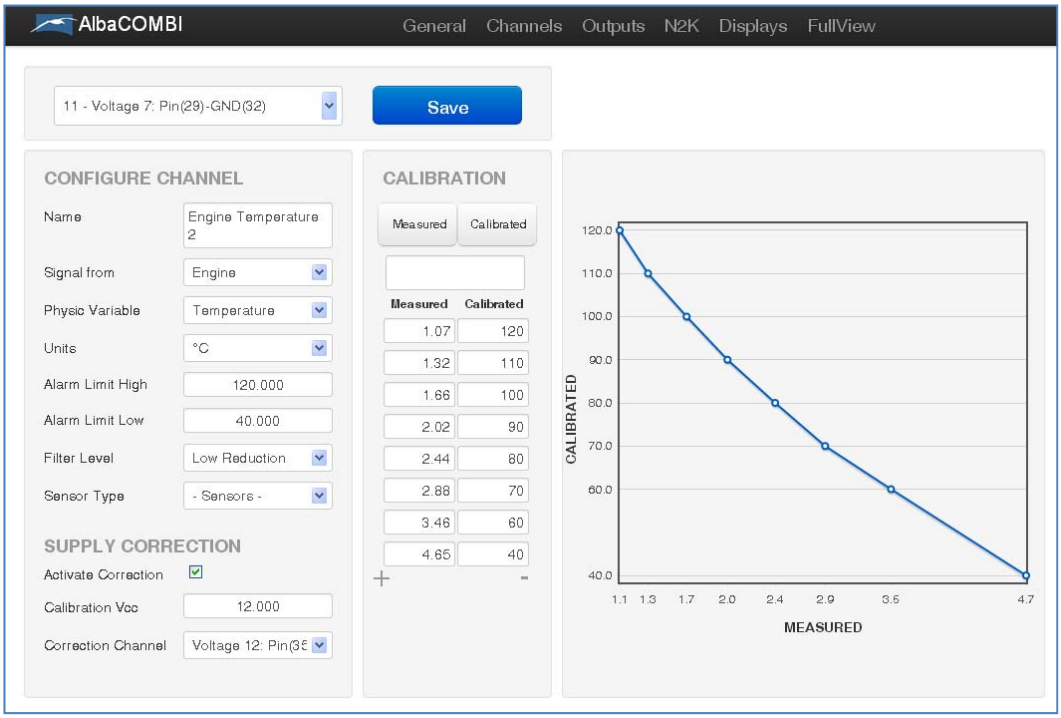
If you press on “Measured” you will see the current value:



You can click on **“Measured”** and see the current value or you can write the theoretical value of the sensor output corresponding to the measurement.

The **“Calibrated”** button is used to test if your calibration table is correct. Note that you must click on “Save” before makingthe test.

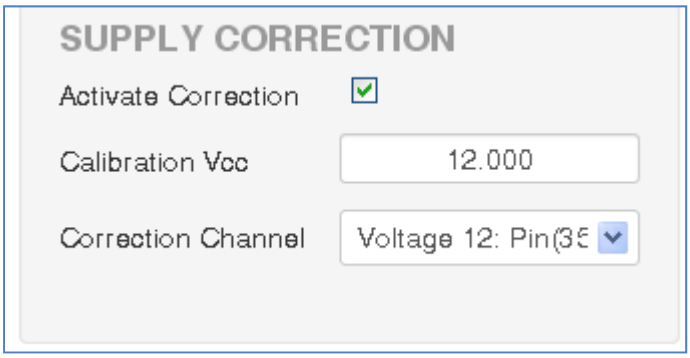
4.2.5 Voltage Input



- Signal from: You can select the parameter that the input will measure: engine, battery, general fluid, general temperature, general pressure, switch bank or general fluid.

Signal from	Physic Variable
Engine	Rotation Rate
	Pressure
	Engine Tilt
	Temperature
	Voltage
	Fluid flow
Battery	Temperature
	Voltage
	Current
General Fluid	General fluid
General Temperature	General temperature
General Pressure	General Pressure

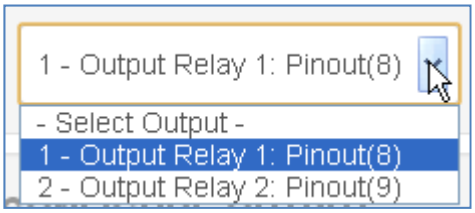
- Limits high and low: these limits will be used to set an alarm.
- Filter Level: please indicate if the level measurement has been made with low, medium or high level.
- Sensor Type: You have some predefined sensors. You can choose a sensor type and make some changes.
- Supply Correction:

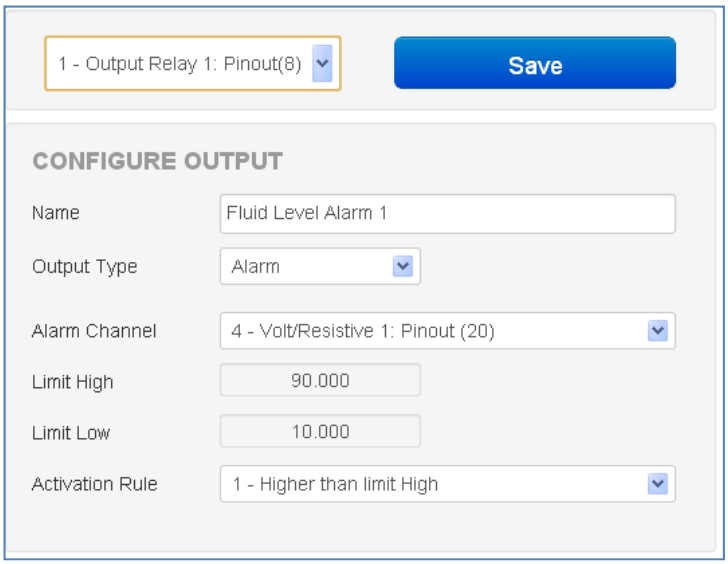


You can activate the supply correction using a voltage input (Correction Channel)

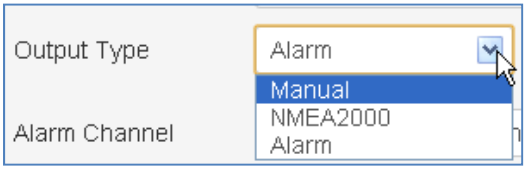
4.3 Output Option

You have 2 relay outputs. If you wish to configure alarms:





- Name: please write down the alarm's name
- Output Type: you have 3 options:
    - Manual: You can switch on/off the relay
    - NMEA2000: allows to act on a device connected to the NMEA network when the alarm is activated
    - Alarm: the alarm up and down values are only to be configured on screen.



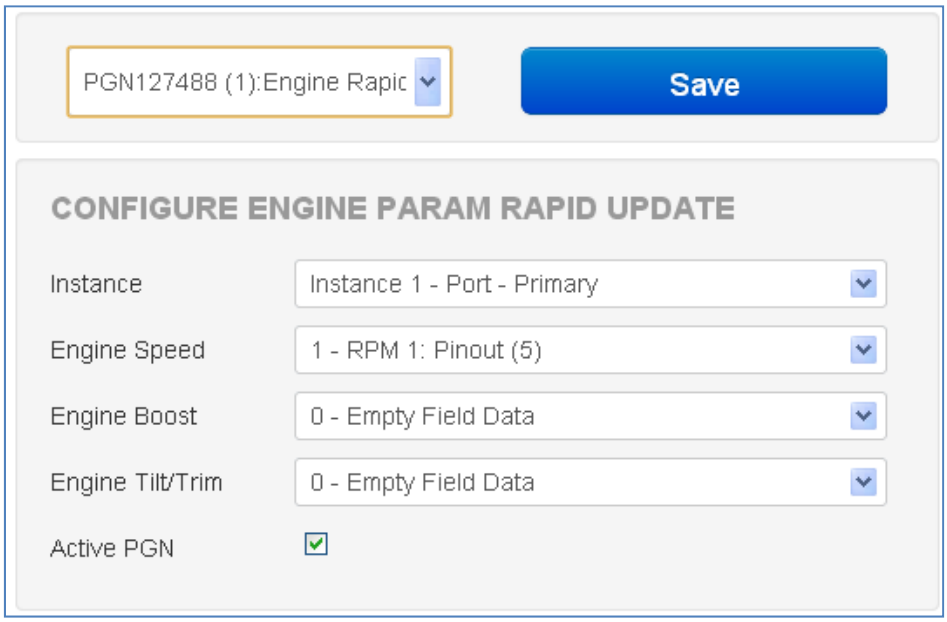
- Limits high/low: these limits have already been configured in the "Channel Option".
- Activation Rule: You can choose the condition for which the alarm is activated.

4.4 N2K Option

In this section you must configure the PGN to send through the NMEA network.

4.4.1 PGN 127488: Engine Rapide Update

Engine
Speed (RPM)
Boost Pressure
7FFFFF

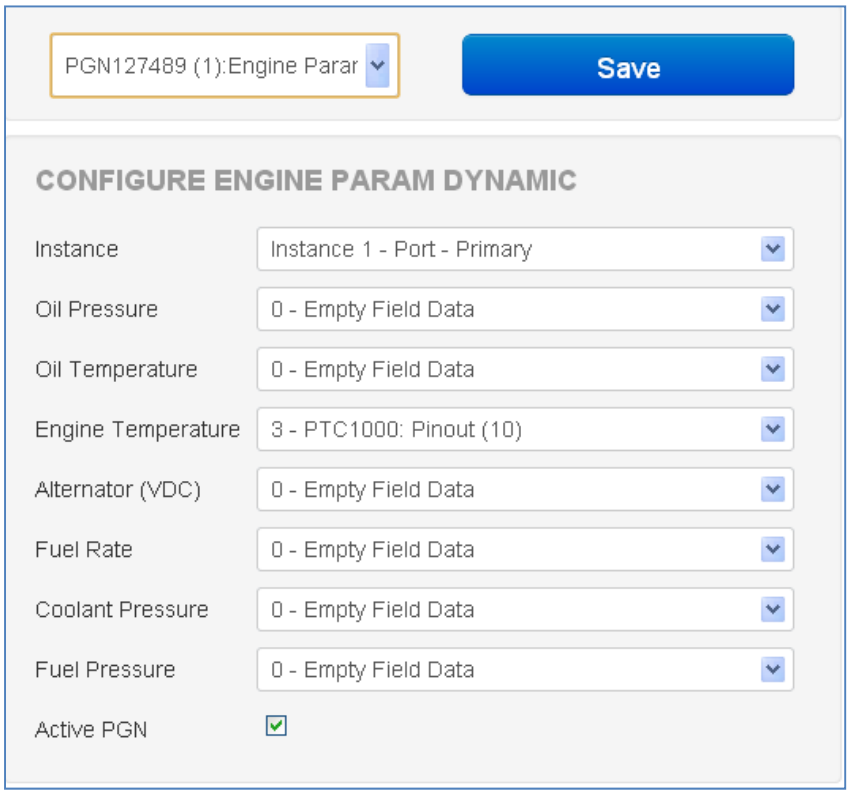


RPM

- Instance: The instance indicates the engine (port, starboard, forward, etc..)
- Engine Speed: if you have a RPM input, please select it.
- Engine Boost: if you have configured a pressure input from engine, please select it.
- Tilt/trim: same as before.
- Active PGN: If you select this option, the AlbaCombi will send this information through N2K network and the information will be shown on your multifunction display on board.

4.4.2 PGN 127489: Engine Parameters Dynamic

Engine
Oil Pressure
Oil Temperature
Engine Temperature
Alternator Voltage
Coolant Temperature

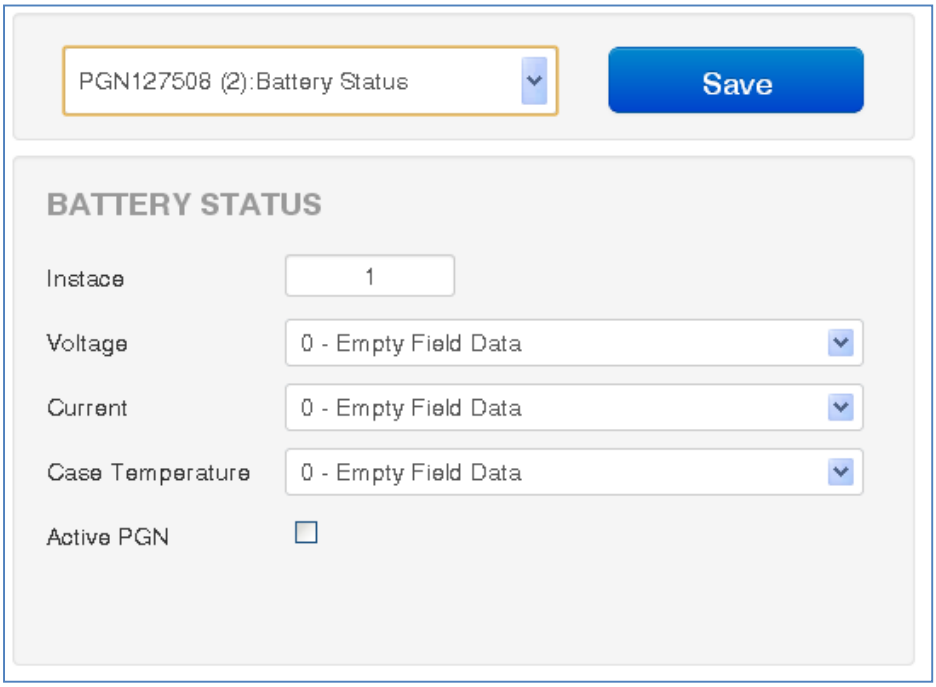


The following PGNs which are mentioned in the standard NMEA will be displayed:

- Instance: The instance indicates the engine values (port, starboard, forward, etc..)
- Oil Pressure: if you have configured a pressure input from engine, please select it.
- Engine Temperature: If you have configured a temperature sensor from engine, please select it.
- Proceed in the same way with the rest of parameters.
- Active PGN: If you select this option, the AlbaCombi will send this information through N2K network and it will be shown on a muntifunction display on board.

4.4.3 PGN 127508: Battery Status

Battery Instance
Voltage
Current
Temperature
FF

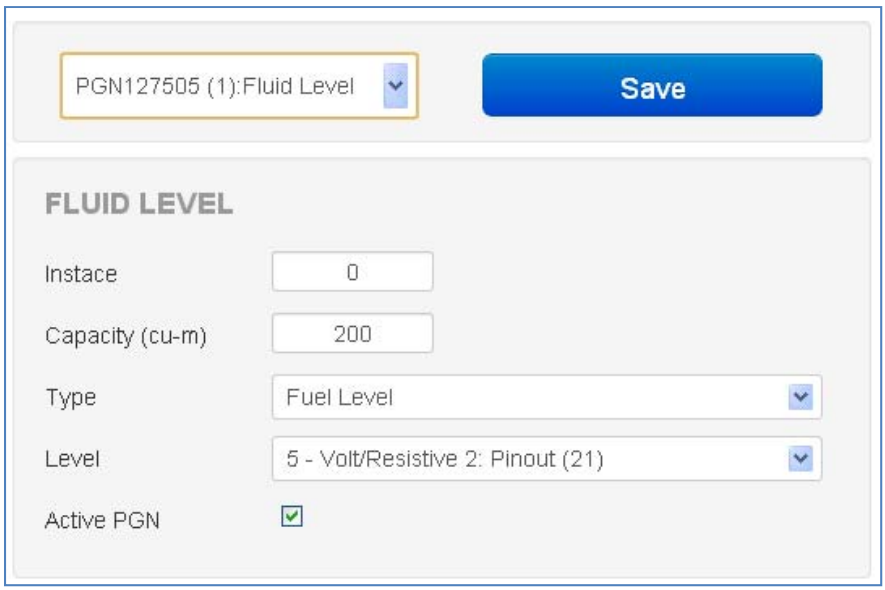


- Instance: this is a very important field. If you have two or more batteries on your vessel, each battery bank should be configured with a different distance.
- Range 0 to 250 for valid position fixes.
- Voltage: Select the input where you have connected the battery voltage on your AlbaCombi.
- Current: Select your shunt input channel.
- Temperature: Select the temperature input from battery bank.

Note, enable the “Active PGN” if you wish to display the parameters in your on board NMEA N2K multifunction display.

4.4.4 PGN 127505: Fluid Level

Fluid Instance
Fluid Type
Fluid Level
Tank Capacity
Reserved FF

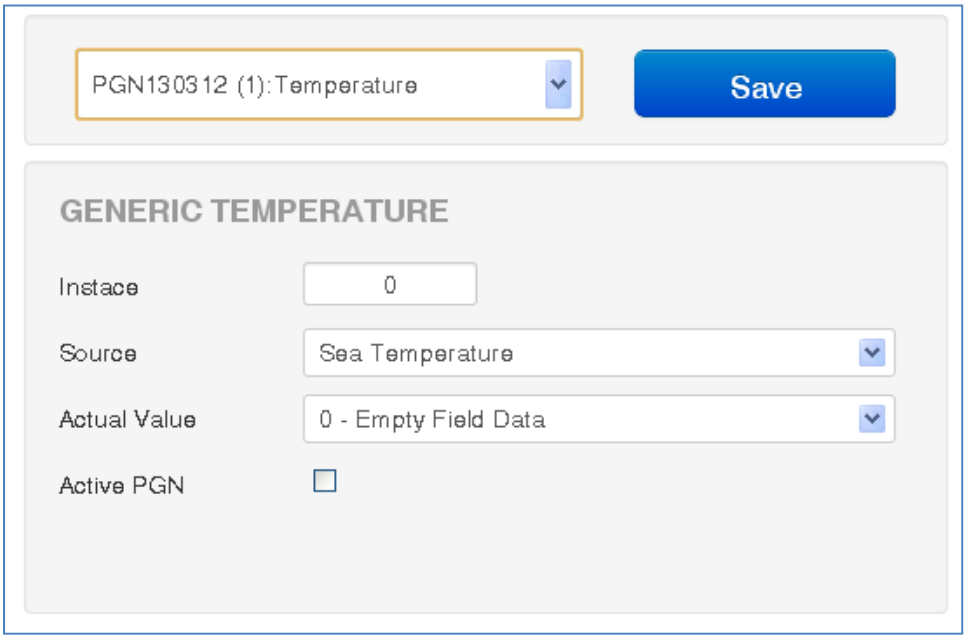


- **Instance:** this is a very important field when you have two or more level sensors on your vessel, each sensor should be configured with a different instance.
- **Capacity:** (cubic meters) You must define the capacity of your tank.
- **Type:** You can select the type as NMEA standard ndicates (Fuel , fresh water, waste water, live well, oil and black levels).
- **Level:** Select the correct input.

Note, enable the “Active PGN” if you wish to display the parameters in your on board NMEA N2K multifunction display.

4.4.5 PGN 130312: Temperature

SID
Instance nº
Temperature Source
Actual Temperature (ºK)
Temperature Set
Reserved FF



- Instance: this is a very important field if you have two or more temperature sensors on your vessel, each sensor must configure with different instances.
- Source: You can select the source type as NMEA standard indicates:

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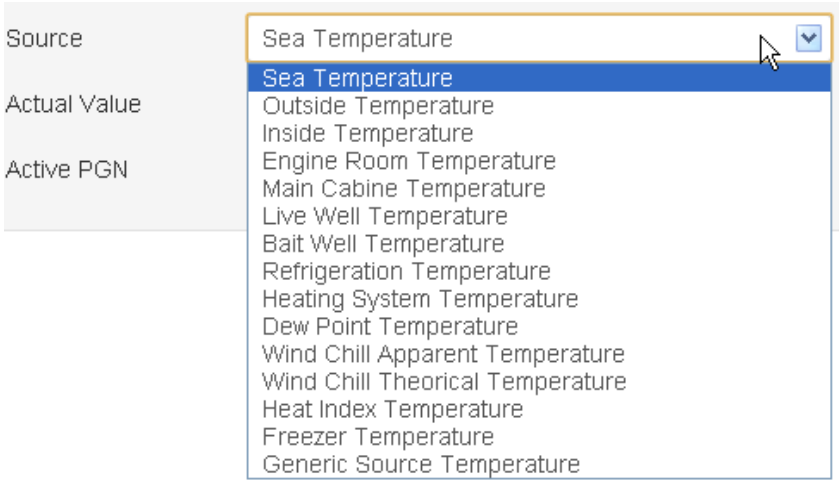
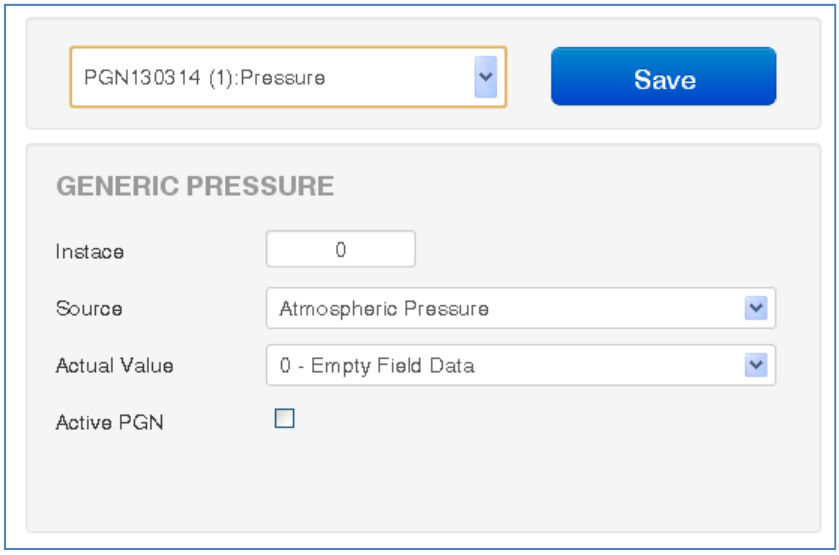


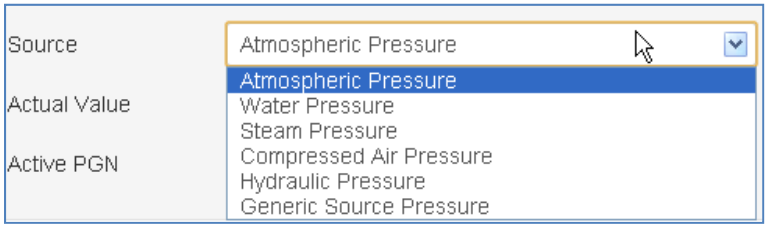
- Actual Value: Select the correct input.

4.4.6 PGN 130314: Pressure

SID
Instance nº
Pressure Source
Pressure (Pa)
Reserved FF



- Instance: this is a very important field if you have two or more pressure sensors on your vessel, each sensor must configure with different instances.
- Source: You can select the source type as NMEA standard indicates:

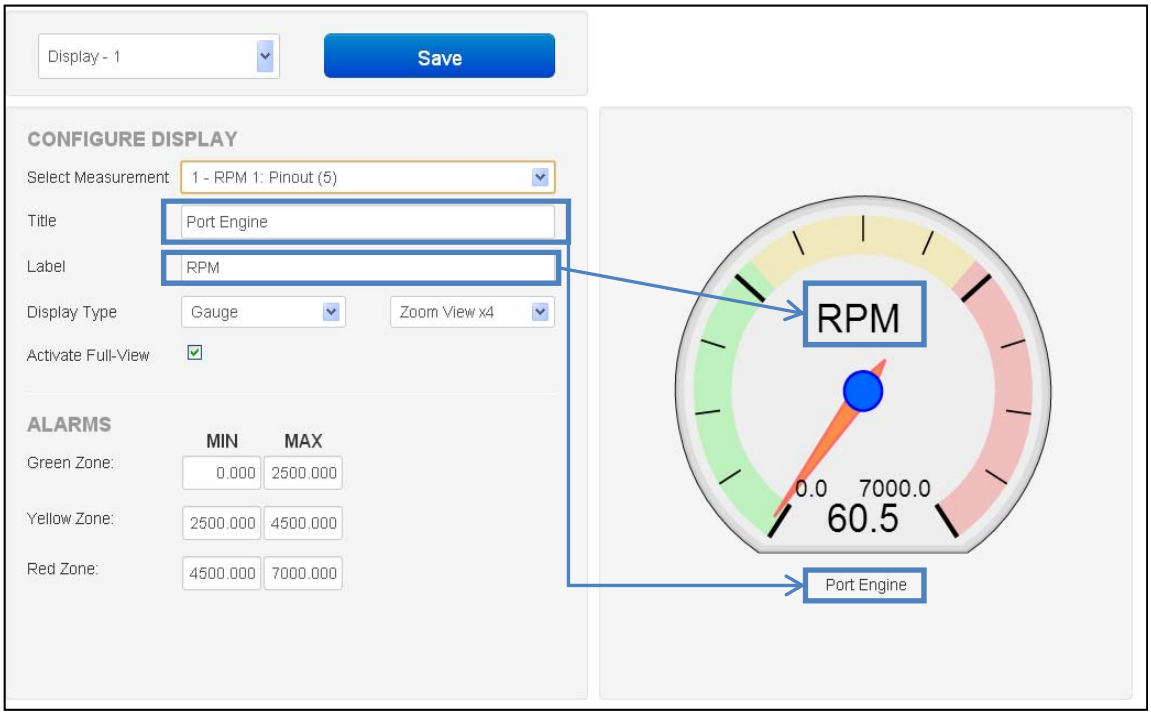


- Actual Value: Select the correct input.

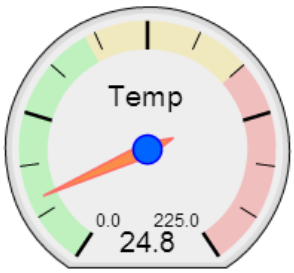
4.7 Displays Option

In this option you will configure the parameters to monitoring in the FullView Option.

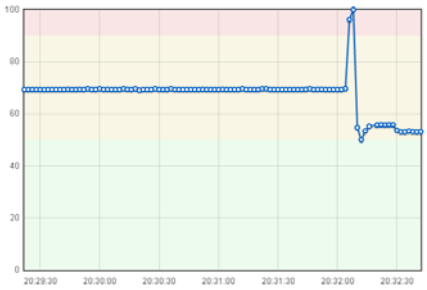
Select the first display to configure it:



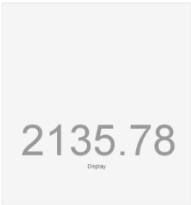
- Select Measurement: You will choose any input that you had connected to AlbaCombi
- Title: Display name, you will see underneath the gauge.
- Label: name on the gauge label.
- Display Type: when displaying the information you can select between the following forms:
    - Gauge:



- Graph:



- Display:

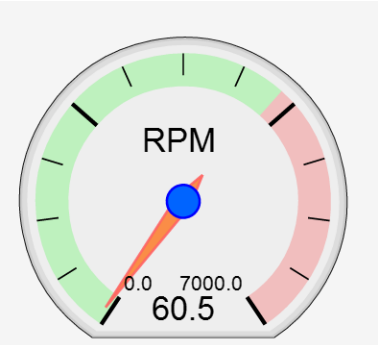


- Activate Full-View: If you select this option, you will see the parameter in the full screen option from AlbaCombi.
- Alarms zone: It is important to set the alarm values as it will define the scale limits on your display.
- Please find hereby examples on how to set these limits:

	MIN	MAX
Green Zone	0	2500
Yellow Zone	2500	4500
Red Zone	4500	7000

Note that the upper limit has to be equal to the lower limit of the area above.

In case you wish only two zones, the configuration is as follows:



	MIN	MAX
Green Zone	0	4500
Yellow Zone	4500	4500
Red Zone	4500	7000

- Press “Save” when the you have finished configuring the display.

4.8 FULL-SCREEN OPTION

The default page of AlbaCombi will be displayed as shown below.

All displays that you have configured before will be displayed. This option can work in parallel to a NMEA display.

You can view this data in NMEA display installed in your boat, and also from any device connected to the same Ethernet network as the AlbaCombi internet based page.

Press on the **padlock** icon to block/unlock the screen. In unlock mode you will can move the indicators.

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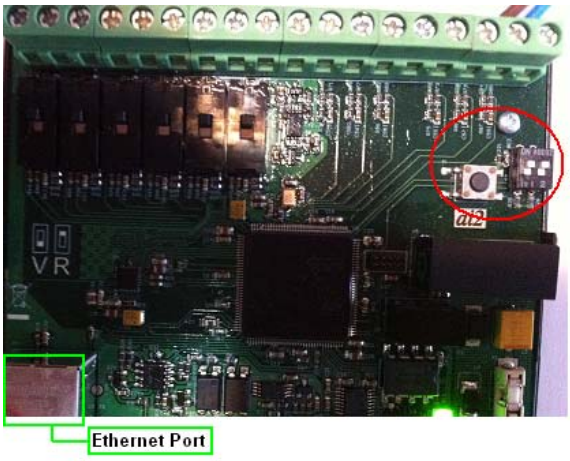
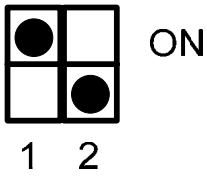
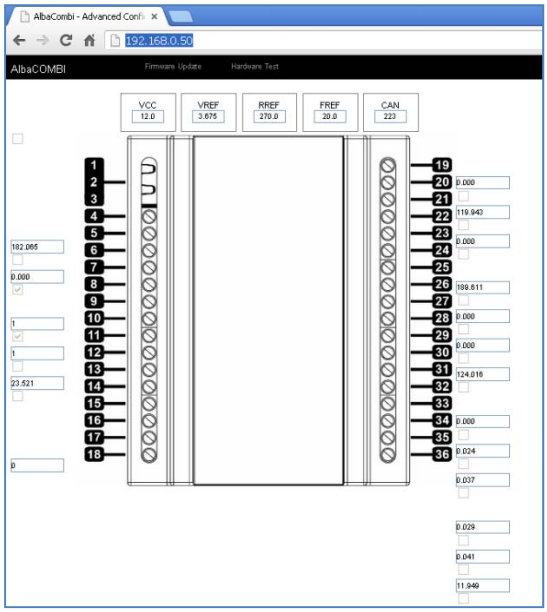
Before making all connections, please follow the next steps:

1. Change the state of the switch on **Hardware Test Mode**:
   Switch 1 on, switch 2 off and then press reset button





1. Please access the following URL on your PC: http://192.168.0.50/
2. You will see the “Hardware Test” Option:



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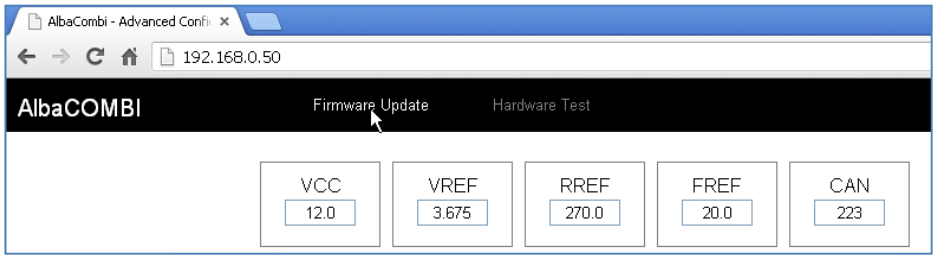
If you connect the test board, the device will be a hardware test and in your web page you will see the checkbox marked if the result has been positive.

To update the AlbaCombi device:

1. Download the last firmware version from: www.albacombi.com and save it on your PC
2. Enter in Installer Mode on your AlbaCombi device.
3. Go to: http://192.168.0.50/.
3. Select the “Firmware Update” option:



4. Select the .xin file saved on step 1.
5. Press “Update”.

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SPECIFICATIONS IN / OUT	
Analogue Inputs	6 x Resistive (0 to 600 Ohm) or Voltage (0-32V)
	6 x Voltage (0-32V)
	2 x RPM W signal or magnetic sensor
	1 x Precision temperature PTC1000
	1 x 100mV current shunt
Analogue input precision	1% or better
Relay out	2 x Open collector output
Data in/out	Ethernet port (calibration and monitoring)
	RS232 (module programming)
	Isolated CAN NMEA2000

NMEA2000 Parameter Group Numbers (PGN's)	
Periodic	PGN127488 Engine Parameters, Rapid Update
	PGN127489 Engine Parameters, Dynamic
	PGN127508 Battery Status
	PGN127505 Fluid Level
	PGN130312 Temperature
	PGN130314 Actual Pressure
	PGN127501 Binary Switch Bank Status
	PGN127502 Binary Switch Bank Control

ELECTRIC SPECIFICATIONS	
Tension	9-18V DC from the NMEA2000 bus
Consumption	150mA
Equivalent load	3 LEN as per NMEA2000

MECHANICAL SPECIFICATIONS	
Size	104mm x 86mm x 588mm (DIN 43880 size 6)
Weight	230g
Mounting	DIN Rail Clip EN 50.022
Case material	Top PC/UL 94-V0, Base PPO / UL 94-V0

ENVIROMENTAL SPECIFICATIONS		
Protection Class EN60529	IP20	
Working temperature	-15C to +55ºC	
Storage temperature	-25ºC to +85ºC	
Relative humidity	93% HR @ 40ºC	IEC60945-8.3
Vibration	2-13.2Hz @ ±1mm 13.2-100Hz @ 7m/s^2	IEC60945-8.7
Corrosion	4x7 days @ 40ºC, 95%HR after two hour salt spray	IEC60945-8.12
E.M.C.	Emission	IEC60945-9
	Immunity	IEC60945-10