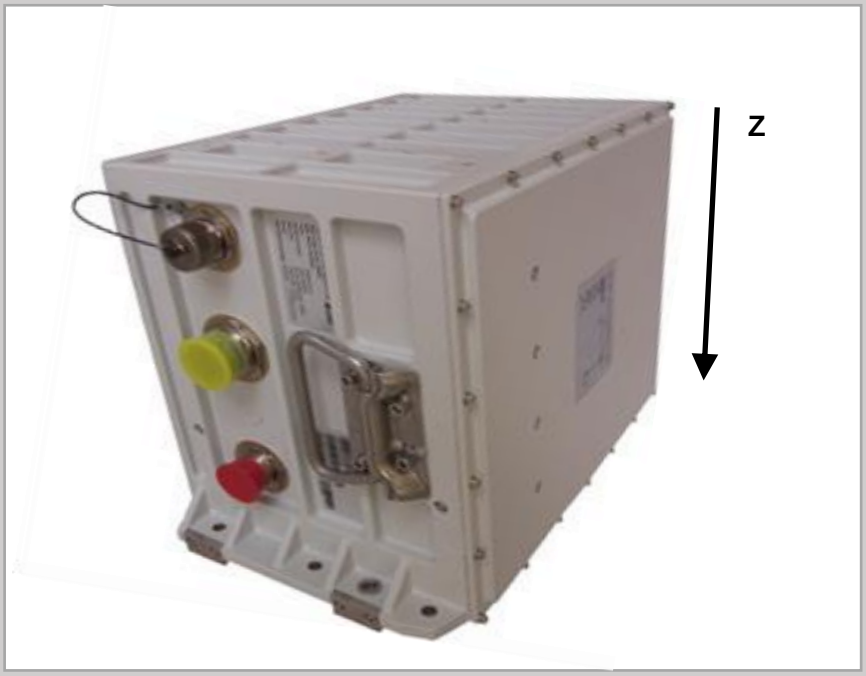
iATTHEMO-TRIDENT-Rx

Motion Reference and True North Alignment & GNSS

Three marine functionalities unified in a single maintenance-free device



The **iATTHEMO-TRIDENT-Rx** unifies the most important Marine Navigation functionalities (***ATT***itude, ***HE***ading, ***MO***tion) in a single device. It comprises a maintenance-free 6-axes gyro compassing capability together with an integrated GNSS and MRU functionality. Its superior performance, low life-time costs and reliable construction make it *perfectly suited for all navigational, control, stabilization and surveying functions*.

CAPABILITIES & FEATURES

- Perfectly adaptable to customer needs by just applying the most adequate sensor class (R0 to R2)
- Supporting GNSS aided navigation as well as autonomous navigation without GNSS for surface and subsea vessels
- Very low cost of ownership
- Very fast settling time even in rough seas for gyro compassing (< 20 minutes with sufficient GNSS aiding under suffic. motion)
- Maintenance-free: RLG technology provides very high MTBF, especially in naval applications (sensor core > 100,000 hrs) and guarantees by physics highest insensitivity against vibration and temperature gradient impacts of its class
- Real-time high-speed output with exceptional low latency and jitter on true heading, roll, pitch, heave, acceleration, rate of turn, which all are available also in GNSS denied environment
- Supporting all frequencies / all constellation GNSS (GPS / GLONASS / GALILEO / Beidou etc.), depending on ordered options
- iATTHEMO-TRIDENT-Rx is not subject to ITAR regulations
- Perfectly suitable for any newbuilds & retrofits; operates even, where FOG based systems have physical limitations (vibration, shock, temperature gradients).
- The only system of its class, providing continuous and complete bias monitoring of its inertial sensors, even when being operated motionless and/or under “motion with constant heading” conditions. This unique feature guarantees correct / true heading values under all operational conditions (equal to SIL 2/3, but not formal approved).

ACCESSORIES

- Multiple repeater types available (digital, bearing, dial)
- Other accessories available (data distribution box, converters to naval interfaces like synchro)

light weight – easy to integrate – easy to operate – maintenance-free

iATTHEMO-TRIDENT-Rx

Technical Data iATTHEMO-TRIDENT-R0 / -R1 / -R2

Maintenance-free motion reference and true north indicating unit & integrated GNSS

P/N 00190-0520x-03Rx - all data are RMS values, if not otherwise stated

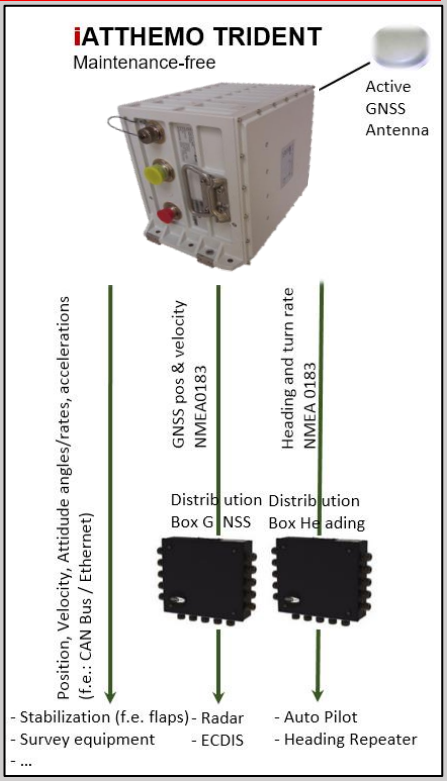
Performance: *

Heading Accuracy of -R0 / -R1 /-R2:	0.01 / 0.02 / 0.03 deg sec lat	(gyro compassing, with Log)
Heading Accuracy with GNSS aiding:	0.01 deg	with GNSS aiding *
Settling Time:	< 3 to 20 minutes	with GNSS aiding
	< 10 to 120 minutes	w/o GNSS aiding, with EM-Log
Dynamic Roll & Pitch Accuracy	< 0.01 deg (< 0.05 deg during online self-calibration)	
Position Accuracy of -R0 / -R1 / -R2 (CEP):	1 nm/24h / 1 nm/12 h / 1 nm/8 h (free inertial, ***)	
	< 0.2 % distance travelled [CEP]	(with LOG aiding, **)
	< 2 m [RMS]	(with GNSS aiding, S/A off)
Velocity Accuracy:	0.5 / 1 / 1.5 kn	(free inertial, ***)
	< 0.2 % ** / 0.05 m/s	(Log aided / GNSS aided)
Angular Rate / Acceleration Range:	±400 °/s / ±20 g	
Heading / Roll / Pitch Range:	0…360° / ±180° / ±90°	(no limitations, ****)
Data Output Rate / Bandwidth:	integer divisor of 400 Hz / internal data rate > 3 kHz	

Please note, that iATTHEMO-TRIDENT-R – same as other similar naval navigation systems – requires aiding with GNSS receipt under sufficient motion and for sufficient duration before providing the specified position accuracy in free inertial mode.

Outputs:

Serial Data:	3 x UART RS422 or RS232 (NMEA 0183)
Ethernet:	1 x TCP/IP or UDP (sensor data and alert)
CAN Bus:	2 x standard protocol (sensor data and alert)
Time Synchronization (Pulse Port):	PPS Output (RS422 level, ext. converter to TTL level as option)
Synchro (fine/course):	via optional data distribution unit (DDU)
Status / Alarm:	
System Failure:	1 x potential-free relay contact (< 30 V / 200 mA) [option]
Alert Communication (ALR/ACK):	RS422 (IEC 61162-1 conformity)



Inputs:

LOG (mandatory, if not free inertial & no GNSS):	Speed input via NMEA183 (UART RS422 or RS232)
GNSS:	active GNSS antenna via TNC connector (internal GNSS eng.)
external GNSS: Latitude / Longitude / Vel:	via NMEA183 (if iATTHEMO is operated w/o internal GNSS eng.)
PPS:	via RS422 level (external GNSS engine and external PPS recommended as backup only, not as a primary source)

Physical / Operating / Environmental Parameters:

Power Supply Voltage:	24 V DC (11…35 V DC)
Power Consumption:	< 40 W (average, incl. integrated GNSS engine)
Dimensions:	383 x 276 x 221 mm³ (LxWxH; without connectors)
Weight:	~ 18.0 kg
Operating / Storage Temperature; Humid.:	-10…+55 °C / -45…+85 °C; 8…100 % rel. humidity
Housing / Protection Category:	fully sealed aluminium enclosure / IP 67
Qualification:	MIL-STD-810G, MIL-STD-461G, MIL-STD-704F

Accessories:

Included:	- Graphical User Interface (Windows / Linux) - operator handbook (usage & maintenance)
Optional:	- external GNSS interface instead of internal all-frequencies / all constellation GNSS receiver incl. SBAS) - heave calculation (PE50): < 5 % / 5 cm whichever is greater (real-time) for wave length < 25 s - external military GNSS receiver (SASM, M-Code, anti-jamming GNSS antenna / CRPA) - various repeaters and accessories; body noise isolator (e.g. for military AUV applications)

* The system additionally provides the following accuracy for advanced surveying, stabilization and other applications (not subject to wheelmark):
Roll / pitch / heading accuracy with GNSS: < 0.01° (rms) under sufficient vessel motion (heading changes and speed) over suff. time and GNSS observability
Velocity accuracy: < 0.02 m/s (0.04 knots)

** this performance value depends directly on averaged LOG accuracy (bottom track; otherwise plus current, if not corrected); not subject of INS specification

*** after 12 hrs aiding with sufficient GNSS availability and sufficient motion (heading changes, speed) to allow reasonably data fusion state estimation (physical reason)

**** the average value of roll and pitch over 30 minutes shall be within 15 deg to provide the specified highest heading performance, otherwise heading is 3 times worse

iMAR Navigation GmbH ● Im Reihersbruch 3 ● D-66386 St. Ingbert / Germany
Phone: +49-(0)-6894-9657-0
Fax: +49-(0)-6894-9657-22
www.imar-navigation.de
sales@imar-navigation.de

Rev. 1.15 / 02.12.2023 ● DocNo. DOC210115147