

# Actisense<sup>®</sup>

## EMU-1

### NMEA 2000<sup>®</sup> Engine Monitoring Unit

The Actisense EMU-1 is a specialized analogue to NMEA 2000 Gateway which converts data from analogue engine gauges/senders into NMEA 2000 data. The EMU-1 enables the sharing of engine data throughout the NMEA 2000 bus. It digitises analogue engine sensors, enabling NMEA 2000 display devices to monitor the connected engine(s) on a vessel.

The EMU-1 can monitor vital engine parameters such as temperature, pressure, RPM and fluid levels from up to two engines.



#### Feature

#### Advantage

#### Benefit

<ul style="list-style-type: none"> <li>Converts analogue signals in to digital NMEA 2000 data</li> </ul>	<ul style="list-style-type: none"> <li>Allows analogue engines without an "ECU" to share data digitally</li> </ul>	<ul style="list-style-type: none"> <li>The EMU-1 upgrades an existing engine, allowing older engines to be used with to the latest digital MFDs</li> </ul>
<ul style="list-style-type: none"> <li>6 Gauge inputs</li> </ul>	<ul style="list-style-type: none"> <li>Connects to resistive/voltage gauges or resistive senders</li> </ul>	<ul style="list-style-type: none"> <li>Wide compatibility with existing installations</li> </ul>
<ul style="list-style-type: none"> <li>2 Tacho inputs</li> </ul>	<ul style="list-style-type: none"> <li>Connects directly to the RPM signals from 1 or 2 engines (with a common ground)</li> </ul>	<ul style="list-style-type: none"> <li>The EMU-1 can work with up to two engines simultaneously</li> </ul>
<ul style="list-style-type: none"> <li>4 Alarm inputs</li> </ul>	<ul style="list-style-type: none"> <li>Connects directly to alarm switches or Gauge signals and maps them to NMEA 2000 alarms</li> </ul>	<ul style="list-style-type: none"> <li>Most MFD's understand the NMEA 2000 engine alarm signals, altering users of engine issues, such as 'Over Temperature'</li> </ul>
<ul style="list-style-type: none"> <li>2 auxiliary inputs</li> </ul>	<ul style="list-style-type: none"> <li>Additional voltage monitoring</li> </ul>	<ul style="list-style-type: none"> <li>Future expansion opportunity to support new functionality</li> </ul>
<ul style="list-style-type: none"> <li>Custom Conversion Curves</li> </ul>	<ul style="list-style-type: none"> <li>If the Actisense Toolkit's Conversion Curve library doesn't match, a custom Conversion Curve can be designed</li> </ul>	<ul style="list-style-type: none"> <li>A user can quickly create a custom Conversion Curve without searching for gauge or sender datasheets</li> </ul>
<ul style="list-style-type: none"> <li>Switchable Sender current source</li> </ul>	<ul style="list-style-type: none"> <li>Allows control over the current used to power a resistive Sender without a gauge</li> </ul>	<ul style="list-style-type: none"> <li>When an analogue gauge is not present, the EMU-1 can automatically power the Sender directly</li> </ul>
<ul style="list-style-type: none"> <li>Fluid level Gauge and Sender compatibility</li> </ul>	<ul style="list-style-type: none"> <li>Allows use of Fluid Level Gauges (sharing the engine's common ground) to expand the EMU-1's functionality</li> </ul>	<ul style="list-style-type: none"> <li>The EMU-1 is a flexible analogue to digital solution, reducing installation cost, and offering wide Fluid / Tank Level support</li> </ul>
<ul style="list-style-type: none"> <li>Logs total engine hours</li> </ul>	<ul style="list-style-type: none"> <li>Accumulates engine running hours when the Tacho input indicates engine rotation</li> </ul>	<ul style="list-style-type: none"> <li>Accumulated engine running hours are stored and shared as NMEA 2000 data</li> </ul>
<ul style="list-style-type: none"> <li>Wide operating voltage</li> </ul>	<ul style="list-style-type: none"> <li>Allows operation on 12V or 24V systems</li> </ul>	<ul style="list-style-type: none"> <li>Compatible with all common power systems</li> </ul>
<ul style="list-style-type: none"> <li>Input protection</li> </ul>	<ul style="list-style-type: none"> <li>Protects against reverse polarity and transients</li> </ul>	<ul style="list-style-type: none"> <li>Protects against installation faults, provides peace of mind</li> </ul>
<ul style="list-style-type: none"> <li>Custom IP65 case</li> </ul>	<ul style="list-style-type: none"> <li>Electronic parts and connections are protected from water and dust ingress</li> </ul>	<ul style="list-style-type: none"> <li>Supports installation in more humid below deck, areas of the vessel</li> </ul>
<ul style="list-style-type: none"> <li>Diagnostic LEDs</li> </ul>	<ul style="list-style-type: none"> <li>Clear feedback on operational status and NMEA 2000 communications</li> </ul>	<ul style="list-style-type: none"> <li>Allows a user to quickly diagnose the EMU operation and NMEA 2000 communication</li> </ul>
<ul style="list-style-type: none"> <li>Pluggable 2-Part screw terminal connectors</li> </ul>	<ul style="list-style-type: none"> <li>Clear feedback on operational status and NMEA 2000 communications</li> </ul>	<ul style="list-style-type: none"> <li>Fast and Simple installation saves time and money</li> </ul>
<ul style="list-style-type: none"> <li>Panel or optional DIN rail mount</li> </ul>	<ul style="list-style-type: none"> <li>Can mount to bulkhead or DIN rail using optional mounting brackets</li> </ul>	<ul style="list-style-type: none"> <li>Flexible installation options to save time and money</li> </ul>

## NMEA 2000® Engine Monitoring Unit

### Technical Specifications

Power Supply	
Supply Voltage	9 to 35V DC
Supply Current	Typically < 25mA @ 12V DC
Supply Protection	Continuous reverse polarity protection and load dump protection (meets SAE J1113)
Supply Connector	Pluggable 2-way screw terminal, 3.5mm pitch
Supply Voltage (NMEA 2000 Port)	9 to 29V DC
Supply Current (NMEA 2000 Port)	< 20mA @ 12V DC from NMEA 2000 bus
Load Equivalent Number (LEN)	1
Supply Protection (NMEA 2000 Port)	Continuous reverse polarity protection
NMEA 2000 Port - In/Out	
Compatibility	Fully NMEA 2000 certified
Galvanic Isolation	NMEA 2000 port
Speed / Baud Rate	250kbps
NMEA 2000 Connector	M12 male (A coded) connector
Gauge Inputs	
Voltage Range	0 to 35V DC
Input Impedance	> 50kΩ
Sender Current Feed	0, 4mA or 18mA
Accuracy	<= 2%
Input Connector	Pluggable 6-way screw terminal, 3.5mm pitch
Input Protection	Overvoltage protection to ±40V
Alarm Inputs	
Voltage Range	0 to 37V DC
Input Impedance	> 50kΩ
Threshold Voltage	Configurable, default is 5V
Alarm Polarity	Configurable, default is alarm on low input
Accuracy	<= 2%
Input Connector	Pluggable 4-way screw terminal, 3.5mm pitch
Input Protection	Overvoltage protection to ±40V

Tacho Inputs	
Voltage Range	±3 to ±60V
Input Impedance	> 100kΩ to ground
Input Pulse Range	4 to 30,000Hz
Accuracy	<= 1%
Sender Compatibility	Ignition coil, alternator ("W", "R" or "AC") terminal, hall effect, VR or inductive sender
Threshold	Automatically adjusts to signal level
Input Connector	Pluggable 4-way screw terminal, 3.5mm pitch
Input Protection	Can withstand an ignition pulse to ±500V
Engine Log	
Engine Hours	2 separate engine hour logs internally connected to the tacho inputs. Hours are logged when RPM is present, stored in non-volatile memory
Mechanical	
Housing Material	Polycarbonate
Protective Lid Material	Polycarbonate
Sealing Materials	Expanded silicone foam gasket, closed cell polyurethane splash guard and ePTFE waterproof vent
Dimensions	127mm (L) x 112mm (W) x 48mm (H)
Weight	250g
Mounting	4 x 3.5mm lugs to allow panel mount with self-tapping s/s screws (included), optional DIN Rail mount available on request
Approvals and Certifications	
Fully NMEA 2000 Certified	
EMC	EN 60945 (sections 9 & 10)
Environmental Protection	IP65 (PCB housing)
Operating Temperature	-20°C to +55°C
Storage Temperature	-30°C to +70°C
Recommended Humidity	0 - 93% RH
Guarantee	3 years

Part Number: A-EMU-1-BAS

All specifications are taken with reference to an ambient temperature of 25°C unless otherwise specified.  
All specifications correct at time of print.