

C18 User Guide



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Thank you for using the C18 device. These instructions will guide you on how to quickly use the device in regards to opening the equipment correctly and common work scenarios. For items you encounter that are not covered in these instructions or if you have problems using this device, you can either contact your dealer or HowayGIS directly at Email: supports@howaygis.com

1. Overview

1.1 Feedback

The C18 Continuous Operation Base Reference System uses a Trimble BD990 OEM board. It can be used in a variety of applications and is compatible with various platforms that can improve Single Base Station applications and any kind of VRS setup. An advanced type of self-locking connection is employed; the outer casing is made of aluminum alloy with a system that cools the machine. This self-cooling mechanism is coupled with anti-shock technology and more.

1.2 Product Features

- Diverse connections; complete compatibility with various mobile smart terminals and conventional RTK devices.
- Flexible configuration and wide selection. Can configure modules with different precisions depending on customers' demand; provide selection of different parts to effectively reduce cost and improve efficiency.
- Industrial design of casing with good resistance to shock, water and dust; can endure severe work environment in field.
- Support standard data formats as well as customized data formats to adapt to industrial development.
- With external antenna, eliminate impact of EMI on performance to receive signals from satellites so as to make best use of board/card.
- Separate communication to reduce interference in the device.
- With built-in stable network connection, provide functions of GNSS server so as to easily provide functions of reference station at all times and in all places.

1.3 Specification

- Channels: 336
- GPS: L1 C/A, L2E, L2C, L5
- GLONASS: L1 C/A, L2 C/A, L3 CDMA
- BeiDou: B1, B2, B313
- SBAS: L1, C/A, L5
- GALILEO: E1, E5A, E5B, E5AltBOC, E6
- IRNSS: L5
- QZSS: L1C/A, L1 SAIF, L2C, L5, LEX



1.4 Communication

- A LAN Ethernet port
- Support connection to 10BaseT/100BaseT network;
- GNSS modules and applications are implemented through web access
- Ntrip server side
- A 2.0 USB device port(Optional)
- Two RS232 serial ports

1.5 Locating Precision

Mode	Precision
RTK	0.008m+1ppm horizontal
(<30Km)	0.015m+1ppm vertical
DGNSS	0.25m+1ppm horizontal
	0.5m+1ppm vertical
SBAS	0.5m horizontal
	0.85m vertical

1.6 Physical specifications

Maximum overall dimension (including wall hanging plate): 167mm*150mm*60mm Maximum overall dimension (without wall hanging plate): 167mm*128mm*58mm Weight: principal machine 685g Raw material: Aluminium alloy Operating temperature: -30° C $\sim +75^{\circ}$ C Storage temperature: -40° C $\sim +85^{\circ}$ C Operating humidity: 5% $\sim 95\%$ (noncondensing)

1.7 Electrical parameters

DC input: 12V 1A

2. Device and accessories

- C18 mobile base station
- 12V-1A DC power adapter
- USB cable
- RS232 DB9 female cable
- RJ54 cable
- Power cable
- SMA mail to TNC female cable



3. Schematics of Ports





4 Inspection before Use

Connecting C18 to the power supply, when the power indicator is on, it means C18 power on.

5 Log On to the GNSS management interface

Open the browser and enter the IP address of the GNSS module. According to the prompt, enter the user name "Admin" and Password "password" and press the "confirm" button.

C C Mtp://192.168.1.208	, рх	🥶 Easy-link - 思速 - LuCI	○ 正在等待 192.168.1.208 ×		ର ଦି ଭି
		Windows 安全	-	×	
		The server 192.168.1.20	8 is asking for your user name and		
		password. The server re	eports that it is from Trimble.		
		authentication on a con	ne and password will be sent using basic nection that isn't secure.		
		admin			
			•• 我的凭据		

确定 取消

If the account number and password are correct, the interface will show as below.



Trimble - 2017-11-29T(×		
← → C ① 192.168.3.143		@ ☆ :
Pennium Status	Receiver Status - Activity	BD970 S325C00266
Activity Position Position (Graph) Vector Google Map Google Earth Identity Receiver Options	Satellites Tracked:33 GPS (9): 2, 5, 6, 7, 13, 15, 20, 29, 30 GLONASS (5): 3, 4, 5, 18, 19 Gailleo (3): 7, 19, 26 BeiDou (11): 1, 2, 3, 4, 5, 6, 8, 9, 11, 13, 14 SBAS (4): 128, 129, 137, 140 QZSS (1): 193	
Satellites Receiver Configuration	Input/Output:	
I/O Configuration	Output : TCP/IP (5017) - RT27 (1Hz)	
Network Configuration	Output : NTRIP Server - RTCM_V3	
Firmware	Temperature: 36.00°C	
Help	Runtime: 20:14:48	
	2017-11-29T02:40:52Z (UTC)	

Note: The IP address of GNSS module and its related information configuration are shown on Annex 1

5.1 View Receiver Status

You can view information such as the current state of the receiver, etc. as below

$\leftarrow \rightarrow$ C \bigcirc 192.168.3.143		T 🗣 🏠 🛇
Receiver Status	Receiver Status - Activity	ED970 Solution
Activity Position (Graph) Vector Google Map Google Earth Identity Receiver Options Satellites	Satellites Tracked:34 GPS (9): 10, 12, 15, 18, 20, 21, 24, 25, 32 GLONASS (7): 5, 6, 7, 9, 15, 16, 22 Gaileo (5): 1, 4, 11, 12, 19 BeiDou (9): 1, 2, 3, 4, 6, 7, 9, 10, 13 SBAS (3): 129, 137, 140 QZSS (1): 193	
Receiver Configuration	Input/Qutput:	
I/O Configuration	Output : TCP/IP (5017) - RT27 (1Hz)	
Network Configuration	Output : NTRIP Server - CMR	
Security	Output : NTRIP Server - RTCM_V3	
Firmware	Temperature: 37.50°C	
Help	Runtime: 1 Day 00:56:51	
	2017-11-29T07:22:55Z (UTC)	

5.2 Satelites

View the satellite details, shown as below



\leftrightarrow \rightarrow C (I) 192.168.3.14	}					
Receiver Status	Satelli	tes	s - General Inform	na	tion🛿	
Satellites		Tra	acked	Co	nstellation	
Tracking (Table)		#	Satellites	#	Satellites	
Tracking (Graph) Tracking (SkyPlot)	GPS	9	10, 12, 15, 18, 20, 21, 24, 25, 32	32	1, 2, 3, 532 Unhealthy: 4	
Satellite Almanacs	GLONASS	7	5, 6, 7, 9, 15, 16, 22	24	124	
Predicted Elevation Predicted Constellation Current Constellation	Galileo	5	1, 4, 11, 12, 19	16	14, 7, 11, 12, 19, 22, 26 Unhealthy: 5, 8, 9, 20, 24, 30	
Ground Track Rise/Set (Table) Rise/Set (Graph)	QZSS	1	193	1	193 Disabled:194197	
Satellite Data	BeiDou	9	14, 6, 7, 9, 10, 13	15	114, 17	
Receiver Configuration	SBAS	3	137:MSAS-2 129:MSAS-1 140:SDCM - LUCH-5A			
Network Configuration	2017-11-29	T07 [.]	24:467 (UTC)			
Security	2017-11-20		24.402 (010)			
Firmware						
Help						

5.3 Receiver configuration

Configure the antenna height, reference station and other information of the receiver, as shown in the figure.

\leftarrow \rightarrow C (3) 192.168.3.143		루 🕸 🌣 Օ
Â	Receiver Configuration	
Receiver Status	, , , , , , , , , , , , , , , , , , ,	
Satellites	Elevation Mask: 10°	
Receiver Configuration	PDOP Mask: 99	
Summary	Horizontal Precision: 0.30 [m]	
Antenna	Vertical Precision: 0.30 [m]	
Reference Station	Clock Steering: Disabled	
Correction Controls	Everest™ Multipath Mitigation: Enabled	
Position	Antenna ID: 0	
General	Antenna Type: Unknown External	
Application Files	Antenna Measurement Method: Antenna Phase Center	
Default Language	Antenna Height: 0.000 [m]	
1/0 Configuration	1PPS On/Off: Disabled	
1/O Configuration	Event 1 On/Off: Disabled	
Network Configuration	Event 1 Slope: Positive	
Security	Motion: Static	
Firmware	CMR Input Filter: Disabled	
Help	Reference Latitude: 31°06'49.16698"N	
	Reference Longitude: 121°25'04.89303"E	
	Reference Height: 33.412 [m]	
	RTCM 2.x ID: 0	
	RTCM 3.x ID: 0	
	CMR ID: 0	
	Station Name: CREF0001	
	Ethernet IP: 192.168.3.143	
	System Name: Trimble	

5.4 I / O configuration

I / O configuration can configure TCP / IP, ntrip server, ntrip caster and other types of output.



5.4.1 TCP/IP

\leftarrow \rightarrow C \bigcirc 192.168.3.143	3	루 🗟 🌣 🗄
	I/O Configuration	Trimble, BD970
Receiver Status		\$5,500,200
Satellites	TCP/IP 5017 RT17/RT27 V	
Receiver Configuration	Server: TCD 192 169 2 142	
I/O Configuration	Server. ICP 192.106.3.143. 5017 Delete	
Port Summary Port Configuration	Client (2)	
Network Configuration	Output only/Allow multiple connections	
Security	UDP Mode	
Security	Authenticate, set password:	
Firmware	Input/Output	
нер	Output: RT27 (1 Hz)	
	RT27:	
	Epoch Interval Options	
	1 Hz V Concise V Multi-System Support	
	Measurements K-I Flag Smooth Pseudorange Positions Send Raw GPS Data Smooth Phase	
	Send Raw SBAS Data I Include Doppler	
	GLONASS Ephemeric When new one is available *	
	Galileo Ephemeris When new one is available •	
	QZSS Ephemeris When new one is available •	
	BeiDou Ephemeris When new one is available •	

Where 1 is the configuration of the type of the output data, including RT17 / RT27 / NMEA, etc.

- (2) can Configure the output port
- $(\ensuremath{\underline{3}})$ is the detailed configuration of the corresponding output type

Configure the data output according to the actual demand. After the configuration completed, click "OK" below.

5.4.2 NTRIP Client

← → C ① 不安全 192.	168.3.143	부 책 ☆ 📀
	I/O Configuration	
Receiver Status	-	5325C00266
Satellites	NTRIP Client	
Receiver Configuration		
I/O Configuration	NTRIP Client	
Port Summary Port Configuration	Status: Init	
Fort Conliguration	Enable: 🗹	
Network Configuration	TGIP Mode:	
Security	NTripCaster http:// 192.168.1.203	
Firmware	Username: gps1	
Help	Password: ····	
	Verify Password: ••••	
	Mount Point: TEST	
	TEST (6km) Get Mount Points	
	OK Cancel	

Enter the IP address, user name, password and other information of Ntrip caster, tick the box beside Enable, then click OK to start Ntrip client

5.4.3NTRIP Caster

← → C ① 不安全 192.1	68.3.143	र 💀 🕸 (
	I/O Configuration 🛛	Trimble, 5325C0026
Receiver Status		\$ 30230020
Satellites	NTripCaster 1	
Receiver Configuration		
I/O Configuration	NTripCaster	
Port Summary Port Configuration	Enable: 🕢 Port: 2101	
Network Configuration	Identifier: Country: USA	
Security	Mount Point: test	
Firmware		
Help	CMR	
	CMR+ Delay: Omsec T Bandwidth limit : RT17:	
	Epoch Interval Options	
	Off Concise Multi-System Support	
	Measurements R-T Flag Smooth Pseudorange	
	Positions Send Raw GPS Data Smooth Phase	
	L2 Signal Legacy with L2 - CS fallback V	
	GPS Ephemeris When new one is available	
	SBAS Ephemeris When new one is available •	

Configure the port and output data format of Ntrip caster, tick the box beside Enable, and click OK to start Ntrip caster.

5.4.4 NTRIP Server

← → C ① 不安全 192.1	.68.3.143	۳ 🕸 🛧
Receiver Status	I/O Configuration	ED970 S325C002
Satellites	NTRIP Server	
Receiver Configuration		
I/O Configuration	NTRIP Server	
Port Summary Port Configuration	Status: Up and Connected	
Network Configuration	NTRIP Version: NTRIP v1.0 V	
Security	NTripCaster http:// 180.166.8.227:2101	
Firmware	Mount Point: DGPS	
Help	Username: howay	
	Password:	
	Verify Password:	
	Identifier: 5325C00266 Country:	
	Network:	
	CMR	
	CMR+ Delay: 0 msec Bandwidth limit :	
	RT17:	
	Epoch Interval Options	

Input the IP address, user name, password and other information of ntrip caster, tick the box beside Enable, configure the output data type, and click OK to start ntrip server.

5.4.5 Serial Port

← → C ③ 不安全 192.1	168.3.143	۴ 🗣 🛧 🚺
Receiver Status	I/O Configuration	ED970 S325C00266
Satellites	Serial1 / COM1 CMR	
Receiver Configuration I/O Configuration Port Summary Port Configuration	Serial Port Setup Baud: 38400 • Parity: N •	
Network Configuration	CMR	
Security		
Firmware	Disabled	
Help	OK Cancer	

Configure the output data type, baud rate and other information, and click OK.

5.4.6 USB

The USB configuration is the same as the serial configuration.

5.5 Network settings

← → C ③ 192.168.3.143				۴ 🕸 🖈 🚺
	Network Config	guratior	n 🛛 🗧 🗖	
Receiver Status				5325C00266
Satellites	DHCP Status:	On		
Receiver Configuration	Ethernet IP:	192,168,3,143		
I/O Configuration	DNS Address:	192.168.1.1		
Network Configuration	Secondary DNS Address:	192.168.3.1		
Summary	HTTP Server Port:	80	-	
DNS Configuration	Network Address Translation :	Disabled		
PPP				
Routing Table				
E-Mail Alerts				
HTTP				
NTP				
DDNS Client				
Zeroconf/UPnP				
Security				
Firmware				
Help				

Configure network routing and email alarm settings etc.

5.6 Security

\leftrightarrow \rightarrow C \odot 192.168.3.143	3	የ 🗟 🕁 🚺
Receiver Status	Security Summary	ED970 S325C00266
Satellites Receiver Configuration	Security: Disabled	
I/O Configuration	Username Receiver Config File Download File Delete Edit Users NTripCaster	
Security		
Summary Configuration Change Password		
Firmware		
Help		

Set password for GNSS receiver

5.7 Firmware

← → C ③ 192.168.3.143			የ 🕸 🕁 🛙
Receiver Status	Install New Firn	1ware 🛿	ED970 (5325C002)
Satellites	Firmura Wernste Date:	2011 11 01	
Receiver Configuration	Firmware Warranty Date:	2014-11-01	
I/O Configuration	Active Firmware Version:	4.93	
Network Configuration	Active Core Engine Version:	4.93	
Security	Active Firmware Warranty Date:	2014-05-01	
Firmware Install FW Upgrade Check	Active Firmware Checksum: 选择文件 未选择任何文件	60f0244c	
Help	Install New Firmware		
	Status: Idle		

View the current firmware status and complete the firmware upgrade

6. Connect C18 Using Ethernet Port

Step 1: Open a new WEB browser interface, enter IP address of GNSS module learned in Annex 1 Following prompt on the screen, enter "admin" as user name and "password" as password, and then press "OK" button.

		HV	航微科技 HOWAY GIS
X 🧭 Easy-link - 8% - LuCI	〇 正在等待 192.168.1.208 ×		ි මේ ප බ සි ම
Windows 安全	•••		
The server 192.168.1.208 password. The server re Warning: Your user nam authentication on a conn	8 is asking for your user name and ports that it is from Trimble. te and password will be sent using basic tection that isn't secure.		
admin	•• 約/供編		
	ME RA		

If the user name and password are correct, you can see the interface shown below.

Trimble - 2017-11-29TC ×		
\leftarrow \rightarrow C (192.168.3.143		Se 🛧 :
<u></u>	Receiver Status - Activity	
Receiver Status Activity Position Position (Graph) Vector Google Map Google Earth Identity Receiver Options Satellites Receiver Configuration I/O Configuration I/O Configuration Network Configuration Security Firmware Help	Satellites Tracked:33 GPS (9): 2, 5, 6, 7, 13, 15, 20, 29, 30 GLONASS (5): 3, 4, 5, 18, 19 Gailleo (3): 7, 19, 26 BeiDou (11): 1, 2, 3, 4, 5, 6, 8, 9, 11, 13, 14 SBAS (4): 128, 129, 137, 140 QZSS (1): 193 Input/Output: Output: TCP/IP (5017) - RT27 (1Hz) Output: NTRIP Server - CMR Output: NTRIP Server - CMR Output: NTRIP Server - RTCM_V3 Temperature: 36.00°C Runtime: 20:14:48	5325C00266
	2017-11-29T02:40:52Z (UTC)	

Note: See Annex 1 for configuration of IP address of GNSS module and other information.

Annex 1. Configure IP Address of GNSS Module Using Serial Port

Step 1: Connect C18 to computer using cable with serial port supplied.

Step 2: Connect C18 to network port of computer using network cable supplied.

Step 3: Download the tool "winflsh" via the following link.

http://trl.trimble.com/docushare/dsweb/Get/Document-710324/WFC-BD9xx-V234V485.exe

Step 4: Following the prompt on screen, install "winflsh" to computer.

Step 5: After installation is completed, run "winflsh" software. Following prompt on the screen, select serial port number of C18, and press "Next" button.

Step 6: Following prompt on the screen, select "configure Ethernet setting", single click "Next" to configure it.

Select an operation to perform and provide the sections Operations Configure radio settings Configure cellular modem settings Load GPS software Load internal radio software			
Configure reliance settings Configure reliance settings Configure reliance mode settings Load GPS software Load internal relia software	Anna and	Select an operation to perform and pr 'Next' to continue	ess
Configure radio settings Configure radio settings Configure cellular moden settings Load GFS software Load internal radio software		Operations	
Configure radio settings Configure cellular modem settings Load GPS software Load internal radio software	N.C.	Configure ethernet settings	
Load internal radio software		Configure radio settings Configure cellular modem settings Load GPS software	H
Undate receiver ontions	and the second from the second from	Load internal radio software	÷
Descripti		Descripti	
Configure the ethernet settings	():Trimble.	Configure the ethernet settings	

Step 7: Click "complete". After successful connection, "configuration" interface appears.

WinFlash	the DB9 cable. Review the setting 'Finish' to start	to come of the fo ding s below and press the Configure ethernet
	Current Settings	
- COLE	Device configur BD9xx Recei connected to Operation to pe Configure e	ation ************************************
Trimble		*
Contribute.	1.	

	.Titgs	~~	
IP Setup:	Static	11 addres	S 🔽
IP Address:			
Netmask:			
Broadcast:	-		
Gateway:			
DNS			
HTTP settings			
Server	80		

Step 8: Configure IP address of GNSS module.

Select "static IP address", and set IP address, Netmask, Gateway etc. In case of static IP, the IP address setting should be in same network segment with the computer that controls C18. Select "", allow C18 built-in router to automatically assign IP address to GNSS module. This automatically assigned IP address can be seen in Step 2 in Section 9.2.

Step 9: After configuration is completed, click "OK". Wait until "configure" configuration ends, and then exit the software.

Status The ethernet settings Press 'Menu' to select quit WinFlash	were configu another ope	red successfu ration, or 'E	lly! xit't
•	100%		
	100%		

Step 10: Enter IP address of GNSS module in browser. Following prompt on the screen, enter "admin" as user name and "password" as password, then press "OK" button.

	Windows 安全
	The server 192.168.2.198 is asking for your user name and password. The server reports that it is from Trimble. Warning: Your user name and password will be sent using basic authentication on a connection that isn't secure.
 Trimble - 2017-11-291 × → C 0 192.168.3.14 	
alver Status dany pation soliton (Graph) ector coole Map coole Map coole Map attin coole Map attin coole Map attin configuration configuration work Configuration work Configuration work Configuration p	Receiver Status - Activity@ Satellites Tracked33 (Status - The Status - Activity@) Satellites Tracked33 (Status - Activity@) Conversion (Status - Activity@) Satellites Tracked33 (Status - Activity@) Conversion (Status - Activity@) Satellites Tracked33 (Status - Activity@) Galleo (St) 7.19.26 BeDou (Th) (Status - Activity@) Comparison (Status - Activity@) ImputOutput (Output: ITRPP Server - CMR) Output: INTRP Server - CMR (Comparison - Activity@) Temperature: 800*C Promoversity Conversion - Activity@)
	2017-11-29T02-40-52Z (UTC)

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