

Specifications

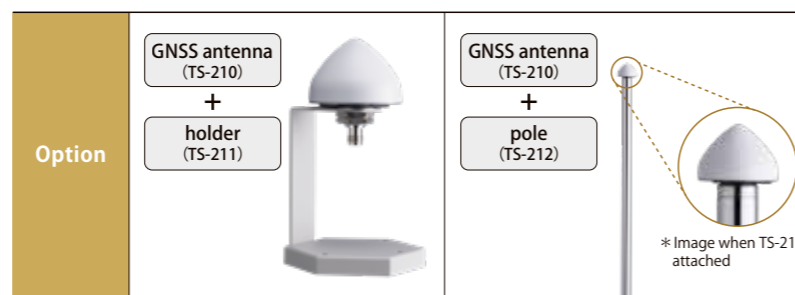
| Model | TS-2910 | TS-2912 | TS-2914 | TS-2922 | TS-2924 |
|---------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------|----------------|---------|
| Time source | GNSS (GPS, QZSS, Galileo, GLONASS) | | | | |
| Holdover accuracy*1 | OCXO | Type-C / Type-A | Type-C / Type-A | Type-A | Type-A |
| Pulse output | 1PPS | 1:(Either 1PPS or 10MHz) | | 1 | — |
| | 10MHz | | | 1 | — |
| Ethernet interface | 100BASE-TX / 1000BASE-T | 2 | 1 | — | — |
| | SFP-optical (1000BASE-X) | — | 1 | 2 | — |
| LAN connector | SFP-optical (1000BASE-X/10GBASE-R) | — | — | 2 | 2 |
| LAN connector | RJ-45 | 1 | | | |
| Memory card | CompactFlash | | — | SD memory card | |
| PTP | Number of available interface port | 2 | | 3 | 2 |
| | Correction accuracy (When GNSS locked) | UTC within < 40ns (PRTC-B) | | | |
| | Profile | Default Profile (IEEE1588v2), Telecom profile (G.8265.1, G.8275.1, G.8275.2), IEEE802.1AS-2011 (gPTP) *2 | | | |
| | Protocol | IPv4 UDP / Ethernet | | | |
| | Delay mechanism | Delay request-response (Default Profile, Telecom Profile) / Peer Delay (IEEE802.1AS-2011) | | | |
| | Sync message transmission type | 1 step (Default Profile, Telecom Profile) / 2step (IEEE802.1AS-2011) | | | |
| | Maximum processing capability | Sync: 128pps*3*4, Delay_request (receive): 128pps*3*4, Announce: 8pps | | | |
| | Maximum number of connectable slave devices | 128*3 | | 1024*4 | |
| NTP | Number of available interface port | 2 | | — | |
| | Correction accuracy (When GNSS locked) | ±1ms | | — | |
| | Protocol | NTP, SNTP | | — | |
| Network | Recommended processing capability | 500pps or above | | | |
| | SyncEther | Master function supports ITU-T G.8261, G.8262 and G.8264 | | | |
| | VLAN | Tag-based VLAN (IEEE 802.1Q) | | | |
| Management (IPv6) | Routing | Static | | | |
| | Monitoring | SNMP (v1/v2c/Private MIB), SYSLOG | | | |
| | Authentication | RADIUS, Local authentication | | | |
| | Remote connections | TELNET, SSH, FTP, SFTP, TFTP | | | |

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|-------------------|-------------------|-----|---------|-----------------------------------|-----|---------------|------------------|------------------|
| | -10 | -12 | -12 | -20 | -22 | -22 | -12 | -12 |
| Rated voltage | DC-40.5V ~ -57.0V | | | AC100V ~ AC240V ±10% (50/60Hz) *5 | | | DC-40.5 ~ -57.6V | DC-40.5 ~ -57.0V |
| Rated current | 0.37A | | | 0.34A / 0.19A | | 0.32A / 0.17A | 0.42A (DC-48V) | 0.38A (DC-48V) |
| Power consumption | 18.0W | | | 20.0W | | 18.0W | 20.0W | 18.2W |
| Calorific value | 64.8kJ/h | | | 72.0kJ/h | | 64.8kJ/h | 64.8kJ/h | 65.5kJ/h |

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|----------------------------------|--------------------------------------------------------------------------------------------|--------------------------------|---------------------------------|--------------------------------|
| Operation temperature | 0~50°C | -40~70°C | 0~50°C | -40~65°C |
| Operation humidity | 15~ 85% RH (No condensation) | | | |
| Installation style | On the shelf (horizontal) | Wall-mount, pole-mount, etc. | Rack-mount | Wall-mount, pole-mount, etc. |
| Dimensions (without protrusions) | 208 (W) × 282 (D) × 44 (H) mm | 312 (W) × 102 (D) × 430 (H) mm | 422.5 (W) × 280 (D) × 44 (H) mm | 312 (W) × 102 (D) × 430 (H) mm |
| Weight (approximate) | 2kg | 6.5kg | 3.6kg | 6.5kg |
| Certificates | VCCI-A, RoHS | VCCI-A, RoHS, IP65 | VCCI-A, RoHS | VCCI-A, RoHS, IP65 |
| Optional Accessories | Multi GNSS antenna, GNSS antenna pole, GNSS extension cable, GNSS amplifier, GNSS arrester | | | |

- *1: The holdover accuracy, varying with the oscillator installed in this product, is as follows. Regardless of the model, a common accuracy is achieved with the selected oscillator.
OCXO Type-C: 1.5 microseconds/2 hours / 50 microseconds/24 hours
OCXO Type-A: 400 seconds nano seconds/5 hours / 1.5 microseconds/24 hours
- *2: Support for IEEE802.1AS-2011 (gPTP) is available as an optional feature.
- *3: The maximum number of slaves is limited to 128pps for up to 32 nodes, 64pps for up to 64 nodes, and 32pps for up to 128 nodes.
- *4: The maximum number of slaves is limited to 128pps for up to 128 nodes, 64pps for up to 256 nodes, 32pps for up to 512 nodes, and 16pps for up to 1024 nodes.
- *5: For use with AC240V an applicable power cable is necessary.

(Model Number Format Example) **TS-291X-YZ**
X=0: Copper Ports×2 **X=2:** SFP Port×1+Copper Port×1
Y=1: DC Power Model **Y=2:** AC Power Model **Z=0:** OCXO Type-C **Z=2:** OCXO Type-A



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2312-SS01-BS



Empowering diverse social infrastructure with precise timing

Time Server Pro.

TS-2910 / TS-2912 / TS-2914
 TS-2922 / TS-2924

Grandmaster clock for highly accurate time distribution



TS-2914



TS-2922

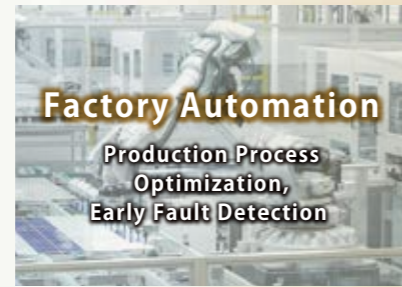


TS-2910

SEIKO SOLUTIONS INC.

In modern society, ensuring efficiency, reliability, and safety in critical infrastructure depends significantly on precise time synchronization.

Seiko, with its proven track record as a PTP Grandmaster Clock provider in the mobile carrier industry, offers high-precision time synchronization solutions across various domains.



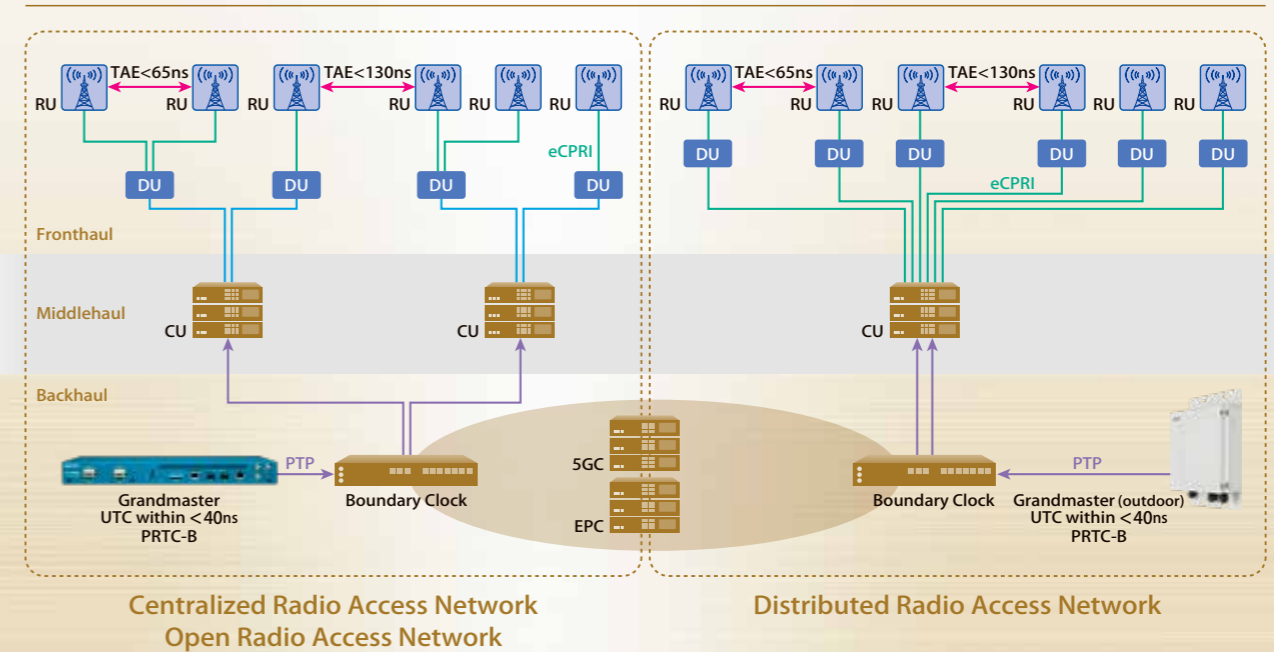
Seiko's GMC is the exclusive solution for meeting high-precision time synchronization needs, offering flexibility in selecting the communication interface and indoor/outdoor models to suit your deployment environment.

Seiko's Time Server Pro, series designed with an extensive foundation of knowledge, delivers nanosecond-level, high-precision time synchronization, meeting the international standard PRTC-B requirements, a critical component for 5G mobile network deployments.

- Achieves precise synchronization for 5G network demands
- Complies with PRTC-B via multi-GNSS support and enhanced signal reception
- Features high-performance receivers with anti-jamming and multipath mitigation
- Backed by extensive experience in the communication industry and critical infrastructure, along with top-notch customer support

PRTC-B, defined in the international standard (G.8272), sets the accuracy for a Primary Reference Time Clock (PRTC) device to achieve a time error of within 40 nanoseconds relative to UTC. This level of precision is required to achieve more accurate time synchronization than PRTC-A (within 100 nanoseconds) offers.

Time Synchronization System in a 5G Mobile Network



O-RAN (Open Radio Access Network) is a specification that opens up interfaces between RU-DU and DU-CU, emphasizing interoperability with various vendor equipment.

Mobile applications and its time-sync accuracy requirements

| Category | Application | TAE* |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| A+ | MIMO or TX diversity transmission, at each carrier frequency | 65 ns |
| A | Intra-band contiguous carrier aggregation with or without MIMO or TX diversity | 130 ns |
| B | Intra-band non-contiguous carrier aggregation with or without MIMO or TX diversity, and Inter-band carrier aggregation, with or without MIMO or TX diversity | 260 ns |
| C | TD-LTE | 3 μs |

In addition to the 1.5 μsec precision required in traditional 4G TD-LTE networks, the realization of high-speed, low-latency networks in 5G necessitates even greater accuracy in time synchronization across the entire network. The ITU-T has established a standard for the required precision of a GMC known as PRTC-B, with an accuracy level set at less than UTC \pm 40 nsec.

* Kaoru Arai and Makoto Murakami: 'Standardization Trends in High-Precision Time and Frequency Synchronization Technologies for Achieving 5G Mobile Networks,' NTT Technical Journal, Vol. 30, No. 11, pp. 44-48, 2018.

Indoor Model TS-2910 Series

Compact model ideal for multi-site base station deployments

A simple and cost-effective model with the features necessary for high-precision time stamping logic. The indoor installation model, which can accommodate two units in a 1U space, allows flexible selection of power and oscillators. Saving the device settings to a CF card enables swift recovery in case of malfunctions.



TS-2910 (AC Model)

Equipped with two versatile copper ports (electric) for PTP interfaces. Suitable for systems where all equipment is centralized within the same facility.



TS-2912 (AC Model)

Equipped with one SFP port (optical) and one copper port (electric) for PTP interfaces. Ideal for wide-area systems that connect over long distances using optical cables.

Indoor Model TS-2920 Series

A 10G-compliant model required for the O-RAN era

Building upon the fundamental specifications of the TS-2910 Series, this 1U-sized model incorporates a 10Gbps interface to enhance connectivity allowing time synchronization for up to 1024 devices and supports power redundancy.



TS-2922 (DC Model)

Equipped with one SFP port (optical) and one copper port (electric) for PTP interfaces. Ideal for wide-area systems that connect over long distances using optical cables.

Outdoor Models TS-2914 and TS-2924

Outdoor-installable models compliant with IP65 standards

Building upon the features of the TS-2912, it is well-suited for use in base stations installed in a variety of environments, regardless of location.

TS-2914/TS-2924

TS-2924 is compatible with a 10Gbps interface, making it suitable for even broader applications.

