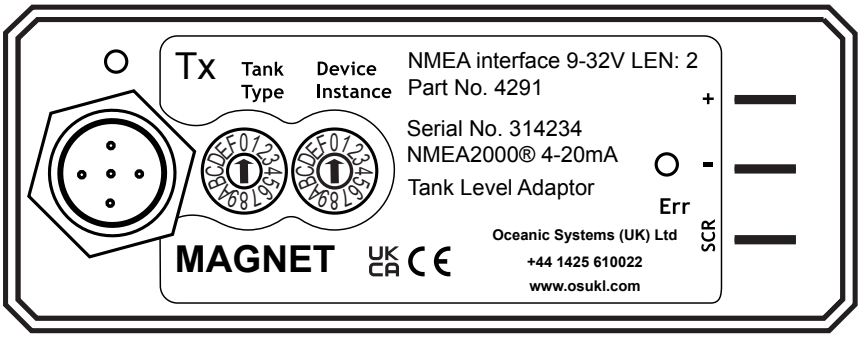
NMEA2000® 4-20mA Tank Level Adaptor
Part Numbers: 4291
USER MANUAL



Revision 5

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1 INTRODUCTION

The Oceanic Systems Tank Level Adaptor is designed to monitor any 4-20mA level sensor including Fuel, Fresh Water, Waste Water, Live Well, Oil & Black Water senders on the NMEA2000® network.

The Tank Sender Adaptor is designed to be located in a dry and protected location.

It is very important that it is installed and set up correctly according to this manual. Please read and follow the installation and setup instructions carefully to achieve the best results.

1.1 PRODUCT FEATURES

The NMEA2000® 4291 4 – 20mA Tank Level Adaptor has the following features:

- 4 – 20mA tank level input conversion to remaining level percentage with ± 1% full scale deflectio
- Heartbeat blue LED confirming NMEA2000® transmission
- Faulty sensor/connection detection (under or over current)
- NMEA2000® micro C interface plug
- Panel mounting

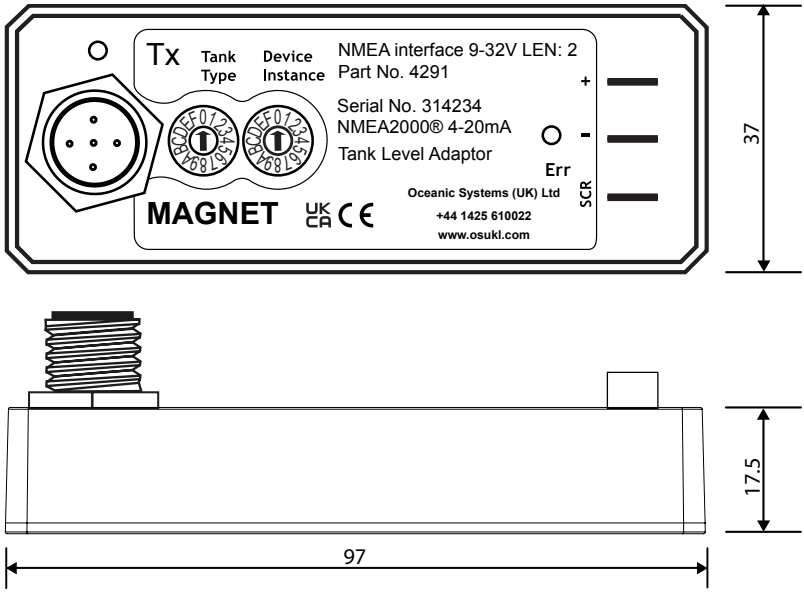
2 INSTALLATION

2.1 UNPACKING THE BOX

You should find the following items in the 4291 shipping box
1 x 4291 NMEA2000® 4 - 20mA Tank Level Adaptor
1 x 4291 User Manual (This document)

2.2 MOUNTING THE UNIT

The Tank Sender Adaptor is water resistant but NOT waterproof. It is designed to be located in a dry and protected location in the cable run between the NMEA2000® network and the tank level sender. It does not need to be attached to any surface but should be restrained from free movement by means of cable ties to the rest of the cable run or similar.

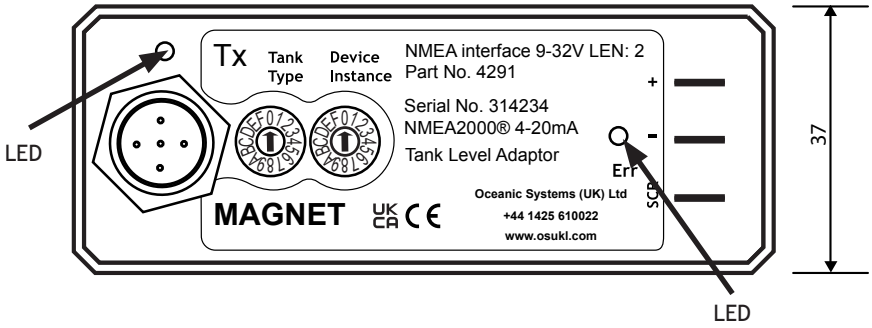


2.3 CONNECTING THE NMEA2000® CABLE

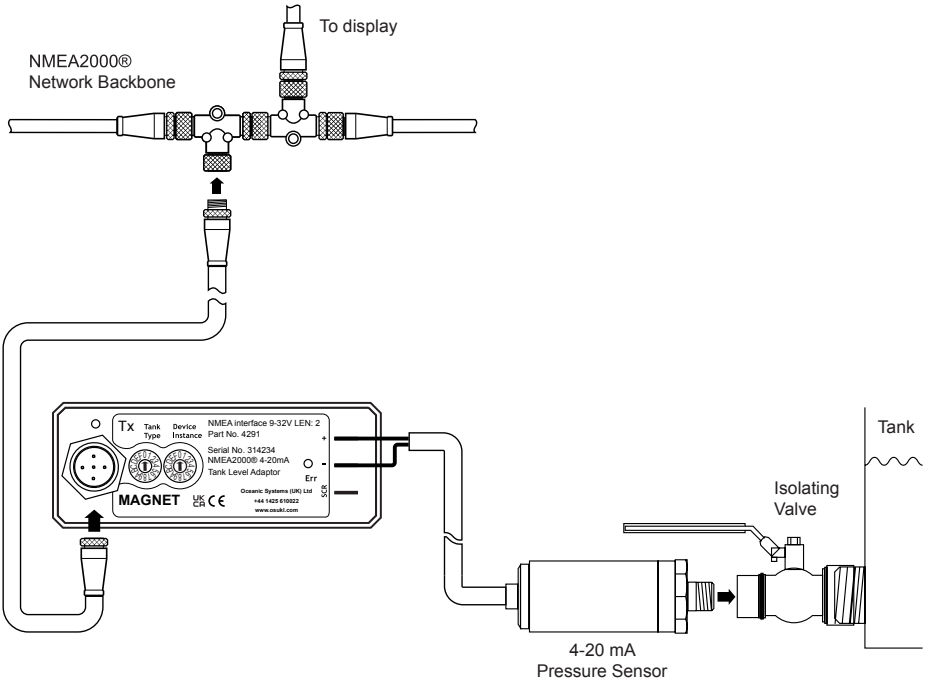
The unit is connected to the NMEA2000® network by the 5 way micro C plug on the front Carefully attach the network drop cable to this plug and hand tighten until it is fully seated. Take care to match the orientation of the pip inside the socket to the recess inside the drop cable socket. The other end of the drop cable should be connected to a suitable Tee connector on the NMEA2000® network backbone cable.

2.4 CONNECTING THE 4 – 20mA SENSOR TO THE 4291 ADAPTOR

The connections for the sensors are as follows:



Connector	Function
+	24V Supply to sensor
–	4 – 20 mA sensor input
SCR	GND (Cable Screen)



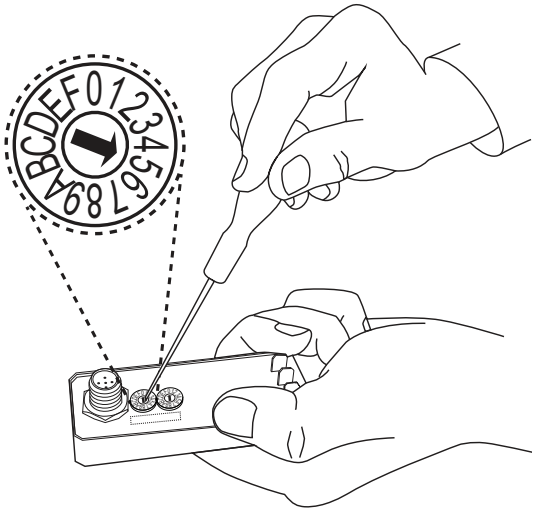
2.5 CONFIGURATION

The following items can be configured on the 4291 Adaptor.

2.5.1 TANK TYPE

Adaptor allows to configure up to 6 different tank types. alid Tank Types are starting from “0” through to ”5”. To select use the rotary switch (SW1) and rotate by using a small screwdriver. By selecting invalid tank type, the device will stop sending NMEA2000® tank level messages and the Red LED will lit to indicate wrong selection.

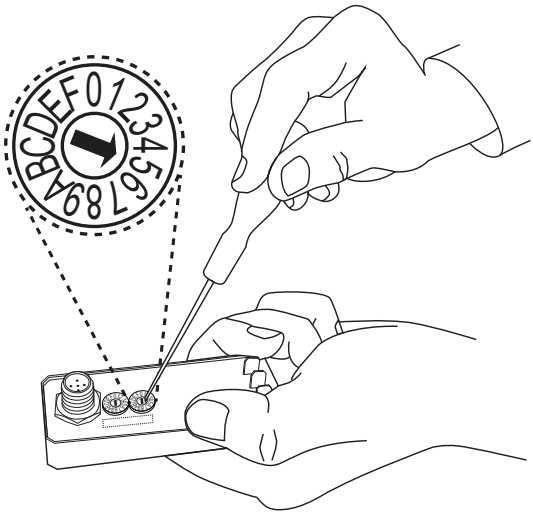
Switch Position	Tank Type SW1
0	Fuel
1	Fresh Water
2	Waste Water
3	Live Well
4	Oil
5	Black Water
6	Invalid
7	
8	
9	
A	
B	
C	
D	
E	
F	



2.5.2 DEVICE INSTANCE

It is possible to install 16 Tank Level Adaptors of each tank type on the network. Each Tank needs to have its own Device Instance address. To set the Device Instance use a small screw driver to rotate the rotary switch (SW2 ). On tank configuration the blue LED will flas once. Valid Device Instances range from “0” through to “F”.

Switch Position	Device Instance SW2
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15



2.5.3 CALIBRATION & DAMPING VALUES

The 4-20mA Tank Level Adaptor can operate in either Level or Volume mode, damping seconds can also be set. Select your desired value with SW1 from the table below.

Switch Position	Damping / Mode Calibration SW1 + button
0	No Damping
1	1sec Damping
2	2sec Damping
3	3sec Damping
4	4sec Damping
5	5sec Damping
6	6sec Damping
7	7sec Damping
8	8sec Damping
9	9sec Damping
A	10sec Damping
B	Not Used
C	Level Mode
D	Volume Mode
E	Empty Level
F	Full Level

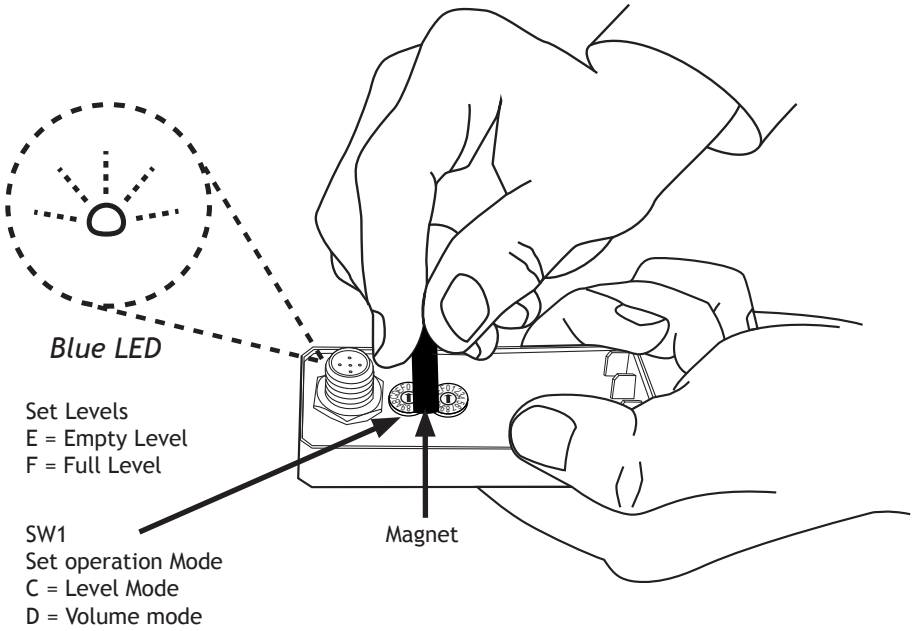
When Adaptor is set to **Level Mode** the unit sends pure (unmodified) level percent

When in **Volume Mode** the level percent is modified by volume table of the device

Empty Level – In this mode, during the actualization, the device stores the current tank level as the empty level.

Full Level – In this mode, during the actualization, the device stores the current tank level as the full level.

To select your desired operation mode, set SW1 to position and actuate reed switch, applying a small magnet momentarily. DO NOT HOLD THE MAGNET AGAINST THE SENDER as this can delete settings. The switch is positioned below the rotary switches.



The 4-20mA Tank Level Adaptor can be calibrated to operate between the set **Empty & Full level**.

To set calibration values for Empty :
Connect Tank Level adaptor (4291) to the NMEA2000® network and then connect the 4-20-mA pressure sender to the adaptor. With the 4-20mA sender **NOT connected** to the tank set SW1 to 'E' and actuate magnetic switch. Tap the magnet momentarily as shown to actuate the switch. This should cause the blue LED to flash once for 2.5 seconds. This means the calibration is set. DO NOT HOLD THE MAGNET AGAINST THE SENDER as this can delete settings.

To set Full calibration :
Ensure the Tank Level adaptor (4291) is connected to the NMEA2000® network and the 4-20mA pressure sender. Connect the 4-20mA sensor to a full tank. Set SW1 to 'F' and actuate magnetic switch. Tap the magnet momentarily as shown to actuate the switch. This should cause the blue LED to flash once for 2.5 seconds. This means the calibration is set. DO NOT HOLD THE MAGNET AGAINST THE SENDER as this can delete settings.

Set SW1 back to required tank type.

Once the value is selected correctly, setting Not Used values will not take effect on the device.

3 TANK LEVEL MODE

The Tank Level value calculated as percentage of the fluid level, between the empty and full level values. In Volume Mode this value modified by the olume Table of the device, which represents the shape of the tank. The 4291 can be factory programmed with up to 100 points of volumetric information and to transmit the remaining fuel VOLUME percentage if the user chooses.

PERCENTAGE LEVEL MODE output from 0 – 100% indicates the percentage level of the fluid in the tank. The user can tell when the unit is in 'Level Mode' because the blue LED flashes ONCE every 2.5 seconds when a level message has been sent.

PERCENTAGE VOLUME MODE output from 0-100% indicates the actual fluid volume within the tank taking allowance for the tanks internal shape. The user can tell when the unit is in 'Volume Mode' as the blue LED flashes twice rapidly every 2.5 seconds when a volume message has been sent. The accuracy of the tank level value is +/- 1 % in case of linear volume table. Extreme tank shapes can cause bigger differences because of multiplying of the offset error of the sensor.

The Volume Mode PGN message is exactly the same as the Level Mode PGN message which means that the volume can easily be shown on any NMEA2000® display that accepts Fluid Level PGNs from tank senders. The Volume Mode Tank data can be entered from any Oceanic Systems Display that is equipped to set up this data. Please contact us for more information on these displays. It can also be set up at manufacture if the information is made available at the time of ordering.

LEVEL MODE can be set with the Tank Type Switch SW1 by setting the switch to 'C' and then briefly holding a small magnet on the 'Magnet Calibration position for 5 seconds.
The blue LED will flash once for 2.5s to confirm that the magnet is in the proper position

VOLUME MODE can be set with the Tank Type Switch SW1 by setting the switch to 'D' and then briefly holding a small magnet on the 'Magnet Calibration position for 5 seconds.
The blue LED will flash once for 2.5s to confirm that the magnet is in the proper positio

4 MAINTENANCE

- Clean the unit with a soft cloth.
- Do not use chemical cleaners as they may remove paint or markings or may corrode the enclosure or seals.
- Ensure that the unit is mounted securely and cannot be moved relative to the mounting surface. If the unit is loose, tighten the mounting screws.
- Check the security of the cables connected to the NMEA2000® connector, tighten if necessary.

5 TECHNICAL SPECIFICATION

As Oceanic Systems are constantly improving their products specifications are subject to change without notice. Oceanic Systems products are designed to be accurate and reliable however they should only be used as aids to navigation and not as a replacement for traditional navigation aids and techniques.

Specification	
Parameter	**Comment**
Accuracy	±1% (Level Mode)
Number of Tanks	Up to 16 per tank type on single network

Certifications	
Parameter	**Comment**
NMEA2000	Level B

NMEA2000® Parameter Group Numbers (PGNs)		
Type	**PGN No**	**PGN Name**
Monitor	PGN127505	Fluid Level
Protocol	PGN126464	Tx/Rx PGN List
	PGN126996	Product Information
	PGN059392	ISO Acknowledge
	PGN059904	ISO Request
	PGN060928	ISO Address Claim
	PGN126208	Command/Request Group

Electrical and Mechanical		
Parameter	**Value**	**Comment**
CAN Operating Voltage	9 to 32 Volts	
Power Consumption	71.5mA	Average Operating
Load Equivalence Number	2	LEN
Reverse Battery Protection	Yes	Indefinitel
Load Dump Protection	Yes	SAE J1113
Size	mm	97 x 37 x 17.5
Weight	gr	135

Environmental	
Parameter	**Value**
IEC 60954 Classificatio	Protected
Degree of Protection	IP67
Operating Temperature	-25°C to 50°C
Storage Temperature	-40°C to 70°C
Relative Humidity	93%RH @40° per IEC60945-8.2

6 TROUBLESHOOTING

If the adaptor is sending inaccurate readings then this can be due to either:

1. The connected sensor is faulty or damaged.

2. The tank LEVEL calibration has been done incorrectly.

Blue LED does not flas	Check power is provided to network. Check cable runs have not been damaged.
Blue LED flashes rapidl	No display equipment connected to receive data.
Red LED lit	Sensor is missing, wired incorrectly or damaged. Check sensor and wiring.
I have multiple tanks but only one is displayed	Check each rotary switch is addressed to an individual tank instance and the display is set to receive the corresponding tank instance. Check the display is capable of displaying multiple tanks.
Fuel level is not reading correctly.	Carry out “Tank Level Calibration” process

7 TECHNICAL SUPPORT

If you require technical support for any Oceanic Systems products you can reach us using any of the following:-

tel: +44 (0)1634 290772

email: sales@energy-solutions.co.uk

web: osukl.com or energy-solutions.co.uk

osukl.com

Oceanic Systems is a brand of:

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energy-solutions.co.uk

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Our policy is one of continuous product improvement, therefore product specifications are subject to change without notice.
Oceanic Systems products are designed to be accurate and reliable. However, they should be used only as aids to vessel monitoring, and not as a replacement for traditional navigation and vessel monitoring techniques.
NMEA2000® is a registered trademark of the National Marine Electronics Association

8 WARRANTY

Oceanic Systems warrants this product to be free from defects in materials and workmanship for one year from the date of original purchase. If within the applicable period any such products shall be proved to Oceanic Systems satisfaction to fail to meet the above-limited warranty, such products shall be repaired or replaced at Oceanic Systems option. Purchaser's exclusive remedy and Oceanic Systems sole obligation hereunder, provided product is returned pursuant to the return requirements below, shall be limited to the repair or replacement, at Oceanic Systems option, of any product not meeting the above limited warranty and which is returned to Oceanic Systems; or if Oceanic Systems is unable to deliver a replacement that is free from defects in materials or workmanship, Purchaser's payment for such product will be refunded. Oceanic Systems assumes no liability whatsoever for expenses of removing any defective product or part, or for installing the repaired product or part or a replacement therefore or for any loss or damage to equipment in connection with which Oceanic Systems products or parts shall be used. The foregoing warranties shall not apply with respect to products subjected to negligence, misuse, misapplication, accident, damage by circumstances beyond Oceanic Systems control, to improper installation, operation, maintenance, or storage, or to other than normal use or service.

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WARRANTY RETURN PROCEDURE

To apply for warranty claims, contact Oceanic Systems or one of its dealers to describe the problem and determine the appropriate course of action. If a return is necessary, place the product in its original packaging together with proof of purchase and send to an Authorized Oceanic Systems Service Location. You are responsible for all shipping and insurance charges. Oceanic Systems will return the replaced or repaired product with all shipping and handling prepaid except for requests requiring expedited shipping (i.e. overnight shipments). Failure to follow this warranty return procedure could result in the product's warranty becoming null and void.

Oceanic Systems reserves the right to modify or replace, at its sole discretion, without prior notification, the warranty listed above