

# iTraceRT-M200A-SDA

## Real Time Vehicle's Trajectory and Dynamics Measuring using MEMS Gyros and Performing Deeply Coupled INS/GNSS Filtering

iTraceRT-M200A is one of the smallest INS/GNSS MEMS based inertial navigation, measurement, surveying and control systems on the market for applications on the surface (land/sea) and in the air. It provides all kinematic measurements like acceleration, angular rate, attitude, true heading, velocity and position of the target vehicle in real-time with a data update rate of 200 Hz.

- robust, compact, light weight system
- based on medium grade MEMS Gyro, Accel technology and GPS/GLONASS L1/L2 GNSS
- Galileo and Beidou ready
- output of angular rate, acceleration, attitude, heading, CoG, velocity and position in realtime with up to 200 Hz (adjustable)
- **iTraceRT-M200A-SDA**: 0.02 m position accuracy (RTK) with deeply coupled INS/GNSS filter, 0.04° roll/pitch, 0.25° heading, 0.1 m/s velocity accuracy with L1L2 RTK, shortest re-acquisition time after loss of GNSS due to **deeply coupled INS/GNSS**
- optional integrated communication modules such as **GSM/GPRS/UMTS/LTE, WLAN, 403 – 473 MHz Radio**
- Interfaces: USB/RS232/CAN/Ethernet for real-time data, RS232 for DGPS/RTK correction input
- iTraceRT-M200 is available with several inertial MEMS sensor grades, dependent on user application

In urban canyons often the number of observable satellites is quite limited and therefore not only the GNSS data is used to aid the inertial data signal processing but also the GNSS engine inside of the iTraceRT-M200A-SDA is supplied with the MEMS IMU data providing a deeply coupled INS/GNSS solution. This allows the GNSS engine to operate with less than 4 satellites and this also allows a better detection of multi-path and therefore provides a significant better position result compared to a standard L1 or L1L2 GNSS solution.

For land vehicles additionally an odometer aiding capability is available as an option.



Classic loosely coupled INS/GNSS



iTraceRT-M200A-SDN:  
deeply coupled INS/GNSS

The iTraceRT-M200A provides system performance and system reliability which is required in standard tasks of vehicle motion dynamics testing, trajectory surveying and platform control tasks (car / truck / naval vessel / civil and military aircraft).

The iTraceRT-M200 is delivered with a LabView-



based configuration software. All output data can be displayed and stored online on the user's notebook or process computer. With iREF-L1L2 iMAR also provides a GNSS reference station to provide RTK or DGPS corrections on demand.

A powerful postproc software is available to allow post-mission processing including a multi station GNSS correction data solution, and a direct visualisation in Google Earth™.



## Technical Data iTraceRT-M200A-SDA:

	Rate	Acceleration	Attit./Heading	Position (LLA)	Velocity (ENU/Body)
Range:	± 450 °/s	± 10 g	unlimited	unlimited / no phys. Limitations	
Accuracy (1σ):	0.25 °/s 6 °/h	16 mg 0.1 mg	pure INS, unaided, day-to-day, OTR pure INS, after 5 minutes RTK-GNSS aiding		
Angles:			0.04° RP, 0.25° Y <sup>1</sup> 0.1° RP, 0.4° Y 0.2° Side slip angle (v > 10 m/s) <sup>2</sup>	(INS/RTK-GNSS) (after 10 sec RTK-GNSS outage)	
Position (horizontal / vertical):				± 2 cm / 5 cm + 2 ppm (INS/RTK-GNSS) ± 2 m / 0.4 m (10 s GNSS outage) ± 1.8 m (pure GNSS; CEP50) ± 0.7 m (INS/Omnistar-VBS) ± 2 cm / 5 cm (post-proc, INS/RTK)	
Velocity:					0.08 m/s (INS/RTK-GNSS) 0.25 m/s (10 s GNSS outage.)
Noise:	< 0.3 °/√h	< 100 µg/√Hz	0.02 °	< 20 mm	< 0.02 m/s
Resolution:	< 0.001 °/s	< 10 µg	0.005 °	< 5 mm	< 0.005 m/s
Scale factor error:	< 1 %	< 0.5 %			
Linearity error:	< 0.1 %	< 0.1 %	< 0.03 %		
Initial Alignment:	automatically with integrated INS/GNSS Kalman filter				
Data Processing Rate:	200 Hz; PPS timing accuracy better 10 ns				
Data Output Rate:	1...200 Hz; all data available in real time (RT = RealTime)				
Synchronisation:	PPS output, Trigger output, Marker input (RS422)				
Output:	USB, CAN, RS232, WLAN (option: Ethernet)				
Inputs:	DGNSS/RTK correction data from base, if available (RS232); odometer (A or A/B at RS422 level) wheel sensor interface as an option				
Graphical User Interface:	Windows based Windows software for configuration and data readout				
Power Supply:	11...34 V DC, approx. 5...6 W (depends on options)				
Temperature and shock:	-40...+71 °C (outer case temperature); 60 g, 11 ms				
Mass, size:	approx 450 g, approx. 100 x 90 x 62 mm				
Deliverables:	<ul style="list-style-type: none"> <li>- MEMS based INS with integrated L1L2 GNSS receiver, GNSS antenna</li> <li>- optional wireless data transmission for data from GNSS base station radio modem or GSM as an option; WLAN for multi IMS / multi vehicle communication as option</li> <li>- Windows based GUI software iTraceRT-Command</li> </ul>				
Options:	<ul style="list-style-type: none"> <li>- housing in metal (standard) or plastic</li> <li>- Odometer / wheel sensor interface for aiding during longer GPS outages (position error then limited to approx. 0.5 % of longitudinal distance travelled)</li> </ul>				

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<sup>1</sup> RPY = Roll/Pitch/Yaw (Azimuth = -Yaw)

<sup>2</sup> The side slip angle is the angle between course over ground (CoG) and true heading. It is calculated from the longitudinal and transversal velocity of the vehicle. Its accuracy therefore increases with increasing velocity. At standstill the side slip angle cannot be defined.

