



Smart Bicycle Lock S90-V2



Product Manual

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Warranty

Sentinel NV warrants that all components of S90 smart lock have been carefully designed, manufactured, packaged and tested and are free from defects of any kind. Sentinel NV shall not be liable for any accident, loss, damage or increase of expenses arising from the use of S90 lock directly or indirectly. Sentinel NV's obligation under this warranty is to repair or replace any parts of the system. The customer is responsible for all matters beyond the control of Sentinel NV, such as handling, storage, cleaning or misuse. This warranty may supersede and exclude all other warranties of merchantability or fitness, expressed or implied.

Product Name	Smart Bicycle Lock
Model and Specification	S90-V2
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01 Introduction

1.1 About the S90 smart bicycle lock

This manual describes the specifications and user instructions of the S90 smart bicycle lock.

The S90 smart bicycle lock (S90 for short) is a digital lock that can be installed on bicycles and electric moped. It features RFID card unlocking, Bluetooth unlocking, vehicle tracking, sound and light notification, motion detection, OTA firmware updates, fast charging and other functions.

■ Product Appearance



S90 smart bicycle lock appearance

■ Function Description

Function	Description
UART Communication	For communication with cabled peripheral devices
Bluetooth communication	Supports unlocking, debugging mode, iBeacon detection, OTA upgrade
RFID reader	Supports ISO14443-A, ISO14443-B, MIFARE standards
Unlock	RFID unlocking via RFID, Bluetooth
Charging	Charge the S90 with the supplied magnetic charging cable or hook up a Sentinel solar panel or an external 5V power supply to the external connector
Firmware updates	The firmware can be updated over-the-air via the Bluetooth
Motion detection	The S90 has a built-in acceleration sensor that detects movement. It is used for detecting unauthorised movement (theft)
LED indicator	The different states of the lock are indicated by the LED indicator on the side of the lock
Sound indicator	The lock has a built-in buzzer

1.2 Table of contents

Chapter 02 - Instructions for using the S90 Lock.

Chapter 03 - Overview of the technical specifications.

Chapter 04 - Describes the system labels.

Chapter 05 - Provides transportation and storage conditions.

Chapter 06 - Testing and certifications

1.3 Important Information

Before using the S90 lock, you must read this manual in its entirety and pay particular attention to the Notes, Caution and Warning messages.



Note

Important information for the user.



Caution

Pleas follow these instruction carefully, otherwise the device may be damaged or the environment may be polluted.

02 Instructions for Using the S90 Lock

2.1 Application

The S90 smart lock is designed for use on bicycles with tires of up to 80mm wide.



2.2 S90 lock operations

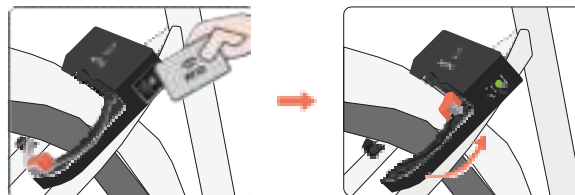
■ Unlock

The lock can be opened in several ways: with a registered RFID card, via bluetooth communication using an authorized app, via network.

- **RFID card unlocking**

Hold an authorized RFID card close (<1cm) to the NFC reading area of the lock. When the card is read successfully you will hear a short beep and the LED indicator will light up green. The lock will open instantaneously.

(Note: Some older RFID cards may not be read instantaneously. It may be necessary to hold the card near the reader for a few seconds in order to read it.)



- **Bluetooth unlocking**

The Bluetooth communication protocol of the lock includes an unlocking instruction allowing it to be unlocked with an authorized app. The app can send an unlocking instruction to the lock via the Bluetooth connection.

■ Lock

1. Press the button on the handle to release the safety mechanism;



2. Slide the locking bar all the way down to close the lock;



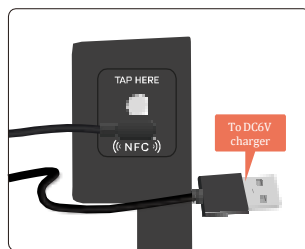
3. You will hear a "click" when the lock is fully closed. The locking bar should stay in the closed position after you release the handle.

■ Charging

The S90 lock can be charged in 2 ways; with the magnetic connector port at the side of the lock or via the external connector port.

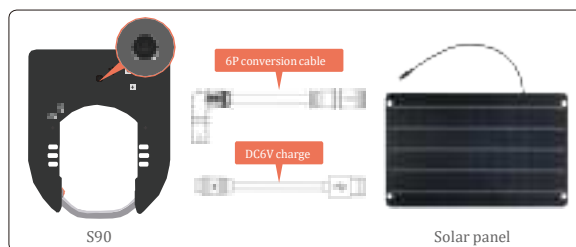
- **Magnetic connector charging**

Connect the magnetic connector of the dedicated USB cable to the magnetic connector at the side of the lock and plug the USB connector in to a (mobile phone) DC6V charger.



- **Cable charging**

Cable charging is done by connecting a dedicated 6P conversion cable to the solar panel (DC6V stabilized output) or connecting a dedicated USB charging cable to charge the lock with a DC6V charger.



■ Sound and LED indicator

It is typical, can be different based on system integration.

• Sound indicator

Status	Beep Action
RFID card read	Beep twice
Received an OTA	Beep twice
Unlock CMD received	Beep once
Report unlocking success	Beep once
Alarm	Parameters can be configured

• LED indicator

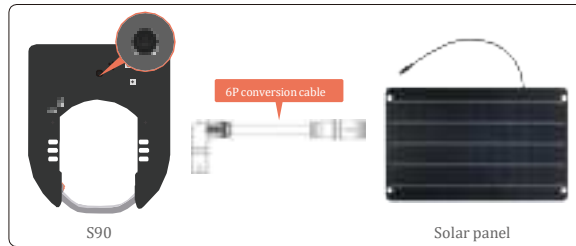
Status	LED indicator
RFID card read	Green - blink twice
During OTA	Red - steady
Received OTA	White - blink twice
OTA success	Blue - steady for 3 seconds
OTA failed	Blue & red - alternating for 3
Receive unlock CMD	Green - blink once
Report unlocking success	Green - blink once
Enter sleep mode	Blue - steady for 2 seconds

■ External Connection Port

The S90 lock has a 6 pin port for external connections at the back of the lock. It can be used for charging or for communicating with an external device.

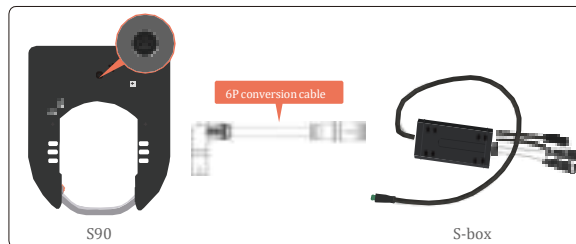
• Connecting a solar panel

1. Insert the male head of the special 6P conversion cable into the 6P connector on the back of the lock and plug tightly
2. Connect the solar panel cable with the female head of the 6P conversion cable and plug tightly



• Connecting an S-Box adapter (to interface the lock with an e-bike controller)

1. Insert the male head of the special 6P conversion cable into the 6P connector on the back of the lock and plug tightly
2. Connect the 5P cable connector of the S-Box to the female end of the 6P conversion cable and insert it tightly

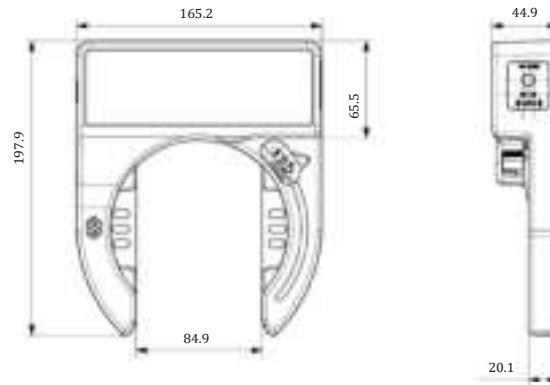


2.3 Disposal

After the S90 lock is discarded, it should be disposed of according to the local laws and regulations.

03 Technical Specifications

3.1 Product specifications



(Unit: mm)

3.2 Performance parameters

■ Lock Parameters

Size	165.2 * 197.9 * 44.9mm
Weight	1.1kg
Shell material	ABS
Shell color	Black
6P connector specification	Female, diameter: 8.1mm
Built-in battery	Rechargeable Li-ion, 3.7V
Standby current	≤1mA
Charging	DC5.0±1.0V / 1A
Communication interface	UART * 2
Waterproof class	IP66
Operation temperature	-10°C ~ +55°C
Working humidity	10% ~ 85%
Storage temperature	-20°C ~ +80°C

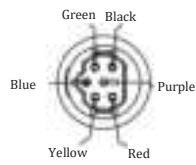
■ **RFID Performance**

Frequency	13.56MHz
Communication protocol	ISO/IEC14443A, ISO/IEC14443B
Card reading distance	< 1CM

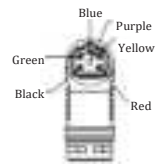
■ **Bluetooth performance**

Frequency	2402-2480MHz
Communication protocol	BLE4.0
Communication distance	≥8m





6P Cable Connector (Female)















6P cable connector (Male)

6P cable connector (female) description

PIN	Wire Color	Function
1	Red	VCC Input (DC5.0V - 6.0V)
2	Yellow	UART-RX
3	Blue	UART1-RX
4	Green	UART-TX
5	Black	GND
6	Purple	UART1-TX

04 System Labels

The following table lists the component labels in the system :

 Waterproofing class	 Production Lot number	 Production date	 Warning or Notice
 See instructions	 Attention to moisture	 Sun protection	 Stacking tier limit
 Handle lightly	 Humidity limit	 Temperature limit	 Pressure limit

05 Transportation and Storage Conditions

5.1 Transportation conditions

- Keep dry during transport.
- Do not ship together with inflammable, explosive or corrosive materials. Do
- not transport together with objects with magnetic field sources.

5.2 Storage conditions

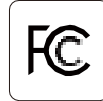
- Temperature -10 ~ +55°C, relative humidity ≤85%, no corrosive gas, well-ventilated and clean environment.
- S90 lock should be stored in a dry place away from magnetic field sources.

06 Testing and Certifications

6.1 Testing

- We tested the S90 lock for continuous lock opening and closing. The test life reached up to 15k times or more. Based on the average frequency of a lock being used 5 times a day, the mechanical life span of a lock is over 8 years or more.
- The S90 lock passed a continuous 24 hours vibration test.S90
- passed the IK10 test.
- S90 passed the IP66 waterproof test.
- S90 lock passed the 120H salt spray test (ISO 9227-2012).

6.2 Certifications



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure statement

The device has been evaluatec to meel general RF exposure requirement. The device can be used in portable exposure condition without restriction.

The device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.