

Platypus Owners Manual

Level and Pressure Measurement



Platypus Models



Standard



Plastic



Plug



Rigid



Level Stick

Common Accessories



Vent Box
PL-TERM-SG/TX-E



DIN Mount Transmitter
PL-TX-DIN



2-Wire Lightning
Protection



PR Electronics
DIN Rail Mount
Transmitters

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Rev: June 2012



Platypus Installation Guide

Platypus Mechanical Considerations

The PLATYPUS uses a gauge (referenced to atmospheric pressure) type sensor. This requires that the cable end be terminated so that it is open to the atmosphere but protected from moisture ingress. All the PLATYPUS cabling options (including the Standard Nylon Tubing, 6 core vented cable and Military Plug) provide this atmospheric reference for the sensor. When the unit is installed in locations such as pumping stations or tanks inside buildings this is generally easy to achieve. For installations in exposed locations such as reservoirs and locations where there is a high ambient humidity it is **mandatory** to terminate the cable in a enclosure such as the PL-TERM-SG/TX-E. This provides an entry cable gland for the PLATYPUS cable and another gland for system cabling to exit. There is also a vent that allows atmospheric reference to be maintained but eliminates water ingress, together with silica gel desiccant inside the enclosure to absorb any moisture that does penetrate.

The standard nylon tubing type cable that is supplied with the PLATYPUS comes with a stainless steel support wire that should be used to mechanically support the PLATYPUS in position. Where cable length is less than 5m and the PLATYPUS is not mounted in a position where it is subject to turbulence it is permissible to dispense with the support wire and support the PLATYPUS using the nylon tubing. **UNDER NO CIRCUMSTANCES SHOULD THE INSTRUMENT CABLE BE DRAWN THROUGH THE TUBING, OR THE 6 CORE VENTED CABLE BE USED TO SUPPORT THE UNIT!**

Manifold mounted units should be protected from pressure spikes such as water hammers, and from freezing of the liquid in the pipe (both these events will damage the diaphragm of the sensor). Another point to note is that any air trapped on installation should be bled off.

The diaphragm of the sensor is extremely delicate and should not be pressed with any object (fingers and screwdrivers included) as these will cause permanent damage to the sensor. We have found that a large proportion of PLATYPUS sensors sent for repair have no faults other than a dented diaphragm suffered during a "test". For trouble shooting procedures please refer to that section of this manual. A pressure spike that can damage the sensor can also be generated by dropping the sensor into a tank or reservoir, the sensor should be lowered into position.

All the components of the PLATYPUS body are constructed from 316 stainless steel and are highly resistant to corrosion. Concentrations of chlorine can cause corrosion of stainless steel so care must also be taken in not locating the unit close to chlorine dosing points. **FOR SALINE WATER from bores or seawater use the PLASTIC VERSION OF PLATYPUS.**

Platypus Electrical Considerations

The PLATYPUS uses a strain gauge type pressure sensor that is supplied either with 4 wire strain gauge output or fitted with an internal 4-20mA loop powered transmitter, the PLATYPUS-TX.

4 Wire Output (PLATYPUS-SG, PLATYPUS-LP)

The 4 wire strain gauge output version can be used with either an external strain gauge transmitter such as the PL-TX-DIN which provides a loop powered 4-20mA output, or with a strain gauge input indicator/alarm unit. The PLATYPUS-LP Lightning Protected strain gauge version has the LP PCB fitted inside the housing and this is transparent to any transmitter or indicator. Internal lightning protection is only available with the strain gauge version of the PLATYPUS.



Sensors



Calibration



Instrumentation



Systems



Manufacturing

These SG units are supplied calibrated with their transmitter or indicator but the calibration can be altered in the field if required. (see field calibration with PL-TX-DIN page 5)

Units that are to be installed in lightning prone areas should also have some form of surge protection on the 4-20mA loop. The PL-TX-DIN transmitter includes a loop surge protector but if this transmitter is not used then a device such as the PLATYPUS-ELP should be used. On long cable runs loop surge protection should be used on both ends of the loop.

On LP versions, the stainless steel support wire also forms the ground connection for the LP PCB and **MUST** be connected, with a maximum resistance of 1 ohm to ground, for the lightning protection to be effective.

Internal 4-20ma Transmitter (PLATYPUS-TX)

The PLATYPUS-TX has a 4-20mA loop powered transmitter fitted internally. It is recommended for sensors where the cable length exceeds 20m or where using an external transmitter is unsuitable. This output interfaces directly with telemetry and process control systems. Indicator/Alarm units such as the PR-5714 can power and monitor the output of the sensor without the need for a separate DC power supply.

The calibration depth must be specified at the time of order and this cannot be changed in the field. If the calibration needs to be changed the unit must be returned to ECEFast – see “Repair of Platypus” section for instructions on sending units to ECE.

If the unit is to be installed in a lightning prone area loop surge protection should be installed as described above, as close as practical to the sensor.

The internal transmitter is reverse polarity protected.

Use of an external **SCALING power supply** such as PR-4114 allows high level galvanic isolation and enables calibration of the 4-20mA output - external to the PLATYPUS-TX.

Colour Code of Cable Connection

- Positive – Red and Black Wires twisted
- Negative – Green and white wires twisted

These pairs are separately screened with a common drain wire – earth this at remote end only.

Platypus Electrical Considerations

Mechanical:

- ⇒ Terminate cable in a suitable enclosure such as the PL-TERM-SG/TX-E, linked to atmospheric pressure but protected from water/humidity ingress.
- ⇒ For submersible versions use stainless steel support wire to hold sensor.
- ⇒ If manifold mounting protect against pressure spikes (e.g. water hammer) and water freezing in pipes.
- ⇒ DO NOT TOUCH DIAPHRAGM!
- ⇒ Lower the PLATYPUS into position, DO NOT DROP IN.
- ⇒ Do not mount next to chlorine dosing points or SS versions in saline waters

Electrical:

- ⇒ See wiring diagrams for electrical connections.
- ⇒ The cable should be located away from any power wiring or electrically noisy areas.
- ⇒ The cable shielding should be connected to a good earth.



Sensors



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- ⇒ Sites prone to lightning strikes should use the lightning protected sensors and a surge protector at each end of the 4-20mA loop to the transmitter such as the PLATYPUS-ELP. The PL-TX-DIN includes an integral 4-20mA surge protector that requires the male spade connector on the side of the unit to be connected to a good earth.
- ⇒ Check the output of the sensor (if TX version) or transmitter (if SG or LP version) immediately after installation.
- ⇒ Make sure the signal wires are isolated from the body of the platypus

Configuration Description Build Number

All PLATYPUS sensors have a build number engraved in the body that describes the physical and electrical configuration of the unit.

Platypus units are identified by a small number of physical variables including the type, the cable length, the calibrated depth and the accessories. If in doubt request a Platypus configuration sheet which is available for Standard [SG, TX, and LP], Plug, Plastic, and Rigid versions.

Field Calibration (PLATYPUS-SG and PLATYPUS-LP) with PL-TX-DIN Transmitter

1. Setting the Dip Switches On The PL-TX-DIN For Gross Range Change Selection

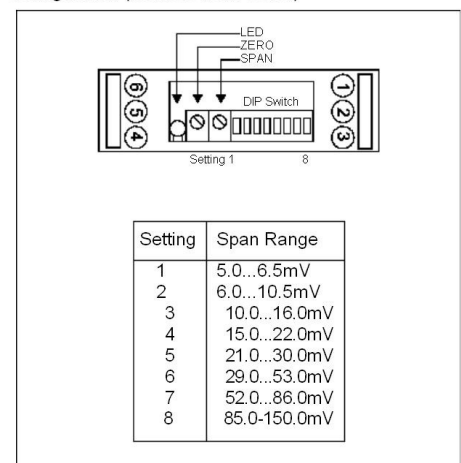
The output of the pressure sensor used in the PLATYPUS is nominally 100mV for full scale output. The full scales ranges of the sensors used are:

- 1 bar (10mWG) for sensors up to 10mWG
- 2 bar (20mWG) for sensors between 10m-20mWG
- 7 bar (70mWG) for sensors between 20m-70mWG

To calculate the mV output of a sensor at a specific depth: $mV \text{ Output} = 100mV \times (\text{Depth}) / (\text{Full Scale Depth of sensor})$. Then simply select the range DIP switch on the PL-TX-DIN that this output falls into. E.g. A PLATYPUS sensor was supplied by ECEFast with a PL-TX--DIN calibrated to 8m WG. It is now desired to use the unit in a water tank with a maximum 4m depth.

The unit was originally scaled to under 10m WG so has a 1 bar sensor installed so the Full Scale Depth of the sensor is 10m. The mV output at 4m = $100mV \times (4m) / (10m) = 40 \text{ mV}$. This falls into the range covered by DIP switch No:6 on the PL-TX--DIN. Set this switch to the ON position, all other switches OFF.

Configuration (Remove front Cover)



2. Adjusting the Zero and Span Pots on the PL-TX-DIN

- Connect the Sensor to the PL-TX-DIN transmitter and put a mA meter in series with the output.
- With the sensor out of the tank adjust the Zero pot so that the output of the PL-TX-DIN is 4mA.
- Lower the sensor into the tank to a known depth and adjust the span so that the output is the correct proportion of the full scale range required. $mA \text{ Output} = 4mA + (\text{Known Depth}) / (\text{max Depth}) \times 16$

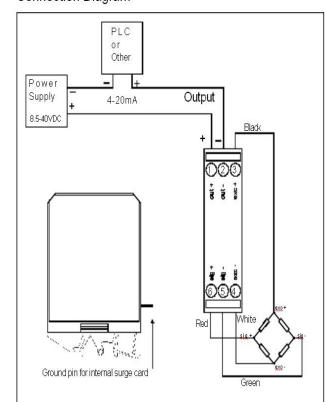
E.g. The PLATYPUS sensor is lowered gently to a known depth of 3m and the max depth is 4m

$$MA \text{ Output} = 4mA + (3m/4m) \times 16 = 16mA$$

The zero and span adjustment can be repeated if required.

On PL-TX-DIN transmitters used with the PLATYPUS-LP model, the ground pin MUST be connected with a maximum resistance of 1 ohm to ground, for the lightning protection to be effective.

Connection Diagram



PL-TX-DIN Transmitter

1. Setting the Dip Switches On The PL-TX-DIN For Gross Range Change Selection

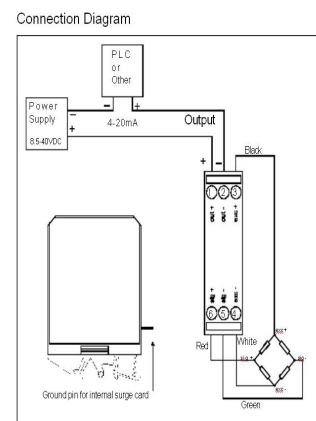
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To calculate the mV output of a sensor at a specific depth: $\text{mV Output} = 100\text{mV} \times (\text{Depth}) / (\text{Full Scale Depth of sensor})$. Then simply select the range DIP switch on the PL-TX-DIN that this output falls into. E.g.: A PLATYPUS sensor was supplied by ECEFast with a PL-TX--DIN calibrated to 8m WG. It is now desired to use the unit in a water tank with a maximum 4m depth.

The unit was originally scaled to under 10m WG so has a 1 bar sensor installed so the Full Scale Depth of the sensor is 10m. The mV output at 4m = $100\text{mV} \times (4\text{m}) / (10\text{m}) = 40\text{ mV}$. This falls into the range covered by DIP switch No:6 on the PL-TX--DIN. Set this switch to the ON position, all other switches OFF.



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- With the sensor out of the tank adjust the Zero pot so that the output of the PL-TX-DIN is 4mA.
- Lower the sensor into the tank to a known depth and adjust the span so that the output is the correct proportion of the full scale range required. $\text{mA Output} = 4\text{mA} + (\text{Known Depth}) / (\text{max Depth}) \times 16$ E.g. *The PLATYPUS sensor is lowered gently to a known depth of 3m and the max depth is 4m, therefore, the MA Output = $4\text{mA} + (3\text{m}/4\text{m}) \times 16 = 16\text{mA}$*
- The zero and span adjustment can be repeated if required.
- On PL-TX-DIN transmitters used with the PLATYPUS-LP model, the ground pin MUST be connected with a maximum resistance of 1 ohm to ground, for the lightning protection to be effective.

Troubleshooting

At the first sign of a problem with a PLATYPUS sensor it should be removed from service immediately. Leaving it connected and submerged will inevitably increase the cost of the repair.

- By far the most common cause of sensor failure is moisture in the cable. A simple test for this is to measure the resistance between any of the output wires and the body of the PLATYPUS with a multi meter (Using a Megger WILL damage the sensor) this should be very high, nearing infinity. If the resistance is less than this then it is certain that there has been moisture penetration down the cable. The unit will need to be returned to ECEFast with its transmitter (if a strain gauge SG or lightning protection LP version) for repair.
- For strain gauge versions the bridge resistance can also be measured. Remove the 4 wires from the transmitter (or indicator) and measure the resistance between the Black and White wires (excitation side of bridge), this should be about 3-4k Ohms. Now measure the resistance between the Red and Green wires (output side of bridge), this should be about 5k Ohms. These readings vary from sensor to sensor but use these values as a guide.
- If the above readings proved to be OK then it is almost certain that the sensor is in working order and the problem lies elsewhere. Things to check are:
 - All connections to transmitter.
 - Power supply
 - Measure current flowing in 4-20mA loop. This should be 4mA with the sensor connected but not installed. The tests and checks above will enable you to identify the component at fault. If the PLATYPUS or its transmitter needs to be returned to ECEFast for repair the matching sensor + transmitter pair should be returned together where possible.

Specifications

PLATYPUS-LP Internal Lightning Protection

- Sensing element: Strain gauge type pressure sensor.
- Ranges Available 0.35, 1, 2, 7, 17 bar
- Accuracy 0.2% FSO
- FSO at 1mA excitation 100mV nominal (min 70, max 130)
- Over-pressure 2 x sensor rating
- Non-sacrificial multistage lightning protection tested to IEC 1000-4-5
- Housing dimensions 32mmØ x 140mm
- Housing and diaphragm material 316 SS
- O-Ring material Nitrile (Viton available on request)
- Process connection 1/2" BSP, cable connection 1/4" BSP or sealed multi-pin socket
- Maximum immersion depth 100m water

PLATYPUS-TX Internal Transmitter

- Supply Voltage 10-40VDC
- Output 4-20mA loop powered
- Input range 4mV-115mV
- Gross range changes link selectable. Zero and Span pots 20% adjustment.
- Accuracy 0.2% FSO
- Operating temperature range 0-70 °C

PL-TX-DIN External Transmitter

- Supply Voltage 8.5-40VDC
- Output 4-20mA loop powered with integral surge protection tested to AS1768 Category B
- Accuracy <0.3% FSO
- Operating temperature range 0-70 °C
- Input range 5-150mV dip switch selectable

Standard Cable

4 core instrument wire drawn down Ø8mm rigid nylon tube with SS support wire. 10m long.

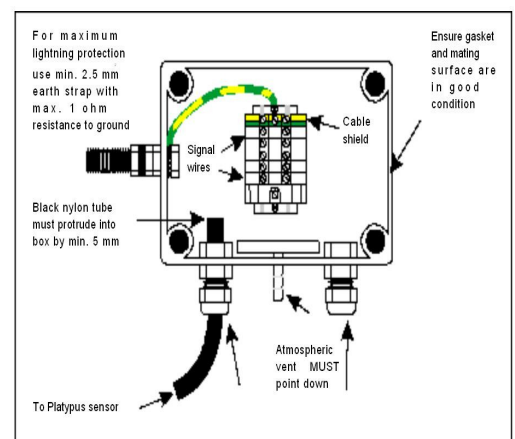
Cable Options

- Rigid nylon tube with/without support wire to max length of 50m
- 6 core polypropylene vented cable with/without support wire to max length of 500m.
- Pipe mount (PLATYPUS-TXP (plug) and -TXC (cable) versions) come with 10m vented polypropylene cable.

Standard Vented Terminal Box (PL-TERM-SG/TX-E)

This robust terminal box is designed to match the Platypus range of sensors and fulfills the function of protecting the top of the cable from water entry and providing convenient termination of the cables, as well as venting the sensor to atmosphere effectively.

- IP65 enclosure
- Atmospheric reference
- DIN rail terminals
- Contains desiccant to protect sensor
- Fitted cable glands



Platypus Level Stick Installation Guide

'Levelstick' is a low-cost continuous transmitter for level measurement in highly contaminated liquids and slurries, including raw sewerage. All wetted parts are non-metallic, and resist organic and many inorganic chemicals at low temperatures. It is shipped in a standard air satchel and assembled on-site with simple tools and familiar processes.

Level Stick Assembly Instructions

1. The following items may be procured from most leading hardware or plumbing stores:
 - A length of 32mm PVC pressure pipe to suit your application, and
 - Priming fluid and PVC adhesive to suit PVC-U pipes and fittings. This is available in 125ml bottles.
 - PVC pressure pipe is available in 3 classes, [PN] based on pressure ratings: 9, 12 and 18.
 - For short Levelsticks, to say 1-2 metres, Class 9 is sufficient, for Levelsticks of 4 metres and above, use Class 18 [PN18]. See Item 10 for further information.
2. Feed the cable of the sensor assembly loosely up through the length of PVC pressure pipe, then through end cap and gland. Leave the gland loose enough for cable to slide through freely.
3. Apply PVC primer to both ends of pressure pipe, as well as to inside mating surfaces of adaptor flange of sensor assembly and the inside of the end cap /gland assembly, to prepare the surface for assembly with PVC cement. Always refer to manufactures instructions prior to using either the primer or adhesive.
4. Apply PVC pipe adhesive to the end of the pressure pipe, and the inside of the adaptor flange of the sensor assembly and push firmly together. Remove excess adhesive. See Diagram 1.
5. Repeat the process at 4. with the top end of the pressure pipe, and top cap. See Diagram 2.
6. Leave some cable slack in the PVC pressure pipe before tightening the cable gland and ensure cable entry has waterproof seal. Do not pull on the cable to test if gland is tight enough as this may damage internal wiring connection. Gland tightness and sealing of cable can be easily tested by trying to push the cable through the gland.
7. Allow appropriate time for adhesive to cure as per manufacturer's directions for use.
8. Attach or fix PL-LEVELSTICK assembly and connect wiring to suit your application.
9. Standard PL-LEVELSTICK is fitted with a 0 to 1 BAR (10.2mWG) sensor and has 4-20mA output. Power supply requirement: 8-30Vd.c. Connections: Red = positive, Blue = negative.
10. In many cases, the sensor will be mounted in a flange or compression fitting which, in turn, will be mounted in the top of a tank and it will be unsupported i.e. cantilevered. When this is done, the longer the probe, the more prone it will be to lateral movement at the tip due to applied forces from the liquid, including the force of buoyancy. This is why, in recommending the PVC tube, Item 1, we suggest a heavier wall for longer probes. An alternative, which would allow using the lighter tube, is to provide support at the tip, or along the probe, to prevent movement sideways. Saddles or "ring" form brackets are ideal and can be designed to allow ready removal of the sensor.



Diagram 1



Diagram 2

Platypus Repair

'To return a PLATYPUS product to ECE for repair or warranty claim, please phone (toll free) on **1800 180 977** to ask for a RRF (Return Request Form) or a Warranty Claim Form. This form will provide all the details you need to send the units to us, and by completing the form fully, ensures we can service your needs as quickly as possible.

Platypus Warranty

The Platypus units are covered by warranty, as per ECE's Standard Terms and Conditions of Sales. A current version can be provided upon request or from our website. However, it is worth noting that special conditions apply for pressure sensors and transducers. An excerpt from the warranty section is reproduced here:

"Pressure transducers will be replaced only if it is clearly shown to fail due to a defect of manufacture. No warranty will be applicable to units subject to overpressure demonstrated by open circuit bridge, plastic deformation of the sensor or excessive zero shift."



Sensors



Calibration



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Systems



Manufacturing