

4. Introduction

DS-IMU-N1, DS-IMU2 and DS-IMU1 are miniature GNSS/INS & AHRS systems that provide accurate position, velocity, acceleration and orientation under the most demanding conditions.

DS-GYRO1 is a miniature orientation sensor and AHRS that provides accurate orientation under very difficult conditions.

All of them are a combination of temperature calibrated accelerometers, gyroscopes and magnetometers in a sophisticated fusion algorithm to deliver accurate and reliable orientation.

All 3 instruments can provide amazing results but they need to be set up properly and operated with an awareness of its limitations. Please read through this manual carefully to ensure success within your application.

The software is downloadable from our webpage:

www.dewesoft.com

4.1. Options

There are 4 Dewesoft inertial navigation instruments available:

- DS-IMU-N1
- DS-IMU2
- DS-IMU1
- DS-GYRO1

4.2. DS-IMU-N1

- DS-IMU-N1 is a ruggedized and reliable single antenna GNSS aided navigation system
- Combines inertial sensors together with single antenna GNSS receiver coupled in a sophisticated fusion algorithm to deliver accurate and reliable navigation and orientation
- GNSS receiver supports GPS, GLONASS, BeiDou, GALILEO, WAAS, EGNOS, MSAS, GAGAN, QZSS and Real-time kinematic --> RTK
- IP67 & MIL-STD-810G environmental protection
- Up to 100 Hz output data rate
- Connected over USB
- Fast and Easy to install

4.2.1. Scope of supply

DS-IMU-N1 is supplied in a kit that contains everything required to get started operating the system right away. It's supplied in a transport case to protect the equipment during the shipment.



Image 8: Complete DS-IMU-N1 supply package

4.2.1.1. Kit contents

- DS-IMU-N1
- 1x GPS/GLONASS/BeiDou/Galileo L1/L5 GNSS antenna with integrated 5m cable and magnetic mount
- Interface cable harness (with USB, auxiliary data port (RS232) and Sync connector)

Optional:

- Interface cable harness with additional PWR cable for powering the RF RTK module
- RF modem with RF cable + antenna
- 3G network RTK modem

4.2.1.2. Quick start

- Position the GNSS antenna in a level orientation with a clear view of the sky.
- Connect the coaxial antenna cable to the DS-IMU-N1.
- Plug the interface cable into DS-IMU-N1.
- Download DewesoftX® software and the plugin from www.dewesoft.com.
- Install the driver for RS232 converter [Link](#).
- Run DewesoftX® software --> go to Settings --> Devices --> Click on the plus button and under Plugins you will find the DS-IMU option.

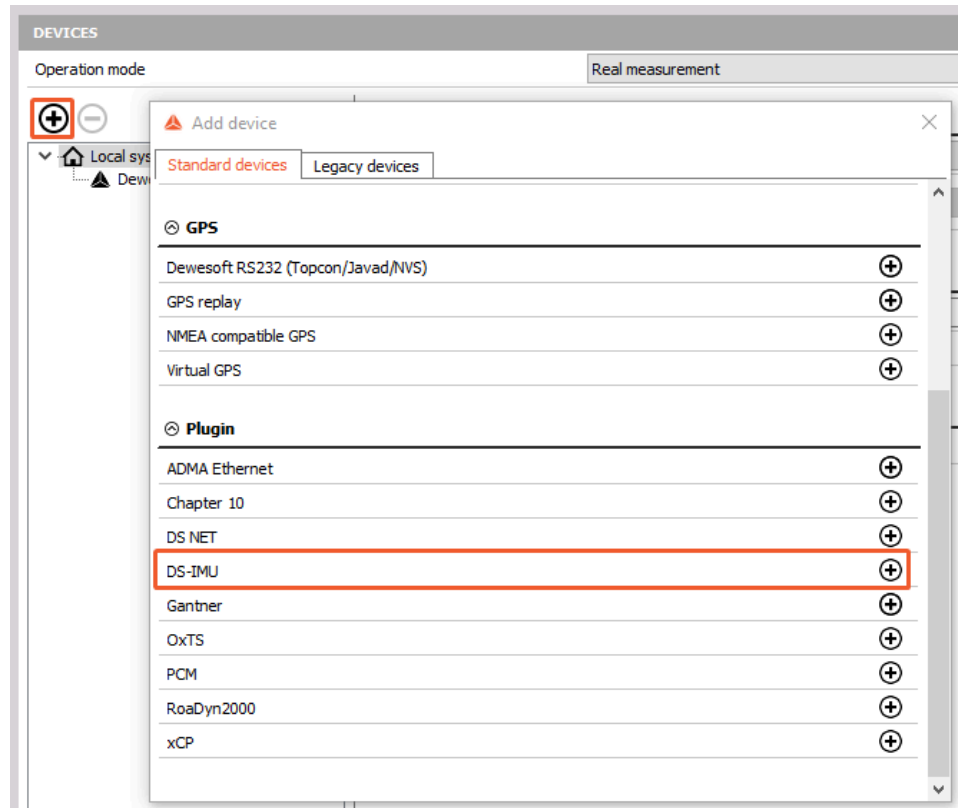


Image 9: Add DS-IMU as a device

- The device should be automatically recognized, if not press the Rescan device.

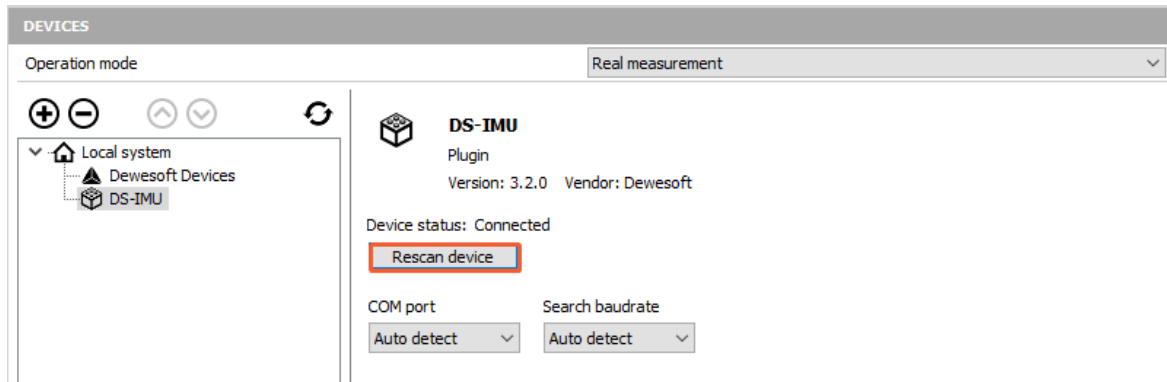


Image 10: If the device is not automatically recognized, press the Rescan device button

- After recognizing the device press OK.
- In Ch. setup define the GNSS antenna offset from the Inertial unit and upload the configuration to the device.
- Initialization of the Kalman based algorithm is done with driving in a straight line for a few seconds with a velocity over 1.15 m/s.
- The device will send the data all the time, so you can watch them already in the Channel setup.

DewesoftX 2026.1 - Trial Version

Measure Analyze Setup files Ch. setup Measure

Store Save Save as Storing Analog in CAN DS-IMU Math Polygon TestBed More... Remove

Device setup equals this setup.

Connected Healthy Upload to device Download from device Restart device Disconnect

Data Mounting Configuration

Rate 100 Hz Velocity unit km/h ☐ Reset distance on start ☐ Detect standstill

☐ Store raw data log Acc. unit g



+	Used	C	Channel name	Units	Min	Values	Max	Scale	Offset	Zero
--- Satellite channel ---										
	Used		Number of satellites	-	0,00	AVG 26,000 (-)	100,00	1,00	0,00	Zero
--- Navigation channel ---										
	Used		Navigation	-	0,00	46°10,313' N 15°03,309' E	0,00	1,00	0,00	Zero
--- System state channels ---										
	Used		Time	-	-INF	09.02.2026 13:53:01	INF	1,00	0,00	Zero
	Used		System status	-	-INF	AVG 10,000 (-)	INF	1,00	0,00	Zero
	Used		GNSS status	-	-INF	AVG 2,000 (-)	INF	1,00	0,00	Zero
	Used		Latitude	'	-540...	46°10,313' N	5400...	1,00	0,00	Zero
	Used		Longitude	'	-108...	15°03,309' E	1080...	1,00	0,00	Zero
	Used		Altitude	m	0,00	AVG 355,828 (m)	1000...	1,00	0,00	Zero
	Used		Height	m	0,00	AVG 402,887 (m)	1000...	1,00	0,00	Zero
	Used		Velocity North	km/h	0,00	AVG -0,011 (km/h)	1800...	1,00	0,00	Zero
	Used		Velocity East	km/h	0,00	AVG 0,037 (km/h)	1800...	1,00	0,00	Zero
	Used		Velocity Down	km/h	0,00	AVG -0,059 (km/h)	1800...	1,00	0,00	Zero
	Used		Velocity Total	km/h	0,00	AVG 0,071 (km/h)	1800...	1,00	0,00	Zero
	Used		Software distance	m	0,00	AVG 0,757 (m)	1000...	1,00	0,00	Zero
	Used		Velocity X	km/h	0,00	AVG -0,038 (km/h)	1800...	1,00	0,00	Zero
	Used		Velocity Y	km/h	0,00	AVG -0,011 (km/h)	1800...	1,00	0,00	Zero
	Used		Velocity Z	km/h	0,00	AVG -0,059 (km/h)	1800...	1,00	0,00	Zero
	Used		Body acceleration X	g	-16,32	AVG 0,001 (g)	16,32	1,00	0,00	Zero
	Used		Body acceleration Y	g	-16,32	AVG 0,000 (g)	16,32	1,00	0,00	Zero
	Used		Body acceleration Z	g	-16,32	AVG 0,000 (g)	16,32	1,00	0,00	Zero
	Used		G force	g	0,00	AVG 1,000 (g)	16,00	1,00	0,00	Zero
	Used		Roll	deg	-90,00	AVG 0,431 (deg)	90,00	1,00	0,00	Zero

Image 11: You can preview the device data inside Channel setup

4.2.2. Specifications

4.2.2.1. Mechanical drawings

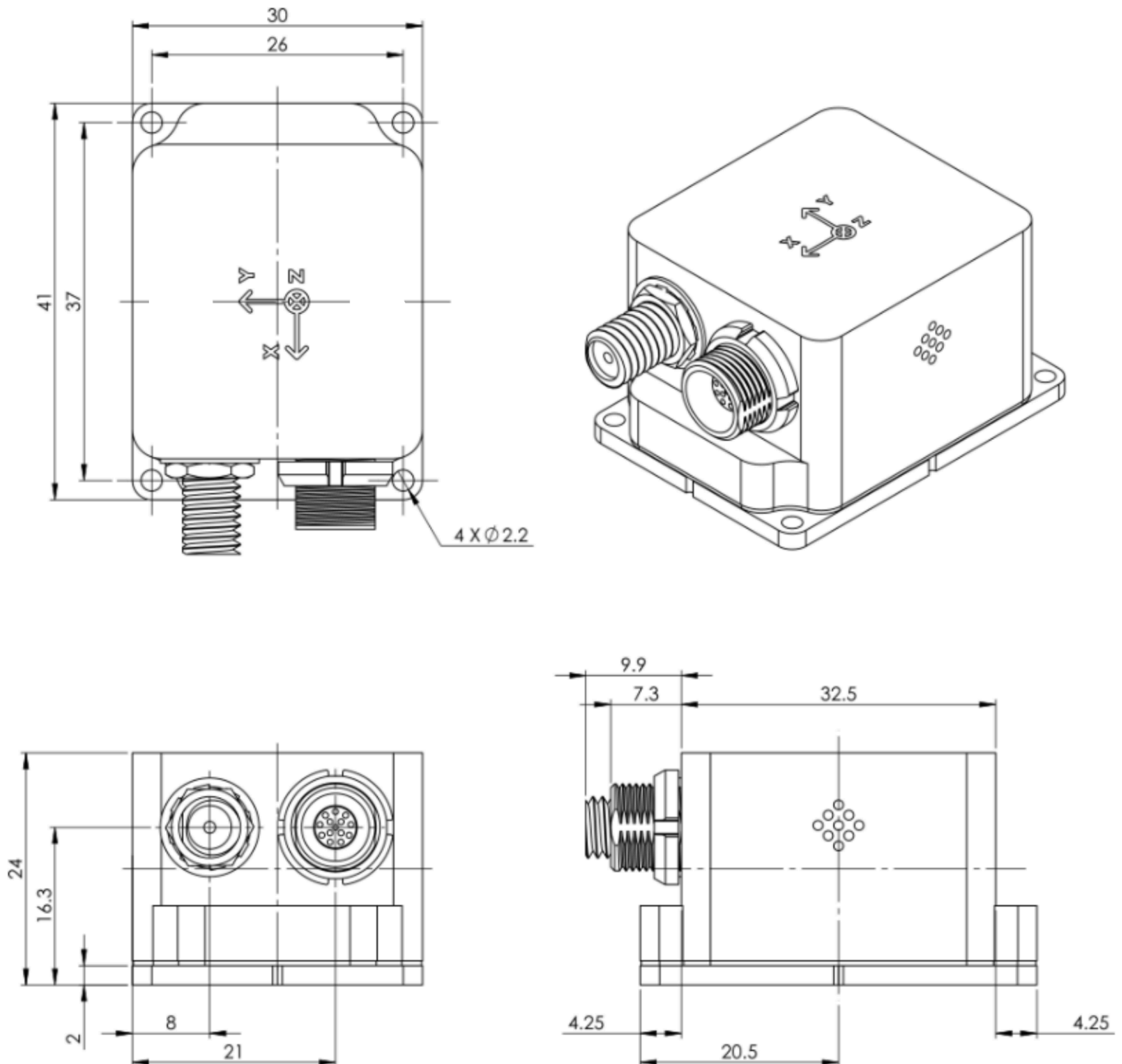


Image 12: Drawing from front view

4.2.2.2. Navigation specifications

Parameter	Value
Horizontal position accuracy	1.5 m
Vertical position accuracy	2.0 m
Horizontal position accuracy (SBAS)	0.7 m
Horizontal position accuracy (SBAS)	0.8 m
Horizontal position accuracy (RTK) *1	0.02 m
Vertical position accuracy (RTK) *1	0.03 m
Velocity accuracy	0.05 m/s
Roll & Pitch accuracy (static)	0.1 °
Heading accuracy (dynamic with GNSS)	0.2 °
Heading accuracy (dynamic with only magnetometer)	0.8 °
Slip angle accuracy	0.2 °
Orientation range	Unlimited
Hot start time	< 5 s
Internal filter rate	400 Hz
Output data rate	Up to 100 Hz

*1 with base station and optional RF modem

*All navigation specifications are valid in open sky conditions

4.2.2.3. Sensor specifications

Parameter	Accelerometers	Gyroscopes	Magnetometers	Pressure
Range (dynamic)	2 g 4 g 16 g	250 °/s 500 °/s 2000 °/s	8 G	30 to 125 kPa
Noise density	100 µg/√Hz	0.004 °/s/√Hz	210 µg/√Hz	0.56 Pa/√Hz
Non-linearity	< 0.05 %	< 0.05 %	< 0.08 %	-
Bias stability	< 20 µg	< 0.2 °/s	< 0.09 %	< 100 Pa
Scale factor stability	< 0.06 %	< 0.05 %	< 0.05 %	-
Cross-axis alignment error	< 0.05 °	< 0.05 °	< 0.05 °	-
Bandwidth	400 Hz	400 Hz	110 Hz	50 Hz

4.2.2.4. GNSS Specifications

Parameter	Value
Supported navigation systems	GPS L1C/A, L5; GLONASS L1OF; Galileo E1B/C, E5a; BeiDou B1I, B2a; NavIC L5 SPS
Supported SBAS systems	WAAS, EGNOS, MSAS, GAGAN, QZSS
Update rate	Up to 25 Hz
Hot start first fix	3 s
Cold start first fix	27 - 37 s
Horizontal position accuracy	1.5 m
Horizontal position accuracy (SBAS)	1.0 m
Horizontal position accuracy (RTK) *1	0.02 m
Velocity accuracy	0.05 m/s
Timing accuracy	30 ns
Acceleration limit	4 g
Velocity Limit	500 m/s
Altitude Limit	80,000 m

*1 with base station and optional RF modem

4.2.2.5. Hardware specifications

Parameter	Value
Operating voltage	5 to 36 V
Input protection	- 40 to 60 V
Power consumption	0.7 Watts -> 140 mA @ 5 V
Hot start battery endurance	> 10 years
Operating temperature	- 40 °C to 85 °C
Environmental sealing	IEC 60529 IP67
Shock limit	150 g for 6 msec (MIL-STD-810H 516.8)
Dimensions	30 x 41 x 24 mm
Weight	43 grams
Interface	USB

Peripheral interface	1x GPIO and 1x NMEA/RTK
GPIO Level	5V or RS232

4.2.2.6. Electrical specifications

Parameter	Minimum	Typical	Maximum
Power supply			
Input supply voltage	5 V		36 V
Input protection range	- 40V		60 V
RS 232			
Tx voltage low		-5.4 V	-5 V
Tx voltage high	5 V	5.4 V	
Tx short circuit current		±30 mA	
Rx voltage low	0.6 V	1.2 V	
Rx voltage high		1.5 V	2.0 V
GPIO			
Output voltage low	0 V		0.5 V
Output voltage high	3.8 V		5 V
Input voltage	-15 V		20 V
Input threshold low			1.5 V
Input threshold high	3.5 V		
Output current	-15 mA		15 mA
GNSS Antenna			
Active antenna supply voltage		3.2 V	3.3 V
Antenna supply current			100 mA