iNavionix-M/TLE

AHRS with Localization and Data Storage Capability,
Magnetometer and Air Data Computer for UAV, OPV and Small Aircraft

For navigation and control of unmanned air vehicles (UAV), like Optionally Piloted Vehicles (OPV) or general aviation small aircrafts (CS23, CS25) and helicopters, an Attitude Heading Reference System (AHRS), a Magnetometer (MAG) and an Air Data Computer (ADC) are required.

With **iNavionix** iMAR provides the full range of these components as a plug&play solution for applications, where no formal certification is required:

- iNAT-M300/TLE: MEMS based AHRS: any INS/GNSS solution from iNAT family
- iMAG-DMC-A: 3D Magnetometer (EASA Part 21G)
- ADC-10: Miniature Air Data Computer
- Interfaces: CAN, ARINC825 (option), UART RS422 and Ethernet
- Wide range supply voltage 10…33 V DC
- Full EMI/EMC protection for aviation applications

The components are available both, as stand-alone devices or as **iNavionix**. They are designed for UAV applications with the potential to be EASA certified.

Technical Data of the iNavionix-M/TLE-x:

ADC-10:	**Air Data Computer by SimTec AG (details can be found on specific data sheet)**
Data Output:	Pressure-Altitude (Hp), Barometric-Altitude (Hb), Calibrate airspeed (CAS), True airspeed (TAS), Mach-Number (M), Climb-Rate (CR), Static Air Temperature (SAT),
Digital Interface / Data Rate:	UART RS422, ≤ 460'800 bd / up to 100 Hz
Operating Range:	-1'800 to +69'000 ft altitude, 45…1'080 hPa; +/- 50 m/s altitude rate, Available Full Scale ranges: ±16 hPa [~95 KCAS] … ±500 hPa [~515 KCAS] (KCAS = knots calibrated arspeed)
Outer Air Temperature (OAT):	-80…+85 °C
Accuracy / Latency:	whatever is larger: 0.1 % FS or ±1 Pa (FS = Full Scale) / < 14 ms
iMAG-DMC-A (EASA Part21G, FORM1)**:**	**Magnetometer by iMAR Navigation (details can be found on specific data sheets)**
Heading Accuracy:	0.5 deg (2σ), depending on environment
Digital Interface:	RS232 or RS422 (factory set)
Sensor Range:	± 100 µTesla Note: 1 Gauss = 100 µTesla; earth magnetic field is between
Resolution:	< 0.01 µTesla earth magnetic field is between 30 µTesla (equator) and 60 µTesla (poles)
Roll/Pitch Range (magn. sensor):	< +/- 45 ° within specification (0.5 deg heading), +/- 80 ° operational
iNAT-M300/TLE-SP1:	**INS/GNSS by iMAR Navigation (details can be found on specific data sheets)**
Angular Range:	unlimited; output of Eulerian angles (RPY), quaternions and DCM (direction cosine matrix)
Attitude Accuracy:	< 0.1 deg rms dynamic flight, < 0.05 deg static flight with proper velocity aiding (GNSS)
Heading Accuracy:	< 0.1 deg GNSS aided, typically 0.5 deg magnetic aided;
Heading drift without aiding:	< 5 deg/h during short term GNSS outages[1]
gyro | accel parameters:	±450 °/s; < 0.1 deg/s bias day-to-day ; 0.08 °/sqrt(hr) | ±8 g; < 2 mg day-to-day; 60 µg/sqrt(Hz)
Position / Velocity:	see datasheet of iNAT-M300/TLE-SP1; integrated multi-frequency / multi-constellation GNSS with RTK; for higher performance see also the full iNAT systems series from economical MEMS over FOG up to high end RLG sensor technology
Aiding:	integrated all frequencies / all consteallations GNSS receiver connected ADC-10 (air data) and iMAG-DMC-A (magnetic)
Data Rate:	1… 500 Hz adjustable
Data Output:	Angular rates, accelerations, velocity, position, time (GNSS based), True Air Speed and baro altitude (if iADC-10 connected), heading (GNSS / magnetic), standard deviations, BIT
Output Interfaces:	UART RS422 / RS232, CAN / CANaero, Ethernet (TCP/IP and UDP); iXCOM protocol & HMI/GUI
Hardware I/F:	standard iNAT-M300 connector interface for INS
Power Supply:	10…33 V DC; hold-over protection for at least 50 ms according to DO160G (other on request) ADC-10: < 0.6 W; iNAT-M300 < 11 W, iMAG < 1 W → ∑ < 12.6 W
Drivers:	iXCOM C++ SDK, ROS 2, Python for easy integration
Qualification / PN:	-55…+71 °C operational (≥-40 °C power-up); MIL-STD-810G/-461G/-704F; optional DO160G
Mass:	ADC-10: 130 grams, iNAT-M300: 670 grams, Pitot tube: 75 grams, iMAG: 200 grams
MTBF; Shock / Vibration:	ADC-10: 95'000 hrs; iNAT-M300 > 50'000 hrs; iMAG-DMC-A 100'000 hrs; 50 g, 11 ms (operational) / 5…2'000 Hz 5 g rms

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[1] assuming sufficient GNSS aiding and sufficient motion dynamics before GNSS outage occures