UNMATCHED
USER-FRIENDLY
RELIABLE
PRECISE
GNSS-AIDED INERTIAL MEASUREMENT SOLUTIONS

MAKE MEASURING EASY WITH THE
AUTOMOTIVE DYNAMIC MOTION ANALYZER

GeneSys

Sensor Systems, Service & Smiles

GENESYS ELEKTRONIK GMBH

OUR GLOBAL PARTNERS FOR YOUR SUCCESS

Our partners and their qualified personnel are at your service

Real-time support for automotive pioneers, wherever you are
www.genesys-offenburg.de/en/partner

Sensor Systems, Service & Smiles

Three decades of practical experience and pioneering spirit

GeneSys is specialized in the development and production of high precision and performance sensor-systems that are used in the automotive industry, in tunnel machines or in industrial image processing applications. Laser measurement technology and inertial sensor technology are used to record precise position and motion data of moving objects.

Our GNSS-based inertial system ADMA (Automotive Dynamic Motion Analyzer) series was especially developed for vehicle dynamics analysis and ADAS evaluations in the automotive industry. Our customers use the ADMA in a wide range of applications: for vehicle dynamics testing, braking distance measurements, ADAS evaluation, navigation of steering and driving robots or validation of highly automated driver assistance functions.

Users benefit from three decades of application know-how and hands on expertise of GeneSys experts. A customized and committed support completes the comprehensive measurement and testing experience provided by the ADMA.

Support you can rely on

Instant Support: You can use our support whenever you need it – free of charge.

Measuring should be easy

Helpful Toolings: A high degree of user-friendliness, many helpful toolings and integration solutions – make measuring with the ADMA as easy as possible for you.

Always up-to-date

Free Firmware: You can update your existing ADMA with the latest firmware.

Efficient & reliable

Fastest initialization: The ADMA has the fastest initialization time and is extremely failsafe and reliable – saves money and time.

POWERFUL SOLUTIONS FOR YOUR APPLICATION

We offer combined GNSS and inertial measurement technology, inclination measurement instruments, industrial image processing solutions and laser measurement technology for high-performance solutions. Mechanics, electronics, optics and software are continuously fine-tuned to each other.

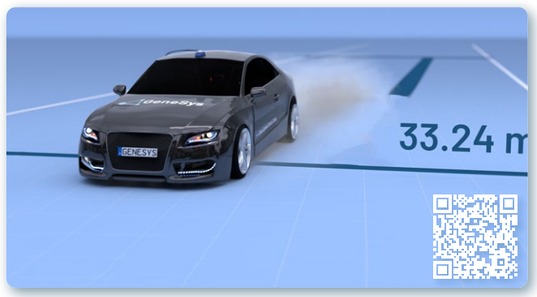
Vehicle Dynamics Testing

Our GNSS-based inertial system ADMA (Automotive Dynamic Motion Analyzer) was especially developed for vehicle dynamics analysis. With the ADMA you can quickly and easily perform a wide range of vehicle dynamics tests in real-time.

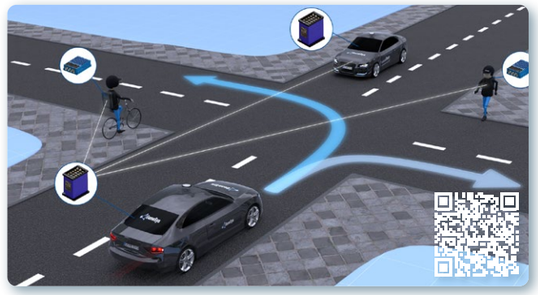
The strapdown technology ensures that the ADMA is stable and resistant to unwanted vibration during use. This means the ADMA is very well suited for evaluation of Vehicle Dynamics according to test standards e.g. ISO lane change.

Brake and Tire Testing

To provide the most secure and shortest braking distance when it comes to emergency traffic situations, OEM and TIER1 intensively develop braking systems.



The ADMA-Speed enables unmatched accurate and simple leading measuring solution to perform brake tests and tire inspections. ADMA-Speed is a tried and tested variant of our Automotive Dynamic Motion Analyzer (ADMA), which provides reliable, accurate (up to 0,05 m RMS) and easy usable measurement data, compensation of the vehicle pitch during braking process, easy and quick installation & drift compensation at standstill.



ADAS Testing

The decisive factor in ADAS test systems is the precise and synchronous recording of the positions of all vehicles, objects and persons involved as well as their relative movement to each other.

Our ADMA system was developed specifically for the evaluation of driver assistance systems. GeneSys solutions offer you easy handling and highest accuracy and meet all requirements of international test standards EURO NCAP and NHTSA.

VRU Testing

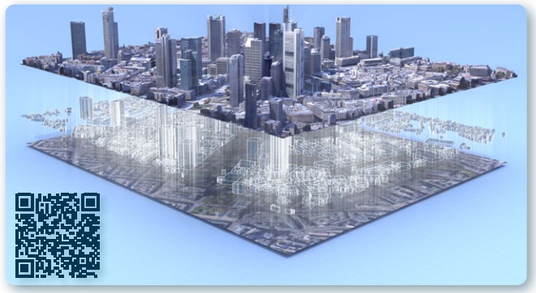
Protection of VRUs (Vulnerable Road Users e.g. pedestrians, cyclists, etc.) is one of the major issues and a huge challenge in the research and development of new safety systems.

To reduce the number of accidents involving VRUs, vehicles must achieve fast and reliable environment detection and object classification. The algorithms for classifying and tracking radar-detected road users and objects are becoming increasingly complex. For further development and verification of these algorithms, real scenarios should be combined with known reference objects.

Autonomous Vehicle Testing

For the development of autonomous vehicle technologies, it is essential to have precise and reliable reference.

Self-driving vehicles will have to drive in a variety of environments on public roads, requiring a flexible reference and test system that can be deployed virtually anywhere. Reflected satellite signals from structures, bridges and tunnels all result in significant jumps in position estimates. Pure GNSS systems are therefore not very dependable on the public roads.

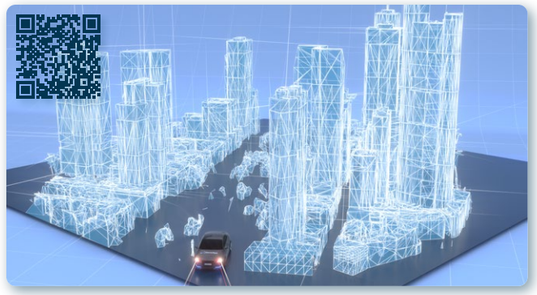


Surveying and Mapping

The ADMA system is increasingly used for road measurement on public roads. The ADMA high-precision gyro measurement system fuses inertial data (acceleration and rotation rates) with GNSS to compute improved orientation and position. ADMA enables precise georeferencing of data, even in the presence of GNSS interference and outages.

With the ADMA-PP post-processing software the recorded data by the sensor can be optimized and GNSS correction data can be added afterwards.

Ground Truth



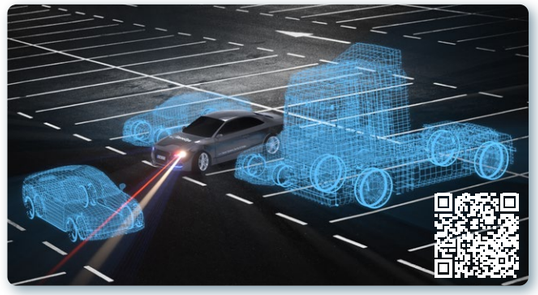
Accurate and reliable ground truth data makes it possible to localize the vehicle position and its movements very precisely – up to one centimeter – and thus to perform an objective evaluation of Lane Keeping Assist System (LKAS).

Tracking accurate ground truth maps is required for objective quality assessment of automated driving functions. The goal is to achieve maximum accuracy of the absolute 3D trajectory. In combination with other sensors such as radar, lidar, or camera, road markings or traffic signs can also be recorded with high accuracy.

Indoor Testing

Accurate position detection without GNSS in cooperation with Racelogic: with the IPS (Indoor Positioning System), driving tests, crash tests with new sensor systems and safety functions can be tested in indoor facilities under constant ambient conditions.

A hardware interface for the GeneSys ADMA has been specifically developed and allows an interoperability with the IPS system. This way, the standardized ADMA position data output are equivalent to the ones, when operating the ADMA with GNSS in RTK2 mode.



Vehicle-in-the-Loop

Vehicle-in-the-Loop testing solution bridges the gap between simulated and actual physical tests through the use of a virtual environment that is synchronized and integrated with a physical vehicle.

Tests can be performed within a streamlined and efficient track environment and data can be collected from different virtual scenarios under real road conditions. Our ADMA-G devices support the use of various VIL applications in combination with for example IPG Automotive's simulation solutions.

GENESYS DATA LOGGER

Effortless measurement data recording and visualization.

The Data Logger offers the option of creating individual workspaces and measurement displays in order to clearly visualize and record measurement data from multiple ADMA systems in parallel for all your applications.

Video: youtu.be/82LBfMpJhHE

Data Logger: genesys-offenburg.de/en/adma-data-logger-software

Various widgets such as live data values, bar charts, images and many more can be used to display your own measurement scenarios.

With numerous presets for all existing ADMA data streams (ADMAnet, Add-On DELTA, Add-On Braking, Robot, Add-On LatDev) and the integrated user aids, guides and graphics, the measurement data can be displayed quickly and clearly.

Licence Options **CAN Data Input** **Math Channels** **Linux** **Event Triggers** **New Widgets**

Discover testing solutions for
YOUR**WORLD**

ISO 17025
ISO 9001

YOUR WORLD	*TYPICAL PRODUCTS*	*ADD-ONS**	*OPTIONS**	*ACCESSORIES**	*MATCHING SYSTEMS (TURNKEY SOLUTION)**
 **ADAS Testing**  **VRU Testing**  **Autonomous Vehicle Testing**	 ADMA-G-Pro+ ADMA-G-Eco+ ADMA-G-Eco  ADMA-Slim  ADMA-Micro	DELTA 1:5 FILTER LATDEV Smoothing gPTP / NTP NTRIP Client	GNSS-Raw Data Dual-Ant Correction Data via Ethernet RTK2 Multi-GNSS	WiFi-Kit GPS Base Station NTRIP-DGNSS-Box Mounting Accessories	IPS - Indoor Positioning System VIL - Vehicle-in-the-Loop ADAS Targets Steering & Driving Robots
 **Vehicle Dynamics Testing**  **Brake and Tire Testing**	 ADMA-G-Pro+ ADMA-G-Eco+ ADMA-G-Eco  ADMA-Speed	FILTER LATDEV BRAKING	1 kHz Dual-Ant Multi-CAN Full-INS	Mounting Accessories	IPS - Indoor Positioning System Steering & Driving Robots
 **Surveying and Mapping**  **Ground Truth**	 ADMA-G-Pro+ ADMA-G-Eco+	Smoothing gPTP / NTP NTRIP Client	GNSS-Raw Data Dual-Ant RTK2 Multi-GNSS Vehicle Model	ADMA-PP NTRIP-DGNSS-Box Mounting Accessories	IPS - Indoor Positioning System Extern Velocity

**SYSTEM-RELATED DEPENDENCIES*

WE ARE ALWAYS HAPPY TO HELP YOU FIND THE PERFECT SOLUTION – JUST CONTACT US.

We combine GNSS and inertial measurement technology, inclination measurement, industrial image processing and laser measurement technology for high-performance solutions. Mechanics, electronics, optics and software are continuously fine-tuned to each other.

Quick Start Guide · **First Level Support** · **Calibration**

GeneSys Training Academy · **Maintenance & Repair** · **Software Updates** · **Rental Service** · **Second Level Support** · **Warranty Extension**

ADMA PRODUCT FAMILY

GNSS/Inertial System for vehicle dynamics testing

ADMA stands for Automotive Dynamic Motion Analyzer. This acronym refers to our highly precise Inertial Measurement Unit (IMU) using DGNSS (Differential Global Navigation Satellite System). The system was developed particularly for Vehicle Dynamics Testing in the automotive testing industry.

Our ADMA system allows constant measurement of acceleration, velocity and position of moving vehicles in all three dimensional axes. Pitch, roll and yaw angles can be continuously and precisely measured with ADMA as well as course and side-slip angles as well as angular rates.

This makes GeneSys ADMA system the best choice where challenging measurements with maximum accuracies are required.

THE RIGHT SENSOR-SYSTEM FOR YOUR APPLICATION

ADMA-G

The best choice where challenging measurements with maximum accuracies are required.

The high precision Fiber Optical Gyroscopes (FOG) and acceleration sensors ensure that the ADMA is stable and resistant to vehicle vibration during measuring operations.

This means the ADMA is very well suited for evaluation of Vehicle Dynamics and Driver Assistance Systems. The ADMA system is successfully used for Motorsports, Driverless Systems and Construction Machines. It has a proven track of record for Ground Truth overland measurement campaigns, railways application and tire testing with highest side-slip data precision.

ADMA-Speed

Optimized for brake tests. For easy installation, the inertial sensors are combined with the GNSS antenna.

All motion data of the vehicle is calculated by means of the long experienced and proven ADMA technology.

In the basic version acceleration, speed and braking distance are transmitted via the CAN and Ethernet interface. ADMA-Speed eliminates the known disadvantages of GNSS speed sensors.

ADMA-Slim

Specially developed for applications with space or weight restrictions. It is smaller, lighter and more compact, without limitations in performance or quality of measurement data.

ADMA-Slim is the perfect choice for applications in motorcycles, overrunnable platforms for GSTs (Guided Soft Targets) or VRUs (Vulnerable Road Users such as pedestrians or cyclists), for example.

ADMA-Slim is based on the proven ADMA technology for centimeter accuracy in positional data acquisition. It delivers precise, smooth and consistent signals even during poor GNSS reception.

ADMA-Micro

Our smallest GNSS-aided inertial measurement unit (IMU).

It measures the 3D position in real-time within an accuracy of 0.01 m (1σ) . Based on accelerations and rotation rates, which are also measured, velocities, position angles and heading can be determined. The use of MEMS gyros and accelerometers makes it possible to create a highly accurate, compact and light-weight device. Different structural shape allows choosing the right design for a variety of applications, including vehicles and VRUs (Vulnerable Road Users), construction machines, UGVs (Unmanned Ground Vehicles) and robotics.

ADMA-G PRO+ / ECO+ / ECO

ADMA-G available in three different versions

ADMA-G Highlights

- Data output rate up to 1000 Hz
- Data latency < 1 msec
- Data output via 5 CAN bus interfaces and Ethernet
- Configuration via Ethernet
- Forwarding of GNSS correction data and relative data calculation (e.g. distance) via WiFi in real-time for multi-vehicle operation
- GNSS synchronized DAQ synchronization signal, the high clock frequency
- Inputs for the recording of analog signals
- The output of GNSS raw data via Ethernet interface
- Indoor GNSS interface
- Dual GNSS antenna option
- Multi GNSS capable (GPS, GLONASS, GALILEO, BEIDOU)
- Compatible with all common steering and driving robots

ADMA-G
PRO+ / ECO+ / ECO

ADMA-G features

Measurement of vehicle motion in three axes, even during GNSS signal outages
- Dynamic attitude and heading angle determination
- Precise acceleration, velocity and position data due to extended Kalman filter
- Internal Dual-Antenna and multi GNSS capable GNSS receiver
- High precision position data (1 cm) with internal RTK2 DGNSS receiver and GNSS correction data
- Robust inertial sensors and strapdown technology without moving parts and Fiber Optic Gyro technology (FOG)

ADMA-Speed

ADMA-Speed Highlights

- User-friendly handling thanks to the combination of GNSS antenna and inertial sensors in one housing
- Mounting by means of powerful magnets on the vehicle roof
- Online output of acceleration, speed, braking distance and MFDD data
- Pitch compensation during braking
- Considerably smoother speed signal in comparison to GNSS
- Compensation of GNSS data latency
- Correction of acceleration-dependent GNSS signal distortion
- Speed calculation at the vehicle center of gravity
- Data processing unit with tried and tested Kalman filter technology
- Speed and signal-triggered braking distance
- Signal inputs for braking trigger or light barrier

ADMA-Speed

ADMA-Speed is a GNSS speed sensor with integrated inertial sensors. It is optimized for brake tests. For easy installation, the inertial sensors are integrated in the GNSS antenna.

All motion data of the vehicle are calculated by means of the tried and tested ADMA technology. In the basic version acceleration, speed, braking distance and MFDD data are transmitted via the CAN and Ethernet interface. ADMA-Speed eliminates the known limitations of GNSS speed sensors.

ADMA-Micro

ADMA-Micro versions

- Standard: LEMO connectors in a waterproof housing
- OEM: System integrator version

The ADMA-Micro achieves highly accurate measurements of position, velocity, angles, rotation rates or accelerations of a moving object. The system is small, rugged and low powered, making it ideal for a range of applications including:

- Autonomous vehicle (AV) operation
- ADAS Evaluation e.g. ACC, FCW, AEB (VRU, Car2Car), LSS (LDW, LKA)
- Simultaneous localization and mapping (SLAM)
- Validation of predictive vehicle safety functions with e.g. Camera, Radar, Lidar sensors
- Vulnerable Road Users (VRU) Tracking
- Comprehensive vehicle safety functions with connected sensor systems and V2X

ADMA-Micro Highlights

- Ideal integrated solution in ADAS Targets and driving robots
- Our smallest GNSS/INS system
- Advanced Kalman filter for sensor fusion
- Centimeter-level positional accuracy RTK
- Real-time 3D position, velocity and attitude measurement up to 200 Hz
- Data latency <1 msec
- Dual antenna support for highly accurate heading in static and low dynamic conditions
- Multi GNSS capability for a high position reliability
- Fully compatible with existing ADMA systems
- Embedded webinterface for easy configuration
- Ready for series production

ADMA-Slim
Single connector

ADMA-Slim
Standard version

ADMA-Slim

ADMA-Slim versions

- Standard: LEMO connectors in a waterproof housing
- Single connector: MIL connector in a waterproof housing
- OEM: System integrator version

ADMA-Slim is available either with an L1 GNSS receiver with SBAS and DGNSS correction data reception capability or with an L1/L2 GNSS receiver with RTK2 correction data reception capability, allowing for position accuracy down to the centimeter.

ADMA-Slim Highlights

- Fullfledged GNSS/inertial system with proven ADMA technology
- Small, lightweight and convenient size
- Measuring of vehicle movements in all three measuring axes, even with GPS outage
- Robust MEMS inertial sensors in strapdown technology with 5, 10 or 15 g
- Improved satellite reception via Multi-GNSS (GPS, GLONASS, GALILEO, BEIDOU)
- Also as Dual Antenna version available
- Mounting with high power magnets possible
- Direct attachment of the GPS antenna to the inertial sensor technology possible
- Available in a waterproof housing or as unhoused version for OEMs
- Compatible with all common overrunnable platforms
- Optional extendable, e.g. with RTK or DELTA option

	System Type	ADMA-G-Pro+	ADMA-ECO+	ADMA-ECO	ADMA-Slim	ADMA-Speed	ADMA-Micro
Complete system	GNSS constellations	GPS L1, L2 GLONASS L1, L2 BeiDou[1] B1, B2 Galileo[1] E1, E5	GPS L1, L2 GLONASS L1, L2 BeiDou[1] B1, B2 Galileo[1] E1, E5	GPS L1, L2 GLONASS L1, L2 BeiDou[1] B1, B2 Galileo[1] E1, E5	GPS L1, L2 GLONASS L1, L2 BeiDou[1] B1, B2 Galileo[1] E1, E5	GPS L1, L2 GLONASS L1, L2 BeiDou[1] B1, B2 Galileo[1] E1, E5	GPS L1, L2 GLONASS L1, L2 BeiDou B1, B2 Galileo E1, E5
	Dual antenna	Optional	Optional	Optional	Optional	Optional	Optional
	Position accuracy (1 σ)[2]	0.01 / 0.20 / 0.60 / 1.20 / 1.50 m	0.01 / 0.20 / 0.60 / 1.20 / 1.50 m	0.01 / 0.20 / 0.60 / 1.20 / 1.50 m	0.01 / 0.20 / 0.60 / 1.20 / 1.50 m	0.01 / 0.20 / 0.60 / 1.20 / 1.50 m	0.01 / 0.20 / 0.60 / 1.20 / 1.50 m
	Angle Measurement range roll / pitch / yaw	60 ° / 60 ° / ± 180 °	60 ° / 60 ° / ± 180 °	60 ° / 60 ° / ± 180 °	60 ° / 60 ° / ± 180 °	60 ° / 60 ° / ± 180 °	60 ° / 60 ° / ± 180 °
	Angle Measurement accuracy roll & pitch (1 σ) / yaw (1 σ) / sideslip (RMS)	0.01 / 0.015 / 0.05 °	0.01 / 0.025 / 0.1 °	0.015 / 0.025 / 0.1 °	0.02 / 0.05 / 0.15 °	0.02 / 0.05 / 0.15 °	Velocity accuracy (RMS)[3]: 0.06km/h RMS
	Angle resolution	0.005 °	0.005 °	0.005 °	0.005 °	0.005 °	Download the ADMA-Micro data sheet PDF here:
	Velocity accuracy (RMS)[3]	0.03 km/h	0.03 km/h	0.04 km/h	0.04 km/h	0.04 km/h	
	Position error after 10 / 30 / 60 s GNSS outage (RMS)[3]	0.1 / 0.6 / 2.0 m	0.2 / 1.0 / 5.0 m	0.3 / 2.0 / 10.0 m	0.4 / 5.0 / 40.0 m	0.4 / 5.0 / 40.0 m	
	Velocity error after 10 / 30 / 60 s GNSS outage (RMS)[3]	0.01 / 0.03 / 0.06 m/s	0.02 / 0.10 / 0.20 m/s	0.04 / 0.15 / 0.35 m/s	0.06 / 0.5 / 1.5 m/s	0.06 / 0.5 / 1.5 m/s	
	Roll / Pitch angle error after 10 / 30 / 60 s GNSS outage (RMS)[3]	< 0.01 / 0.01 / 0.01 °	0.01 / 0.02 / 0.03 °	0.02 / 0.03 / 0.05 °	0.05 / 0.15 / 0.30 °	0.05 / 0.15 / 0.30 °	
	Heading angle error after 10 / 30 / 60 s GNSS outage (RMS)[3]	< 0.01 / 0.01 / 0.01 °	0.02 / 0.07 / 0.15 °	0.03 / 0.10 / 0.20 °	0.05 / 0.15 / 0.30 °	0.05 / 0.15 / 0.30 °	
	Braking distance accuracy without RTK2 (RMS)[3]	0.05 m	0.05 m	0.05 m	0.05 m	0.05 m	
	Data output rate	50 / 100 / 200 / 250 / 500 Hz / (1000 Hz)[1]	50 / 100 / 200 / 250 / 500 Hz / (1000 Hz)[1]	50 / 100 / 200 / 250 / 500 Hz / (1000 Hz)[1]	50 / 100 / 200 / 250 / 500 Hz / (1000 Hz)[1]	50 / 100 / 200 / 250 / 500 Hz / (1000 Hz)[1]	100 Hz / 200 Hz
	Calculation latency	1 msec	1 msec	1 msec	1 msec	1 msec	1 msec
Sensors - Gyros	Sensor Technology	3 closed-loop fiber optic gyros	3 open-loop fiber optic gyros	3 open-loop fiber optic gyros	3 MEMS gyros	3 MEMS gyros	3 MEMS gyros
	Measurement range	± 327 °/s	± 200 °/s	± 200 °/s	± 450 °/s	± 450 °/s	± 450 °/s[5]
	Data output resolution	0.0001 °/s	0.0001 °/s	0.0001 °/s	0.0001 °/s	0.0001 °/s	0.0001 °/s
	Bias repeatability typ. (1 σ)	6 °/h (0.0017 °/s), optional 1 °/h (0.00028 °/s)	24 °/h (0.0066 °/s)	24 °/h (0.0066 °/s)	0.2 °/s	0.2 °/s	x-axis and z-axis 0.14 °/s | y-axis 1.4 °/s
	In-run-bias typ.	0.1 °/h	1 °/h	1 °/h	6 °/h	6 °/h	x-axis 2.7 °/h | y-axis 2.2 °/h | z-axis 1.6 °/h
	Noise (random walk) typ.	0.047 °/√h	0.02 °/√h	0.02 °/√h	0.3 °/√h	0.3 °/√h	x-axis and y-axis 0.15 °/√h | z-axis 0.2 °/√h
	Scale factor	0.05 %	0.1 %	0.1 %	0.2 %	0.2 %	n.a.
	Sensor bandwidth	3200 Hz	1000 Hz	1000 Hz	330 Hz	330 Hz	x-axis and y-axis 480 Hz | z-axis 590 Hz
Sensors - Accelerometers	Sensor Technology	3 servo accelerometers	3 servo accelerometers	3 MEMS accelerometers	3 MEMS accelerometers	3 MEMS accelerometers	3 MEMS accelerometers
	Measurement range	± 5 g / (± 10 g)[1]	± 5 g / (± 10 g)[1]	± 2 g / (± 5 g)[1]	± 5 g / ± 15 g[1]	± 5 g / ± 15 g[1]	± 15 g
	Data output resolution	0.0001 g	0.0001 g	0.0001 g	0.0001 g / 0.0001 g	0.0001 g / 0.0001 g	0.0001 g
	Bias repeatability typ.	< 1.0 mg	< 1.0 mg	5 mg	4 mg / 16 mg	4 mg / 16 mg	15 mg
	In-run-bias typ. (1 σ)	10 µg	10 µg	10 µg	32 µg / 70 µg	32 µg / 70 µg	x-axis and y-axis 12.75 µg | z-axis 13.66 µg
	Noise (random walk) typ.	< 50 µg /√Hz	< 50 µg /√Hz	50 µg /√Hz	50 µg /√Hz / 63 µg /√Hz	50 µg /√Hz / 63 µg /√Hz	x-axis and y-axis 90 µg /√Hz | z-axis 75 µg /√Hz
	Scale factor (1 σ)	0.015 %	0.015 %	0.2 %	0.2 % / 0.2 %	0.2 % / 0.2 %	n.a.
	Sensor bandwidth	1500 Hz	1500 Hz	100 Hz	330 Hz / 330 Hz	330 Hz / 330 Hz	750 Hz
Interfaces	Ethernet	2x 1 GBit Data input/output, configuration and firmware update, driving robot data output, optional for relative data calculation and DGNSS routing. 1x 100 MBit GNSS Receiver; GNSS firmware update	2x 1 GBit Data input/output, configuration and firmware update, driving robot data output, optional for relative data calculation and DGNSS routing. 1x 100 MBit GNSS Receiver; GNSS firmware update	2x 1 GBit Data input/output, configuration and firmware update, driving robot data output, optional for relative data calculation and DGNSS routing. 1x 100 MBit GNSS Receiver; GNSS firmware update	1x 1 Gbit Data input/output, configuration and firmware update, driving robot data output, optional for relative data calculation and DGNSS routing.	2x 1 GBit Data input/output, configuration and firmware update, driving robot data output, optional for relative data calculation and DGNSS routing. 1x 100 MBit GNSS Receiver; GNSS firmware update	1x 1 Gbit Data input/output, configuration and firmware update, driving robot data output, optional for relative data calculation and DGNSS routing.
	CAN	1x CAN, 5x CAN[1], 2b, 1 Mbit Data output, input[1]	1x CAN, 5x CAN[1], 2b, 1 Mbit Data output, input[1]	1x CAN, 5x CAN[1], 2b, 1 Mbit Data output, input[1]	1x CAN 2b, 1 Mbit Data output, input[1]	1x CAN, 2b, 1 Mbit Data output, input[1]	1x CAN 2b, 1 Mbit Data output, input[1]
	Serial	1x RS232 GNSS Receiver; DGNSS correction data input 1x RS232 GNSS Receiver; GPGGA Log output, IPS (Indoor Positioning System)	1x RS232 GNSS Receiver; DGNSS correction data input 1x RS232 GNSS Receiver; GPGGA Log output, IPS (Indoor Positioning System)	1x RS232 GNSS Receiver; DGNSS correction data input 1x RS232 GNSS Receiver; GPGGA Log output, IPS (Indoor Positioning System)	1x RS232 GNSS Receiver; DGNSS correction data input 1x RS232 GNSS Receiver; GPGGA Log output, IPS (Indoor Positioning System)	1x RS232 GNSS Receiver; DGNSS correction data input 1x RS232 GNSS Receiver; GPGGA Log output, IPS (Indoor Positioning System)	1x RS232 GNSS Receiver; DGNSS correction data input, IPS (Indoor Positioning System)
	Digital/Analog Input	4x Digital / Analog (16 bit) e.g. Frequency, Brake trigger, ... 1x Digital / Analog (16 bit) external velocity X	4x Digital / Analog (16 bit) e.g. Frequency, Brake trigger, ... 1x Digital / Analog (16 bit) external velocity X	4x Digital / Analog (16 bit) e.g. Frequency, Brake trigger, ... 1x Digital / Analog (16 bit) external velocity X	up to 4x Digital / Analog (16 bit) e.g. Frequency, Brake trigger, ...	3x Digital / Analog (16 bit) e.g. Frequency, Brake trigger, ...	2x Digital / Analog (16 bit) e.g. Frequency, Brake trigger, ...
	Digital Output	4x Digital TTL (e.g. PPS, Frequency, PPD Pulse per distance, ...)	4x Digital TTL (e.g. PPS, Frequency, PPD Pulse per distance, ...)	4x Digital TTL (e.g. PPS, Frequency, PPD Pulse per distance, ...)	up to 4x Digital TTL (e.g. PPS, Frequency, PPD Pulse per distance, ...)	4x Digital TTL (e.g. PPS, Frequency, PPD Pulse per distance, ...)	2x Signal Out (e.g. PPS, Frequency, PPD Pulse per distance, ...)
	Connector type	Lemo	Lemo	Lemo	Lemo, SC, Samtec	Lemo & Sub-D	Lemo, Samtec
	GNSS	2x TNC GNSS Antenna connectors	2x TNC GNSS Antenna connectors	2x TNC GNSS Antenna connectors	2x SMA GNSS Antenna connectors	2x TNC GNSS Antenna connectors	2x SMA GNSS Antenna connectors
Hardware / Miscellaneous	Ordering Variants	–	–	–	Lemo-Version / SC-Version / OEM-Version	–	OEM-Version / Lemo-Version
	Internal Memory	up to 64 GB	up to 64 GB	up to 64 GB	up to 64 GB	up to 64 GB	up to 64 GB
	Power supply	9 to 32 VDC typ. 30 W	9 to 32 VDC typ. 30 W	9 to 32 VDC typ. 30 W	9 to 32 VDC typ. 15 W	9 to 32 VDC typ. 20 W	5 VDC typ. 7.5 W / 9 to 32 VDC typ. 7.5 W
	Dimensions (W x L x H)	110 x 170 x 197 mm	110 x 170 x 197 mm	110 x 170 x 197 mm	130 x 186 x 47 mm / 130 x 194 x47 mm / 125 x 148 x 31 mm	Data processing unit 225 x 235 x 75 mm Sensor unit 110 x 130 x 70 mm (with magnets) 87 x 130 x 60 mm (without magnets)	78.0 x 61.0 x 26.9 mm / 93.0 x 71.5 x 32.5 mm
	Weight	3.6 kg	3.6 kg	3.6 kg	1.5 kg	Data processing unit 2.3 kg | Sensor unit 0.75 kg	0.116 kg / 0.229 kg
	Operating temperature	-20 to +60 °C	-20 to +55 °C	-20 to +55 °C	-20 to +60 °C	Data processing unit -20 to +60 °C | Sensor unit -40 to +85 °C	-20 to +75 °C
	Protection Class	IP 65[4]	IP 65[4]	IP 65[4]	IP 65[4] / IP 67 / IP 20	Data processing unit IP 50 | Sensor unit IP 67	IP 20 / IP 67

[1] Optional | [2] Depending on GNSS conditions, correction data and license model | [3] Typical values according to internal test standards with settled Kalman filter. | [4] The housing is protected against dust and water jets in accordance with IP65. Please note that not all plug connections and cables are fully sealed in accordance with the IP standard. The cable is therefore not intended for use in permanently wet or damp environments. | [5] Calibration range 0 °/sec to 200 °/sec

ADMA INTEGRATED SOLUTION FOR ADAS EVALUATION

This single system enables fast and precise evaluation of driver assistance systems by synchronous acquisition of relative movements between multiple vehicles as well as between vehicle and environment. An online visualization and an in-situ evaluation of the captured data supports you in the testing process. This integrated, easy to operate solution makes us the best choice in ADAS Targets and driving robots.

Highlights

- **Web browser based configuration**
- **Easy installation and operation**
- **Pre-configured, sophisticated and tested system**
- **All data of all vehicles conveniently available online at a single glance**
- **Reproducible driving maneuvers using online driver guidance**
- **Online 3D distance measurement between moving objects (vehicles, pedestrians) and fixed objects (lane, obstacles)**
- **Data security by in-situ quality assurance**
- **Time saving by automatic reporting**
- **No synchronization of data required**

APPLICATIONS

Relative data car to car / pedestrian

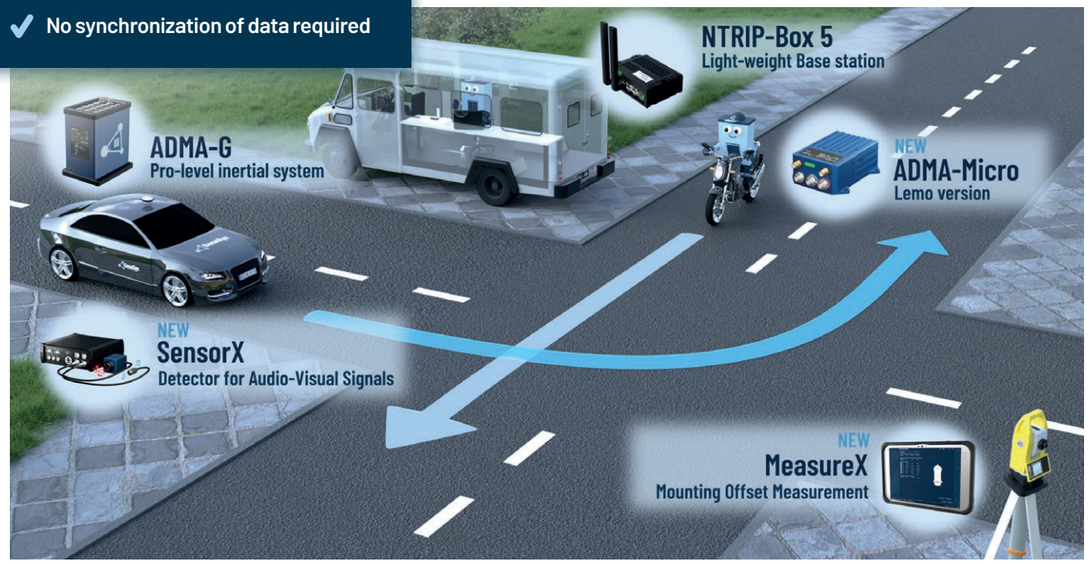
Active safety
- ACC *(Adaptive Cruise Control)*
- FCW *(Forward Collision Warning)*
- BA/AEB *(Braking Assistant, Autonomous Emergency Brake)*
- BSD *(Blind Spot Detection)*

Driver assistance
- Ultrasonic sensors
- Long range Radar
- Video systems

Passive safety
- Crash detection
- Rollover detection
- Pedestrian safety

Relative data car to environment / reference track

- LSS *(Lane Departure Warning, LDW, Lane Keeping Assistant, LKA)*
- PA *(Parking Assistant)*
- Traffic Sign Recognition
- Lateral Offset *(braking, load change)*
- Cross wind sensitivity
- Steady state circular test *(braking, load change)*
- Lane change
- ISO 26262 *(Functional Safety of Road Vehicles, e.g. for ESP and EPS)*



ADMA-PP

Meet the required level of accuracy for validation of advanced driver assistance systems and route measurement on public roads.

Increasingly, the GeneSys ADMA system is used to validate Driver Assistance Systems as well as surveys on public roads. In order to meet the required accuracies, GeneSys has developed the ADMA-PP post-processing software. ADMA-PP combines the inertial and GNSS data post-measurement, using identical online and offline algorithms – ensuring consistency on how data is handled. The core component of the software is a Kalman filter which optimizes the merging of GNSS and inertial data.

Information received from auxiliary sensors like barometers or odometers may be added to the calculation.

Compared to the real-time solution which is also available, the offline calculation offers two distinct advantages:

1. The GNSS correction data can be easily downloaded from the Internet for the relevant measurement run. This reduces the time and effort required for installation when performing the measurement. With the real-time solution, it is necessary to continuously supply the GNSS correction data via a radio or GPRS connection – which is not always possible on public roads.

2. ADMA-PP calculates the position both forward and reverse in the time-domain. This leads to considerably higher levels of accuracy compared to the real-time method. Signal data integrity is improved and much higher accuracies can be achieved in the event of GNSS signal drops or interference.

ADMA-PP technical data and properties

- **Improved accuracy by combining the forward / backward navigation solution**
- **Much higher position accuracy during total GNSS shading**
- **Compensation of position steps after GNSS reentry (e.g. on emergence from a tunnel)**
- **Increased DGNSS positional accuracy**
- **Easiest possible operation with a configuration wizard**
- **Customization and functional extension via a plug-in interface**

APPLICATIONS

- Track analysis
- Road mapping
- GIS data acquisition
- Precise altitude profiling
- Power train optimization
- Consumption optimization
- Verification of simulation models
- Underground and tunnel survey

ADMA-PP Add-Ons

Add-On Delta Multi
Relative distance calculation to any number of objects

Add-On Moving Base
Relative distance calculation via post processing

ADMA ADD-ONS AND OPTIONS

Meet new measurement and testing requirements with Add-Ons and Options.

The new generation of ADMA 3.5 devices now allows our customers to meet their new and changing needs. Our focus is on straight-forward use and increased productivity. The Add-Ons and Options can be activated quickly and conveniently by entering a license key. This is possible at any time without modifications to the hardware. A high degree of flexibility is thus ensured.

Add-On BRAKING

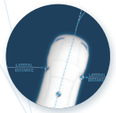
Real-time calculation of brake performance data according to international regulations

Add-On DELTA

Relative data calculation via WiFi in real-time for multi-vehicle operation

Add-On FILTER

Option for online signal filtering



Add-On LATDEV

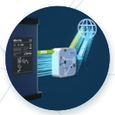
Real-time calculation of the lateral deviation

Add-On gPTP

Time synchronization with generalized Precision Time Protocol (gPTP)

Add-On Smoothing

Define maximum step size for the GNSS signal



Add-On NTRIP-CLIENT

Seamless connection to NTRIP providers with an active internet connection

Option DGNSS Correction Data

Correction data reception via Ethernet

Option 1kHz

Data output rate of 1 kHz via CAN or Ethernet interface

Option Dual-Ant

Two GNSS antenna option

Option GNSS-Raw Data

Raw data output via Ethernet for post-processing

Option Internal Memory

Storing ADMA measurement data in internal memory

Option Multi-CAN

Data output via several CAN channels simultaneously

Option Multi-GNSS

Multi-GNSS: Use of multiple satellite systems such as GPS, GLONASS, Galileo, BeiDou

Option RTK2

High-precision position measurement using correction data

Option Vehicle Model

2D vehicle model predicts vehicle behavior, supports IMU & adapts to conditions.

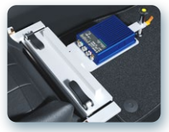
ADMA ACCESSORIES

ADMA accessories provide reliable and highly accurate measurement data. Our NTRIP-DGNSS-Box significantly improves position accuracy, while enabling greater flexibility and the sharing of correction data via Ethernet, particularly in swarm tests.

Our WiFi-Kit makes it easy and reliable to connect multiple instruments over long distances. Additionally, our mounting accessories facilitate quick and easy installation.

NTRIP-DGNSS-Box 5

DGNSS Correction Data for High-Precision Positioning from RTK Network Provider or GPS Base Station.



Mounting Accessories

For all ADMA systems, various accessories are available for installation in the test vehicle. These installation options are critical for safety and enable quick and easy mounting.

WiFi-Kit

Provides high bandwidth, long range and reliability at an affordable cost. Pre-configured to run either as an access point or a client.

GPS Base Station

Provides RTK correction data to differential enabled GNSS receivers via radio modem or ethernet (WiFi)

DECODERS, DRIVERS, PROGRAM LIBRARIES

Software integration solutions for the acquisition and evaluation of synchronous ADMA measurement data

Numerous cooperations make software and hardware solutions — depending on the application — available to GeneSys customers. For the acquisition and evaluation of synchronous ADMA measurement data, customers can rely on numerous software solutions such as decoders, drivers, or program libraries.

Vector

Thanks to the ***CANape & CANoe*** Protocol Decoder implemented by Vector, the GNSS-based inertial system ADMA can be used as a reference system, especially for ADAS development and autonomous driving.

ROS driver

Sensor processing, evaluation, planning and control: The latest ADMA ***ROS1*** and ***ROS2*** driver can be downloaded directly from GitHub.

GeneSys Data Reader API

The GeneSys Data Reader API is a programming interface for linking the ADMA Ethernet data output in proprietary software solutions. Research and development use the ADMA Data Reader Library to realize online data acquisition or to post-process and analyze ADMA measurement data.

Plugins

Thanks to the implemented ADMA plugins, ADMA can be used as a reference system for vehicle dynamics and advanced driver assistance systems. Data acquisition systems enable a fully synchronized acquisition, storage and visualization of measurement data from different interfaces.

DIN EN ISO/IEC 17025:2018 DEVICE TESTING AND CALIBRATION

GeneSys is the first DAkkS accredited calibration laboratory according to DIN EN ISO/IEC 17025:2018 for the measurement quantity of velocity in the range 5 m/s to 23 m/s. The accreditation also covers the measurement quantities of acceleration and angular velocity.

Regular calibration ensures the quality of the products on the basis of internationally comparable measurement results. As a DAkkS accredited service provider, we can develop an individual calibration strategy quickly and efficiently, independent of the device manufacturer.

High precision – our standard

Our calibration laboratory is DAkkS accredited and complies with ISO 9001 & DIN EN ISO/IEC 17025:2018 standards.

Full traceability

The accuracy of the data previously measured is consistent with the future measurements.

Fast, personalized service

Short turnaround time for your calibration & flexible services tailored to your exact requirements.

In addition to the calibration of our ADMA systems, devices from third party suppliers can now also be calibrated according to DIN EN ISO/IEC 17025:2018.

Outage times are expensive

To eliminate the possibility that the measurement data of tests carried out cannot be used by the customer, all measuring equipment should be calibrated at close intervals of one to two years. Calibration is an important part of measurement hardware maintenance. Regular calibration not only saves time and money but also makes sure that the customer can meet all project requirements.

Compliance with standards

From general quality management systems such as ISO 9001 to requirements that are specifically geared to test and measurement equipment, such as DIN EN ISO/IEC 17025:2018, there are a number of standards that prescribe when calibration is required. A customer with regularly calibrated equipment ensures compliance with the applicable measurement standards.

SUPPORT AND CONTACT

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Training

With our hands-on training days, courses and webinars you can get to know our ADMA product family better or further deepen application and functionality knowledge.

Technical Support Center

Here you will find documentation and application help for our products & software. With our whitepapers you can deepen your knowledge.

Firmware & Software downloads

Here customers can find current releases and have the possibility to activate update notification.

Your contact person at GeneSys

Edition October 2025

Printed on environmentally friendly FSC® paper.

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