

Industrial NTP Time Server — Product Specification (Shipping)

Item	Content
Model	SY-1231-BG-T-S
Document	Product Specification
Version	1.4

1. Overview

GNSS-disciplined LAN **NTP Stratum 1** time server providing Ethernet NTP, RS-485 Modbus absolute time, TTL **1PPS** (GNSS edge via 硬件缓冲), and a four-pin **PPM pulse**. For industrial, security, office, and auxiliary metrology timing. **This respin has no IRIG.**

Item	Specification
Commercial model	SY-1231-BG-T-S
Constellation code	BG = BeiDou + GPS (UI may show BD+GPS)
Oscillator / Power	T = TCXO; S = single supply
Timing protocol	NTP v3/v4 (UDP 123)
Time reference	GNSS 1PPS + TCXO discipline; industrial RTC holdover (temperature-compensated)
Management	Web (HTTP Basic Auth) + front-panel LCD; SNMP read-only (UDP 161 , SNMPv2c)
Identity	Factory SETID (Web / LCD: SN:)

2. Electrical & Environment (summary)

Item	Specification
Power	Single path -S . Two inlets; use only one at a time : (1) AC 220 V IEC-style inlet (isolated step-down); (2) DC-IN + external adapter, 12-24 V DC (see nameplate/adapter). Do not feed AC and DC together. Export: plug/adapter per order. Not dual-redundant (-D)
Ethernet	1x RJ45, 10/100M (single port; not dual-port redundancy)
Operating temperature	Per hardware datasheet / nameplate
Default IP	192.168.1.123 / 255.255.255.0 / gateway 192.168.1.1

3. Interfaces

Interface	Function	Notes
RJ45	NTP + Web	Same IP/MAC; not a second independent port
RS-485	Modbus RTU slave	Absolute UTC time registers (incl. ms)
1PPS OUT	TTL pulse-per-second	硬件缓冲 GNSS-edge fan-out (3.3 V); not MCU-driven
PULSE	PPM	4-pin Pin4; 200 ms at UTC minute after LOCK (5 V via level shifter)
GNSS antenna	Fix + 1PPS	Outdoor antenna as installed
Front panel	LCD + single key	Ops / status display

4. Timing Accuracy (by channel)

Metrics of different interfaces **must not be mixed**.

Channel	Typical capability (after LOCK)	Use
Internal / GNSS 1PPS reference	Short-term typically ≤ 10 ns RMS (see validation report)	Factory / acceptance reference
TTL 1PPS OUT	GNSS second edge via hardware buffer	Hardware second-edge sync
RS-485 Modbus	1 ms resolution	PLC / SCADA absolute time
Ethernet NTP	Lab clause: LOCK + low LAN RTT $\rightarrow$ client offset can reach ms class (see report); no arbitrary-field guarantee	PCs / servers / switches
Holdover	Degrades toward ppm with unlock time	Short GNSS outages

Important: “GNSS 1PPS 10 ns RMS” is **not** “NTP client 10 ns” or “nanosecond Modbus timing.”

5. NTP Service

Item	Nominal	Range	Method
Mode	NTP server	—	RFC 5905 subset
After LOCK	Typically Stratum 1	—	—
Warm-up / policy	May reply Stratum 2 per Web policy	—	Factory default: lock-based serve
Accuracy (network NTP)	±1–5 ms	lab typical	LOCK; same LAN; software stamp; ≠ 1PPS
Performance	Up to 3840 NTP requests per second	sustained 3840	LOCKED; lab full load 24 h. Short peaks are not the specification
Planning	($N=R/f_{\{ \}}$)	—	from client poll interval
Per source IP	≤ 8 replies/s	—	—
Global replies	Adaptive rate limit	—	further derated during large Web exports
ACL	Optional NTP source IP allow-list	—	Web

Not included: IRIG-B, OCXO, PTP/IEEE 1588 stack (no third-party PTP license pack), NTS, dual-port failover, IPv6, NTP broadcast/multicast server, **HTTPS**, SNMPv3 / SNMP write. Oscillator class is –T– (TCXO).

6. RS-485 Modbus RTU

Item	Specification
Link	9600 8N1
Slave ID	0x01
Function codes	Read 0x03 / 0x04 (write only for factory use; see protocol annex)
Clock registers	UTC Y/M/D/h/m/s/ ms
Poll rate	Recommend ≥ 1 Hz

Full register map: Industrial Interface Protocol annex.

7. 1PPS & PULSE (summary)

Item	1PPS OUT	PULSE (4-pin Pin4)
Drive	Hardware-buffered 3.3 V TTL	Level-shifted 5 V TTL
Role	Metrology second edge	UTC minute PPM (default 200 ms, LOCK only)

Item	1PPS OUT	PULSE (4-pin Pin4)
Absolute time	Pulse = GNSS second boundary	Minute boundary; calendar via Modbus/NTP
Not	not a software square-wave on this jack	Impersonating 1PPS; IRIG
Accept	Scope on 1PPS jack (1PPS 输出座)	Scope Pin4: ~200 ms at UTC minute after LOCK; mute if unlocked

8. Management & Logs

Item	Specification
Web	Dashboard / Network; Basic Auth
SNMP	Read-only SNMPv2c, UDP 161 ; MIB-II system + device status; no Set / SNMPv3 / Trap; enterprise OID per shipping note
Syslog	Optional UDP edge push (default OFF); same dictionary as event_log; Web Network configures target IP:514
Event log	event_log.csv (/flog), ring ~ 2048 entries; default export ~ latest 1024 ; Dashboard → Diagnostics → Export
24 h quality	quality_24h.csv (/stats24); hourly buckets; samples=0 = no GNSS-disciplined samples that hour
Front panel	Four pages: patrol / decide / diagnose / asset

9. Ordering & Traceability

Record on the shipping sheet:

Model: SY-1231-BG-T-S
 SETID: _____
 Firmware / Build: _____
 Production test: PASS / FAIL

10. Related Documents

Document	Content
Reference · Serve Policy · Capacity (One Page)	Selection Sheet (Reference · Policy · Capacity)
User Guide	Power-up, LCD, Web, clients, FAQ
Industrial Interface Protocol	Modbus map, PULSE PPM, 1PPS (hardware fan-out), integration checklist
This specification	Contract / selection boundaries

This document is a shipping/contract summary. Implementation details follow the annex and the shipped firmware.