

NET10 GNSS Receiver

User Manual



Edition: V1.0_20210520

Statement

Please read carefully:

Thank you very much for purchasing our product. For instructions on how to use this product, please be sure to read the user manual.

This user manual is for your receiver only. If your receiver does not match the situation in the user manual, the actual situation of the receiver shall prevail.

The information in this document is subject to change without notice; We reserve the right to change or improve its products as well the content without any obligation to notify individual or organization of such changes or improvements. For any questions, please contact the customer service center or contact our authorized dealer.

Customer safety is important. Please carefully read the precautions and instructions in the user manual. To avoid accidental damage, use only original supplied parts. If you do not use the system or connect incompatible accessories in accordance with the correct procedures, it may cause damage to the equipment and may even endanger others and your safety. In this regard, the company does not assume any responsibility.

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1. Product Description

NET10 is designed as high-precision GNSS receiver. The traditional permanent reference stations have many functions and not easy for use. NET10 can be easily installed and configure through the web user interface. Combine with the choke-ring antenna, NET10 provides stable and reliable correction data.

Main features:

- Robust housing with IP67 protection
- Support ethernet or WiFi connection
- Support Bluetooth and RS232
- Easy configuration via WebUI
- Support NTRIP Caster, server, and client mode

2. Appearance

There are four indicators on NET10: satellite, data recording, data transmitting and power supply.



3. Technical Specifications

GNSS	
Satellites Tracking	GPS: L1CA/L1P/L1C/L2P/L2C/L5 BDS: B1I/B2I/B3I/B1C/B2a/B2b/ ACEBOC GLONASS: G1/G2/G3, P1/P2 GALILEO: E1/E5a/E5b/E6/ALTBOC QZSS: L1CA/L1C/L2C/L5/LEX IRNSS: L5 SBAS ¹ : L1/L5 L-Band: Atlas H10/H30/Basic
Channels	800
Signal Reacquisition	< 1 sec
Cold Start	< 60 sec
Warm Start	< 30 sec
Hot Start	< 10 sec
Initialization Reliability	> 99.9%
Update Rate	10 Hz standard, up to 20 Hz
Operation System	Linux
Internal Memory	32 GB
Performance	
High Precision Static	H: 2 mm + 0.1 ppm V: 3 mm + 0.4 ppm
Static/Fast Static	H: 2.5 mm + 0.1 ppm V: 3.5 mm + 0.4 ppm
RTK	H: 8 mm + 1 ppm V: 15 mm + 1 ppm
Code Differential	H: 0.3 m V: 0.6 m
SBAS	H: 0.3 m V: 0.6 m
L-Band	Atlas H10: 4 cm RMS Atlas H30: 15 cm RMS Atlas Basic: 30 cm RMS
1PPS	10 ns
Power Supply	
Power	2-pin DC in
Voltage	8~36 VDC with over-voltage protection
Communication	
Bluetooth	BT5.0 + EDR, compatible with BLE
WIFI	802.11 b/g/n/ac
Ethernet	Support
Port	1 x Lemo-0, 2-pin, DC in 1 x DB9 female, RS232 1 x RJ45 ethernet 1 x GNSS TNC female
Baud Rate	9600 ~ 115200 bps
Web UI	Support
NMEA Output	NMEA0183
Correction Data	RTCM2.X, RTCM3.X, CMR, CMR+, DGPS, BINEX, RAW
Data Recording	Support 8 recording simultaneously
Recording Format	Binary, RINEX, BINEX
Recording Interval ²	2s, 5s, 10s, 15s, 30s, 60s 1 Hz, 2 Hz, 5 Hz, 10 Hz, 20 Hz
Data Stream	1 x Bluetooth 1 x Serial port 3 x NTRIP server streams 1 x NTRIP client streams 5 x Socket (TCP/UDP) streams
Smart Alert	Email alert
FTP Function	FTP server FTP client (FTP push)
NTP Server	Support
Others	DDNS, SNMPD, Firewall, VPN
Physical	
Dimension	131 x 36.5 x 97 mm
Weight	435 g
Operating Temperature	-40°C ~ +65°C
Storage Temperature	-45°C ~ +80°C
Water/Dust Proof	IP67
Humidity	Up to 95%
Indicators	Power, satellite, recording, datalink
Button	1 x Reset button

4. Basic Operations

- **Connect the GNSS antenna**

To receive satellite signals, NET10 needs to be connected to an external antenna with TNC port.

- **Connect the power supply**

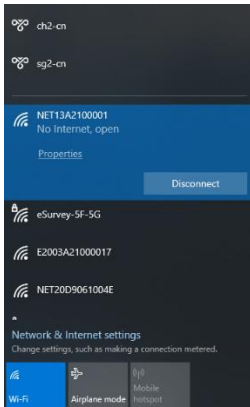
NET10 does not have internal battery. To run the device, the external power supply is needed. Please use the original adapter to avoid any danger. Once device is connected to the 2-pin power cable, it will automatically power on. Disconnect the 2-pin power cable to power off the device.

- **Reset Button**

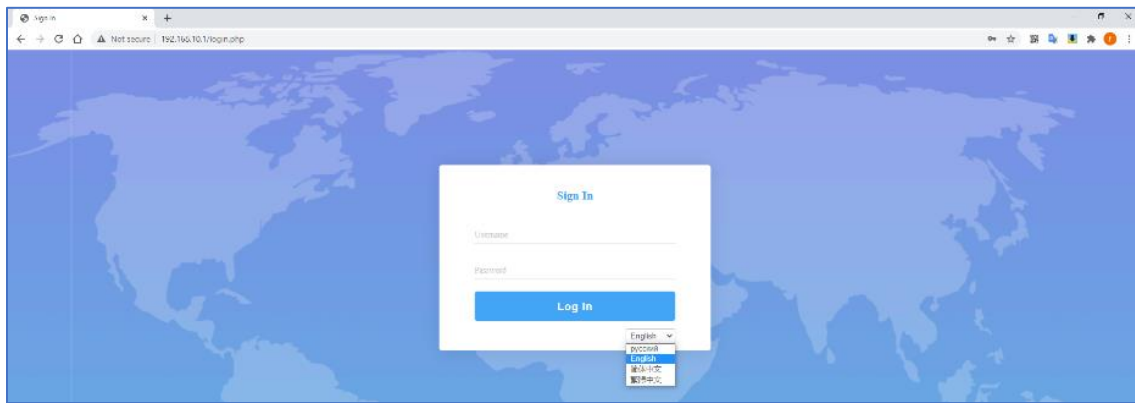
Press the reset button 3 seconds to reset some basic settings. To reset all settings including network setting, press the reset button for 1 minutes.

5. WebUI Settings

When device is powered on, use computer or tablet to search and connect the device hotspot.

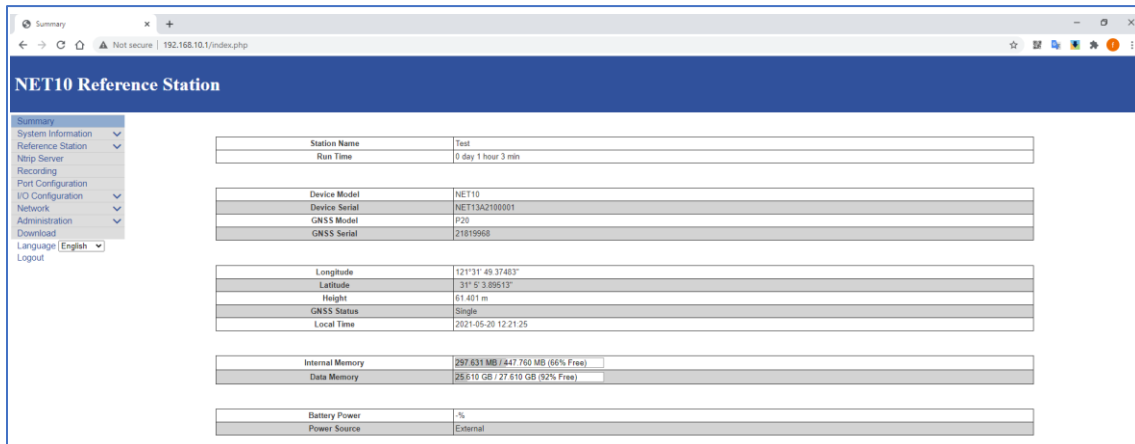


Open web browser and access IP "192.168.10.1", the username is "admin", password is "password". User can change the language and click "Log in" to show the Web user interface.



[Summary]

This page shows the basic information including device running time, device serial number, GNSS board, position, storage, and power supply status.



[System Information]

This page shows more details about the firmware version, GNSS functionality.

NET10 Reference Station

Summary
System Information
System Information
GPS Status
Satellites
Map
Reference Station
Ntrip Server
Recording
Port Configuration
I/O Configuration
Network
Administration
Download
Language | English
Logout

Station Name	Test
Expire Date	20210720
Time Zone	GMT+08:00

Device Model	NET10
Device Serial	NET13A3100801
Hardware Version	MINICORS-V1.0
BOOT Version	0117
OS Version	4.1.6-0121-M1G2
APP Version	2.12-216422
Web Version	2.12
MCU Version	0003

GNSS Model	P20
GNSS Serial	21819968
GNSS Hardware Version	1
GNSS Firmware Version	6.5Aa03a2
GNSS Functionality	OPT+ 10Hz RTK L2_L5_MULTI_GNSS-HEADING ATLAS_LBAND_China_Only

Internal Memory	207.831 MB (847.760 MB (66% Free))
Data Memory	265.10 GB / 27.610 GB (92% Free)

Battery Power	%
Power Source	External

[GPS Status]

This page shows details about the position status including PDOP, HDOP, HRMS and VRMS.

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Local Time	2021-05-20 12:21:40 (GPS Time + 8)
Satellites	38
Longitude	121°31'49.37485"
Latitude	31°5'3.89466"
Height	61.465 m
Status	Single
PDOP	0.872
HDOP	0.463
HRMS	0.926
VRMS	1.479

Station Number	0111
Base Longitude	113°21'59.82440"
Base Latitude	23°7'35.67690"
Base Height	30.800 m

MET Type	Z211A
Pressure	-hPa
Temperature	-°C
Humidity	-%RH

Antenna Type	HX-GG486A
Antenna Height	0 mm
Measurement Mode	Antenna Phase Center

[Satellites]

Satellites view in list or plot.

Satellites

NET10 Reference Station

Summary
System Information
GPS Status

Satellites

Satellites Table

Type	SV	Elev.[Deg]	Azim.[Deg]	L1G1(B1E1)(dBHz)	L2G2(dBHz)	L5E5a(B2a)(dBHz)	G3E5b(B2b)(dBHz)	E5B2(dBHz)	L6E6B3(dBHz)
GPS	1	80	54	47	59	36	-	-	-
GPS	3	24	144	39	53	-	-	-	-
GPS	7	38	286	44	57	-	-	-	-
GPS	8	28	60	39	42	-	-	-	-
GPS	14	40	320	42	45	-	-	-	-
GPS	17	27	280	40	54	-	-	-	-
GPS	21	54	42	44	49	-	-	-	-
GPS	22	35	110	44	46	-	-	-	-
GPS	28	24	316	40	39	-	-	-	-
GPS	30	46	262	41	59	36	-	-	-
GLONASS	12	63	166	42	40	-	-	-	-
GLONASS	13	57	322	-	33	-	-	-	-
GLONASS	23	55	286	40	-	-	-	-	-
GLONASS	24	24	246	38	36	-	-	-	-
BDS	1	46	140	42	-	-	44	-	-
BDS	2	34	234	38	-	-	43	-	-
BDS	3	51	200	42	-	-	44	-	-
BDS	4	35	122	39	-	-	42	-	-
BDS	5	16	258	36	-	-	40	-	-
BDS	7	77	46	46	-	-	47	-	-
BDS	8	57	190	44	-	-	47	-	-
BDS	9	10	216	32	-	-	36	-	-
BDS	10	61	326	44	-	-	45	-	-
BDS	11	65	324	46	-	-	49	-	-
BDS	12	34	42	41	-	-	47	-	-
BDS	13	35	202	42	-	-	42	-	-
BDS	21	12	98	40.39	-	-	41	-	-
BDS	23	35	310	45.43	-	-	46	-	-
BDS	24	25	162	42.40	-	-	44	-	-
BDS	25	66	230	49.48	-	33	49	-	-
BDS	34	67	18	48.48	-	-	48	-	-
BDS	38	48	198	46.44	-	-	47	-	-
BDS	40	64	358	45.44	-	33	48	-	-
BDS	43	49	278	46.46	-	-	47	-	-
BDS	44	12	56	40.37	-	-	41	-	-
BDS	59	47	148	44	-	-	46	-	-
BDS	60	37	246	42	-	-	45	-	-
BDS	61	57	264	-	-	-	48	-	-
Galileo	1	45	134	44	-	32	-	-	-
Galileo	12	48	234	40	-	-	-	-	-
Galileo	24	25	318	40	-	-	-	-	-
Galileo	26	23	48	40	-	-	-	-	-
Galileo	31	76	330	44	-	33	-	-	-
Galileo	33	72	18	47	-	33	-	-	-
SBAS	137	53	170	39	-	-	-	-	-

Satellites Used(39): GPS(10), BDS(20), GLONASS(3), Galileo(6)
Satellites Tracked(45): GPS(10), BDS(24), GLONASS(4), Galileo(6), SBAS(1)

Satellites

NET10 Reference Station

Summary
System Information
GPS Status

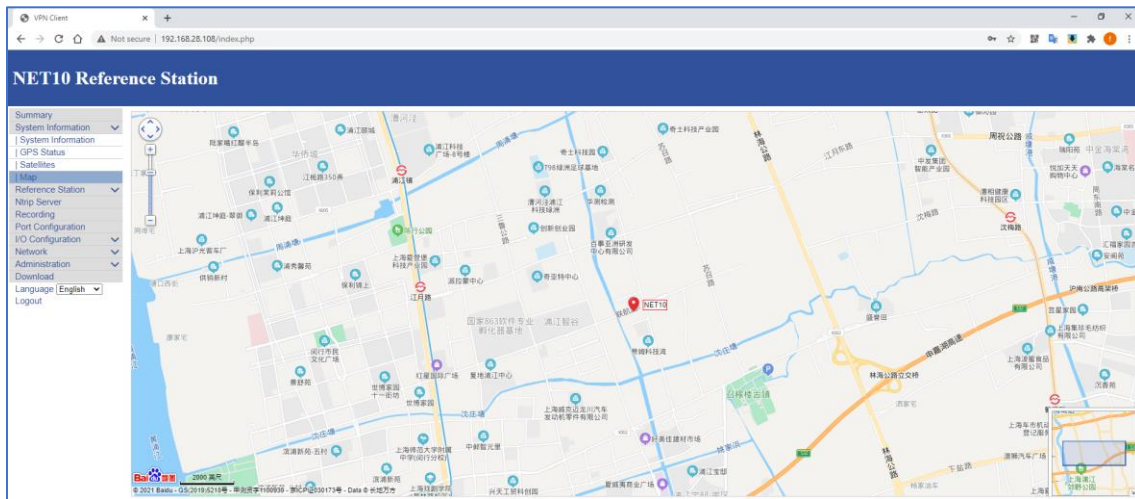
Satellites

Satellites Skyplot

GPS
SBAS
GLN
GAL
BDS

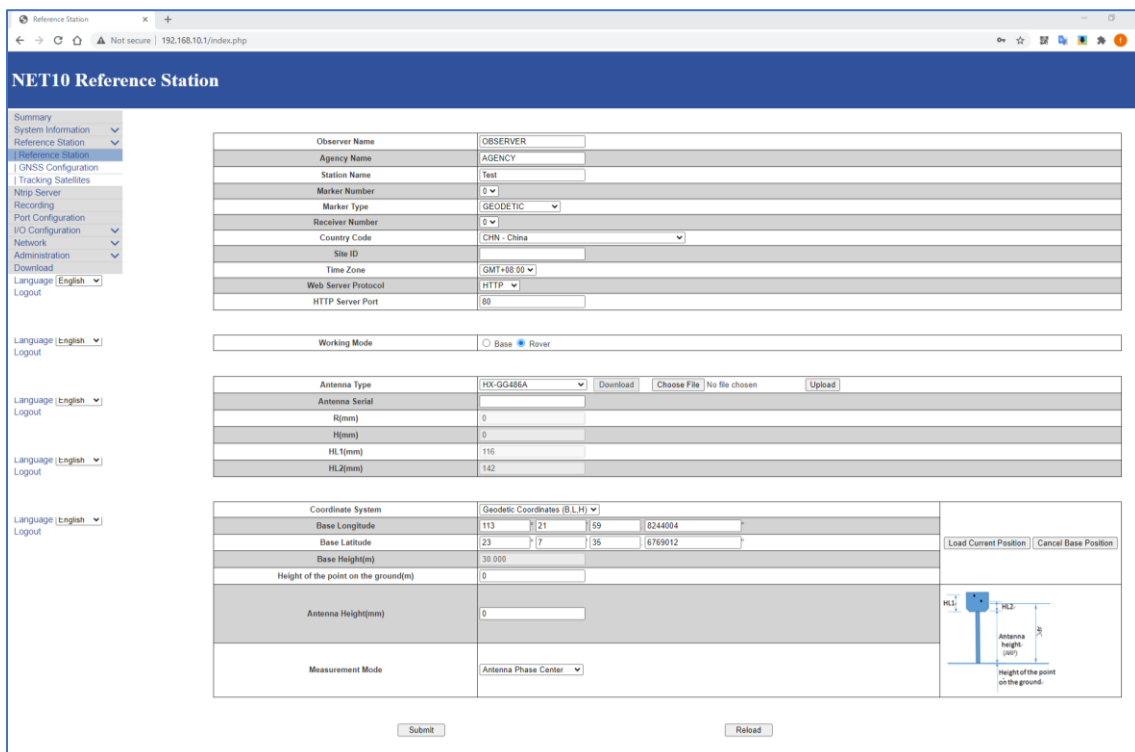
[Map]

The online map requires the computer or tablet to connect network.



[Reference Station]

“Working Mode”: to select base/rover mode. “Antenna”: configure the antenna parameters. “Coordinate and antenna height measurement”: when setup base station, the base coordinate and antenna measurement height is required.



Below image shows how NET10 calculate the antenna phase center height when measuring from the bottom of antenna mount.

Antenna Type	UA-35	Download
Antenna Serial	esurveyantenna	
R(mm)	76	
H(mm)	46	
HL1(mm) a	47.5	
HL2(mm) b	42.5	

Coordinate System	Geodetic Coordinates (B,L,H)		
Base Longitude	121	31	49
Base Latitude	31	5	3
Base Height(m) c	50		
Height of the point on the ground(m) d	50		

Antenna Height(mm) e	0
-----------------------------	---

a = height from antenna bottom to L1 phase center
b = height from antenna bottom to L2 phase center
c = antenna phase center height
d = ground point elevation value
e = antenna measurement height (from ground to the bottom of antenna)
 $c = (a + b)/2 + e + d$

Measurement Mode: Bottom of antenna mount

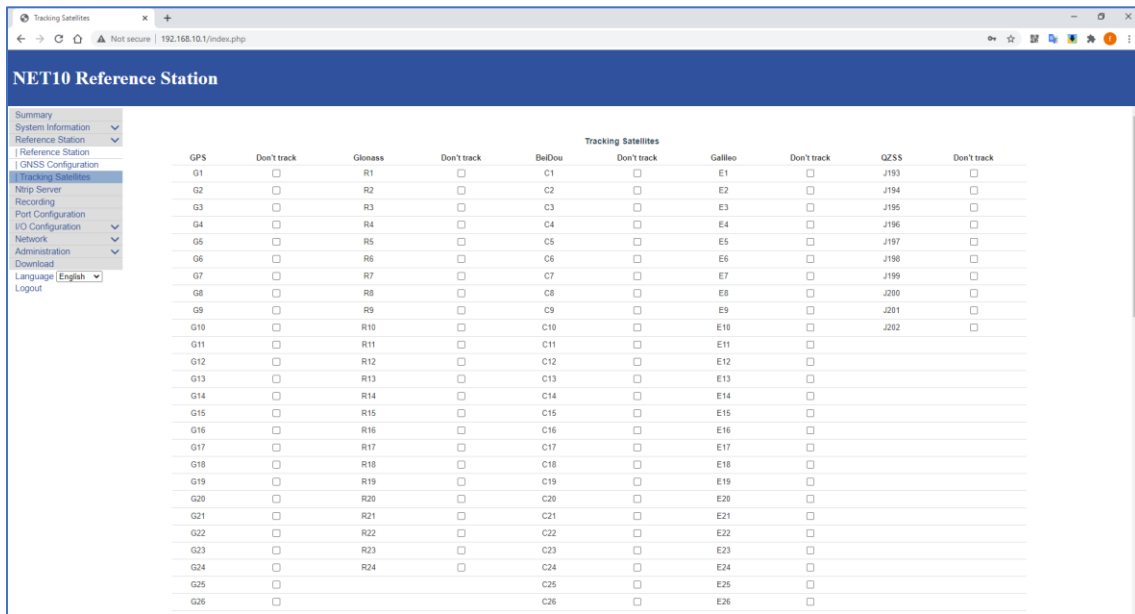
[GNSS Configuration]

To configure cut-off angle and constellations.

Setting	Value
Cutoff Angle	10
1PPS	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Smooth Pseudorange	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
BDS	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
GPS	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
GLONASS	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Galileo	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
QZSS	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
SBAS	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Atlas	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
RTK MODE	<input checked="" type="radio"/> NORMAL <input type="radio"/> SUREFIX

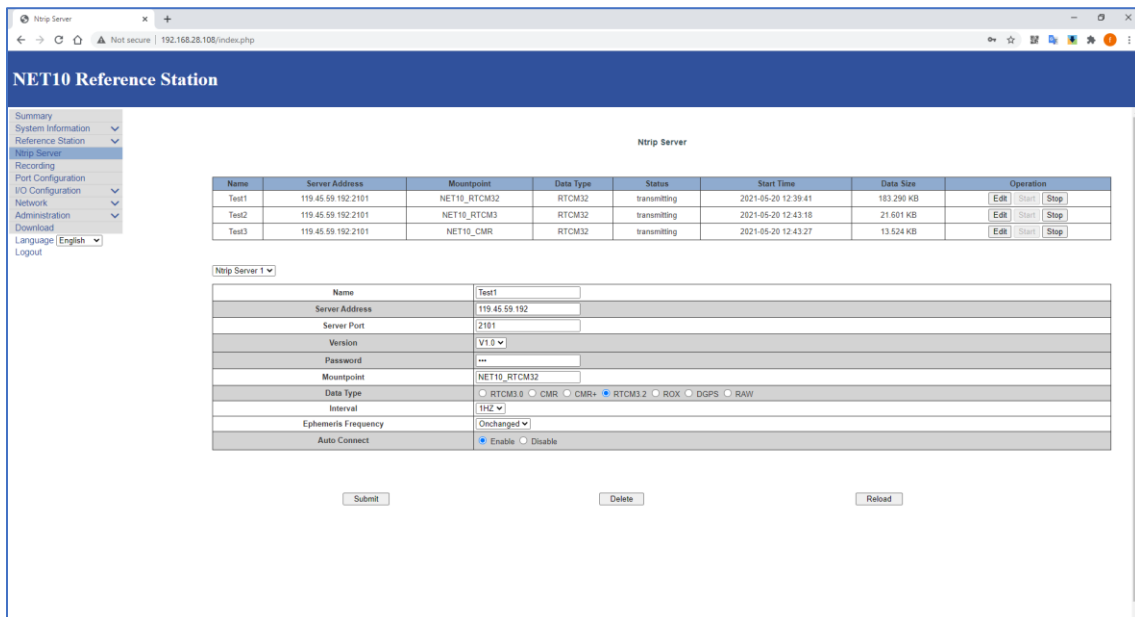
[Tracking Satellites]

To enable or disable satellite tracking.



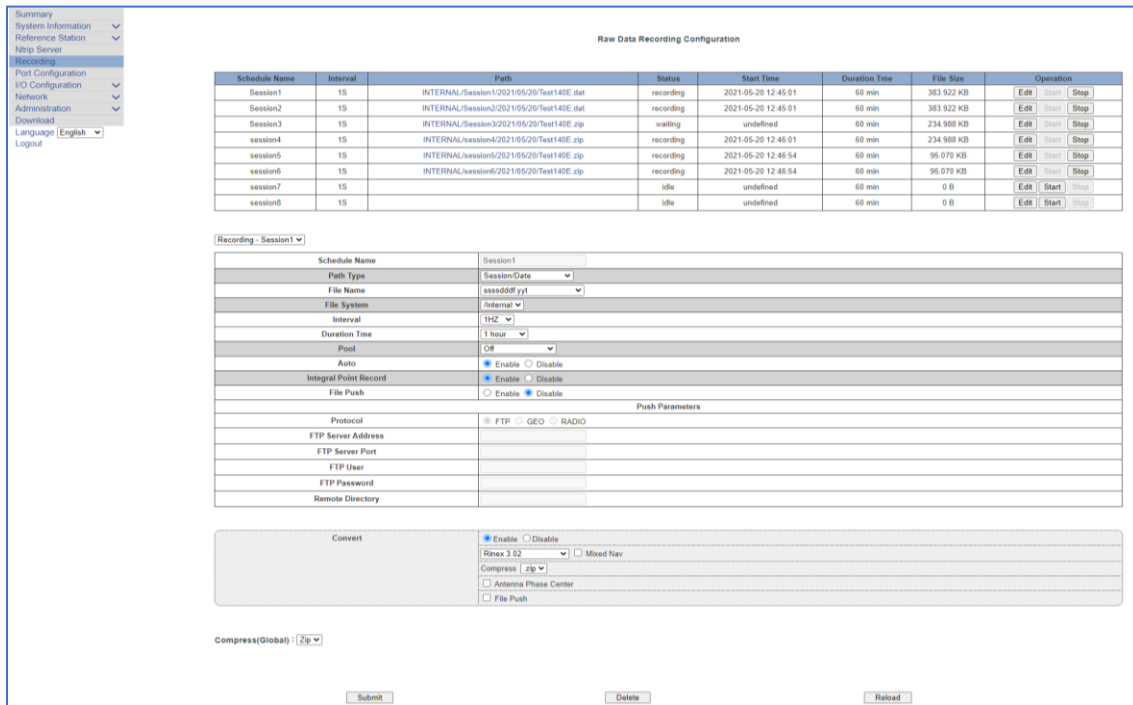
[NTRIP Server]

In base mode, NET10 can transmit correction streams to NTRIP Caster. Up to 3 data streams are supported simultaneously. When NET10 itself enables the “NTRIP Caster” function in “port configuration” page, here the “Server Address” is “127.0.0.1”.



[Recording]

Configure raw data recording and FTP upload. Up to 8 sessions are supported simultaneously. The original raw file format is *.dat, it supports to be converted to RINEX format. To save the memory, user can choose to compress the data in *.zip format.



Raw Data Recording Configuration

Schedule Name	Interval	Path	Status	Start Time	Duration Time	File Size	Operation
Session1	1S	INTERNAL:Session1/20210520/Test140E.dat	recording	2021-05-20 12:45:01	60 min	383.922 KB	Edit Start Stop
Session2	1S	INTERNAL:Session2/20210520/Test140E.dat	recording	2021-05-20 12:45:01	60 min	383.922 KB	Edit Start Stop
Session3	1S	INTERNAL:Session3/20210520/Test140E.zip	waiting	undefined	60 min	234.968 KB	Edit Start Stop
session4	1S	INTERNAL:session4/20210520/Test140E.zip	recording	2021-05-20 12:46:01	60 min	234.968 KB	Edit Start Stop
session5	1S	INTERNAL:session5/20210520/Test140E.zip	recording	2021-05-20 12:46:54	60 min	95.070 KB	Edit Start Stop
session6	1S	INTERNAL:session6/20210520/Test140E.zip	recording	2021-05-20 12:46:54	60 min	95.070 KB	Edit Start Stop
session7	1S		idle	undefined	60 min	0 B	Edit Start Stop
session8	1S		idle	undefined	60 min	0 B	Edit Start Stop

[Recording - Session1]

Schedule Name: Session1

Path Type: SessionDate

File Name: %ss%dd%YY%T

File System: Internal

Interval: 1HZ

Duration Time: 1 hour

Pool: Off

Auto: Enable Disable

Integral Point Record: Enable Disable

File Push: Enable Disable

Push Parameters

Protocol: FTP GEO RADIO

FTP Server Address:

FTP Server Port:

FTP User:

FTP Password:

Remote Directory:

Convert: Enable Disable

Rinex 3.02: Mixed Nav

Compress: .zip .dat

Antenna Phase Center

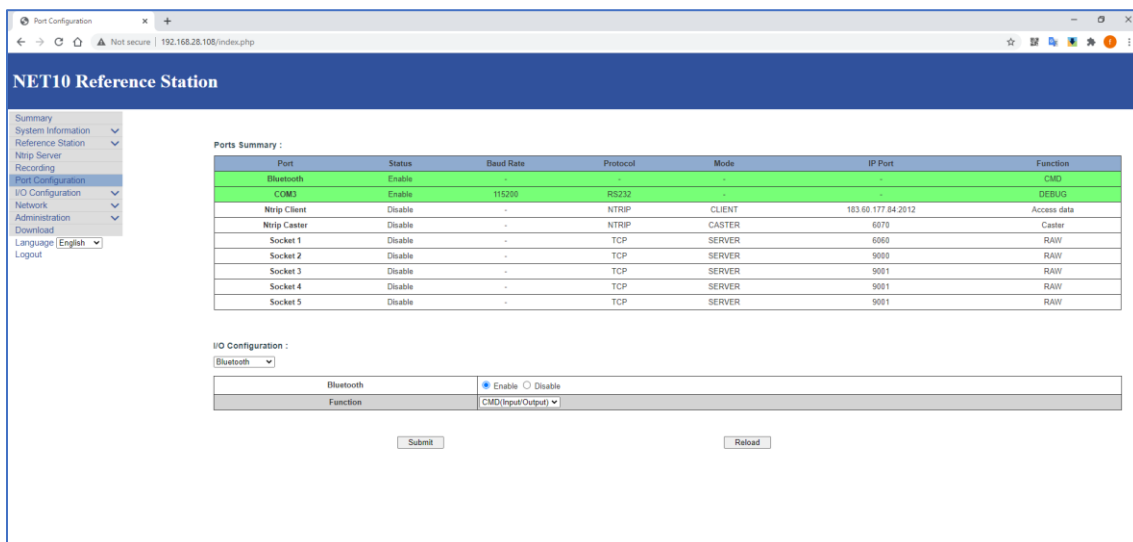
File Push

Compress(Global): Zip Dat

[Submit](#) [Delete](#) [Reload](#)

[Port Configuration]

NET10 supports Bluetooth, COM3 RS232, NTRIP Client, NTRIP Caster and 5 TCP/UDP sockets.



NET10 Reference Station

Ports Summary :

Port	Status	Baud Rate	Protocol	Mode	IP Port	Function
Bluetooth	Enable	-	-	-	-	CMD
COM3	Enable	115200	RS232	-	-	DEBUG
Ntrip Client	Disable	-	NTRIP	CLIENT	183.60.177.84.2012	Access data
Ntrip Caster	Disable	-	NTRIP	CASTER	6070	Caster
Socket 1	Disable	-	TCP	SERVER	6060	RAW
Socket 2	Disable	-	TCP	SERVER	9000	RAW
Socket 3	Disable	-	TCP	SERVER	9001	RAW
Socket 4	Disable	-	TCP	SERVER	9001	RAW
Socket 5	Disable	-	TCP	SERVER	9001	RAW

IO Configuration :

Bluetooth

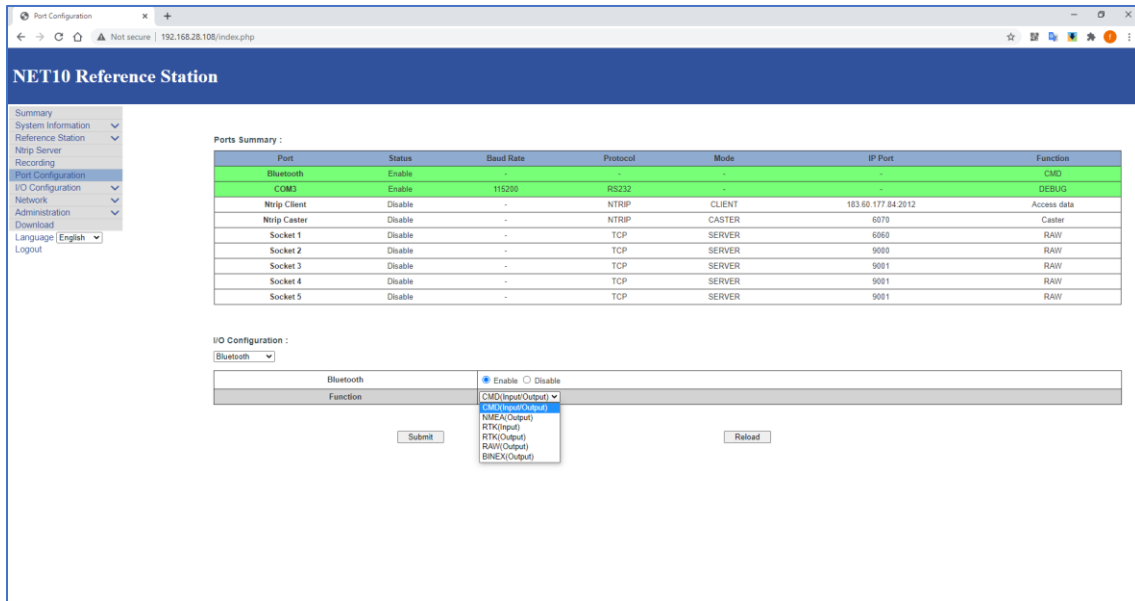
Bluetooth: Enable Disable

Function: CMD/Input/Output

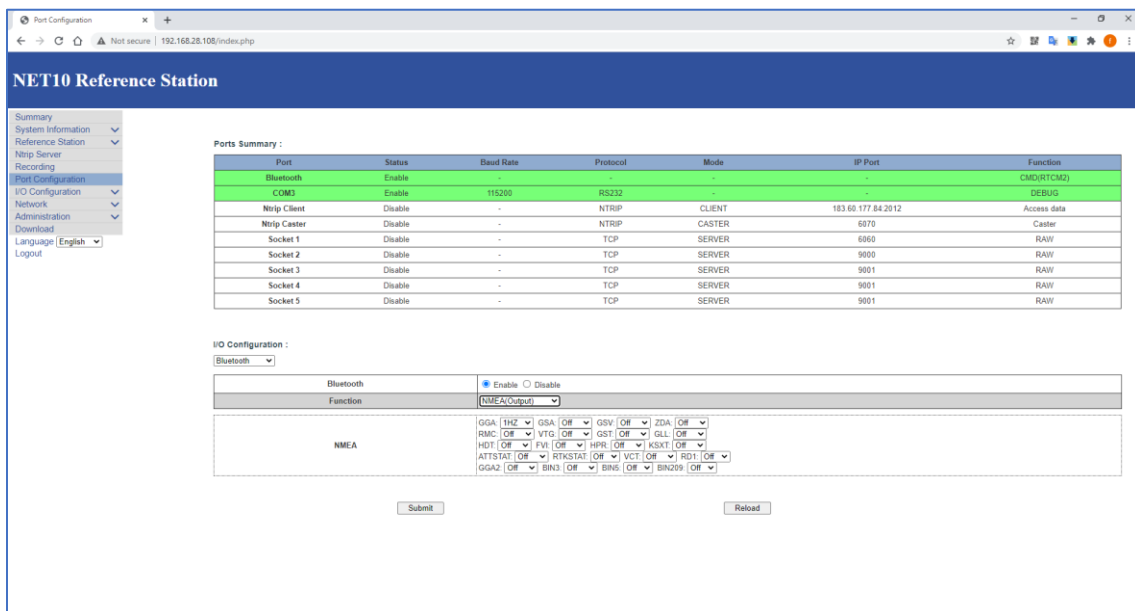
[Submit](#) [Reload](#)

[Port Configuration-Bluetooth]

Bluetooth mode supports CMD(input/output), NMEA(output), RTK(correction data input/output), raw output and BINEX output.

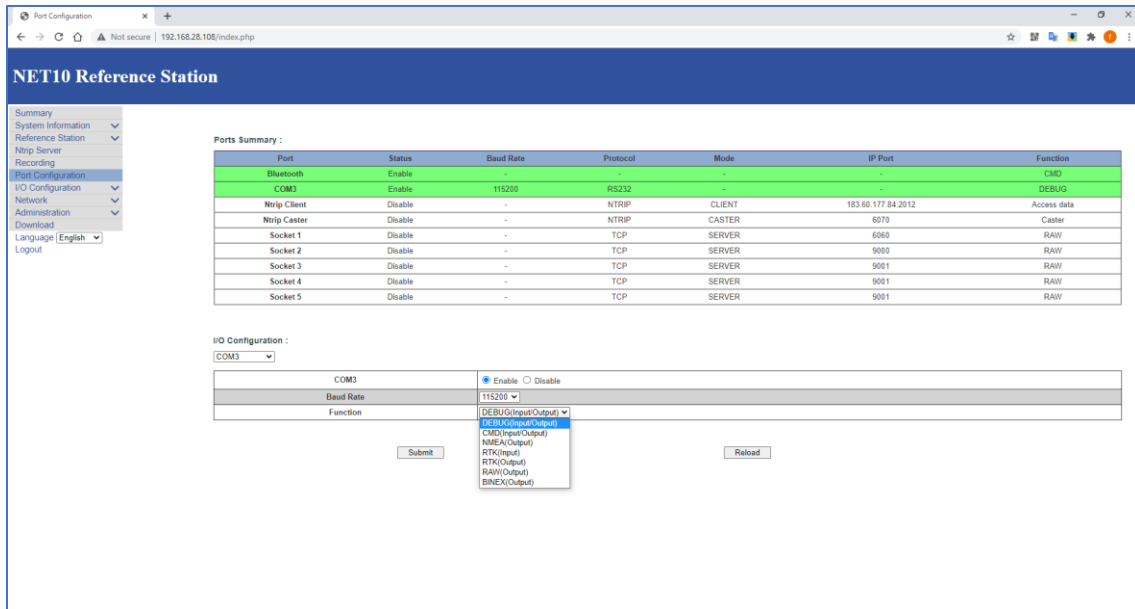


In NMEA setting, when “Convert Coordinate” is enabled, “FVI” message will output the local NEZH coordinate.



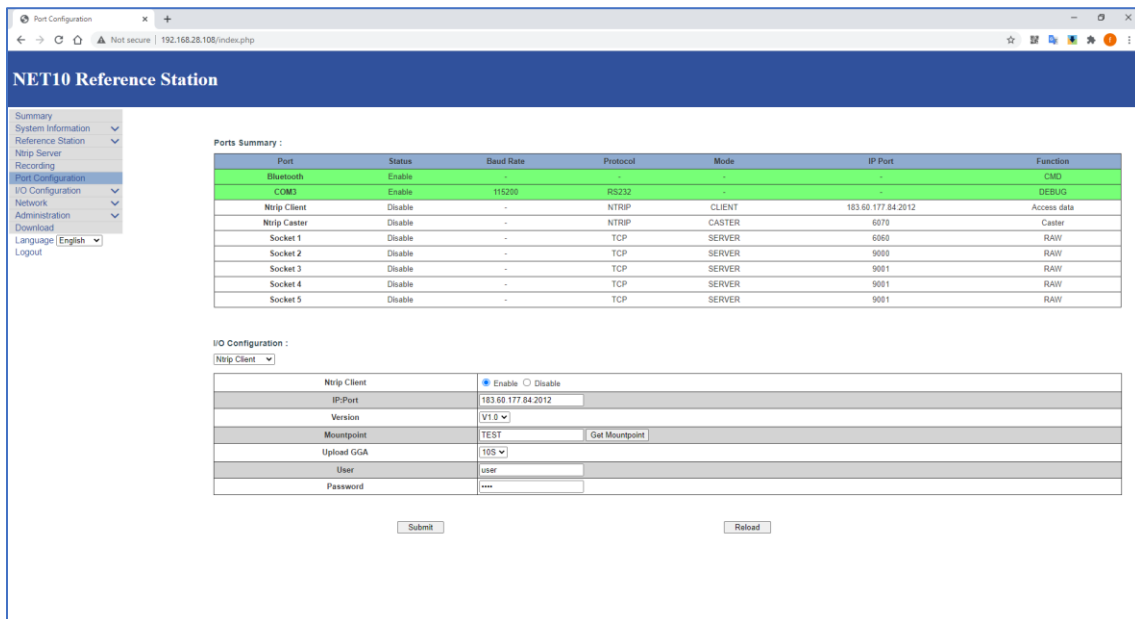
[Port Configuration-COM3]

COM3 supports Debug(input/output), CMD(input/output), NMEA(output), RTK(correction data input/output), raw output and BINEX output.



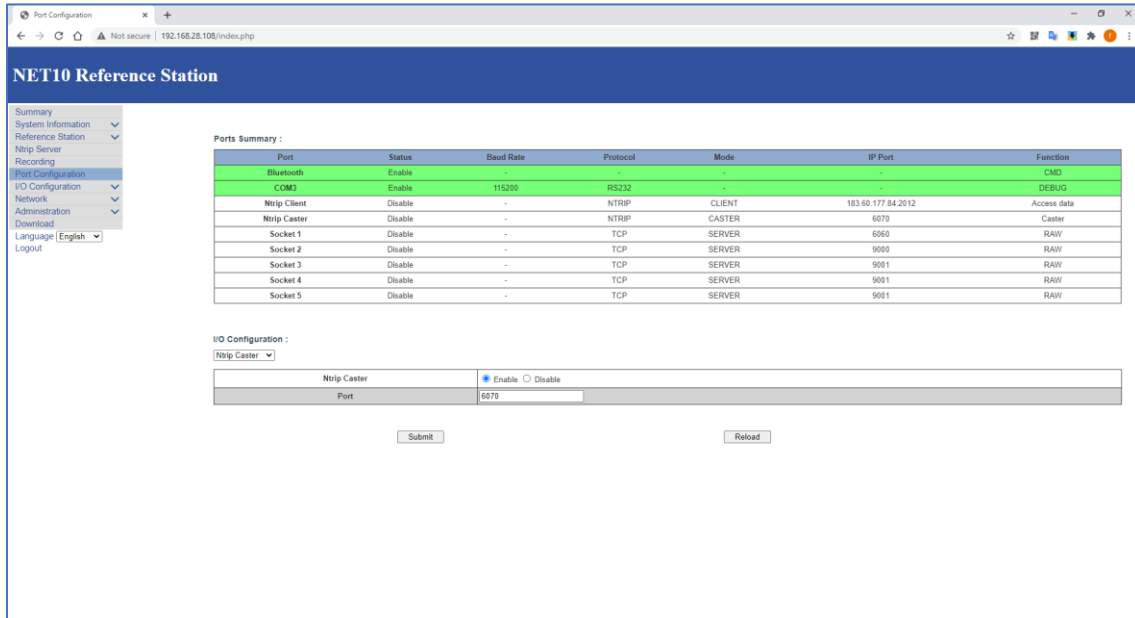
[NTRIP Client]

In "Reference station" page, when "rover" mode is selected. Setup NTRIP client parameter to receive the correction data.



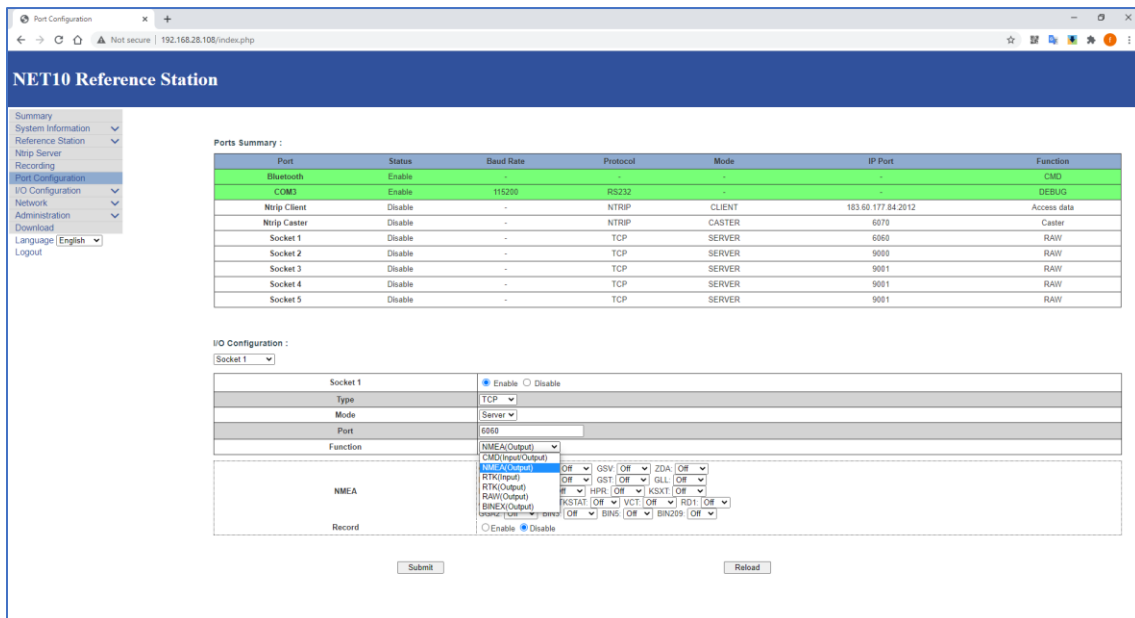
[NTRIP Caster]

NET10 has built-in NTRIP caster platform to forwarding the correction data. To let the user access the mountpoint, the ethernet network should have port forwarding rules for the port.



[Socket]

In socket setting, user can configurate TCP/UDP mode to transmit data.



[Convert Coordinate]

NET10 supports local grid coordinate output. When “Convert coordinate” is enabled and the coordinate parameter is setup, NMEA message “FVI” in “Port Configuration” can output NEH values.

Convert Coordinate

Enable Output: Enable Disable

Destination Datum: Custom

Semi-Major Axis(a): 0

Bot Flattening(b/f): 0

Use Seven Parameter:

Seven Parameter:

- dX(m): 0
- dY(m): 0
- dZ(m): 0
- RotateX(°): 0
- RotateY(°): 0
- RotateZ(°): 0
- Scale(ppm): 0

Projection Parameter:

Projection Type: Gauss

CenterMeridian(°): 0

Scale: 1

North(m): 0

East(m): 0

Ref Height: 0

Base-Lat(°): 0

Base-Long(°): 0

Parallel1: 0

Parallel2: 0

Use Four Parameter:

Four Parameter:

- dX(m): 0
- dY(m): 0
- Rotate(°): 0
- Scale(ppm): 0

Buttons: Submit, Reload

[Track back Settings]

The device can upload the position and device serial number information to TCP server.

Track back Settings

Start: Enable Disable

Server Address: [Input Field]

Server Port: [Input Field]

Username: [Input Field]

Password: [Input Field]

Interval(s): [Input Field]

Buttons: Submit, Reload

@GELOC,2021-05-20T17:02:51,31.0844208400,121.5303884860,58.6100,nan,-nan,58.6100,37,1,0.972,2.450,4.568,0,0.0730,53.7220,NET13A2100001,,,*4F

String	Type	Meaning	Note
@GELOC	string	Header	
Time	Number	Date and time	Second precision
Lat	number	Latitude	Unit: degree
Lon	number	Longitude	Unit: degree
Alt	number	Altitude	Unit: meter
North	number	North	Unit: meter, available when coordinate system is enabled
East	number	East	Unit: meter, available when coordinate system is enabled
Height	number	Elevation	Unit: meter
SatNum	number	Used satellites	
PosStat	number	Solution status	0 = No position 1 = Single 2 = DGNSS 4 = Fixed 5 = Float
PDOP	number		
HRMS	number		
VRMS	number		
Age	number	Delay time	
Speed	number	Speed	Unit: km/h
Dir	number	Direction/Heading	Unit: degree
SN	string	Serial number	
///	-	Reserved	
Check	Checksum	CRCB check	Check the message

[Network]

To setup the ethernet or wireless network. Please note, once the wireless net is changed to “Client” mode, the WebUI will be stopped and not able to access. For user who is not familiar with the device, we do not suggest change the wireless net setting.

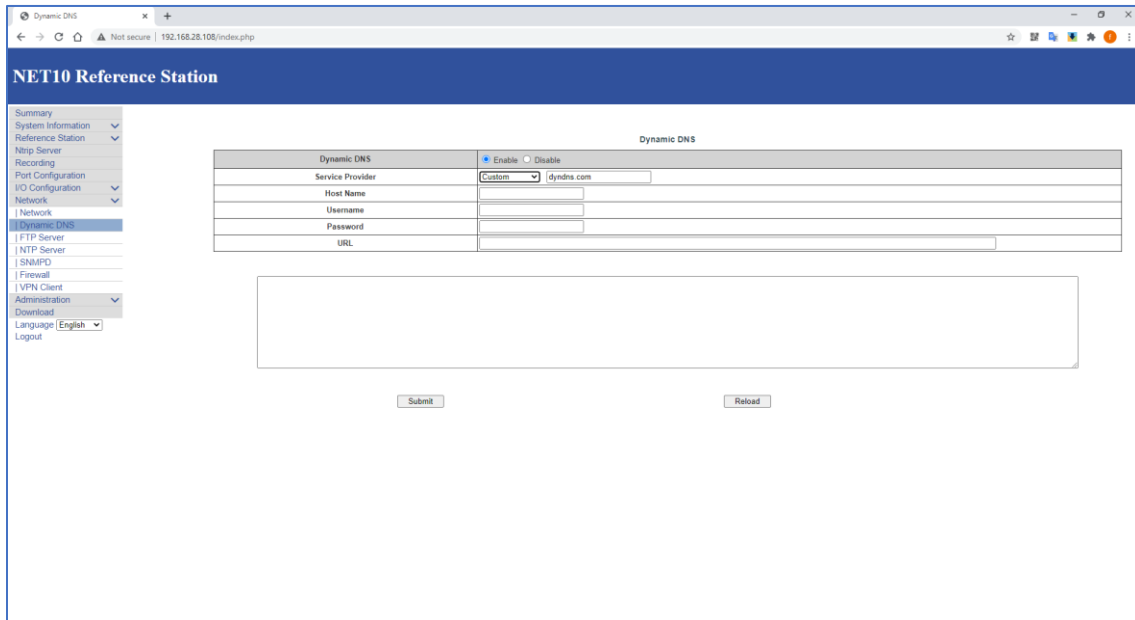
The screenshot shows the 'NET10 Reference Station' web interface. The left sidebar contains a navigation menu with options like Summary, System Information, Reference Station, Ntrip Server, Recording, Port Configuration, I/O Configuration, Network, Dynamic DNS, FTP Server, NTP Server, SNMPD, Firewall, VPN Client, Administration, Download, Language (English), and Logout. The main content area is titled 'The Running Network' and contains several configuration sections:

- The Running Network:**
 - Priority Network: Wired Net Wireless Net
 - Switch Strategy: Local Network Public Network Disable
 - Current Network: WAN
 - Default Gateway: 192.168.28.253
 - DNS: 114.114.114.114 8.8.8.8
 - PING: Timeout: []s Counts: []
- Device Network Settings:**
 - Wired Net: WAN LAN
 - DHCP: Enable Disable
 - IP: 192.168.28.108
 - Mask: 255.255.255.0
 - Gateway: 192.168.28.253
 - MAC address: 64.69.4E.69.4F.28
 - Link Status: Link connected
 - Status: Internet access
- Wireless Net:**
 - Wireless Net: Client Hotspot Disable
 - MAC address: 74.7A.90.6E.47.87
 - SSID: NET13A2100001
 - Password: NONE
 - IP: 192.168.10.1

At the bottom of the configuration area, there are 'Submit' and 'Reload' buttons.

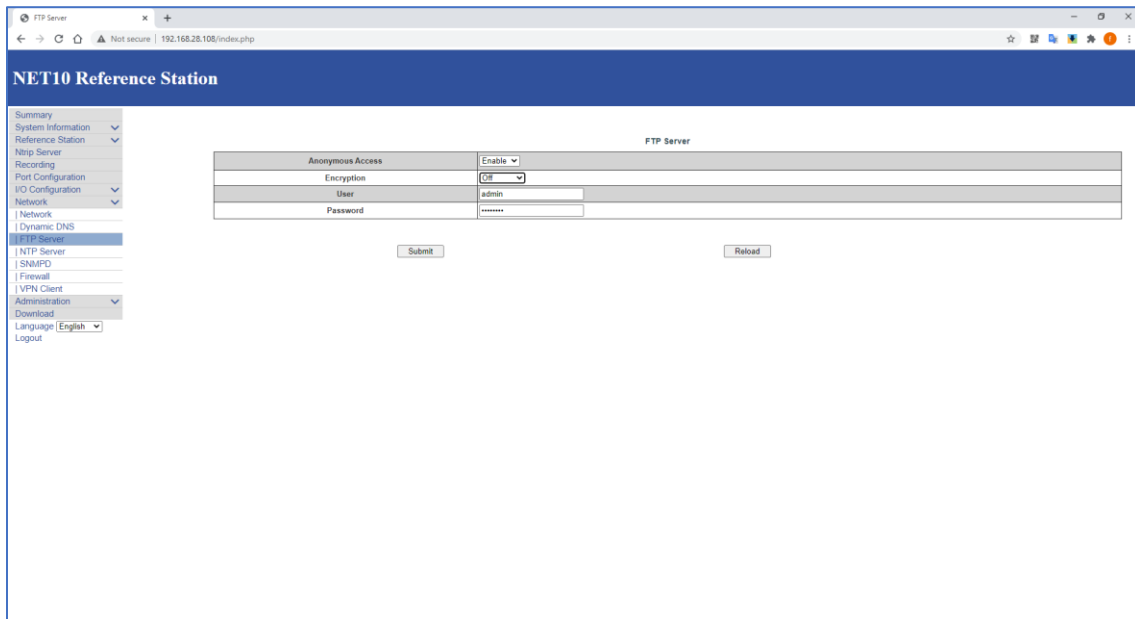
[Dynamic DNS]

This function can be used when NET10 itself as NTRIP Caster. If user does not have static IP, dynamic DNS service is suggested.



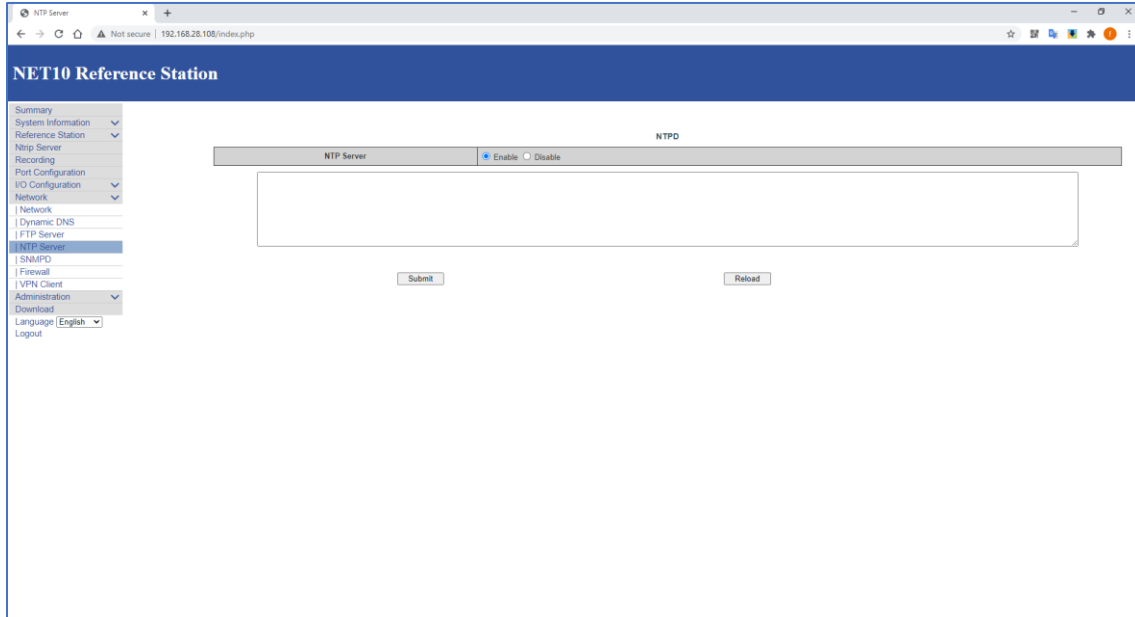
[FTP Server]

To configurate NET10 as FTP server. User can access NET10 storage with the correct username and password.

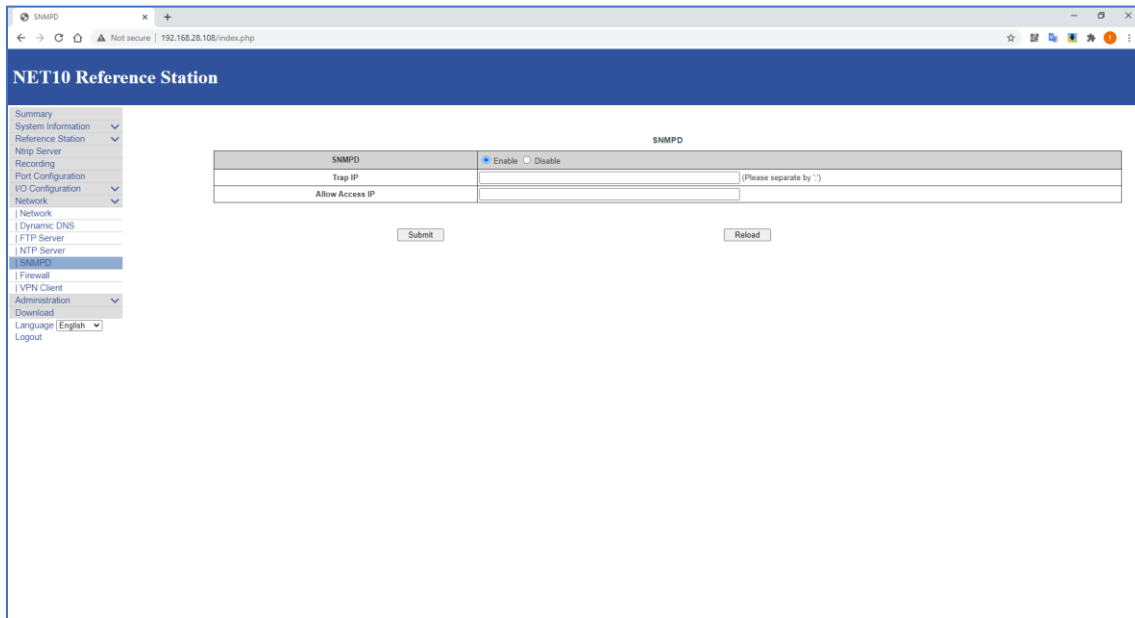


[NTP Server]

NET10 time is from the satellite. When enabled, the devices like computer which is under the same network can sync the time with NET10.

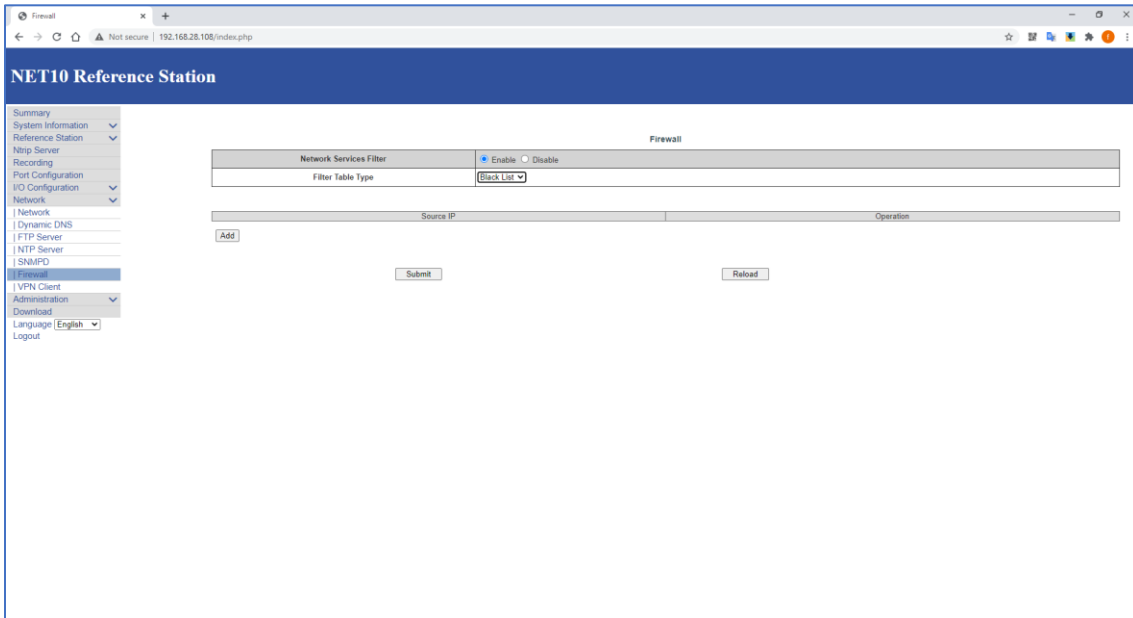


[SNMPD]



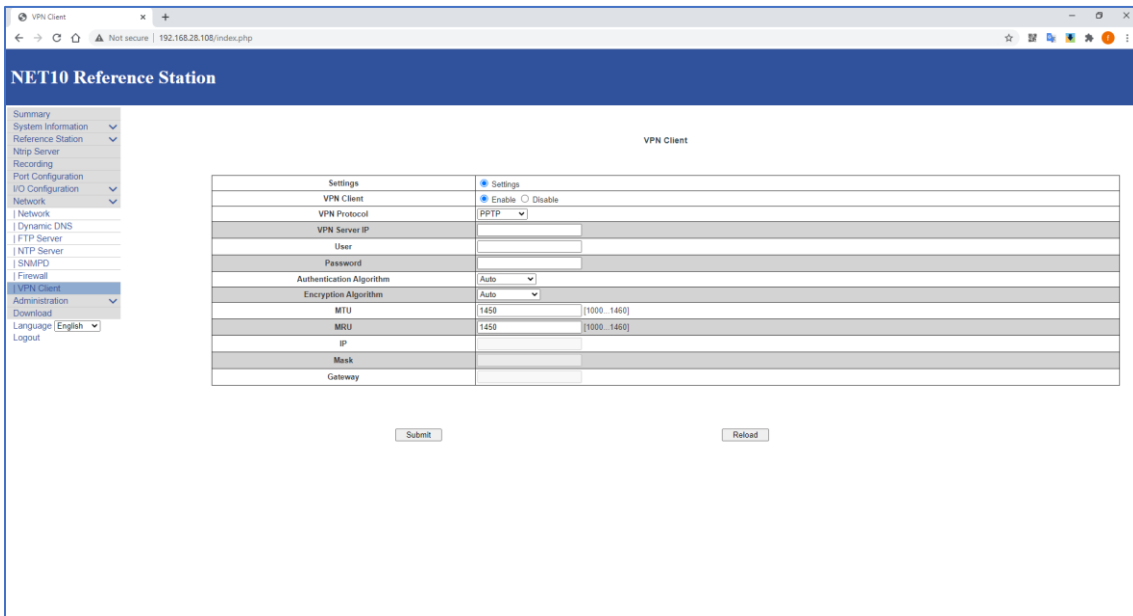
[Firewall]

To configure the IP address access in blacklist or whitelist.



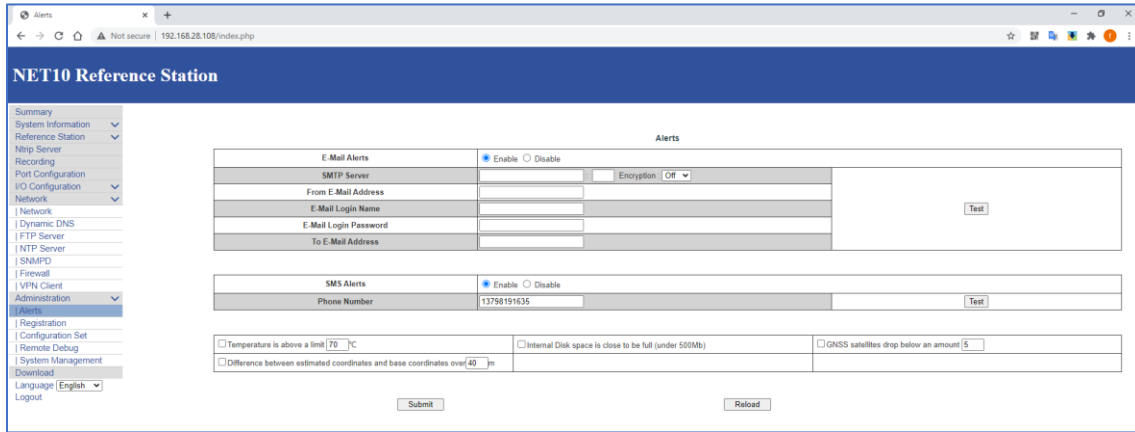
[VPN Client]

To configure the VPN settings.



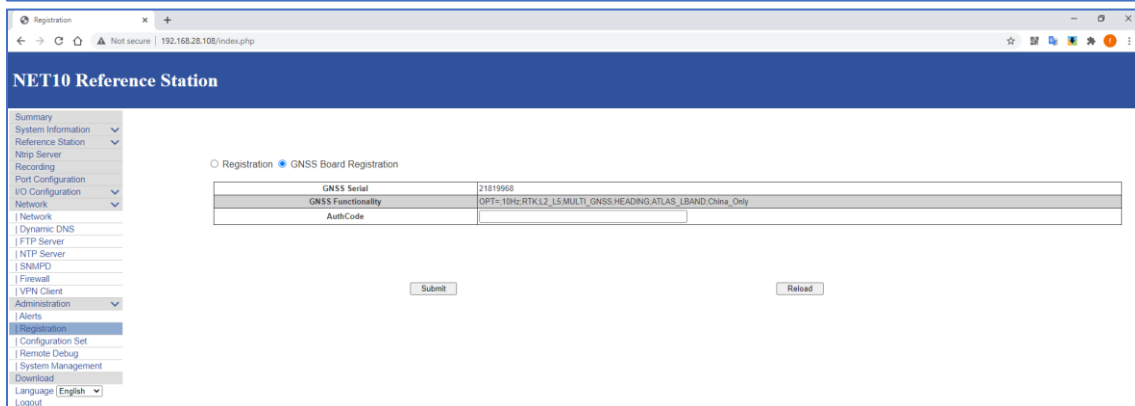
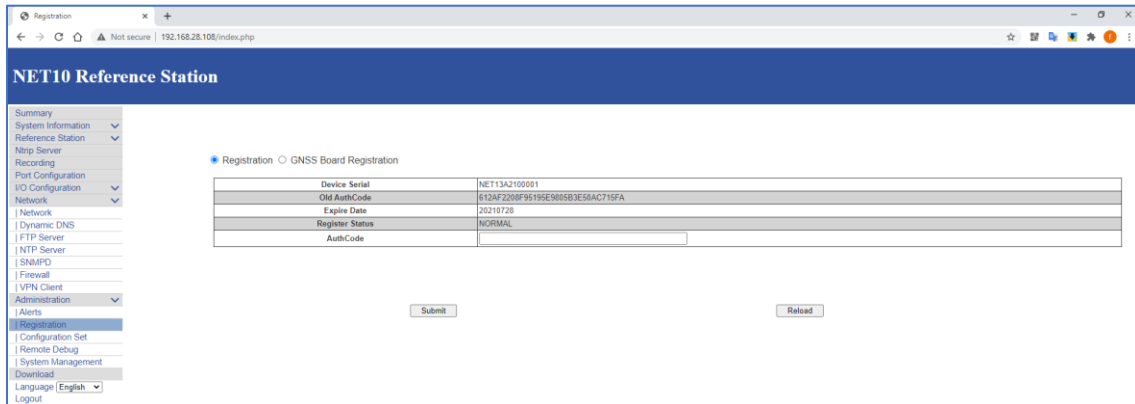
[Alerts]

NET10 support email alert when temperature is above the limitation, internal storage is almost full, satellite number is to less or when the device is moved away.



[Registration]

Register the device and GNSS board. For the GNSS board, it is used mainly to register the L-band Atlas function.



[Configuration Set]

Config Files	Save config	Restore config
System config	Download	Choose File No file chosen Upload
Service config	Download	Choose File No file chosen Upload
User config	Download	Choose File No file chosen Upload

[Remote Debug]

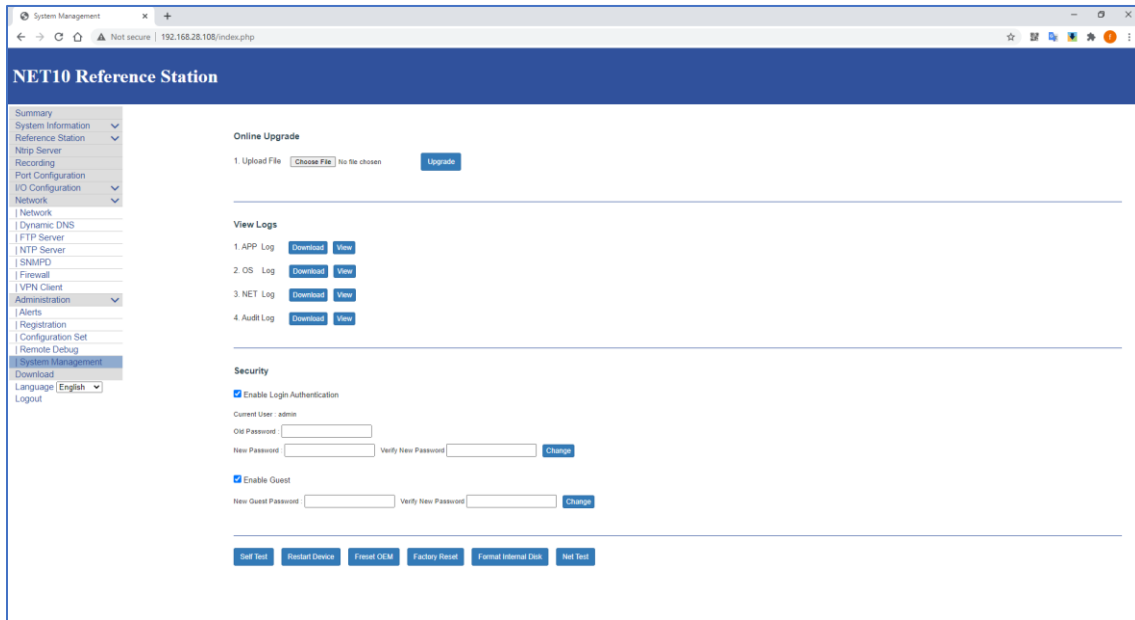
Remote Debug

Enable Disable

IP: Port

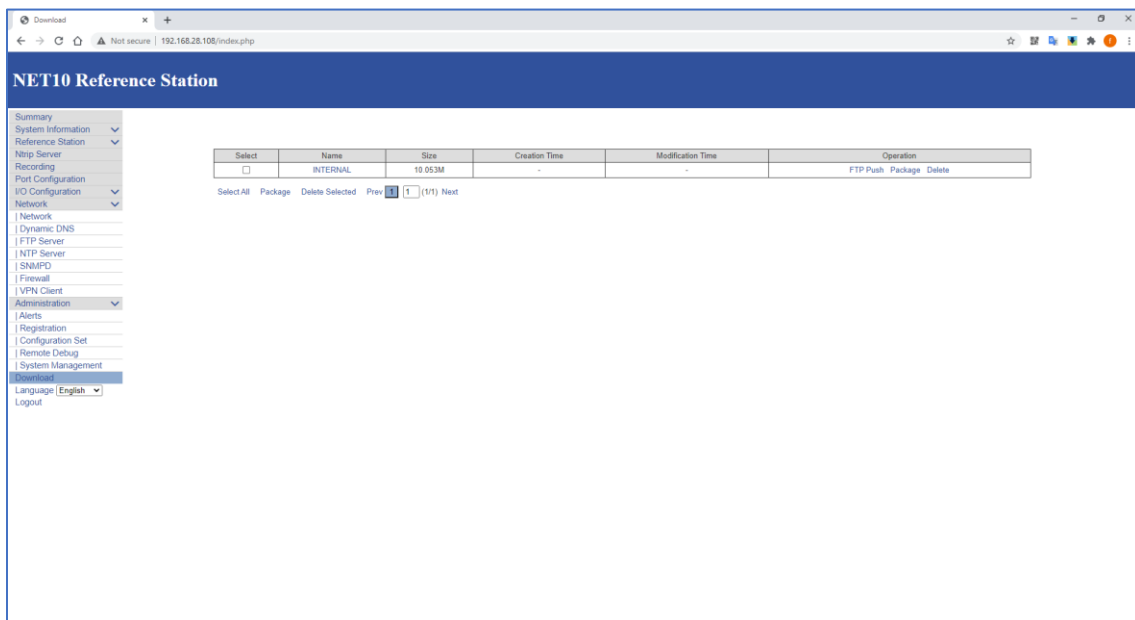
[System Management]

This page is used to update firmware version, view logs, change WiFi password, do self-test, restart device, reset GNSS board, reset factory settings, format internal disk.



[Download]

Download the recorded data.



Warranty Policy

The Guarantees Rights

- e-survey supports free exchange or refund within 7 days from the day when you have received the products, where the device appears "performance failure", which confirmed by e-survey repaircenter.
- e-survey supports free maintenance or exchange within 15 days from the day when you have received the products, where the device appears "performance failure", which confirmed by e-survey repair center.
- e-survey supports free maintenance or exchange the same type of device within one year from the day when you have received the products, where the device appears "performance failure", which is still not in working conditions after two repairs.
- e-survey supports a 24-month warranty service for the device host and a 3-month free warranty service for the accessory from the day when you have received the products.

Warranty service

If the device host meets the warranty conditions, the warranty service can be obtained according to the warranty card and the purchasing invoice. If the proof of purchase and the warranty card cannot be provided, and e-survey will use the delivery time as the standard for the warranty period.

- If it is a non-warranty product, and the repair center will handle the maintenance of the extra-fee.
- After the device is repaired, the same fault is confirmed by the repair center and e-survey will provide a 3-month free warranty service.
- The transportation, delivery and disposal costs incurred during the delivery or inspection of the product to e-survey shall be borne by the user. The freight generated by the repair or inspection equipment returned to the user shall be borne by e-survey.
- Equipment that needs to be repaired or sent for inspection, please back up the data in the machine in time.
- During the warranty period, the parts normally used for maintenance are free.
- The parts that have been replaced during the repair are owned by e-survey.
- e-survey is not responsible for non-product standard and software or applications that are not certified by the company.

Following conditions are not within the scope of the warranty and service

The device host and accessories have been subjected to: abnormal or improper use, improper storage of abnormal conditions, unauthorized disassembly or alteration, accidents, damage caused by improper installation.

- Damage caused by improper use of user, such as liquid injection, damage due to external force, etc.
- Failure to use, repair or transport caused by the equipment's instruction manual.
- Damage to the product is caused by external, including but not limited to, abnormal and unpredictable factors such as satellite systems, geomagnetism, static electricity, physical pressure, etc.
- Damage caused by force majeure such as earthquakes, floods, wars, etc.
- Other conditions that cannot comply with the relevant provisions of the Guarantees Rights.