GeneSys
Sensor Systems, Service & Smiles

QUICKSTARTGUIDE

ADMA 3.5

ADMA Hardware: 35
ADMA Firmware: 35.0.0.x

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Note

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Contents

1 INTRODUCTION

The basic instructions are intended to be read in conjunction with the installation and configuration of your ADMA. The instructions are valid for all ADMA 3.0 models. Further details can be found in the User Manual or Technical Documentation.

2 ADMA-G

2.1 MOUNTING THE ADMA-G

- The ADMA-G can be installed anywhere in the vehicle.
- Install the ADMA-G on a rigid system. Ensure that a rotational or linear motion of the ADMA-G is avoided while the vehicle is moving.
- The ADMA-G is usually installed with the arrow on the ADMA facing towards the driving direction. Other installation positions are possible if the relevant modifications are made in the ADMA Webinterface (*Menu 6 Parameters*).
- The GNSS antenna must be mounted on the roof of the vehicle. For best performance, it is necessary to mount the GNSS antenna(s) away from any object that may shadow the satellite signal.

Note:
Safe and secure installation of the ADMA is essential to receive reliable data.

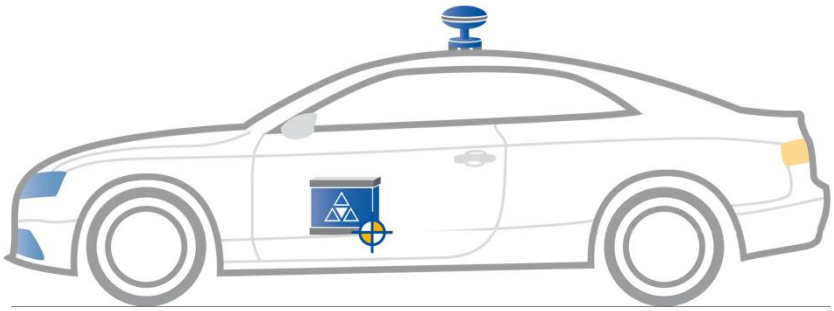


Figure 1 ADMA-G point of installation

2.2 MOUNTING ACCESSORIES ADMA-G

Seat rail adapter with ADMA mounting plate

RT-Strut with ADMA mounting adapter

Mounting plate with quick installation mounting pole

On-seat-adapter for ADMA and data acquisition systems

2.3 KEY CONNECTOR ADMA-G

[DC In]

Supply voltage

12 VDC nominal

[GPS Ant 1]

GNSS antenna

[GPS Ant 2]

GNSS antenna

[Ethernet 1]

Ethernet connection for configuration and firmware update

ADMA IP: 192.168.88.30

[CAN]

Caution: Terminating resistors are usually pre-installed in the

[Modem]

Connection option for RF modem or GPRS modem

[Ext Vel]

Input for optional speed sensor, e.g. Correvit

[Ethernet 2]

Interface for driving robots

[Signal Out]

Synchronisation of Data Acquisition (DAQ)

2.4 STATUS OPERATING MODE ADMA-G

Port	LED		Description
9-32 V DC IN	●	OFF	No supply voltage
	●	OFF	
9-32 V DC IN	●	ON	Supply voltage connected
	●	OFF	ADMA boot process started
9-32 V DC IN	●	ON	Ready for operation
	●	ON	
Modem	●	ON	Modem port activated
Baro	●	ON	Baro activated
CAN1-5	●	⎍⎍	Data output via CAN
Ethernet1-3	●	⎍⎍	Data
	●		Link
COM	●	⎍⎍	Data output via COM
	●		

2.5 MOUNTING OFFSETS – SINGLE ANTENNA

2.5.1 Determining the offset between the ADMA and the GNSS antenna

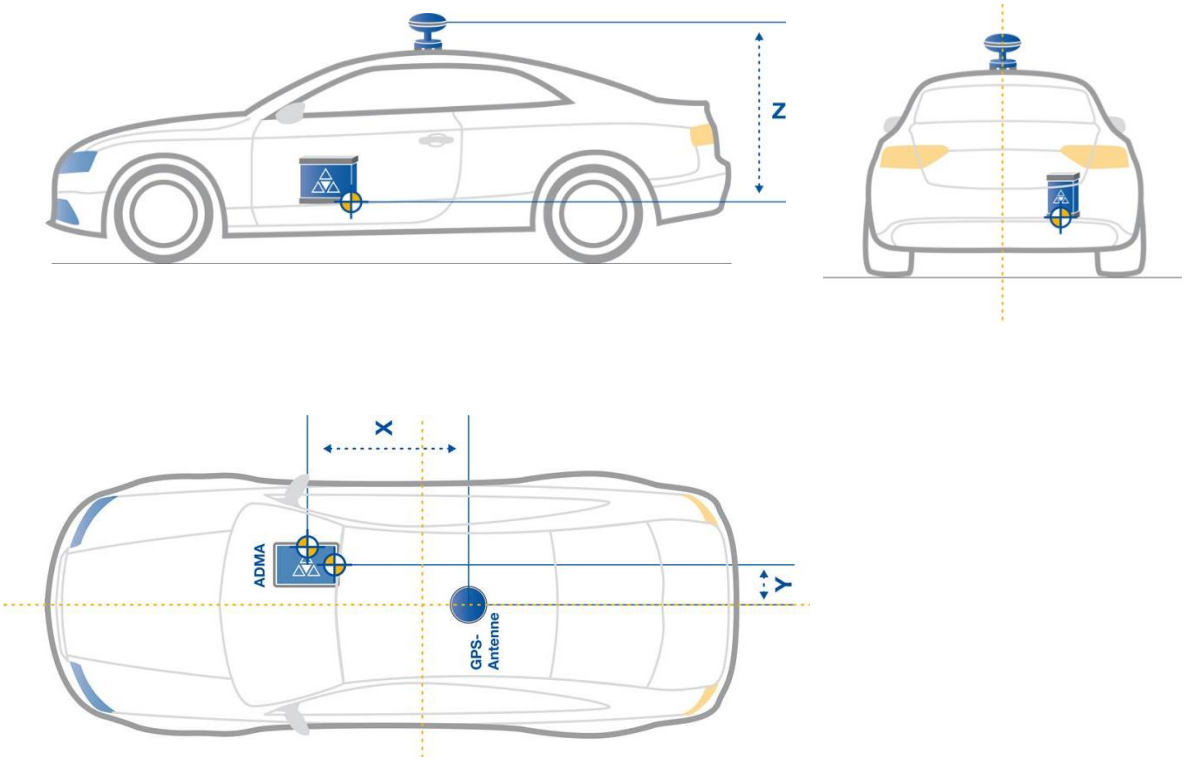


Figure 2 Determining the X/Y-axis offsets

2.5.2 Determining the Z-axis mounting angle in relation to the actual position of the vehicle

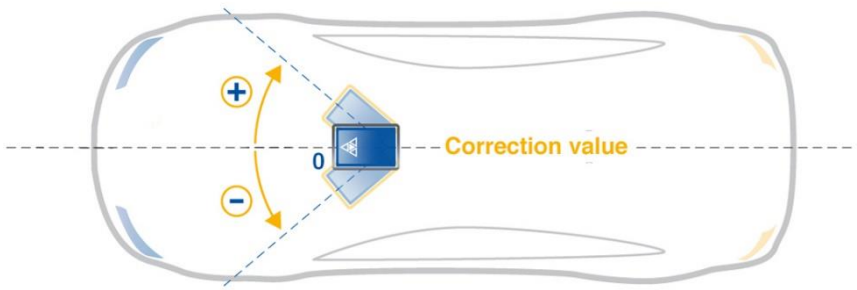


Figure 3 Determining the Z-axis offsets

Correction value

3 ADMA-SPEED

3.1 MOUNTING THE ADMA-SPEED

- Mount the sensor unit in a suitable position (Figure 5) on the roof of the vehicle.
- The data processing unit can be installed anywhere in the vehicle.
- The sensor unit is usually installed with cabling facing backwards to the driving direction. Other installation positions are possible if the relevant modifications are made in the ADMA Webinterface (*Menu 6 Parameters*).

Note:
Safe and secure installation of the ADMA-Speed is essential to receive reliable data.

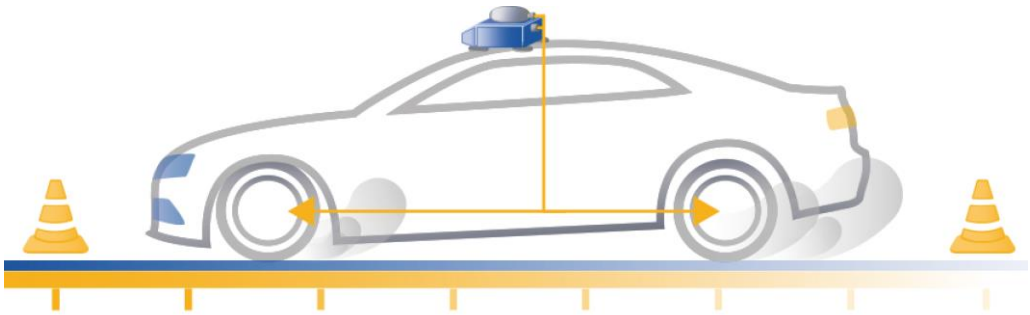


Figure 4 ADMA-Speed point of installation

Do not mount the ADMA-Speed nearby or directly on a glass roof. We recommend to keep the system at least 30 cm away from glass surface or outer edges of the vehicle.

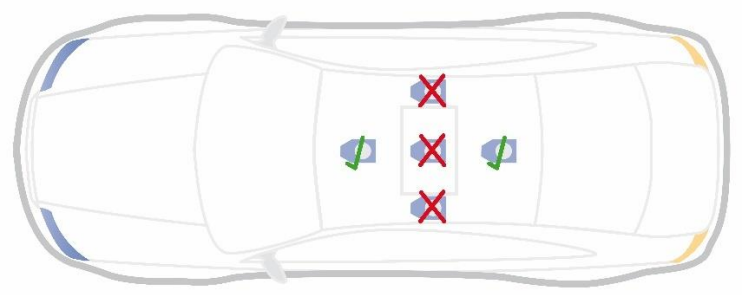


Figure 5 ADMA-Speed point of installation

3.2 KEY CONNECTORS ADMA-SPEED

[CAN]

Caution: Terminating resistors are usually pre-installed in the

[GPS Ant 1/2] and [IMU]

GNSS antenna and IMU connector

[DC In]

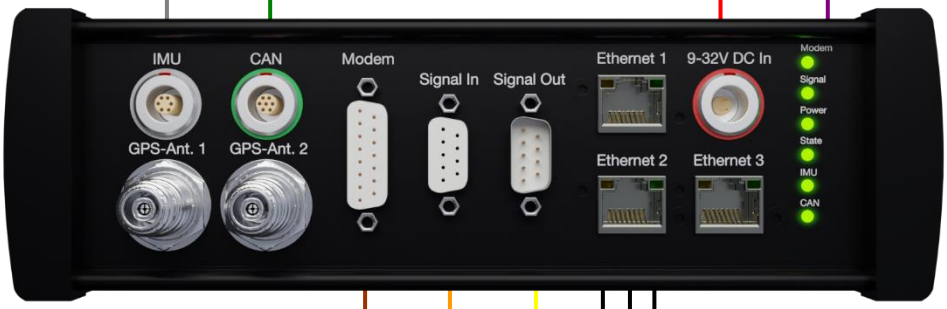
Supply voltage

12 VDC nominal

[Status LED indicators]

Modem/Signal/Power/

State/IMU/CAN



[Modem]

RF modem or GPRS modem connector

[Signal In]

Digital and Analog input

[Signal Out]

Digital output

[Ethernet 3]

DELTA function

[Ethernet 2]

Interface for driving robots

[Ethernet 1]

Ethernet connection for:

- Configuration
- Data output
- Firmware update

3.3 STATUS OPERATING MODE ADMA-SPEED

Port	LED		Description
9-32 V DC IN	●	OFF	No supply voltage
	●	OFF	
9-32 V DC IN	●	ON	Supply voltage connected
	●	OFF	ADMA boot process started
9-32 V DC IN	●	ON	Ready for operation
	●	ON	
State	●	ON	Ready for operation
Modem	●	ON	Modem port activated
CAN1	●	⎍⎍	Data output via CAN
Ethernet1-3	●	⎍⎍	Data
	●		Link
IMU	●	ON	IMU connected
Signal	●	ON	+ 5V DC and +12V DC power at signal out port active

4 ADMA-SLIM

4.1 MOUNTING THE ADMA-SLIM

- The ADMA-Slim can be installed in a suitable position anywhere in, or on the roof of the vehicle.
- The GNSS antenna must be mounted on the vehicle's roof. For best performance, it is necessary to mount the GNSS antenna(s) away from any object that may shadow the satellite signal.
- Install the ADMA-Slim on a rigid system. Ensure that a rotational or linear motion of the ADMA-Slim is avoided while the vehicle is moving.
- The ADMA-Slim is usually installed with the x-axis arrow on the ADMA-Slim facing towards the driving direction. Other installation positions are possible if the relevant modifications are made in the ADMA Webinterface (*Menu 6 Parameters*).

Note:
Safe and secure installation of the ADMA-Slim is essential to receive reliable data.

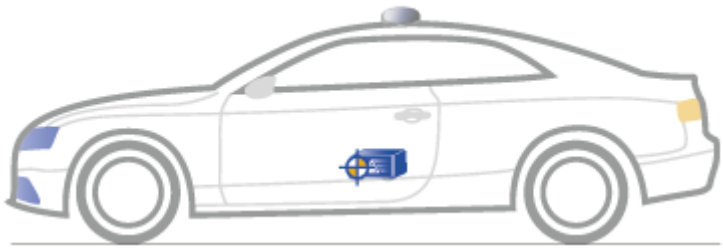


Figure 6 ADMA-Slim with detached GNSS antenna

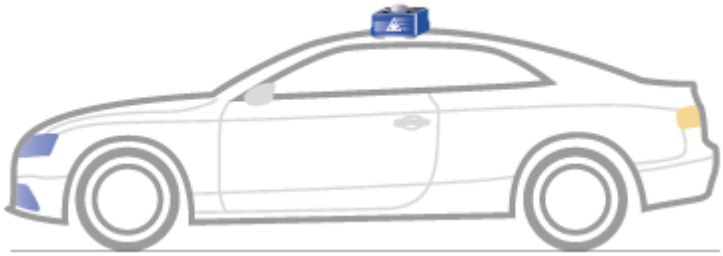


Figure 7 ADMA-Slim with fitted GNSS antenna

4.2 KEY CONNECTORS ADMA-SLIM

[Status LED indicators]

Power/Core Status/COM/CAN/ETH Link/ETH Data/GNSS Status

[GNSS Ant 2]

GNSS rover antenna (for dual antenna systems)

[CAN]

Caution: Terminating resistors are usually pre-installed in the

[Signal In]

Digital and Analog input

[Ethernet 1]

Ethernet connection for:
- Configuration
- Data output
- Firmware update
- Driving robots

Default IP: 192.168.88.30
Submask: 255.255.255.0

[GNSS Ant 1]

GNSS master antenna

[Modem]

RF modem or GPRS modem connector

[DC In]

Supply voltage
12 VDC nominal
(9-32 VDC) max. 25W

[Signal Out]

Digital output

4.3 STATUS OPERATING MODE ADMA-SLIM

Port	LED		Description
Power 9-32 V DC IN	● ●	OFF ON	No supply voltage Supply voltage connected
Core Status	● ● ● ● ●	OFF ON ON ON ON	No supply voltage System booting System ready for operation System booting (HW Version <30.4.x.y) HW Error (HW Version ≥30.4.x.y)
COM	●		Data output via COM
CAN1	●		Data output via CAN
ETH Data	● ●	OFF 	No data output via ETH Data output via ETH
ETH Link	● ●	OFF ON	No Link (Network disconnected) Link
GNSS Status	● ●	 ON	GNSS OK GNSS Error

4.4 MOUNTING OFFSETS – SINGLE ANTENNA

The determination of the offset between ADMA-Slim and GNSS antenna follows the same concept as for the ADMA-G system.

5 DUAL ANTENNA SYSTEMS

5.1 MOUNTING THE DUAL ANTENNAS

The easiest way to install the dual antennas is to place both antennas on the same longitudinal axis at the same height. The primary GNSS antenna should be installed behind the second antenna with a minimum distance of 50 cm to a maximum distance of 200 cm. Thus, no configuration of the offsets between the Secondary GNSS Antenna to the Primary GNSS Antenna in the ADMA Webinterface is necessary. Only the mounting offsets between Primary GNSS Antenna and ADMA must be defined.

In case of lateral or height offset between the antennas, the descending offsets must be configured in XYZ axis via ADMA Webinterface.

Warning:
It is important that both antennas are of the same type. Using two different types of antenna may cause the solution to fail.

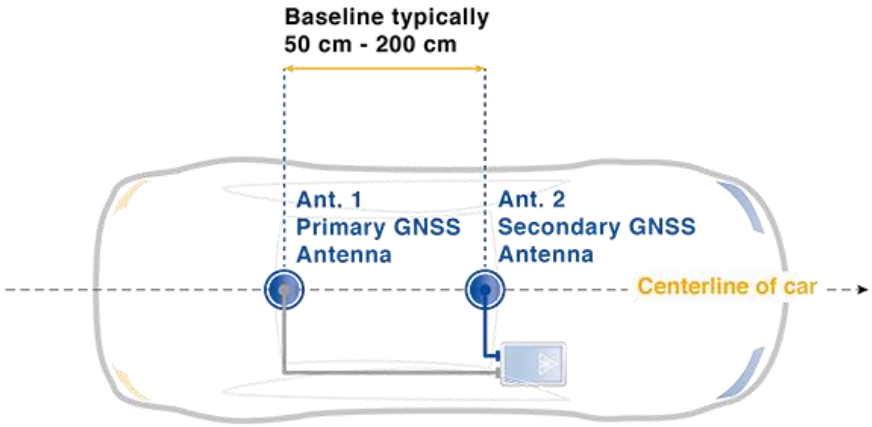


Figure 8 Dual antenna mounting

5.2 DETERMINING THE OFFSET BETWEEN THE GNSS ANTENNAS AND ADMA

5.2.1 Mounting offsets Primary GNSS Antenna to ADMA

The Primary GNSS Antenna always refer to GNSS ANT1 interface of the ADMA. This offset must always be determined.

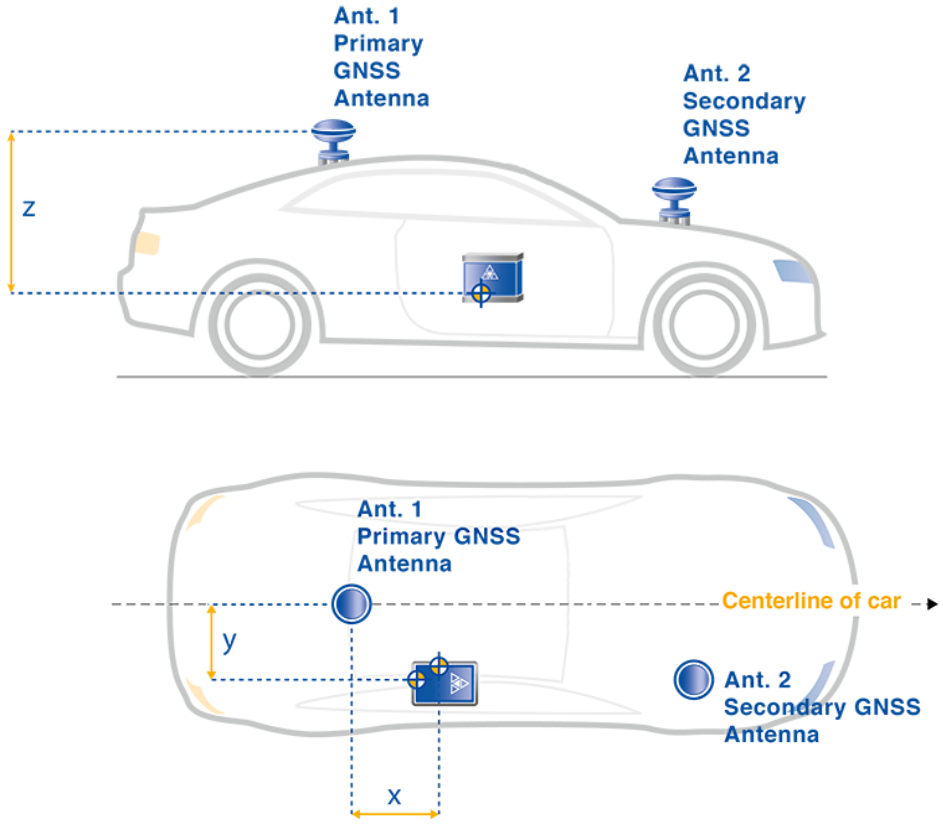


Figure 9 Mounting offsets Primary GNSS Antenna to ADMA

5.2.2 Mounting offsets Secondary GNSS Antenna to Primary GNSS Antenna

The Secondary GNSS Antenna refers to the Primary GNSS Antenna, in case of lateral and/or height offset between Primary and Secondary GNSS Antenna the offsets must be determined.

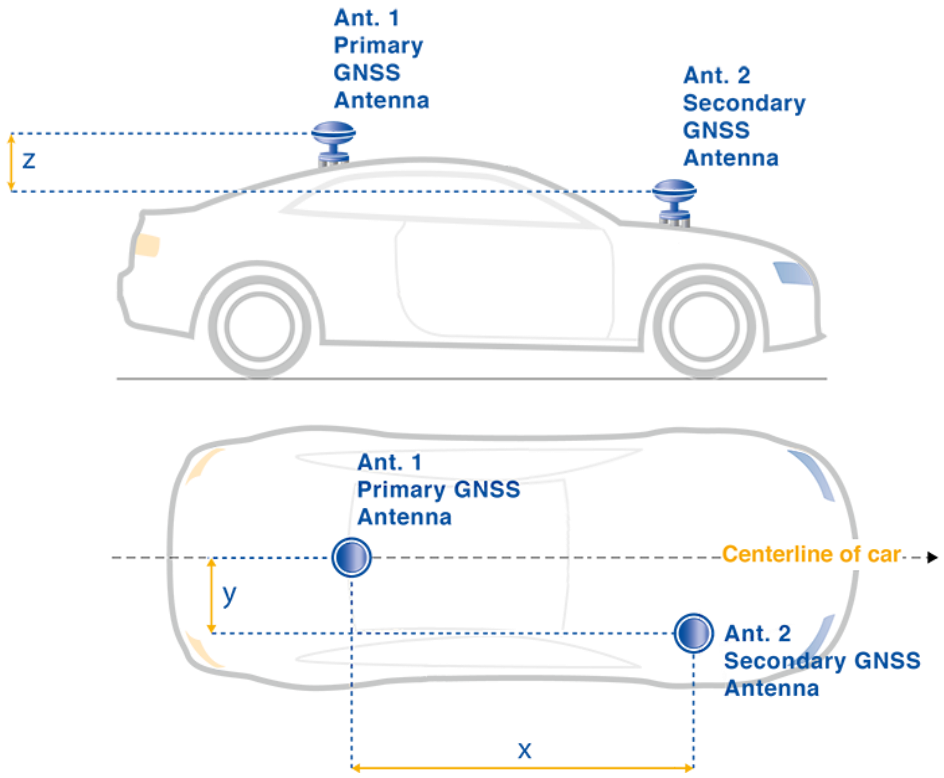


Figure 10 Mounting offsets Secondary GNSS Antenna to Primary GNSS Antenna

6 CONNECTING THE ADMA WEBINTERFACE

The Webinterface is integrated in the ADMA. To access, the following settings of the network connection must be done:

1. Open Network Connections by clicking the Windows **Start** button. Open the **Control Panel** and change to the menu **Network and Sharing Center**, click View **network connections**.

2. Right-click the interface you like to adapt, then open the **Properties** dialog. If you're asked for an administrator password or confirmation, enter the password or provide the required confirmation.

3. Click the **Networking** tab. Under **This connection uses the following items**, choose **Internet Protocol Version 4 (TCP/IPv4),** then choose Properties.

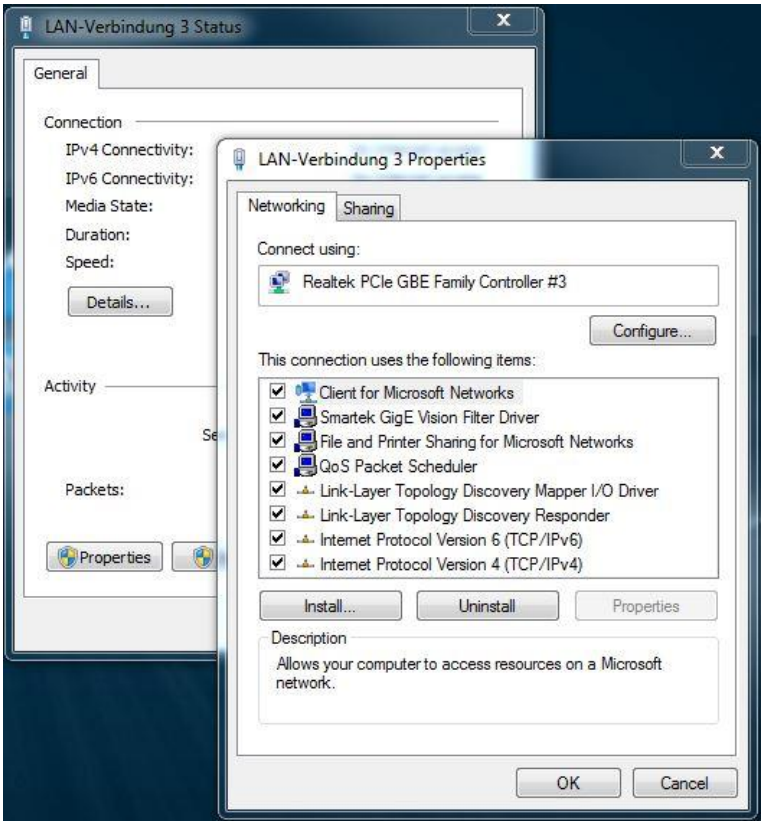


Figure 11 The Network Connection Properties dialog box

4. To specify an IP address, click Use the following IP address.

   IP-Adress: 192.168.88.XXX
   Subnetzmask: 255.255.255.0

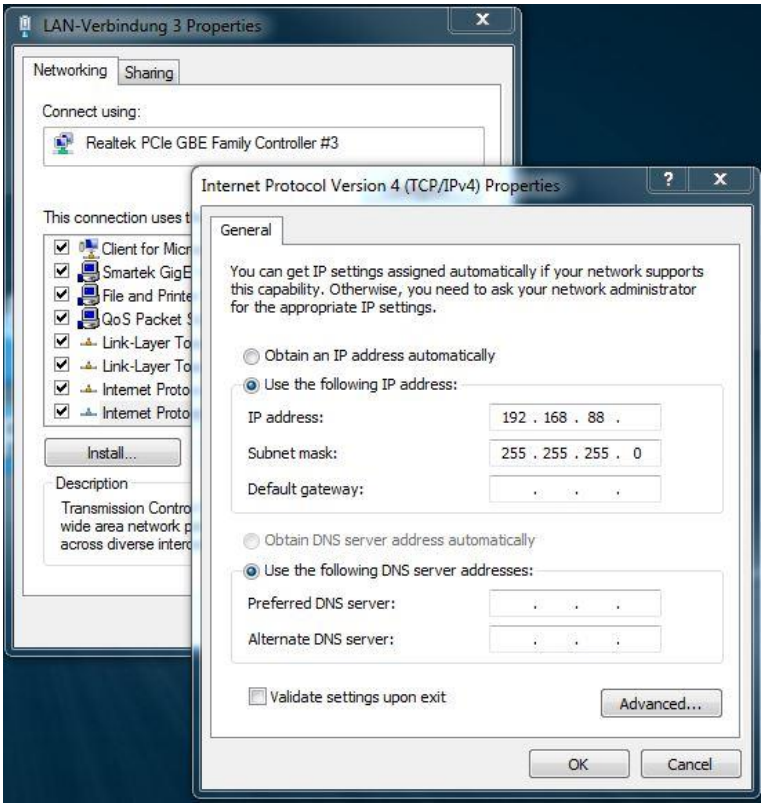
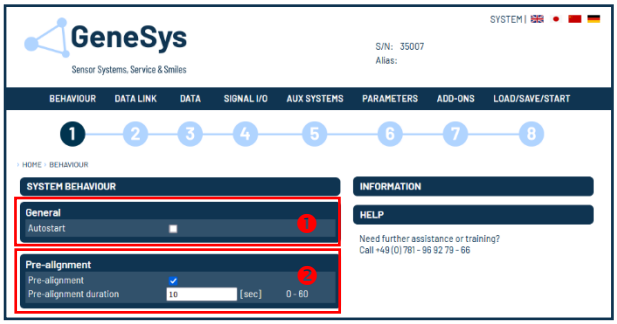


Figure 12 The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

5. To check your settings, please start the internet browser of your computer. Type in http://192.168.88.30 in the address bar, the ADMA Webinterface should appear.

Note: Your Proxy settings must be deactivated!

7 RECOMMENDED SETTINGS



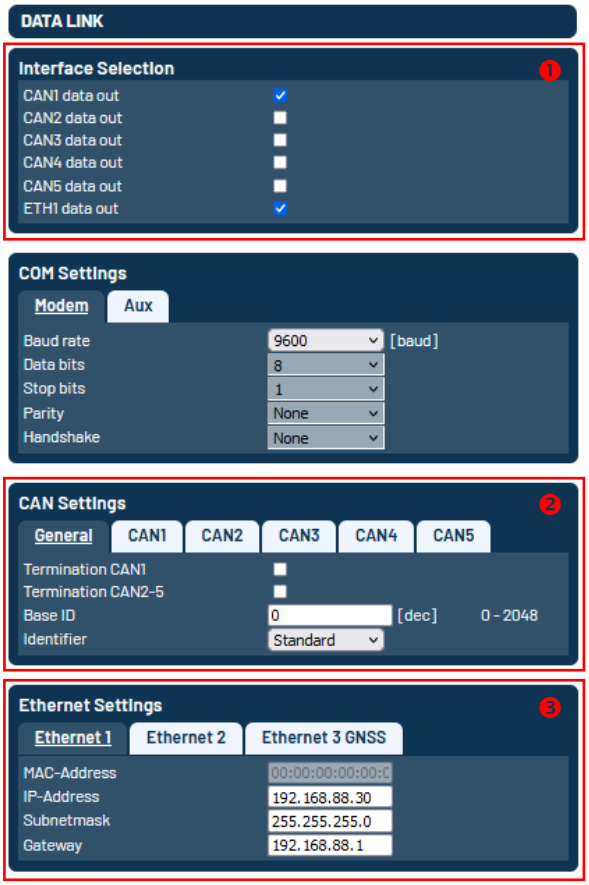
1 BEHAVIOUR

❶ Autostart

The ADMA will start the measurement-mode automatically after powering up.

❷ Prealignment

The horizon is determined during this period. Do not move the vehicle, do not close doors.
Typical values:
10 sec for passenger cars
20 sec for trucks



2 DATA LINK

❶ Interface Selection

Used interfaces for data output.

❷ Interface CAN:

Define the CAN interface hardware settings.

The default **Base ID** is set to 100 dec.

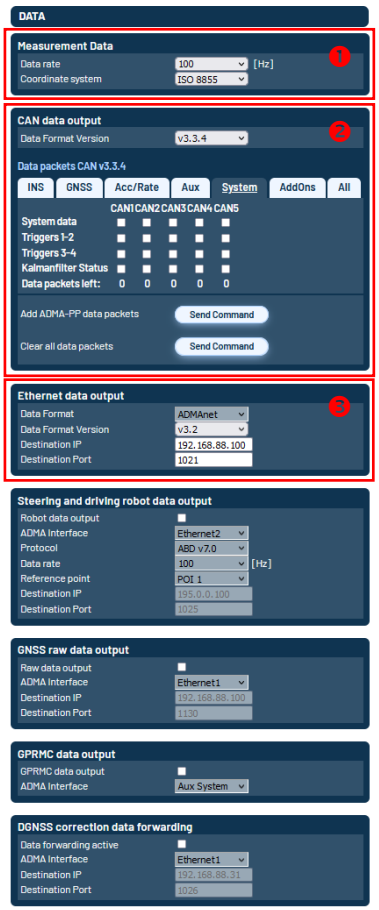
The ***CAN baud rate*** is usually set to 1000 kBaud. This provides the following advantages:

- Greater number of maximum channels
- Higher data rate
- Lower transmission time

❸ Ethernet Settings

The IP settings of each Ethernet interface can be done manually.

In case the connection to the user defined IP address fails use the default IP 192.168.88.30.



3 DATA

❶ Measurement Data

Configure sampling rate and Coordinate System for measurement.

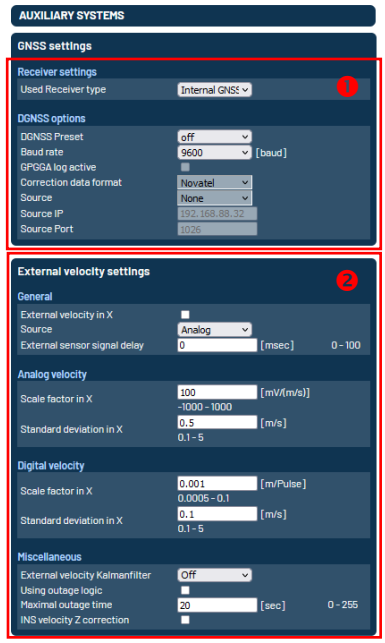
❷ CAN Data output

Select data format and needed data packets for measurement via CAN interface.

❸ Ethernet Data output

Define the data format and destination IP/Port for the Ethernet data output of the measurement data via UDP.

To use the Ethernet Broadcast function set the last character to 255.



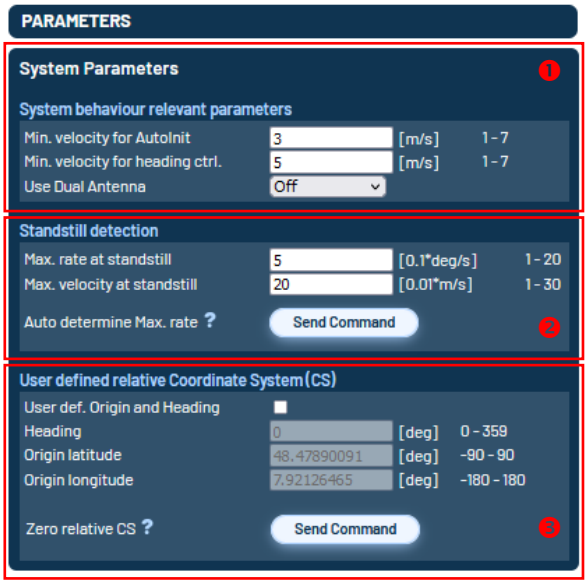
5 AUX SYSTEMS

❶ DGNSS Option

Use the DGNSS Preset to configure the correction data reception via Radio Modem or WLAN from a GeneSys BASE Station or via NTRIP (GPRS) from a correction data service (e.g. SAPOS, AXIO-NET, ...).

❷ External velocity

Additional speed sensor, e.g. Correvit for system augmentation especially in case of GNSS outages.



6 PARAMETER

❶ System behaviour relevant parameters

The parameters min. velocity for AutoInit and min. velocity for heading ctrl. must be adapted depending on the GNSS conditions.

- Bad GNSS-reception: min. 5 m/s
- Good GNSS-reception: min. 3 m/s
- Typical value: 5 m/s

To configure the work mode of dual antenna systems you can select the following parameters:

Off: Disable the use of Dual Antenna information for heading control.

Initial: Presents the heading only at start by use of Dual Antenna information.

Always: Continuous use of Dual Antenna information for heading control.

❷ Standstill detection

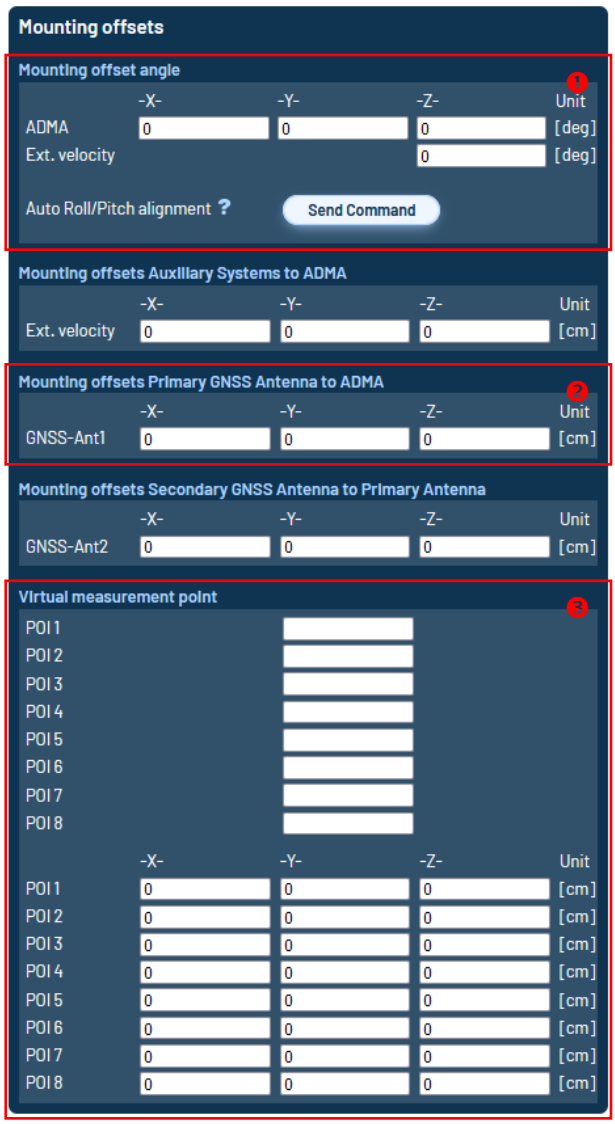
Standstill detection must be configured according to the device and vehicle.

Typical values for standstill detection at passenger vehicles are:

System-Type	Max. rate at standstill [0.1*deg/s]	Max. velocity at standstill [0.01 m/s]
ADMA-G-Pro+ ADMA-ECO\ECO+	5	20
ADMA-EL\EL+ ADMA-Speed ADMA-Slim	7	20

❸ Position as origin

If this option has not been enabled, the initially received GNSS position is the reference point for the relative position data.



6 PARAMETER

❶ Mounting offset angle

The offset values for the roll axis (X) and the pitch axis (Y) can be determined automatically using the set-up function "Auto Roll / Pitch alignment". The compensation value of the yaw axis (Z) must be entered manually.

❷ Mounting offset position

Specify the mounting offset as accurately as possible. Recommended value:

- for driving dynamics ±5 cm (X Y Z)
- for position determination ±2 cm (X Y) and ±5 cm (Z)

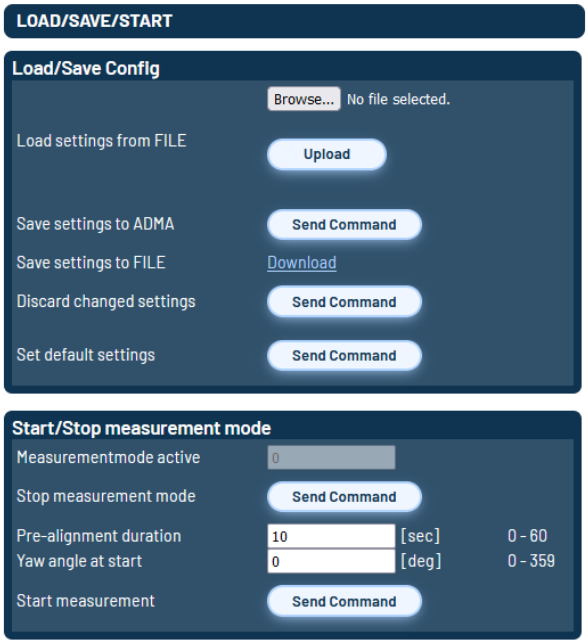
❸ Virtual measurement point (POI1-8)

If the ADMA is not mounted in the Point Of Interest (POI), it results in lever arms between the ADMA and the installation position. The lever arms can be compensated by entering the XYZ offset values.

Please note that large lever arms will generate larger application noise.

7 ADD-ONS

The available ADD-ONS depend on your purchased license.



8 LOAD/SAVE/START

Save the changed setting to the ADMA with the button “Save settings to ADMA”.

Depending on the changed settings a restart of the measuring mode is necessary, and the system must be reinitialized.

8 INITIALIZATION

With a quick series of specific manoeuvres, the system can produce the optimum level of accuracy. This will help the Kalman filter to characterize the outputs from the IMU. Manoeuvres like this are not completely necessary if the Kalman filter will have enough data within a normal dynamic drive for a few minutes, included accelerations and decelerations in all axes.

Recommended procedure

Step 1: Ensure that the position of the vehicle allows you to drive off in a straight line.

Step 2: Connect the ADMA to the power supply. The start-up takes around 10 seconds, configuration or measurement commands will be ignored in this timespan.

Step 3: Start the measurement. Wait for 5 - 30 seconds till the pre-alignment countdown has elapsed. Make sure the vehicle is not exposed to any other vibrations than the vehicle engine during the pre-alignment period. Especially shocks from closing doors or movements in the vehicle must be avoided. During this period, the LED of the selected CAN interface (if activated) flashes once per second. All data is available at the full data rate, once the pre-alignment period is over.

Step 4: Check GNSS reception before going to the next step.

Step 5: Auto Init. Exceeding the configured velocity threshold (default 18 km/h) for auto init. Make sure you are driving straight ahead by exceeding this threshold (no slip angle). The current value of the *Yaw* (0°/360°) change to the real yaw angle to north. This is essential to compensate the earth's rate of rotation.

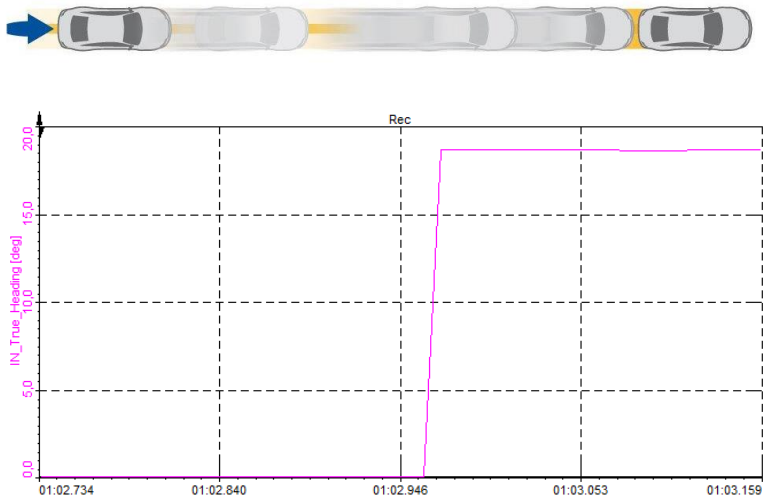


Figure 13 Auto Init. - Yaw Angle (True Heading)

Step 6: Transient phase of the Kalman filter. Start driving dynamically for at least 180 to 300 seconds. It's important maintaining a straight line while occasionally changing direction (like an eight shown on the image below). Straight ahead driving and standstill can accelerate the initialization process.

The attained Kalman filter adjustment can be indicated via status bit which is designated Status_Kalmanfilter_settled and modelled like a red green lights function. The ADMA data output includes the data packet Kalmanfilter_Status which gives a percentage overview of the individual states and the needed driving maneuvers.

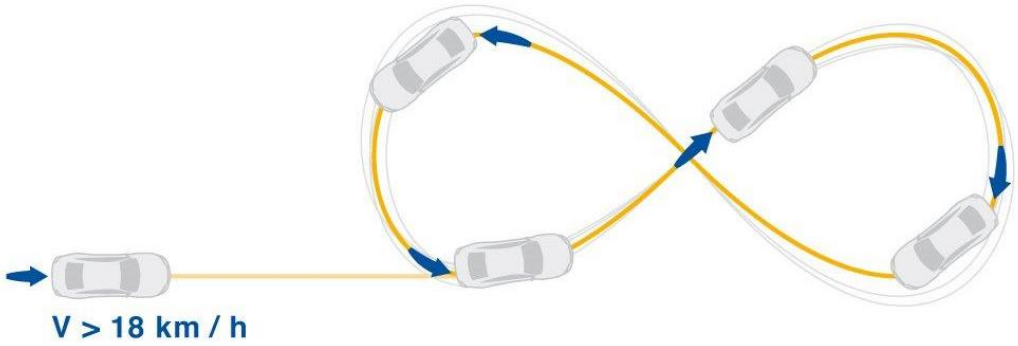


Figure 14 Transient phase of the Kalman filter

9 KEY VALUES IN MEASUREMENT MODE

9.1 SYSTEM STATUS

Channel Name	Description
Status_Standstill	***Standstill detection*** 1 = vehicle standstill detected 0 = vehicle movement detected If vehicle standstill is not detected, accordingly adjust the system parameters (see User Manual).
Status_Count	***Status variable count*** Increases by one for each transferred data record. Reset to 0 after 255 transfers. This value indicates potential low voltage or data recording problems.
Error_Hardware	***Fault messages*** It is not worth continuing with a measurement if a hardware error occurs.
Warn_GNSS Warn_Misc1	***Warning messages*** Depending on the measurement task, warning messages can be ignored or must be analysed individually (see Technical Documentation).
Status_Kalmanfilter_settled	***Kalman filter status*** 1 = Kalman filter settled in all axes. 0 = Kalman filter not complete initialized.

9.2 GNSS/POSITION STATUS

Channel Name	Description
GNSS_Sats_Used	***Used GNSS satellites*** Displays the number of used GNSS satellites.
GNSS_Mode	***GNSS status*** 1 = no GNSS reception 2 = default GNSS reception 4 = DGNSS (rough, 40–120 cm), e.g. EGNOS 8 = RTK (fine, 2–10 cm), e.g. SAPOS
GNSS_DiffAge	***Age of the correction data*** This channel displays the age of the GNSS data. Typical accuracies are: up to 10s accuracy of 2 cm (1 Sigma) up to 30s accuracy of 10 cm (1 Sigma) up to 60s accuracy of 100 cm (1 Sigma) from 60s default GNSS accuracy
INS_Stddev_Long INS_Stddev_Lat	***Standard deviation position*** This data package contains the estimated default deviation of the inertial position. This estimated variable is a rough indicator, but not a measured variable.

10 TERMINATING A MEASUREMENT

In unfavourable conditions, the Kalman filter may oscillate incorrectly. In this case, we recommend terminating the measurement and carrying out a restart. Possible indications are:

1. Despite GNSS reception, the positional accuracy no longer returns to the normal range (1 m and less).
2. The vehicle speed (*INS_Vel_Hor_X* channel) no longer falls below 0.05 m/s when the vehicle is at standstill.
3. The yaw angle (*INS_Yaw* channel) no longer stands still when the vehicle is at standstill but continues to increase at several tenths of a degree per second.

We recommend stimulating the ADMA again if it has been standing still for an extended period of time:

ADMA-G-Pro+	more than 30 minutes
ADMA-ECO / ECO+ ADMA-EL / EL+ ADMA-Speed ADMA-Slim	more than 10 minutes

11 COMMON OPERATING FAULTS

Fault: **Kalman filter status does not reach the 100%**

Possible causes:

- - HW errors
- - no GNSS or bad GNSS condition during initialization
- - wrong compensation of the ADMA mounting angles (Roll/Pitch/Yaw)
- - Auto-Init threshold not exceeded
- - insufficient dynamics or initialization too short

Fault: **All the measurement channels display implausible values.**

Possible causes: The Kalman filter is unable to oscillate correctly due to a missing or defective comparison of the offsets. Possible causes are:

- The ADMA has been mounted opposite to the default installation position and no comparison of the angle misalignment values has been done in the ADMA Webinterface (*Parameter / Mounting offset angle*).
- Lever arms have been entered in the ADMA Webinterface with incorrect signs (*Parameter / Mounting offset GNSS antenna*).

Fault: **There is a permanent offset in the angle values (Nick/Roll).**

Possible causes: No angle comparison has been executed in the reference position. The angle comparison can be executed automatically via the menu item (*Parameter / Auto Roll-Pitch alignment)* in the ADMA Webinterface.

Fault: **The course angle drifts and the coordinate system are rotated, the longitudinal speed VX becomes the lateral speed VY.**

Possible causes: The standstill detection has been configured incorrectly. The standstill bit displays "0" during standstill with the engine running. Please modify the values in the ADMA Webinterface, (*Parameters / Standstill detection*).

Fault: **The measurement is cancelled, or temporary failure of the measurement data, error bits are displayed.**

Possible causes:

- Low voltage problems during ADMA operation result in reinitialization (the Kalman filter is no longer oscillating).
- Low voltage problems during ADMA start-up result in erroneous initialization of the sensors.

Please check the power supply and execute a restart.

Fault: **It is no longer possible adhering to specified accuracies.**

Possible causes:

- Excessive movements of the vehicle during prealignment. Please avoid all vehicle movements during prealignment.
- Pre-alignment too short. Adjust the prealignment parameter in the ADMA Webinterface (*Behaviour / Pre-alignment duration*).

Fault: **The coordinate system is rotated, the longitudinal speed VX becomes the lateral speed VY.**

Possible causes:

- An incorrect start angle has been entered for operation without Autostart. The Kalman filter does not oscillate correctly. If the start angle is not known, please enter zero. The Autoinit function determines the angle automatically.
- No GNSS reception when starting the measurement. If there is no GNSS reception when starting the measurement, a course angle must be specified.

Fault: **No data on the CAN bus**

Possible causes:

- The selected port ADMA Webinterface (*Data Link / Interface selection*) is incorrect.
- The CAN interface configuration is incorrect (e.g. baud rate)
- The option that stops the measurement with a faulty ACK is active.
- The measurement was started before the CAN cable had been connected to the ADMA.
- The CAN bus is defective or connected incorrectly. Please check the terminating resistor.

Fault: **GNSS failure results in the output of an implausible speed value**

Possible causes:

- Additional speed sensor is mounted at an angle.
- Additional speed sensor is not available but has been activated in the ADMA Webinterface (Aux Systems / *External velocity in x/y*).

Fault: **Correction data cannot be received**

Possible causes:

- Incorrect operating mode in the ADMA Webinterface (Aux Systems / *DGNSS preset*). Selection of base station via radio modem, correction data service / Base Station with GPRS modem or satellite-based via SBAS.
- The internal GNSS receiver is not approved for DGNSS/RTK operation.

Common radio modem faults:

- Incorrect configuration of the radio modem (frequency or spacing)

12 SUPPORT

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