



Rethinking Sensing Technology

Inclinometer Sensor (Beandevic[®] 2.4GHz INC/HI-INC) – Repeatability Tests with Static & Dynamic Data Acquisition Mode – Youssef SHAHIN, Technical Support Engineer
Version document V1.0 – Date 12.11.2020

Berlin, Germany

Tests Description:

The improvement of repeatability is available on the following products:

- BeanDevice® 2.4GHz INC / Hi-INC /Hi-INC Xrange

For Static modes (Low Duty Cycle and Alarm measurement mode) and Dynamic mode (Streaming measurement mode) on Firmware version V7.6

Test session 1: Test on static measurement mode

Configure the BeanDevice with Low Duty Cycle Measurement Mode for 2 min with a refreshment cycle of 2s

The tests are performed on Battery power.

To decrease as much as possible all the external vibrations and shocks, the sensors were tested on a Granite table certified DIN 871.

Test session 2: Test on dynamic measurement mode

Put the BeanDevice on Streaming mode for 1min with different sampling rate (10Hz,100Hz)

The tests are performed on Battery power also.



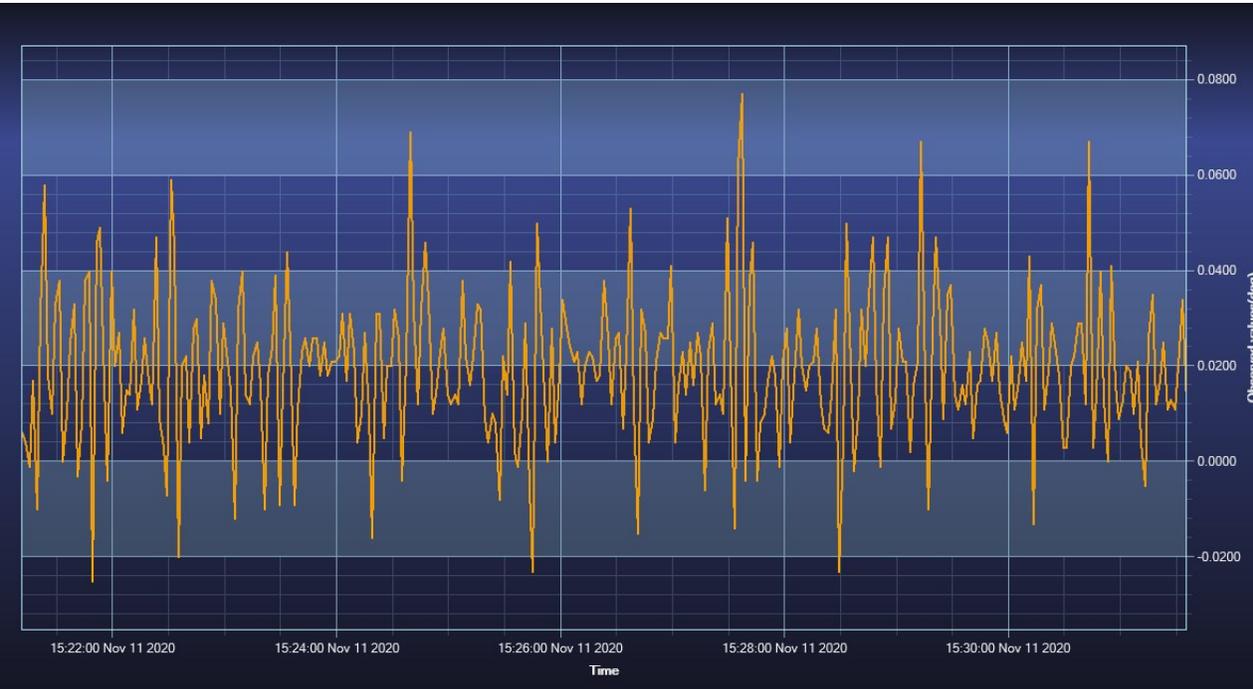
List of Equipment used:

- **1 BeanDevice 2.4 GHz Hi-INC Xrange 15B, SW version V7.6**
- **1 BeanDevice 2.4 GHz Hi-INC Xrange 15B, SW version V7.1**

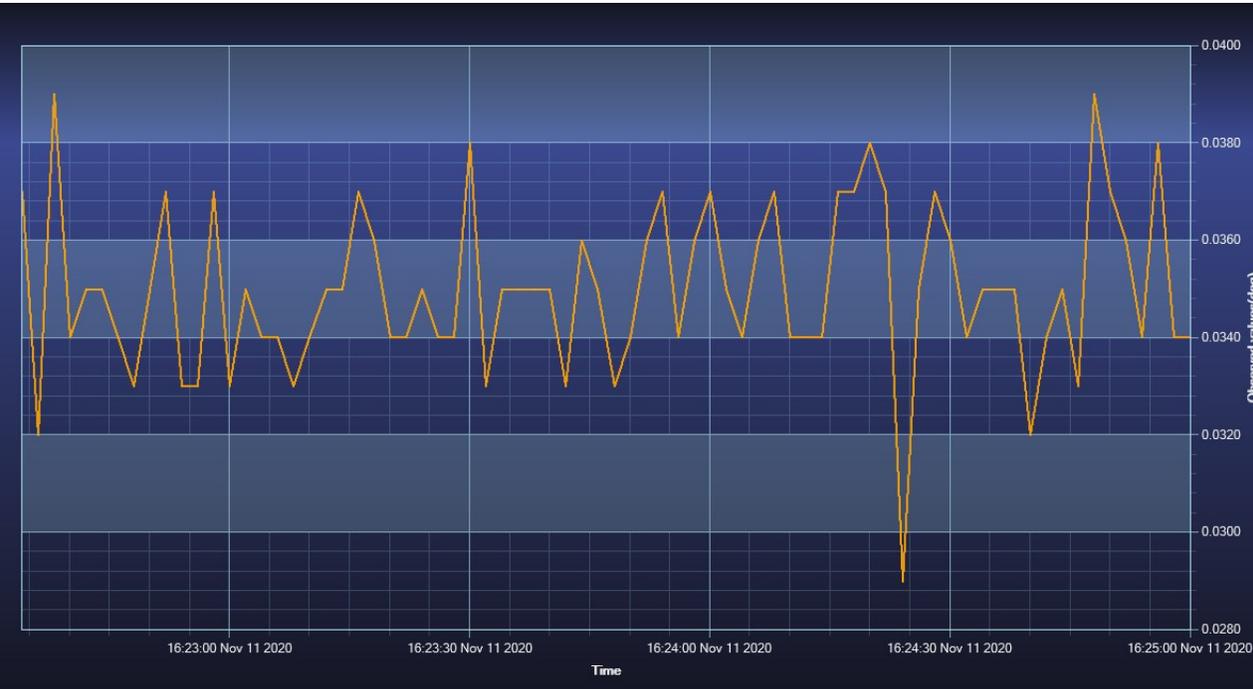
- **Granit Plate (DIN861 certified)**

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15\text{B}$ with Static measurement mode on X axis

Firmware version: 7.1



Firmware version: 7.6



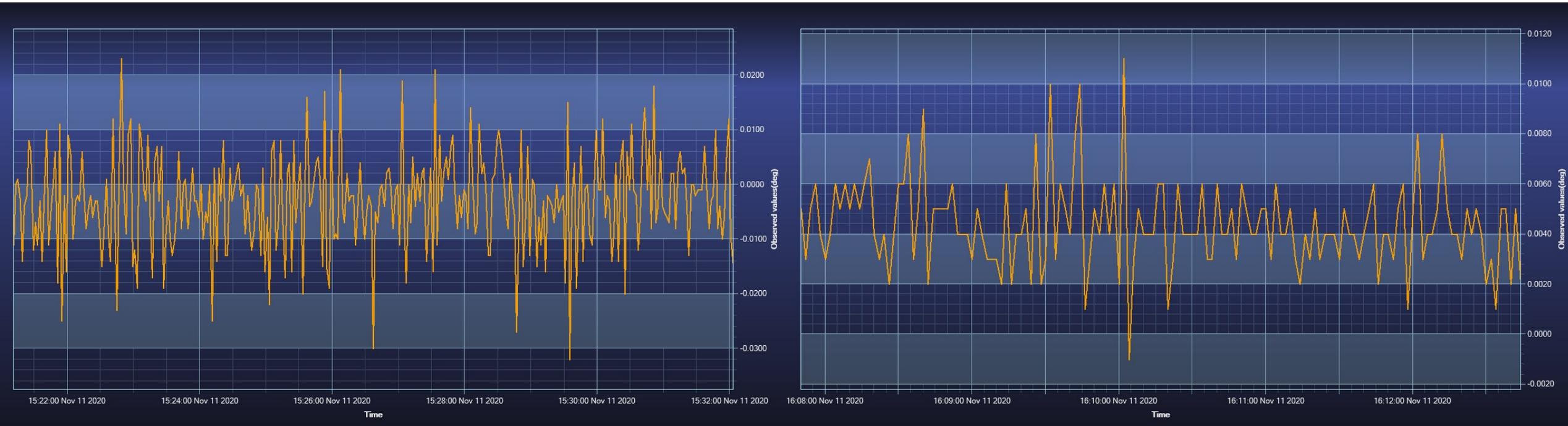
DAQ mode: LowDutyCycle 2s

Channel 1	Firmware version 7.1	Firmware version 7.6
X axis	± 0.05 deg	± 0.005 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15\text{B}$ with Static measurement mode on Y axis

Firmware version: 7.1

Firmware version: 7.6



DAQ mode: LowDutyCycle 2s

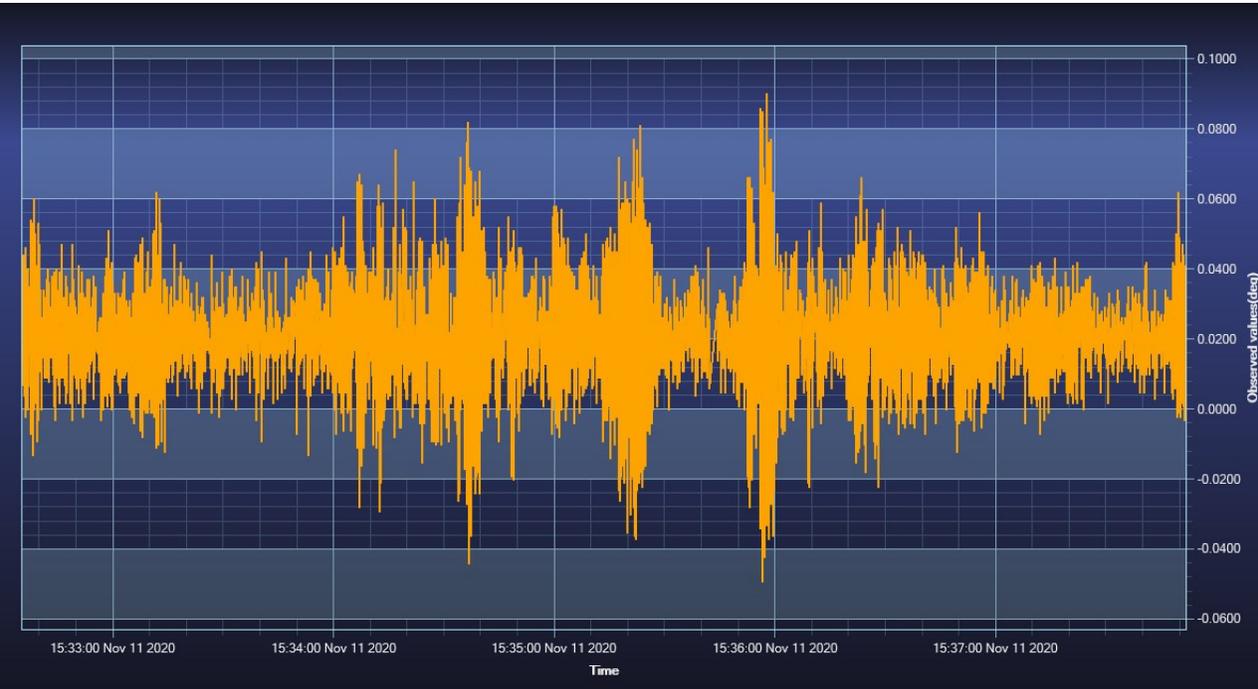
Channel 1	Firmware version 7.1	Firmware version 7.6
Y axis	± 0.026 deg	± 0.006 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15B$ with Static measurement

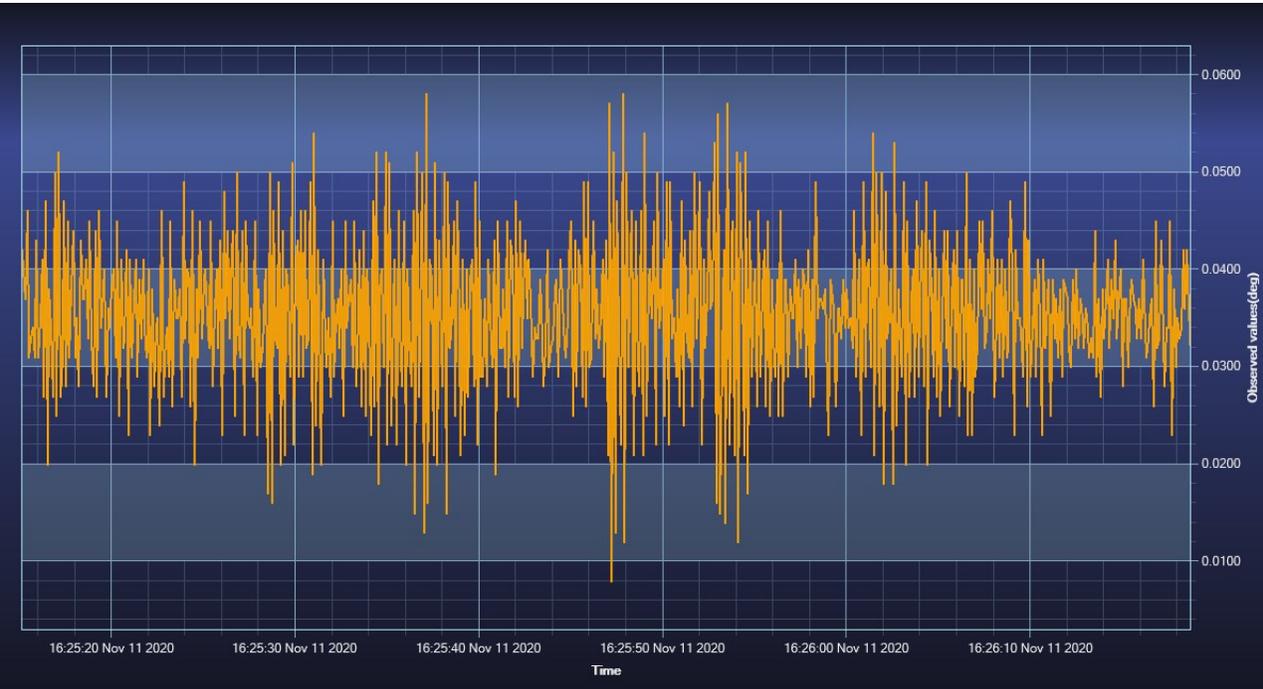
BeanDevice	Power mode	DAQ mode	Channel	Repeatability Results (in deg) on firmware version 7.1	Repeatability Results (in deg) on firmware version 7.6
Hi-INC Xrange $\pm 15B$	Battery	Low Duty Cycle	X axis	± 0.05 deg	± 0.005 deg
			Y axis	± 0.026 deg	± 0.006 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15\text{B}$ with Dynamic measurement mode on X axis

Firmware version: 7.1



Firmware version: 7.6

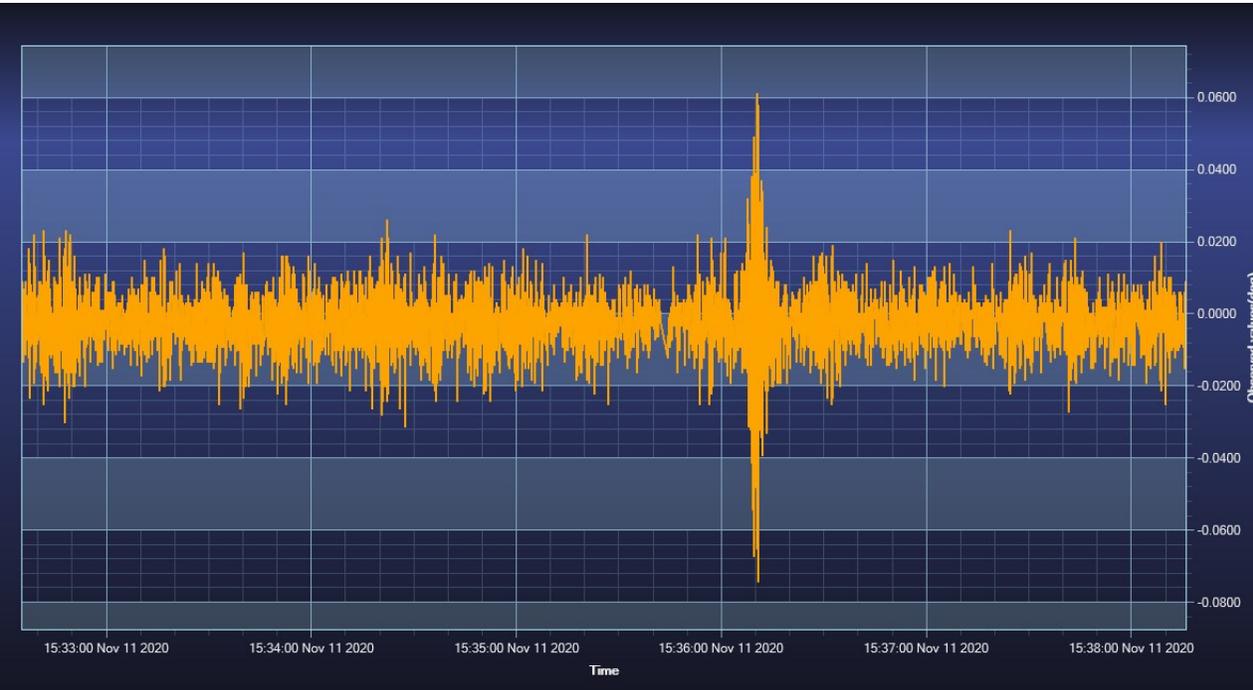


DAQ mode: Streaming 10Hz

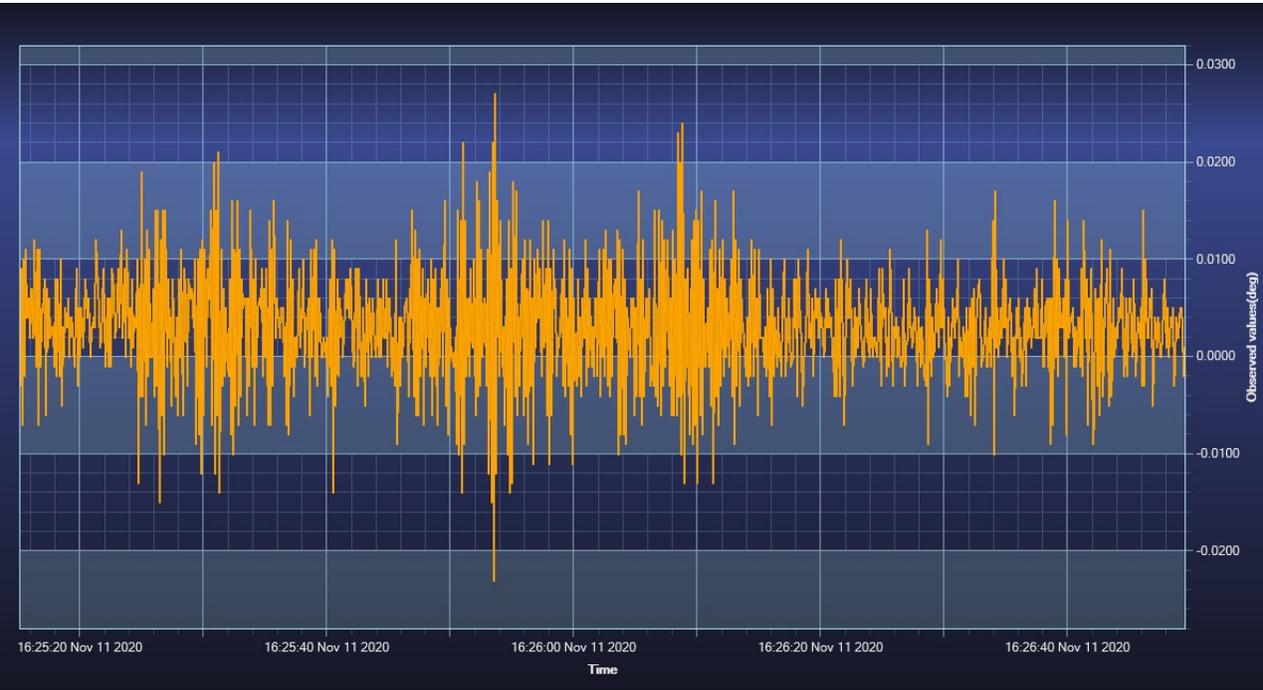
Channel 1	Firmware version 7.1	Firmware version 7.6
X axis	± 0.07 deg	± 0.025 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15\text{B}$ with Dynamic measurement mode on Y axis

Firmware version: 7.1



Firmware version: 7.6



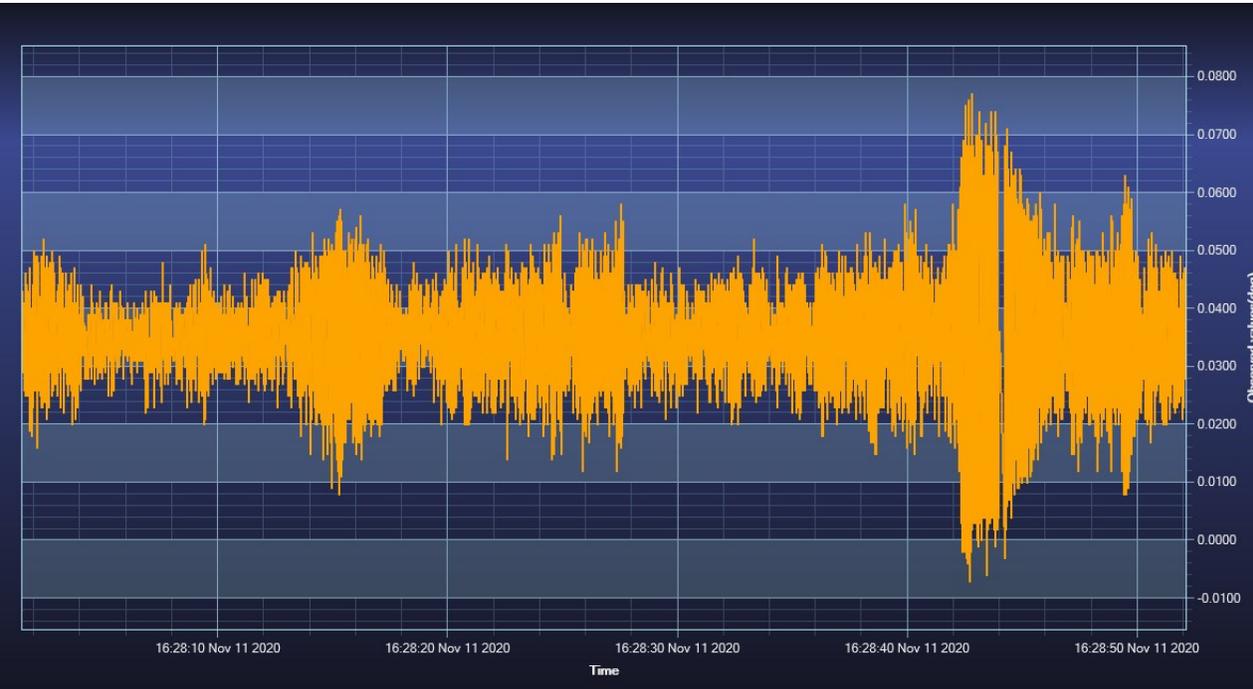
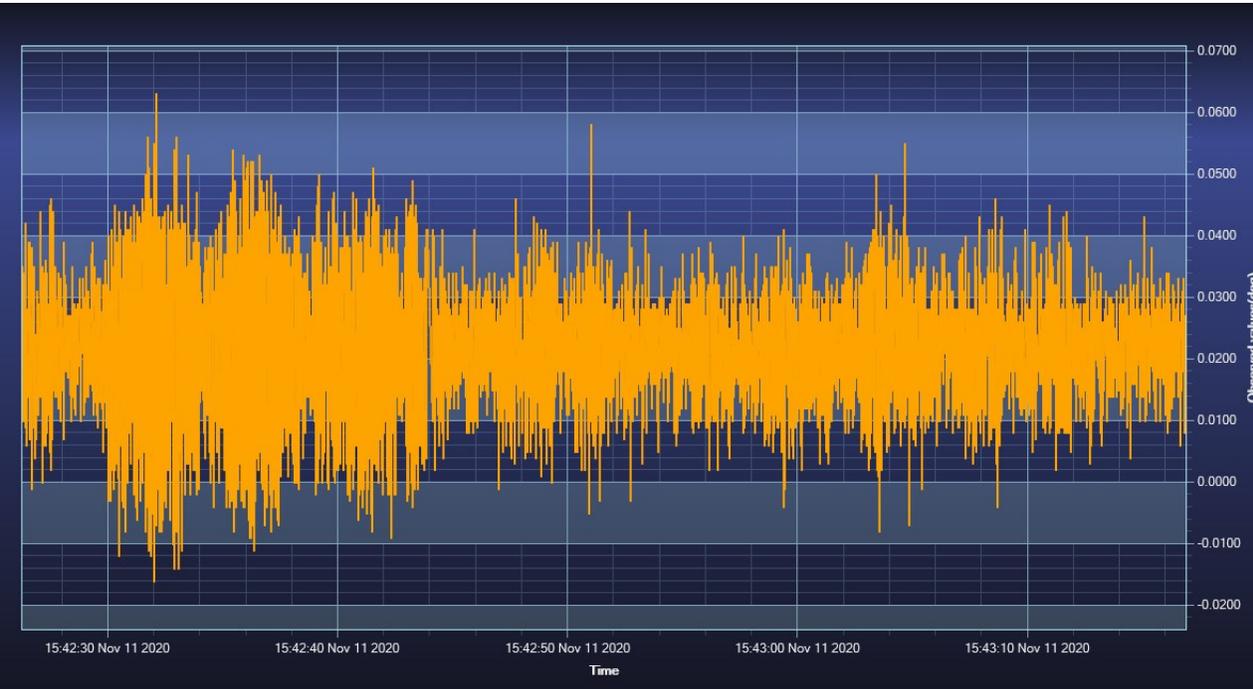
DAQ mode: Streaming 10Hz

Channel 1	Firmware version 7.1	Firmware version 7.6
Y axis	± 0.07 deg	± 0.026 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15\text{B}$ with Dynamic measurement mode on X axis

Firmware version: 7.1

Firmware version: 7.6



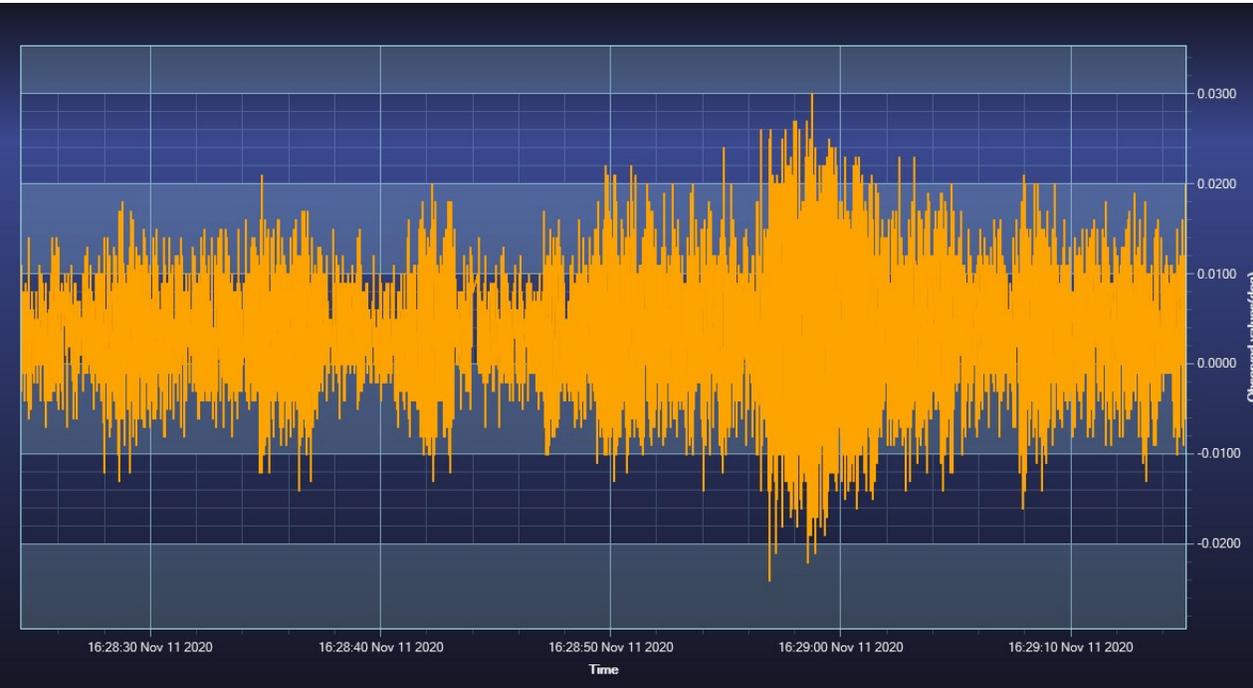
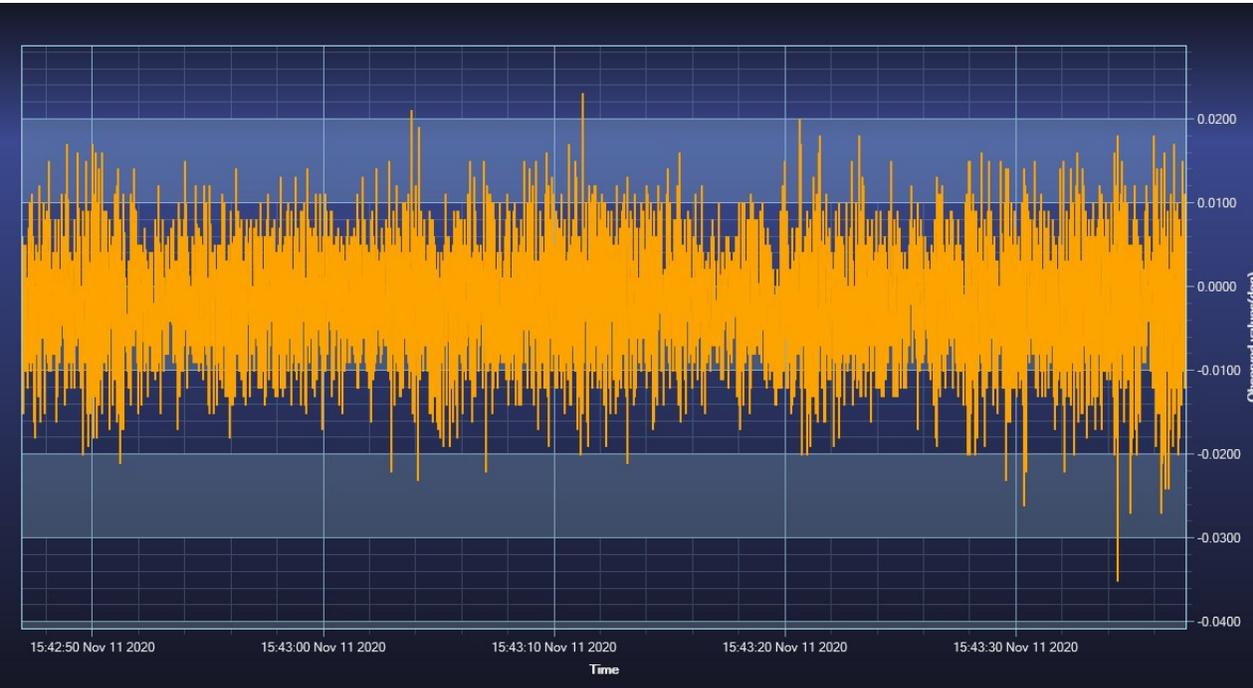
DAQ mode: Streaming 100Hz

Channel 1	Firmware version 7.1	Firmware version 7.6
X axis	± 0.04 deg	± 0.04 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15\text{B}$ with Dynamic measurement mode on Y axis

Firmware version: 7.1

Firmware version: 7.6



DAQ mode: Streaming 100Hz

Channel 1	Firmware version 7.1	Firmware version 7.6
Y axis	± 0.029 deg	± 0.027 deg

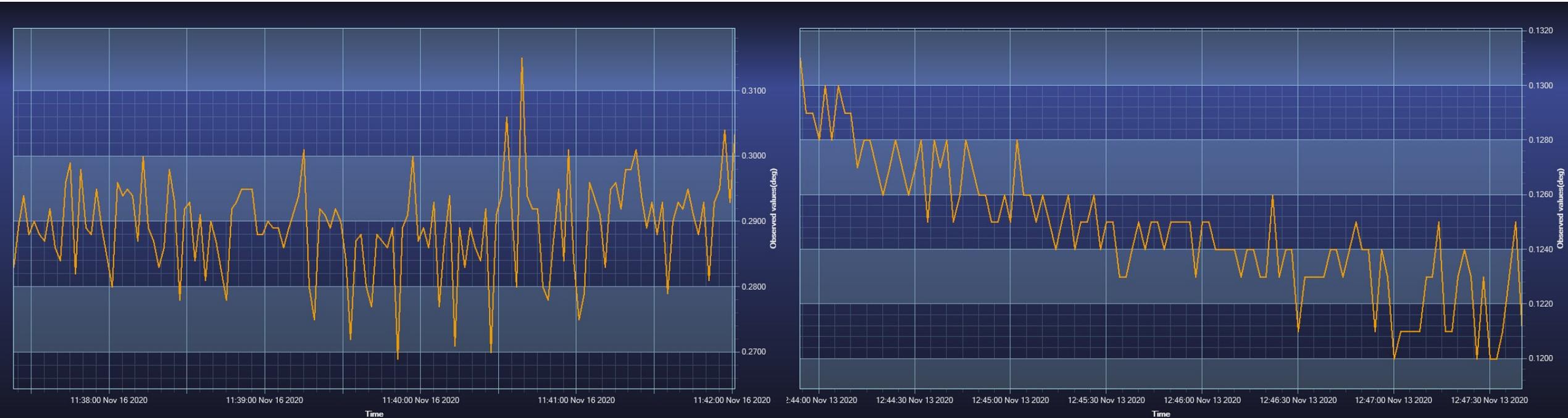
Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15B$ with Dynamic measurement

BeanDevice	Power mode	DAQ mode	Channel	Repeatability Results (in deg) on firmware version 7.1	Repeatability Results (in deg) on firmware version 7.6
Hi-INC Xrange $\pm 15B$	Battery	Streaming 10Hz	X axis	± 0.07 deg	± 0.025 deg
			Y axis	± 0.07 deg	± 0.026 deg
		Streaming 100Hz	X axis	± 0.04 deg	± 0.04 deg
			Y axis	± 0.029 deg	± 0.027 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 30B$ with Static measurement mode on X axis

Firmware version: 7.1

Firmware version: 7.6

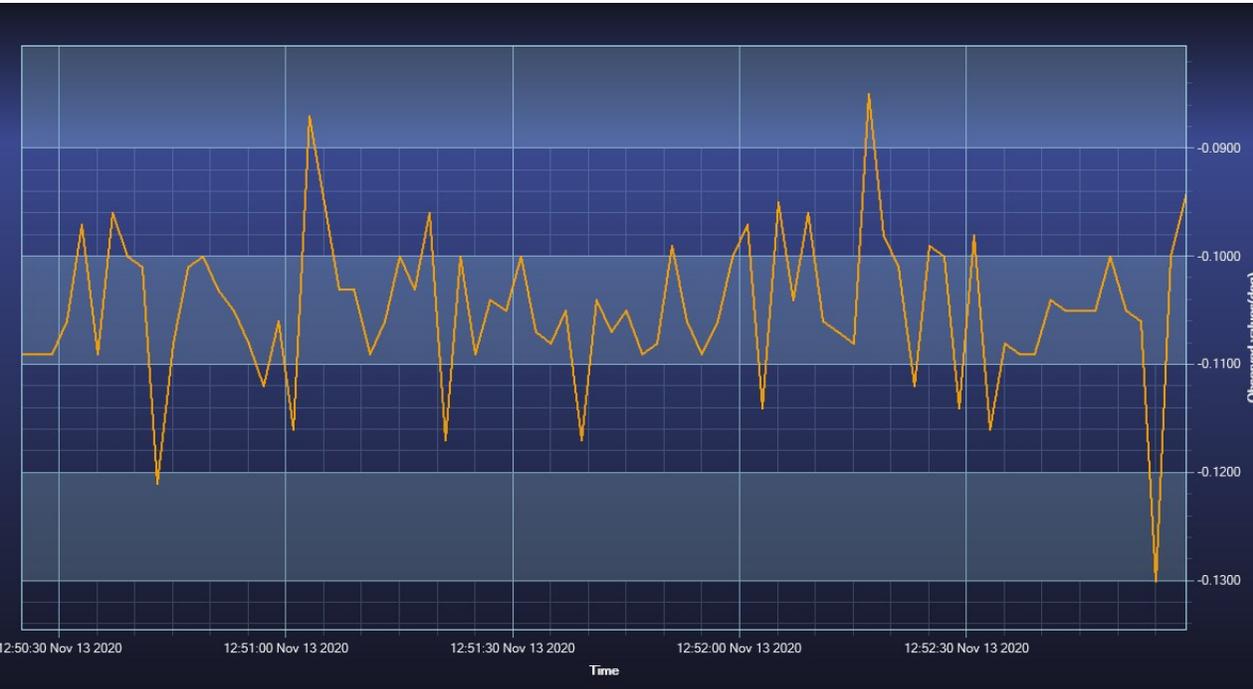


DAQ mode: LowDutyCycle 2s

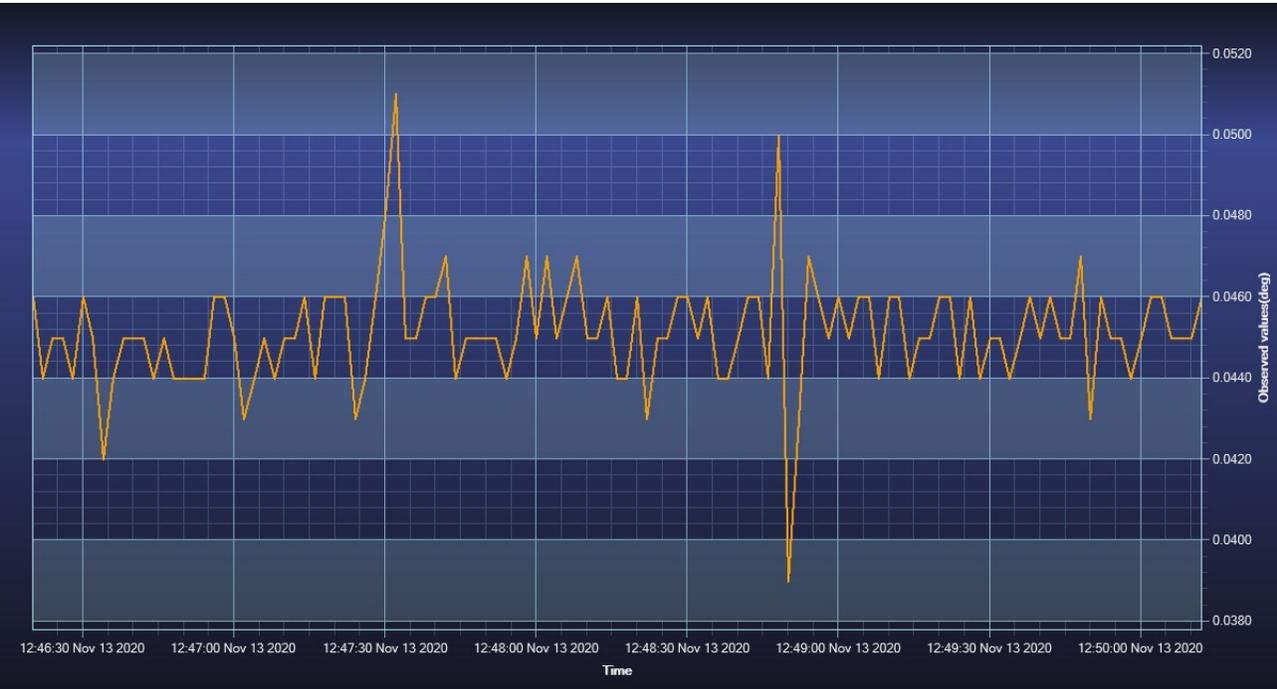
Channel 1	Firmware version 7.1	Firmware version 7.6
X axis	± 0.0225 deg	± 0.0055 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 30\text{B}$ with Static measurement mode on Y axis

Firmware version: 7.1



Firmware version: 7.6



DAQ mode: LowDutyCycle 2s

Channel 1	Firmware version 7.1	Firmware version 7.6
Y axis	± 0.011 deg	± 0.006 deg

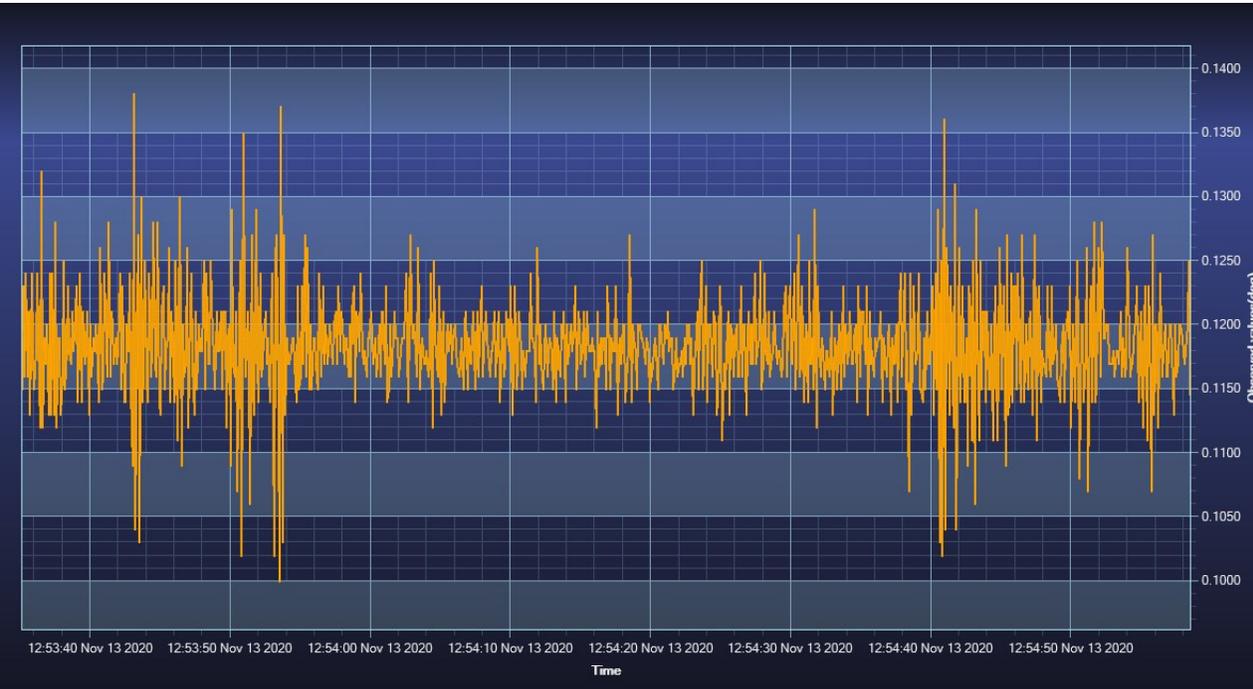
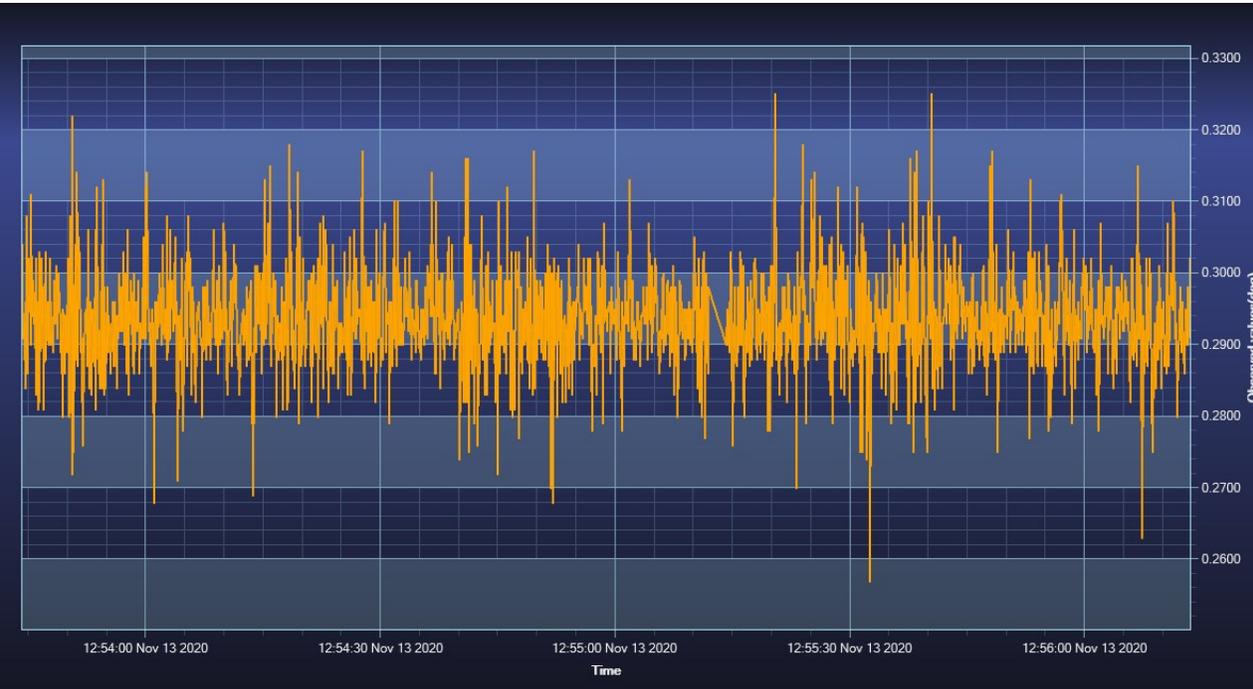
Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 30B$ with Static measurement

BeanDevice	Power mode	DAQ mode	Channel	Repeatability Results (in deg) on firmware version 7.1	Repeatability Results (in deg) on firmware version 7.6
Hi-INC Xrange $\pm 30B$	Battery	Low Duty Cycle	X axis	± 0.0225 deg	± 0.0055 deg
			Y axis	± 0.011 deg	± 0.006 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 30\text{B}$ with Dynamic measurement mode on X axis

Firmware version: 7.1

Firmware version: 7.6

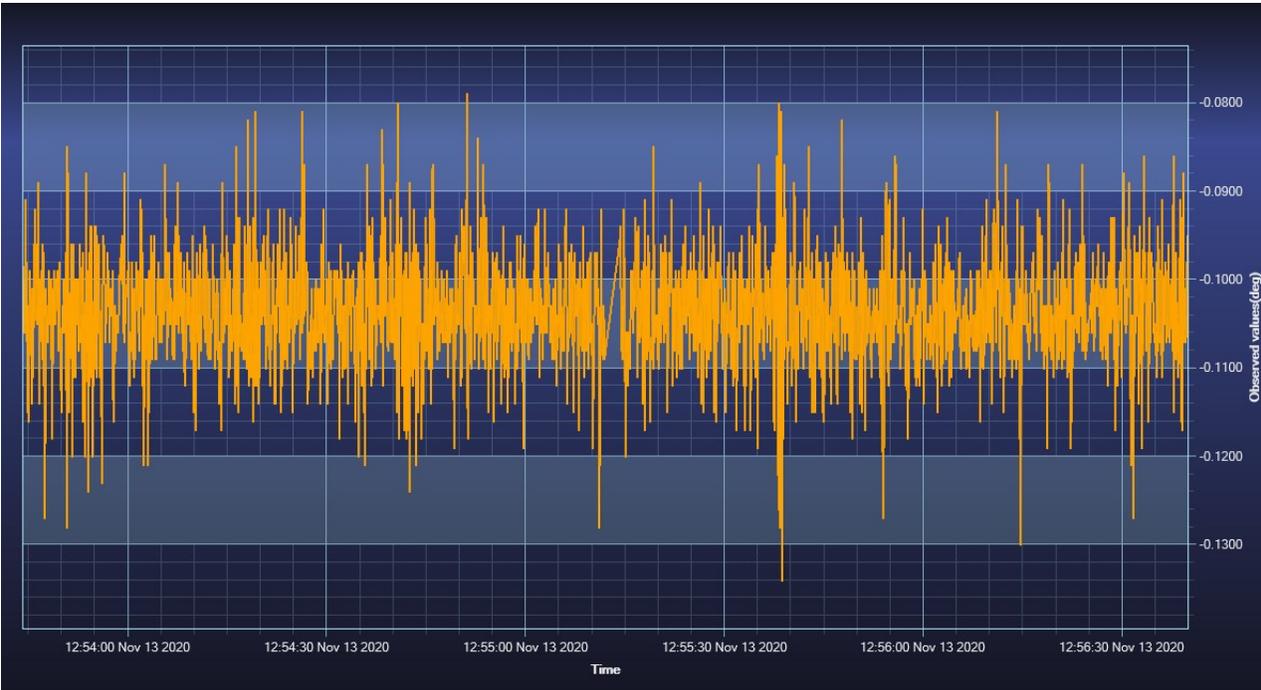


DAQ mode: Streaming 10Hz

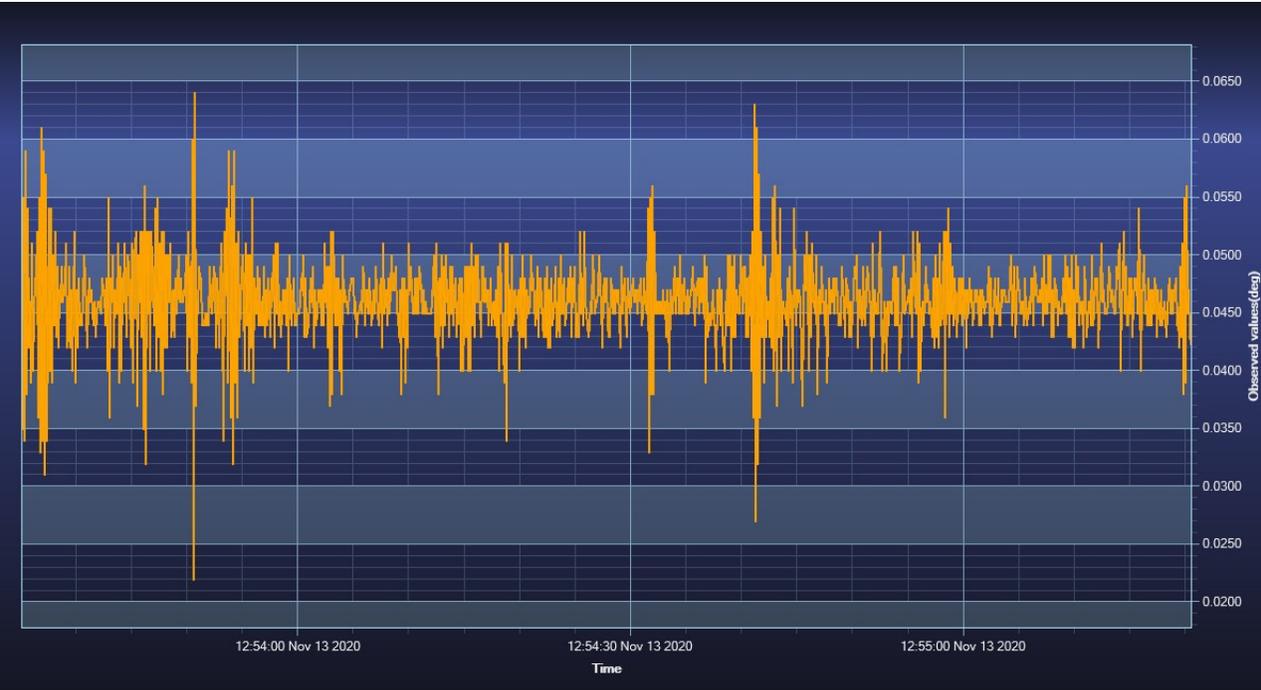
Channel 1	Firmware version 7.1	Firmware version 7.6
X axis	± 0.03 deg	± 0.02 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 30\text{B}$ with Dynamic measurement mode on Y axis

Firmware version: 7.1



Firmware version: 7.6

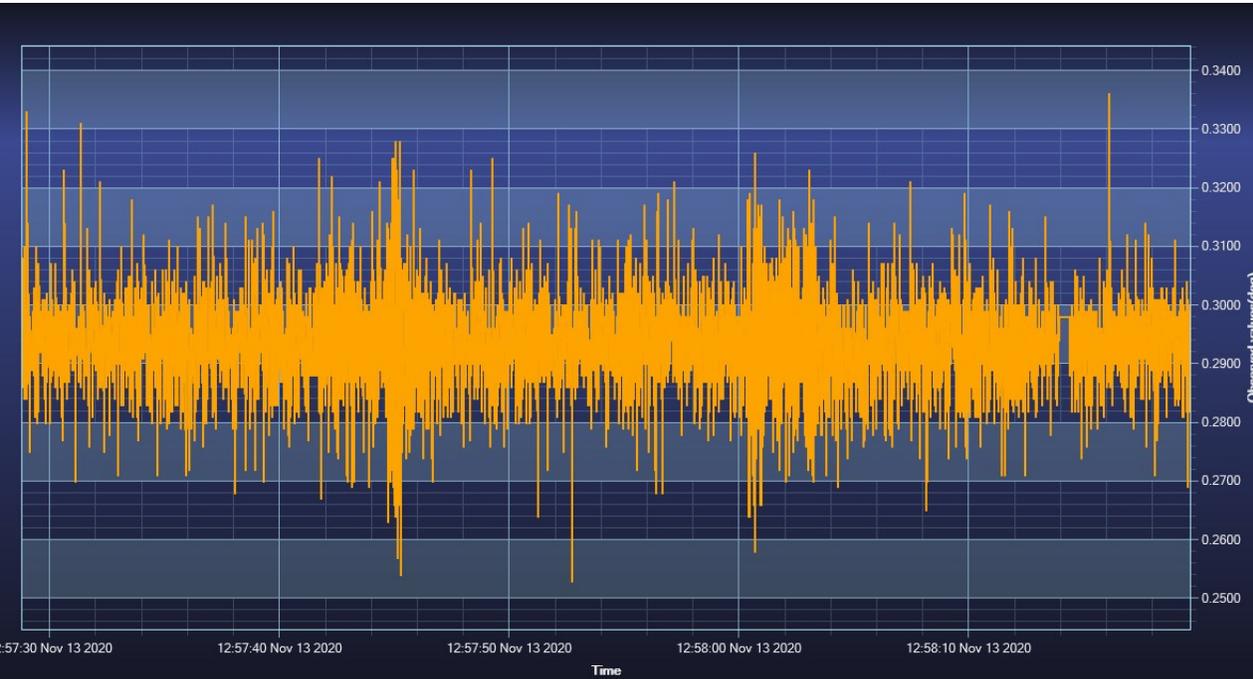


DAQ mode: Streaming 10Hz

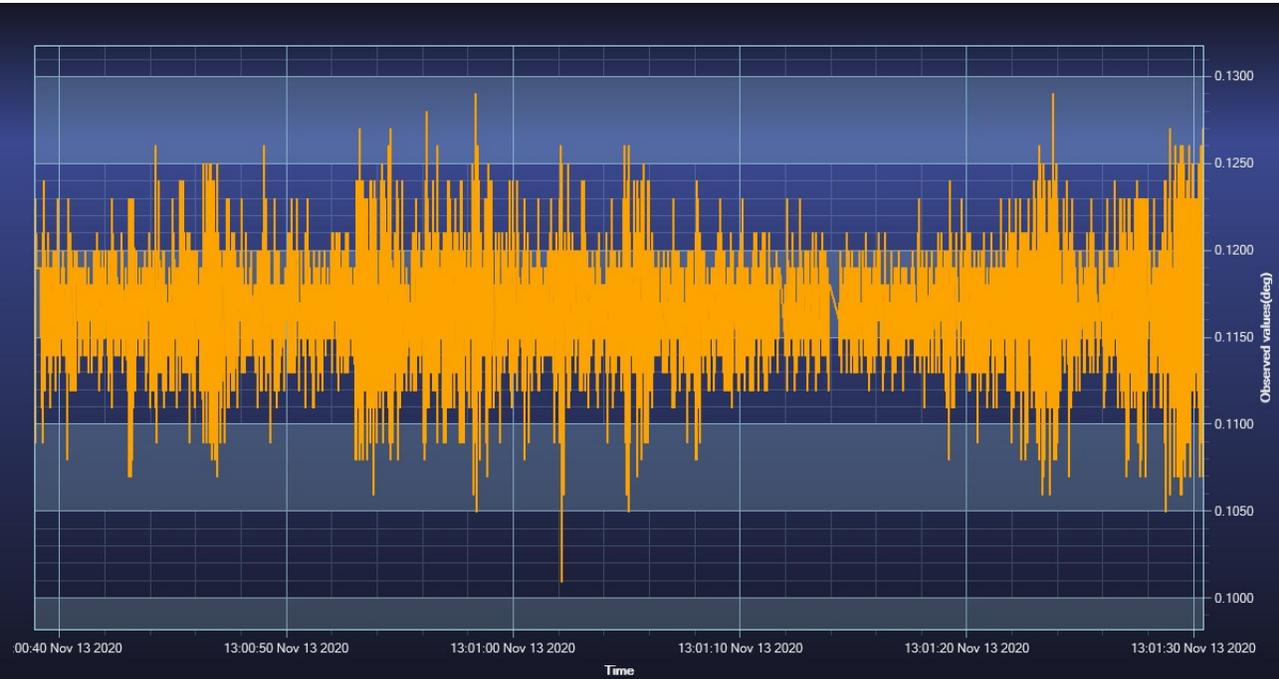
Channel 1	Firmware version 7.1	Firmware version 7.6
Y axis	± 0.025 deg	± 0.021 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 30B$ with Dynamic measurement mode on X axis

Firmware version: 7.1



Firmware version: 7.6



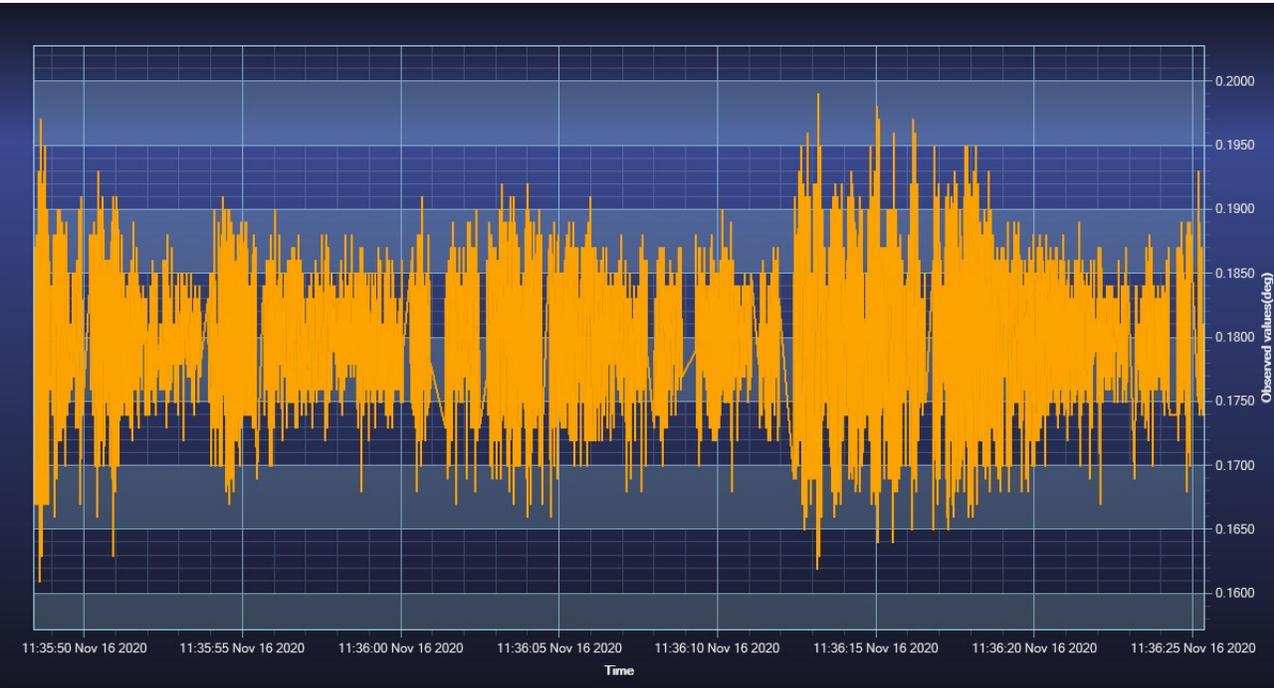
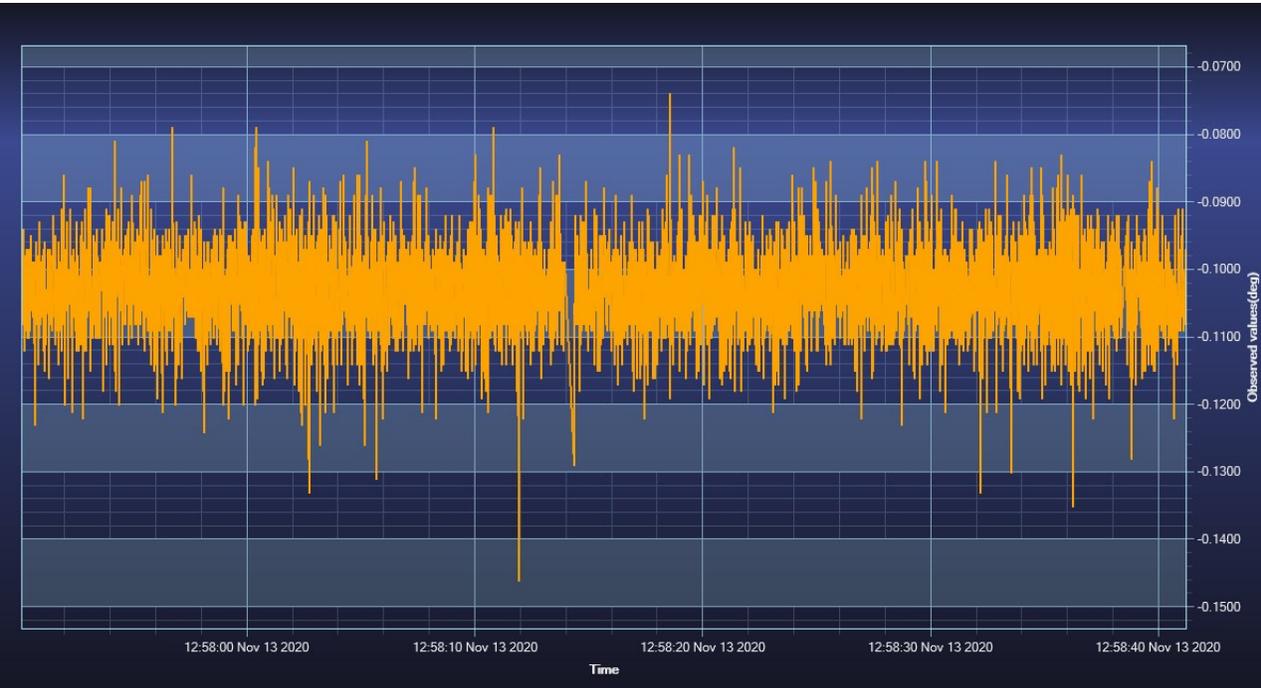
DAQ mode: Streaming 100Hz

Channel 1	Firmware version 7.1	Firmware version 7.6
X axis	± 0.045 deg	± 0.014 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 30B$ with Dynamic measurement mode on Y axis

Firmware version: 7.1

Firmware version: 7.6



DAQ mode: Streaming 100Hz

Channel 1	Firmware version 7.1	Firmware version 7.6
Y axis	± 0.04 deg	± 0.014 deg

Sensor Repeatability tests on Beandevic[®] Hi-INC Xrange $\pm 15B$ with Dynamic measurement

BeanDevice	Power mode	DAQ mode	Channel	Repeatability Results (in deg) on firmware version 7.1	Repeatability Results (in deg) on firmware version 7.6
Hi-INC Xrange $\pm 30B$	Battery	Streaming 10Hz	X axis	± 0.03 deg	± 0.02 deg
			Y axis	± 0.025 deg	± 0.021 deg
		Streaming 100Hz	X axis	± 0.045 deg	± 0.014 deg
			Y axis	± 0.04 deg	± 0.014 deg

Conclusion:

BeanDevice	Power mode	DAQ mode	Channel	Repeatability Results (in deg) on firmware version 7.1	Repeatability Results (in deg) on firmware version 7.6
Hi-INC Xrange $\pm 15B$	Battery	Low Duty Cycle	X axis	± 0.05 deg	± 0.005 deg
			Y axis	± 0.026 deg	± 0.006 deg
		Streaming 10Hz	X axis	± 0.07 deg	± 0.025 deg
			Y axis	± 0.07 deg	± 0.026 deg
Hi-INC Xrange $\pm 30B$	Battery	Low Duty Cycle	X axis	± 0.0225 deg	± 0.0055 deg
			Y axis	± 0.011 deg	± 0.006 deg
Hi-INC Xrange $\pm 30B$	Battery	Streaming 10Hz	X axis	± 0.03 deg	± 0.02 deg
			Y axis	± 0.025 deg	± 0.021 deg
		Streaming 100Hz	X axis	± 0.045 deg	± 0.014 deg
			Y axis	± 0.04 deg	± 0.014 deg



Headquarter :

Beanair GmbH
Wolfener Straße 32 - 34
12681 Berlin - Germany

Middle-East and Africa branch office

Beanair Tunisia
Rue de Kairouan –
4000 Sousse Tunisia

Email: info@beanair.com
www.beanair.com

Stay tuned:



■ <https://www.facebook.com/BeanAir>



■ @beanair



■ Beanair WSN