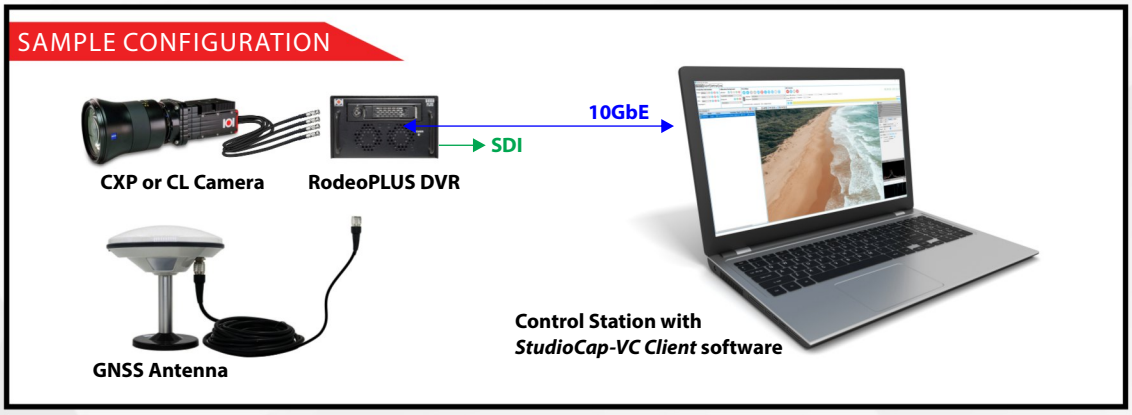
# RODEO PLUS™ GNSS OPTIONS

***Add satellite-based timing and position logging to RodeoPLUS DVRs***




## FEATURES INCLUDE:

- Synchronizes video timestamps to within 1µs of GNSS time
- Position, velocity and GNSS lock details are recorded with video for later analysis
- Several multi-constellation, multi-frequency GNSS receivers to choose from

### GNSS Receiver Options:

| | Frequency Tracking | | Supported Constellations | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **GNSS Receiver** | **Single** | **Triple** | **GPS** | **GLO** | **GAL** | **BDS** | **QZSS** | **NavIC** | **Supported Frequencies** |
| **G01** | X | | X | | | | X | | L1, SBAS L1 |
| **G02** | | X | X | | | | X | | L1/L2/L5/L6, SBAS L1/L5 |
| **G03** | X | | X | | X | | X | | L1/E1, SBAS L1 |
| **G04** | | X | X | | X | | X | | L1/L2/L5/L6/E1/E5a/E5b/E6, SBAS L1/L5 |
| **G05** | X | | X | X | | | X | | L1, SBAS L1 |
| **G06** | X | | X | | | X | X | | L1/B1, SBAS L1 |
| **G07** | X | | X | X | X | X | X | | L1/E1/B1, SBAS L1 |
| **G08** | | X | X | X | X | X | X | X | L1/L2/L5/L6/E1/E5a/E5b/E6/B1/B2I/B2a/B2b/B3, NavIC L5, SBAS L1/L5 |

### Common Specifications:

| | |
|---|---|
| **Time Accuracy** | < 5 ns RMS |
| **Position Accuracy** | L1: 1.5 m, L1/L2: 1.2 m, SBAS: 0.6 m |
| **Velocity Accuracy** | < 0.03 m/s RMS |
| **Channels** | Up to 555 |
| **Signal Reacquisition** | L1: < 0.5 s / L2: < 1.0s (typ) |
| **Time to First Fix** | Cold: < 34 s / Hot: < 20 s (typ) |
| **Data Rate** | 20 Hz |
| **Video Timestamp Accuracy** | +/- 1 µs |

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## QUICK REFERENCE

**GNSS (Global Satellite Navigation System):** GNSS refers to any satellite-based geospatial positioning system. A GNSS constellation involves multiple satellites orbiting over the Earth with the ability to transmit signals to an Earth-based receiver. Once the receiver "locks" to enough satellites, it can accurately determine its current position and time. Depending on the number of satellites and their distribution, coverage of a GNSS can be global or region-specific.

**GPS (Global Positioning System):** GPS is a GNSS with global coverage operated by the U.S. Space Force. The constellation includes 31 satellites using three frequencies referred to as L1, L2 and L5.

**GLONASS (Global Navigation Satellite System):** GLONASS is a GNSS with global coverage operated by Russia, with comparable precision to GPS. The constellation includes 24 satellites using two frequencies referred to as L1 and L2. GLONASS' orbit makes it especially suited for usage in high latitudes (North or South), where locking to a GPS signal can be problematic.

**BDS (BeiDou Navigation Satellite System):** BDS is a GNSS with global coverage operated by China. The constellation includes 56 satellites using several frequencies, referred to as variants of B1, B2 and B3.

**Galileo:** Galileo is a GNSS with global coverage operated by the European Union. The constellation currently includes 23 satellites and is expanding to a target of 30 total satelites. Several frequencies are used and referred to as variants of E1, E5 and E6.

**QZSS (Quasi-Zenith Satellite System):** QZSS is a regional 4-satellite system with Asia-Oceania coverage operated by Japan. It uses the same frequencies as GPS, so QZSS satellites can be used as if they are additional GPS satellites. SBAS and a high-precision L6 signal is also transmitted.

**NavIC (Navigation with Indian Constellation):** NavIC (formerly known as IRNSS) is a regional 7-satellite system operated by India, with coverage of India and surrounding areas. It transmits a single civilian frequency, L5.

**GNSS Receiver:** A GNSS receiver is an optional factory-installed module available for RodeoPLUS digital video recorders. When paired with an appropriate antenna and RF cable (sold separately) this module receives and digitally processes signals from GNSS satellites. Depending on the selected receiver option, one or more frequencies from one or more constellations can be received. This results in an accurate time reference for the timestamps applied to all video frames during recording. As well, a stream of accurate position and velocity data (up to 20 updates per second) can be recorded along with the video.

**GPS Timing Accuracy:** Refers to the accuracy of the precise clock used by the GNSS receiver.

**Position Accuracy:** Refers to the accuracy of the position data determined by the receiver. Typically stated as a radius, the position accuracy can be improved from the basic single-frequency accuracy by the use of additional frequencies and/or support for additional GNSS constellations. As well, further improvements can be had with the use of correction services such as SBAS.

**SBAS (Satellite-based Augmentation System):** A system that provides correction data to GNSS receivers to further improve position accuracy. A system may provide correction information applicable to a wide area or a smaller regional area. Multiple ground stations, located at accurately-surveyed points, receive GNSS signals and calculate the position error. This is transmitted to a satellite network which then broadcasts the data to any SBAS-capable receivers. An example SBAS is the Wide Area Augmentation System (WAAS) operated by the U.S. Federal Aviation Administration.

**Channels:** A GNSS receiver searches for satellites on multiple signal channels simultaneously, attempting to lock to as many satellites as possible to compute the best solution for the position of the receiver. The number of channels a receiver supports affects how fast the receiver can lock to enough satellites to achieve a solution, as well as the Time to First Fix and Signal Reacquisition rates.

**Signal Reacquisition:** The time it takes a GNSS receiver to lock to satellite signals after a complete loss of all signals for a short period of time.

**Time to First Fix:** The time it takes a GNSS receiver to produce a first position solution.

**Data Rate:** The frequency of time and position messages provided by the receiver. 1Hz sampling is common and any higher sampling rate leads to better position accuracy - especially for mobile applications - and a higher video timestamp accuracy for all situations.

**Video Timestamp Accuracy:** Refers to the accuracy of the timestamps applied to all video frames during recording, relative to GNSS time, when the receiver is locked. With no GNSS receiver installed, and in the absence of other time reference signals (PTP, LTC, IRIG), the timestamp clock of the RodeoPLUS is initialized to the time of the connected PC, and it then experiences drift throughout operation. With a GNSS receiver, the timestamp clock is updated continuously, reducing total drift over time to the maximum drift between an update period.

## ORDERING

Example: RODEOCXPLUS-VC-G03

| DVR | Receiver |
|---|---|
| RODEOCXPLUS-VC | G01-G08 |
| RODEOCLPLUS-VC | |

## REQUIRED PARTS

Not included; must purchase separately:
1x GNSS Antenna (suitable for receiver's frequencies and constellations)
1x RF Cable, TNC to antenna connector

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*Specifications subject to change without notice*