

In this workflow we will focus on the RTK configuration between eMotion and Leica GS sensor using Leica Captivate for an eBee X. Note: Ensure to have the latest version of senseFly's eMotion as found on my.senseFly.com.

### 1. Base Station field setup:

- Setup base station over station point. This station point can be either known or unknown before flight (We will need to known coordinates for post processing in eMotion.)

- A typical set up would are using a Tripod, tribrach and offset pole for the base setup. - Record the height of the base station from the ground. A height hook may be used, but needs to be accounted for. This will be needed for post processing the base station in eMotion.



Connect the GEV269 cable lemo connection to GS sensor. - Switch on GS Sensor.





### 2. Connection to computer

Connect and plug the GEV269 cable USB into the computer. Make a note of the COM port number that the base is using.

Notes:

- To ensure proper functionality of the cable, please make sure to download all the necessary driver software. This can be found on Leica MyWorld:



GS & CS & TS Drivers 64 bit Driver for connecting GS / TS / CS devices to a PC via USB cable. The drivers support Windows 7, Windows 8 and Windows 10 operating systems. V6.02 06.12.2017 EXE 18.25 MB

- Other compatible Leica cable connection from base to laptop may also be available. Refer to the Leica Accessory Guide for more information or contact your local Leica support for more information.

### 3. Base station configuration (Field controller)

- Unlike other base station configurations, eMotion is unable to send or receive commands to or from the Leica GS Sensor, as such a field controller will used to setup the GS senor. The Leica controller can run on Leica Captivate or Leica SmartWorx Viva. Other software may also work, this article only refers

Turn on Leica field controller and in the main menu, select the option <Switch to base>. The controller will then be in the Base mode, as indicated by "Leica Captivate – Base"



To connect to the GS sensor in base mode, select <Settings>, <Connections> , <Connect to GS Base>. Press F4 *Search* to search the GS sensor, then F1 OK to accept the GS sensor found.

Download



つ Leica Captivate - Bas	e 📆 🎋 📔 2D	(2) 23:10	5 Settings	74 0 □ 1D ·····	23:13
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Fn OK		Fn (2) (23:14	Fn OK	2D 0 ID	Fn (2) 23:15
Connect to GS base	All other connections		Sensor Connect using Last used base Bluetooth ID	Bluetooth BT_Name_1 BT_Address_1	~
Fn OK		Fn	ОК	Search	

Once the CS controller is connected via Bluetooth to the GS sensor, this will be indicated at the top Toolbar of the Base menu.



The GS sensor will only start logging data and transmit RTK correction information if there is sufficient GNSS coverage to get an autonomous position.



NOTE: It is import to make sure that GS sensor is connected to the CS20 controller and is tracking and receiving satellites



### 4. Base setup Workflow:

From Leica Captivate - Base Menu, select <Settings>, <GS Base>:



In the GS Base menu select and make the following two options are set:

Ensure the tick box GPS, and Glonass are checked

1<5	Satellite Tracking> :		2 <gn< th=""><th>ISS raw data logging&gt;</th><th></th></gn<>	ISS raw data logging>	
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Satellite tracking	GNSS raw data logging		Satellite tracking	GNSS raw data logging	
			to OK		En
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Make sure the Log GNSS raw data is checked Log data every: **1.0 s,** Log data to Leica MDB format



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Global Regional Advanced		
GPS	✓	
Glonass	$\checkmark$	
Galileo		
BeiDou		
Show message & audio warnin when loss of lock occurs	ıg, 🗸	
Choose which global satellite s	systems should be tracked	
ОК		Page
In Advanced tab, set:		
Cut-off angle: 10°		
DOP limit: <i>None</i>		
L2C tracking: Autom	natic	
Satellite health: <i>Autor</i>	natic	
Satellite Tracking	₩ 2D /▲ 0 ■ 1D	00:22
Global Regional <b>Advanced</b>		
Cut-off angle	10 °	
DOP limit	None	$\vee$
L2C tracking	Automatic	$\vee$

OK Page

└ GNSS Raw Data Logging	👼 📁 1D	0 00:25
Log GNSS raw data	✓	
Log data every	1.0s	$\sim$
Log data to	Leica format (MDB)	$\sim$

Log GNSS raw data for post-processing in office software. Static data will be logged to the SD card of the GS sensor.



#### Note:

Logging in Leica MDB format will require the usage of Leica Infinity software to export Leica MDB format to RINEX. If the receiver has the appropriate paid option, it may allow for direct RINEX format.

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Log GNSS raw data	✓	
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be logged to the SD card of the $GS$	RINEX (Version 2.11)	
	RINEX (Version 3.02)	
	RINEX (Version 3.04)	

Once the settings are made, press F1 to accept and save the changes.

#### Interface Settings/USBserial port setup

In the base menu, select <Settings>, <Connections>, <All Other Connections>, highlight **Base RTK 1**, and press **F3** *Edit* 



⑤ Base Connect	ion Settings	📆 🕺	<u></u> 2D ■ 1D	00:54	
<b>GS base</b> Device GS16	Port Bluetooth				
<b>GS internet</b> Device -	Port -				
Base RTK 1 Device Satel M3-TR4					
Base RTK 2 Device -	Port -				
Fn OK	Edit	Control		Fn	
In the RTK Base	Settings, und BTK data: <b>d</b>	er the <i>Ge</i>	<i>eneral</i> tab:	In the	RTK Base Settings, under the <i>Data rates</i> tak
Connect u	using: <b>GS PC</b>	rt 1		•	Message type: <i>Extended</i>
<ul> <li>Device. <i>R</i>.</li> <li>RTK data</li> </ul>	format: <b>RTC</b>	MV3		•	Info: <i>60s</i>
<ul> <li>Apply ant stream: U</li> </ul>	enna correc Inchecked	tion to RT	K data	•	End of message: Nothing RTK base ID: <b>0</b>
STK Base Setting	s (RTK 1)    🕱	<sup>%</sup> ,   ₂ 2D 0 □□ 1D	@ 💻	្តិ 🖒 RTI	K Base Settings (RTK 1) 🛛 🛣 🖞 🔛 🗤 💷 💷 🖉 📖

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RTK data Data rates Time slicing			
Transmit RTK data	✓		
Connect using	GS Port 1		$\vee$
Device	RS232		
RTK data format	RTCM v3		$\checkmark$
Apply antenna correction to RTK data stream			
ОК		Device	Page

RTK data format	RTCM v3	
Data	1.0s	$\vee$
Message type	Extended	$\vee$
Coordinates	10s	$\sim$
Information	60s	$\vee$
End of message	Nothing	$\vee$
RTK base ID	0	
ОК		Page

RTK data Data rates Time slicing

Press F1 OK to sure the settings are saved

#### Setting up Base over either a Known and Unknown Point:

Depending on the point's origin, one may choose to set up over a known coordinate. This can be manually inputted or selected during the Base setup by choosing *Over Known Point* to set up base. However, eMotion Post Flight will allow for the point to be input during the FDM process. Hence, using the unknown point (Over any point) option is recommended at this point.



In the base menu, select <Base setup>, <Over any Point>:



	Fn	ОК	Fr
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From the Over Any Point:

- Antenna height: Enter the antenna height. (if using a height hook, enter the measurement found on the hook)
- Base antenna: If using height hook with a Leica carrier, make sure to select the specific antenna **with tripod** as there is a 36cm offset when using the height hook with a Leica carrier. If a height hook is NOT used, select GS(X) on a Pillar as this will remove the Vertical offset.
- Note: Vertical offset 0.36m if using a *GSxx Tripod antenna*

Press F6 Next to continue



Over Any Point	2D 9.253 ft 17 ID 12.257 ft Q 11:48am
Enter the antenna height & se	elect base antenna
Antenna height	4.310 ft
Base antenna	GS16 Tripod
Vertical offset	1.181 ft
Back	Next
ntar the name of the Dec.	- Deint ID, and proce F( Next to continue
nter the name of the Base	e Point ID , and press F6 Next to continue
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The Base setup is complete, select F6 Base to return to main menu.



🕤 Over Any Point	🕀 🕺 📙	2D 8.623 ft 1D 11.588 ft
Base setup complete.		
Press 'Rover' to return to the	controlling GS rover (fir	st disconnect the
cable from the controller to t	the GS if using a cable)	
Press 'Base' to remain connect	cted to the GS base	
	Rover	Base

### 5. eMotion Flight computer Laptop setup Procedures:

#### Port Settings on Computer:

In Windows, open the Control Panel and click Device and printers.

In Device and printers, go to Ports- Expand Unspecified Ports entry and double-click Leica USB-to-Serial Comm Port: (COM number appears differently for other users). Be sure to note the correct COM port number to be used for the base connection in eMotion.

Right click on Leica USB to Serial Comm port and select properties. In Prolific Comm port Properties-Page to Hardware. Double click on Comm Port will open advance tab. Page to Port settings. On the Comm Port Properties dialog, set the following properties

neral Hardware Prolific USB to - Serial Comm Port (COM7)	)	General Port Settings Driver Details	
Device Functions:		Bits per second: 115200	•
Name Prolific USBto-Serial Comm Port (COM7)	Type Ports (COM	Data bits: 8	•
		Parity: None	•
		Stop bits: 1	•
		Flow control: None	•
Device Function Summary Manufacturer: Prolific Location: Port_#0002.Hub_#0004		Advanced Restore D	)efaults
Device status: This device is working property.			



### 6. eMotion Procedures, Prepare your eBee for flight

Have the eBee RTK, eBee Plus RTK or eBee X placed on a flat, stable surface in an area with good exposure to the sky. This will maximize the number of GNSS satellite signals it receives.

- Connect the eBee battery and allow it to start up.
- Launch eMotion, load or create a mission, and connect to the eBee/
- In the RTK/PPK tab on eMotion's left-hand Mission panel, click on Set up RTK/PPK then click Add base.

#### Base settings in eMotion:

- Enter the following settings. You may give your base a custom name. Using a serial connection, choose the correct COM port.



#### Configure RTK source

From the Choose RTK Source menu, choose your base station setup that was just created. This will launch the Setup Local Base window. Select On unknown point and then click on **Open base-drone** datastream. eMotion will connect to the base and populate all fields as shown. Once complete, click OK.



e Set up Local Bas	e	
Position (WGS 84)		
Motion is not able to	send commands to your model of bas	e station.
f your base station tosition using the bas toint in post-processi	was placed above a known point, se se's own positioning function and ente ng after the flight.	t the approximate base in the coordinates of the
r your base station v position using the bas after your flight.	was placed in an unknown location, s se's own positioning function. You will	then correct this position
See our <u>Knowledge B</u>	ase for details on base compatibility.	
	Open base-drone datastream	
RTK corrections		
format:		
SPS:		
Glonass:		
ARP:		
Antenna type:		
Latitude:		-
Longitude:		
Ellipsoid height:		-

- If all the settings are correct the Open base downstream will populate all the fields below. Examine each field to ensure accuracy. Press Ok to accept.

eMotion is not able to send commands to your model of base station. If your base station was pleade above a known point, set the approximate base position using the base's own postioning function and enter the coordinates of the point in post-processing after the flight. If your base station was placed in an unknown location, set the approximate base position using the base's own postioning function. You will then correct this position after your flight. See our <u>Knowledge Base</u> for details on base compatibility. If Corrections Format: PS: Ok Jonass: Ok ARP: Antenna type: LEIDS14 Latitude: 46.577713557° Longitude: 6.588271235° Elipsoid height: 637.697 m	Position (WGS 84)	
f your base station was placed above a known point, set the approximate base position using the base's own positioning function and enter the coordinates of the position using the base's own positioning function. You will then correct this position there your fight.     See our <u>Knowledge Base</u> for details on base compatibility.     Open base-drone datastream     RIK corrections     Open base-drone datastream     Difference     Open base-drone datastream     Open base-drone datastream     Difference     Open base-drone datastream     Open base-d	Motion is not able to send	commands to your model of base station.
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Longitude:         6.5892/1235°           Ellipsoid height:         637.697 m	Latitude:	46.5///1355/*
Ellipsoid height: 637.697 m	Longitude:	6.5892/12350
	Ellipsoid height:	637.697 m

In the RTK menu, RTK corrections status for both GPS and GLONASS should be OK and the GNSS status in your drone's Status Panel should be RTK Fixed. The location of the station appears on the map and the drone is ready to fly:



### 7. eBee In Flight Status

In Flight, monitor that the RTK remains fixed for the entire flight. The RTK may float when the eBee is in a bank turn, this is normal, otherwise the RTK should remain fixed. If loss of RTK is constant throughout flight please check serial connection and all the steps have been correctly followed above.



Important Note:

- Don't turn off or move the base station between flights if you will be flying multiple flights from the same location (the longer the base station log, the more accurate the post-processing).
- When the mission is finished, turn the base station off before moving it.