

AsteRx SB3

User Manual







User Manual Revision 1.4 Applicable to version 4.14.4 of the AsteRx SB3 Pro/Pro+ firmware Applicable to version 4.14.4 of the AsteRx SB3 ProBase firmware Applicable to version 4.14.4 of the AsteRx SB3 CLAS firmware

October 04, 2024

Thank you for choosing the AsteRx SB3! This user manual provides detailed instructions on how to use the AsteRx SB3 and we recommend that you read it carefully before you start using the device.

Please note that this manual provides descriptions of all functions of the AsteRx SB3 product family however, the particular AsteRx SB3 you purchased may not support functions specific to certain variants.

While we try to keep the manual as complete and up-to-date as possible, it may be that future features, functionality or other product specifications change without prior notice or obligation. The information contained in this manual is subject to change without notice. We recommend you to look for new or updated information in our Knowledge Base at https://customersupport.septentrio.com/s/topiccatalog



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Contents

1	Intro	oductio	n	4
	1.1	User I	Νοτιces	4
		1.1.1	CE Notice	4
		1.1.2	ROHS/WEEE Notice	4
		1.1.3	Safety information	5
		1.1.4	Support	6
2	Aste	Rx SB3	Overview	7
	2.1	Рнузіс	CAL AND ENVIRONMENTAL SPECIFICATIONS	7
	2.2	AsteR	x SB3 design	8
		2.2.1	Front Panel	8
		2.2.2	Rear Panel	8
3	Conf	iguring	the AsteRx SB3	9
	3.1	CONNI	стілд то тне АзтеRх SB3	9
		3.1.1	Powering the AsteRx SB3	9
		3.1.2	Connecting to the web interface via Ethernet	11
		3.1.3	Connecting to the web interface via USB	12
		3.1.4	Connecting via COM	13
	3.2	How т	O CONFIGURE THE ASTERX SB3 FOR RTK	14
		3.2.1	How to configure the AsteRx SB3 in RTK rover mode via Ethernet	14
	3.3	How т	O CONFIGURE THE ASTERX SB3 FOR ATTITUDE	16
	3.4	Ноw т	O CONFIGURE THE ASTERX SB3 AS A BASE STATION	21
4	Com	mon Re	eceiver Operations	31
	4.1	How т	O CONFIGURE SBF AND NMEA OUTPUT	31
		4.1.1	Output over a serial COM connection	31
		4.1.2	Output over Ethernet	35
	4.2	How т	O LOG DATA	39
		4.2.1	Internal logging	39
	4.3	Down	LOADING LOGGED DATA FROM THE RECEIVER	42
Ар	pend	ix A R	ear-panel port descriptions	43
	A.1	PWR-0	COM2&3/USB	43
	A.2	COM1	-GPIO	44
	A.3	ETH		45
	A.4	MAIN	ANT / AUX ANT (TNC)	45



1 Introduction

1.1 User Notices

1.1.1 CE Notice

CE

AsteRx SB3 receivers carry the CE mark and are as such compliant with the 2014/53/EU - Radio Equipment Directive (RED), 2011/65/EU - Restriction of Hazardous Substances (RoHS) Directive and 93/68/EC - CE-marking Directive.

With regards to EMC, the AsteRx SB3 receiver is declared as class A, suitable for residential or business environment. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

1.1.2 ROHS/WEEE Notice



The AsteRx SB3 is compliant with the latest WEEE, RoHS and REACH directives. For more information see www.septentrio.com/en/environmental-compliance.



1.1.3 Safety information



Caution: Shock hazard. The receiver can have multiple power sources. Make sure you disconnect all power sources when working with the receiver.



The power supply provided by Septentrio (if any) should not be replaced by another. If the receiver is used with a different power supply than provided by Septentrio, it must have a double isolated construction and must match the specifications of the provided power supply. In addition, the power supplies needs to comply with safety standard IEC 62368-1 and SELV.



Ultimate disposal of this product should be handled according to all national laws and regulations.



The equipment and all the accessories included with this product may only be used according to the specifications in the delivered release note, manual or other documents delivered with the receiver.





1.1.4 Support

For first-line support please contact your Septentrio dealer.

Additional documentation can be found in the following manuals:

- **The AsteRx SB3 Reference Guide** (available from the Support section of the Septentrio website) includes information on the receiver operation, the full list of receiver commands and a description of the format and contents of all SBF (Septentrio Binary Format) blocks.
- The **RxTools Manual** covers the RxTools software suite, including RxControl and RxLogger.
- **The Knowledge Base** on the Septentrio website contains a large number of articles and application notes which cover a wide array of technical and less technical topics. The Knowledge Base is part of Septentrio's Support Portal which can be accessed through the support section of the Septentrio website (see below).

The Septentrio website has a dedicated Support section

(http://www.septentrio.com/support), where the User Manual, the Firmware Reference Guide and the latest officially supported Firmware version are readily available for download.

In case the AsteRx SB3 does not behave as expected and you need to contact Septentrio's Technical Support department, you should attach a short SBF log file containing the support blocks and a Diagnostic Report of the receiver.



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AsteRx SB3 Overview 2

The AsteRx SB3 is a multi-frequency, multi-constellation GNSS receiver, available in several variants: Pro, Pro+ or ProBase. It is an IP68 compliant housed GNSS solution ideal for rapid integration in various applications.

AsteRx SB3 Pro/Pro+ is designed to be used as a dual antenna GNSS receiver for rover systems but it can also be used as a single antenna receiver for systems which do not require heading.

The AsteRx SB3 ProBase variant is a single antenna base station receiver with robust, top-quality measurements for RTK and differential corrections.

2.1 **Physical and Environmental Specifications**

Size: Weight:	102 x 36 x 118 mm (4.0 x 1.4 x 4.6 in) 497 g (1.1 lb)
Input voltage: Power consumption:	5 to 36 V DC 1.00 W typical (single antenna) 1.35 W typical (dual antenna)
Operating temperature:	-30 °C to +65 °C (-22 °F to +149 °F)
Storage temperature:	-40 °C to +75 °C (-40 °F to +167 °F)
Ingress Protection: Humidity Dust Shock Vibration	IP68 MIL-STD-810G, Method 507.5, Procedure I MIL-STD-810G, Method 510.5, Procedure I MIL-STD-810G, Method 516.6, Procedure I/II MIL-STD-810G, Method 514.6, Procedure I



2.2 AsteRx SB3 design

2.2.1 Front Panel

The AsteRx SB3 's front panel features two antenna TNC connectors for the Main and Aux antennas.

Exception: AsteRx SB3 ProBase has only one antenna connector.



Figure 2-1: The front panel of the AsteRx SB3

2.2.2 Rear Panel

Figure 2-2 shows the layout of the rear-panel connectors of the AsteRx SB3 . The rear panel has three connectors: a 7-pin female PWR-COM2/3/USB socket, a 7-pin female COM1-GPIO socket and a 4-pin female ETH socket. A full description of the connector PIN layout of the rear panel ports can be found in Appendix A.



Figure 2-2: The rear panel of the AsteRx SB3



3 Configuring the AsteRx SB3

3.1 Connecting to the AsteRx SB3

3.1.1 **Powering the AsteRx SB3**

The AsteRx SB3 can be powered in a number of different ways. The first method is to power the receiver by supplying 5 to 36 VDC via the open-ended power cable connected to PIN 1 of the rear-panel 7-pin female PWR-COM2&3/USB socket.

Important notice on handling the ODU connectors

When connecting the cables to the AsteRx SB3 make sure the red dots on the cable side and on the socket side are aligned. Only push the connector into the socket when properly aligned.

Forcing the connector into the socket while misaligned can damage the connector, the socket or even the internal electronics (in case the cable is connecter to a power supply).



Figure 3-1: Mating ODU connectors: only push the connector in when red dots are aligned

You may also power the AsteRx SB3 by connecting an appropriate USB cable to the same 7-pin female PWR-COM2&3/USB socket, using either the recommended Septentrio USB adapter or the USB socket of a PC as shown in Figure 3-2.

Note: It is recommended to power the AsteRx SB3 by an unmanaged USB 3.0 port that can supply at least 900mA of current at 5V. Typical USB3.0 ports on PCâĂŹs are managed (charging/current draw negotiation) and powering the unit over such an USB port is not always guaranteed.





Figure 3-2: Connecting the receiver through USB using the rear panel PWR-COM2&3/USB socket

The AsteRx SB3 can also be powered through the ETH socket using power over Ethernet (PoE). All of the rear-panel ports and their pin assignments are described in more detail in Appendix A.



3.1.2 Connecting to the web interface via Ethernet

Step 1: Connect the Power and Ethernet cables

Connect the Ethernet cable to the connector labeled 'ETH' on the rear panel of the receiver as shown in Figure 3-3 and make sure it is connected to a LAN network. Then connect the power cable to the receiver and make sure the correct input voltage is applied (between 5 and 36 V DC). Note that in case the receiver is powered over Ethernet, connecting a power cable is not necessary.



Figure 3-3: Rear panel Ethernet socket

Step 2: Open a web browser and connect to the AsteRx SB3

By default, the AsteRx SB3 has the hostname 'http://asterxsb3-xxxxxx', where xxxxxx are the 7 digits of the serial number of the receiver board inside the AsteRx SB3. This hostname can be used on a local area network to connect to the AsteRx SB3 if the IP address assigned by the DHCP server is unknown. The hostname can be found on a sticker on the bottom of the receiver housing. Figure 3-4 shows a screenshot of an Ethernet connection to a receiver with serial number 3238978 using 'http://asterxsb3-3238978'.



Figure 3-4: Connecting to the Web Interface via Ethernet



3.1.3 Connecting to the web interface via USB

Step 1: Connect the combined Power/USB cable

Connect the combined Power/USB cable to the 7-pin female PWR-COM2&3/USB socket on the rear panel of the receiver as shown in Figure 3-5 and make sure it is connected to a computer.



Figure 3-5: Rear panel 7-pin PWR-COM2&3/USB socket

Step 2: Open a web browser and connect to the AsteRx SB3

Once connected via USB, the AsteRx SB3 can be reached using the default Ethernet-over-USB IP address 192.168.3.1 as shown in Figure 3-6. Note that this address cannot be changed.



Figure 3-6: Connecting to the Web Interface via USB



3.1.4 Connecting via COM

In case you do not have an appropriate USB cable, Ethernet cable or a LAN network available, you may still connect to the receiver using one of the receiver's COM ports and RxControl.

Step 1: Connect the Power and COM cables

Connect the COM cable to the connector labeled 'COM-GPIO' on the rear panel of the receiver as shown in Figure 3-7 and connect the other end to a computer. It may be necessary to use a serial-to-USB converter. Now connect the power cable to the receiver and make sure the correct input voltage is applied (between 4.5 and 36 V DC).



Figure 3-7: Rear panel COM 1 socket

Step 2: Open RxControl and connect to the AsteRx SB3

Once connected, open RxControl on the computer to which the receiver is connected and follow the sequence of steps described in Figure 3-8 to open a connection to the AsteRx SB3 . Note that RxControl is part of the RxTools software suite which can be freely downloaded from the Septentrio website.

* Change Connection X	★ Ax-SB ProDirect.serial - RxControl- S/N 3034022 - X File View Communication Navigation Tools Logging Help
Select Connection	🔐 🖽 🖬 🐵 🗵 🍉 🥂 🝩 📜 🕶 🔛 🔇 🖭
Use last connection: dx.2010918.doffile © Serial Connection: SBF File Connection: Serial Port: Class Serial Port: Class Serial Port: Class Serial Port: Connection: Use Serial Port: Use Serial Port: Serial Port: Use Serial Port: Serial Port: Serial Port: Serial Port: Serial Port: Serial Port: Serial Port: Serial Serial Port: Serial Serial Port: Serial Serial Port: Serial Port: Serial Serial Port: Serial Serial Port: Serial Serial Serial Port: Serial Port: Serial Serial Port: Serial Port: Serial Seri	Position Information Position Velocity Geodetic c: N 50,849625792° ost: +0,822m WiGS4/ITRS A: E 004,732130897° ost: +0,651m GNS only h: +129,758m ost: +1,459m Satellite Status GPS GLONASS Galleo BeDou SRAS Q255 IRNES L-Band G3 c: C 0 0 0 c: C 0 c: C 0 0 c: C 0 0 c: C 0 c:
USB Seri Standarr Standarr Specify the serial settings Serial Port (COMS) Advanced Settings Connection Name: AxSB ProDirect Work Offline < Back Next> Findam	Construction Construction<
	+18s offset to UTC VDOP: 0,63 Corr Age: N/A
ProDirect	SBF Status DiffCorr Exervent ExSensor SSRC12 - AsteRx SB ProDirect - SEPT

Figure 3-8: Connecting to the receiver via COM using RxControl. Select 'Serial Connection' and choose 'Create New'. Next, choose the correct serial port, define a name for the connection and press Finish.



3.2 How to configure the AsteRx SB3 for RTK

The AsteRx SB3 can use correction data to calculate a cm-level RTK position. The AsteRx SB3 can obtain this correction data in several ways: over the internet via NTRIP, using a serial or USB connection or via Ethernet. The example below shows how to set up the receiver for RTK using using TCP/IP in a closed network.

Note: this function is not available in the AsteRx SB3 ProBase model.

3.2.1 How to configure the AsteRx SB3 in RTK rover mode via Ethernet

Step 1: Enable RTK positioning mode

Ensure that RTK is enabled as a positioning mode. This can be done in the GNSS Position tab by checking the 'RTK' box in the 'Position Mode' field as shown in Figure 3-9.

Overview	GNSS	Communication	Corrections	NMEA/SBF Out	Logging	Admir		
GNSS > Position	Position							
-GI	Name and Marker							
	Attitude		🕉 GPS (Pc	sition: 7 8, Track: 10 9)	(Main Aux1)			
	Satellites and Signa	GLONASS (Position: 0 0, Track: 7 7) Galileo (Position: 3 3, Track: 9 8)						
	Spectrum		SBAS (F BeiDou	osition: 0 0, Track: 0 0) (Position: 2 2, Track: 15	5 14)			
				·				
	PPS/Timing		A QZSS (F	Position: 0 0, Track: 0 0) Position: 0 0, Track: 2 0))))			
	PPS/Timing	Static Rover	A QZSS (F	20sition: 0 0, Track: 0 0) Position: 0 0, Track: 2 0)))			
Pro M	PPS/Timing osition Mode lode	○ Static ● Rover	A QZSS (F	Position: 0 0, Track: 0 0) Position: 0 0, Track: 2 0))))			
Pr M S	PPS/Timing osition Mode	 ○ Static ● Rover ✓ 	Access (F	יosition: 0 0, Track: 0 0) Position: 0 0, Track: 2 0))))			
Pr M B S S	PPS/Timing osition Mode lode RTK tandAlone BAS	 ○ Static ● Rover ✓ ✓ ✓ 	後QZSS (F 第NAVIC (יosition: 0 0, Track: 0 0) Position: 0 0, Track: 2 0))))			
Pr M S S D	PPS/Timing osition Mode lode RTK tandAlone BAS GPS	 ○ Static ● Rover ✓ ✓ ✓ ✓ ✓ ✓ 	及ZSS (F 第 NAVIC (יosition: 0 0, Track: 0 0) (Position: 0 0, Track: 2 0))))			
Pr M S S D R	PPS/Timing osition Mode lode RTK tandAlone BAS GPS eference position	 Static Rover 2 2 2 auto 	及ZSS (F 第 NAVIC (יosition: 0 0, Track: 0 0) Position: 0 0, Track: 2 0))))			

Figure 3-9: Ensure that RTK is enabled as a positioning mode

Step 2: Configure the Ethernet connection

On the **IP Ports** window of the rover receiver, click on **C** New **IP Receive Connection** as shown in Figure 3-10 to start configuration sequence. The **Port** and **TCPAddress** should match the port and IP address of the Base station receiver.



Figure 3-10: In the IP Ports window, click on 🛟 New IP Receive Connection to configure the connection with the base station

Step 3: Verifying the configuration

If the Base station and rover receivers have been configured correctly then the Communication Ethernet window should appear similar to the window shown in 3-11.

Figure 3-11: Ethernet tab of the rover receiver showing a fixed RTK position and reception of RTCMv3 diff corr on receiver port IPR1

3.3 How to configure the AsteRx SB3 for Attitude

With two antennas connected to the AsteRx SB3 , the receiver can calculate Heading and either Pitch or Roll. This section details how to configure the AsteRx SB3 in a two-antenna setup.

Note: this function is optional in the AsteRx SB3 Pro model and not available in the AsteRx SB3 ProBase model.

Step 1: Connect a second antenna

Connect a second antenna to the front panel connector labeled **AUX ANT** as indicated in Figure 3-12.

Figure 3-12: Auxiliary antenna connector on front panel

Step 2: Configure attitude settings

The attitude settings of the AsteRx SB3 can be configured in the **GNSS**, **Attitude** window as shown in Figure 3-13.

Overview	GNSS	Communication	Corrections	NMEA/SBF Out	Logging	Admin
GNSS > Attitude	Position					
CAt	Attitude					
	Satellites and Signals	19911	11.30	145		
	Contraction and originals	8	1.8			
	Spectrum	3	- Fe	135		
	PPS/Timing	67	L E	125		
	PinPoint-GIS Web	8 20-		120		
	كننا كسي	051110	1 1091	110		
	North up	10 9	8 7 6	Boat V		
		<u>, , , , , , , , , , , , , , , , , , , </u>	1.1.1.1			
	N DECKIT	a lin	ALC: NOT	00 00		
		8 1	E R			
	Egl		11 a			
	11 042 5	051 111	24	09. 06-		
	-441	Inu				
-GN	NSS Attituda		- Attitu	de Information		
	NUTCE O DODO O MOI		Attitu	de Mode: Attitu	ide fix (2D)	
E	oat		Sats	AUX Attitude:	21	
Fi	xed 🕑		Delta	East: 8.2	280e-4 m	
			Delta	North: 5.6	582e-3 m	
At	titude Offset		Delta	Up: 9.6	697e-3 m	
He	eading offset	0.000 deg	Head	ing: 8.292°	oheading: N/A	
Pit	tch offset 6	0.000 deg	Pitch	-0.631°	opitch: N/A	
C ^{BA}	Advanced Settings —					
C	Antenna Location					
	Aux1	Base				
	Mode auto	▼ auto				
	Delta X 0.00	0.000 m	n			
	Delta Y 0.00	0.000 m	n			
	Delta Z 0.00	0.000 m	n			

Figure 3-13: GNSS Attitude window when two antennas are connected

GNSS Attitude field

The recommended settings for a Heading setup are **MultiAntenna** mode with attitude calculated using **Fixed** ambiguities as shown. These settings are configured by default.

Antenna Location and Antenna Offset

The AsteRx SB3 assumes that the main and auxiliary antennas are placed along the longitudinal axis of the vehicle with the auxiliary in front of the main antenna. If the antennas cannot be placed in such a configuration, the reported heading and pitch may be biased. The default settings in the **Antenna Offset** and **Antenna Location** fields shown in Figure 3-14 can be altered to compensate for these biases.

In many cases the antenna baseline will not align perfectly with the vehicle's longitudinal axis or its perpendicular and in these circumstances the provided attitude offset value can also be used to compensate for small angular deviations. Note that, in order to ensure the integrity of the solution, offsets greater than 5 degrees from the longitudinal axis or its perpendicular are not recommended.

An increase in angle between the antenna baseline and the vehicle's longitudinal axis in the clockwise direction corresponds to a positive change in the value of the heading offset To better explain this, a few examples of possible setups are given below in Figure 3-14.

Figure 3-14: Examples of a number of antenna setups and the corresponding heading offsets. a.) The default setup for which the angle between the antenna baseline and the longitudinal axis is 0 and no heading offset needs to be set. b.) a slight deviation (5 degrees) from the longitudinal axis in the clockwise direction is reflected by a positive increase in the heading offset. c.) An alternative antenna configuration where the antennas are placed perpendicular to the longitudinal axis. d.) An alternative antenna configuration where the longitudinal axis with a small deviation.

The examples above all relate to a heading offset but the antenna orientation can also be characterized by a vertical offset. Vertical offsets can be compensated for by adjusting the Pitch offset. This may be necessary in cases where the antenna baseline is not exactly parallel to the longitudinal axis of the vehicle or in situations where the two antenna ARPs

may not be exactly at the same height in the vehicle reference frame. Since pitch is defined as the right-handed rotation about the vehicle Y axis, a situation where the main antenna is mounted lower than the aux antenna (assuming the default antenna setup) will result in a positive pitch a shown in Figure 3-15.

Figure 3-15: Visual representation of the effect of vertical offset between the two antennas on the Pitch offset. Assuming the default antenna configuration, the aux antenna being mounted higher will result in a positive value for the pitch.

Step 3: Attitude information in SBF and NMEA data

Details on how to output SBF and NMEA data can be found in Section 4.1.

SBF

Attitude information is contained in the SBF blocks *AuxAntPositions*, *AttEuler*, *AttCovEuler* and *EndOfAtt*. These blocks are selected automatically when checking the 'Attitude' box when configuring SBF output via the **NMEA/SBF Out** window as Figure 3-16 shows.

Attitude	
AuxAntPositions	
AttEuler	
AttCovEuler	
EndOfAtt	1

Figure 3-16: SBF blocks containing attitude information

NMEA

You can output the attitude information from the AsteRx SB3 in NMEA format by selecting the standard NMEA HDT sentence or the Septentrio proprietary HRP sentence as shown in Figure 3-17.

GSV	
HDT	
RMC	
ROT	
VTG	
ZDA	
HRP	
LLQ	

Figure 3-17: NMEA sentences containing attitude information

3.4 How to configure the AsteRx SB3 as a Base station

This section describes the Base station configurations applicable to the AsteRx SB3. Note: this function is not available in the AsteRx SB3 Pro model.

If the feature is included with the purchased product variant, the AsteRx SB3 can be set up as a Base station receiver and provide differential corrections data to one or more rover receivers.

Step 1: Preparing the AsteRx SB3 as a Base station

Set the Base station position as static

To work as a Base station, the position of the AsteRx SB3 should be set to static. The **Static** position mode can be selected in the **GNSS** tab as shown in Figure 3-18.

Figure 3-18: Setting the AsteRx SB3 Base station position to static

Set the correct position

An accurate position of the antenna that is connected to the AsteRx SB3 should also be set. A Rover receiver in RTK mode calculates a position relative to the Base station receiver. The default setting of 'auto' can be used for demonstrations however, for most other purposes where an accurate absolute position is important, a properly surveyed position is advisable. In the example shown in Figure 3-19, the position stored under 'Geodetic1' is used. The static positions can be entered via the **Advanced Settings** menu on the same page. Pre-set positions can be entered in either Geodetic or Cartesian coordinates as shown.

In the **Datum** field, you can select the datum to which the antenna coordinates refer. The selected value is stored in the Datum field of position-related SBF blocks (e.g. PVTCartesian) and also in any output differential corrections. Please note that the **Datum** setting does not apply any datum transformation to the antenna position coordinates.

Click **OK** to apply the new settings

HUGE	Static ○ Rover					
	×					
StandAlone	V					
SBAS	×					
DGPS	V					
Reference position	Geodetic1 ~					
SIGIL integration	🖲 off 🔍 on					
Antonno Informatio	n					
	Main		Aux1]		
Marker to ARP - Ea	st 0.0000	m	0.0000	m		
Marker to ARP - No	orth 0.0000	m	0.0000	m		
Marker to ARP - Up	0.0000	m	0.0000	m		
Antenna type	Unknown	~	Unknown	\checkmark		
Serial number	Unknown		Unknown			
Setup ID	0		0			
)		
Geodetic Datum						
Datum Default	<u>~</u>					
Datum Default	<u> </u>					
Datum Default	 ✓ ✓					
Datum Default ■Advanced Settings → Differential Corre	ctions Usage					
Datum Default Advanced Settings Differential Corre Antenna Reference	ctions Usage	ion - Geodetic-				
Datum Default Advanced Settings Differential Corre Antenna Reference	ctions Usage	ion - Geodetic- Geodetic2	Geo	odetic3	Geodetic4	Geodetic5
Datum Default Advanced Settings Differential Corree Antenna Reference G ARP Latitude	ctions Usage ce Point Static Positi cedetic1 50.848231000 d	ion - Geodetic- Geodetic2 eg 0.0000	Gee 000000 deg	odetic3 0.00000000 deg	Geodetic4	Geodetic5
Datum Default Advanced Settings Differential Corree Antenna Reference ARP Latitude ARP Longitude	ctions Usage ce Point Static Positi cedetic1 50.848231000 d 4.731798000	ion - Geodetic- Geodetic2 eg 0.000 deg 0.000	Ger 000000 deg 000000 deg	odetic3 0.000000000 deg 0.00000000 deg	Geodetic4 0.000000000 deg 0.000000000 deg	Geodetic5 0.000000000 deg 0.000000000 deg
Datum Default Advanced Settings Differential Corree Antenna Reference ARP Latitude ARP Longitude ARP Altitude	 ctions Usage ce Point Static Positic cedetic1 50.848231000 d 4.731798000 130.0000 m 	ion - Geodetic- Geodetic2 eg 0.000 deg 0.000	Geo 000000 deg 000000 deg	odetic3 0.000000000 deg 0.00000000 deg 0.0000 m	Geodetic4 0.000000000 deg 0.000000000 deg 0.0000 m	Geodetic5 0.000000000 deg 0.00000000 deg 0.0000 m
Datum Default Advanced Settings Differential Corree Antenna Reference ARP Latitude ARP Longitude ARP Altitude Datum	ctions Usage ce Point Static Positie cedetic1 50.848231000 d 4.731798000 130.0000 m WGS84	ion - Geodetic- geodetic2 deg 0.0000 deg 0.000 v WGS84	Geo 000000 deg 000000 deg 00000 m ~ WC	odetic3 0.000000000 deg 0.00000000 deg 0.0000 m 3584 ~	Geodetic4 0.000000000 deg 0.000000000 deg 0.0000 m WGS84 ∽	Geodetic5 0.000000000 deg 0.00000000 deg 0.0000 m WGS84 ✓

Figure 3-19: Setting the static position to the pre-set 'Geodetic1' position

Set Marker/Station name

A **Marker name** and **Station code** can also be defined through the **GNSS/Name and Marker** menu as shown in Figure 3-20.

Marker name	SEPT
Marker number	Unknown
Marker type	Unknown
Station code	
Monument index	0
Receiver index	0
Country code	
Observer Paramet	ters
Observer name	Unknown
Observer agency	Unknown
Observer Commer	nt
Obconvor commo	nt Unknown

Figure 3-20: Setting the Station settings

Step 2: Configure the internet connection

GN

An internet connection can be achieved by using the Ethernet connector or the USB connector of the AsteRx SB3. When using Ethernet, make sure your network has internet access. Contact your system administrator to confirm that your network is properly configured. Extra settings are available on the **Ethernet** settings page under the **Communication** menu.

Internet access can be enabled via USB (RNDIS IP interface), however this will depend on the PC or device you are connected to. Specific settings on the PC or device will be necessary so that internet can be shared over USB (e.g. by ssh port forwarding). Please contact your system administrator or PC/device manufacturer to guide you in realizing this connectivity.

Step 3a: Configure the output of differential corrections using an NTRIP Caster

The AsteRx SB3 includes a built-in NTRIP Caster that makes correction data from the AsteRx SB3 available to up to 10 NTRIP clients over the internet. The caster supports up to three mount points and can also broadcast correction data from a remote NTRIP server.

All settings relating to the AsteRx SB3 NTRIP Caster can be configured on the **NTRIP Caster** window from the **Communication** menu.

Communication > NTRIP Caster Settings General Settings Enable NTRIP caster O of O on IP Port 2101 Caster identifier default Edit Mount Point IP TLS Port 2102 Enabled Yes For TLS, the same certificate is used as for HTTPS Leuven Mount point name Enable Local Serve This can be configured using the Web Server/TLS page Allow external serve Nic Enable Local Server on 🗸 Mount Points Server user name Server password ο Output Type There are currently no mount points defined. Client authenticatio The internal caster mount point is configured New mount point RTCMv3 Data format to distribute RTCMv3 Manual format str Client Users-Currently, no RTCMv3 output is configured. Format details There are currently no users defined. Messages to Output-New user Which RTCMv3 messages do you want to output? B MSM1 Press "OK" to apply the changes. B MSM2 MSM3 ■ MSM4 B MSM5 B MSM6 RTCM1001 RTCM1002 RTCM1003 RTCM1004 RTCM1005 RTCM1006

Define a new mount point

Figure 3-21: The configuration sequence for defining a new mount point

In the NTRIP Caster window, click on the **Settings** tab.

In the General Settings field, enable the NTRIP Caster and select the IP port over which you wish to send correction data: the default port is 2101.

Click on **Click mount point** as indicated in Figure 3-21. Select **Yes** to enable the mount point and give it a name. This is the name that will appear in the caster source table. Up to 3 mount points can be defined each with a different name. You can also select the type of **Client authentication** for the mount point: **none** - any client can connect without logging in or, **basic** - clients have to login with a username and password.

By default, the field **Allow external server** is set to **No**. By setting **Allow external server** to **Yes** the mount point can receive a stream from a remote NTRIP server.

Click on the **Configure Output** ... button to enable the local NTRIP server of the AsteRx SB3 and to select the individual messages you want to broadcast. By default, RTK correction messages necessary for GPS, GLONASS, Galileo and BeiDou are pre-selected. Click **Ok** to apply the settings.

Define a new user

If you selected **basic** client authentication when configuring the mount point in the previous step, you will need to define at least one user. The user name and password are the credentials needed for the NTRIP client to access the correction stream.

In the **Client Users** section, click on **C New User** as shown in Figure 3-22. Enter a User Name and Password for the user and select the mount points that they will have access to. Up to 10 NTRIP clients can log in as a particular user. Click **Ok** to apply the settings.

Enable NTRIP cast	er ○off ⊙on				Enable	NTRIP caste	r ⊖off ⊙on	
IP Port	2101				IP Port		2101	
Caster identifier	default				Caster i	dentifier	default	
IP TLS Port	2102				IP TLS	Port	2102	
This can be configured	d using the <u>Web Server/TL</u>	S page.			This can	the same cert be configured	using the <u>Web Server/TLS</u>	S page.
					-Mount E	lointe		
Mount Points					F MOULL F	Units		
Mount Points Name Forma	t Enabled Authent	cation			Nar	ne Format	Enabled Authentic	cation
Mount Points Name Forma Leuven RTCMv3	t Enabled Authent	cation		\Box	Nar Leuv	ne Format en RTCMv3	Yes basic	cation
Mount Points Name Forma Leuven RTCMv3	t Enabled Authent	cation			Norregeneration	ne Format en RTCMv3	Yes basic	cation [2
Mount Points Name Forma Leuven RTCMv3	t Enabled Authent 3 Yes basic t	Cation			New 1	ne Format en RTCMv3 mount point	Yes basic	cation 2
Mount Points Name Forma Leuven RTCMv3 New mount point Client Users	t Enabled Authent 3 Yes basic t	Cation	Mildred		Client U	ne Format en RTCMv3 mount point	Yes basic	cation 2
Mount Points Name Forma Leuven RTCMv3 New mount point Client Users Lere are currently	t Enabled Authent Yes basic t	Cation	Mildred		Client U	ne Format en RTCMv3 mount point sers	Enabled Authention Yes basic	cation
Mount Points Name Forma Leuven RTCMv3 New mount point Client Users There are currently	t Enabled Authent 3 Yes basic t no users defined.	Cation			Client U User Na	ne Format en RTCMv3 mount point sers Allow Moun	Enabled Authention Yes basic Ted Max. Nr. t Points of Clients	cation
Mount Points Name Forma Leuven RTCMv3 New mount point Client Users There are currently New user	t Enabled Authent 3 Yes basic t no users defined.	Cation	Mildred i O Leuven Unused/MP2 Z		Client U User Na Mildred	me Format en RTCMv3 mount point sers ame Allow All	Yes basic Yes basic t Points of Clients 10	cation
Mount Points Name Forma Leuven RTCMv3 New mount point Client Users There are currently New user	It Enabled Authent 3 Yes basic t	Cation	Mildred Leuven C Unused/MP2 C Unused/MP3 C		Client U User Ni Mildred	me Format en RTCMv3 mount point sers Allow All user	Yes basic Yes basic t Points of Clients 10	cation
Mount Points Name Forma Leuven RTCMv3 New mount point Client Users There are currently New user	It Enabled Authent Yes basic t no users defined.	Cation	Mildred Leuven Unused/MP2 Unused/MP3 10		Client U User N: Mildred	me Format en RTCMv3 mount point sers Allow All user	Enabled Authention Yes basic ed Max. Nr. t Points of Clients 10	cation
Mount Points Name Forma Leuven RTCMv3 New mount point Client Users There are currently New user	t Enabled Authent Yes basic t no users defined.	Cation	Mildred Leuven Unused/MP2 Unused/MP3 S		Client U User Na Ok	me Format en RTCMv3 mount point sers ame Allow All user	Enabled Authention Yes basic ed Max. Nr. t Points of Clients 10	cation

Figure 3-22: Configuring the login credentials for a user

Is the NTRIP Caster working?

In the **Status** tab of the NTRIP Caster window, you can see a summary of the NTRIP Caster to make sure that it has been properly configured. In the example shown in Figure 3-23, a client is connected to the mount point named **Leuven** as user **Mildred**.

If the client receivers are configured to send a GGA message to the caster (as was the case in Figure 3-24), then their position will also be visible.

Mountpoint	Serv Conne	er cted	Con	nnect me	Rate	e C	lients
Leuven	Yes		1h11	.m40s	435 Bp	os	1
Connected Clie	ents						
Connected Clie	ents User	Conr	nect	Lati	tude	Lon	gitude

Figure 3-23: Connecting as a client to the AsteRx SB3 NTRIP Caster

On the NTRIP Client side

Rover receivers can connect to the NTRIP Caster by entering its IP address and Port as shown in Figure 3-24. After clicking **Ok**, the mount point source table will be filled and a mount point can be selected. The user name and password can then be entered and within a few seconds, the Rover receiver should report an RTK fixed position.

(N) -		In:RTCMv3	
			192.168.110.227: Leuv
Edit NTRIP Connecti	on		
Mode	Client	•	
Caster	192.168.110.227		
Port	2101		
User name	Mildred		
Password			
Mount point	Leuven	•	
Mount point	Details		
	10 sec	T	

Figure 3-24: Connecting as a client to the AsteRx SB3 NTRIP Caster

Step 3b: Configure the output of differential corrections using a TCP/IP in a closed network

Configure the IPS connection

Setup an IPS connection over which the differential corrections can be streamed. On the **IP Ports** page, click on **New IP Server** as shown in Figure 3-25, then insert the port number and mode of the connection. When choosing a port number avoid conflicts with other applications such as the commands port (28784), the webserver port (80), the FTP port (21) as well as the default NTRIP port (2101) and the NTP port (123).

Overview GNSS Communication C	orrections NMEA/SBF Out	Logging	Admin	
Communication > IP Ports TCP/IP Port Settings Commands port 28784 FIP control port 21 IP Server Settings There are currently no server ports defined. New IP Server IP Receive Settings There are currently no receive ports defined New IP Receive Connection CK	Cedit IP Server Settino Port 600 Mode TCP2Way UDPAddress 255.255.2 Ok C	(send and receive) V 55:255 ancel		TCP/IP Port Settings Commands port 28784 FTP control port 21 IP Server Settings ID Port Mode IP Server New IP Server IP Receive Settings There are currently no receive ports defined. New IP Receive Connection

Figure 3-25: Select and configure an IP Server port on which to output differential corrections

Configure the correction stream

On the **Corrections Output** window, click on **New RTCM3 output** as shown in Figure 3-26. You can then select the IPS connection configured in the previous step. The messages necessary for RTK and DGNSS (for GPS, GLONASS, Galileo and BeiDou) are selected by default¹ but you can select any combination of correction messages that you want to output. A summary of other RTCM messages can be found in the 'AsteRx SB3 Reference Guide'.

Figure 3-26: Output RTCMv3 differential corrections on the configured TCP/IP server port of the Base station receiver

¹Note that if you do not have permissions for RTK Base corrections, you will only be allowed to output RTCM2 DGPS messages

Verifying the configuration

Having configured the settings and clicked **Ok** to apply them, you can now connect to the configured Ethernet port of the AsteRx SB3 using a terminal emulator tool such as Data Link². The Ethernet IP address is IP address shown under **Ethernet Status** on **Communication > Ethernet** page.

This IP address and the port number 600 can then be used to configure a Data Link connection as shown in Figure 3-27.

🧬 Data Link			
File Tools Help			
Connection 1			
Connect	TCP/IP Client		
Show Data			
$Link \to \boxed{1} \boxed{2} \boxed{3} \boxed{4} \boxed{3}$	Select the connection	×	
$GGA \rightarrow \boxed{1} \boxed{2} \boxed{3} \boxed{4} \boxed{3}$	Serial TCP/IP UDP	NTRIP	
Send every 10 th received GGA	Connection Modes		
Connect Script: gurations)\Assignme	TCP/IP Client O TCP	/IP Server	
Send every 1,00 s.	Host Name or IP-Address	🖉 Data Link	
Close Script:	102 168 20 1		
Log File:	152.100.20.1	Connection 1	
	Port Number		Top to clini
Press Connect	600 🗢	Disconnect	1CP/IP Client 12.168.20.1:600
		Show Data	
		$Link \rightarrow \boxed{1} \boxed{2} \boxed{3} \boxed{4} \boxed{5}$	6
		$GGA \rightarrow \boxed{1} \boxed{2} \boxed{3} \boxed{4} \boxed{5}$	6
		Send every 10'th received GGA	
		Connect Script: gurations)\Assignments	_solutions.docx
		Send every 1,00 s.	
	ОК	Close Script:	
L		Log File:	
		Connected to 192.168.20.1	/O 0,5/0,0 kBps

Figure 3-27: Configure the Data Link terminal emulator tool to connect to the AsteRx SB3 Ethernet port over which differential corrections have been configured

When connected to the output correction stream, click on the **Show Data** button on Data Link and you should see output similar to that shown in Figure 3-28.

nata Link: Connection 1		<u>177</u> 7	
>à□鰍\ő»□€£kAú馥vZ×8z□HÓ»?@pb□□、	OD4øÀ5ßúzÀDð 'ÿD	Ê à⊡ú¢€⊡1⊡ÅúC	\$#m)Ìcó(«E
nownDSEPT ASTERXD4.4.xD3024596Ì	GäÓLà≀à?aÓ¥>À4⊡ • T]æ	įѰ;ÚvËý*€:	aþ£EÿÐDÉÿŐS
öÈl ÚÄú6OûX□□ÿ;□□、雛□¹Ôm?îÀÝ	û[áR`@⊡載p{ÿSÿÑ;à@Õ%urÓ⊡>	>à□\\õ»□€EkAú骸vZ>	sz⊡HÓ»?@pb
₽€Mú			
24596ÌGäÓLà≿à?aÓ¥>À4+" T1⊡ /ene ònn∜n	Ѱ;Úv£ý*€lûp!æþ£Eÿ	Ü□ê?Õal□pô_ő:麽□¯Ć	éþ,ÚG <mark>⊗⊡;S</mark> W
	- 14		
nknownOSEPT ASTERXO4.4.xO302459	96ÌGäÓLà≀à?aÓ¥>À4:Â T⊡:	¢ Ѱ¿ÚAwGý*€);	5À! <mark>þ</mark> £EÿÖDÝ
è0@O('ü鮴O:@麽;úkĐOOfñÿV9謊).EpOpj	þà ì□ ÿÑ¢]VQ際(;;Ò¶□,?ø□	¢6,Xøïèl@OóýAÀL∤	ýkkú0
nownDSEPT ASTERXD4.4.xD3024596Ì	GāÓLà čà?a		
<			>
Shaw All data	ion for None	-	
Show All data	ion for None	•	

Figure 3-28: The RTCMv3 differential correction stream output from the IPS1 Ethernet connection of the AsteRx SB3

When a connection to the configured Ethernet port has been established, in this example using Data Link, the **Data Streams** field on the Corrections Output window should now show the active blue connection shown in Figure 3-29 and the corrections output icon in the information panel should appear active.

Overview	GN	SS Communi	cation	Corrections	NMEA/SBF Out	Logging	Admin
Corrections > Corr	ections Ou	itput					
D-t	C 1	_					
Dat	a Stream	S					
		and the second se			PS1 (Out:RTCMv3 0.10kB/	/s)	
⊂ Dif	ferential (Corrections Output-					
	Port D	escription	Туре	Messages			
۲	IPS1 TO	CP 2-Way Server on ort 600	RTCMv3	3 1006, 1033, 12	30 📝 🗙		
0	New RTC	M2 output 🚦 New I	RTCM3 ou	tput 🛟 New C	MR2 output		
—∎Ac	dvanced S	Settings—					
_							
Ok							

Figure 3-29: Web Interface showing differential corrections output over an Ethernet connection

4 Common Receiver Operations

4.1 How to configure SBF and NMEA output

The AsteRx SB3 can output position and GNSS data in both standard NMEA format and Septentrio's proprietary compact binary format SBF. The following sections detail how to configure connections to other devices in order to send data.

SBF and NMEA can also be logged on the internal 16 GB disk of the AsteRx SB3 . Section 4.2.1 and 4.3 detail how to log data on the receiver and how to download data logged on the receiver.

4.1.1 Output over a serial COM connection

The AsteRx SB3 can be connected via a serial COM cable to an RS-232 compatible secondary device.

Step 1: Configure the serial COM port

The COM port of the AsteRx SB3 should be configured with the same baud rate and flow control setting as the coupled device. These settings can be configured via the **Communication/Serial Port** tab as shown in Figure 4-1. In this example, COM3 is set with a speed of 19200 baud.

Figure 4-1: Configure the baud rate and flow control of the AsteRx SB3

Step 2: Configure data output

NMEA

In the **NMEA/SBF Out** tab, clicking on **New NMEA Stream** will guide you through the steps needed to configure NMEA output as shown in Figures 4-2 and 4-3.

Figure 4-2: Selecting to output NMEA data on COM3

Select mess	sages to output			Port	Туре	Messages	Interval		
Interval	1 sec	•	0	COM3	NMEA	GGA+ZDA	1 sec		
DIM		-	0	New N	MFA str	eam 🛟 New SBE	stream		
CBC			Str	eame n	renared	nress "OK" to a	nnly the changes		
GGA		_		cumo p	repared	, press on to a	ppi) are changes.		J
GNS		-	- 🗷 A	dvance	d Settin	igs—			
GRS		-							
GSA		-	Def	ault	Ok				
GST				llour					
GSV			Pres	s "OK"	to app	bly the changes.	•		
HDT									
RMC			CDat	a Strea	ms				
ROT									
110	-				-		<	COM3 (Ou	it:NMEA 0.07kB/s)
ZDA	2			N.					
HUU									
Back	Next Finish	Cancel							a
				IEA/SBI	- Outpu	t Streams)
				Port COM2	Туре	Messages	Interval	D Y	
				COMS	INMEA	GGATZDA	1 Sec	-	
			0	New N	MEA stre	eam 🛟 New SBF	stream		
)
			- 🗷 A	dvance	d Settin	gs-			

Figure 4-3: Selecting to output the GGA and ZDA NMEA message every second

SBF

By clicking **New SBF stream** in the **NMEA/SBF Out** window, a second output stream can be configured. In the example shown in Figures 4-4 and 4-5 the PVTCartesian SBF data block will be output over COM1 once per second.

Data Streams Image: Complex Streams MMEA/SBF Output Streams Port Type Orms Interval Image: Streams Image: Streams </th <th>Data Streams Image: Comparison of the stream of t</th> <th>erview</th> <th>GNSS</th> <th>Communication</th> <th>Corrections</th> <th>NMEA/SBF Out</th> <th>Logging</th> <th>Admin</th>	Data Streams Image: Comparison of the stream of t	erview	GNSS	Communication	Corrections	NMEA/SBF Out	Logging	Admin
COM3 NMEA GGA+ZDA 1 sec Select connection type: New NMEA stream New SBF stream Serial port Advanced Settings If yee NTRIP server If yee If yee If yee Default Ok If yee	COM3 NMEA GGA+ZDA 1 sec X • New NMEA stream • New SBF stream Select connection type: • Advanced Settings— • NTRIP server • Default • New • Ok • New SBF stream • Default • New SBF stream • Default • New SBF stream • Default • New SBF stream		ta Streams	eams-	erval	COM3 (Out:NMEA 0.07kE - New SBF Output-	i/s)	
	Back Next Finish Cancel New SBF Outp	● ● I ● I I ● I I I I I I I I I I I I I	Vew NMEA stream	•+ZDA 1 se		Select connection Serial port NTRIP server IP server IP receive (2-w IP connection	type: vay)	
● COM1 ● COM3								Back Ne

Figure 4-4: Selecting to output SBF data on COM1

New SBF Output)						
Select messages to ou	itput:							
Interval 1 sec	•							
Rinex (meas3)								
Support								
Hide detailed selection	100 C							
Measurements								
Meas3		CN	MEA/SBI	F Outpu	it Streams			
RawNavBits			Port	Туре	Messages	Interval	-	
⊞ GPS			COM1	SBF	PVTCartesian	1 sec	2	×
⊞ GLO		🤍	COM3	NMEA	GGA+ZDA	1 sec		×
∃ GAL			New NR		eam 🖸 New SBE	stream		
B GEO		C+		TER SU	proce "OK" to p	and the changes		
BDS		SU	reams p	repared	, press OK to a	oply the changes.	6	
₽ 07 5		-==/	Advance	d Settir	nas-			
PVTCart		1 1 1 1 1						
PVTCartesian	.							
Back Next Fir	nish Cancel	Pres	s "OK"	to app	bly the changes.			

Figure 4-5: Selecting to output the PVTCartesian SBF block every second

Step 3: Verifying the configuration

Having configured the data output and clicked on **Ok**, the **NMEA/SBF Out** page will now display a summary of all data output as shown in Figure 4-6.

Overview	GI	ISS/IN	S Communicat	tion Corr	ecti	ons	NMEA/SE	SF Out	Loggin	g	Admin
CDa	ata Stre	ams —									
						COMI	(Out:SBE 0.06	kB/s)			
	4	(m)			Ser		Conception of the	nu oj oj			
		00			0	COM	Out-NMEA A	0760/6)			
					000	COM:	CULTINMEA U.	U/KB/S)			
_											
CNM	1EA/SBI	= Outpu	it Streams	-	_						
	Port	Туре	Messages	Interval	D	~					
	COM1	SBF	PosCovCartesian	1 sec	4	<u> </u>					
	СОМЗ	NMEA	GGA+ZDA	1 sec	13	×					
0	New N	1FA str	eam	eam							
-		101 30		cum							

Figure 4-6: Summary of all configured data output streams

Figure 4-7 shows the actual data output. NMEA is in ASCII and is thus readable unlike SBF which is formatted in binary. In this example, the serial COM was connected to a PC via a USB adapter which maps the serial connection to a virtual COM9 of the PC.

\$GPGGA, 110505.75, 5050.5845766, N, 00429.2577391, E, 4, 16, 0.8, 70.7634, M, 47.: \$GPGGA, 110505.80, 5050.5845763, N, 00429.2577391, E, 4, 16, 0.8, 70.7629, M, 47.: \$GPGGA, 110505.90, 5050.5845763, N, 00429.2577393, E, 4, 16, 0.8, 70.7628, M, 47.: \$GPGGA, 110505.90, 5050.5845764, N, 00429.2577393, E, 4, 16, 0.8, 70.7628, M, 47.: \$GPGGA, 110505.90, 5050.5845764, N, 00429.2577393, E, 4, 16, 0.8, 70.7628, M, 47.: \$GPGGA, 110506.00, 56 \$GPGGA, 110506.10, 56 \$GPGGA, 110506.10, 56 \$GPGGA, 110506.10, 56 \$GPGGA, 110506.20, 56 \$GPGGA, 110506.25, 56 \$GPGGA, 110506.25, 56 \$GPGGA, 110506.25, 56 \$GPGGA, 110506.30, 56 \$GPGGA, 110506.55, 56	🖨 Data Link: Connect	ion 1			×			
\$GPGGA, 110505.95,56 \$GPGGA, 110506.00,56 \$GPGGA, 110506.05,56 \$GPGGA, 110506.10,56 \$GPGGA, 110506.15,56 \$GPGGA, 110506.15,56 \$GPGGA, 110506.15,56 \$GPGGA, 110506.20,56 \$GPGGA, 110506.30,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.63,56 \$GPGGA, 110506.63,56 \$GPGGA, 110506.63,56 \$GPGGA, 110506.63,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.35,56 \$GPGGA, 110506.35,56 <td>\$GPGGA,110505.75,50 \$GPGGA,110505.80,50 \$GPGGA,110505.85,50 \$GPGGA,110505.90,50</td> <td>)50.5845766,N,00429.2577391,E)50.5845768,N,00429.2577391,E)50.5845763,N,00429.2577394,E)50.5845763,N,00429.2577393,E</td> <td>,4,16,0.8,70. ,4,16,0.8,70. ,4,16,0.8,70. ,4,16,0.8,70.</td> <td>.7634,M,4 .7629,M,4 .7628,M,4 .7624,M,4</td> <td>7.1 7.1 7.1 7.1</td> <td></td> <td></td> <td></td>	\$GPGGA,110505.75,50 \$GPGGA,110505.80,50 \$GPGGA,110505.85,50 \$GPGGA,110505.90,50)50.5845766,N,00429.2577391,E)50.5845768,N,00429.2577391,E)50.5845763,N,00429.2577394,E)50.5845763,N,00429.2577393,E	,4,16,0.8,70. ,4,16,0.8,70. ,4,16,0.8,70. ,4,16,0.8,70.	.7634,M,4 .7629,M,4 .7628,M,4 .7624,M,4	7.1 7.1 7.1 7.1			
\$GPGGA,110506.10,50 "@>>@02\$@Q\$@N_418èý +x_4:1 \$GPGGA,110506.15,50 \$GPGGA,110506.20,50 \$GPGGA,110506.20,50 \$\$GPGGA,110506.25,50 \$GPGGA,110506.30,50 "\$@ 'O`lp +x_4*'Eú5ÀàGSeó?dEÿô;pô;#*t:Ráé:C1!ñC*x "\$@ 'O`lp +x_4*'U(ú±NA"=ÜHÔE!!An)bÜAÇRA~t=Bîî;UDS;w&å°ù0 D+´<·È?aQ>!!!C* "\$@ 'O`lp +x_4*'U(ú±NA"=ÜHÔE!!An)bÜAÇRA~t=Bîî;UDS;w&å°ù0 D+´<·È?aQ>!!!C* "\$@:@02\$@(18Lp +x_4*'IZ 8 ¬ 7a¬8-ê)= Uý6 6 7ù0 D] <a1û0 +x]*="" 7\<="" d\$@[2!!18lp="" dù0="" td="" ù=""> 7Ú5_80>=5" 6[47n ôµ 5§µ1*p7\$@,ˤDLp +x]94}*(@d¥7A CEe6? Î 0;tîêwUBs>w&â:C1 ñC* "\$@*@00@02\$@ûô(418°p +x]*E<8udi7gø¬8 Å)=nÛp6* ì7ù0 Dvô;1ù0 Dù0 D\$@[iW!!8°p +x]*{D</a1û0>	\$GPGGA,110505.95,50 \$GPGGA,110506.00,50 \$GPGGA,110506.05,50	nta Link: Connection 2				_		×
"\$@+ë¦O`°p -x]+Rbä[ú±NAÛ+ HÕE!!A©üÜAÇRA~t=Bæ+:äÈl;Èl~°ù© Đc;‡Iè È? O >!!)+C+ "@@60002\$@ûÔ4[8°p -x]+C< 8üďì7gø¬8 Å)=nÛp6+ ì7ù0 ĐvÒ;¶ù0 Đù0 Đ\$@íW!!t8°p -x]+C	\$GPGGA,110506.10,50 \$GPGGA,110506.15,50 \$GPGGA,110506.20,50 \$GPGGA,110506.25,50 \$GPGGA,110506.30,50 \$GPGGA,110506.35,50	"60>80Q\$@N_418èý ⊦x 8;\7RĬ8Ó▶*=«♥ü6LQ 7ù0 ĐÄ À µhwn7\$@l_ʤDèý ⊦x 04)•∢`Æú5Àå "\$@ 'O`Lb ⊦x • Ü[ú1 "60:80Q\$@ 418Lb ⊦x •ï2 7Ú5_8Ö>=5" 6047n Ôµ 5§µ1•p7\$@ Õ;tîÊ»UĐs»w&â:Ct ñC◆	I Iù❶ Đù❶ Đ\$@±Ñ‼ SSeó?dÞÿÔ;pÔÇ NA∵=ÜHÕE‼An)k 3 8 ¬ 7a¬8-ê)= ,ˤDLþ ⊾x∎04)◆	18èý ⊢x∎ ≫é×t:Râé: ÜAÇRA~t=H Uý6 ô 7ù0 ∢@d¥7À CÆ	â 7e` 4 7 4 ¬7, :C‡!ñC◆x B‡ÎÊ;UĐs;w&â D]<À¶ù© Đù© eó? Î	}§8¾¬@5 Л £ °ù ® Đ♠´ < Đ\$@ ⊒ Q‼ 1 8	2 6v1∢7U • È?aQ > Lþ ⊢x ⊑ ◆	′еЁµВТ ^ > !! ▶С◆ ù 7\1•
	Show All data	"\$@→ë¦O`°p ⊢x →Rbä[ú "@@600Q\$@ûÔ4‡8°p ⊢x → "\$@È ¦O`¶ÿ ⊢x →è)é[ú: "@@D00a\$@Ü\$4‡8¶ÿ ⊢x →i ¥)=↓:7m¶Å7ù0 Đć·À¶ù0 Đù0 Đ\$@Ã‼ "	±NAÛ→ HÕE‼A©üÜ £< 8ü dì 7gø¬8 Ã ±NAÆÕøHÕE‼A±¢ 4Ý 8d¤ì7ÈA®8 ⊈8¶ÿ ⊢x∎ocd 7 ;	JAÇRA~t=Ba .)=nÛþ6♥ ì ÜAÇRA~t= S¶7w ®7- §	æ→:ãÈI;Èl~°ù 7ù@ ĐvÒ;¶ù@ Đ Ɓåû ¹F®G9æ® §8©Ï65≪Ë 6 ¤¤	9 Đc;‡Iè : ρù@ Đ\$@í₩ ;ù@ ĐC~]V 7ừ Øμ Õ▲μ	È? O > ‼) ‼ 1 8°p ⊢x 7É È?Da Ø q7\$@{	·C◆ □◆{D ↓ >!!▶C◆ SË×D¶ <u>↓</u> ✓
Show All data V Auto completion for None V		Show All data ~ Auto com	npletion for None	0070		~		>

Figure 4-7: Example showing output of NMEA GGA (left panel) and SBF PVTCartesian (right panel) data

4.1.2 Output over Ethernet

SBF and NMEA data can be sent over an Ethernet connection from the AsteRx SB3 .

Step 1: Configure an IP connection on the AsteRx SB3

The Ethernet port settings can be configured by selecting **IP Ports** from the **Communication** menu. In the example shown in Figure 4-8, port 600 has been configured as connection IPS1 in **TCP2Way** mode so data can be received as well as transmitted over the connection. When choosing a port number, avoid conflicts with other applications such as the commands port (28784), the webserver port (80), the FTP port (21) as well as the default NTRIP port (2101) and the NTP port (123).

Note that a new IP port can also be configured by following the sequence of settings for NMEA output described in *Step 2*.

Figure 4-8: Configuring the TCP/IP server port setting for data output

Step 2: Configure output of NMEA messages

In the **NMEA/SBF Out** window, click on **New NMEA stream** and follow the sequence of windows to configure the data you want to output. In the example shown in Figure 4-9, the NMEA GGA message will be output every second. Ensure that the previously configured IPS1 port is selected for output as highlighted.

Data Streams Image: S	
NMEA/SBF Output Streams There are currently no data streams defined. New NMEA stream New SBF stream Advanced Settings- Mathematical Settings- Image: Stream S	
NMEA/SBF Output Streams There are currently no data streams defined. Image: Provide the stream Image: Provide the	
Image: New NMEA stream Image: New NMEA stream Image: New NMEA stream Image: New SBF stream Image: New NMEA stream New Stream Image: New NMEA stream New Stream Image: New NMEA stream New NMEA stream	
Default Ok IP server IP server IP receive (2-way) IP connection Back Next Back Next MMEA/SBF Output Streams Select messages to output Interval 1 sec IPS1 TCP 2-Way Server on NMEA Streams prepared, press "OK" to apply the changes. Interval	
Back Next Finish Cancel Back Next Finish NMEA/SBF Output Streams New NMEA Streams New NMEA GGA Interval Select messages to output Interval Select messages to output IPS1 TCP 2-Way Server on NMEA GGA 1 sec X GGA GGA GGA GIL GGA GIL GST HDT Interval Inte	r on port 6 on
NMEA/SBF Output Streams New NMEA Output Port Description Type Messages Interval IPS1 TCP 2-Way Server on NMEA GGA Interval IPS1 TCP 2-Way Server on NMEA GGA Isec Ort New NMEA stream New SBF stream GGA Isec Streams prepared, press "OK" to apply the changes. HDT Interval	Cancel
NMEA/SBF Output Streams Select messages to output Port Description Type Messages Interval Interval Interval Interval Isec GGA GGA GGA GGA GIL GNS GST GST GT GT HDT TOT	
Port Description Type Messages Interval Inscription Interval Interval Interval IPS1 TCP 2-Way Server on NMEA GGA Isec Image: Server on GGA Interval Isec Image: Server on Server on NMEA Interval Interval Interval Interval Isec Image: Server on NMEA Isec Image: Server on GGA	t:
● IPS1 TCP 2-Way Server on NMEA GGA 1 sec Port 600 New NMEA stream New SBF stream Streams prepared, press "OK" to apply the changes. HDT	*
port 600 GLL New NMEA stream New SBF stream Streams prepared, press "OK" to apply the changes. GST HDT Image: Construction of the stream of the	
GNS GNS GST HDT	
Streams prepared, press "OK" to apply the changes.	
HDT	
- Advanced Settings-	
VIG	
Default Ok	
Press "UK" to apply the changes.	
PASHR	-
Back Next Finish	Constant of

Figure 4-9: Outputting NMEA GGA over the configured IPS1 connection

Similar steps can be followed to output SBF messages.

Step 3: Configure Data Link to listen for NMEA output

The screenshots in Figure 4-10 show how the Septentrio GUI tool Data Link can be configured to listen for the AsteRx SB3 GGA output.

Click on the **TCP/IP Client** button to configure the connection. In the highlighted fields insert the IP address or hostname of the receiver and the port number configured in *Step 1*. Click on **Connect**.

Connection 1		
Connect	TCP/IP Client 192, 168, 110, 227:600	
Show Data	Select the connection	×
$GGA \rightarrow \boxed{1} \boxed{2} \boxed{3} \boxed{4}$	Serial TCP/IP UDP NTRIP	
Send every 10'th received GGA Connect Script: gurations)\Assig	Connection Modes TCP/IP Client TCP/IP Server 	
Send every 1,00 s.	Host Name or IP-Address	Data Link : Tools Help
Press Connect	Port Number Co	Disconnect TCP/IP Client 192.168.110.227:600
	Li	Show Data $hk \rightarrow 1$ 2 3 4 5 6
	s	end every 10'th received GGA
		Connect Script: gurations)\Assignments_solutions.docx
	ОК Сан	Close Script:
L		Log File:

Figure 4-10: Configure the TCP/IP connection settings in Data Link

The info line at the bottom of the window should indicate that a connection has been made. Click on the **Show Data** button to display the GGA data coming from the receiver as in Figure 4-11.

🧬 Data Link				
File Tools Help				
Connection 1				
Disconnect Show Data Link \rightarrow 1 2 3 4 GGA \rightarrow 1 2 3 4 Send every 10'th received GGA \diamondsuit Connect Script: gurations)/Assig Send every 1,00 s. \diamondsuit Close Script: Log File:	TCP/IP Client 192.168.110.227:600	74778, N, 00443, 9274464, E, 74774, N, 00443, 9274468, E, 74777, N, 00443, 9274469, E, 74773, N, 00443, 9274480, E, 74774, N, 00443, 9274471, E, 74767, N, 00443, 9274483, E,	5,15,0.7,81.2385,M 5,15,0.7,81.2412,M 5,15,0.7,81.2400,M 5,15,0.7,81.2400,M 5,15,0.7,81.2392,M 5,15,0.7,81.2392,M 5,15,0.7,81.2392,M	 X 2.0,03 3.0,04 4.0,05 5.0,02 .0,02
Connected to 192.168.110.227				
	<			>
	Show All data	completion for None	•	
	10-12	Clear Freeze	Close	

Figure 4-11: The Show data window of Data Link showing the NMEA GGA message coming from the AsteRx SB3

4.2 How to log data

The AsteRx SB3 has 16 GB of memory for internal data logging. Note: this function is not available in the AsteRx SB3 Pro model.

4.2.1 Internal logging

Step 1: Defining the Disk Full action

When setting up a logging session for the first time, it is a good idea to define what you would like to happen when the internal memory is full. This can be configured in the **Advanced** tab of the main page of the **Logging** menu as shown in Figure 4-12. There are two options, either the receiver stops logging when the memory is full or it continues logging by making space for new files by deleting the oldest files. The default setting is 'Stop logging in all sessions'.

Overview	GNSS	Communication	Corrections	NMEA/SBF Out	Logging	Admin
CDi	sk Usage					
		Internal Disk (13.7 G	B)			
		used (0%, 112.0 KB))			
		nec (100 %, 15.7 62				
	Unmount Format		J			
C Er	hable Logging					
Lo	gging ● off ○ on					
G	eneral Advance	d Disk Contents				
	Marker and Statio	n Parameters				
	Marker name	SEPT				
	Marker number	Unknown				
	Marker type	Unknown				
	Station code					
	Monument index	0				
	Receiver index	0				
	Country code					
	Disk Full Action—					
	DSK1					
	Action StopLoggi	ng 🔻				
	Global File Namin	g Options				
	Add .A suffix to c	urrent file names 🔍	off on			
	USB Mass-Storage	e Device Configuratio	on La ia anno actad			
	Automatically ena	adie UMSD when cab	ie is connected	• orr • on		
)		
Def	ault Ok					

Figure 4-12: Selecting what you wish to happen when the internal 16 GB memory is full

Step 2: Configuring a logging session

To define a new logging session, press **New NMEA Stream** or **New SBF Stream** as shown in Figure 4-13.

Overview	GNSS	Communication	Corrections	NMEA/SBF Out	Logging	Admin	
- Die	sk Lisago-						
	SK USage	Internal Disk (13.7 G	(B)				
		used (0%, 40.0 KB)	,				
		free (100%, 13.7 GE	B)				
	Unmount Format)					
	abla Lanatan						
En	able Logging — naina off o						
	gging o on o o						
G	eneral Advanc	ed Disk Contents					
	There are current	lly no data streams d	lafinad				
	New NMFA str	eam 😳 New SBF str	eam				
	DS LOYVING Para	SK1					
Naming type FileName							
	File name log						
Der							

Figure 4-13: Defining a new logging session

You can then follow the sequence of steps shown in Figure 4-14, selecting the various configuration settings for the logging session. In the **Edit SBF Stream** window, the messages required for RINEX generation have been selected as well as those useful for the Support department for diagnosing problems. SBF messages can also be selected individually. In the **SBF Logging Parameters** field you can select the naming convention. The **IGS** options names files according to IGS convention but files can also be freely named using either **Filename** or **Incremental** options. After you have finished configuring the log session, do not forget to enable logging and press Ok.

here are currently no data streams defined.	Interval 1 sec	· · · · ·	
New NMEA stream 🖸 New SBF stream	PostProcess		
BE Logging Parameters	Rinex Dinex (mens2)		
bor Logging Parameters	Rinex (meas3)		CEnable Logging
DSK1	Support		
	Hide detailed selection		
ile name log	Measurements		General Advanced Disk Contents
	# Meass		- NIMEA/SPE Logging Strooms
	# RawNavBits		NIMERYSBF Logging Streams
	H GPS		I ype Messages Interval
	B GLO		SDF POStProcess+Rinex+Support 1 sec
	U GAL	(*)	😳 New NMEA stream 🛟 New SBF stream
	H GEO	e	Streams prepared, press "OK" to apply the changes
	■ BDS	e	
	₽ QZS	· ·	SBF Logging Parameters
			DSK1
	Ok Cance		Naming type IGS24H 🔹
			File name log

Figure 4-14: Follow the sequence of windows to fully configure the logging session

Step 3: Verifying the configuration

When you have finished configuring the logging session, the **Log Sessions** window will show a summary of the defined logging sessions as in Figure 4-15. An estimate of the daily size of data generated with the current logging configuration is also given.

able Logging gging O off O on eneral Advanced Disk Contents NMEA/SBF Logging Streams Type Messages Interval SBF PostProcess+Rinex+Support 1 sec [New NMEA stream New SBF stream SBF Logging Parameters DSK1 Naming type FileName T File name log	Unmount	Internal Disk (13. used (2%, 218.3 free (98%, 13.5 Logging SBF 110 MB/day	7 GB) MB) GB)
Description Interval SBF PostProcess+Rinex+Support 1 sec New NMEA stream New SBF stream SBF Logging Parameters DSK1 File name log	able Logging gging O off (ieneral Adva NMEA/SBF Lo	on Disk Contents gging Streams	
New NMEA stream New SBF stream SBF Logging Parameters DSK1 Naming type FileName File name log	Type Messa SBF PostPr	iges ocess+Rinex+Suppor	t 1 sec
SBF Logging Parameters DSK1 Naming type FileName File name log	🕄 New NMEA	stream 😳 New SBF	stream
DSK1 Naming type FileName File name Iog	SBF Logging I	Parameters	
File name log	Newstern	DSK1	
File name log	Naming type	FileName	1.1
		log	

Figure 4-15: A summary of the newly defined logging sessions showing the expected amount of data generated daily

4.3 Downloading logged data from the receiver

Data files logged by the AsteRx SB3 can be downloaded using the web interface using the **Disk Contents** tab on the main page of the **Logging** menu. Individual files can be downloaded by clicking on the green download arrow () next to the file name as shown in Figure 4-16. Obsolete files can be deleted by clicking the × button.

Overview	GNSS	Communication	Corrections	NMEA/SBF Out	Logging	Admin
	sk Usage	Internal Disk (13.7 G used (2%, 218.8 MB free (98%, 13.5 GB) Logging SBF 110 MB/day	B)			
Lo	gging off on					
	eneral Advanced ame Internal Disk (13.7 C LOG1_my_loggin_ 18162 log.sbf LOG2_ efresh	Disk Contents Size B) 218.8MB session 4.0M	*			

Figure 4-16: Downloading logged files

A Rear-panel port descriptions

A.1 PWR-COM2&3/USB

Figure A-1: Solder view of the 7-pin female PWR-COM2&3/USB socket on the rear panel of the AsteRx SB3

The 7-pin connector type is an ODU MINI-SNAP F Circular Connector Series S40F1C-P07MCD0-500S.

PIN #	Colour	COM mode	USB mode	Comment
1	Red	PWR	Not	5-36 VDC input (1.3A)
·	neu		connected	Pink wire with Red heat-shrink tube
2	Black	GND	GND	Ground
	Black		CITE	Brown wire with Black heat-shrink tube
				EITHER Serial COM3 receive line
3	Green	RxD3	USB D-	OR Negative USB 2.0 FS device node.
				Selection is done via pin 7.
4	Yellow	TxD3	Not	Serial COM3 transmit line
			connected	
_	_			EITHER Serial COM2 receive line
5	Grey	RxD2	USB D+	OR Positive USB 2.0 FS device node.
				Selection is done via pin 7.
6	White	TxD2	Not	Serial COM2 transmit line
			connected	
				4.4-5.25 V input.
7 Blue	Blue	e Not	VBus	If present , USB-mode is selected.
,	2.40	connected	. 200	If not present , UART Serial COM mode is
				selected.

43

A.2 COM1-GPIO

Figure A-2: Solder view of the 7-pin female COM1-GPIO socket on the rear panel of the AsteRx SB3

The 7-pin connector type is an ODU MINI-SNAP F Circular Connector Series S40F1C-P07MCD0-500S.

PIN #	Colour	Name	Comment
1	Pink	EVENTA	First EVENT input (Max. V_{IL} = 1V, Min. V_{IH} = 2V, Max. V_{IH} = 24V, Internal delay to detection < 1 μ s, 15 K Ω pull-down)
2	Black	GND	Ground Brown wire with Black heat-shrink tube
3	Green	COM1 CTS/ EVENTB	COM1 Clear to Send. This also connects to the second event EVENTB input. It has the same electrical specifications as EVENTA (see pin 1).
4	Yellow	COM1 RTS/ PPS_OUT	COM1 Request To Send or PPS_OUT (PPS_OUT low = 0V, PPS_OUT high = 5V). PPS_OUT polarity is consistent with command line reference of OEM module.
5	Grey	RxD1	Serial COM1 receive line
6	White	TxD1	Serial COM1 transmit line
7	Red	5V OUT	5V +/- 5%, 300 mA DC output Blue wire with Red heat-shrink tube

A.3 ETH

Figure A-3: Solder view of the 4-pin female ETH socket on the rear panel of the AsteRx SB3

The 4-pin connector type is an ODU MINI-SNAP F Circular Connector Series S40F1C-P04MFG0-50OO.

PIN #	Name	Description
1	ТХР	Ethernet TX+
2	TXN	Ethernet TX-
3	RXP	Ethernet RX+
4	RXN	Ethernet RX-

A.4 MAIN ANT / AUX ANT (TNC)

Connect an active GNSS antenna to these connectors. The gain at the connectors (antenna gain minus cable losses) must be in the range 15 to 50dB.

Note: AsteRx SB3 ProBase model has only one antenna connector.

The receiver provides a 5V DC supply on both the MAIN and AUX connectors to feed the antennas. The maximum supported current is 150mA.

Never inject a DC voltage into the MAIN or AUX connectors as it may damage the receiver. When using a splitter to distribute the antenna signal to several receivers, make sure that no more than one output of the splitter passes DC. Use DC-blocks otherwise.

APPENDIX A. REAR-PANEL PORT DESCRIPTIONS

