

RX720

MULTI-FREQUENCY, MULTI-CONSTELLATION, GNSS SMART ANTENNA

Thank you for choosing TeeJet Technologies' RX720 as your GNSS receiver solution. This document provides instructions for mounting and operation of the RX720. Contact a local dealer for more information or visit www.teejet.com.

RX720 GNSS receiver delivers the latest in positioning technology for agricultural applications. This state-of-the-art smart antenna receives multiple GNSS signals to deliver more robust GNSS positioning under challenging terrain and environmental conditions.

Accuracy, Stability and Reliability

The RX720 can deliver the positioning accuracy needed for your precision farming applications. This flexible receiver can be configured to deliver basic performance using free correction signals, and can also be upgraded to use subscription-based satellite corrections or RTK for more demanding applications. TerraStar services provide 19.7 in / 50 cm (TerraStar-L) or 1.2 in / 3 cm (TerraStar-C PRO) level accuracy (95%) using globally transmitted satellite correction signals. ClearPath technology is integrated into the receiver and provides smooth positions and excellent pass-to-pass accuracy that are ideal for agricultural guidance and steering applications.

Multi-Signal, Multi-Frequency, Totally Flexible

A high-quality internal antenna element combined with the ability to track 555 channels make the RX720 extremely flexible. This receiver can receive GPS, GLONASS, BeiDou, Galileo and QZSS, along with TerraStar correction signals. This results in high numbers of satellite signals and a wide range of configurations that can deliver the accuracy your application needs – from subscription free SBAS (WAAS, EGNOS, MSAS, GAGAN) corrections through TerraStar-L and TerraStar-C PRO, and even centimeter-level RTK accuracy.

Features & Benefits

- Supports GPS, GLONASS, BeiDou, Galileo and QZSS
- Available centimeter-level accuracy with RTK or 1.2 in / 3 cm accuracy (95%) with satellite-delivered TerraStar-C PRO
- A durable, waterproof housing that meets MIL-STD-810G environmental standards for years of reliable use in the field
- Magnetic and screw mounting options
- For use with TeeJet and third-party guidance and steering systems
- Capable of operating on supplies of +7 to +30 VDC with low 4 W power consumption



Correction Options

- Capable of operating with free SBAS corrections
- Compatible with TerraStar-L correction service for 5.9 in / 15 cm (95%) pass-to-pass accuracy
- Compatible with TerraStar-C PRO corrections for repeatable 1.2 in / 3 cm (95%) accuracy, which means <0.8 in / 2 cm pass-to-pass accuracy
- TerraStar subscriptions offered in 3 month, 1, 2 or 3 year subscriptions
- RTK compatible with either conventional radio link or network-delivered NTRIP solutions

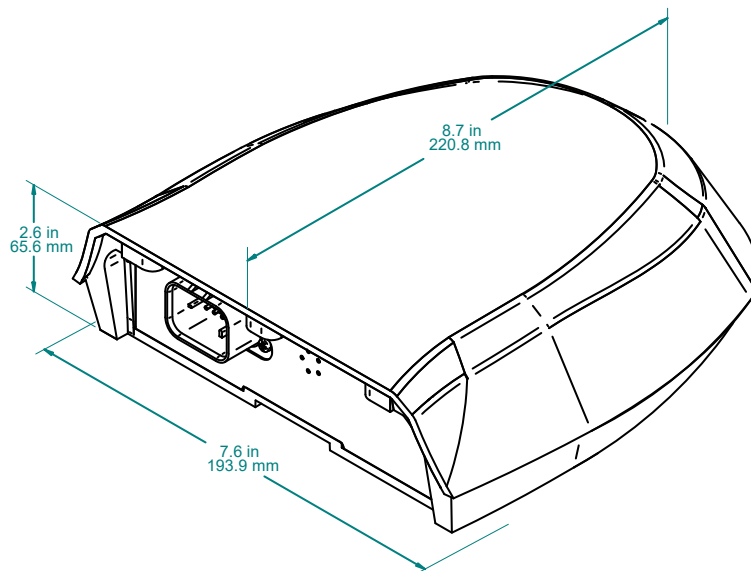
RX720 Kits and Components

Kit/Part Number	Description
90-02942	Kit, GNSS Receiver, RX720, Dual Frequency, TerraStar-L ready, ClearPath, no-SBAS
90-02943	Kit, GNSS Receiver, RX720, Dual Frequency, TerraStar-L ready, ClearPath, SBAS
90-02944	Kit, GNSS Receiver, RX720, MCMF, TerraStar-L & TerraStar-C PRO ready, ClearPath, SBAS
90-02945	Kit, GNSS Receiver, RX720, MCMF, TerraStar-L & TerraStar-C PRO ready, ClearPath, no-SBAS
90-02946	Kit, GNSS Receiver, RX720, MCMF, TerraStar-L & TerraStar-C PRO ready, RTK, ClearPath, SBAS
90-02944	Kit, GNSS Receiver, RX720, MCMF, TerraStar-L & TerraStar-C PRO ready, TSX, RTK, SPAN, ClearPath, SBAS
65-05243	Mounting bracket for RX520 and RX720
45-05957	Cable, RX520 and RX720 to Power & Serial Com 1
45-05979	Cable, RX520 and RX720 to Power & Dual Com Ports

GETTING STARTED

This guide will assist in the set-up and operation of the RX720 GNSS receiver. With the exception of use in RTK applications, the receiver is shipped from TeeJet ready to operate in the configuration ordered. When the receiver is properly mounted with a clear view of the sky, and with the connections for data and power completed, the unit will begin to provide positions. If using Single Point (Autonomous) solutions, position data will be output within a few minutes of power-up. Allow approximately 15 minutes for quality SBAS positions and 20 minutes (approximately 5 minutes for firmware v7.08.12 and later) for L-band positions to be available.

Figure 1: RX720 dimensions



RX720 LED

LED on the side of the RX720 provides basic receiver status information. The operation of the LED on the RX720 is summarized in the following table:

State	Description
Green Solid	Precise solution good (RTK/PPP or Fixed)
Green Slow Flash (1Hz)	Precise solution converging
Yellow Solid	Basic solution (Single Point/SBAS/DGPS)
Yellow Slow Flash (1 Hz)	Tracking satellites and calculating initial position solution
Yellow Fast Flash (3 Hz)	Initialised and ready for communication
Red Solid (Initial)	Power On/Reset (for about 10 seconds after power-on or reset)
Red Solid (Continuous)	Receiver system error, if indicator persists after 30 seconds
Red Slow Flash (1 Hz)	Position quality warning (unreliable/high error)
Red Fast Flash (3 Hz)	Positioning failure (unusable)

L-BAND SUBSCRIPTION

To subscribe to the TerraStar subscription L-band service:

1. Note the serial number of your RX720, the part number of the subscription that you intend to purchase, and the date that you want your subscription to be activated.
2. Ask your dealer to contact TeeJet customer support for the TerraStar Subscription bulletin [98-01494] and provide this information. Your dealer will send the order to TeeJet, and your financial transaction will take place between you and your dealer.

NOTE: The minimum lead time for activation is 72 hours.

The receiver does NOT need to be powered on at the time the subscription is activated. The first time you power the receiver on after the specified activation date, the subscription activation will be captured by the receiver over-the-air within 4 hours of being powered on. During subsequent operation of the receiver, it will typically require 20 minutes (approximately 5 minutes for firmware v7.08.12 and later) of operation with a clear view of the sky to fully process the L-band correction data and provide a GGA quality indicator value of "2" (TerraStar-L) or "5" (TerraStar-C PRO).

MOUNTING INSTRUCTIONS

The RX720 is equipped with three (3) built-in magnets for attaching to the included mounting bracket. If a permanent mount for the RX720 is required please contact TeeJet Technologies Technical Support for more information.

Intermediate Mounting Plate Template

A template for the intermediate mounting plate has been drawn in the background of this user guide.

- Red circles indicate holes where attachment will occur.
- Green lines indicate the outline of the mount and other holes for attaching the release plate.

Mounting Considerations

- Choose a location that has a clear view of the sky so that each satellite above the horizon can be tracked without obstruction.
- Best practices:
 - Mount orthogonally on the chassis
 - Mount level when the machine is parked on level ground
- NOTE: *In the case of SPAN kit 90-02944, it is critical that the receiver is mounted in this manner with the fore-aft centerline through the receiver connector being parallel to the longitudinal centerline of the machine.*
- When mounting the RX720 Receiver, a space of at least 5.9 in / 15 cm between the receiver and any bend in the cable is required. Any length shorter than 5.9 in / 15 cm puts undue stress on the cable and the enclosure for the RX720.
- The receiver should not be mounted where water can pool around it. The receiver housing is designed to withstand rain and splashing, but not submersion in liquids for sustained periods of time.
- Mount the receiver above all other metal objects to avoid multipath. Satellite signals received by the GNSS receiver by a reflection from an object can decrease positioning accuracy. For example, roof racks, large headlight enclosures, etc., can cause multipath that may result in an inaccurate GNSS position.

Figure 2: Mounting Plate

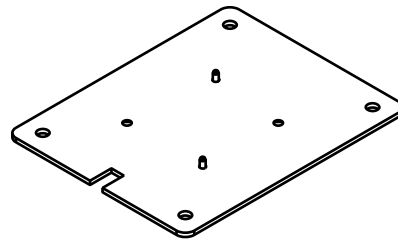
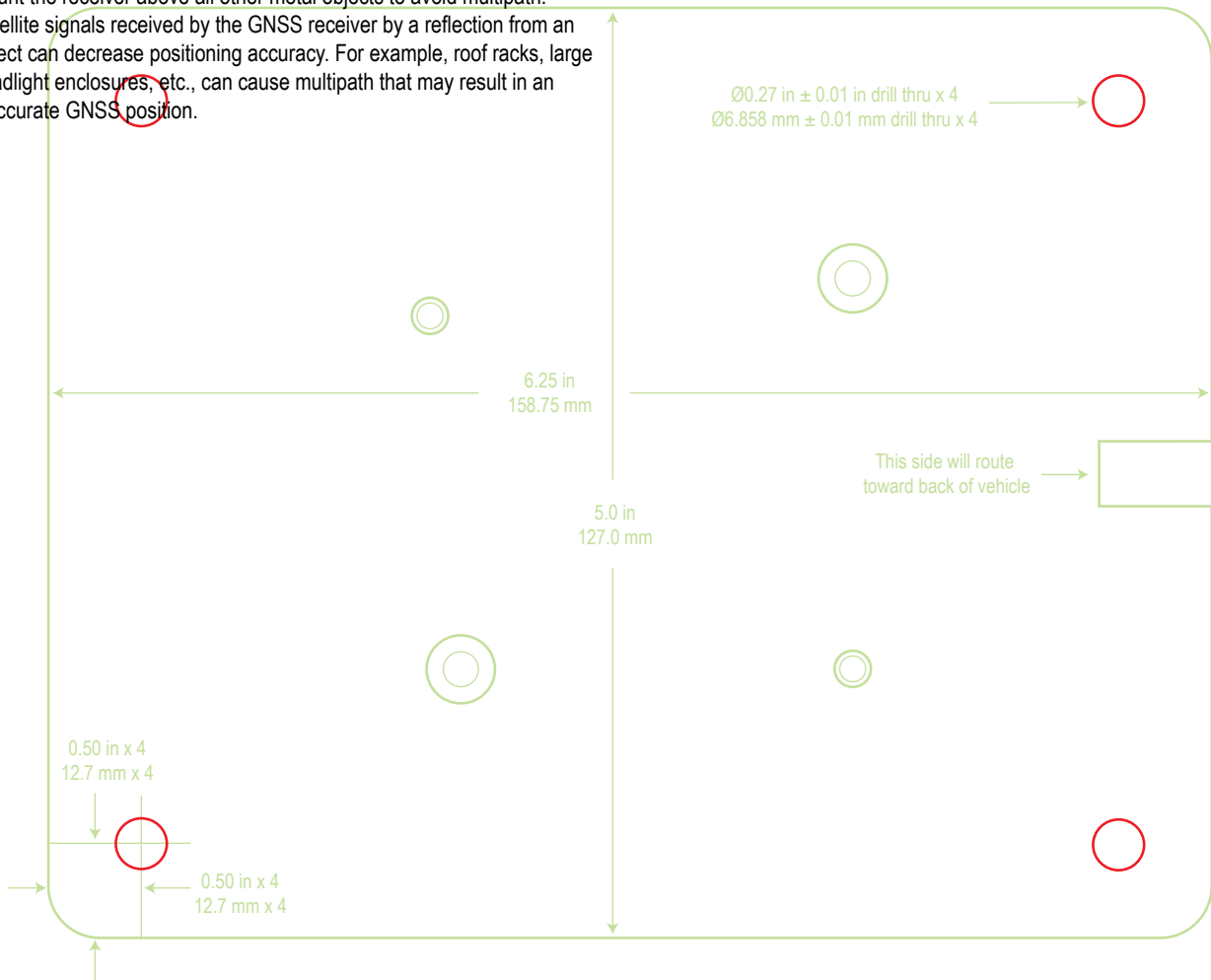
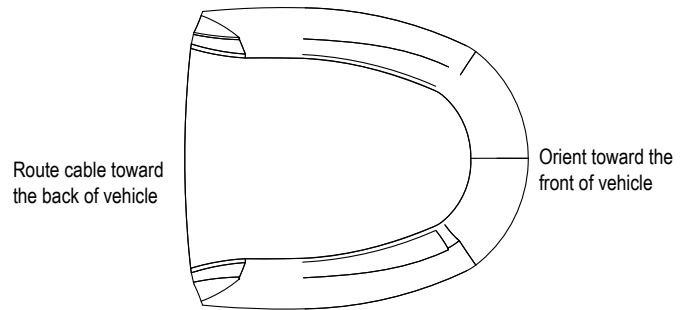


Figure 3: Orientation Example



SPECIFICATIONS

Performance¹

Channel Configuration.....555 channels

Signal Tracking¹⁰

GPS..... L1, L2, L2C, L5
 GLONASS..... L1, L2
 Galileo..... E1, E5a/b, E5, AltBOC
 BeiDou..... B1I, B1C, B2I, B2a
 SBAS..... L1
 L-Band

Horizontal Position Accuracy.....(RMS)

Single Point L1/L2..... 3.9 ft / 1.2 m
 SBAS²..... 23.6 in / 60 cm
 DGPS..... 15.7 in / 40 cm
 TerraStar-L^{3,4}..... 15.7 in / 40 cm
 TerraStar-C PRO^{3,4}..... 1 in / 2.5 cm

Horizontal Position Accuracy.....(95%)

Single point L1/L2..... 7.9 ft / 2.4 m
 SBAS²..... 3.9 ft / 120 cm
 DGPS..... 31.5 in / 80 cm
 TerraStar-L^{3,4}..... 19.7 in / 50 cm
 TerraStar-C PRO^{3,4}..... 1.2 in / 3 cm

Pass-to-pass Accuracy.....(95%)

L1/L2 ClearPath Single Point..... 13.8 in / 35 cm
 TerraStar-L..... 5.9 in / 15 cm
 TerraStar-C PRO..... 0.8 in / 2 cm

Maximum Data Rate

Measurements..... Up to 20 Hz
 Position..... Up to 20 Hz

Time to First Fix

Cold Start⁵..... <40 s (typical)
 Hot Start⁶..... <20 s (typical)

Signal Reacquisition

L1..... 0.5 s (typical)
 L2..... <1.0 s (typical)

Velocity Accuracy⁷..... 0.03 m/s RMS

Time Accuracy⁸..... 20 ns RMS

Physical and Electrical

Dimensions..... 8.7 in / 220 mm long
 7.6 in / 192 mm wide
 2.6 in / 66 mm height

Weight..... <2.4 lbs / 1088 g

Connector..... 14-pin Tyco Ampseal

Mounting..... 4 x M4 screw inserts
 Integrated magnetic mount
 Optional mounting plate

Power

Input Voltage Range..... +7 to +30 VDC
 Power Consumption⁹..... 4 W (typical)⁸

Status LED ..Multi-coloured, daylight viewable

Environmental

Temperature

Operating..... -40°F to +158°F
 -40°C to 70°C
 Storage..... -49°F to +176°F
 -45°C to 80°C

Humidity..... MIL-STD-810G Method 507.6

Immersion..... MIL-STD-810G Method 512.6

Shock..... MIL-STD-810G Method 516.7

Solar Radiation..... EN60950-22 8.2
 ...ISO 9022-9, Method 20, Severity Degree 03

Salt Fog..... IEC 60068-2-11

Sand and Dust MIL-STD-810G Method 510.5

Vibration

Random..... MIL-STD-810G, Method 514.7

Compliance..... FCC, ISED, CE, E-Mark

Ingress Protection Rating..... IP67

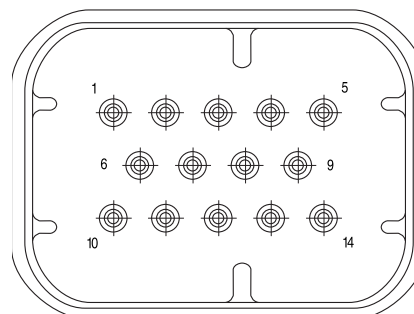
Warranty

1 year from Date of Purchase

Electrical Connection

Connector Pin-outs

Figure 4: Connector Pin-outs



Pin	Use
1	COM1TxD
2	COM1RxD
3	COM2TxD
4	COM2RxD
5	Signal Ground (COM/MKI/PPS/ER)
6	CAN+
7	CAN-
8	COM3TxD
9	Power Negative/Return
10	ER_OUT(Emulated Radar Output)
11	MKI (Mark Input)
12	PPS (Pulse Per Second) Output
13	COM3RxD
14	Power Positive/Source

1. Typical values (open sky conditions). Performance specifications subject to GNSS system characteristics, Signal-in-Space (SIS) operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length, multipath effects and the presence of intentional or unintentional interference sources.

2. GPS only.

3. Requires subscription to data service. Subscriptions available from TeeJet.

4. RMS/95% accuracy under ideal conditions and may vary based upon user's geographic region, ionospheric activity, scintillation levels, GNSS availability and constellation health, multipath conditions and presence of interference sources.

5. Typical value. No almanac or ephemerides and no approximate position or time.

6. Typical value. Almanac and recent ephemerides saved and approximate position and time entered.

7. Export licensing restricts operation to a maximum of 515 metres per second.

8. Time accuracy does not include biases due to RF or antenna delay.

9. Power consumption values for GPS L1/L2.

10. Signals tracked dependent on receiver Model/Configuration purchased.