

Universal Water Level Sender

INSTALLATION AND OPERATING INSTRUCTIONS



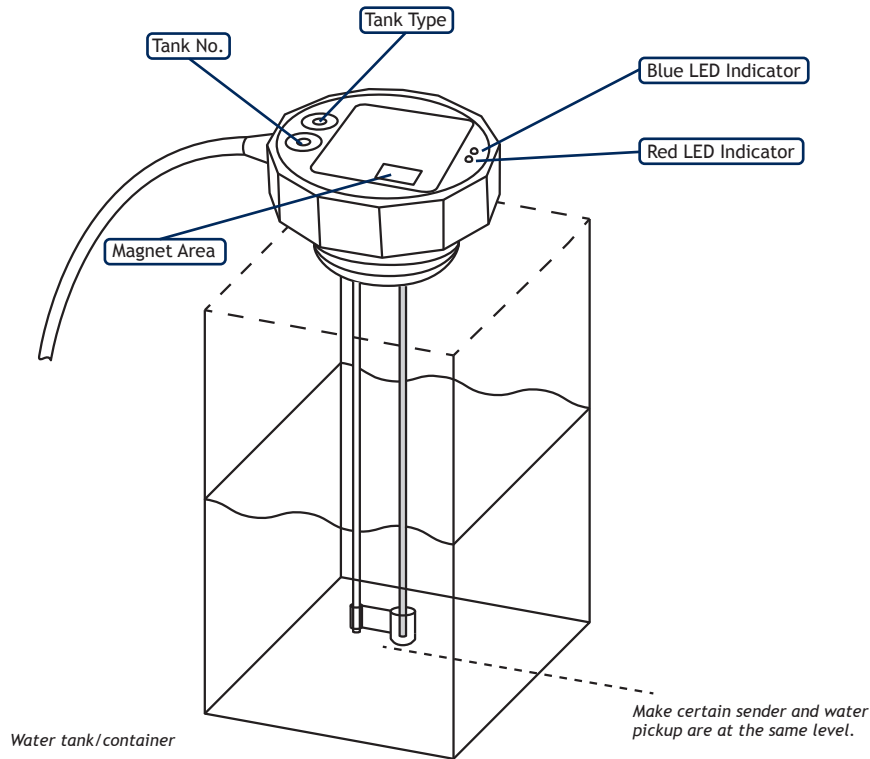
Part No 3281

The Offshore Systems 3281 NMEA2000 Universal Water Level Sender measures the level of either Fresh water, Grey water or Black water tanks.

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.

The 3281 NMEA2000 Universal Water Level Sender has the following features:

- User settable for Fresh Water, Grey Water or Black Water sensing
- Water level sensing from 250mm to 2 metres
- User settable for tank Level or tank Volume output
- User settable tank instance from 0 to 15
- Heartbeat blue LED to indicate normal activity
- Red Warning LED to indicate damaged rods.
- 1.25" BSP single threaded mount
- NMEA2000 Interface



FIRMWARE REVISION

The information in this manual corresponds to firmware revision 4.0

1 INSTALLATION

Take great care when unpacking the sender that the coated rod is not damaged in any way. If the coating is scraped or punctured the sender will not work.

We test every sender before it is packed so the coated rod is protected against transit damage. Do not remove the protective packaging until you are ready to install the sender.

You should find the following items in the 3281 shipping tube:

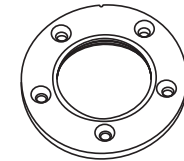
- 1 x 3281 NMEA2000 Universal Water Level Sender
- 1 x Water Sender Probe End Cap (May already be attached)
- 1 x 3281 User Manual (This document)

1.1 MOUNTING LOCATION AND REQUIREMENTS

The sender is designed to be mounted on a flat area on the top of the water tank over the tank's deepest part. Examine the tank internal structure and choose a location that ensures the sender probes will not chafe on any of the tank's internal structure or baffles.

The sender requires a 1.25 inch standard BSP threaded mounting hole with a small 45° machine chamfer at the top to seal against the sender mounting O ring.

If the tank has an existing SAE 5 bolt hole then the optional 3261 Mounting ring can be attached to the SAE 5 bolt holes to provide a 1.25" BSP threaded hole mount for the Water Sender.

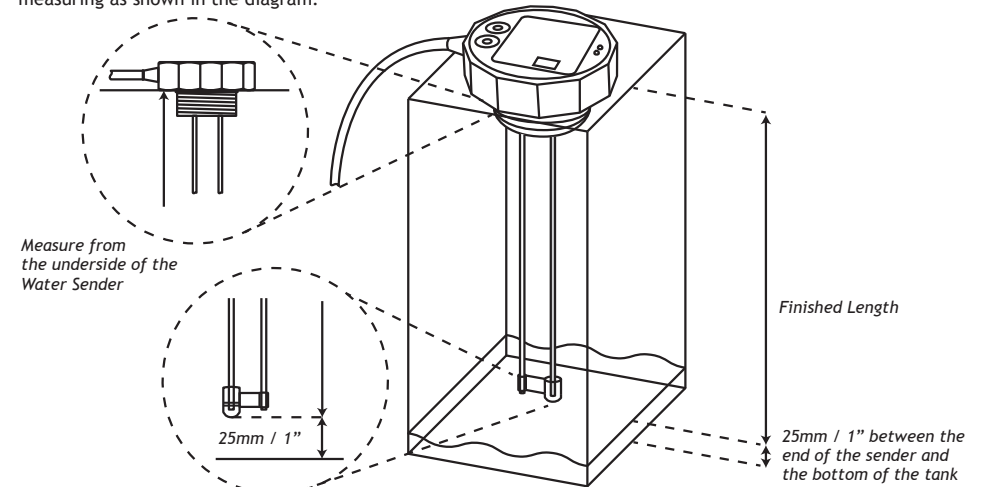


Optional 3261 Mounting Ring.

1.2 MEASURING SENDER LENGTH

The sender may be supplied already cut to length with the probe end cap already installed and be ready to install into the tank if you have supplied the required cut length at the point of ordering. In this case there is no extra work to do in this part.

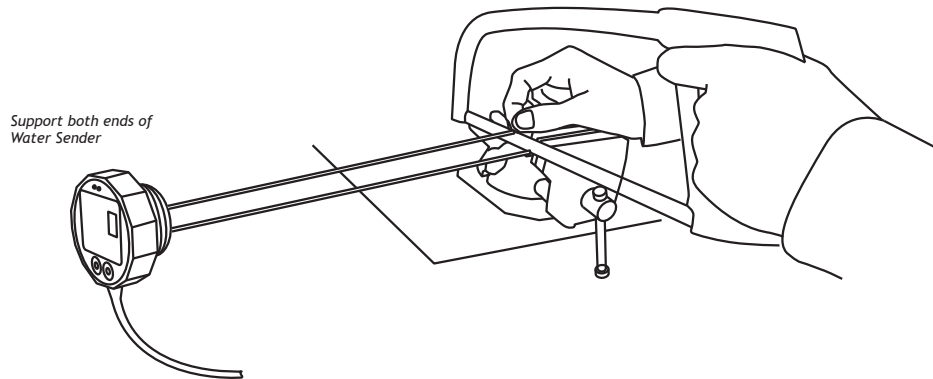
If the sender was supplied in a standard length to be cut down then the finished length should be determined by measuring as shown in the diagram.



1.3 CUTTING TO LENGTH

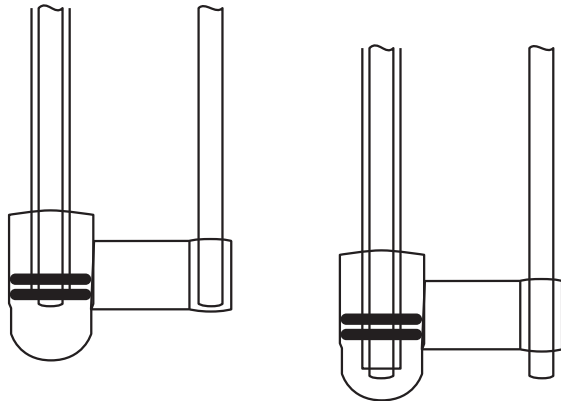
Cut the coated and uncoated rod to length using a sharp hacksaw.

CAUTION
BE VERY CAREFUL NOT TO DAMAGE THE PLASTIC COATING ON THE REMAINING LENGTH OF ROD DURING THE CUTTING PROCESS. IF YOU ARE SUPPORTING THE ROD DURING THE CUTTING PROCESS SUPPORT THE ROD ON THE PART BEING REMOVED. IF THE PLASTIC COATING IS DAMAGED THE SENDER WILL NOT WORK!



After cutting the rods to length remove any sharp edges with a file. The cut end now needs to be insulated by means of the clear plastic end cap included with the unit. Enter the insulated rod in the enclosed part of the end cap and the plain rod in the other end as shown in this image.

Push the insulated rod firmly into the enclosed end until it is fully home as shown the following image. This will be quite stiff and care must be taken not to damage the coated rod in this operation.



Make sure the Plastic outer is well past the O-rings to ensure a good seal.

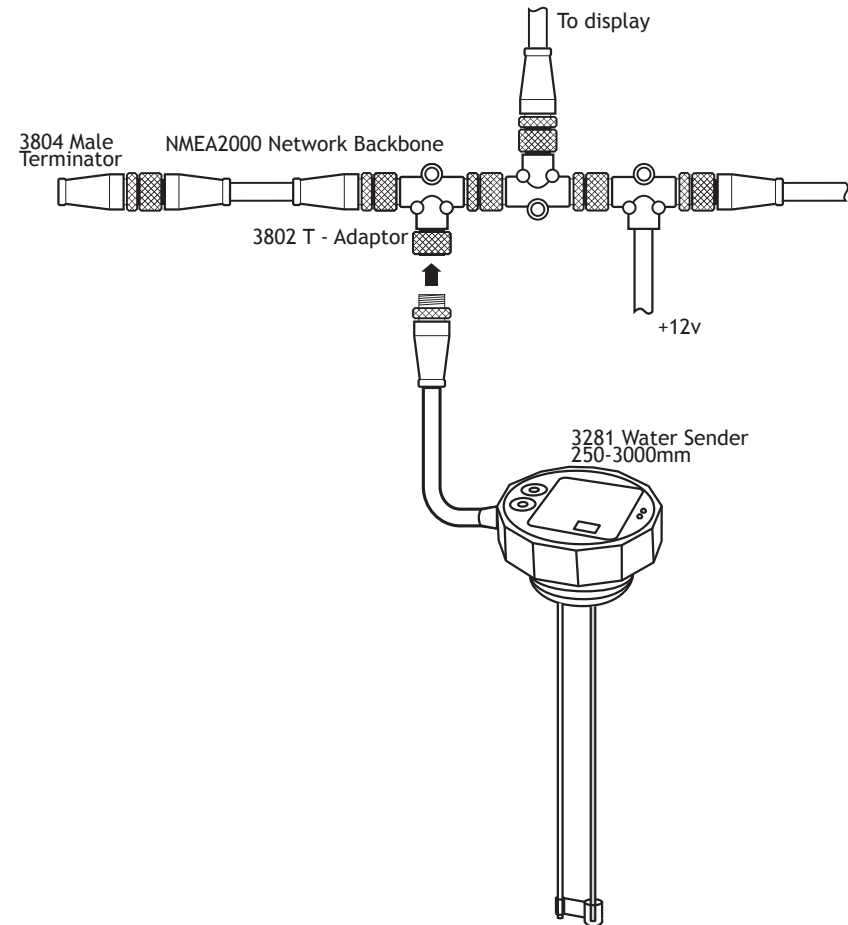
1.4 INSERTING SENDER INTO THE TANK

Carefully insert the Water Sender probe into the threaded hole in the top of the tank. Ensure that the probe coating does NOT scrape against the edge of the tank. Tighten sender sufficiently to prevent leaks.

1.5 CONNECTING THE NMEA2000 INTERFACE

The unit must be connected with POWER OFF to prevent damage.

The NMEA2000 interface cable on the unit should be connected to a nearby NMEA2000 Tee connector (part number 3802). The male end of the cable should be inserted into the female Tee connection noting the position of the keyway in the plug and the socket. This cable can be extended up to a maximum length of 6 metres to the Tee connector. Ensure that the locking ring is securely tightened so that the connection is waterproof and secure.



2.1 TANK TYPE CONFIGURATION

The 3281 Universal Water Sender can be used to measure the level of either Fresh water, Grey water or Black water tanks. Selection of the tank type to measure is done by setting the “Tank Type” switch as per the following table:

Tank Type	Switch Position
Fresh Water	1
Grey Water	2
Black Water	5

Note that any other position of the “Tank Type” switch is INVALID and will prevent the sender from working.

2.2 TANK DEVICE INSTANCE

NMEA2000 requires a unique Device Instance to be set for each type of 3281 NMEA2000 Universal Water Sender on a single network. This is settable from device instance 0 to Device Instance 15 using the right hand small rotary switch on the top of the sender labeled “Tank No.”

This means that each Fresh Water tank should have a device instance starting from 0. Each Grey Water sender should also have a device instance starting from 0, and each Black Water sender should also have a device instance starting from 0.

This can be set at any time regardless if power is on or off. The switch counts from 0 - 9 then A - F being equivalent to Device Instance 0 - 15.

The NMEA2000 Device Instance is set by using the small rotary switch on the front panel labeled “Tank No.” as per the following table:

Switch Position	Device Instance
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

2.3 OUTPUT MODE CONFIGURATION

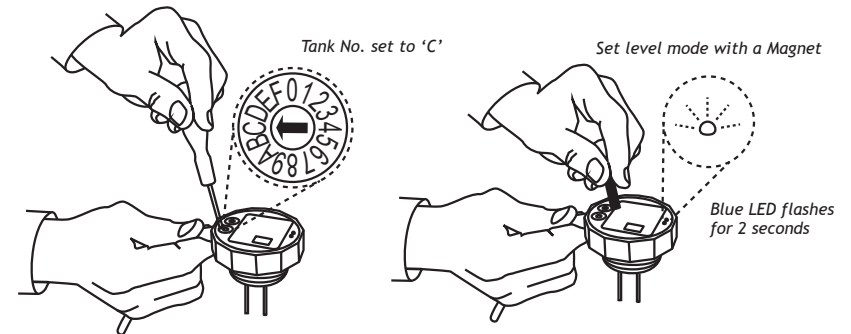
The 3281 Universal mode Water Sender has two output modes to choose from.

It has a normal tank LEVEL output from 0 - 100% that indicates the exact 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.

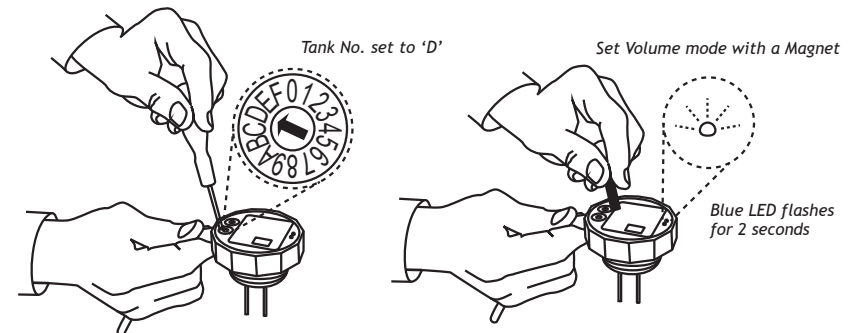
In addition to this mode the unit can transmit a tank VOLUME output from 0-100% that reflects the actual fluid volume within the tank taking allowance for the tanks internal shape. The user can tell when the unit is in Volume Mode because the blue LED flashes twice rapidly every 2.5 seconds when a volume message has been sent.

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 Offshore 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 by setting the “Tank No.” switch to “C” and then placing a small magnet on the “Magnet Calibration” position of the top table. The blue LED will flash for 2 seconds to indicate that the unit saw the magnet. Then return the “Tank No.” switch to its original position and the sender will transmit Level messages as indicated by the blue LED flashing ONCE briefly every 2.5 seconds.



Volume Mode can be set by setting the “Tank No.” switch to “D”, then placing the magnet on the “Magnet Calibration” position of the top table. The blue LED will flash for 2 seconds to indicate that the unit saw the magnet. When the switch is returned to its original positions the sender will transmit Volume messages as indicated by the blue LED flashing rapidly TWICE every 2.5 seconds.



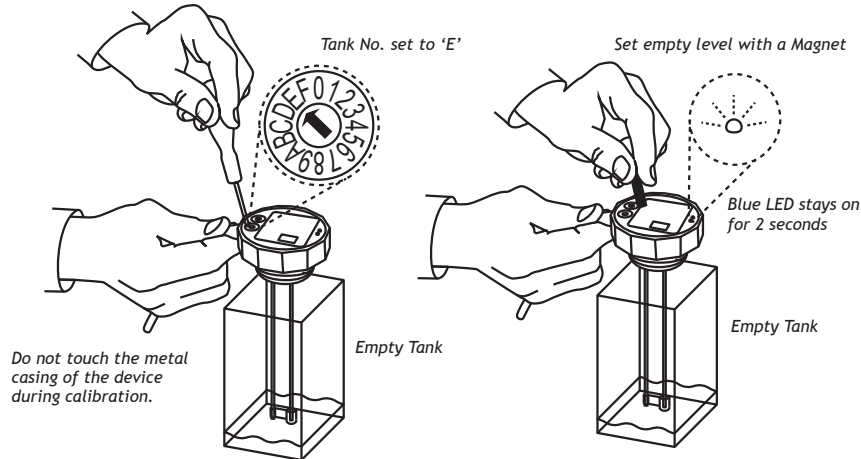
If the senders Volume Mode Tank Data has NOT been set up and the unit is accidentally set to Volume Mode then the data transmitted will actually be the Level Data so the unit remains fully functional.

3 CALIBRATION

When the unit is first installed it needs to be calibrated to the tank. This is easily done as follows:

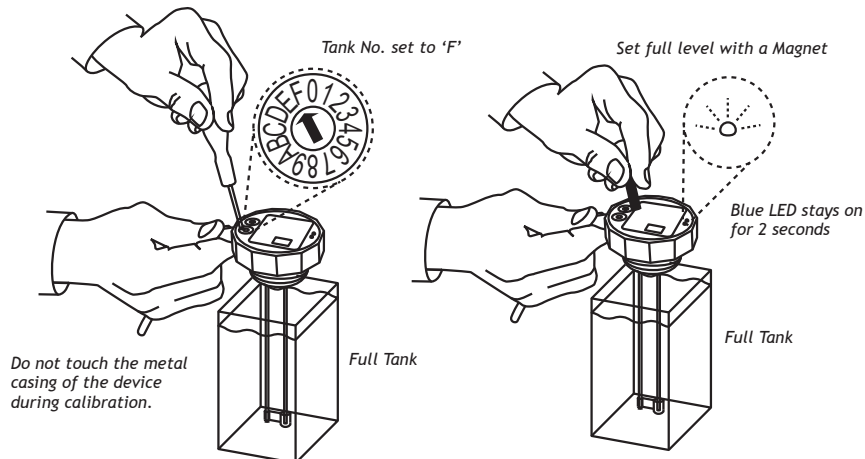
3.1 TANK EMPTY CALIBRATION

When the unit is first installed in an EMPTY tank and powered on the Tank Empty Calibration is done by setting the "Tank No." switch to "E" then placing a small magnet on the "Magnet Calibration" position of the top table. The blue LED will light for 2 seconds to indicate that the unit saw the magnet and that the empty calibration is complete.



3.2 TANK FULL CALIBRATION

This is easily done in a FULL tank and powered on by setting the "Tank No." switch to "F" then placing a small magnet on the "Magnet Calibration" position on the top table. The blue LED will light for 2 seconds to indicate that the sender saw the magnet and that the fixed full calibration point has been set.



In all cases do not forget to set the "Tank No. switch back to its original tank number.

4 TROUBLESHOOTING

The following table will help diagnose common faults:

LED does not flash	Check power on network or Tank Type switch not set to valid value
LED flashes rapidly	Network not terminated correctly or no other NMEA2000 device on the network
LED flashes once every 2.5 seconds	Normal Operation in Level mode (see 2.3 above)
LED Flashes twice every 2.5 seconds	Normal Operation in Volume mode (see 2.3 above)
LED on for about 2 seconds	Calibration magnet detected
Inaccurate Reading	Check end cap still installed on end of sender, carefully clean the sender rods and recalibrate using instructions above.
Red LED on or red LED flashing intermittently	While a short is detected due to an ill fitting end cap or damaged sleeve the red LED will be on.

MAINTENANCE

Ensure that the sender is mounted securely in the top of the tank and that there are no liquid leaks. Reseat and tighten if necessary. Check the security of the NMEA2000 cable to the NMEA2000 Tee Connector and tighten if necessary. Clean the unit with a soft cloth. Do not use chemical cleaners as they may remove label markings. On the Grey Water and Black Water senders you may need to clean the probes from time to time as solid matter can build up and affect the readings. The probes should be cleaned with plenty of water and a soft rag. Be very careful not to damage the coated rod whilst cleaning.

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