nemi G+

Small, wireless sensor for measuring accelerations, vibrations and rotation

Description

nemi G+ not only measures vibrations & accelerations, but also rotation rates, rotation angles and magnetic fields in and around all three axes. With its integrated rechargeable battery, radio connection nemi Link 2400 and i4M's highly efficient technology, nemi G+ can be operated completely wirelessly for many hours. It is also suitable for permanent installations using its wide-range voltage input.

Key Features

- **Compact & lightweight design** (32 x 32 x 23) mm, 30 grams
- **Completely wireless and maximized battery life** due to our radio technology nemi Link 2400
- Transmission of **live raw data** or **smart data** pre-evaluated by edge computing
- **Weather resistant IP 67 rating** on request
- **Permanent installation** possible with wide range voltage input

High-resolution, triaxial, capacitive **MEMS accelerometer**; measuring range up to 8 g or up to 40 g		**nemi Link 2400** - i4M's own robust and **flexible radio technology** in the 2.4 GHz frequency band	
IMU sensor module for measuring accelerations and rotation rates in and around all 3 axes; ACC up to 16 g; GYR up to 4000 °/s		**Internal rechargeable battery** with more than 10 hours runtime at a sampling rate of 4 kHz (all three axes active)	
Triaxial **magnetometer**; measuring range up to 16 Gauss		Power supply/ battery charging via **micro USB**	
Internal **temperature sensor**; measuring range- 20 - 60 °C		Continuous operation with **wide range voltage input** 8.5 - 28 V DC	

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Specifications

General information		
Dimensions	31.6 x 31.6 x 22.3	mm
Weight	approx. 30	gram
Internal power supply	Lithium-ion battery, 1 cell	-
Runtime with full battery at 4000 Hz, (all three axes active)	> 10 Possible for several weeks depending on configuration	hours
Charging time (0 - 100 %)	approx. 3	hours
External power supply	5 (Micro USB) 8.5 - 28 (wide range voltage input)	V
Temperature range permitted during operation	-20 to 60	°C
Onboard MCU, usable for edge computing	64 MHz ARM Cortex M4F, 1 MB Flash, 256 KB RAM; various hardware crypto features	-
Housing protection class	IP 41	-
Main sensor device (MEMS accelerometer)		
Selectable sampling rates	4,000 / 2,000 / 1,000 / 500 / 250 / 125	Hz
Stability of the sampling rate (over the entire temperature range)	± 50	ppm
Realizable signal bandwidths (-3 dB)	800 / 500 / 250 / 125 / 62,5 / 31,25	Hz

Selectable measuring ranges
    Variant 08
    Variant 40
	
	± 8 / 4 / 2
	± 40 / 20 / 10
		
		g
		g

Sensor resonance frequency
    Variant 08
    Variant 40
	
	2,400
	5,500
		
		Hz
		Hz

Signal resolution	20	bit
Non-linearity (related to measuring range)	0.1	%
Cross-sensitivity	1.0	%

Inaccuracy (related to measuring range)
    Without calibration
    With calibration (on request)
	
	< 8
	< 1
		
		%
		%

Additional integrated 9-DoF IMU **per 3-axis MEMS accelerometer (ACC) / gyrometer (GYR) / magnetometer (MAG)**		
Sampling rate	= 1/25 of the sampling rate of the main sensor e.g. = 160 Hz at 4,000 Hz	Hz
Selectable measuring ranges ACC	± 16 / 8 / 4 / 2	g
Selectable measuring ranges GYR	± 4,000 / 2,000 / 1,000 / 500 / 250 / 125	°/s
Selectable measuring ranges MAG	± 16 / 12 / 8 / 4	Gauss
Signal resolution	16	bit

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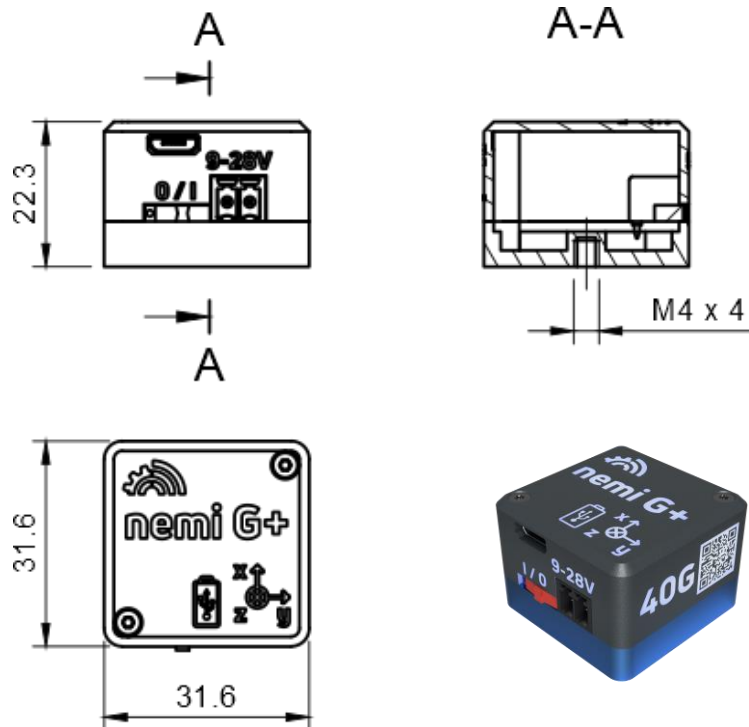| Internal temperature sensor		
Sampling rate	= 1/25 of the sampling rate of the main sensor e.g. = 160 Hz at 4,000 Hz	Hz
Measuring range	-20 to 60	°C
Signal resolution	0.1	°C

Frequency responses of the main sensor module

Variant 08: measuring range max. ± 8 g

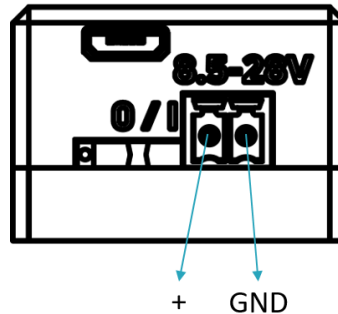### Variant 40: measuring range max. ± 40 g
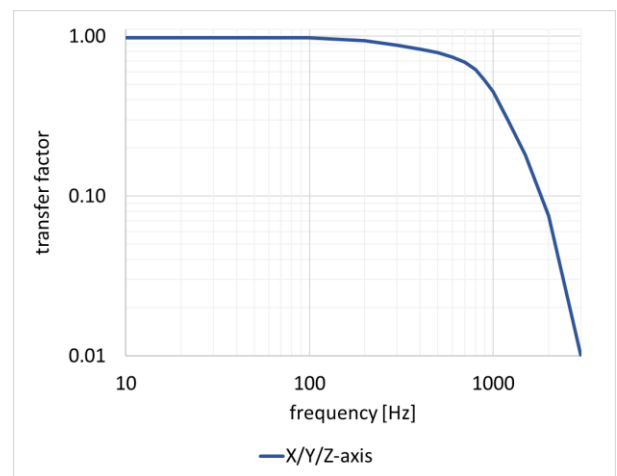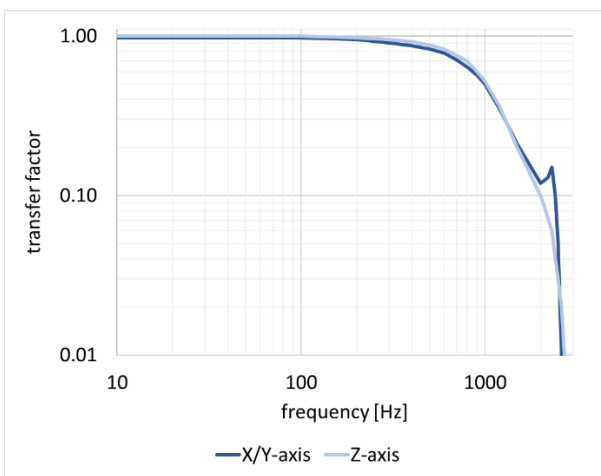
Dimensions

(All dimensions in mm)

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Wide range voltage input

The following picture shows the ports of the wide range voltage input:

+   GND

GND ≙ Ground

Radio technology nemi Link 2400

Our own radio technology nemi Link 2400 is a wireless, battery-powered sensor network in the 2.4 GHz frequency band with star topology and one receiver module. This high-speed network enables the reliable transmission of data at high sampling rates. The high efficiency of our robust radio technology enables very long battery runtimes of our products. Our wireless sensors synchronize their internal clocks to the clock of the receiver module with extremely small deviations.

To optimize the measurements of a use case, nemi Link 2400 offers the possibility to adjust the number of sensor nodes per radio channel and the radio speed to achieve the perfect balance between range, data rate and runtimes for each application.

Please find detailed information in the nemi Link 2400 info sheet.

Compatible receiver modules in the nemi Link 2400 wireless network

nemi G+ is compatible with all receiver modules in i4M's nemi Link 2400 network. The following products are available under the nemione® trademark:

nemi EdgeBase   nemi Connect   nemi Log (+ cellular)
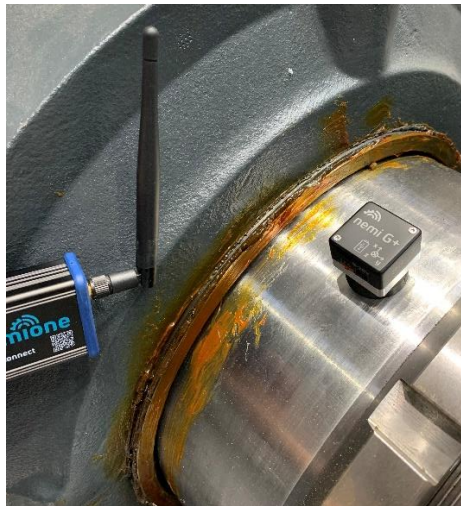
Application

Due to its robust design and easy mounting, nemi G+ works perfect **in highly dynamic applications** such as roller coasters, but also **on rotating or moving components** such as pitch bearings of wind turbines or gearboxes. For permanent installations, it can be operated with a wide-range voltage input. Examples of specific use cases for nemi G+ are:

- Wireless condition monitoring systems on rotating machine parts, for example on wind turbine main shafts
- Long-term vibration measurements for the implementation of predictive maintenance on machines and systems, for example on production machines
- Measurement of translational and rotational movements on machine elements, systems and vehicles, for example roller coasters


Picture: nemi G+ in rotating application

Download use cases:

Mounting options

The compact, lightweight and completely wireless nemi G+ is very easy to mount. It is manufactured with an M4 thread in the base. This means that it can not only be glued on, but also screwed on or magnetically fastened. The best vibration transmission is realized with a grub screw connection.

M4 grub screw   Adhesive   Glued mounting plate   Magnet
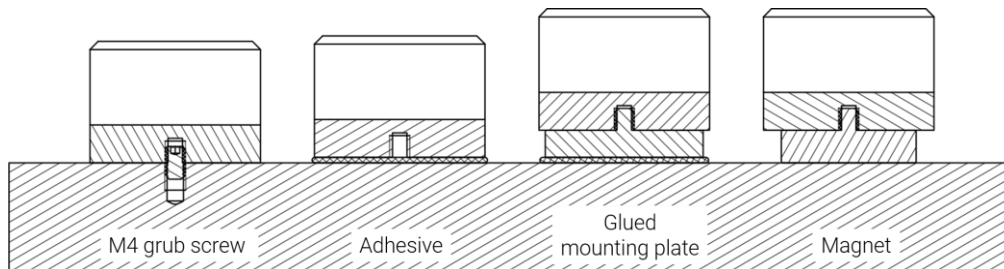
Adhesive, mounting plate and magnet are not included.

For magnetic mounting we recommend the following magnets: supermagnete

Attention: When fastening with a magnet, the measurements of the magnetometer installed in the nemi G+ are affected.

LED Blink Codes

The nemione® nemi G+ has integrated LEDs that are visible through the housing. This flashing indicates the various operating states of the sensor node:

Operating Mode	Description
Rapid flashing in the sequence white, green, red, blue	Indicates a restart of the sensor node.
Red LED, continuously	The battery is charging, power supply via USB or wide-range voltage input.
Red LED no longer lights up continuously	The battery is fully charged.
Green lights up continuously, yellow flashes simultaneously	A USB port with a data connection has been detected. The sensor node is waiting for a virtual COM port to open.
Green lights up continuously, blue flashes simultaneously	The virtual COM port has been opened. The sensor node is waiting for new RF parameters or settings from the PC software.
Regular short red flashes for approx. 2 seconds	The sensor node samples and transmits measurement data.
Regular short green flashes all 10 seconds for approx. 1 second	The sensor node is in sleep mode.
Regular short blue flashes for approx. 1 second	The sensor node resynchronizes with the wireless network (time synchronization).
The green LED lights up temporarily or continuously in wireless mode	The internal data memory (ring buffer) is 80 % full as the data could not be transmitted via radio link. There is a risk of data loss.

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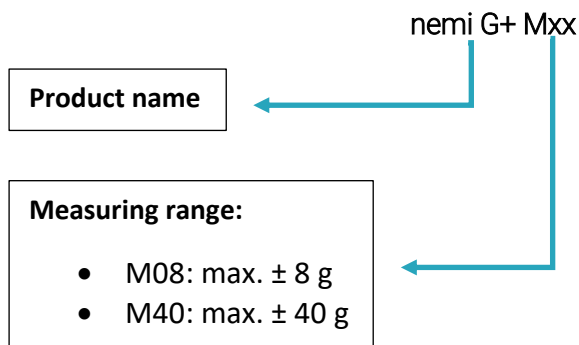
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Data Analysis

Upon request, we will be happy to support you with data analysis. The data analyses can be performed directly in the sensor or in the gateway by edge analytics as well as on the server or measuring computer. A great advantage of edge analytics is the **reduction of the transmitted data to the essentials** ("smart data"). This **reduces storage space** and **increases battery runtimes**.

Based on our knowledge from a multitude of previous projects, we have developed **algorithms for data evaluation** to generate **maximum added value** for our customers. We will gladly advise you on this. In addition to our existing algorithms we create **individualized scripts** upon request.

At the same time, the **data remains your capital**: We do not rely on big cloud providers but **keep the data in your IT ecosystem**. Alternatively, you can rely on our nemione® cloud solutions - hosted in the European Union.

Ordering options of nemi G+

nemi G+ Mxx

Product name

Measuring range:

- M08: max. ± 8 g
- M40: max. ± 40 g

Contact

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