GEMAC

GEMAC MOTUS®

Highly accurate orientation calculation with the „Enhanced Kalman Filter" specially optimized for motion detection.

gemac-chemnitz.com

The first Power-IMU for mobile Power-Machines

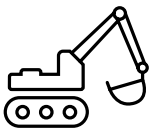
Our configurable sensor measurement unit GEMAC MOTUS® enables 6-axis motion detection on mobile power machines, such as construction machinery, agricultural machinery, forestry machinery, cranes and lifting technology, as well as ships.

Our proprietary sensor fusion algorithm performs high-precision orientation calculation, supported by sensor fusion filters that suppress external accelerations. The combination and calculating of the six measured values mean that only one measuring system needs to be integrated for a wide range of requirements. The accuracy of the inclination measurement includes a compensated cross-sensitivity and is independent of the local gravity field due to the 3D measurement.

Range of functions

- Automatic configuration of the mounting position
- Flexible zero point adjustment
- Convenient parameterization with sensor programming adapter
- Configuration of the sensor fusion
- Configuration of the output data with SAE J1939
- CANopen Autostart

Applications (typical)



Construction machinery

Forestry machinery

Agricultural machinery

Lifting technology

Ships

Sensor Portfolio - General Overview

Performance Class	Accuracy	GEMAC MOTUS® Greenline	GEMAC MOTUS® Blackline	GEMAC MOTUS®
E economic	static	±0.1° to ±0,5°	-	-
	dynamic	±0.8°	-	-
B basic	static	-	±0.3°	±0.3°
	dynamic	-	±0.5°	±0.5°
C classic	static	-	±0.1°	±0.1°
	dynamic	-	±0.5°	±0.25°
X Inertial Measurement Unit		XE	XB XC	XB XC IB
N Inclination sensor dynamic		NE	NB NC	NB NC
S Inclination sensor static		SE	SB SC	

Variants GEMAC MOTUS®

Recording of inclination (static and dynamic)

Variants	NB	NC
General parameters	Inclination static and dynamic	
Measurement range	±90°/±180° (360°)[2]	
Resolution	0.01°	
Temperature coefficient	±0.01 °/K	±0.0016 °/K
Static accuracy[1]	±0.3°	±0.1°
Dynamic accuracy[1]	±0.5°	±0.25°
In run bias stability	-	-
Angle Random Walk (ARW)	-	-
Interface	CAN, CANopen, SAE J1939, Current 4...20 mA, Voltage 0...10 V	

Recording of acceleration and rotation rate

Variants	IB		
General parameters	Inclination	Accelerometer	Gyroscope
Measurement range	-	±8 g	±250 °/s
Resolution	-	0.244 mg	0.00875 °/s
Temperature coefficient	-	0.2 mg/K	0.005 °/s/K
Static accuracy[1]	-	-	-
Dynamic accuracy[1]	-	-	-
In run bias stability	-	-	2.5 °/h
Angle Random Walk (ARW)	-	-	0.1 °/√h
Interface	-	CAN, CANopen, SAE J1939	

Recording of inclination (static and dynamic), acceleration & rotation rate

Variants	XB			XC		
General parameters	Inclination	Accelerometer	Gyroscope	Inclination	Accelerometer	Gyroscope
Measurement range	±90°/±180° (360°)[2]	±8 g	±250 °/s	±90°/±180° (360°)[2]	±8 g	±250 °/s
Resolution	0.01°	0.244 mg	0.00875 °/s	0.01°	0.244 mg	0.00875 °/s
Temperature coefficient	±0.005 °/K	0.2 mg/K	0.005 °/s/K	±0.0016 °/K	0.02 mg/K	0.005 °/s/K
Static accuracy[1]	±0.3°	-	-	±0.1°	-	-
Dynamic accuracy[1]	±0.5°	-	-	±0.25°	-	-
In run bias stability	-	-	2.5 °/h	-	-	2.5 °/h
Angle Random Walk (ARW)	-	-	0.1 °/√h	-	-	0.1 °/√h
Interface	CAN, CANopen, SAE J1939					

[1] incl. compensated cross sensitivity [2] up to 2 measuring axes with configurable orientation

Technical parameters

- **Connector:**
  1 or 2 sensor connectors M12 5-pole, A-coded
- **Degree of protection:** IP6K7/IP6K9K,
  Operating temperature: -40 °C to +85 °C
- **Dimensions and weight:**
  114 mm x 66 mm x 30 mm, approx. 330 g
- **Housing material:**
  zinc die casting, nickel plated
- **Supply Voltage:**
  10 V to 36 V (in some cases from 7.5 V)
- **Current consumption at 24 V:**
  approx. 12 mA (digital), max. 70 mA (analog)

Available interfaces:

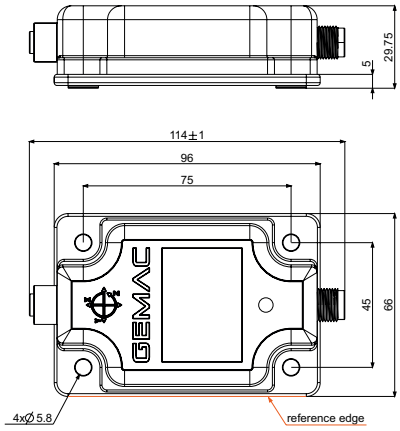
digital:
- **CAN 2.0 A and B (11- and 29-Bit-ID)**
  according ISO 11898-2
- **CANopen**
  according CiA DS-301,
  Profile according CiA DSP-410
- **SAE J1939**
  configurable process data

analog:
- **Current (4 ... 20 mA)**
- **Voltage (0 ... 10 V)**

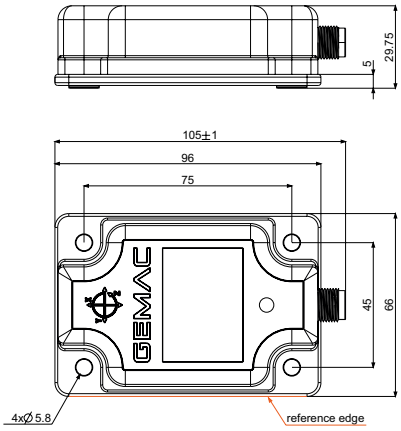
Sensor programming adapter incl. cable and PC software (PR-23999-10)

Dimensional drawing

digital



analog



Connector Pin Out

M12 plug connector pin out digital

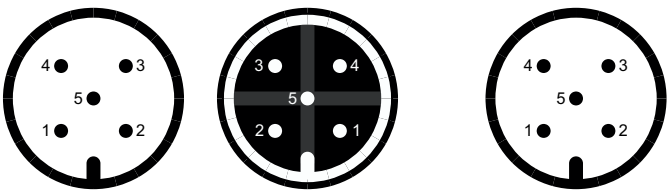
PIN	Signal	Allocation
1	CAN_SHLD	Shield
2	V+	Supply voltage (+24 V)
3	V-	GND / 0 V / V-
4	CAN_H	CAN_H bus line
5	CAN_L	CAN_L bus line

M12 plug connector pin out analog

PIN	Signal	Allocation
1	V+	Supply voltage (+24 V)
2	B-OUT	Sensor output B
3	V- / GND	Supply voltage ground / Sensor ground
4	A-OUT	Sensor output A
5	TEACH	Input for zero point adjustment

M12 female connector pin out digital

PIN	Signal	Allocation
1	CAN_SHLD	Shield
2	V+	Supply voltage (+24 V)
3	V-	GND / 0 V / V-
4	CAN_H	CAN_H bus line
5	CAN_L	CAN_L bus line



digital: plug connector/female connector - view from outside

analog: view from outside

Ordering Information

Performance Class - B basic

N Inclination sensors dynamic	Static accuracy	±0.3°	±0.3°
	Dynamic accuracy	±0.5°	±0.5°
	Product line	GEMAC MOTUS®	GEMAC MOTUS®
	Specification		
	Measurement range	+/– 90°	to ±180° (360°)
	Axis	2D	1D
	CAN	PR-26014-30	PR-26010-30
	CANopen	PR-26114-30	PR-26110-30
	SAE J1939	PR-26714-30	PR-26710-30
	Current	PR-26414-00	PR-26410-00
	Voltage	PR-26514-00	PR-26510-00

X/I Inertial measurement unit	Static accuracy	-	±0.3°
	Dynamic accuracy	-	±0.5°
	Product line	GEMAC MOTUS®	GEMAC MOTUS®
	Specification	without inclination	with inclination
	Measurement range	to ±180° (360°)	to ±180° (360°)
	Axis	6D	6D
	CAN	PR-26015-30	PR-26016-30
	CANopen	PR-26115-30	PR-26116-30
	SAE J1939	PR-26715-30	PR-26716-30

Ordering Information

Performance Class - C classic

N Inclination sensors dynamic	Static accuracy	±0.1°	±0.1°
	Dynamic accuracy	±0.25°	±0.25°
	Product line	GEMAC MOTUS®	GEMAC MOTUS®
	Specification		
	Measurement range	+/– 90°	to ±180° (360°)
	Axis	2D	1D
	CAN	PR-27014-30	PR-27010-30
	CANopen	PR-27114-30	PR-27110-30
	SAE J1939	PR-27714-30	PR-27710-30
	Current	PR-27414-00	PR-27410-00
	Voltage	PR-27514-00	PR-27510-00

X/I Inertial measurement unit	Static accuracy	±0.1°
	Dynamic accuracy	±0.25°
	Product line	GEMAC MOTUS®
	Specification	
	Measurement range	to ±180° (360°)
	Axis	6D
	CAN	PR-27016-30
	CANopen	PR-27116-30
	SAE J1939	PR-27716-30

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