

DATASHEET & HARDWARE MANUAL

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BASE-X5B

All-in-One Industrial RTK Base Station Board

Product No. QM3001A — Rapidly deploy self-hosted differential base stations with direct RTCM network broadcasting, wide DC input and nanosecond-level timing — no host PC or

CORE MODULE

Septentrio Mosaic-X5 (Belgium Original)

SATELLITE SYSTEMS

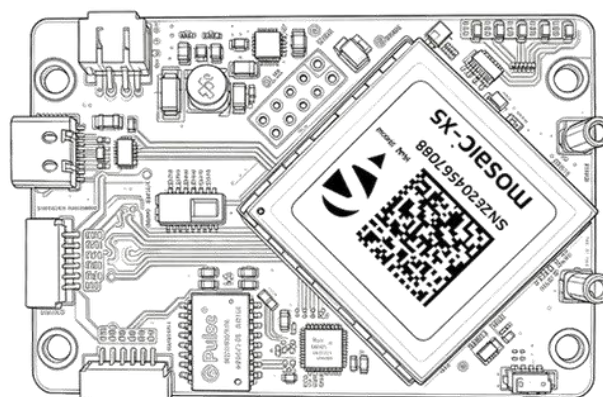
GPS, BeiDou, GLONASS, Galileo, QZSS, NavIC

HARDWARE CHANNELS

448 parallel receiving channels

RTK POSITIONING ACCURACY

6mm + 0.5ppm (H) / 10mm + 0.8ppm (V)



ENNFU SCIENTIFIC COMPANY LIMITED

Room A411-A413, NO.99, Daxue Road, Xuzhou City,
Jiangsu Province, China 221116

www.qumtrix.com
sales@qumtrix.com

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About This Manual

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Safety and Warning Instructions

This manual outlines the commissioning, installation, and operation of the BASE-X5B All-in-One Industrial RTK Base Station Board.

- This equipment may only be used for the purpose specified by the manufacturer.
- This manual should be kept accessible.
- Illegal changes and the use of spare parts as well as accessories that have not been sold or recommended by the manufacturer of this unit can cause operational failures or hazards. Such measures lead to an exclusion of liability, and the manufacturer accepts no responsibility.
- Repairs may only be carried out by the manufacturer or accredited distributor/re-seller.
- Basis for the guarantee of the manufacturer is the version of the warranty policy for the unit at the time of purchase. No liability is accepted for inappropriate, incorrect manual or automatic setting of parameters, or improper use.
- The distributor/re-seller is responsible for ensuring that the device is assembled and integrated according to recognised technical guidelines as well as valid regulations in the country of use.

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1. Introduction Summary

This datasheet and hardware manual outlines the technical characteristics, interfaces, configuration paths and integration guidelines for the BASE-X5B All-in-One Industrial RTK Base Station Board. It collects the published product datasheet together with the information needed to commission the board — specifications, interfaces and protocols, configuration, target applications and support terms — so that an integrator can design it in and bring it into service from one document.

2. Product Overview & Technology

Traditional RTK boards need an external controller, a separate network module and extra power regulation before they can serve as a base station at all.

The BASE-X5B removes that stack. It puts the survey-grade Septentrio Mosaic-X5 core together with native Ethernet isolation, an embedded NTRIP server and complete onboard power management on one miniature board — a plug-and-play RTK base station that broadcasts corrections the moment it is powered.

Core Hardware

Multi-frequency RF front-end, hardware RTK solver and built-in anti-jamming algorithms on a miniature carrier board — the positioning engine is the module, not a host-side computation.

Wide-Voltage Power

DC 5–15V ultra-wide input with onboard multi-stage DC-DC / LDO regulation outputting clean 3.3V / 5V for stable 24/7 field operation.

Precision Timing

Nanosecond-level PPS output and dedicated multi-frequency active antenna RF seat with antenna power supply for GNSS+IMU fusion and time-sync gateways.

Deployable Node

A lightweight, independently deployable industrial GNSS edge node — positioning, differential distribution, data transmission and timing in one board.

3. Technical Data & Specifications

Parameter	Value	Note
Core Module	Septentrio Mosaic-X5 (Belgium Original)	Survey-grade multi-frequency GNSS RTK module for high-precision base stations and harsh industrial outdoor scenarios
Hardware Channels	448 parallel receiving channels	Full-band signal reception with multi-frequency observation for ionospheric and multipath suppression
Satellite Systems	GPS, BeiDou, GLONASS, Galileo, QZSS, NavIC	Compatible with SBAS (WAAS / EGNOS / MSAS / GAGAN / SDCM)
Frequency Bands	GPS L1/L2/L5 · BeiDou B1C/B2a/B3 · Galileo E1/E5a/E5b/E6 · GLONASS G1/G2/G3	Full-band coverage for maximum signal diversity and robust positioning
RTK Positioning Accuracy	6mm + 0.5ppm (H) / 10mm + 0.8ppm (V)	Centimeter-level RTK precision (6 mm + 0.5 ppm) for high-end engineering work
Data Update Rate	Up to 100Hz · latency < 10ms	High-frequency output for high-speed robots and surveying
Operation Modes	RTK Base · RTK Rover · Single Point · PPP	Switchable modes from single-point to PPP precise point positioning
Power Input	DC 5–15V · typical 0.6W / max 1.1W	Ultra-wide input with onboard 3.3V/5V regulated output for field, vehicle and factory deployment
Anti-Interference	AIM+ · RAIM+ · LOCK+	RF anti-jamming, integrity monitoring and anti-vibration tracking for continuous lock under EMI
Working Temperature	–40°C ~ +85°C	Industrial wide temperature range for long-term outdoor operation

4. Core Advantages

Full Constellation & Multi-Frequency Tracking

448 parallel hardware channels covering GPS, BeiDou, Galileo, GLONASS, QZSS and NavIC. Multi-frequency observation suppresses ionospheric error and multipath, so the board keeps lock under heavy foliage, in urban canyons and beside EMI-heavy machinery.

Centimeter-Level RTK & High-Hz Output

Up to 100 Hz output at 6 mm + 0.5 ppm horizontal / 10 mm + 0.8 ppm vertical. Switchable Base / Rover operation and PPP convergence let one board serve both ends of a correction network.

AIM+ Anti-Jamming & Interference Resistance

Septentrio AIM+ RF anti-jamming, RAIM+ integrity monitoring and LOCK+ vibration-robust tracking actively mitigate RF noise, spoofed signals and mechanical vibration — the reason the fix survives machine halls, radio masts and a moving chassis.

Native NTRIP & Network Isolation

Onboard Ethernet with an industrial Pulse H1102NL isolation transformer runs a standalone NTRIP Server or Client, streaming RTCM corrections to rovers, unmanned platforms and survey terminals directly over LAN or WAN.

Ultra-Low Power & Industrial Integration

Typical 0.6 W draw from a 5–15 V DC wide input with onboard 3.3 V / 5 V LDO rails, plus NMEA-0183, RTCM3 and SBF output on a standard UART / PPS / GPIO header — drop it into a robot chassis or data radio with no extra power stage.

5. Interfaces, Protocols & Timing

Parameter	Value	Note
Interfaces	Ethernet (NTRIP) · USB-C · Multi-UART · GPIO	Native Ethernet for NTRIP Server/Client; USB-C for power, config and logs; reserved UART/PPS/GPIO for integration
Timing & Sync	Nanosecond-level PPS output	High-precision PPS for multi-sensor time alignment and GNSS+IMU fusion navigation
Protocols	NMEA-0183 · RTCM3 · SBF · RINEX	Full industrial standard protocol support for base station and rover interoperability
Ethernet Port (Core Highlight)	Pulse H1102NL isolated · NTRIP Server/Client	Industrial network isolation transformer; works directly as an NTRIP RTK base station broadcasting RTCM over LAN/Internet
USB-C High-Speed Interface	Power · Config · Firmware · Logs	Universal mainstream interface for rapid power supply, parameter configuration, firmware upgrade and log export
Multi-UART & Peripheral Pins	TX · RX · PPS · GPIO	Reserved complete TX/RX/PPS/GPIO pins for direct connection with MCU, data radios, sensors and robot chassis



Figure 2 — BASE-X5B board outline

6. Configuration & Operation

Configure your module locally in the browser — no cloud account, no software install.

Configure your module locally in the browser — no cloud account, no software install.

7. Target Applications

1. **Construction & machine control:** A yard or site base that broadcasts RTCM to every excavator, dozer and rover on site, with no dependence on mobile coverage or a third-party CORS subscription.
2. **Telecom & industrial timing:** Feeds nanosecond-level PPS to ground-station, substation and test-bench clocks, replacing a dedicated timing appliance.
3. **Marine & offshore survey:** A shore base streams corrections over WAN to survey vessels and USVs, so the vessel needs neither a local radio link nor a second receiver.

8. Technical FAQ

What GNSS core does BASE-X5B use, and how many channels does it track?

It is built on the Septentrio Mosaic-X5 (Belgium origin), a survey-grade multi-frequency receiver with 448 parallel channels tracking GPS, BeiDou, GLONASS, Galileo, QZSS and NavIC, with SBAS support.

What RTK accuracy and output rate does BASE-X5B deliver?

6 mm + 0.5 ppm horizontal and 10 mm + 0.8 ppm vertical, with data output up to 100 Hz at under 10 ms latency — enough for high-speed robots as well as static surveying.

Does BASE-X5B work as an NTRIP base station without extra hardware?

Yes. The onboard isolated Ethernet port (Pulse H1102NL) runs a native NTRIP server/client, so the board broadcasts RTCM3 corrections over LAN or the internet directly — no separate caster PC, and no mobile coverage needed on site.

How is BASE-X5B powered, and what does it draw?

A wide DC 5–15 V input, drawing 0.6 W typical and 1.1 W maximum, with onboard 3.3 V / 5 V regulated output for field, vehicle and factory deployment.

Which interfaces and protocols does BASE-X5B expose for integration?

Ethernet (NTRIP), USB-C for power / configuration / firmware / logs, and multi-UART pins brought out as TX, RX, PPS and GPIO for MCUs, data radios, sensors and robot chassis. Protocols: NMEA-0183, RTCM3, SBF and RINEX, plus nanosecond-level PPS for time alignment.

What temperature range and interference protection does it have?

–40 °C to +85 °C industrial operating range, with AIM+ RF anti-jamming, RAIM+ integrity monitoring and LOCK+ anti-vibration tracking for continuous lock under EMI.

9. Ordering, Shipping & Support

- **What are the shipping terms, the freight and the delivery time?** Goods are quoted FOB Shanghai Airport. The default carrier is DHL Economy, freight is prepaid by the seller and added to the invoice, and delivery to the airport is free of charge. Air freight takes 7–10 days and express courier 3–5 working days, depending on the destination region and the carrier's official tracking. Main markets are Europe, the Middle East, the USA and South America; shipping is worldwide.
- **How are volume discounts and special projects handled?** Discounts are granted at the seller's discretion according to the project volume. For special projects and long-term partners, terms and pricing are negotiable — tell us the expected volume and the deployment plan and we will quote accordingly.

FOR MORE INFORMATION PLEASE CONTACT QUMTRIX SALES TEAM

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Room A411–A413, NO.99, Daxue Road, Xuzhou City, Jiangsu Province, China 221116

Web: www.qumtrix.com · Sales: sales@qumtrix.com · Product: BASE-X5B

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