TRENZ

Pilot Plug Manual

Content

Introduction

Thanks for purchasing a TRENZ Pilot Plug!

We hope you will have a great experience with using your new assistant. This manual will help you set everything up and answer any upcoming questions.

If there is anything this manual can't help you with, just contact us and we will help you as soon as we can!

The Pilot Plug transmits the vessels AIS data to any connected WIFI or Bluetooth device. This AIS data can be used for navigational purposes. TRENZ Pilot Plug was built and designed to cease the struggle a modern pilot has on any ship worldwide. An extremely fast GPS, reliable and steady Rate of Turn (ROT), absolute orientation sensing (for example to detect vessel roll) and the best connectivity in class.

Top Features

AIS Repeating: You can use Pilot Plug as an AIS repeater of the vessels AIS data port (more on Page 5).

GPS Mouse: Most of the current mobile devices have positioning sensors but most of the sensors are cheap consumer hardware which can sometimes struggle under rough conditions. To meet the requirements of the pilot, the Pilot Plug can be easily used as a standalone GPS mouse (more on Page 6).

ROT Sensor: The Rate of Turn is one of the most crucial values in any maneuver in harbours worldwide. The angle per minute a vessel is turning must be precise and reliable. You can use the TRENZ Pilot Plug as standalone ROT sensor (more on Page 5).

Getting Started

Powering the Pilot Plug On

On the front side, there is a small switch next to the USB Type C ports. By default, it is in the “off” position. Once you switch it to the other side, you Pilot Plug will start it’s bootup sequence.

Charging the Pilot Plug

To charge the device, connect the Pilot Plug USB cable to one of the USB Type C ports on the Pilot Plug and connect the other end to the included charger.

Connecting to the Pilot Plug

For a successful connection, the Pilot Plug must be turned on and in range for the device to connect to. Depending on the device, you should check if you have disabled “Flight mode” and that the device can connect by either Bluetooth or WIFI.

Windows 10 & WIFI

1. Open your network settings by clicking on the small computer (LAN) or the WIFI symbol within the Notification Center in the bottom right corner of your screen.
2. Open the “Network” tab and switch on “Wireless” (Blue is active) to activate the module.
3. Choose “Pilot Plug” from the available WIFI networks and type in “12345678” when asked for a password.
4. Wait for the connection to be established (“No Internet connection” will be displayed in the Wireless network information).

The pre-configuration to enter in your navigation program is

IP:10.10.10.100 Port: 8919 Protocol: TCP

The Pilot Plug is now connected to your Windows 10 device.

Windows 10 & Bluetooth

1. Open the “Action Center” (a speech bubble) on the bottom right corner of your screen.
2. Right-click or hold your finger on the Bluetooth tile and choose “Go to settings”.
3. Enable Bluetooth and click on “Add Bluetooth or different device”.
4. In the new window (“Add device”) choose “Bluetooth”.
5. Wait for “PilotPlugV1” to show up and choose it (accept any code by clicking on “connect”).

Wait for the connection to be established.

To find out which COM port is used for the Pilot Plug, open your Bluetooth settings (steps 1+2) and click on “More Bluetooth settings” (right side panel). In the new window (“Bluetooth Settings”), open the tab “COM Connections”. In the list you can see and outgoing connection to “PilotPlugV1” and which COM port it uses. You can access your Pilot Plug in any navigation program by using this port (e.g. COM3 and a Baud rate of 38.400).

The Pilot Plug is now connected to your Windows 10 device.

Google Android & Bluetooth

1. Open your settings app.
2. Go to your Bluetooth settings and activate Bluetooth.
3. Search for other devices and wait for “PilotPlugV1” to show up.
4. Select “PilotPlugV1” and accept any shown code.

The Pilot Plug is now connected to your Android device.

Google Android & WIFI

1. Open your settings app.
2. Go to your WIFI settings and make sure it is turned on.
3. Wait for “TRENZ Pilot Plug” to show up in the list of available networks.
4. Select it and enter “12345678” when asked for a password.

The pre-configuration to enter in your navigation program is

IP:10.10.10.100 Port: 8919 Protocol: TCP

The Pilot Plug is now connected to your Android device.

Apple iOS & WIFI

1. Open the settings for you iOS device.
2. Go to your WIFI settings and make sure it is turned on.
3. Wait for “TRENZ Pilot Plug” to show up in the list of available networks.
4. Select it and enter “12345678” when asked for a password.
5. Click on the small “i” next to “TRENZ Pilot Plug” and click on IP Configuration “Manual”.
6. Enter the following data in the fields:
    - IP: 10.10.10.101
    - Mask: 255.255.255.0

ATTENTION: If you have multiple devices simultaneously connected to the Plug, chose different IPs on the devices. For Example: Device 1 has IP 10.10.10.103 and device 2 has IP 10.10.10.105.

The pre-configuration to enter in your navigation program is

IP:10.10.10.100 Port: 8919 Protocol: TCP

The Pilot Plug is now connected to your iOS device.

Sensors & Functions

AIS

The AIS receiver receives the serial AIS data of the vessel by the AIS to Type-C cable and sends it to any device connected to the Pilot Plug. This feature is enabled by default. AIS receiving can be activated by using the Joystick (Left) and the AIS-Data is signalled by the flickering orange LED (Number 1). Simply activate or deactivate the AIS receiver by pushing the joystick to the left.

Rate of Turn (ROT)

The rate of turn gives an information of the current turning angle per minute of the vessel. This sensor can be activated by using the Joystick (Up), the state is signalled by the red LED (Number 4). Simply activate or

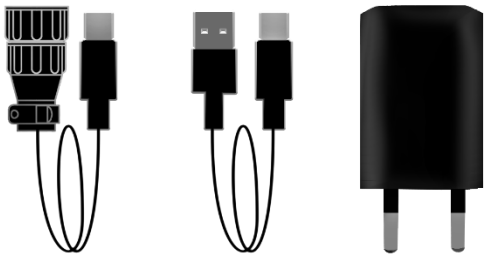
deactivate the ROT sensor by pushing the joystick up. By default, the ROT is calibrated on start-up, if the calibration differs, or it occurs that you have a drifting ROT signal, lay down the Pilot plug on a steady surface (make sure it is turned on for at least 2 minutes) and press down the Joystick slightly. A new fresh calibration pattern will be recorded and be signalised due to the 4 LED turning on, this process will take round about 10 seconds. Wait till all 4 LED blink, this will confirm that the calibration was done properly, and a new calibration was stored local.

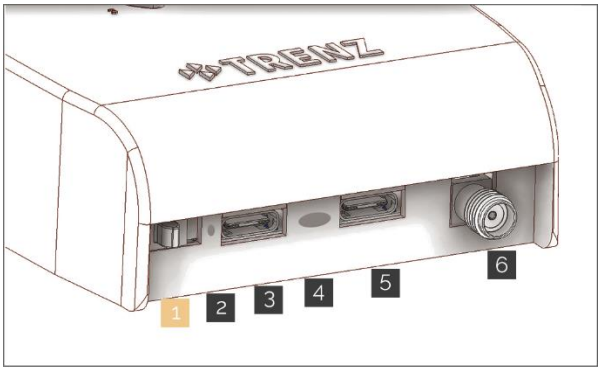
GPS

The GPS gives a real-time information of the current position, speed, heading and time. This sensor can be activated by using the joystick (Down) and the state is signalled by the green LED (Number 2). Simply activate or deactivate the GPS sensor by pulling the joystick down. For more Information's about all Specifications of the internal GPS-Chip, please have a look at chapter 8 "Technical Specifications

Connecting the vessel

1. Connect the AIS to USB Cable (left picture) with the Pilot port and any of the two available USB Type C Ports of the Pilot Plug (right picture - Port 3 or 5).
2. Turn on the Pilot Plug with the Power switch (right picture – 1 Power switch)
3. The LEDs on top and the red Power LED (right picture – 2 Power LED) will light up and indicate that the Pilot Plug booting.
4. Connect the Pilot Plug with your PPU (at first time setup the short introduction "Connection with the PPU" is recommended) and open your Navigation software.



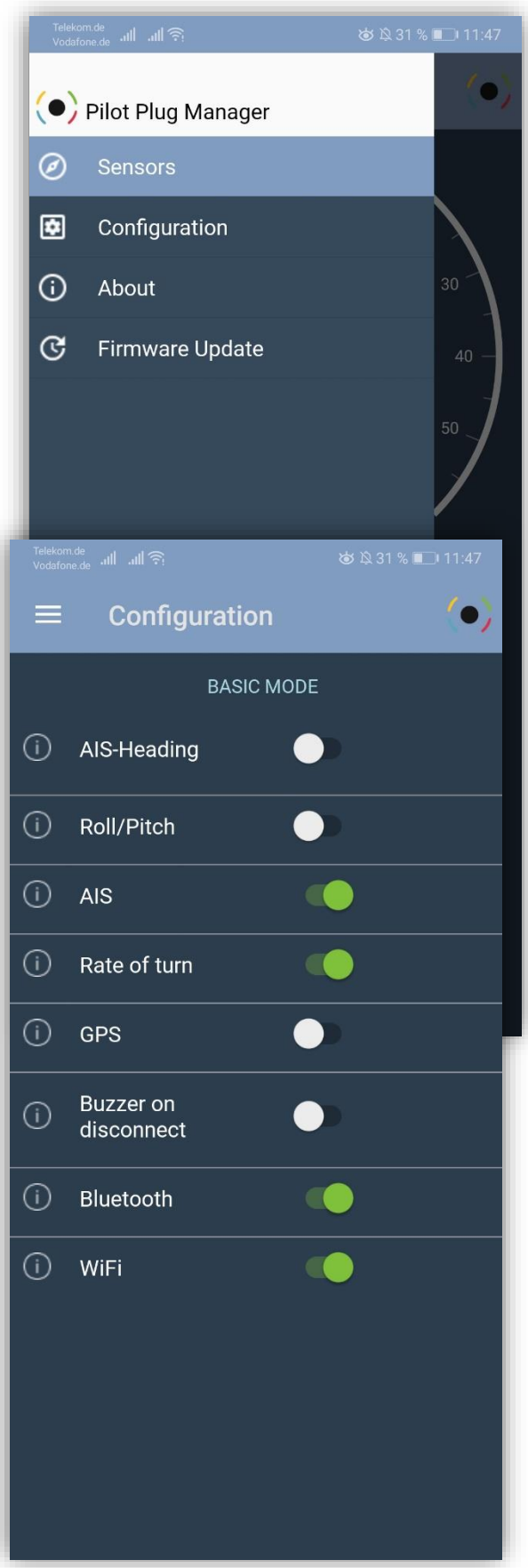


ROT Calibration

1. Turn on the Pilot Plug.
2. Wait for at least 1 Minute (the Pilot Plug will make some noise when the boot is finished correctly).
3. Place the Pilot Plug on a steady and flat floor and press the joystick.
4. All 4 LEDs will light up; do not touch the device while the LEDs are lit up!
5. The Pilot Plug will signalize a good calibration with the flashing LED circle and a start-up noise.

When the calibration failed (too much movement while calibrating or a sensor error) the plug will pulse the red LED and signalize it with a buzzer sound.

Configuration



Configuration via the App

The Pilot Plug can be configured by multiple mobile devices.

To get started please download one of our Apps first. You can update your configuration with each of our Apps. Android, iOS or Windows apps are available here:

HTTPS://TRENZ-PILOTPLUG.COM/DOCS/DOWNLOADS

Connect to your Pilot Plug (See "Connecting to the Pilot Plug") and start the App. Once the connection between your device and the Pilot Plug has been established, the App will show you all the sensor data currently available". The configuration can be found in "Configuration". As soon as you click on Configuration the device will request and refresh the configuration of your device to view it in your App. Now you can proceed to change any required setting. The settings will not be instantly pushed to your device. Please click Submit (to submit your current changes) or revert (to delete the changes you have made and start over). The Update process will take round about 5 seconds and will be terminated with a confirmation sound and a restart of the Plug.

Configuration Reset

In case there is any trouble with the device, you can always reset it to its factory configuration.

Warning: This will reset the settings and the device will have the default settings instead of the user configured settings.

To reset your device, you just must turn the device off, turn it on again, hold the Joystick down for at least 15 seconds and wait for the 4 LEDs on top to light up and a confirmation sound.

The Plug is now reset and will start as usual. When you are facing any problem at this moment please restart and start over with this process.

Firmware Updates

Your Pilot Plug will periodically (and on special occasions) receive Firmware updates from the TRENZ development team (a new Firmware update will always be visible in our Apps, the Blog, the Firmware newsletter and social media).

This Firmware upgrade comes always with a documentation of changes and an estimation of relevance to update your Pilot Plug. If there is any change in the battery lifetime due to new features, they will be stated clearly and understandable, so the you are able to determine if the new features are worth the device runtime or not.

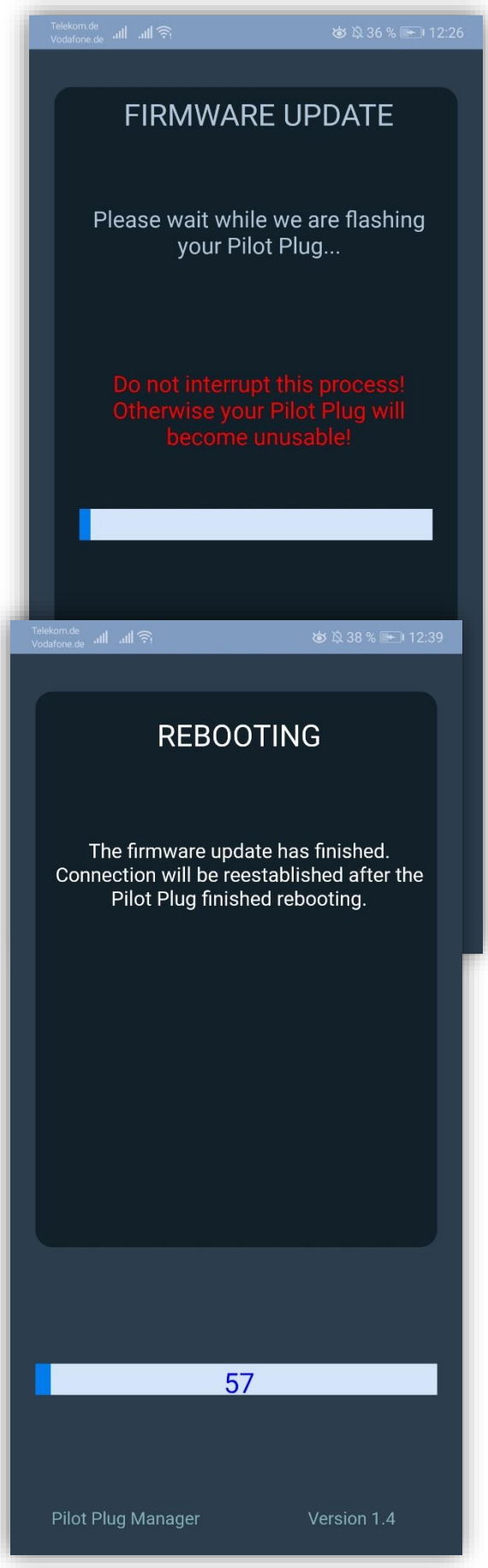
Preconditions

This firmware update is much more complex internally than a configuration update. Due to the complexity we decided to make this process as easy as possible for you. This was ensured by using a physical connection (a cable) and a device with windows 8 or higher for the upgrade.

Hardware: **USB 2.0 Port** and a device with **windows 8 or higher** and the **original Pilot Plug USB Type C connection cable**. Alternative a mobile device with Android or iOS and a WiFi connection to our PilotPlug.

Before you start: Make sure your Windows device is properly working, particularly your USB ports. Also make sure you have at least 200 MB of free storage space.

Your mobile device should be connected to the internet to receive the latest firmware of our webservice and the connection to your PilotPlug should be steady (close proximity between the device and the PilotPlug is a good factor).



1.

The Manager will download the latest Firmware when you open the “Update Firmware” window on the landing page of the Android and iOS App. Otherwise download the current “FW-Updatefiles” for the windows version manually from our website at:

www.trenz-pilotplug.com/update

(THE WINDOWS VERSION IS ABLE TO DOWNLOAD THIS FILE INDEPENDENT)

2.

Open the Firmware Update Tab (in the Apps, connect first) and follow the on-screen instructions.

3.

On versions below 3.2A it is necessary that you reset the PilotPlug before you can proceed. Please use a paperclip to tap gently into the hole above the joystick on top of the PilotPlug (twice, fast as possible, the red LED will start pulsing slowly).

4.

The updater will update your Firmware to your chosen version. Please keep the device and the software running and do not close or detach the device! Once the update is done the PilotPlug will reboot and the App will wait till this process has finished.

Congratulations, you have just updated your Firmware to a newer version.

Description of each setting

Profile

Pilot organisation	Name of the organisation the pilot is assigned to
Name	Name of the profile to identify different profiles and settings
Info	Information about the profile (like accuracy) or sea and harbour pilot profile

Bluetooth

Active	Sets the Bluetooth module to be activated or disabled by default. **Attention**: This setting can't be changed by the joystick while the Pilot Plug is running!
Reconnect	Multiple devices (like Windows 10 devices and below) can work with different Com ports for devices. The Pilot Plug is configured as an outgoing and incoming Com port by default. This incoming port can be used to allow the Pilot Plug to perform a reconnect in case of a lost connection to the plug. For example, if the PPU loses the connection to the Pilot Plug, the Plug can reconnect to the incoming Com port on windows. For this feature, it is necessary to set both Com ports (incoming and outgoing) in the navigation program as sensor. Some navigation program performs its own kind of reconnect by closing and opening the Com port. Please don't use this feature if you are using Software like Lisy (Seven C's) because this software performs an own reconnect.

AIS

Active	Sets the AIS receive to be disabled by default. **Attention:** This setting can't be changed by the joystick while the Pilot Plug is running!
Polarity detection	The Pilot Plug detects the polarity completely autonomous in automatic mode, the polarity cannot be triggered in this mode. The Manual mode can be used to trigger polarity detection manual to keep track of ships with reversed polarity.
Advanced AIS Parser	This setting allows the software to perform more actions with the incoming AIS Data.

Mode

Active	When the Mode is activated, the Pilot Plug sends basic information to the PPU every few seconds.
Style	NMEA is recommended for every software which has not implemented the TRENZ custom modes, every software which decided to implement the custom messages (Lisy and SeaIQ for example) should use the TRENZ-Style.
Interval	Sets the interval the mode should be send to the PPU, it is recommended to use the On Change or 60S setting.

Rate of Turn/ROT

Active	Sets the Rate of Turn sensor and sending to be enabled/disabled by default. **Attention:** This setting can't be changed by the joystick while the Pilot Plug is running!
Interval	Sets the interval the Rate of Turn should be send to the PPU, it is recommended to use the 1s or 2s setting.
Accuracy	The accuracy of the ROT can be changed to get just basic information about the turning angle.
Magnetic inclination	
Magnetic Field Strength	
Calculation	It is highly recommended to set this setting to Internal! If this setting is set to external the Plug will send Raw sensor data to the PPU.

Heading

Active	Sets the Heading sensor and sending to be enabled/disabled by default. **Attention:** This setting can't be changed by the joystick while the Pilot Plug is running!
Interval	Sets the interval the heading should be send to the PPU, it is recommended to use the 1s or 2s setting.
Calculation	The calculation of the heading can be done by the sensor or by using the OwnShip information of the provided AIS data of the vessels AIS port.
Automatic Mode	This mode sets the automatic heading parsing of AIS and compares it to the sensor data. If the OwnShip data is corrupted the sensor heading will be send.

GPS

Active	Sets the GPS receiving and sending to be enabled/disabled by default.
Interval	Sets the sending interval of the GPS data transmitted to the PPU, it is recommended to use the 1s or 2s setting.
Sentences	Can be changed to transmit different amounts of NMEA sentences to the PPU. The differences are: Recommended sends just basic GGA and GSV sentences, minimum just sends GGA sentences and All sends every type of NMEA GPS sentence. **Attention:** It is possible to receive different GNSS systems (preconfigured are GLONASS and GPS). Please contact the support for more information regarding different satellite and positioning systems.

LED

Active: Sets the custom LED states to be enabled/disabled. Disabled means the factory settings are applied.

LED1: Orange
LED2: Blue
LED3: Green
LED4: Red

Can be configured as the current state of sensors, data or connections.

Each LED can indicate a different state of the supplied settings. For example: the green LED (LED 3) can be an indicator for a GPS fix. As soon as the Pilot Plug detects a GPS-Fix the green LED will light up.

Joystick

These settings apply to the axis of the joystick. The joystick can be configured by the user to comply with the pilot's requirements. In case the pilot wants the ROT settings to be easily set on the fly by simple joystick input the axis can be configured below.

Active: Sets the custom Joystick settings to be enabled/disabled. Disabled means the factory settings are applied.

Left/Right/Up/Down/Press: Each axis can be applied to different functions to be enabled/disabled or started:

ROT	Turn On/Off ROT Sensor
ROT Calibration	Start a ROT calibration
GPS	Turn On/Off GPS Sensor
AIS	Turn On/Off AIS receiving
AIS Polarity	Toggle AIS polarity
Bluetooth	Turn On/Off Bluetooth
WIFI	Turn On/Off WIFI
Reset	Reset the device

MicroSD

In case the pilot wants to keep track of his received and send data, a micro SD card can be used to save these data streams.

Active	Sets the micro SD usage to be activated/disabled. **Attention**: If you activated this feature please make sure that a micro SD is inserted!
AIS Data	Saves the incoming AIS data to a file on the micro SD.
GPS Data	Saves the received GPS data to a file on the micro SD.
ROT Data	Saves the sensor ROT data to a file on the micro SD.
Battery Data	Saves the battery voltage and percentage with a timestamp to a file on the micro SD.
Connectivity Data	Saves the connection states of Bluetooth and Wi-Fi with a timestamp to a file on the micro SD.
Any Data	Activates all 5 data streams above to record every any relevant data of the plug.

Buzzer

Active	Activates/Deactivates the buzzer with the stated Sensor Status below.
Sensor Status	This sets the buzzer to buzz as soon as the state of the sensor or for example battery status changes.
ROT Violation	Threshold of 20° per minute has been reached.

AIS Error	No valid AIS Sentence anymore, just happens when the Plug had for at least 2 minutes full AIS sentences.
WIFI/BT connection	The connection was established but is now disconnected (Left behind – 30 seconds)

Attention: Every buzzer sound can be aborted by pushing in the Joystick at any time!

Battery

Active	Sends basic battery information to the PPU Disabled/Enabled.
Information	The custom battery information must be implemented in the navigational software you use. Voltage and percentage are transmitted to the PPU.
Interval	Sets the interval the battery information should be send to the PPU, it is recommended to use the 120s or 300s setting.
Accuracy	You can set the accuracy to 1/5/10 units. This can be convenient in case the pilot wants the battery capacity to be shown smoothed.
Calibration	The calibration presets can be loaded from external micro SD, given by the configuration or internal flash.
MicroSD	Datafile put on the micro SD, the file is provided by TRENZ and can be changed by the pilot.
External User	Calibration is pushed by the App to the device. Exchange between pilots is possible.
Internal Flash	The Plug performs self-calibrations and uses these patterns.

WIFI

Active	
SSID	Sets the name of the WIFI.
Password	Sets the password for the WIFI connection. The type of encryption is WPA2 – TKIP.
Channel	Sets the WIFI channel to use, in case the device sends on the same frequency as different other devices please set a different channel (at least 3 channels apart of the source of disturbance).
DHCP	Activate or deactivate the DHCP server on the Plug. In case you deactivate the server, please keep in mind that the PPU set their IP Address manually.
IP	IP of the Plug to connect to.
Port	This is the port the AIS data is available.
Automatic Switch Off	Switches the WIFI off in case no device has been connected since the last 5 minutes. Low-Power-Mode can be deactivated by restarting the device or using the joystick.

Attention: Be careful when you change any WIFI settings like: SSID, Password, DHCP, IP or Port. These settings may prevent you from being able to connect to the Plug!

Technical specifications

Connectivity

WIFI

- Standard: 802.11 b/g/n with 17dBm transmission power for up to 32 Clients
- Configurable with the included Web Panel (WIFI-Name, port for data, frequency, transmission power)
- Optional LowPower mode if no connection is needed (smart switching)

Bluetooth

- Standard: 802.15.1 with more than 12dBm transmission power and multi-client functionality
- Bluetooth 2.0 up to 4.2
- Automatic reconnect
- Bluetooth Low Energy and Bluetooth Classic enable the best trade of between power saving and performance
- Custom built-in antenna for maximum connectivity

USB Type C

- 2 USB 3.0 Type C Ports for charging the Pilot Plug and passing through AIS data
- One of the Ports can be used to connect to a computer and load data or program the Pilot Plug
- Reversible
- New standard for mobile devices

Sensors

Rate of Turn

- Axis drift compensated 9-axis sensor (Gyroscope, Accelerometer, Magnetometer)
- Accurate Rate of Turn Signal
- Optional built-in manual calibration

GPS

- Built-in antenna
- Multiple standards supported (GPS, GLONASS, QZSS, BEIDOU, GALILEO, SBAS)
- Assisted GPS
- Datalogger (saves last positions at wish)

Storage

- Internal microSD card slot – optimal for individual Software solutions and storing data logs (AIS, ROT, battery information, GPS position, connectivity)

Battery

- 4000mAh Lithium Ion Battery
- Up to 60h run time with maximum connectivity (Bluetooth and AIS)

Buttons & Switches

- Power switch on the side
- Joystick on the upper side with push-down functionality to manage the Pilot Plug (configurable)

Feedback

- Internal buzzer
- 4 colored LEDs on the upper side

- 2 LEDs next to the ports to indicate power and charging status

Weight

- Below 200g

CE, RoHS and FCC certified parts used.

Contact

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