



CANAL DE PANAMÁ

Non – Portable Piloting Unit For Vessels Specifications

(109 feet of beam or greater)

October 20, 2023

Non-portable piloting unit for vessels

Specifications (109 feet of beam or greater)

1. Components:

GNSS antennas: Two GNSS antennas placed outside high on the vessel are required.

- **Frequencies:** L1C/A, L2C, L1OF, L2OF, E1B/C, E5b, B1I, B2I
- **Gain:** ≥ 37 dB
- **Noise Figure:** ≤ 1.8 dB typ. @ 25°C
- **VSWR:** $< 1.8:1$
- **Operating Temperature:** -45°C to 85°C
- **Mechanical Vibration:** MIL-STD-810E - Test method 514.5
- **Shock & Drop:** MIL-STD-810G - Test method 516.6
- **Salt Fog:** MIL-STD-810G - Test method 509.6
- **Low Pressure – Altitude:** MIL-STD-810F - Test method 500.5
- **IP Rating:** (housing) IP69K

GNSS Receiver: Dual antenna GNSS receiver.

- **Tracked Systems:** GPS / QZSS, Galileo, GLONASS, BeiDou.
- **Frequencies:** L1C/A, L2C, L1OF, L2OF, E1B/C, E5b, B1I, B2I
- **Interference Mitigation:** Spoofing and Jamming detection
- **Position Accuracy:** RTK: 0.01m +/- 1ppm, SBAS: 1m
- **Heading Accuracy@10m Antenna Separation:** 0.02 degrees
- **Speed Accuracy:** 1 cm/sec
- **Rate of Turn Accuracy:** 0.1°/min

UHF Antenna:

- **VSWR @ 454.325MHz:** < 4

UHF DGNSS corrections:

- **Frequency:** 454.325 MHz
- **Radio frequency (RF) Protocol:** PCC FST @ 19200 bps
- **DGNSS Corrections Protocol:** RTCM Version 3.3 (MSM4)

Network DGNSS corrections:

- **Protocol:** Networked Transport of RTCM via Internet Protocol (NTRIP)
- **UDP Port:** 2102

VHF Antenna:

- **VSWR @ 162MHz:** < 1.5

AIS Receiver:

- **Dual Frequency:** 161.975 & 162.025MHz.
- **Receiver Sensitivity:** <-110dBm @ 20% packet error rate

Cables: for VHF, UHF and GNSS antennas

- **Operating Temperature:** -40°C to 80°C
- **Total loss signal cables:** Max. 17dB

Inertial Motion Unit (IMU): To provide heading, rate of turn and dead reckoning when GNSS signals are obstructed.

- **Gyro Bias Instability:** $\leq 1.2^\circ/\text{hr}$
- **Angular Random Walk:** $\leq 0.08^\circ/\text{Vhr}$
- **6 Degree OF Freedom:** Triple Gyroscopes

WiFi: tested at all conning positions.

- **Access Point:** IEEE 802.11 b/g/n with single band
- **Number of clients:** ≥ 4
- **Security:** WPA2
- **Signal strength:** > -70dBm at all conning positions

Data output:

- **NMEA output:** GGA, VTG, HDT, ROT, GSA, GSV, VDM
- **UDP Port:** 17608
- **Data Protocol:** Compatible with Trelleborg SafePilot
- **Certification ID output:** PTMSX message every 10 second
- **PTMSX message:** Must contain unique vendor ID and unique equipment ID
- **PTMSG message**
- **POSOS message**
- **POSOC message (UDP Port: 510)**

Non-portable piloting unit unique ID:

- **ID, SSID & password / QR code:** validated by the Panama Canal.

Power:

- **Supply:** 90 - 240 VAC
- **Battery Backup:** ≥ 5 hours of operation

2. **Reference unit:** P3 from Trelleborg.

3. Installation guideline

- GNSS / VHF / UHF antennas must be installed in a location without interference from other equipment's or vessel infrastructures.
- GNSS antennas must be separated not less than 4 meters from each other.
- Inertial measurement unit (IMU) must be installed leveled to the vessel and free from vibrations.
- Unit must be operational when at the Panama Canal anchorage or water ways.
- Wi-Fi communication must be tested to comply with the specifications at all conning positions. We strongly recommend to reserve Wi-Fi channel 11 for this purpose.
- Wi-Fi SSID must not be hidden.
- A Wi-Fi configuration QR code sticker must be placed near the main pilot plug.
- The QR code must not be less than 2.5 x 2.5 centimeters, preferable black on white.
- SSID and password must be available upon Panama Canal Personnel request.
- Antenna certificate must be requested and returned to the Panama Canal:
arqueadores@pancanal.com

4. For technical inquires contact posicionamiento@pancanal.com