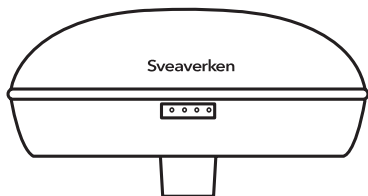# Sveaverken

Svea GNSS Receiver User Manual

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Revisions

Version	Date	Description
1.0	2022.09.01	First release

Safety Instructions

Before using this product, make sure that you have read and understood all the operation instructions and precautions in the Svea GNSS Receiver User Manual.

Operation Environment:

1. Keep away from people, animals, electrical wires, tall buildings, airports, signal towers, and other obstacles, to avoid interference to GNSS signals and ensure the positioning accuracy.
2. Avoid working in extreme weather such as heavy rain, strong wind, thick fog, snow, and lightning.

Others:

1. Do not disassemble the product without authorization, which may invalidate the warranty.
2. Damages caused by force majeure events, such as lightning strikes, high voltage, and collision, are not covered by the warranty.
3. Use the device in strict accordance with the manual. When connecting cables such as data cables, hold the end of the plug and gently plug or unplug it. Do not pull the plug by force or twist the plug, which may break the pins.

4. Use the regulated power supplies accepted by Sveaverkan, and strictly follow the rated voltages, to prevent damaging the radio, the field controller, and the receiver.

5. During charging, keep away from fire sources such as flammables and explosives, to avoid fire and other serious consequences.

6. During operation, do not power the receiver via the Type-C interface and the aviation connector at the same time.

7. Do not plug or unplug cables when the receiver is powered on, and replace the damaged cables in time to avoid personal injury.

Contents

1 About This Document

1.1 Introduction

SVEA V1 GNSS receiver integrates high-precision GNSS motherboard, data link, Bluetooth and other modules, with delicate and simple structure, small and lightweight. V1 high precision receiver fully supports BDS, GPS, GLONASS, Galileo systems, accurate positioning, stable performance, V1 high precision receiver makes your work more convenient and efficient.
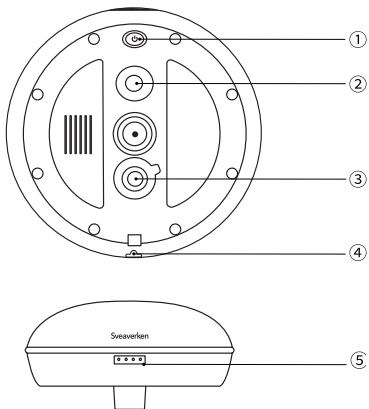
1.2 GNSS Receiver

Figure 1.2 Interfaces and indicators

No.	Name	Description
1	Power button	Press and hold for 1 to 3 seconds until the indicator turns solid green, and release the button to turn on the receiver. Press and hold for 5 seconds to turn off the receiver. Press and hold for over 8 seconds to enter the upgrade mode. In this case, the four indicators flash green, blue, green, and blue respectively from left to right.
2	Radio antenna interface	For connection to the radio antenna.
3	Aviation connector interface	For data transmission, and connection to an external power supply or an external radio.
4	Type-C interface	For data transmission and charging.

No.	Description	
5	Power Indicator (red, blue, and green)	Green: battery level of 60%-100%; blue: battery level of 30%-60%; Red: low battery (<30%); Charging: flashes red during charging, and turns solid green after charging is complete.
	Data Indicator (blue and green)	Off: The base station does not transmit differential data, or does not start static collection. Solid green: The data link is established after settings. Flashes green: The differential data is transmitted, and the indicator flashes at the transmission frequency. Flashes blue: In the static mode, the indicator flashes at the collection interval when the interval ≥ 1s, and flashes at 1s when the interval < 1s

No.	Description	
5	Satellite Indicator (red and green)	Off: no satellite tracking; Solid green: fixed solution; Flashes green: positioning but not in the fixed solution status; Flashes red: satellite tracking but not positioning; Flashes green and red alternatively: GNSS board exception.
	Bluetooth Indicator (blue)	Off: no Bluetooth connection. On solidly: Bluetooth connection established.

The indicators are in the following colors during upgrade:
Power: green
Data: blue
Satellite: green
Bluetooth: blue

⚠ Note:

· Do not plug or unplug the charger repeatedly during charging.
· Do not disassemble the receiver without authorization. In case of a fault, contact the maintenance staff or your dealer.
· Stop using the damaged pole. Repair or replace it in time.

⚠ Caution

Burn Hazard

Coverings on the surface of the receiver or the external radio may affect heat dissipation.

➲ Reduce or remove such coverings.

➲ Maintain good ventilation.

⚠ Danger

Lightning Strikes

Usage of the antenna and the pole in thunderstorms.

➲ Do not use the antenna and the pole in thunderstorms.

2 Operation Instructions

2.1 Overview

This manual describes the main workflow for the first time use of the product.

2.2 Workflow

Setup → Establishing the Connection → Set the base station.

2.2.1 Setup

2.2.1.1 Setting up the External Radio

Set up the tripod over a known point or an unknown point, and install the base station receiver on the extension pole of the tripod, or on the base of the tripod.

> **!** Note: When setting up a base station over a known point, use a base purchased separately for centering and levelling.

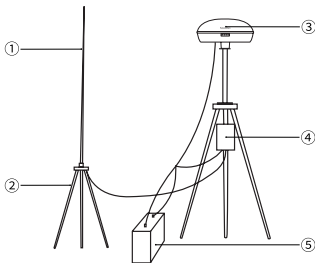The external radio of the base station is set up as below.

Figure 2.2.1.1 External radio of base station

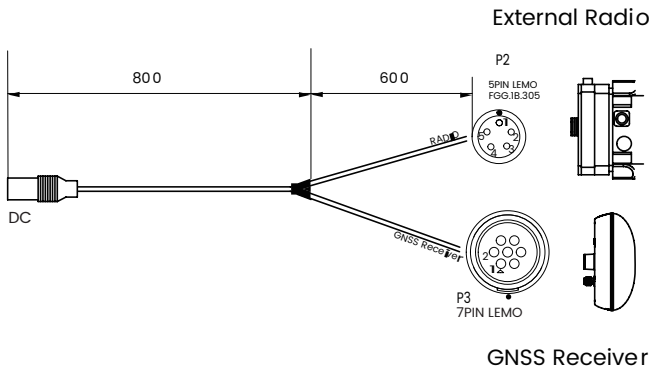| No.	Name	Purpose
1	Radio antenna	External radio antenna.
2	Tripod	Mount the radio antenna on it.
3	Receiver	Receive satellite signals.
4	Radio	External radio.
5	Battery	Power the receiver and the external radio. You are recommended to purchase it separately due to transportation restrictions.

External Radio

GNSS Receiver

Figure 2.2.1.1-2 Diagram of connection between External radio base station and GNSS Receiver

2.2.1.2 Setting up the Inner Radio

Mount the receiver on the tripod and fix the tripod on the ground.

> **!** Note: The inner radio covers a range of 5 - 10 km and has high environmental requirements for the operation area.
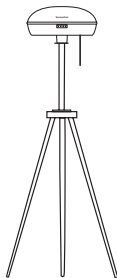

Figure 2.2.1.2 Inner radio

| The Defult Settings		
Radio Type	410~470MHz	902~928MHz
Pair Mode	Channels	Frequency Code
Protocol	TRIMMK3	——
Channels	20	——
Baud Rate	19200	19200
Frequency（MHz）	449.875	——
Frequency Code	——	BSA+XXXXX（SN:SVEAV1F229XXXXXZC）

2.2.2 Working Mode Setting

2.2.2.1 Establishing the Connection

Choose Communication. The options are Bluetooth connection and demo mode. Select Bluetooth, and tap the device name beginning with "GNSS" from Bluetooth Devices. Connected is displayed after the connection is established.
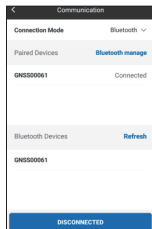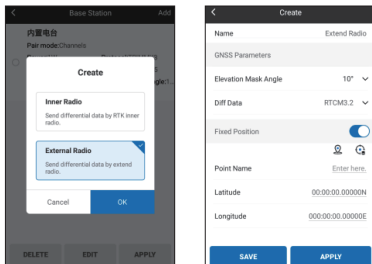

2.2.2.2 Set the base station

Inner Radio mode: Go to "Add" -> select "Inner Radio", enter a name, select " Protocol", "Channel", "Baud Rate" for the base station to be connected, and click "Apply".
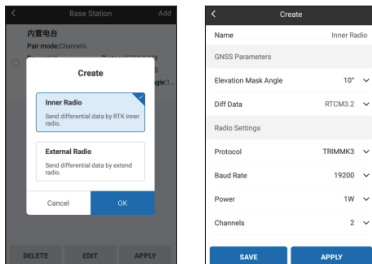
External Radio mode: Go to "Add" -> select "External Radio", enter the name, select "Diff Data" of the reference station to be connected, whether to check "Fixed Position" base station.

2.3 Status Bar

1. Receiver status. It can be one of the following:

Unknown: The receiver is not connected.

Ex Radio: The receiver is set to the base station mode and uses the external radio for data transmission.

In Radio: The receiver is set to the base station mode and uses the inner radio for data transmission.

Controller Network: The receiver is connected to the CORS network through the controller network.

2. Differential processing status: Fixed solution, float solution, and single point solution. When it shows Fixed, the differential processing status is normal.

3. Number of visible satellites: It shows how many satellites are visible.

4. Power level: It shows the current power level in percentage. When the power level is 0, the system will automatically turn off.
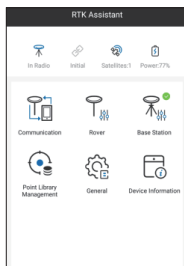
3 Appendix

3.1 Specifications

GNSS Receiver		
GNSS	Signal tracking	GPS: L1, L1C/A, L2C, L2P, L5
		BDS-2: B1I, B2I, B3I
		BDS-3: B1I, B3I, B1C, B2a, B2b
		GLONASS: G1, G2, G3*
		Galileo: E1, E5a, E5b, E6C*, AltBOC*
		QZSS: L1, L2C, L5, L1C*, L1-SALF
		SBAS: L1C/A, L5*
		IRNSS: L5*
		L-band*
	Items marked with * will be updated with the firmware.	
	Time to first fix	< 20s (cold start)
		< 10s (hot start)
	Signal reacquisition	< 1s
	Pseudorange accuracy	≤ 10 cm
	Carrier phase accuracy	≤ 1 mm
	RTK initialization time	< 5s (baseline < 10 km)
	Initialization reliability	> 99.9%

GNSS Receiver			
	Channels	965	
	GNSS positioning accuracy	Single-point positioning (RMS): horizontal 1.5 m, vertical 3 m;	
		Static differential (RMS): horizontal ± (2.5+1*10-6*D) mm, vertical ± (5.0+1*10-6*D) mm D refers to baseline length, unit: km.	
		RTK (RMS): horizontal ± (8+1*10-6*D) mm, vertical ± (15+1*10-6*D) mm *D refers to baseline distance, unit: km.	
	Timing accuracy	20 ns	
	Update rate	Raw observation data: 1, 2, 5, 10 Hz	
		Real-time positioning data: 1, 2, 5, 10 Hz	
	Data format	RTCM2.X, RTCM3.X, CMR, CMR+, CMRx, NMEA-0183, RINEX	
Bluetooth	Protocol	BT4.2&BLE	
Wi-Fi	Protocol	IEEE 802.11b/g/n standards	

GNSS Receiver		
Built-in Radio	Power consumption	0.5 W/1 W
	Modulation type	GMSK or 4FSK
	Frequency	410 ~470 MHz/902~928MHz
	Protocol	TRIMATLK, TRIMMARK3, TT450S.TRANSEOT
Battery	Battery capacity	6500 mAh
	Battery life	Static measurement: 10 h dynamic measurement: 15 h
Power Supply	Voltage	USB PD: 12 V /2.5 A; DC input : (9 – 32) V
Indicator	Type	Power, data, satellite and Bluetooth
Overall	Size	162mm x 86 mm
	Weight	≤ 1 kg
	IP rating	IP67

Ambient Environment	Operating temperature	-30℃ – +60℃
	Storage temperature	-40℃ – +70℃
	Humidity	95%

3.2 Warranty

Upholding the user-centered principle, Sveaverken Intelligent Technology (Shenzhen) Co., Ltd. (SVEA), as a leading machinery and smart driving system manufacturer, provides the following warranty for each Svea GNSS receiver:

1. Warranty period: A warranty period of 1 year is granted to each user (including lifetime free software upgrade). The period starts from the invoice date and expires on the date stipulated in this warranty.
2. If the receiver or any of its parts fails during the warranty period, the dealer shall repair or replace the damaged part free of charge. If warranty for the damaged part has expired, the user shall pay for the new part and the repair service provided by the dealer.
3. Within the warranty period, if the receiver is damaged due to improper use, maintenance, or adjustment by the user or for reasons other than product quality issues, the user shall pay for the new part, while the dealer shall provide the repair service free of charge.
4. The dealer shall also provide free training and services for the software system within the warranty period.
5. Warranty period: 1 year.
6. SVEA reserves all rights to interpret this warranty.

Sveaverken Intelligent Technology (Shenzhen) Co.,Ltd.