

01 – INERTIAL MEASUREMENT UNIT

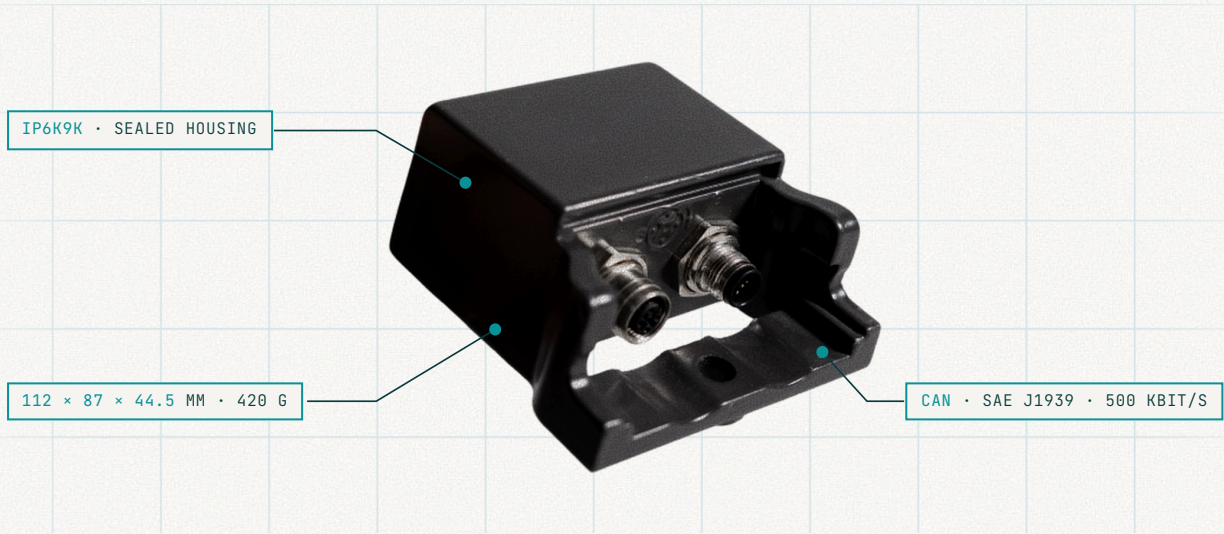
IMU2.1

Accurate orientation and motion data for on-road and off-road machines

IMU2.1 delivers high-precision motion data in real time over CAN (SAE J1939).

Every IMU is put through an extensive calibration procedure that ensures its accuracy in static and dynamic conditions across the full temperature range, and continuously self-calibrates to guarantee performance over time.

A versatile sensor, tested and proven in a wide range of industrial machines operating in challenging conditions.



ROLL / PITCH, STATIC

0.05° RMS

typical • 0.2° max

ROLL / PITCH, DYNAMIC

0.5° RMS

typical • ±1.5° max

ANGULAR VELOCITY

±250°/s

0.008 °/s resolution

ACCELERATION

±16 g

all axes • 0.49 mg resolution

SUPPLY VOLTAGE

8—32 VDC

12 / 24 V systems

OUTPUT RATE

4—100 Hz

configurable

OPERATING RANGE

−40 — +85°C

full performance

RELIABILITY

264 years

MTTF • Siemens SN 29500

Features

02

- Roll, pitch and yaw estimation in static and dynamic conditions
- Angles output as Euler ZXY
- Angular velocity and angular acceleration
- Acceleration with gravity removed
- Configurable mounting orientation and output rates
- Self-calibrating sensors • built-in connector strain relief

Applications

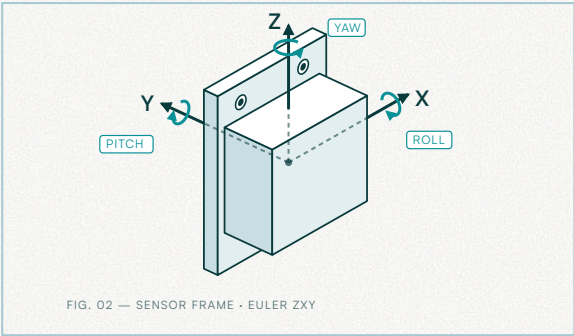
03

- Machine control and machine guidance
- Slope and grade control
- Platform and chassis levelling
- Load weighing
- Machine stability and rollover monitoring
- Condition monitoring

04 Performance

Outputs roll, pitch and inertial yaw (heading) as Euler ZXY angles, plus angular velocity, angular acceleration and gravity-compensated acceleration.

Right-handed sensor frame centred in the unit (Fig. 02). Other 90° mounting orientations are configured in software.



Angle 4.1

RANGE	0 — 360	°
RESOLUTION	0.008	°
BANDWIDTH (-3 DB)	44	Hz
ROLL/PITCH ACCURACY, STATIC	0.05 typ / 0.2 max	° RMS
ROLL/PITCH ACCURACY, DYNAMIC	0.5 typ / ±1.5 max	° RMS
INERTIAL HEADING DRIFT, STATIC	2 typ	°/h

Static values apply after at least 1.5 s stationary. Dynamic values are relative to the static angle.

Angular velocity 4.2

RANGE	±250	°/s
RESOLUTION	0.008	°/s
BANDWIDTH (-3 DB)	5	Hz
ACCURACY, STATIC	0.01 typ / ±0.2 max	°/s RMS
ACCURACY, DYNAMIC	±1 max	°/s

Static values apply after at least 1.5 s stationary.

Angular acceleration 4.3

RANGE	±1000	°/s²
RESOLUTION	0.03125	°/s²
BANDWIDTH (-3 DB)	5	Hz
ACCURACY, STATIC	±5 max	°/s²
ACCURACY, DYNAMIC	±5 max	°/s²

External acceleration 4.4

RANGE, X / Y / Z	±16	g
RESOLUTION, X / Y / Z	0.49	mg
ACCURACY	1 max	mg
SAMPLING RATE	100	Hz
OUTPUT RATE	4 — 100 configurable	Hz

Acceleration with gravity removed.

Noise 4.5

NOISE DENSITY, ACCELERATION	37	µg/√Hz
RMS NOISE, ACCELERATION	1.2	mg
NOISE DENSITY, ANGULAR RATE	0.0038	°/s/√Hz
RMS NOISE, ANGULAR RATE	0.038	°/s
CROSS-AXIS SENSITIVITY	±1	%

Noise density figures are stated at 10 Hz.

Temperature 4.6

EFFECT ON ANGLE ACCURACY	±0.01 typ	°/°C
GYRO SCALING STABILITY	±0.05	%/°C

Full performance across the entire operating range, -40 to +85 °C.

Interface & installation

Power supply 5.1

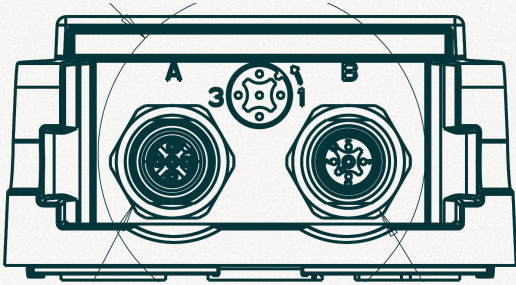
SUPPLY VOLTAGE	8 — 32	VDC
NOMINAL SYSTEM VOLTAGE	12 / 24	VDC
TYPICAL CURRENT	72 @12 V / 37 @24 V	mA
MAX POWER CONSUMPTION	1	W
MAX FUSE ON SUPPLY PINS	3 daisy-chained	A
INTERFACE	SAE J1939, 500 kbit/s	

CAN messages and configuration: see IMU2.1 CAN Interface Specification.

Connectors 5.2

Two 5-pin Molex Brad Ultra-Lock M12 connectors (female A, male B), pin-to-pin interconnected for daisy chaining. Pinout and wiring: see IMU2.1 Installation Guidelines.

FIG. 03 — CONNECTORS A = FEMALE · B = MALE, POWER INLET



Accessories 5.3

Mount the unit with the connectors pointing down (as in Fig. 04) to keep water out of the connectors. Mounting, harness routing and clamping requirements are given in the IMU Installation Guidelines.

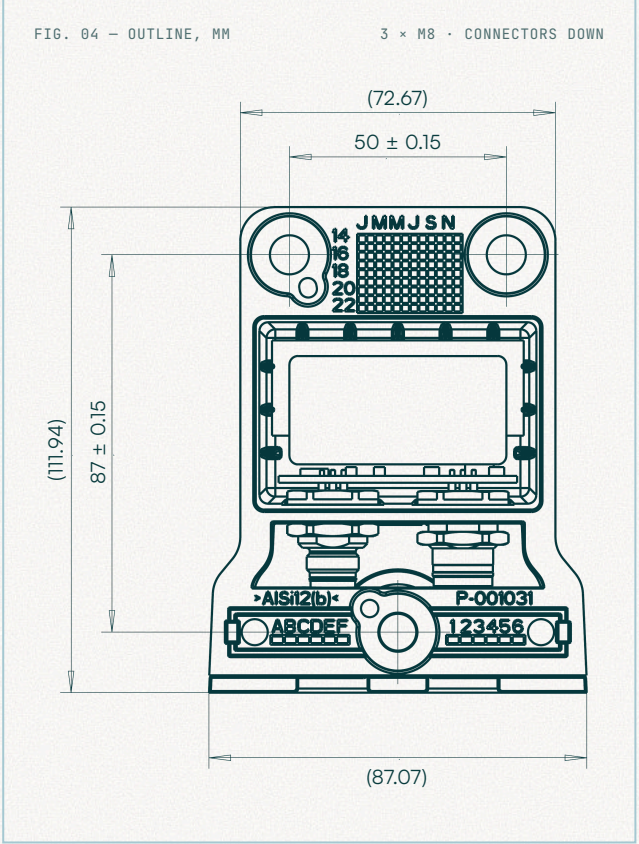
Recommended cordsets and bus terminator: see IMU2.1 Installation Guidelines.

Environment & reliability 06

OPERATING TEMPERATURE	−40 to +85 full perf.	°C
STORAGE TEMPERATURE	−40 to +85	°C
PROTECTION CLASS	IP6K9K ISO 20653	
MTTF, CONTINUOUS OPERATION	264	years
CALIBRATION / SERVICE	None required · sealed	

IP rating applies with Molex Brad Ultra-Lock M12 connectors. MTTF per Siemens SN 29500, mission profile 50 °C 60 %, 60 °C 20 %, 70 °C 10 %, 85 °C 10 %.

Mechanical 5.4



DIMENSIONS (W × D × H)	112 × 87 × 44.5	mm
WEIGHT	420 incl. strain relief cover	g
ORIENTATION COMPENSATION	Any 90° rotation · software	

Approvals & standards 07

EMC, EARTH-MOVING MACHINERY	EN 13309:2003 • ISO 13766
RADIO INTERFERENCE	UN ECE R10
ENVIRONMENTAL CONDITIONS	ISO 16750-1 to -5
DEGREE OF PROTECTION	ISO 20653 • IP6K9K
ISO 16750-1, -2:2010, -3:2007, -4:2010, -5:2010. UN ECE R10.	