nemi EdgeBase

4G-Gateway with Linux operating system and edge computing capabilities

Description

nemi EdgeBase forms the bridge between the sensor nodes in the wireless network nemi Link 2400 and worldwide networks. As a gateway, it receives the data from up to eight wireless sensors or collects data itself through integrated MEMS & GPS technology. All data can be stored on an internal SSD drive. For data reduction, edge analytics based on Python scripts can be performed on nemi EdgeBase before data is transmitted over a secure 4G cellular connection or a wired network connection.

Key Features

- **Receiver for up to 8 sensor nodes** in the radio network nemi Link 2400
- Integrated **IMU sensor module** (ACC, GYR, MAG 3 axes each), temperature sensor and GPS
- **64 bit Linux edge computing power** with 4 x 1.2 GHz CPU and 1 GB RAM
- Data transfer via secure 4G **cellular connection** or **wired network**
- Transmission of time raw data as compressed binary files or pre-evaluated data as MQTT streams using **edge computing with Python scripts** (smart data)
- Robust, weatherproof **IP 65 housing** with passive cooling

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

Triaxial **magnetometer**; measuring range up to 16 Gauss

Internal **temperature sensor**

GPS module for localization with an accuracy of 2 m CEP

nemi Link 2400 - i4M's own robust and **flexible radio technology** in the 2.4 GHz frequency band

4G modem with SIM slot LTE Cat. 4: max. 150 Mbit/s downstream, max. 50 Mbit/s upstream
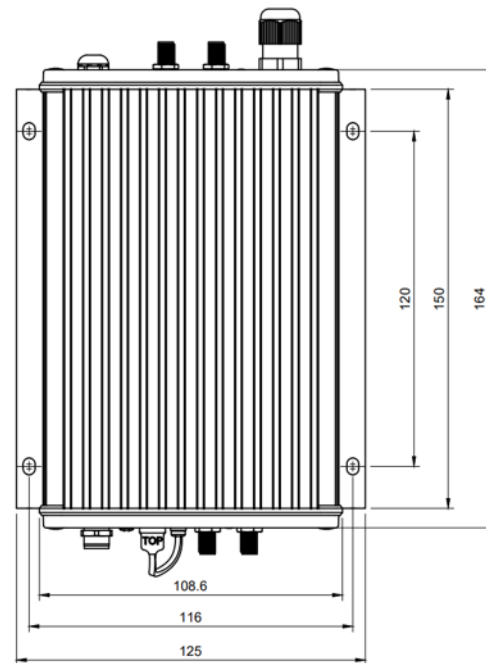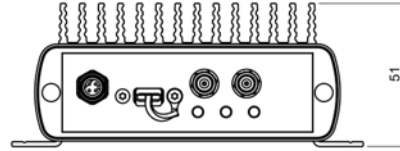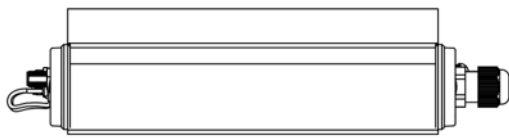
Continuous operation with **voltage input 24 V DC**

SSD hard disk with 240 / 480 GB

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Specifications

General information		
Dimensions (without antenna and connectors)	164 x 125 x 51	mm
Weight	approx. 800	grams
CPU	ARM, 4 core, 1.2	GHz
RAM	1024	MB
Custom scripting	Python	-

SSD hard disk
   S240
   S480
	
	240
	480
		GB

Data transmission	FTP server via VPN, MQTT data streams	-
Cellular connection	4G modem with SIM slot LTE Cat. 4: for worldwide networks, max. 150 Mbit/s downstream, max. 50 Mbit/s upstream	-
External power supply	24 DC 230 AC via external power supply	V
Temperature range permitted during operation	-20 to 60	°C
Housing protection class	IP 65	-
Additional integrated 9-DoF IMU per 3-axis MEMS accelerometer (ACC) / gyrometer (GYR) / magnetometer (MAG)		
Sampling rate	416 / 208 / 104 / 52	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
Temperature sensor		
Sampling rate	= 1/12 of the sampling rate of the IMU e.g. = 35 Hz at 416 Hz	Hz
Measuring range	-20 to 60	°C
Signal resolution	0.1	°C
Satellite navigation		
GPS module	GPS/GLONASS/BeiDou/Galileo	-
Sampling rate	max. 10	Hz
Accuracy	2	m CEP

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Dimensions

(All dimensions in mm)

Connections

Front Panel:

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Connection / LED	Description
ETH, M8 socket	Ethernet connection, M8, D-coded, see below
USB-Type C socket	For connection of external USB devices (network adapters, nemi Connect, others upon request)
GPS antenna	SMA socket for connection of active or passive GNSS antennas
RF antenna	RP-SMA socket for connection of an antenna for the 2.4 GHz frequency band (nemi Link 2400)
ETH-LED	Lights up light blue when Ethernet is connected and flashes during data transmission
SYS-LED	Indicates the status of the internal Linux system: If lights up permanently red (from approx. 10 s after switching on, until approx. 30 seconds after switching on): System is booting / starting up If lights up blue continuously (from approx. 30 seconds after switching on to approx. 50 seconds after switching on): System has booted successfully / has started up If flashes blue / violet alternately (from approx. 50 seconds after switching on): System is receiving measurement data and logging it
RF-LED	Indicates the status of the data transmission: If flashes red: data transmission waiting for connection from Linux system If flashes alternately blue / green: data transmission waiting for settings from Linux system Flashes green: data transmission

Back Panel:

Connection / LED	Description
24 V	Connection of 24 V DC voltage supply Power requirement max. approx. 24 Watt, average approx. 5 W
LTE 1	4G/LTE main antenna
LTE 2	4G/LTE second antenna (diversity antenna)
PWR LED	Flashes green: 24 V voltage is on

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Suitable cable for connection of nemi EdgeBase via Ethernet:

- Connection type 1 (at nemi EdgeBase): M8, D coded
- Connection type 2: RJ45
- Network cable, CAT5, 100 Mbit/s
- https://www.phoenixcontact.com/de-de/produkte/datenkabel-konfektioniert-nbc-m8msd-10-93cr4ac-1423711
- https://shop.murrelektronik.de/Anschlusstechnik/Verbindungsleitungen/Signal/M8-St-0-D-kod-RJ45-St-0-geschirmt-7000-86101-7960030.html
- https://www.digikey.de/en/products/detail/1423711/277-1423711-ND/14309653

Expansion of the wireless network

nemi EdgeBase receives data from up to eight sensor nodes on one radio channel. In addition, the network can be extended by two further radio channels:

Two nemi Connect USB receivers can be connected to the nemi EdgeBase via the USB port of nemi EdgeBase. Each nemi Connect transmits on its own radio channel and can therefore receive data from up to eight further sensor nodes. The data is stored on the nemi EdgeBase. This means that by connecting two nemi Connect to nemi EdgeBase, the data from up to 24 sensor nodes can be received simultaneously and synchronized with one nemi EdgeBase. All data is then provided by nemi EdgeBase.

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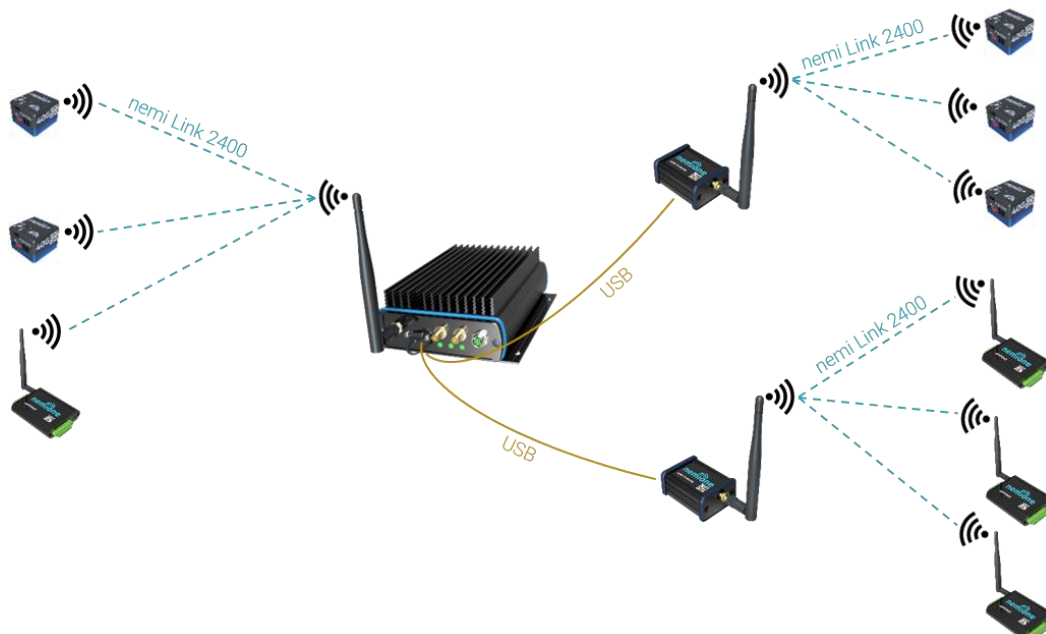
Data storage & transmission

nemi EdgeBase is a gateway for receiving and forwarding data. It can receive data from up to eight wireless sensor nodes in the nemi Link 2400 radio network. This data can be stored locally on an internal SSD and transferred via a 4G cellular or Ethernet network connection.

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.

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Compatible sensor nodes in the nemi Link 2400 wireless network

nemi EdgeBase is compatible with all sensor nodes in i4M's nemi Link 2400 network. The following products are available under the nemione® trademark:

nemi G+   nemi G+ nano   nemi DAQ   nemi DAQ nano

Application

nemi EdgeBase is convincing in various use cases where long-term monitoring is carried out to perform predictive maintenance. This includes, for example, permanent data acquisition for load monitoring on wind turbines, condition monitoring of rolling bearings or the permanent monitoring of roller coaster ride performance.

Download use case:

ONLINE MONITORING FOR THE ANALYSIS OF THE DYNAMIC BEHAVIOR OF ROLLER COASTERS
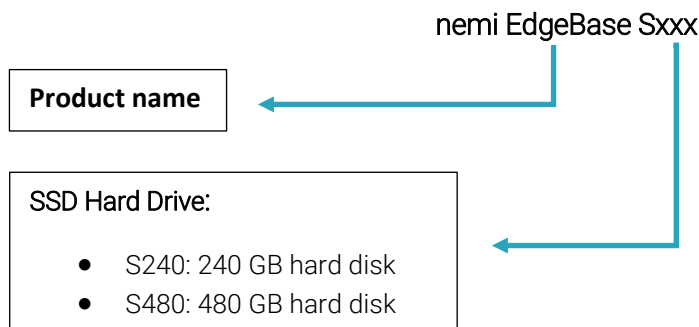
Data Analysis

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**.

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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.

Order options

nemi EdgeBase Sxxx

Product name

SSD Hard Drive:

- S240: 240 GB hard disk
- S480: 480 GB hard disk

Contact

nemione® is a trademark of

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