CHC X360
GIS Receiver

Copyright

Trademarks

Safety Warnings
The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for the accuracy and maintenance of the GPS network. Accuracy can also be affected by poor satellite geometry and obstructions, like buildings and heavy canopy.

FCC interference statement
This equipment has been designed to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules in the Portable Mode. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

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.

X360 GIS Receiver User Guide – Revision 1.0 January 2015

SAFETY INFORMATION

Before you use your CHC X360 GIS Receiver, make sure that you have read and understood all safety requirements.

REGULATIONS AND SAFETY

The Receiver contains an internal wireless modem for communicating signals through Bluetooth® wireless technology or through an external data communications radio. Regulations regarding the use of the wireless modem vary greatly from country to country. In some countries, the unit can be used without obtaining an end-user license. Other countries require end-user licensing. For licensing information, consult your local CHC dealer.

Before operating a X360 GIS Receiver, determine if authorization or a license to operate the unit is required in your country. It is the responsibility of the end-user to obtain an operator's permit or license for the Receiver for the location or country of use.

TYPE APPROVAL

Type approval, or acceptance, covers technical parameters of the equipment related to emissions that can cause interference. Type approval is granted to the manufacturer of the transmission equipment, independent from the operation or licensing of the units. Some countries have unique technical requirements for operation in particular radio modem frequency bands. To comply with those requirements, CHC may have modified your equipment to be granted Type approval. Unauthorized modification of the units voids the Type approval, the warranty, and the operational license of the equipment.

EXPOSURE TO RADIO FREQUENCY RADIATION

Safety. Exposure to RF energy is an important safety consideration. The FCC has adopted a safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated equipment. Proper use of this radio modem results in exposure below government limits. The following precautions are recommended:

C. *Do not* operate the transmitter when someone is 20 cm (7.8 inches) of the antenna.

D. *Do not* operate the transmitter unless all RF connectors are secure and any open connectors are correctly terminated.

E. *Do not* operate the equipment near electrical blasting caps or in an

explosive atmosphere.

F. All equipment must be correctly grounded for safe operation.

G. All equipment should be serviced only by a qualified technician.

BATTERY SAFETY

⚠ **WARNING** – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage. To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
- Do not expose the battery to fire, high temperature, or direct sunlight.
- Do not immerse the battery in water.
- Do not use or store the battery inside a vehicle during hot weather.
- Do not drop or puncture the battery.
- Do not open the battery or short-circuit its contacts.

⚠ **WARNING** – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage. To prevent injury or damage:

- If the battery leaks, avoid contact with the battery fluid.
- If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!
- If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.

⚠ **WARNING** – Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage. To prevent injury or damage:

B. Do not charge or use the battery if it appears to be damaged or leaking.

C. Charge the Lithium-ion battery only in a CHC product that is specified to charge it.

D. Discontinue charging a battery that gives off extreme heat or a burning odor.

E. Use the battery only in CHC equipment that is specified to use it.

F. Use the battery only for its intended use and according to the instructions in the product documentation.

DC POWER SUPPLY SAFETY

⚠️ **WARNING** – When DC voltage is applied to this Receiver through COM 1 or COM 2 (Lemo connectors), the DC voltage must be limited to no more than 36 V DC +0% under both normal and single fault conditions. If the recommended input voltage is exceeded, the Receiver may present an electrical hazard.

WET LOCATION SAFETY

⚠️ **WARNING** – This Receiver is not intended to be used in a wet location, or a location that may become wet, when it is powered by the external DC power supply. Use the Receiver in a wet location *only* when operating it on its own internal battery.

⚠️ **WARNING** – The external power adapter and its associated power cord and plug are not intended to be installed outdoors, or in a wet location.

⚠️ **WARNING** – Do not power the Receiver through external power when operating in a wet environment or an environment that may become wet. The power input connections must be sheltered.

CONTENTS

A. INTRODUCTION

The X360 GIS Receiver User Guide describes how to set up and use the CHC X360 GIS Receiver.

In this manual, "the Receiver" refers to the X360 GIS Receiver unless otherwise stated.

Even if you have used other Global Navigation Satellite Systems (GNSS) products before, CHC recommends that you spend some time reading this manual to learn about the special features of this product. If you are not familiar with GNSS, go to www.chcnav.com for an interactive look at CHC and GNSS.

A.I. ABOUT THE RECEIVER

The X360 GIS Receiver ("the Receiver") is a multiple-frequency GNSS Receiver. It can track all GPS (L1/L2/)

You can use the front panel of the Receiver or an office computer to configure the Receiver, access files, and publish data files to a company Intranet or to the Internet. The Receiver makes it easy for you to set up a powerful, flexible, and reliable station for continuous operation.

The Receiver serves in all common geodetic Receiver roles. It can be the main component in a Continuously Operating Station (CORS), streaming data to CHC GNSS Infrastructure software. It can also work well as a campaign Receiver prior to permanent deployment. The Receiver makes an excellent portable RTK base station with its internal battery. It also has specialized capabilities that make it an excellent Receiver for scientific applications.

A.II. TECHNICAL SUPPORT

If you have a problem and cannot find the information you need in the product documentation or CHC website (www.chcnav.com), contact your local CHC dealer from which you purchased the Receiver(s).

If you need to contact CHC technical support, please contact us by email (support@chcnav.com) or Skype (chc_support).

A.III. DISCLAIMER

Before using the Receiver, please make sure that you have read and understood this User Guide, as well as the safety requirements. CHC holds no responsibility for the wrong operation by users and for the losses incurred by the wrong understanding about this User Guide. However, CHC reserves the rights to update and optimize the contents in this guide regularly. Please contact your local CHC dealer for new information.

A.IV. YOUR COMMENTS

Your feedback about this user guide will help us to improve it in future revision. Please email your comments to support@chcnav.com.

B. OVERVIEW

This chapter introduces the X360 GIS Receiver ("the Receiver"). This Receiver makes it easy to set up a powerful and reliable Continuously Operating Station (CORS) or to collect data from temporary field locations.

The Receiver is ideal for the following infrastructure applications:

- As part of a GNSS Infrastructure network in conjunction with CHC Station Network (CRNet) software.
- As part of a permanent station with or without supporting software.
- A temporary field base station to broadcast RTK corrections and collect observations for post processing.

B.I. RECEIVER FRAMEWORK

The Receiver integrates the multi-frequency GNSS technology into a specialized processing and communications framework. The Receiver can operate as a standalone station or it can be integrated into a scalable network.

With an Internet Protocol (IP) as the primary communications method, you can use public domain tools, such as a web browser and FTP client, to configure the Receiver and access logged data files.

> **NOTE** - All s to the Internet refer to either a Wide Area Network (WAN) or a Local Area Network (LAN) connection.

The Receiver adopts a secured system that requires a password protected login for configuration changes and/or file access.

Use the network management features to create a base/rover configuration with a variety of operating modes. You can then enable those modes as necessary instead of switching the global state of the Receiver from one mode to another. For example, you can configure a number of streaming services with different configurations (such as any combination of data stream, sample interval) on different TCP or UDP ports. To activate one or more modes, open the connection to the specific port. This allows multiple clients to access any given streaming service.

These features and many more, shift the model of a GNSS Receiver toward the concept of a "network appliance".

B.I.i. THE NETWORK APPLIANCE CONCEPT

Traditionally, a GNSS Receiver has one operator. That person is the only user of the Receiver so they can change settings without affecting other users.

With the X360 GIS   Receiver, an operator can configure a Receiver once, and then make it available as a network appliance for general use by one or more users (or clients).

This network appliance concept lets you set up the Receiver to provide one or more services that one or more users can access through a Local Area Network (LAN) or a Wide Area Network (WAN), such as the Internet. Once the Receiver is set up, you need make only minimal changes, if any, to the Receiver configuration.

When the Receiver is operating as a network appliance, it provides services to all users attached to the Receiver through the network.

Different streamed services may be configured on different ports, for example, with differing data rates or data combination. To obtain a service, the client has only to connect to a specific port. In this way, most users do not need to control the Receiver. Changing global settings, such as masks, will affect all users of all services.

The Receiver provides the following standard configuration and data logging services:

Use	To perform...
HTTP	All manual and automated configuration operations to manage the logged data file space.
FTP	Remote manual and/or automated operations to manage the logged data file upload path.

B.II. RECEIVER SERVICES

The Receiver can provide one or more streaming or query services over a RS-232 serial port or a TCP/IP port:

- Streaming service

  Anyone with authorized access can obtain streamed information, such as GNSS measurements or RTCM corrections, without having to control or issue commands to the Receiver. The client simply connects to the port that is streaming the required information.

B.III. RECEIVER FEATURES

- 220-channels
  - GPS: L1C/A,L1,L2
- 16 GB internal data logging storage
- External USB drive support
- Integrated battery, provides up to 10 hour operation
- Integrated display and keypad for system configuration without a controller
- Integrated Bluetooth wireless technology for cable-free data transmission
- Permanent/semi-permanent and mobile quick setup base station capability
- Easy-to-use Web-interface menu system for rapid configuration and status checking
- Eight independent data logging sessions with configurable memory pooling
- Circulating data logging method
- FTP push to allow uploading of logged data files to remote sites
- Multiple languages available through the Web interface
- NTRIP (Networked Transport of RTCM via Internet Protocol) client/server/caster support

B.IV. USE AND CARE

This Receiver can withstand the rough treatment and tough environment that typically occurs in CORS installation. However, it is a high-precision electronic instrument and should be treated with reasonable care.

⚠ **CAUTION** – Operating or storing the Receiver outside the specified temperature range can damage it. For more information, see Chapter 8 Specifications.

B.V. ELECTRONIC INTERFACE

High-power signals from a nearby radio or radar transmitter can overwhelm the Receiver circuits. This does not harm the instrument, but it can prevent the Receiver electronics from functioning correctly.

Avoid locating the Receiver or antenna within 400 meters of powerful radar, television, or other transmitters or GNSS antennas. Low-power transmitters, such as those in cell phones and two-way radios, normally do not interfere with Receiver operations.

B.VI. KEYPAD AND DISPLAY

	Feature	Description
1	Power	Shows if the power is on or off.
2	Buttons	1,Battery
		LED
		2,satellites

B.VII. REAR CONNECTORS

	Connector type	Description
1	TNC	Connect to the GNSS antenna
2	CAN	Can port to connect the external LAN,DC,USB,COM port
3	DC	For the power supply

CAN Port Connectors

1	Lemo (10-pin) Port 1	• Power from an external AC/DC power supply.
		• RS-232 serial communications using a 10-pin Lemo cable (CHC Data Cable).
		• Pass-through to the mainboard without issuing the pass-through command via this port.

2	Lemo (10-pin) Port 2	• Power from an external AC/DC power supply. • RS-232 serial communications using a 10-pin Lemo cable (CHC Data Cable).
3	Rj45 jack	• Data streaming transmission port. • Supports links to 10BaseT/100BaseT auto-negotiate networks • HTTP, TCP/IP, UDP, FTP, NTRIP Caster, NTRIP Server, NTRIP Client Simultaneously transmits multiple data stream
4	USB	• Connect to external USB drive for external data logging after configured through web interface. • Upgrade the Receiver firmware with the inserted USB driver containing the related upgrade file after restart the Receiver. • Connect the Receiver to a computer to download files from the Receiver (as

C. BATTERIES AND POWER

The X360 GIS   Receiver uses an internal rechargeable Lithium-ion battery, which can be replaced only at an Authorized CHC Service Center.

The Receiver can also be powered by an external power source that is connected to either of the Lemo ports.

The operational time provided by the internal battery depends on the type of measurement and operating conditions. Typically, the internal battery provides up to 17 hours operation.

> **NOTE** – All battery operational tests are carried out with new, fully-charged batteries at room temperature, tracking both GPS satellites while storing and streaming data at 1 Hz. Older batteries, at temperatures significantly higher or lower than room temperature, will have a reduced performance. Power consumption increases with an increasing number of actively tracked satellites and with increasing observation and storage rates.

C.I. EXTERNAL POWER

The Receiver uses an external power source in p to its internal battery. If the Receiver is not connected to an external power source, or if the external power supply fails, the internal battery is used.

The Receiver's internal battery charges only when the external voltage is above 11 V DC. CHC recommends that the applied external power offers between 12 V DC and 36 V DC and is able to supply at least 4 W of power for the long-term installations and ensuring that the internal battery is charged and ready to compensate for power supply disruptions.

While carrying out static measurements for post-processed computations using the internal memory, if no external power is supplied and the internal battery is drained, the Receiver shuts down. No data is lost; however, when power is restored, the Receiver should be configured again.

⚠ **WARNING** – The external AC power adapter and its associated power cord and plug are not intended to be installed outdoors, nor in a wet location. Do not power the Receiver through external power when operating in a wet environment or an environment that may become wet. The power input connections must be sheltered.

⚠ **WARNING** – When you apply DC voltage to this product through the Lemo connector, the DC voltage must be limited to 36V DC +0% under both normal and single fault conditions. This product may present an electrical hazard if the recommended input voltage is exceeded.

C.II. BATTERY SAFETY

The Receiver is powered by a rechargeable internal Lithium-ion battery. Charge and use the battery only in strict accordance with the following instructions.

⚠ **WARNING** – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage.

To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
- Do not expose the battery to fire, high temperature, or direct sunlight.

- Do not immerse the battery in water.
- Do not use or store the battery inside a vehicle during hot weather.
- Do not drop or puncture the battery.
- Do not open the battery or short-circuit its contacts.

⚠️ **WARNING** – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage.

To prevent injury or damage:

- If the battery leaks, avoid contact with the battery fluid.
- If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!
- If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.

C.III. BATTERY PERFORMANCE

To optimize battery performance and extend battery life:

- Fully charge all new batteries before use.

C.IV. CHARGING THE BATTERY

The rechargeable Lithium-ion battery is supplied partially charged. Charge the battery completely before using it for the first time. If the battery has been stored for longer than three months, charge it before use.

When connected to a suitable power source, the internal battery charges fully in 10 hours.

⚠️ **WARNING** – Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage.

To prevent injury or damage:

6. Do not charge or use the battery if it appears to be damaged or leaking.
7. Charge the Lithium-ion battery only within the X360 Receiver. The

battery can only be removed by an authorized CHC Service Center.

C.V. STORING THE BATTERY

The internal Lithium-ion battery adopts a self-protection mechanism that protects the battery from discharge when its voltage is below 6 V and shuts down the Receiver. The internal battery will be activated when charged by the external power supply.

The internal battery will only charge from an external power source that delivers more than 11 V, for example, an AC power adaptor. The Receiver is supplied with a mains power supply unit that recharges the battery inside the Receiver when it is connected through the adaptor to either of the Lemo ports. When you use the Receiver in a long-term installation, CHC recommends that you use this power supply or another that provides at least 12 V DC at all times to keep the internal battery charged. This will ensure that the internal battery provides an uninterrupted power supply that will keep the Receiver operational for up to 17 hours after a power failure.

C.VI. REMOVING THE BATTERY

The internal Lithium-ion battery may be removed only at an authorized CHC Service Center. If the battery is removed at an unauthorized service center, the remaining warranty on the product will be void.

D. SETTING UP THE RECEIVER

This chapter describes best practices for setting up the equipment, and outlines the precautions that you must take to protect the equipment. It also describes the typical installation diagram of station composed of X360 GIS Receiver, GNSS antenna, external power and network cable.

The antenna installation guidelines described here are the ***minimum*** standards. When installing a geodetic antenna to gather precise observation data, always follow recommended CORS installation practices to the greatest extent possible.

D.I. GUIDELINES

When you set up the Receiver, follow these guidelines.

D.I.i. ENVIRONMENTAL CONDITIONS

The Receiver has a waterproof housing but you must take reasonable care to keep the unit dry.

To improve the performance and long-term reliability of the Receiver, do not expose the Receiver to extreme environmental conditions, such as:

- Water
- Corrosive fluids and gases

D.I.ii. SOURCES OF ELECTRICAL INTERFERENCE

Do not place the GNSS antenna near the following sources of electrical and magnetic noise:

- Gasoline engines (spark plugs)
- Televisions and computer monitors
- Alternators and generators
- Electric motors
- Equipment with DC-to-AC converters
- Fluorescent lights
- Switching power supplies
- Arc welding equipment

D.I.iii. UNINTERRUPTABLE POWER SUPPLY

CHC recommends that you use an uninterruptible power supply (UPS) to

power the Receiver. The internal battery can also operate as a UPS for up to 17 hours. A UPS protects the equipment from power surges and spikes, and keeps the Receiver running during short power outages.

For more information, contact your local CHC dealer.

D.I.iv. LIGHTING AND SURGE PROTECTION

CHC recommends that you install lightning protection equipment at permanent sites. All connections to the Receiver should have surge protection. Typically, the minimum protection should include a surge protector in the antenna feed line, on the Receiver's power supply system. If serial devices are attached to the Receiver, those serial connections should also be provided with surge protection. Also, protect any communications and power lines at building entry points. If you use other antennas, such as a radio modem that distributes real-time correction messages, install surge protection on those antenna feeds as well.

No surge protection devices can offer protection unless they are connected to an excellent ground using very low impedance conductors. Equipment damage caused by electrical surges occurs in many permanent installations even though surge protection is in place. Commonly, this is because the grounding system used was designed to protect against AC electrical hazards rather than to dissipate the sudden, high current surges caused by lightning. Please consult with a lightning protection expert or research the topic when planning permanent installations.

For more information, contact your local CHC dealer.

D.I.v. PLACING THE ANTENNA

The antenna location will have a significant effect on the quality of your X360 Receiver's performance. In temporary developments it may not always be possible to set up on an ideal location with an excellent sky view. However, when installing a permanent station, be sure to plan the antenna location and mounting system carefully.

The general requirements for the antenna location and mount are:

- Keep the distance from the objects that may cause the multipath effects (such as buildings, trees, reflective surface) for at least 200 m (656 feet)
- Clear sky above 10 degrees elevation
- Away from electromagnetism interference region (e.g. Microwave station, radio transmitting station, high voltage wires) at least 200 m (656 feet)
- Mounted 1.5 m (5 feet) above any nearby signal reflectors.

❖ Mount stability that is not influenced by thermal expansion, wind loading, or soil expansion/contraction.

For additional information on this topic, research the antenna installation guidelines published by the:

❖ US National Geodetic Survey (http://www.ngs.noaa.gov/PUBS_LIB/CORS_guidelines.pdf)
❖ International GNSS Service (http://igscb.jpl.nasa.gov/network/guidelines/guidelines.html)

- **SYSTEM INSTALLATION**

- SUPPORTED ANTENNA

The Receiver provides a TNC-type female connector for connecting to an antenna. The Receiver is intended for use with a CHC Geodetic GNSS antenna or a CHC GNSS Choke Ring antenna.

**CHC Helical GNSS
Antenna**

Other GNSS antennas may however be used ensuring that the antenna receive the proper GNSS frequencies and operates at either 3.3V or 7.1V with a signal greater than 40 dB at the antenna port.

- SYSTEM INSTALLATION DIAGRAM

The typical installation diagram of the CHC X360 GIS Receiver connected with CHC A220GR GNSS Geodetic Antenna, external power supply and network cable.
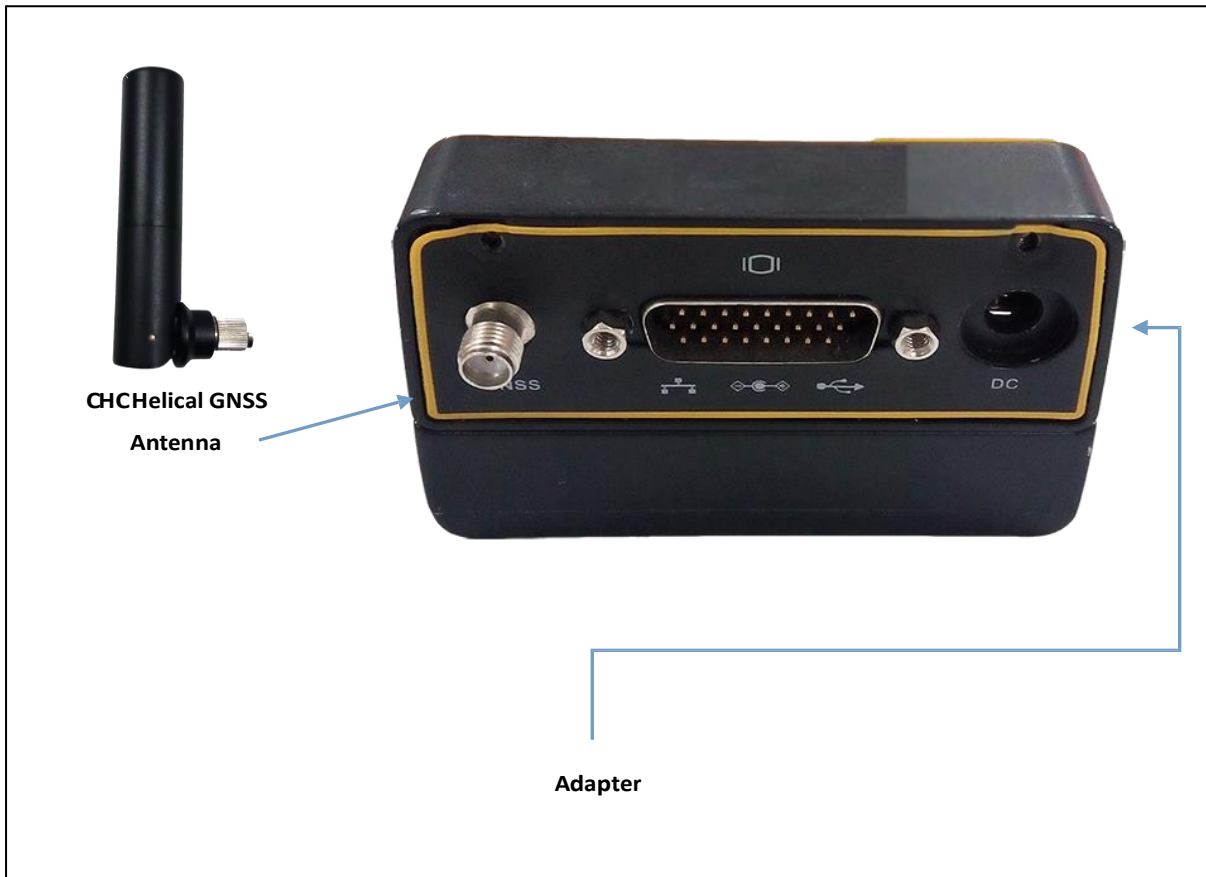
Install the GNSS antenna at the appropriate location (see 4.1.5. Place the antenna for the guidelines); connect the antenna to the TNC Plug Socket of X360 via the GNSS Antenna Cable.

1. Power the X360 by external power source (e.g. mains supply) with Adapter via CHC Data Cable.

   ➢ Connect the 10-pin Lemo of CHC Data Cable to COM 1 or COM 2 of X360.

   ➢ Plug the male jack connector of Adapter into the female connector of CHC Data Cable.

   ➢ Connect two leg plugs or three leg plugs of Adapter to the mains supply.

2. Connect the network cable to the RJ45 jack of X360 to link the X360 with network.

   NOTE: Also, the X360 can be powered by external battery via CHC Data Cable. And the power supply voltage should be controlled between 12 to 36 V DC.

1. CONFIGURING THE RECEIVER: OTHER THAN KEYPAD AND DISPLAY

You can configure the X360 , GIS Receiver to perform a wide variety of functions. This chapter describes the configuration methods other than the front panel display, and explains when and why each method is used.

The WinFlash utility described in this chapter is used primarily to update the Receiver firmware.

➢ CONFIGURING THE ETHERNET SETTINGS

The Receiver Ethernet port connects to an Ethernet network, through which you can access, configure, and monitor the Receiver. No serial cable connection to the Receiver is necessary.

The Receiver has the following Ethernet settings:

5   IP address
6   IP mask
7   Gateway
8   DNS server
9   HTTP port

The default setting for the HTTP port is 80: This port is not assigned by the network. HTTP port 80 is the standard port for web servers and enables you to connect to the Receiver by entering only the Receiver's IP address in a web browser.

For example, using port 80: **http://192.168.9.69**

If the Receiver is set to use a port other than 80, you must enter the IP address followed by the port number in a web browser.

For example, port 9971: **http://169.168.9.69:9971**

Users can configure the Ethernet settings through the front panel (see 5.4. Setting up the Receiver as part of an Ethernet configuration) and a web server. To use a web server, the Receiver must be connected to a network and have a valid Ethernet configuration.

> NOTE: The Receiver should be configured the Ethernet settings through the front panel for its first connection to the Internet.
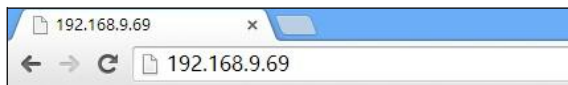
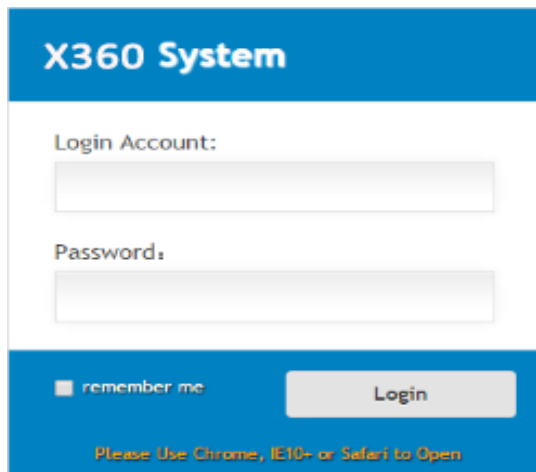> ➢ **CONFIGURING THROUGH A WEB BROWSER**

Supported browsers:

- Google Chrome
- Microsoft Internet Explorer$^{®}$ version 10, or higher
- Apple Safari

To connect to the Receiver through a web browser:

1. Enter the IP address of the Receiver into the address bar of the
   web browser:

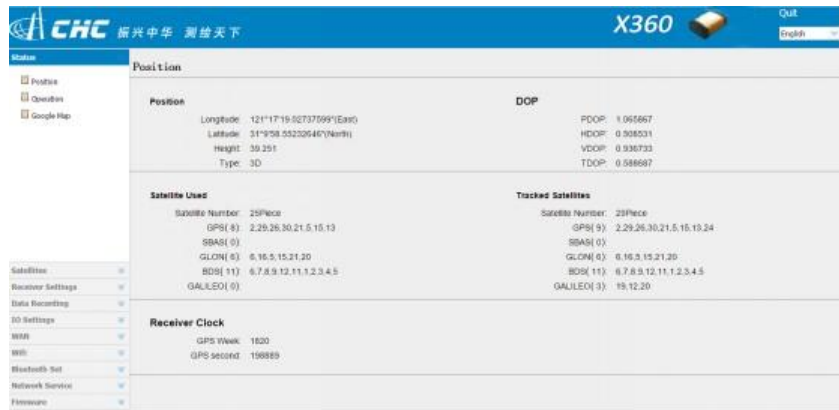2. The web browser prompts you to enter a username and password:

The default login account for the Receiver is:
   - ➢ Login Account: admin
   - ➢ Password: password

NOTE: Tick **remember me** option, and then the browser will
remember the Login Account and Password you entered for the next
time you enter this login screen.

3. Once you are logged in, the web page appears as follows:

- CHANGING THE SETTINGS

The web interface shows the configuration menus on the left of the browser window, and the setting on the right. Each configuration menu contains the related submenus to configure the Receiver and monitor Receiver performance.

This section describes each configuration menu.

To view the web interface in another language, select the corresponding language name from the drop-down list in the upper right corner of the interface.

Currently, three languages are available:
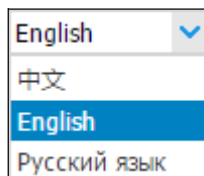
- Status menu

This menu provides a quick link to review the Receiver's position information, satellites tracked, runtime, current data log status, current outputs, available memory, and more.
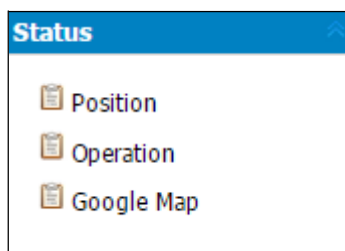
- Position

This page shows the relevant position information about the Receiver's position solution which including the position, DOP values, satellites used and tracked, and the Receiver clock information.

- Operation

Lists several important items to help you understand how the Receiver is being used and its current operating condition. Items include the identities of currently tracked satellites, internal and external storage usage rate, how long the Receiver has been operational, state of the internal battery, power source state, files being logged, and data streams being output. With this information, it is easy to tell exactly what functions the Receiver is performing:

Receiver Activated

Satellites Track

Tracked Satellites:	25Piece
GPS(8):	22,12,25,14,21,18,15,24
SBAS(0):	
GLON(6):	7,10,9,11,8,6
BDS(9):	14,9,10,1,2,3,4,5,6
GALILEO(2):	19,20

Activity Status

Current Time:	2014-11-25 10:53:0 (UTC)
Operation Time:	0-0-0 2:39:40
Internal Storage:	0.82% 119MB/14467MB
External Storage:	0% Not Connected
Battery:	100%
External Power:	Connected

Data Log(Closed)

Recording Number	Recording Name	On Or Off	Log Status
1	record1	No	Not Record
2	record2	No	Not Record
3	record3	No	Not Record
4	record4	No	Not Record
5	record5	No	Not Record
6	record6	No	Not Record
7	record7	No	Not Record
8	record8	No	Not Record

Data Export

|	Port Type	Output Data
1	RTK Client	---
2	TCP/UDP_Client1	---
3	TCP/UDP_Client2	---
4	TCP/UDP_Client3	---
5	TCP/UDP_Client4	---
6	TCP/UDP_Client5	---
7	TCP/UDP_Client6	---
8	TCP/IP_Server1	Raw Data:1Hz,
9	TCP/IP_Server2	Differential Data:SCMR
10	TCP/IP_Server3	Differential Data:SCMR
11	TCP/IP_Server4	---
12	Com Port	Differential Data:CMR
13	Com Port (COM2)	Raw Data:1Hz,GPGGA:1Hz,
14	Bluetooth	---

- Google map

Tap this submenu to show the location of the Receiver on Google map.
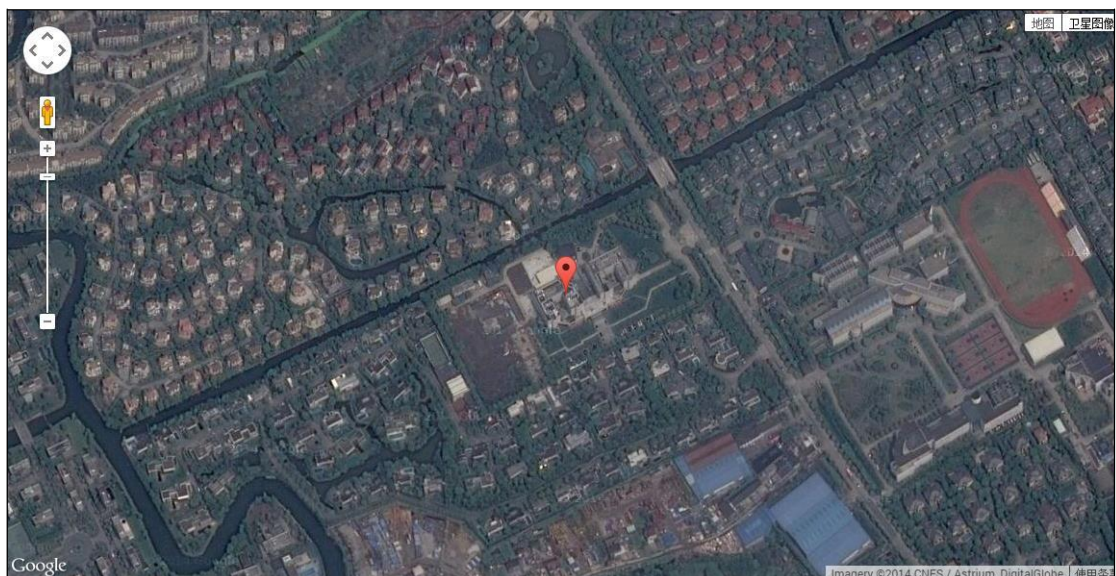
- Satellites menu

Use the Satellites menu to view satellite tracking details and enable/disable GPS. These menus include tabular and graphical displays to provide all required information on satellite tracking status.
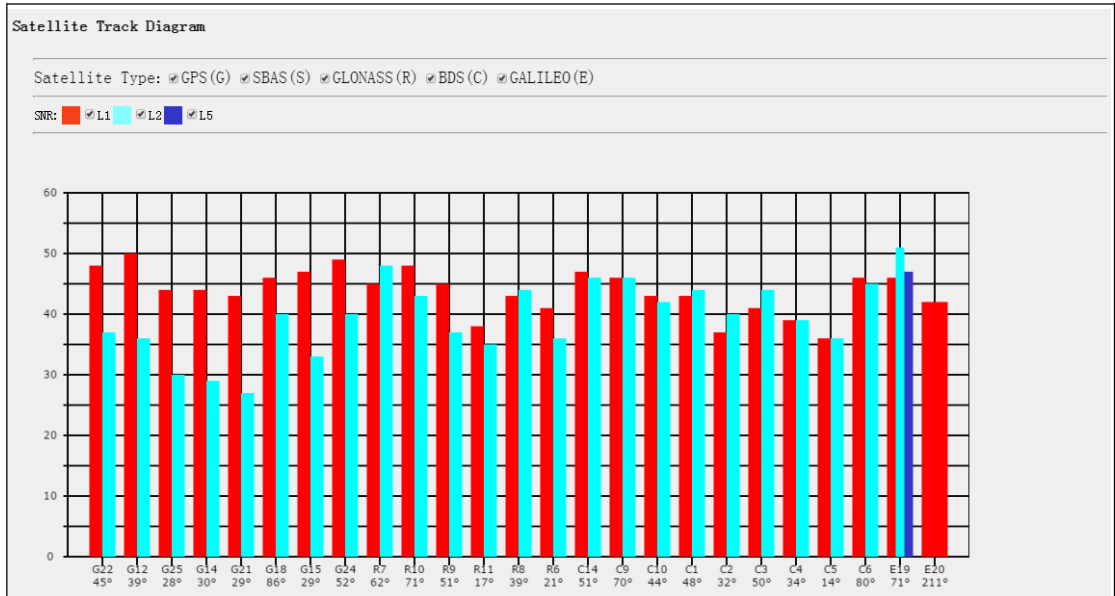
Satellites

- Satellite Track Table
- Satellite Track Diagram
- SkyPlot
- Satellite Settings
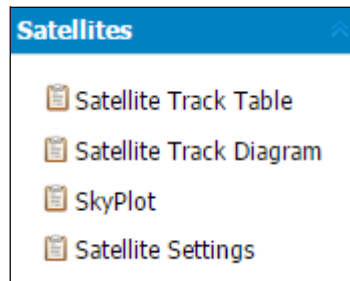
- Satellite Track Table

Provides the status of satellites tracked in general, such as the satellite ID, satellite type, attitude angle, azimuth angle, L1 SNR, L2 SNR, L5 SNR and enable/disable status of each one.

Satellite Track Table

All | GPS | SBAS | GLON | BDS | GALILEO

| Satellite Id	Type	Altitude Angle	Azimuth Angle	L1 SNR	L2 SNR	L5 SNR	Enable/Disable
22	GPS	45	315	50.000	38.000	0.000	Yes
12	GPS	39	112	50.000	36.000	0.000	Yes
25	GPS	27	159	44.000	29.000	0.000	Yes
14	GPS	30	292	43.000	29.000	0.000	Yes
21	GPS	29	213	43.000	29.000	0.000	Yes
18	GPS	85	311	46.000	39.000	0.000	Yes
15	GPS	29	72	46.000	33.000	0.000	Yes
24	GPS	53	37	50.000	40.000	0.000	Yes
7	GLONASS	62	66	45.000	48.000	0.000	Yes
10	GLONASS	71	202	48.000	42.000	0.000	Yes
9	GLONASS	51	31	44.000	37.000	0.000	Yes
11	GLONASS	16	207	37.000	35.000	0.000	Yes
8	GLONASS	39	336	42.000	43.000	0.000	Yes
6	GLONASS	21	118	42.000	37.000	0.000	Yes
14	BDS	51	322	47.000	46.000	0.000	Yes
9	BDS	70	331	45.000	46.000	0.000	Yes
10	BDS	44	226	43.000	43.000	0.000	Yes
1	BDS	48	146	43.000	45.000	0.000	Yes
2	BDS	32	239	37.000	41.000	0.000	Yes
3	BDS	50	199	41.000	45.000	0.000	Yes
4	BDS	34	123	39.000	41.000	0.000	Yes

- Satellite Track Diagram

The following figure is an example of satellite track diagram page. Users can determine the satellite types and the corresponding SNR of L-band carriers to be displayed in any combination.

- SkyPlot
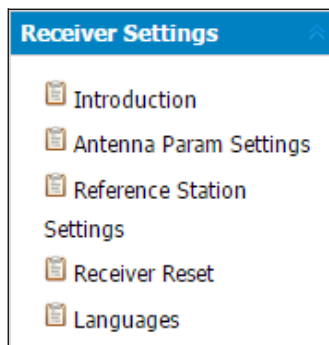
The following figure is an example of Skyplot page.
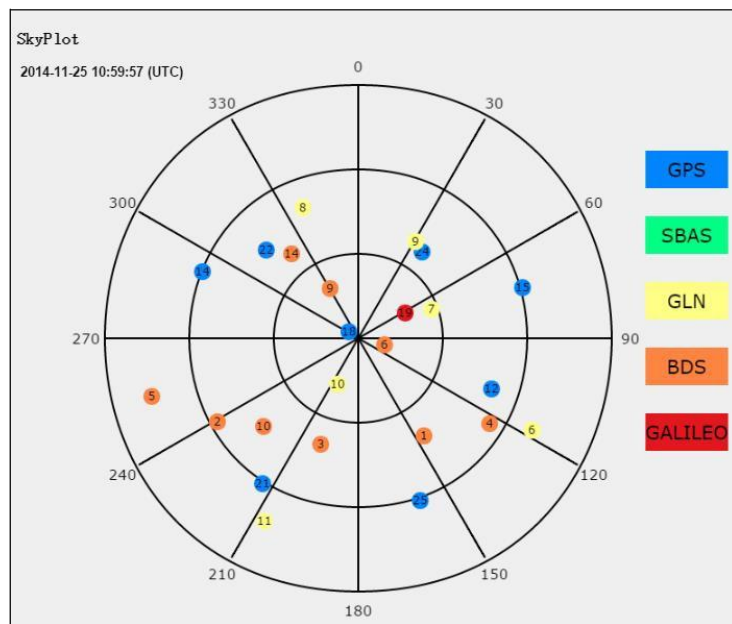
- Satellite Settings

In this submenu, users can enable/disable GPS constellations.

- Receiver Settings menu

Use this menu to configure settings such as the antenna type and height, elevation mask and PDOP setting, the   station coordinates, Receiver resetting and web interface language:

- Introduction

This submenu shows the Receiver information and   station information, including antenna related information, elevation mask angle,   station work mode and position, etc.

- Antenna Param Settings

Use this screen to configure all of the items relating to the GNSS antenna. You must enter the correct values for all antenna-related fields, as the choices you make significantly affect the accuracy for logged data

and broadcast RTK correctors:

Antenna Param Settings

Measure Method:	Antenna Phase Center
Antenna Type:	CHCA300GNSS
Antenna Height:	2.0000 (Meter)
Mask Angle:	13
PDOP Setting:	25

Save

- Station Settings

Use this screen to configure settings such as the station coordinates. You must enter accurate information in these fields, as this data significantly affects the accuracy of logged data files and broadcast RTK correctors.

Reference Station Settings

Reference Station Mode:	Auto Base
Reference Height:	53.372
Reference Latitude:	31 ° 9 ' 58.96214281 " ○ S ◉ N
Reference Longitude:	121 ° 17 ' 19.17883061 " ◉ E ○ W

Acquire Current Position

Sample for Average:
Positioning Limit: ◉ Single Solution Coordinates ○ Fixed Solution Coordinates
Sampling Amount: 300   ✓ Start ✗ Stop
0%

Save

For **Station Mode**:

There are three available options: Auto Rover, Auto Base and Manual Base.

- **Auto Rover**: The Receiver will serve as Rover after the restart.
- **Auto Base:** The Receiver will serve as Base after the restart, and then broadcast RTK correctors based on coordinates obtained through single-point positioning automatically.
- **Manual Base:** The Receiver will serve as Base after the restart, and then broadcast RTK correctors based on the coordinates before power off.

For **Latitude** and **Longitude**:

There are mainly three methods to enter the coordinates and shown as follows:

- **Acquire Current Position**: Click this button to acquire current position obtained through single-point positioning automatically.
- **Manual Input**: Manually input a known coordinates.
- **From CORS**: After logging in CORS, the Receiver will obtain a coordinates based on fix solution. (See 6.2.1.5. IO Settings menu for more details about logging in CORS.)

For **Sample for Average**:

Users can determine the positioning limit and sampling amount. The positioning limit falls into two types:

- **Single Solution Coordinates**: Collect the coordinates of Receiver obtained through single-point positioning.
- **Fixed Solution Coordinates**: Only collect coordinates of Receiver based on fix solution.

After the configuration of positioning limit and sampling amount, click ✓ Start to carry out sampling and averaging → the result will be served as the coordinates of current positon.

Also, users can click 🖫 Save to save the curent settings.

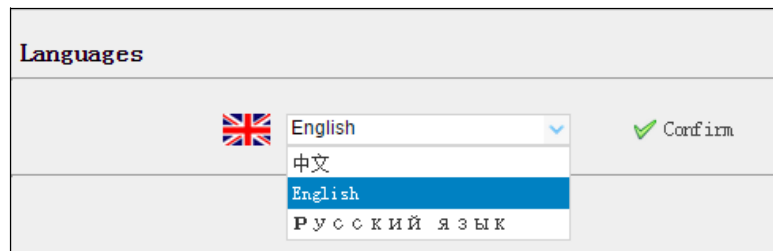- Receiver Reset

Use this screen to completely or partially reset the Receiver:

- Languages

Use this screen to select the web interface language:

Languages			
🇬🇧	English ▾		✔ Confirm
	中文		
	English		
	Русский язык		

- ## Data Recording menu

Use the Data Logging menu to set up the Receiver to log static GNSS data and to view the logging settings. You can configure settings such as observable rate, recording rate, continuous logging limit, and whether to auto delete old files if memory is low. This menu also provides the controls for the FTP push feature:

Data Recording

- 📋 Log Settings
- 📋 FTP Push Settings
- 📋 FTP Push Recording
- 📋 Data Download
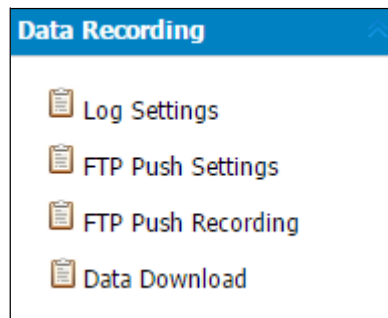
- Log Settings

Shows the data logging status, internal and external storage usage and data logging status of each storage thread. Also, users can configure the data logging settings for each storage thread, including recording name, saving location, storage limit, store formats, start time, etc.

To open or close all the storage threads, click the [**ON**] or [**OFF**] button to the right of Log Status field.

> **NOTE** – The [**ON**] and [**OFF**] button to the right of Log Status field are the **Master Log Switch**. Every storage thread can log data only when the **Master Log Switch** is **ON**. And users can edit the settings of storage threads only when the **Master Log Switch** is **OFF.**

To edit the settings of each storage thread, click the [**Modify**] button to the right of the required storage thread, and then the Recording Edit screen appears:
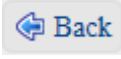
In this screen, you can set all data logging parameters, and determine whether the recording files will be affected by the FTP Push. The parameters are mainly as follows:

- **On or Off**: Select "Yes" or "No" to determine whether to log data when the **Master Log Switch** is ON.
- **Recording Name**: The name of this storage thread.
- **Sample Interval**: Select the observable rate from the dropdown list.
- **Store Location**: Determine whether to store at internal storage or external storage.
- **Start Time**: Set the start time of data log in UTC. Select "Yes" or "No" option below to determine whether to start logging from the set time.
- **Duration Time**: Set the time interval of recording.
- **Storage**: Set the storage limit of this thread.
- **Recycle Storage**: Select "Yes" or "No" to determine whether to auto delete old files if the storage space is full.
- **Storage Format**: The default format of recording files is HCN.
- **FTP Push**: Decide whether to push the stored files to the FTP server of your choice.

Click ![Save] to save the settings and back to the Log Settings screen. Also, users can click ![Back] to abandon the changed settings and back to Log Settings screen.

NOTE – to delete the record data, you can remove all the eight record data by the total button **clear all accounts**. Also you can delete each record data by **clear** button under the selected thread.

To delete the recorded files of **ANY** storage thread, click the [**Clear**] button to the right of the required storage thread.

To delete the recorded files of **ALL** storage threads, click [**Clear All Accounts**] button.

- FTP Push Settings

Use this screen to configure the Receiver to push stored files to the FTP server of your choice. Only files that are configured to use FTP push are transmitted. Click [**Modify**] button to the right of the required FTP server and the FTP Push Settings screen appears:

- FTP Push Recording

Shows the related information about the recorded filed that be pushed. And users can click [**Clear Ftp Send Log**] button in the upper right corner to clear the status of FTP Push operations.

- Data Download

In this submenu, users can download the data files that recorded in the internal storage through the internal FTP site.

5. Click this submenu, and then the log on dialogue box will prompt you to enter a user name and password:

The default logon account for the internal FTP site is:

5.1. User name: ftp

5.2. Password: ftp

6. Click the directory named as **repo** to view and download the files

currently stored on the Receiver:

FTP directory /mnt at 192.168.0.249

To view this FTP site in File Explorer: press Alt, click **View**, and then click **Open FTP Site in File Explorer**.

Up to higher level directory

```
01/01/1980 12:00AM          30,208  conf.tar
01/01/1980 12:00AM           6,144  log.tar
01/01/1980 12:00AM        Directory  repo
01/01/1980 12:00AM       1,833,936  update-used.tar
```

7. To find the file need to be downloaded, click the name of storage thread → the date of file that be recorded → the format of the file → the name of the target file.

FTP directory /mnt/repo/record_1/20141110/hcn/ at 192.168.0.249

To view this FTP site in File Explorer: press Alt, click **View**, and then click **Open FTP Site in File Explorer**.

Up to higher level directory

```
11/10/2014 01:50AM       2,022,286  000227313A0.HCN
11/10/2014 02:10AM       1,931,090  000227313A1.HCN
11/10/2014 02:30AM       2,027,918  000227313A2.HCN
11/10/2014 02:51AM       1,971,546  000227313A3.HCN
11/10/2014 03:11AM       2,064,760  000227313A4.HCN
11/10/2014 03:27AM         240,187  000227313A5.HCN
```

8. To download a file, left-click the name of the target file → download the file according to the prompts.

- IO Settings menu

Use the IO Settings menu to set up all Receiver outputs and inputs. The Receiver can output CMR, RTCM, Raw data, Ephemeris data, GPGGA, GPGSV, on TCP/IP, UDP, serial port, or Bluetooth ports.

- IO Settings

The following figure shows an example of the screen that appears when you select this submenu.

IO Settings

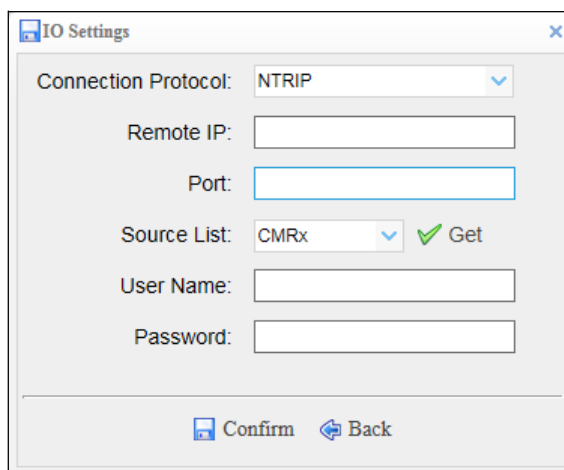|	Type	Introduction	Output	Connection Status	Modify
1	RTK Client	211.144.118.5:2102	---	Unconnected	Connect|Disconnect|Detail
2	TCP/UDP_Client1	192.168.0.249:5001	Raw Data:1Hz,	Unconnected	Connect|Disconnect|Detail
3	TCP/UDP_Client2	192.168.0.249:5002	Differential Data:SCMR	Unconnected	Connect|Disconnect|Detail
4	TCP/UDP_Client3	192.168.3.18:9902	---	Unconnected	Connect|Disconnect|Detail
5	TCP/UDP_Client4	192.168.3.18:9903	---	Unconnected	Connect|Disconnect|Detail
6	TCP/UDP_Client5	192.168.3.18:9904	---	Unconnected	Connect|Disconnect|Detail
7	TCP/UDP_Client6	192.168.3.18:9905	---	Unconnected	Connect|Disconnect|Detail
8	TCP/IP_Server1	9901	Raw Data:1Hz,Ephemeris Data:Auto,	Opened	Connect|Disconnect|Detail
9	TCP/IP_Server2	9601	Differential Data:RTCM3.0	Connected	Connect|Disconnect|Detail
10	TCP/IP_Server3	9972	Raw Data:1Hz,Ephemeris Data:Auto,GPGGA:1Hz,GPGSV:1Hz,	Opened	Connect|Disconnect|Detail
11	TCP/IP_Server4	9903	Raw Data:1Hz,Ephemeris Data:Auto,Differential Data:CMR	Closed	Connect|Disconnect|Detail
12	Com Port	9600	Ephemeris Data:Auto,GPGGA:1Hz,GPGSV:1Hz,	---	Settings
13	Com Port (COM2)	9600	Ephemeris Data:Auto,GPGGA:1Hz,GPGSV:1Hz,	---	Settings
14	Bluetooth	GNSS-R000227	---	---	Settings

In this submenu, users can configure 5 types of input and output settings.

1. RTK Client

After configuring the settings of RTK client, users can log on CORS or APIS. Click the [**Connect**] button to the right → the **IO Settings** screen will appear → choose one of the connection protocols among the NTRIP, APIS_BASE and APIS_ROVER → configure the related parameters → click ![Confirm] to log on CORS or APIS.

A. Connection Protocol: NTRIP

B. Connection Protocol: APIS_BASE
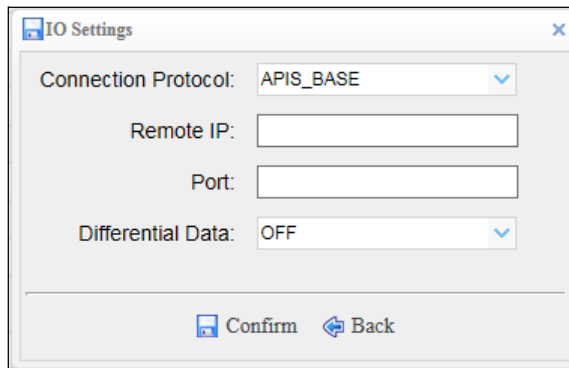
4   Connection Protocol: APIS_ROVER
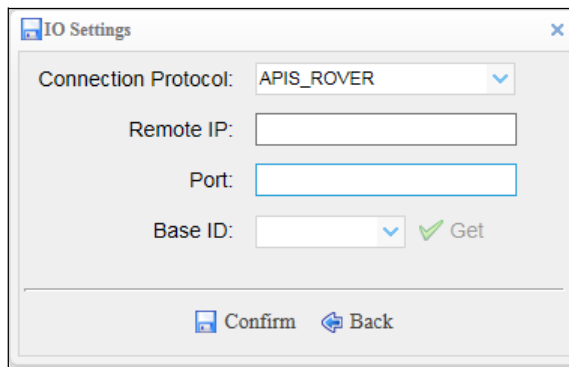
2.   TCP/UDP Client

Click the [**Connect**] button to the right of required TCP/UDP Client →
the **IO Settings** screen will appear → select the connection protocol
from the dropdown list → enter the IP and Port of the target server →
configure messages that you want to output to the target server → click

 to save and complete the connection.
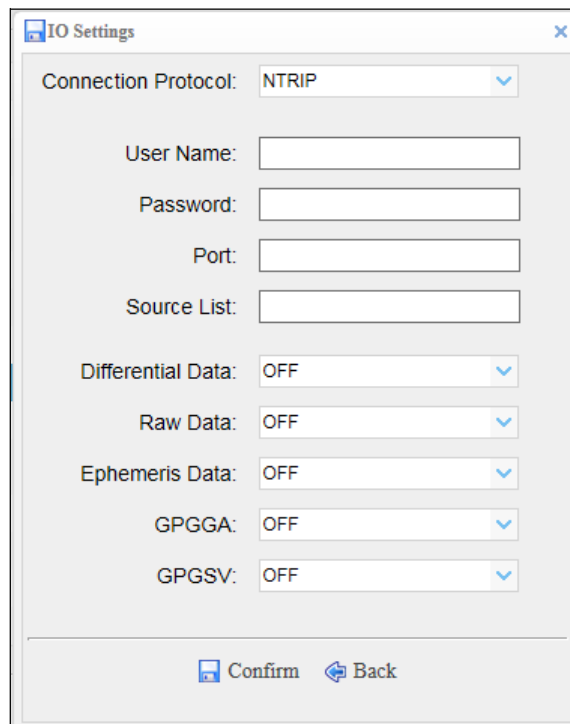
NOTE: If the Receiver and server are under the same Local Area Network (LAN), users can use the IP address in LAN of the server with any Port. However, if the Receiver and server are under the two different LAN, users should use the public IP address of the server and configure the port mapping of the server.
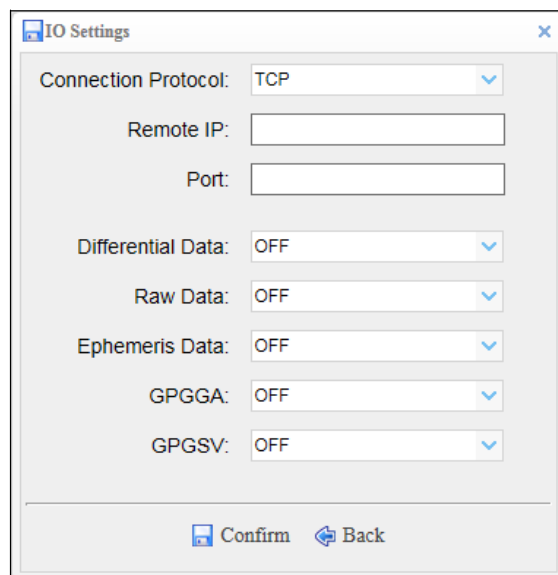
3. TCP/IP Server

Click the [**Connect**] button to the right of required TCP/IP Server →the **IO Settings** screen will appear → select one of the connection protocols between NTRIP and TCP → configure the other related parameters →

click ![Confirm] to save the settings and open the server.

    5   Connection Protocol: NTRIP

    6   Connection Protocol: TCP

4. COM Port

Click the [**Settings**] button to the right of required COM Port →the
Serial Port Setup screen will appear → select Baud Rate used to
transmit data→ configure the messages that you want to output

through the serial port → click [Confirm] to save the settings and
start to transmit.

5. Bluetooth

Click the [**Settings**] button to the right of Bluetooth → the **Bluetooth Set**
screen will appear → configure the messages that you want to transmit

through Bluetooth → click [Confirm] to save the settings and start
to transmit.
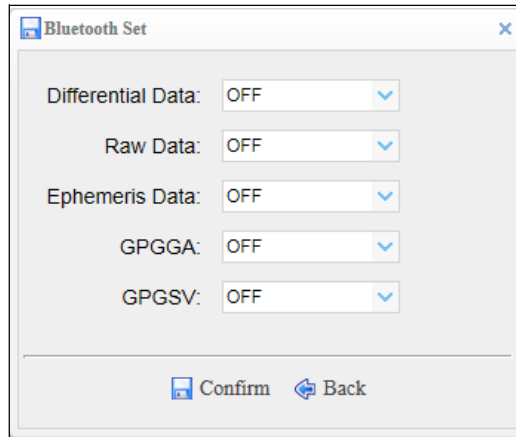
- **WAN menu**

Use this menu to check and configure the Ethernet settings.

- Network Info

The following figure shows an example of the screen that appears when you select this submenu:
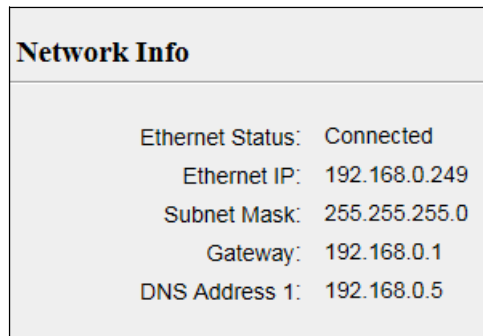
- Network Set

Use this submenu to configure the related parameters of the Network, including static IP, subnet mask, etc.
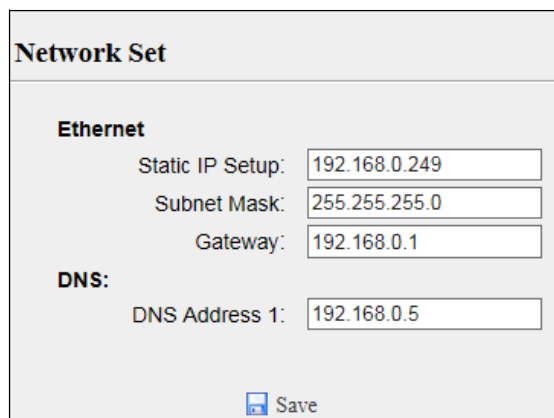
- **Wifi menu**

Use this menu to check and configure the Wifi settings.

- Wifi Info

The following figure shows an example of the screen that appears when you select this submenu:

Wifi Info

Power Status: ON
Wifi Mode: Access Point

Access Point Details
SSID: GNSS-R000227
Encrypt Type: WAP
Password: 12345678
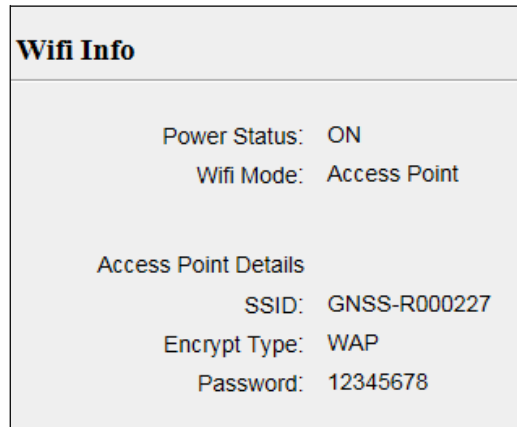
- Wifi Settings

Use this submenu to configure the related parameters of the Wi-Fi settings, including Wi-Fi mode, encrypt type, password, etc.

Wifi Settings

Power Status: ON ⊗ OFF

Auto Start: ⦿ Yes ○ No

Wifi Mode: Access Point ⌄

SSID: GNSS-R000227
Encrypt Type: WAP ⌄
Password: ••••••••

💾 Save
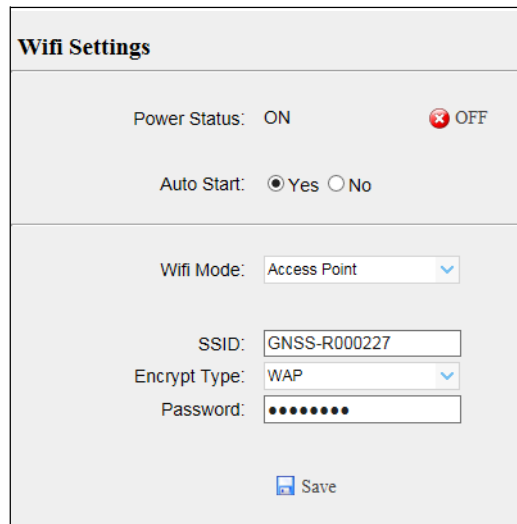
- **Bluetooth Set menu**

Use this menu to configure Bluetooth settings.

- Bluetooth Set

The following figure shows an example of the screen that appears when

you select this submenu:

Bluetooth Set

Local Name: GNSS-R000355
MAC Address: 00:17:E9:DE:95:3B

Visible: ⦿ Yes ○ No
PIN: 1234

💾 Save

• **Network Service menu**

Use this menu to configure the Receiver's HTTP port, and the username and password of internal FTP site.

• HTTP

HTTP

HTTP Port: 9600

💾 Save

• FTP Service

FTP Set

User Name: ftp
Password: •••

💾 Save

• **Firmware menu**

Use this menu to check the current firmware information, download the system log, update the Receiver firmware, download or update the configuration file and register the Receiver.

• Firmware Info

Use this submenu to check the current firmware information. The following figure shows an example of the firmware information.

Firmware Info

Firmware Type: 0.9.6
Firmware Release Time: 20141209_4212
Firmware Description: ......

- System Log

Use this submenu to download the system log of the Receiver.

System Log Download

System Log Type: Firmware Log

✔ Download

- Firmware Update

Use this submenu to load new firmware to the Receiver across the network. Click the [**Browse**] button to locate the upgrade file → click [**Confirm**] button to confirm the selected upgrading file and start upgrading.

Firmware Update

Upgrade File: Browse

Confirm

NOTE: It will take about 2 or 3 minutes to complete the firmware upgrading.

- Config File

In this submenu, users can download the configuration file by clicking
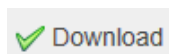
✔ Download button and determine a saving path to download the configuration file (.cfg file). Also, users can click the [**Browse**] button to locate the existing configuration file → click [**Confirm**] button to confirm the selected file and start updating.

Config File

Download Configuration File :   ✓ Download

Update Configuration File: [Browse]

[Confirm]

• GNSS Registration

Use this submenu to register the Receiver. Paste or enter the registration code to the **Registration Code** field → click [**Registration**] button to complete the registration.

GNSS Registration

Receiver ID: R000227
Registration Limit: 2015-5-31
Registration Code: 49422-12200-87242

🖫 Registration

– DEFAULT SETTING AND CONFIGURATION FILES

Most of the Receiver settings are stored in application files. The default application file, Default.cfg, is stored permanently in the Receiver, and contains the factory default settings for the X360 GIS Receiver.

Whenever the Receiver is reset to its factory defaults, the current settings (stored in the current configuration file, copy.cfg) are reset to the values in the default application file.

The X360 GIS Receiver extends the use of configuration files to allow simplified Receiver setting duplication in multiple Receivers. This is sometimes referred to as **Receiver cloning** and is very useful when preparing a large group of Receivers for a field data collection campaign.

- ## DEFAULT RECEIVER SETTINGS

Function		Factory default values
SV Enable		All SVs enabled
General controls	Elevation mask	0°
	PDOP mask	6°
Lemo port	Baud rate	9600
	Format	8-
	Flow control	None-
Log status		OFF
Differential data		OFF
Raw data		OFF
Ephemeris data		OFF
NMEA (GPGGA,		OFF
position	Latitud	0°0'0.00000000''
	e	0°0'0.00000000''
	Longit	0.000
Antenna	Type	CHC Helical GNSS
	Measure	Antenna 2.0000
	Method	(Meter)

- ## RESETTING THE RECEIVER TO FACTORY DEFAULTS

Log in the web page of the Receiver → tap and unfold the **Receiver Reset** menu → tap the **Receiver Reset** submenu →click the [✓ Confirm] button to the right of **Back to Default Setting** field.
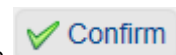
- USING CONFIGURATION FILES TO DUPLICATE RECEIVER SETTINGS

The X360 GIS   Receiver allows the extensive use of application files in order to retain a unique Receiver configuration. With this Receiver, you can create a configuration file that includes most of the Receiver's unique configuration settings. You can then update that configuration file onto one or more other X360 GIS   Receivers to quickly configure them to match the Receiver which creates that configuration file.

> NOTE: The configuration file includes most of the configuration settings except IP Address, IP Mask, Gateway and DNS Server.

This is called Receiver configuration cloning or cloning. Receiver cloning greatly reduces the time required to prepare a large group of Receivers for field operations.

Log in the web page of the Receiver → tap and unfold the **Firmware** menu → tap the **Config File** submenu → click the [**Browse**] button to locate the existing configuration file → click [**Confirm**] button to confirm the selected file and start updating.
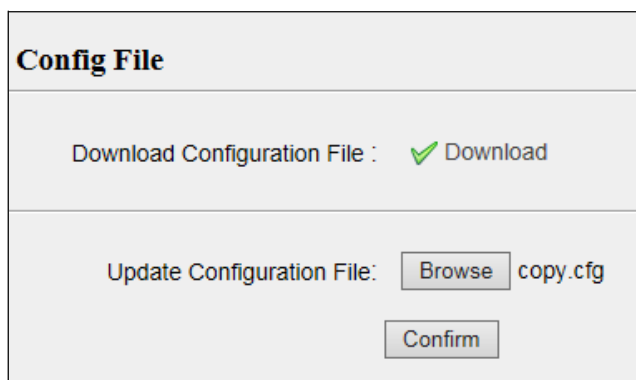
SPECIFICATIONS

This chapter describes the specifications for the X360 GIS Receiver.

Specifications are subject to change without notice.

• GNSS CHARACTERISTICS

Feature	Specification
Tracking	– 220 channels • GPS: L1 C/A, L2C, L2E, L5 – Pseudo-range measurement with high-precision multi-correlator – Very low noise carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
Real Time Kinematic (RTK)	Horizontal: 8 mm + 1 ppm RMS Vertical: 15 mm + 1
Post Processing Static	Horizontal: 2.5 mm + 0.5 ppm RMS Vertical: 5 mm + 0.5 ppm
Initialization time	Typically < 10 s
Initialization reliability	Typically > 99.9%

• COMMUNICATION

Feature	Specification
RJ45 Jack	Ethernet
DB9 male	3-wire RS232, see C.I. CHC X360 Receiver COM 1 (10-pin LEMO port) d
COM1 (10-pin LEMO port)	8-wire RS232, see C.II. CHC X360 Receiver COM 2 (10-pin LEMO port)
COM2 (10-pin LEMO port)	9-wire RS232, see C.III. CHC X360 Receiver db9 male connector definit
USB port	Type-A USB receptacle, operates in Host mode
Bluetooth	Fully integrated, fully sealed 2.4 GHz Bluetooth wireless technology
Protocols	Correction formats: CMR, CMR+, SCMR, RTCM2.3, 3.0 Observables: RT17, RT27, RTCM3.X Position/Status I/O: NMEA-0183 V2.30 (GPGGA & GPGSV)

- **PHYSICAL**

Feature	Specification
Size	110 x 81 x 52 mm
Weight	490g (17.28 oz)
Humidity	100% condensation
Waterproof and dust proof	Tested to IP65; waterproof for temporary immersion to a depth of 1 m (3.28 ft) for 30 minutes; dustproof
Shock	Designed to survive a 1.2 m (3.93 ft) drop onto concrete

- **ELECTRICAL**

Feature	Specification
Power consumption	2.5 W nominal, dependent on user settings
Internal	- Integrated internal battery 7.4 V, 4500 mA-hr, Lithium-ion - Internal battery can operate as a UPS in the event of external power source outage - Internal battery will charge from the external power source when the internal battery is not fully charged
External	- Power source supply (Internal / External) is hot swap capable in the event of power source removal or cut-off - Power input on Lemo ports is 12 V DC to 36 V DC external power input - Receiver will auto power on when connected to external power with voltage above 11 V
Operation time on internal battery	Up to 10 hours continuous operation, dependent on user setting

- **GENERAL**

Feature	Specification
Receiver type	GIS Receiver
Antenna type	- CHC A220GR GNSS Geodetic antenna or CHC C220GR GNSS Choke Ring antenna preferred. - Other models supported.

- **DATA STORAGE**

Feature	Specification
Internal storage	16 GB
External storage	Supporting USB drive or portable hard drive
Storage method	8-thread logging, circulating data logging
Data format	HCN, RINEX, original binary data
Data download	FTP push, online download, storage on an external USB devices

1. UPGRADING THE RECEIVER FIRMWARE

The Receiver is supplied with the latest version of the Receiver firmware already installed. If a later version of the firmware becomes available, use the USB device to upgrade the firmware on your Receiver. For the latest firmware resource, please consult your local CHC dealer.

You can also upgrade the Receiver through the web interface. The firmware file required to upgrade the Receiver through the Web interface is located in the folder where the user saves the file. The file type required is the format update_X360_e_vXXXXX_bYYYYMMDD.bin where XXXXX represents the version of firmware and YYYYMMDD represents the firmware encapsulation date.

1.1. THE WINFLASH UTILITY

The WinFlash utility communicates with CHC products to perform various functions including:

A. load or verify GPS software of the mainboard
B. update or verify the Receiver options

For more information, online help is also available when using the WinFlash utility.

1.1.1. INSTALLING THE WINFLASH UTILITY

You can download the WinFlash utility from the Trimble website. This self-extracting executable guides you through the software installation process.

1.2. UPGRADING THE RECEIVER FIRMWARE

1.2.1. UPGRADING THROUGH USB PORT

1. Copy the firmware file to the root directory of external storage device such as USB drive, portable hard drive.
2. Connect the external storage device with Receiver through USB port.
3. Restart the Receiver and then the screen will prompt you whether to upgrade the firmware.
4. Press **OK** button to upgrade the firmware.
5. When the upgrading is completed, the Receiver will be restarted and the screen will prompt you whether to upgrade the firmware again.
6. Press one of the arrow keys to quit the upgrading and then remove the external storage device.

1.2.2. UPGRADING THROUGH A BROWSER

Please connect to the Receiver through a web browser according to **6.2. Configuring through a web browser**, and then refer to **6.2.1.10 Firmware menu** → **Firmware Update** for detail operation steps.

> **NOTE**: After the Receiver firmware upgrading, the IP information may be changed. Please confirm the IP setting of the Receiver before using it.

– TROUBLESHOOTING

Use this appendix to identify and solve common problems that may occur during the use of the Receiver.

Please read this section before you contact CHC Technical Support.

• **RECEIVER** ISSUES

This section describes some possible Receiver issues, possible causes, and how to solve them.

Issue	Possible cause	Solution
The Receiver does not turn	External power is too low.	Check the charge on the external battery and, if applicable, check the fuse.
	Internal power is too low.	Check the charge on the internal battery.
	External power is not properly connected.	Check that the Lemo connector is seated correctly and that the cable is secured to the Receiver. Check for broken or bent pins in the connector.
	Faulty power cable.	Check that you are using the correct cable for the connection between Lemo port and external power supply. Check that the correct external power supply is connected to a particular Lemo port. Check pinouts with a multimeter to ensure internal wiring is intact.
Receiver does not log data.	The Receiver is tracking fewer than four satellites.	Wait until the Receiver display shows that more than four satellites are being tracked.
The Receiver is not	Receiver needs a soft reset.	Turn off the Receiver and then turn it back on again.
The stati onReceiver	Port settings between Receiver and radio are	Check the port settings for the Receiver by using the Web interface. Check that the radio ports are correctly set up.
	Faulty cable between Receiver and radio.	Try a different cable. Examine the ports for missing pins. Use a multimeter to check pinouts.
	No power to radio.	If the radio has its own power supply, check the charge and connections.
The Receiver is not receiving satellite signals	The GNSS antenna cable is loose.	Make sure that the GNSS antenna cable is tightly seated in the antenna connector on the GNSS antenna.
	The cable is damaged.	Check the cable for any signs of damage. A damaged cable can inhibit signal detection from the antenna at the

	The GNSS antenna is not in clear line of sight to the sky.	Make sure that the GNSS antenna is located with a clear view of the sky.
		Restart the Receiver as a last resort (turn off and then turn it on again).

- **COMMUNICATION PORTS DEFINITION**

CHC X360 Receiver DB9 MALE CONNECTOR DEFINITION
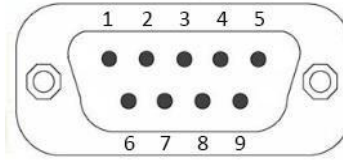
PI	Signal	Description
1	Not Used	
2	TXD	RS232-TX (transmit data through this pin)
3	RXD	RS232-RX (receive data through this pin)
4	Not Used	
5	GND	External Power Ground
6	Not Used	
7	Not Used	
8	Not Used	
9	Not Used	

- ## GLOSSARY

base station	Also called station. A base station in construction, is a Receiver placed at a known point on a jobsite that tracks the same satellites as an RTK rover, and provides a real-time differential correction message stream through radio to the rover, to obtain centimeter level positions on a continuous real-time basis. A base station can also be a part of a virtual station network, or a location at which GPS observations are collected over a period of time, for subsequent postprocessing to obtain the most accurate position for the
carrier	A radio wave having at least one characteristic (such as frequency, amplitude, or phase) that can be varied from a known value by modulation.
carrier frequency	The frequency of the unmodulated fundamental output of a radio transmitter. The GPS L1 carrier frequency is 1575.42 MHz.
carrier phase	The time taken for the L1 or L2 carrier signal generated by the satellite to reach the GPS Receiver. Measuring the number of carrier waves between the satellite and Receiver is a very accurate method of calculating the distance
C	Compact Measurement Record. A real-time message format developed by
M	Trimble for broadcasting corrections to other Trimble mainboard Receivers.
R	CMR is a more efficient alternative to RTCM.
DGPS	See real-time differential GPS.
differen	Differential correction is the process of correcting GPS data collected on a
tial	rover with data collected simultaneously at a base station. Because the base
correcti	station is on a known location, any errors in data collected at the base
on	station can be measured, and the necessary corrections applied to the rover data.
	Differential correction can be done in real-time, or after the data has
Differential GPS	See real-time differential GPS.
DOP	Dilution of Precision. A measure of the quality of GPS positions, based on the geometry of the satellites used to compute the positions. When satellites are widely spaced relative to each other, the DOP value is lower, and position accuracy is greater. When satellites are close together in the sky, the DOP is higher and GPS positions may contain a greater level of error.
	PDOP (Position DOP) indicates the three-dimensional geometry of the satellites. Other DOP values include HDOP (Horizontal DOP) and VDOP (Vertical DOP), which indicate the accuracy of horizontal measurements (latitude and longitude) and vertical measurements respectively. PDOP is related to HDOP and VDOP as follows:
	$PDOP^2 = HDOP^2 + VDOP^2$
dual-	A type of Receiver that uses both L1 and L2 signals from GPS satellites. A
frequency	dual-frequency Receiver can compute more precise position fixes over
GPS	longer distances and under more adverse conditions because it compensates for ionospheric delays.
elevation mask	The angle below which the Receiver will not track satellites. Normally set to 10 degrees to avoid interference problems caused by buildings and trees, and multipath errors.

ephemeris / ephemerides	A list of predicted (accurate) positions or locations of satellites as a function of time. A set of numerical parameters that can be used to determine a satellite's position. Available as broadcast ephemeris or as postprocessed precise ephemeris.
epoch	The measurement interval of a GPS Receiver. The epoch varies according to the measurement type: for real-time measurement it is set at one second; for postprocessed measurement it can be set to a rate of between one second and one minute. For example, if data is measured every 15 seconds, loading data using 30-second epochs means loading every alternate measurement.
firmware	The program inside the Receiver that controls Receiver operations and
GNSS	Global Navigation Satellite System.
GSOF	General Serial Output Format. A Trimble proprietary message format.
HDOP	Horizontal Dilution of Precision. HDOP is a DOP value that indicates the accuracy of horizontal measurements. Other DOP values include VDOP (vertical DOP) and PDOP (Position DOP). Using a maximum HDOP is ideal for situations where vertical precision is not particularly important, and your position yield would be decreased by the vertical component of the PDOP (for example, if you are collecting data under
L1	The primary L-band carrier used by GPS satellites to transmit satellite data.
L2	The secondary L-band carrier used by GPS satellites to transmit satellite data.
L5	The third L-band carrier used by GPS satellites to transmit satellite data. L5 will provide a higher power level than the other carriers. As a result, acquiring and tracking weak signals will be easier.
multi-frequency	A type of Receiver that uses multiple carrier phase measurements (L1, L2, and L5) from different satellite frequencies.
multipath	Interference, similar to ghosts on a television screen that occurs when GPS signals arrive at an antenna having traversed different paths. The signal traversing the longer path yields a larger pseudorange estimate and increases the error. Multiple paths can arise from reflections off the ground or off
NMEA	National Marine Electronics Association. NMEA 0183 defines the standard for interfacing marine electronic navigational devices. This standard defines a number of 'strings' referred to as NMEA strings that contain navigational details such as positions. Most CHC GPS Receivers can output positions as NMEA
PDOP	Position Dilution of Precision. PDOP is a DOP value that indicates the accuracy of

	three-dimensional measurements. Other DOP values include VDOP (vertical DOP) and HDOP (Horizontal Dilution of Precision).
	Using a maximum PDOP value is ideal for situations where both vertical and horizontal precision are important.
postprocessing	Postprocessing is the processing of satellite data after it has been collected, in order to eliminate error. This involves using computer software to compare data from the rover with data collected at the base station.
real-time differen tial GPS	Also known as *real-time differential correction* or *DGPS*. Real-time differential GPS is the process of correcting GPS data as you collect it. Corrections are calculated at a base station and then sent to the Receiver through a radio link. As the rover receives the position it applies the corrections to give you a very accurate position in the field.
	Most real-time differential correction methods apply corrections to code phase positions. RTK uses carrier phase measurements.
	While DGPS is a generic term, its common interpretation is that it entails the use of single-frequency code phase data sent from a GPS base station to a rover GPS Receiver to provide sub-meter position accuracy. The rover Receiver can be at a long range (greater than 100 km (62 miles)) from the
station	See base station
rover	A rover is any mobile GPS Receiver that is used to collect or update data in the field, typically at an unknown location.
RTCM	Radio Technical Commission for Maritime Services. A commission established to define a differential data link for the real-time differential correction of roving GPS Receivers. There are three versions of RTCM correction messages. All CHC GPS Receivers use Version 2 protocol for single-frequency DGPS type corrections.
	Carrier phase corrections are available on Version 2, or on the newer Version 3 RTCM protocol, which is available on certain CHC dual-frequency Receivers. The Version 3 RTCM protocol is more compact but is not as
RTK	Real-time kinematic. A real-time differential GPS method that uses carrier phase measurements for greater accuracy.
signal-to- noise ratio	SNR. The signal strength of a satellite is a measure of the information content of the signal, relative to the signal's noise. The typical SNR of a satellite at 30° elevation is between 47 and 50 dBHz. The quality of a GPS position is degraded if the SNR of one or more satellites in the constellation falls below
skyplot	The satellite skyplot confirms reception of a differentially corrected GPS signal and displays the number of satellites tracked by the GPS Receiver, as well as their relative positions.
SNR	See signal-to-noise ratio
UTC	Universal Time Coordinated. A time standard based on local solar mean time at the Greenwich meridian.
VRS	Virtual Station. A VRS system consists of GNSS hardware, software, and

communication links. It uses data from a network of   stations to provide corrections to each rover that are more accurate than corrections from a single base station.

To start using VRS corrections, the rover sends its position to the VRS server. The VRS server uses the   station data to model systematic errors (such as ionospheric noise) at the rover position. It then sends RTCM or CMR correction messages back to the rover.

Battery Charging:

Please use the applicable adapter with the required specifications to charge the X360 GIS Receiver.

Please plug in the adapter and connect the DC port to X360 GIS Receiver.

Specifications of the adaptor:

input 100~240V, 50/60Hz, 2.0A

Output 12V. 1.5A

GIS Receiver placed in the fixed outdoor use, will not carry.

FCC Statement

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. 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.

The distance between user and products should be no less than 20cm