# PolaRxS
# Product Family Hardware Manual

Version 1.3.0

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## CE NOTICE

PolaRxS receivers carry the CE mark and are as such compliant with the 2004/108/EC - EMC Directive and amendments, 2006/95/EC - Low Voltage Directive, both amended by the CE-marking directive 93/68/EC.

With regards to EMC, these devices are declared as class B, suitable for residential or business environment.

## ROHS/WEEE NOTICE


PolaRxS receivers comply with European Union (EU) Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive).

PolaRxS receivers comply with the European Union (EU) Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). The purpose of this Directive is the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. If purchased in the European Union, please return the receiver at the end of its life to the supplier from which it was purchased.

# SAFETY INFORMATION

 Statement 0000/WARNING: IMPORTANT SAFETY INSTRUCTIONS
This warning symbol means danger and indicates that you are in a situation that may result in body injury and physical damage. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and familiarize yourself with standard practices for preventing accidents. Use the statement number provided at the beginning of each warning to locate its translation in the translated safety warnings that accompanied this device.

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 Statement 0001/WARNING: The power supply provided by Septentrio (if any) should not be replaced by another. If you are using the receiver with your own power supply, it must have a double isolated construction and must match the specifications of the provided power supply.

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 Statement 0003/WARNING: Ultimate disposal of this product should be handled according to all national laws and regulations.

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 Statement 0005/WARNING: The equipment and all the accessories included with the product may only be used according to the specifications in the delivered release note, in the manual and in all other documents delivered with the receiver.

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 Statement 0007/WARNING: Never place the equipment in direct sunlight.

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 Statement 0008/WARNING: The outside of the instrument may be cleaned using a clean, lightly dampened cloth. Do not use any cleaning liquids containing alcohol, methylated spirit, ammonia etc.

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# 1 PolaRxS_PRO


## 1.1 Rear Panel Connectors

The rear panel features three connectors.


Note that two additional connectors may be present on your receiver. These additional connectors are not connected.

### 1.1.1 MAIN (TNC)

Connect an active GNSS antenna to this connector. The gain at the connector (antenna gain minus cable losses) must be in the range 15 to 50dB.

By default, the receiver provides a 5V DC supply on the MAIN connector to feed the antenna. Other voltages can be imposed through pin ANT_EXT of the IN connector on the front panel (see section 1.2.6). The maximum supported current is 200mA.

Never inject a DC voltage into the MAIN connector as it may damage the receiver. For instance, when using a splitter to distribute the antenna signal to several receivers, make sure that no more than one output of the splitter passes DC. Use DC-blocks otherwise.

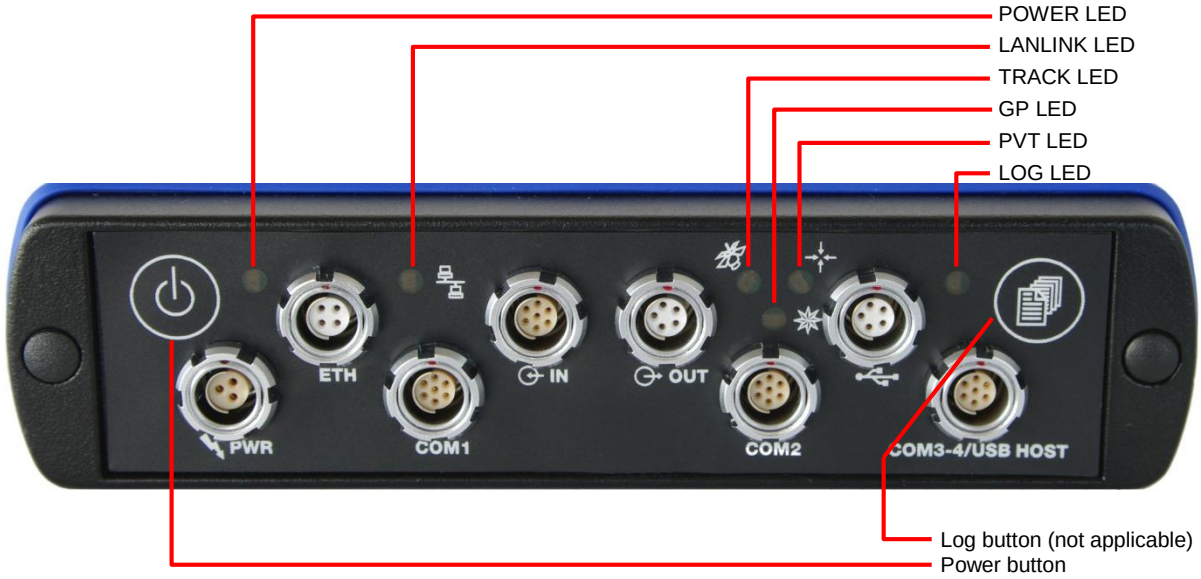
### 1.1.2 PPS OUT (BNC)

xPPS output (5V, output impedance 50Ohms). The rate and polarity of the xPPS output signal are specified by the **`setPPSParameters`** command. The pulse duration is 1.2ms.

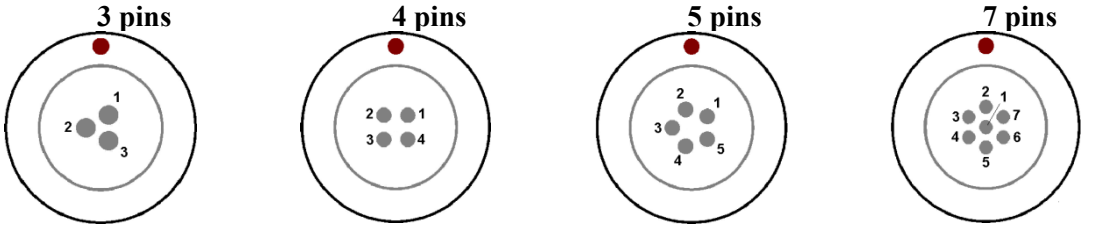
### 1.1.3 REF OUT (BNC)

This connector provides access to the 10-MHz reference signal from the internal ultra low noise OCXO. It is a sinusoidal signal with an unloaded peak-to-peak amplitude of 1.1V. Output impedance is 50 Ohms.

## 1.2 Front Panel Connectors




The front panel features 8 ODU connectors, which are described in the following sections. These connectors are all of type ODU MINI SNAP Series F. The pinout of the female connectors and the ODU part number of the corresponding male connectors is shown below.




S40F1C-P03MJG0-50CP S40F1C-T04MFD0-50CP S40F1C-P05MFD0-50CP S40F1C-T07MCD0-50CP

### 1.2.1 COM1

This 7-pin connector provides access to the first serial port (COM1).

| Pin # | Description |
|---|---|
| 1 | Not connected |
| 2 | Signal ground (GND) |
| 3 | Not connected |
| 4 | Not connected |
| 5 | Receive Data (RXD – input to the receiver ) |
| 6 | Transmit Data (TXD – output from the receiver) |
| 7 | Not connected |

The receiver behaves as Data Terminal Equipment (DTE).

### 1.2.2 COM2

This 7-pin connector provides access to the second serial port (COM2).

| Pin # | Description |
|---|---|
| 1 | +5V DC output |
| 2 | Signal ground (GND) |
| 3 | Clear To Send (CTS – input) |
| 4 | Request To Send (RTS – output) |
| 5 | Receive Data (RXD – input) |
| 6 | Transmit Data (TXD – output) |
| 7 | Not connected |

The receiver behaves as Data Terminal Equipment (DTE).

Pin#1 provides a 5V DC voltage, e.g. to allow feeding a Bluetooth™ device.

### 1.2.3 COM3-4/USB

This 7-pin connector can be configured in two modes:

- COM3 and COM4 mode
- USB mode.

The electrical level at pin#7 defines the operating mode.

#### 1.2.3.1 COM3-4 mode

This mode is selected by leaving pin#7 unconnected.

| Pin # | Description |
|---|---|
| 1 | Not connected |
| 2 | GND |
| 3 | COM4 RX |
| 4 | COM4 TX |
| 5 | COM3 RX |
| 6 | COM3 TX |
| 7 | Leave unconnected |

#### 1.2.3.2 USB mode

This mode is selected by applying 5V DC to pin#7.

| Pin # | Description |
|---|---|
| 1 | Not connected |
| 2 | GND |
| 3 | USB D- |
| 4 | Reserved |
| 5 | USB D+ |
| 6 | Reserved |
| 7 | USB Vbus |

### 1.2.4 Ethernet

| Pin # | Description |
|---|---|
| 1 | TxD+ |
| 2 | TxD- |
| 3 | RxD+ |
| 4 | RxD- |

### 1.2.5 OUT

| Pin # | Description |
|---|---|
| 1 | Reserved |
| 2 | GND |
| 3 | GP1 output, 3.3V. Use the command **`setGPIOFunctionality`** to set the level of this pin. |
| 4 | GP2 output, 3.3V. Use the command **`setGPIOFunctionality`** to set the level of this pin. |
| 5 | nRST_OUT. Open-collector output, driven low when the receiver is resetting. |

### 1.2.6 IN

| Pin # | Description |
|---|---|
| 1 | Reserved, leave unconnected. |
| 2 | GND |
| 3 | Reserved, leave unconnected. |
| 4 | nRST_IN. Driving this pin low resets the receiver. Internally pulled-up. Debouncing and deglitching is foreseen. |
| 5 | EVENTA, 3.3V CMOS, 5V tolerant, 100kΩ pull down resistor. This is the first digital input for external event timing, see Firmware User Manual for operation. |
| 6 | EVENTB, 3.3V CMOS, 5V tolerant, 100kΩ pull down resistor. This is the second digital input for external event timing, see Firmware User Manual for operation. |
| 7 | ANT_EXT, external antenna power. Can be used to apply an external supply voltage to the antenna. The voltage applied to ANT_EXT ($V_{ANT}$) determines the voltage source on the MAIN and AUX1 connectors, as follows:<br>• if $V_{ANT}$<2.0V or ANT_EXT left open, the antenna is powered by the internal 5V supply;<br>• if 3.0V<$V_{ANT}$<4.0V, there is no power provided to the MAIN connector;<br>• if 5.0V<$V_{ANT}$<12.0V, the antenna power supply is taken from ANT_EXT.<br><br>**Warning:**<br>Exceeding 12.0V for $V_{ANT}$, or drawing more than 200mA from the antenna connector can permanently damage the receiver. |

### 1.2.7 

| Pin # | Description |
|---|---|
| 1 | Reserved |
| 2 | Reserved |
| 3 | Reserved |
| 4 | Reserved |

| | |
|---|---|
| 5 | Reserved |

### 1.2.8 PWR

| Pin # | Description |
|---|---|
| 1 | Power: 9 to 30V DC |
| 2 | ON/OFF. When this pin is tied to pin#1, the receiver is always on, regardless of the state of the on/off button. |
| 3 | GND |

If you are using a different power adaptor than the one provided by Septentrio, make sure that it can sustain a current of 1.5A.

## 1.3 Log Button

The log button is not functional on the PolaRxS: it has no effect.

## 1.4 Status LEDs

| LED Name | LED Behaviour |
|---|---|
| POWERLED | LED lights when the receiver is switched on. |
| LANLINKLED | LED blinks when sending or receiving data over Ethernet. |
| LOGLED | LED lights when data is being written to the internal SD memory card. If the logging rate is larger than 1 Hz, LED lights continuously. |
| PVTLED | LED lights when a PVT solution is available. |
| GPLED | General-purpose LED. The function of this LED is configured with the **`setLEDMode`** command. By default, this LED has the DIFFCORLED function (see below). |
| DIFFCORLED | Differential correction indicator. In rover PVT mode, this LED reports the number of satellites for which differential corrections have been provided in the last received differential correction message (RTCM or CMR).<br><br>**LED behaviour** / **Number of satellites with corrections**<br>LED is off: No differential correction message received<br>blinks fast and continuously (10 times per second): 0<br>blinks once, then pauses: 1, 2<br>blinks twice, then pauses: 3, 4<br>blinks 3 times, then pauses: 5, 6<br>blinks 4 times, then pauses: 7, 8<br>blinks 5 times, then pauses: 9 or more<br><br>The LED is solid 'ON' when the receiver is outputting differential corrections as a static base station. |
| TRACKLED | **LED behaviour** / **Number of satellites in tracking**<br>blinks fast and continuously (10 times per second): 0<br>blinks once, then pauses: 1, 2<br>blinks twice, then pauses: 3, 4<br>blinks 3 times, then pauses: 5, 6<br>blinks 4 times, then: 7, 8 |

| | | |
|---|---|---|
| | pauses | |
| | blinks 5 times, then pauses | 9 or more |

## 1.5 Cables

| Cable Name: CBLe_COM_1,8 | Part #: 200416 |
|---|---|

This cable can be connected to either the COM1 or COM2 connector. Note that RTS/CTS lines are only available when connected to COM2.

| Cable Name: CBLe_GPO_OE_5 | Part #: 201203 |
|---|---|

Open-ended cable to be used with the OUT connector (see pinout in section 1.2.5).

| Pin# | Wire Color |
|---|---|
| 1 | Blue |
| 2 | Blue/Black |
| 3 | Orange |
| 4 | Green |
| 5 | Brown |

| Cable Name: CBLe_GPI_OE | Part #: 200419 |
|---|---|

Open-ended cable to be used with the IN connector (see pinout in section 1.2.6).

| Pin# | Wire Color |
|---|---|
| 1 | Orange |
| 2 | Green |
| 3 | Yellow |
| 4 | Black |
| 5 | Red |
| 6 | Purple |
| 7 | Brown |

Do not leave the red and purple wires floating. Tie them to ground if not used. This is to avoid crosstalk effects that could lead to spurious level transitions on the EventA and EventB inputs.

| Cable Name: CBLe_USB | Part #: 201202 |
|---|---|

USB cable to be connected to the COM3-4/USB connector.

| Cable Name: CBLe_ETH_MS | Part #: 200418 |
|---|---|

Ethernet cable (straight) to be connected to the ETH connector.

| Cable Name: CBLe_ETH_MX | Part #: 200417 |
|---|---|

Ethernet cable (crossed) to be connected to the ETH connector.

| Cable Name: CBLe_PWR_OE | Part #: 200422 |
|---|---|

Open-ended cable for the PWR connector (see pinout in section 1.2.8).

| Pin# | Wire Color |
|---|---|
| 1 | Blue and green (these two wires are both connected to Pin#1) |
| 2 | Red |
| 3 | Black and Purple (these two wires are both connected to Pin#3) |

## 1.6 Internal Logging on SD Memory Card

The receiver incorporates a SD memory card for internal logging. Refer to the "How-to…" section of the Firmware User Manual to learn how to use this feature.

To prevent data corruption, logging is protected against accidental power outages. There is no need to unmount the SD memory card before switching off the receiver.

## 1.7 Applicable Software Package

The PolaRxS_PRO is compatible with Septentrio's SSRC3 Software Packages.

## 1.8 Hardware Specifications

| | |
|---|---|
| Power consumption: | Nominal operation: 6.5W typical<br><br>During initial OCXO warm-up: up to 10W.<br><br>Receiver switched off (i.e. POWERLED not lit): 1.6W typical. This is because the internal OCXO remains powered even when the power button is in the "off" state. |
| Size: | 284 x 140 x 37 mm (length including connectors) |
| Temperature Range: | -40 to +60 °C (operational)<br>-55 to +85 °C (storage) |
| Ingress Protection: | IP65 |
| Shock: | MIL-STD-810F, 516.5 |
| Vibration: | MIL-STD-810F, 514.5 |