

iCORUS-02 • iCORUS-02/WTS

Inertial Measuring System for Navigation, Gravimetric Disturbances and Surveying Applications with Gyro Compassing Capability

iCORUS-02 is a member of iMAR's **iCORUS gravimeter family**. The system provides gravimetric disturbances measurements, gyro compassing, inertial navigation, surveying, guidance and stabilization. It contains ring laser gyros and covers applications, which require high accuracy, reliability, a flexible interface and easy integration and usage.

- High performance inertial navigation and surveying system for airborne, naval, surface and railway applications; self gyro compassing, **with gravimetric disturbances surveying capability**.
- RLG technology with low angular random walk and high angular resolution. Strapdown technology.
- Highest servo accelerometer class for best airborne gravimetry results.
- iCORUS-02/WTS is designed to be used within air-conditioned areas. Version iCORUS-02 includes an integrated temperature stabilization. Option –DA contains dual-antenna GNSS heading support.
- Integrated time synchronization module and GPS / RTK-GNSS engine with single or dual antenna.
- Internal 32+ GByte data storage for black-box operation capability (option 128 GByte or more tbd.)
- High data rate, open interfaces: Ethernet TCP/IP - UDP, CAN, UART RS422/RS232 etc.
- Small size, low weight, low power; integrated surveying markers and aiding support points on the enclosure (to support also advanced surveying applications).

The **iCORUS-02** comes with integrated temperature stabilization, while the iCORUS-02/WTS requires the operation within a temperature controlled environment.

The system contains an up to all frequency / all constellation RTK capable GNSS receiver (GPS, GLONASS, GALILEO, Beidou). Communication I/Os are RS422/232 UART, Ethernet (TCP/IP, UDP), ARINC429 (option), CAN, ARINC825.

Data processing (strapdown navigation, gyro compassing, north keeping or motion monitoring) is performed inside of the iCORUS-02, and also data transmission and storage of pure or corrected raw data is available. The measurement results like attitude, heading, position, velocity, rates and acceleration as well as the INS and GNSS raw data are available, incl. time stamp with up to 400 Hz.

The **iCORUS-02** allows free inertial navigation and autonomous gyro compassing within less than 8 minutes.

The optional dual-antenna capability (iCORUS-02-DA) allows the system additionally to determine true heading within shortest time, where required.



iCORUS-02

For surface applications the most sophisticated, wheel sensor supported data fusion provides also highest position accuracy even when the system suffers significant GNSS outages.



The GUI / HMI software iXCOM-CMD provides full control of the system as well as data storing; furthermore, it allows maintenance activities also via network (e.g., download of stored data). Last but not least, the powerful post-processing tool **iPosCALGRAV** is available for advanced surveying applications.

The system is only covered by dual-use export control and not by any ITAR regulations. Within the EU the simplified EU001 procedure is applicable, which allows a fast delivery from iMAR to the end-user.



Technical Data of iCORUS-02 and iCORUS-02/WTS (rms values)

Data Output:	Heading, Roll, Pitch, Angular Velocity, Velocity (Body and World), Position, Raw Data of INS / GNSS / VMS incl. time-stamp, internal status information for gravimetric disturb. postproc.	
Global Performance:	Gravimetric Disturbances:	< 3 mGal under sufficient GNSS observations, sufficient dynamics and with an appropriate post-processing (i.e. relative to an initial externally surveyed gravity reference point)
	True Heading:	< 0.02° with at least single antenna GNSS (data fusion) and under sufficient motion dynamics (no dual antenna required)
		< 0.01° post-proc with RTK corrections
		< 0.1° sec lat gyro compassing (no GNSS support required)
		< 0.05°¹ with 4 m baseline between the two GNSS antennas (-DA option)
	Position accuracy:	1...2 m with GPS, S/A off
		0.6 m with SBAS
		0.02 m with RTK corrections online or with RTK post-proc
		3 nm/hr [CEP] free inertial navigation after sufficient GNSS aiding
	Dead-Reckoning:	< 0.1 % [CEP] of distance travelled in lon/lat and altitude (with wheel sensor)
	Velocity:	0.02 m/s with GNSS; < 0.005 m/s with RTK post-proc
	Altitude:	< 1...4 m with GPS, S/A off
		0.06 m with RTK corrections online or with RTK post-proc
	Roll/Pitch Accuracy:	0.01° with GPS, S/A off; < 0.005° with RTK post-proc
Alignment Time:	< 2 min. GNSS cold start, < 1 min. GNSS warm start; < 30 sec with stored heading	
	< 8 min. to achieve 0.1° sec lat, < 2 min. to achieve 0.5° sec lat (rms) with Gyro Compassing	
Inertial Sensor Performance:	Gyroscopes	Accelerometers
Range:	± 395 °/s (no angle limitation)	± 20 g
Linearity / Scalefactor:	< 15 ppm / < 10 ppm	< 100 ppm / < 30 µg/g²
Bias Stability (AV):	< 0.001 °/hr	< 12 µg < 1.0 mGal
Resolution of Raw Data:	< 0.00033 µrad / LSB	< 5 µg / LSB < 0.5 mGal / LSB
Axis Misalignment:	< 30 µrad	< 50 µrad
GNSS Receiver (integrated):	up to all frequency / all constellation GPS+GLONASS+GALILEO+BEIDOU, RTK/PPP, L-Band	
Input Interfaces (options):	external GNSS receiver (standard: integrated GNSS receiver); event trigger (PPS / SYNC, RS422 level), odometer (opto-coupler input up to 32 V, A/B quadrature or counts & direction, RS422 level compliant)	
Output Interfaces (options):	UART RS232/422, Ethernet TCP/IP / UDP, CAN, ARINC429, ARINC825, HDLC/SDLC, PPT (Pulse Per Time), PPS, SYNC; PTP or NTP on Ethernet as option; NTRIP caster as option; Pulse-per Distance	
Data Output Rate:	1...400 Hz , internal data rate 3'200 Hz	
Data Latency and Jitter:	< 5.3 ms (sampling accuracy better 1 µs, time-stamped according to PPS; jitter < 1 ms)	
Data storage:	up to 128 GByte on internal non-volatile memory (standard: 32 GByte)	
Connectors:	MIL-C-38999 Series III for signals and power, TNC for antenna	
Magnetic. insensitivity:	< 500 µTesla (5 Gauss) for operation within spec.	
MTBF / MTTR:	> 50,000 hrs (estimated for surveying applications) / < 30 minutes	
Shock, Vibration, Altitude:	6 g / 20 ms operational and 40 g / 15 ms non-operational; 60'000 ft	
	6.3 g rms (operating); 60,000 ft	
Qualification:	iCORUS-02/WTS : MIL-STD-810G, MIL-STD-461G, MIL-STD-704F, DO160G; -30...+65°C storage; 8...100%; IP67	
Temperature:	iCORUS-02: -30...+65°C operating (case), if temp.change < ± 15 K during mission	
	iCORUS-02/WTS: -30...+65°C operating (case), but air-conditioned environment needed for full performance	
Power:	iCORUS-02: < 150 W (with integrated temperature control)	
	iCORUS-02/WTS: < 20 W (incl. GNSS); 10...35 V DC ; 50 ms hold up time according to DO160;	
Weight / Size:	iCORUS-02: approx. 14 kg / 259 x 253 x 380 mm³ (WxHxL), w/o connectors;	
	iCORUS-02/WTS: approx. 8 kg / 187 x 130 x 330 mm³ (WxHxL), w/o connectors	
Installation:	Installation in all arbitrary orientations allowed (special requirements for the -FLIP version)	
Software:	iXCOM-CMD GUI software under MS Windows and Linux available; integrated real-time Kalman filter (42+ states); iXCOM communication protocol	
	iPosCAL-GRAY : iMAR's advanced gravimetry post-processing software	

iMAR Navigation manufactures and designs inertial navigation, surveying, guidance, control and stabilization systems for defence, airborne, industrial, gravimetry, automotive, agriculture, mining, drilling, surveying and many other applications. All systems are manufactured and maintained by iMAR Navigation in Europe / Germany.

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¹ initial heading accuracy obtained from dual-antenna setup only; will be automatically improved as soon as sufficient motion is observed; accuracy rule of thumb: 0.2 °/[m baseline]

