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Chapter I Getting Started

Read this chapter, you will have a brief knowledge of South Company and Insight V2 measurement system.

1.1 Introduction

Welcome to South Surveying&Mapping Instruments Co., Ltd, which is China's leading manufacturer of surveying equipment including GNSS receivers and Total Stations. To know more about SOUTH, please visit our official website <u>http://www.southinstrument.com/</u>

This manual takes Insight V2 measuring system for example, to explain how to install, set up and uses the RTK system as well as the use of the accessories. We recommend that you read these instructions carefully before using the instrument.

1.2 Hardware Components

The overall appearance of Insight V2 is round and flat, with a height of 80mm and a diameter of 131mm. It looks elegant, strong and durable. And it adopts a combination design of voice and buttons, easier to operate. The bottom of the receiver has commonly used interfaces.

1.2.1 Front Components



Insight V2

Insight	t V2	SOUTH
Ref	Component	Description
1	Power Button	Power on/off receiver; Switch and confirm working mode; Perform self-check operation.
2	Bluetooth Indicator	Glows in blue to indicate that Bluetooth connection has established between controller and receiver.
3	Data Indicator	 Glows in orange while the receiver is being powered on, after finishing the initialization, it turns into red flashing once, then off. Flashes in red to indicate that the signal is transmitting with the interval in Base mode. Flashes in red to indicate that there is coming the differential data but the receiver doesn't achieve a fixed solution while in Rover mode. Flashes in green to indicate that there is coming the differential data and the receiver does achieve a fixed solution while in Rover mode.

1.2.2 Rear Components



Ref	Component	Description						
	NEC label	Realizing	Bluetooth	close	range	automatic	pair	between
(I)	INF C label	receiver an	receiver and controller with NFC					

1.2.3 Bottom Components



Ref	Component	Description
1	Battery indicator	Checks the battery life in real-time.
2	SN label Apply for a registration code, Bluetooth ID.	
3	Camera	Provides real-time live image for stakeout target.
4	Speaker	Mode setting and working status prompt.
5	USB	1.Use Type-C interface, support access the WebUI interface and the static data transmission of the receiver at the same time.2.Battery charging port.
6	UHF antenna interface	Installs UHF antenna.

1.3 Hardware Operation

1.3.1 Power on/off

Power on

Press the power button for a few seconds, while glowing the Bluetooth indicator (blue) and data indicator (orange) accompany with one beep, after a few seconds (around 10 seconds), the instrument completes initializing along with voice prompt about the working mode (for example, "Rover, Bluetooth mode").



Power off

Press the power button and hold for a while, after 3 beeps and the "Power off" voice prompt at the third beeping, release power button, the instrument will switch off.

1.3.2 Check working mode

Press the power button for once in the state of power-on, the instrument will prompt with voice message about current working mode (for example, "Rover, internal radio mode"), and display the battery life at the bottom of receiver at the same time.



1.3.3 Working mode settings

Rover

Press and hold the power button for about 5 seconds and pass over the state of power off (do not release the button even the instrument says power off), then Insight V2 will say "start to set work mode", at this moment, release power button, the working mode will be repeated from Rover to Static on control panel. When the **Bluetooth indicator** glows in **Blue** accompany with "Rover" voice message, press the power button to confirm.



Base

Press and hold the power button for about 5 seconds and pass over the state of power off (do not release the button even the instrument says power off), then Insight V2 will say "start to set work mode", at this moment, release power button, the working mode will be repeated from Rover to Static on control panel. When the **data indicator** glows in **Red** accompany with "Base" voice message, press the power button to confirm.



Static

Press and hold the power button for about 5 seconds and pass over the state of power off (do not release the button even the instrument says power off), then Insight V2 will say "start to set work mode", at this moment, release power button, the working mode will be repeated from Rover to Static on control panel. When the **power indicator** glows in **Red** accompany with "Static" voice message, press the power button to confirm.



After that, press the power button for once to make sure if the working mode is correctly setup.

Note: Insight V2 only supports the working mode selected by control panel, without datalink settings.

1.3.4 Self-check

Self-check is an useful operation to simply check the main hardware components if the instrument is abnormal or not working properly.

Press and hold the power button for about 10 seconds and pass over the state of power off and mode selection (do not release the button even the instrument says power off and start to set work mode), then Insight V2 will say "start to self-check", at this moment, release power button, the instrument will perform self-check automatically for the modules one by one. The sequence of modules checking is:

- OEM board checking
- UHF module checking
- Sensors checking
- WiFi module checking
- Bluetooth module checking



If all the modules are normal during self-check, the instrument will get into the state of power-on.



1.3.5 Restore factory default

Press and hold the power button for about 20 seconds and pass over the foregoing states (power off, mode selection, self-check), Insight V2 will get into factory reset progress with voice message saying "start to restore factory default", at this moment, release power button, all the indicators glows and the instrument is performing the factory reset automatically. After this progress complete, the instrument will restart automatically with the factory default settings.



1.3.6 Charging

If V2 is in low battery, please connect USB cable to adapter and plug to 220V power socket for battery charging, the battery indicators display in red while battery is being charged, when green indicators light up means the battery is full charged.





Chapter II Web UI Operation

2.1 Web UI Login

Because of using the smart embedded Linux operating system and SOUTH intelligent cloud technology, the web UI allows users to configure and monitor the status of Insight V2 in real-time. The accessing way is not only by WiFi connection, but also can be USB mode.

2.1.1 Accessing by WiFi

The WiFi hotspot is default broadcasted by Insight V2, search the WiFi hotspot which named with SOUTH_xxxx using smartphone, tablet or laptop, then establish the WiFi connection, input the **default IP** (10.1.1.1) into broswer, on the login interface, apply "admin" for the username and password.

For example, search the WiFi hotspot broadcasted by a Insight V2 receiver using a laptop PC, choose the WiFi hotspot and click on connect button to establish the connection without password.



Run broswer on computer and input the default IP (10.1.1.1) into address bar, after a while, the system login interface is refreshed, then apply "admin" for username and password to login.

Insight V2	SÕUTH
● login × + ← → C ▲ 不安全 10.1.1.1	 → □ × → 必 ☆ □ ▲ :
IP Address: 10.1.1.1	Language : English v
	GNSS Web Server

2.1.2 Accessing by USB

The Type-C USB port of Insight V2 can work as an Ethernet port and normal USB port simultaneously, then user no more needs to swtich the USB mode, as long as connect the USB cable to computer, web interface login and internal memory of V2 are available.

First of all, a corresponding driver is required to install to the computer, then this function could be activated.

Due to different operating system is installed on computer, the drivers should be applied to a suitable one. The file bugvista64.inf is applied to 64bit operating system, and linux.inf is for 32bit operating system.

	[作 (E:) ▶ RTK ▶ Galaxy G6 ▶ G6网口驱动	- 4	➔ Search G6网口题	्रि वि	<u>م</u>
File Edit View Tools Help					
Organize 🔻 Include in library	✓ Share with ▼ New folder			•	?
▲ ☆ Favorites ■ Desktop ■ Desktop ■ Downloads ■ Recent Places ■ Documents ■ Documents ■ Nusic ■ Pictures ■ Videos ■ Videos ■ Videos ■ Difference ■ Computer ■ Computer ■ Computer ■ Libraries	Name bugvista64.inf	Date modified 2016/3/15 15:23 2015/10/19 15:24	Type Setup Information Setup Information	Size 3 KB 7 KB	_
 DRIVERS Intel PerfLogs 					
2 items					

Choose the folder which contains the drivers





If the driver has been successfully installed, the USB port of Insight V2 will be recognized as **Linux USB Ethernet/RNDIS Gadget**, and a local area connection will generate in **Network Connections** on the computer. For example, Local Area Connection 138 generates after connecting Insight V2 receiver to computer via USB network interface.



However, sometimes the computer cannot detect the receiver by USB network interface because there is something wrong with acquiring IP automatically, therefore, we need to do something to avoid such problem, that is to set a fixed LAN IP for the connection:

Right click on the local area connection which newly generates, choose properties to call out the local area connection properties window.



Then double click on Internet Protocol Version 4 (TCP/IPv4) option or click on properties button to call out Internet Protocol Version 4 (TCP/IPv4) properties window, set the fixed LAN IP address as shown in following, then click OK button and confirm the settings, return to the IE browser and use the IP address 192.168.155.155 to access the internal web UI.

Local Area Connection 138 Properties	Internet Protocol Version 4 (TCP/IPv4) Properties
Networking Sharing	General
Connect using:	You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Configure	Obtain an IP address automatically
This connection uses the following items:	O Use the following IP address:
	IP address: 192 . 168 . 155 . 100
☑ ➡ File and Printer Sharing for Microsoft Networks	Subnet mask: 255 . 255 . 255 . 0
Internet Protocol Version 5 ((CP/IPv5) Internet Protocol Version 4 (TCP/IPv4)	Default gateway: 192 . 168 . 155 . 1
Link-Layer Topology Discovery Mapper 1/0 Driver	Obtain DNS server address automatically
	OUse the following DNS server addresses:
Install Uninstall Properties	Preferred DNS server:
Description Transmission Control Protocol/Internet Protocol. The default	Alternate DNS server:
wide area network protocol that provides communication across diverse interconnected networks.	Validate settings upon exit Advanced
OK Cancel	OK Cancel

Run broswer on computer and input the default IP (192.168.155.155) into address bar, after a while, the system login interface is refreshed, then apply "admin" for username and password to login.

Insight V2		SOUTH
 login x + ↔ C ④ 192.168.155.155 IP Address: 192.168.155.155 		✓ - □ × I ▲ : Language: English ✓
	GNSS Web Server	Username: admin Password: admin

2.2 Web UI Main Interface

After login the Web UI management of Insight V2 by WiFi or USB connection, the main interface appears with displaying configuration items and positioning. As shown at following figures.

admin 1318 SF61D3148671318 [logout]	> Position Information			Â
Statuc -	Location:			
	Lat: 0°0′0.000000"S	Lon: 0°0′0.000000"W	Alt: 0.000000m	Ellipsoid: WGS-84
Configuration <u>+</u>				
🚿 Satellite Information 🛛 🕂	X: 0.000000	Y: 0.000000	Z: 0.000000	
🛅 🛛 Data Record 🔒 🕂	RTK Status:			
	Solution: Invalid	CorrectionDelay: 0	HRMS: 1414212	VRMS: 9999999.
Network Confin	base X: 0.000000	base Y: 0.000000	base Z: 0.000000	base ID: 0
INetwork Config +	DiffFormat: NONE			
📱 🛛 Radio Config 🗧 🕂	SLink:			
🗈 Firmware Update 🕂	SN: None		TrackingTime: 0	
🛅 Track Manage 🕂	Azimuth: 0.00		Elevation: 0.00	
Coordinate System +	SNR: 0.00		Solution: 0	
🗘 Online Service 🕂	Tracked Satellite(1):			
🐉 User Management 🛛 🕂	GPS(0): None		GLONASS(0): None	
🐉 Frequency Spread 🕂	BDS(1): 38		GALILEO(0): None	
🛅 System Log 🕂	SBAS(0): None		QZSS(0): None	
	IRNSS(0): None			

In the Web UI home page, the configuration items are listed at left side. And the positioning information including coordinates information and satellites are diplayed at right side.

Ref	Component	Description
	Status	Positioning information, satellite tracking and the others will be displayed in this page
×	Configuration	It contains registration for receiver, base configuration, antenna configuration, satellite configuration, receiver configuration and system configuration.
ж	Satellite Information	Display and control the satellites are used or not
11	Data Record	Configure the parameters for static mode and raw data download
묘	Data Transfer	Contains NTRIP configuration, TCP/IP configuration and data transferring with PC
\oplus	Network Config	Contains network parameters configuration, WIFI configuration and the other functions
1	Radio Config	Configure the parameters and frequency for radio modem
£	Firmware Update	It is used to upgrade the firmware for receiver and each modem
<u></u>	Track Manage	Record track file while doing measurement
\oplus	Coordinate System	Setup a local coordinate system for Insight V2
€	Online Service	Upload data onto a server in real-time
ð;	User Management	Add and manage the Web UI users
ð;	Frequency Spread	Reserves to check the frequency status of satellites
11	System Log	Record data log files for problem analysis.

2.2.1 System Information

In this page, all the information of Insight V2 is diplayed such as serial number, hardware ID, MAC address, firmware version and so on.

Insight V2

admin SF61D31	48671318	1318 [logout]	> System Inform	nation
	Status		Model:	InsightV2
System	n Informatio	n 🗖	Serial Number:	SF61D3148671318
Wo	ork Status		Hardware ID:	NNN0EY0N0N10008003135G048F61
Positio	n Informatic	n 🗖	Software ID:	210011000000000
* Cor	figuration		Ethernet MAC:	00:00:00:00:00
	ingulation		Ethernet IP:	192.168.1.1
🚿 Satellit	e Informatio	on 🕂	WiFi IP:	10.1.1.1
Da Da	ta Record	H	Bluetooth MAC:	90:CD:1F:58:CF:64
	taTransfer	E	Hardware Version:	0
			Firmware Version:	1.09.230323.RF61PY
⊕ Netv	vork Config	÷	OEM Version:	610T5-22AO2-1
😨 Rac	dio Config	H	Web Version:	1.09.230313.RG60WEB
🛨 Firmv	ware Update	H	Expire :	20231030
Trac	k Manage	÷		

2.2.2 Work Status

The physical state of Insight V2 such as working mode, datalink, host temperature, remaining power and the free memory is obtained from this page

admin 1318 SF61D3148671318 [logout]	> Work Status	
🖵 Status 🧧	Work Mode: Rover	
System Information	Datalink: None	
Work Status	Host Temperature: 43.00 °C	
Position Information	OEM Temperature: N/A	
* Configuration +	Power Type: Internal Battery	
	ExtPower Voltage: 0.00 V	
🚿 Satellite Information 🕂	BatteryVoltage: 7.53 V	
🛅 🛛 Data Record 🛛 🛨	Storage Type: Internal Memory	
💂 DataTransfer 🕂	Battery Remaining	Disk Capacity
Metwork Config	Battery Remaining65%	0M Used60M Free4024.00M
🔋 Radio Config 🕂		
🚖 Firmware Update 🕂		
🛅 🛛 Track Manage 🕂		
Coordinate System +		

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2.3 Receiver Registration

If the code of Insight V2 has expired or is going to be run out, please provide the serial number of your Insight V2 to us, then we will apply for another available code for you, when you get the code, enter the code into the code box, then click "Register" button to complete the registration.

admin SF61D3148671318	1318 [logout]	> General Config		Î
🖵 Status		Register:		
X Configuration		Serial Number:	SF61D3148671318	
General Config		Code:	FE16BF5BB94E5B22AFDF154485E24EF7C85	Register
Base Setup	=	ExpiredDate:	20231030	
Antenna Setup	=	OnlineRegistration:	OnlineRegi	
Satellite Tracking	, =	OEMRegisterCode	0	Register
Receiver Operation	on 🖃			rogistor
System Setup	=			

2.4 Receiver Operation

2.4.1 Self-check

Self-check operation not only can be executed on control panel of receiver, but also on web interface. We can execute self-check operation to check the main hardware components if the instrument is abnormal or doesn't work properly.

Users can also do the self-check from this configuration page, click on the "Check all" button to check all the modems or click on the check button corresponding to the modem to check one by one.

admin 1318 SF61D3148671318 [logou	t] > Receive	er Operation		
🖵 Status 🕇	Module S	Self-check:		
X Configuration	Item	Module	Operation	Status
General Config	1	OEM	Check	SelfCheck Success
Base Setup	2	Radio	Check	Checking
Antenna Setup – Satellite Tracking –	3	NetModule	Check	N/A
Receiver Operation	4	WiFi	Check	Checking
System Setup	5	Bluetooth	Check	Checking
★ Satellite Information +	6	Sensor	Check	Checking
🛅 Data Record 🕂	7	EEPROM	Check	Checking
🛃 DataTransfer 🕂			Chec	kall
			Chec	

2.4.2 Restore factory default

Login web interface and go to "Receiver Operate" page, we can execute factory default to restore the factory default settings for receiver.

We also can execute "Clean EPH", "Reboot", "Power Off" operations at this page.

Default Settings: (Caution:This operation will reset all parameters!))							
Restore Default :	Clean EPH Ethernet IP: 192.168.1.1 WiFi mode: AP WiFi SSID: galaxy	Facto Subnet Mask: 255.255.255.0 WiFi IP: 10.1.1.1 WiFi Code: None	ry Default Default Gateway: 192.168.1.1 Web port: 80 User and Password: admin				
Power Off:							
	Reboot		Power Off				

2.5 Receiver System Settings

2.5.1 Voice setting

Enable or disable voice prompt at this page, and adjust the voice volume to "Low", "Medium" or "Lound" as you want. Don't forget to click "Enter" button to apply the new settings.

admin SF61D3148671318	1318 [logout]	Voice:		
Status	•	OEMUserDefEnable:	Yes 💿 No	
X Configuration		RTKEngine:	Yes 💿 No	
General Config	=	Volume:	Medium	~
Base Setup		Power Mode:	Normal	~
Antenna Setup		USB:		~
Receiver Operation		Default Language :	English	~
System Setup		Time Zone(h):	+8.0(Beijing China)	~
Receiver Security		FixedMode:	Narrow	~
🚿 Satellite Information	ו 🛨	NmeaHeader:	GN	~
Data Record	Đ	SelfDefine Module:	NULL	~
🗟 DataTransfer	÷	Authority Zone:	Global-20991215	
Over the second seco	+	RTXSatellite:	Auto	~
Radio Config	÷	Satellite System:	All	
Æ Firmware Update		Satellite System.		•
		Satellite System:	Disable	~

2.5.2 Language setting

Configure the default language for Insight V2 which associates with voice guide, after selecting the language, click "Enter" button to save the new settings.

admin SF61D3148671318	1318 [logout]	Voice:		
Status		OEMUserDefEnable :	Yes 💿 No	
X Configuration		RTKEngine:	Yes 💿 No	
General Config	Ξ	Volume:	Medium 🗸	
Base Setup	=	Power Mode:	Normal 🗸	
Antenna Setup Satellite Tracking		USB:	~	
- Receiver Operation		Default Language:	English	
System Setup		Time Zone(h):	Chinese English Russian	
Receiver Security		FixedMode:	Turkish	
🚿 Satellite Informatio	n 🚹	NmeaHeader:	Korean French	
Data Record	+	SelfDefine Module:	Portuguese Italian	
	•	Authority Zone:	Global-20991215	
One Wetwork Config	-	RTXSatellite:	Auto 🗸	
Radio Config	•	Satellite System:	All 🗸	
Firmware Update	H	Satellite System:	Disable V	
Track Manage	H			
Coordinate System	n 🕂		Enter Cancel	

2.6 Firmware Update

2.6.1 Update receiver firmware

This section will explain how to update the firmware for Insight V2, detail steps are written below.

Login the web UI management of Insight V2 with WiFi or USB network connection. Go to "Firmware Update—Firmware Update" configuration page, all the information of the firmware which current installed on Insight V2 would be displayed here.

ight V2		SOU
admin 1318 SF61D3148671318 [logout]	> Firmware Update	
🖵 Status 🕂	Firmware Information:	
Configuration	Firmware Version: 1.09.230323.RF61PY	
Satellite Information	Core Engine Version: PurpleCowY.1.09	
	Release Date: 20230323	
👃 DataTransfer 🕂	Online Update:	
Network Config	Latest Version:	
📱 Radio Config 🕂	Update Status:	
🟦 🛛 Firmware Update 🔤	Download Status: 0%	
Firmware Update 🛛 🖃	Last Update Time: 0	
Module Update 📃	Online Update: Online Upda	
🛅 Track Manage 🕂	Tins: Please make sure the petwork works properly before launching the option	a Undatal
Coordinate System +	rips, i rease make sure the network works properly before nathering the origin	e opualei
Online Service		
🐉 User Management 🔒	Local Update:	
🐉 Frequency Spread 🕂	FirmwareFilePath: 选择文件 未选择任何文件	
🗐 System Log 🕂	Install	
	- Status:	

Click on "Browse" button to load firmware file (Please take in mind that the firmware is ended with **PY.img** as the extension name).

admin 131 SF61D3148671318 [logo	8 > Firmware Update	
	Firmware Information:	
Status	Open	×
🗙 Configuration -	←	ひ Search 电离层抑制固件230323 ₽
🚿 Satellite Information	Organize - New folder	III - 🚺 🖓
🛱 Data Pacard	Desktop ^ Name ^	Date modified Type
	Documents 💿 1.09.210607 RussianLanguage.RG60	PY.img 2021/6/8 8:30 Disc Image Fi
🗟 DataTransfer 🗧	Downloads 💿 1.09.230320.RG60GLimg	2023/4/24 9:05 Disc Image Fi
	Music 💿 1.09.230320-610T5.RG60GL.img	2023/4/24 9:05 Disc Image Fi
Network Config	Pictures 0 1.09.230323.RG60PY.img	2023/5/10 15:08 Disc Image Fi
🗊 Radio Config	Videos 0.09.230323-V610T5.RG60PY.img	2023/4/24 9:05 Disc Image Fi
	🐛 Windows (C:)	
🚖 Firmware Update 🧧	Programs (D:)	
Firmware Update	Public (E:)	
Modula Undata	🥪 Private (F:)	
	Network	
🛅 🛛 Track Manage 🧧	× <	
Coordinate System	File name: 1.09.230323.RG60PY.img	✓ 所有文件 (*.*) ✓
Online Service		Open Cancel

And then click "Install" button to start upgrading.

· 1 / 1/0 т

Insight V2	<u> </u>
Local Update:	
FirmwareFilePath: 选择文件 1.09.230323.RG60PY.img	
Status:	
Local Update:	
FirmwareFilePath: 选择文件 1.09.230323.RG60PY.img	
Status: Firmware is being uploaded, please wait	

After the firmware is completed upgrading, a dialog will appear saying "Firmware updated successfully! Host reboot, please log in later...", then the receiver will restart automatically.

JELCONE	admin	1318	10.1.1.1 显示
	SF61D3148671318	[logout]	Firmware updated successfully! Host reboot, please log in later
	Chatria	-	
	Status		确定
*	Configuration	•	
*	Satellite Informatio	n 🚹	Download Status: 0%
.11	Data Record	•	Last Update Time: 0
显	DataTransfer	•	Online Update: Online Upda
•	Network Config	•	Tips: Please make sure the network works properly before launching the online Update!
Ĩ	Radio Config	•	
±	Firmware Update		
	Firmware Update		Local Update:
	Module Update		FirmwareFilePath: 选择文件 1.09.230323.RG60PY.img
.ii	Track Manage	•	Install
۲	Coordinate System	n 🛨	Status: Firmware is being uploaded, please wait
ŵ	Online Service		

2.6.2 Update OEM board firmware

The OEM board firmware can be updated here on web interface, no more to use the assigned or special program to update the OEM firmware.

Contact with the technical support team for the OEM firmware, then click "Browse" button to load the

correct firmware file, after loading the file, click "Install" button to start updating. Time of updating OEM firmware will take longer than receiver firmware updating, and different time will be taken according to the different model of OEM board.

Reboot the receiver after finishing the updating!

admin 1318 SF61D3148671318 [logout]	> Module Update
🖵 Status 🕂	OEM Update:
🗙 Configuration 🕂	FirmwareFilePath: 选择文件 未选择任何文件
Satellite Information 🔒	Install
🛅 Data Record 🕂	Update Status: No Action
🛃 DataTransfer 🕂	Firmware Version: 610T5-22AO2-1
Overlaphi Metwork Config +	Tips: Update firmware need about 30 minutes!
😨 Radio Config 🕂	Radio Update:
🔹 Firmware Update 🗧	FirmwareFilePath: 选择文件 未选择任何文件
Firmware Update 📃	Install
Module Update 🔤	Update Status: No Action
🛅 🛛 Track Manage 🔒 🕂	

2.6.3 Update UHF module firmware

1, Load the firmware file then click "Install" button to start updating firmware for UHF module.

2, After finishing the procedure, reboot the receiver, then execute self-check operation for UHF module.

VECOME	admin SF61D3148671318 Status	1318 [logout]	FirmwareFilePath: Update Status:	1253年×11十 不起が年11日の×11十 Install No Action	•
*	Configuration	Đ	Firmware Version:	610T5-22AO2-1	
*	Satellite Information	ו 🛨	Tips:	Update firmware need about 30 minutes!	
11	Data Record	Đ			
	DataTransfer	Đ	Radio Update:		
	Network Config	÷	FirmwareFilePath:	选择文件」未选择任何文件	
Ĩ	Radio Config	•		Install	
£	Firmware Update		Update Status:	No Action	
	Firmware Update		RadioType:	BERS02	
	Module Update		Firmware Version:	BERS02.1.0.220803	
11	Track Manage	•			
	Coordinate System	Đ	Sensor Update:		
	Online Service	÷	FirmwareFilePath:	选择又件」未选择任何又件	

2.6.4 Update sensor firmware

1, Load the correct sensor firmware file with .img extension name, then click "Install" button to start updating the firmware.

2, After finishing the procedure, reboot the receiver, then execute self-check operation for sensor.

.11	Data Record	•		
	DataTransfor		Radio Update:	
-5-	Datafransfer		Firmware File Path -	法择文件 未选择任何文件
\oplus	Network Config	•		
	Dadia Config			Install
±	Radio Coniig	•	Update Status:	No Action
£	Firmware Update			
	Firmware Update	=	Radio Type:	BERS02
	Module Update		Firmware Version:	BERS02.1.0.220803
		_		
.11	Irack Manage	•		
æ	Coordinate System		Sensor Update:	
W	Coordinate system			
	Online Service		FirmwareFilePath:	选择文件」本选择任何文件
		_		Install
Ъr	User Management	•	Lindete Oteture	No. A stress
25	Frequency Spread		Update Status:	NO ACIION
6/5	requercy spread	-	SensorType:	THREEAXIS_M82
.11	System Log	• • • •		
		_	Firmware Version:	M8-2_V20221123

ChapterIII Measuring Operation

3.1 Base station settings

Base station shall be set up in the broad view, unobscured and higher places; avoid the vicinity of the high-voltage power transmission equipment, the shade of trees, and the sides of waters, all of which will produce different degrees of impact on the GPS signal reception and transmission of radio signals.

- 1) Set a tripod to the location with known coordinates (or unknown), attach base receiver to the tribrach adapter set (the measuring plate is recommended to install under base receiver).
- 2) Install the UHF antenna onto the receiver.
- 3) Make sure all connections are alright, then power on receiver.



4) Establish Bluetooth connection between receiver and controller, then click "Base" icon to switch base working mode for receiver.





5) Get into base setting page, and set parameters for base differential format, transmitting interval, base start mode, antenna height type, antenna height value, then choose datalink mode as "Internal UHF".

11:20 ам 🗉 📃 🛛		🔊 ≭ 🗢	î
<	Base	C	?
Base Correction Forr	nat	RTCM32	>
Transmit Interval(s)		1	>
Base Start Mode		Auto	>
Antenna Height Type	2	Real Height	>
Antenna Height		1.800 m	>
Mask Angle		10	>
PDOP		3.0	>
Datalink mode		No Datalink	>
	Start		
•	•		

6) After datalink mode is determined, "Datalink Config" appears under datalink mode, then get into "Datalink Config" interface set more parameters, such as radio channel, confirm the frequency, radio power, air baud rate for base and rover communication, the communication protocol (the most important parameter), etc., after that return to Base setting interface, and click "Start" button to apply the settings and start the base station, and the base says "Base is transmitting".



11:21 ам 🔁 📃 🛛	╗┆♀ ▮
< Internal UHF	?
Radio Channel	1 >
Frequency	463.125 >
Power	High >
Baud Rate	9600 >
Radio protocol	TRIMTALK >
Radio Repeater	
Radio channel group	>
Base Locked	
Base ID	>
• •	

3.2 Rover settings

3.2.1 Using UHF link

After verifying the successful transmitting of the Base station, the rover station shall be set up at this moment.

- 1) Install the UHF antenna onto the rover receiver, and screw the receiver into the carbon fiber pole, then power on the receiver.
- 2) Install the bracket holder onto the carbon fiber pole, and fix the controller into the bracket, then power on the controller.
- 3) Establish Bluetooth connection between receiver and controller, then click "Rover" icon to switch rover working mode for receiver.



Insight V2



4) Get into rover setting page, and choose datalink mode as "Internal UHF".



5) After datalink mode is determined, "Datalink Config" appears under datalink mode, then get into "Datalink Config" interface set the same radio channel, frequency, radio power, air baud rate communication protocol as base station, after that return to rover setting interface to check the age and solution type, as long as age value changes between 1~3s, that means the differential data stream is coming from base station, when the rover gets fixed solution, go to point survey interface.



3.2.2 Using internet link

1) Screw the receiver into the carbon fiber pole, then power on the receiver.

2) Install the bracket holder onto the carbon fiber pole, and fix the controller into the bracket, then power on the controller.

3) Establish Bluetooth connection between receiver and controller, then click "Rover" icon to switch rover working mode for receiver.





4) Get into rover setting page, and choose datalink mode as "Bluetooth", that means the receiver will use the controller internet to connect to CORS station.



5) After datalink mode is determined, "Datalink Config" appears under datalink mode, then get into "Datalink Config" interface, click "Add" button to create a new network connection. Define a name for the new connection, and enter the IP address of CORS station, port, assigned user name and password.

11:23 ам в К Ntri	∣ ¤ p(Eagle) Connec Bluetooth	🗟 \$ 🗢 🗎 ction -	11:24 AN	n 🖬 🔲 🗖 Datalink Co	onfig - Bluetoc	🔊 ¥ 🗢 🗎 ∙th
			Select	Server		>
			Name			Network
			IP		47.1	07.86.207
	Ð		Port			6070
N	o Template Parame	eters	Userna	ime		test
			Passwo	ord		8 ø
			Select	Mountpoint		>
Add	Edit	Delete	Mode		NTR	P(Rover) >
Connect	Disconnect	ОК			OF	C C
•	•			•	•	

6) After entering the parameters, click "Select Mountpoint" to choose the mountpoint. If there is still no mountpoint to choose, click "Refresh mountpoints" to download the source table.



11:24 м 🗉 🗖 🛛 🗸 🔹 Datalink Config -	≌ ≯ ♀ ≜ Bluetooth	11:25 ам Т с D
elect Server	>	Select Serve
ne	Network	Name
Select Mount	tpoint ₀₇	IP
Input	t Mountpoint	Port
Refresh Mount	points st	Succeed
Cancel	ок	Password
lect Mountpoint	>	Select Mountpoint
le	NTRIP(Rover)	Mode
Cancel	ок	Cancel
• •		•

7) While the source table (mountpoint list) is downloaded, click again "Select Mountpoint" to choose a proper one, return to datalink config (Ntrip connection) interface, and click "Connect" button to the CORS, there will be a progress bar to show the coming data, click "OK" button to finish the settings.

25 AM 🗎 📄 🗖 Select Mountpoint	≌ ¥ ♀
5000_T_RTCM32	0
Refresh Mountpoints	r
0001_CMRPLUS	\bigcirc
0001_H_RTCM32	\bigcirc
0001_RTCM32	0
0001_RTD	S
0001_T_RTCM30	
00032	\bigcirc
23KM_H_RTCM32	\bigcirc ²
00/44 T DAW	\frown
Cancel	
•••	

8) Go to point survey interface and set the antenna height, then start your job if all is ready.





3.3 Point survey

a) While the rover is configured and gets fixed solution, then go to "Survey"—"Point survey", check the antenna height type and antenna height value.





SOUTH

b) Click the positioning button to save the coordinates for a point.

1:50 ₽м 🂠 🖬 🖰 📄 • 🔜 🛪 🖓 🕯	11:27 AM 🔁 🗖 🗖 🔊 🕅 🕷 🕅
< Fixed H:0.004 H:0.007 ✓ 43 1 2 1 2 1 43 1 2 1	C Topo Point
×	Pt name Pt2 🔇
Ŷ	Code de
	Antenna Height 1.800 m
	Antenna Height Type Pole Height >
	Detail Info
●A	Record <1/1>Collection Finished
	Solution <44/49>Fixed
	North 4762.944 m
Pt name:Pt2 North:4767.502 m East:304.628 m Height:53.634 m Base Dist:0.002 m	Photo Mark OK
< • E	< ● ■

c) Click the coordinate library shortcut to check the stored coordinates in real-time.



1:5 く	7рм 🕇	9 ∎ ¢ 	9 🗖 Poin	• ts Datab	ase	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Ρ	t nam	e ~	Ple	ase Input		Search
Tot	tal 4		Page	e 1/1		
N	ame	North	ing	Easting	Height	Latitude
Ŧ	Pt4	4768.9	951	304.009	53.514	N23*10'53.775
f	Pt3	4767.	500	304.631	53.620	N23*10'53.728
Ŧ	Pt2	4762.944		303.401	49.771	N23°10'53.579
Ŧ	Pt1	4771.237		302.922	41.374	N23*10'53.849



3.4 AR Stake-out

Traditional stakeout uses a guideline on the map and three arrows to point the direction. It could be simple for experienced surveyors, but it may confuse novices. AR stakeout makes up this gap. Beginners or veterans can directly follow what they see on the screen to reach the target. Benefiting from this, users can save more time on stakeout and be less confused about the direction.

Before we start, we need to prepare following devices: an Insight V2, a H6 data controller with at least one available SIM card and the software SurvStar installed on H6. All right, now we get everything prepared. Let's start.

- Turn on all the devices and run SurvStar. Go to "Communication", select "Communication Mode" as "WLAN".
- 2) Click "Device list" and it will jump to WiFi connection setting. Then choose the device name consistent with the last four serial numbers of V2, SOUTH_1318 for example. In this step, please make sure the receiver WLAN setting is AP mode in order to pair with H6.



Communication		?
	RTK	3
	SOUTH	
on Mode	WLAN	
	SOUTH-AP	
	Communication	■ ■ ¥ ● ♀ Communication (* RTK SOUTH on Mode WLAN SOUTH-AP



Insight V2



 After the WiFi of V2 is connected at WiFi connection setting interface, return to communication interface on SurvStar, and click again the "Connect" button to complete the WiFi connection between receiver and controller.

4:58 рм 🌣 📃	A	≌ \$ ⊘ マ	•
<	Communication	0	2
Model		RTK	>
Manufacturer		SOUTH	>
Communicatio	on Mode	WLAN	>
Device list	S	OUTH_1318	>
	Connect		
	Connect		

4) Go to "Device"--"Rover"--"Datalink mode" and select "Bluetooth" as the datalink. Then go to "Datalink config" to set parameters for a network connection to CORS, add a CORS account to obtain corrections and wait till you can get Fixed solution.

4:59 pm 🌣 📃 🛛 ≺	Rover	■ * ● 	5:01 рм ⊀ <	🗘 🔲 🛛 Datalink Confiç	ज्ञ ३ ♥ व g - Bluetooth	а 5:02 рм <	Ntrip	ı (Eagle) Connec Bluetooth	🔜 ≭ 🗢 🕯 etion -	
Datalink mode		Bluetooth >	Select Se	erver		Netwo	ork<219.13	35.151.189:6600>		
Smart Connect C	Config	>	Name		Network					
Datalink Config > Radio Router > Mask Angle 10 >		IP 219.135.151								
		Port		6600						
		10 >	Usernam	ne	user1		Succeeded to login			
Enable Tilt survey		Password								
Record Static Data			Colort M		0001 MOMA					
Pt name		>	Select M	ountpoint	0001_MSM4			RXD-1024		
			Mode		NTRIP(Rover)		Add	Edit	Delete	
				Cancel	ОК	Co		Disconnect	ОК	
•	•			◀ ●			•	٠		

Insight V2

Notice: DO NOT choose "Receiver WiFi", otherwise, its WLAN mode will change to client mode and its WiFi hotspot will disappear, then you need to reset it on Web UI or restore to factory default.

5) Go to "Survey"--"Point Stakeout". Select a point you want to stake out, software will return to stakeout interface.



6) Set a correct antenna height type and value. Usually we use pole height as the antenna height type, and input a pole height value.





7) Initiate IMU tilt survey. Please remember to enable tilt survey or you cannot turn on AR, AR stakeout requires available IMU first. Click sutton enable IMU, then initiate IMU according to the prompt message.









8) Click the R button. When we get close the target, the camera is available. Default setting is 10 meters away from the target point, when the distance is within 10 meters to the target, the camera image will appear on controller screen with guideline and arrow points to target, you can customize the distance. Follow the guidance in H6 and you can easily stakeout the point. Instead of this point, you can also try on other points stored in H6.



ChapterIV Accessories

4.1 Instrument Case



The instrument case for Insight V2 contains two layers of packing: the inner layer is filled with anti-collision foam, the host and other accessories can be dispersed and embedded; the outer layer is a hard instrument case, sealing-strong, wear-resistant anti-wrestling. Compact, durable, can effectively prevent the impact, easy to clean

4.2 Charger&Adapter

Insight V2 is equipped with a rechargeable internal battery, it uses a type-c cable and a PD adapter for the charging.



4.3 Differential Antennas



The UHF differential antenna is required to install to the interface at the bottom of receiver if Insight V2 is set up into internal UHF mode.

4.4 Cables

Type-C cable

This cable is used to connect the receiver with computer for static data transmission, Web UI accessing and firmware update.



4.5 Measuring plate

The measuring plate is convenient to measure the antenna height for base station or rover.



4.6 Tribrach connector

Install the receiver to tribrach.



ChapterIX Firmware Update

Appendix A Insight V2 technical specifications

GNSS Features							
Channels	1598						
GPS	L1C/A, L2C, L2P, L5						
GLONASS	L1C/A, L1P, L2C/A, L2P						
BDS	B1, B2, B3						
GALILEO	E1, E5A, E5B, E5AltBOC*, E6						
SBAS	L1C/A, L5 (Just for the satellites supporting L5)						
IRNSS	L5						
QZSS	L1C/A, L2C, L5						
L-Band	BDSPPP ^[1]						
Positioning output rate	1Hz~20Hz						
Initialization time	< 10s						
Initialization reliability	>99.99%						
Positioning Precision							
Code Differential GNSS	Horizontal: 0.25 m + 1 ppm PMS Vartical: 0.50 m + 1 ppm PMS						
Positioning							
GNSS Static	Horizontal: 2.5 mm + 0.5 ppm RMS Vertical: 5 mm + 0.5 ppm RMS						
Real-Time Kinematic	Horizontal: 8 mm + 1 npm RMS Vertical: 15 mm + 1 npm RMS						
(Baseline<30km)							
SBAS positioning	Typically<5m 3DRMS						
RTK initialization time	<10s						
IMI tilt compensation	Additional horizontal pole tip uncertainty typically less than 8 mm + 0.7 mm/° tilt down to						
	30°, 1.8m pole height.						
IMU tilt angle	0°~60°						
Hardware performance							
Dimension	$131 \text{mm}(\phi) \times 80 \text{mm}(\text{H})$						
Weight	800g (battery included)						
Material	Magnesium aluminum alloy shell						
Operating temperature	-45°C~+75°C						
Storage temperature	-55°C~+85°C						
Humidity	100% Non-condensing						
Waterproof/Dustproof	IP68 standard, protected from long time immersion to depth of 2m						
waterproof/Dustproof	IP68 standard, fully protected against blowing dust						
Shock/Vibration	Withstand 2 meters pole drop onto the cement ground naturally						
Power consumption	4W						
Power supply	6-18V DC, overvoltage protection						

Insight V2

morgine + 2	
Battery	built-in 7.4 V 6800mAh rechargeable Lithium-ion battery
Battery life(Dual-battery)	16h (static mode)
	10h (internal UHF base mode)
	12h (rover mode)
Camera	200 MP
	75°
Communications	
I/O Port	UHF antenna interface
	Туре-С
Internal UHF	2W radio receiver and transmitter
Frequency range	410-470MHz
Communication protocol	Farlink, Trimtalk450s, SOUTH, HUACE, ZHD
Communication range	Typically 8km with Farlink protocol
Bluetooth	BLEBluetooth 4.2 standard, Bluetooth 2.1 + EDR
NFC Communication	Realizing close range (shorter than 10cm) automatic pair between receiver and controller
	(controller requires NFC wireless communication module else)
WIFI	
Modem	802.11 b/g standard
WIFI hotspot	Receiver broadcasts its hotspot form web UI accessing with any mobile terminals
WIFI datalink	Receiver can transmit and receive correction data stream via WiFi datalink
Data	
Storage/Transmission	
Storage	4GB SSD internal storage standard, extendable up to 32GB
	Automatic cycle storage (The earliest data files will be removed automatically while the
	memory is not enough)
	Support external USB storage
	The customizable sample interval is up to 20Hz (Reserve)
Data Transmission	Plug and play mode of USB data transmission
	Supports FTP/HTTP data download
Data Format	Differential data format: CMR(GPS only), RTCM 2.x, RTCM 3.x
	GPS output data format: NMEA 0183, PJK plane coordinate, Binary code
	Network model support: VRS, FKP, MAC, fully support NTRIP protocol
Sensors	
Electronic Bubble	
	Controller software can display electronic bubble, checking leveling status of the carbon pole
	Controller software can display electronic bubble, checking leveling status of the carbon pole in real-time
IMU	Controller software can display electronic bubble, checking leveling status of the carbon pole in real-time Built-in IMU module, calibration-free and immune to magnetic interference
IMU Thermometer	Controller software can display electronic bubble, checking leveling status of the carbon pole in real-time Built-in IMU module, calibration-free and immune to magnetic interference Built-in thermometer sensor, adopting intelligent temperature control technology, monitoring
IMU Thermometer	Controller software can display electronic bubble, checking leveling status of the carbon pole in real-time Built-in IMU module, calibration-free and immune to magnetic interference Built-in thermometer sensor, adopting intelligent temperature control technology, monitoring and adjusting the receiver temperature
IMU Thermometer User Interaction	Controller software can display electronic bubble, checking leveling status of the carbon pole in real-time Built-in IMU module, calibration-free and immune to magnetic interference Built-in thermometer sensor, adopting intelligent temperature control technology, monitoring and adjusting the receiver temperature
IMU Thermometer User Interaction Operating system	Controller software can display electronic bubble, checking leveling status of the carbon pole in real-time Built-in IMU module, calibration-free and immune to magnetic interference Built-in thermometer sensor, adopting intelligent temperature control technology, monitoring and adjusting the receiver temperature Linux

margine v 2	
Indicators	3 color LED indicators, and Battery indicator
Web interaction	With the access of the internal web interface management via WiFi or USB connection, users
	are able to monitor the receiver status and change the configurations freely
Voice guidance	The intelligent voice technology provides status and operation voice guidance, supports
	Chinese/English/Korean/Spanish/Portuguese/Russian/Turkish
Secondary development	Provides secondary development package, and opens the OpenSIC observation data format
	and interaction interface definition
Cloud service	The powerful cloud platform provides online services like remote manage, firmware update,
	online register and etc.

Appendix C Technical Terms

Ambiguity: unknown quantity is the integer number of cycles of the carrier phase measured from the satellite to the receiver.

Baseline: The connection line of the two measurement points, on which to receive GPS signals and collect observation data simultaneously.

Broadcast ephemeris: message released by the satellite demodulator satellite orbit parameters.

SNR (Signal-to-noise ratio): an endpoint signal power to noise power ratio.

Cycle skipping: interfere loop skips a few cycles from a balanced point, and stabilize in the new equilibrium point, this make the phase integer number of cycles to generate an error.

Carrier: As the carrier, Frequency, amplitude or phase modulation of the modulated wave by a known reference value.

C / A code: GPS coarse / acquisition code, modulate the pseudo-random binary code for the 1023 bit duplex, the bit rate of which is 023MHz, and code repetition period of 1ms.

Difference measurement: GPS measurements employ cross-satellite cross-receiver and cross-epoch.

Difference Positioning: the method of determining the relative coordinates between two or more receiver by tracking the same GPS signal.

Geometric dilution of precision: Describe the contribution of satellite geometry errors factor in dynamic positioning

$$e = \sqrt{\frac{a^2 - b^2}{b^2}}$$

Eccentricity:

where a, b of the semi-major axis and semi-minor axis.

Ellipsoid: mathematical graphics formed when an ellipse moves around the minor axis of rotation in Geodetic Survey.

Ephemeris: the position of celestial bodies over time parameters.

ng:
$$f = \frac{1}{a}(a-b) = 1 - \sqrt{(1-c^2)}$$

Flattening:

SOUTH

a is the semi-major axis, b is the semi-minor axis, e is the eccentricity.

Geoid: similar to the mean sea level and extends to the mainland special planes. Geoid everywhere perpendicular to the direction of gravity.

Ionosphere delay: delay of radio waves through the ionosphere (non-uniform dispersion medium)

L-band: The radio frequency range of 390-1550MHz.

Multipath error: the positioning error caused by the interference between two or more radio signal propagation path.

Observing session: the use of two or more receivers at the same time to collect GPS data period.

Pseudo Range: GPS receiver in the time required to copy the code aligned with the received GPS code offset and multiplied by the speed of light to calculate the distance. This time offset is the difference between the signal reception time (time series of the receiver) and the signal emission time (satellite time series).

Receiver channel: GPS receiver RF mixer and IF channel, can receive and track satellites two carrier signals.

Satellite configuration: the configuration status of the satellite with respect to a specific user or a group of users within a specific time.

Static position: do not consider the point of measurement of the movement of the receiver.

FCC Statement

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.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

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.