

iXnews

IXBLUE | JULY 2021 | DEFENSE SPECIAL ISSUE

SEAPIX-FLS SERIES

Forward looking sonar

MCMU

Mine counter-
measure vessels

UMIX SERIES

Compact FOG IMU

WEIBEL RADARS

Advans Vega onboard





Land and Naval operations are increasingly requiring high end stand-alone navigation. On one side there are more and more collaborative operations, precise pointing is required, use of autonomous platforms are progressing; on the other side the GNSS becomes a serious point of vulnerability and cybersecurity can be compromised. As of today, iXblue has built the best offer in the world, proposing a complete range of navigation sensors to answer needs ranging from blue force tracking of armored vehicles with Ursa U5 Land Inertial Navigation Systems (INS) to ultimate submarine performances with Marins Series Naval INS and Netans Naval Data Distribution Units. According to the need, iXblue combines the finest sensors to powerfully address the criticality of the mission.

In 2020, iXblue delivered major programs and has also been selected on the most advanced ones. We can mention the new naval Mine Counter-Measure Vessels (MCMV) Dutch and Belgian program that combines vessels and several Unmanned Surface and Underwater Vehicles (USVs & UUVs). For this program, iXblue provides very high-performance inertial navigation systems on board every platform, as well as cybersecured data distribution with Netans, acoustic underwater positioning and communication with Gaps USBL and finally forward-looking sonars (FLS) for mine detection and avoidance.

We are truly humbled by the trust navies and integrators worldwide show to our solutions. We aim to stay ahead in terms of technology. Our INS already are the finest, but we want to further exploit the potential of the FOG technology, which is limitless. The SeapiX-FLS Series is a very competitive and high-performance range that enhance furthermore our navigation offer and should gradually be popularized as key asset beyond MCM applications. Lastly, our well known Gaps USBL ideally completes the Phins Compact Series for AUVs, providing enhanced underwater positioning and communication even in extreme shallow waters and horizontal tracking.

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**WE ARE TRULY HUMBLLED
BY THE TRUST NAVIES
AND INTEGRATORS
WORLDWIDE SHOW
TO OUR SOLUTIONS.**

”

Last but not least, I would also like to mention here how iXblue is positioning itself as a major player for USVs. DriX USV represents one of the most recent innovations of iXblue. It syncretizes our expertise in navigation, automation & robotics technologies, naval architecture, composite construction and capitalizes on the company's deep understanding of marine operations. It brings more capabilities, more efficiency and highest quality data acquisition in all sea conditions.

I hope you will enjoy this magazine. We are building from your feedback to provide future proof solutions to armies worldwide. This logic applies to the products themselves as well as their applications, as you'll find out by reading about using our Gaps USBL for diver tracking, how we developed SeapiX-FLS forward looking sonars, how we answered the need for cost-effective INS ready to equip entire fleets of land vehicles, or how we are revolutionizing inertial measurement units (IMUs) by fitting the high-performance and reliability of a fiber-optic gyroscope INS' sensors into a compact UmiX inertial measurement unit.

We hope we get to meet you to discuss how iXblue can become a partner in your projects. In the meantime, we wish you a good read!

Jean-Marc
Binois
Commercial Director



01 PRODUCT NEWS

P.8
**LDUUUs &
XLUUUUs**
Navigation solutions

P.14
**SEAPIX-FLS
SERIES**
Obstacle avoidance
forward looking sonar

P.18
GAPS SERIES
Diver tracking

P.22
**RESILIENT
NAVIGATION**
For land vehicles

P.26
UMIX SERIES
Smallest high performance IMU

02 CUSTOMER STORIES

P.32
**EUROPEAN
LEADER IN NAVAL
NAVIGATION**
Major successes in 2020

P.36
WEIBEL RADARS
Advans Vega onboard

P.38
**MINE COUNTER-
MEASURE VESSELS**
iXblue equipping Belgian, Dutch,
and Polish navies

P.44
DRIX
trusted by French and US
Hydrographic Departments



PRODUCT NEWS

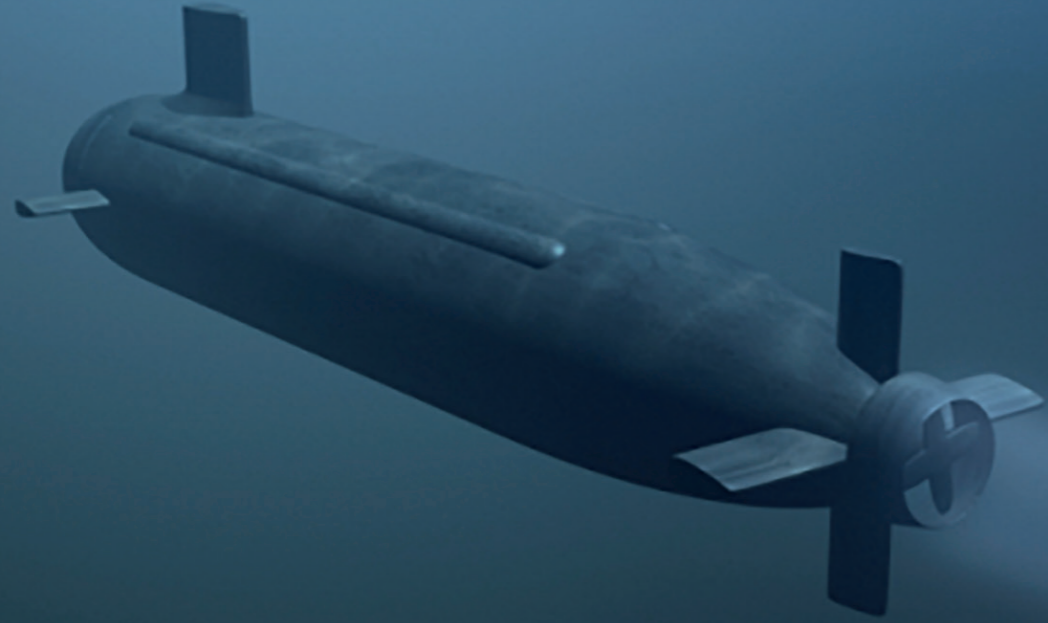
P.8
LDUUS & XLUUS
Navigation solutions

P.14
SEAPIX-FLS SERIES
Obstacle avoidance forward looking sonar

P.18
GAPS SERIES
Diver tracking

P.22
RESILIENT NAVIGATION
For land vehicles

P.26
UMIX SERIES
High performance in a compact IMU



PROVIDING HIGH PERFORMANCE NAVIGATION FOR AUTONOMOUS SUBMARINES

NAVAL ENGINEERS ARE HARD AT WORK TO PERFECT THE EXISTING UUV TECHNOLOGY. THE ADVENT OF AUTONOMOUS SUBMARINES SUCH AS LARGE DISPLACEMENT AND EXTRA-LARGE UNMANNED UNDERSEA VEHICLES (LDUUV AND XLUUV) PUSH THE BOUNDARIES OF WHAT MISSIONS UUVS CAN FULFILL EVEN FURTHER. FAR MORE THAN A TOOL: WITH THESE NEW VEHICLES, UUVS ARE A CRITICAL ASSET FOR NAVIES WORLDWIDE.

IXBLUE UNDERSTOOD THE IMPORTANCE OF AUTONOMOUS VEHICLES VERY EARLY AND DEVELOPED A WIDE ARRAY OF SOLUTIONS TO ENHANCE THE EFFICIENCY OF THESE VEHICLES.

LDUUVs and XLUUVs New Categories of UUVs Requiring High Performance Navigation

UUVs are categorized in several size classes. iXblue has already gained wide market share of the navigational solutions with its Phins Compact Series on Small Unmanned Underwater Vehicles (SUUVs) and Medium Unmanned Underwater Vehicles (MUUVs). SUUVs are typically deployable by one or two men and operate in depths up to 200m. Large Displacement UUVs (LDUUV) are being developed by countries such as the United States. The U.S Navy's Snakehead Program aims to develop a long-endurance, multi-mission LDUUV, deployable from a submarine's large diameter open interface. It is the largest UUV intended to be carried and deployed by a submarine. Its size allows for bigger and more numerous payloads and longer endurance.

Extra Large UUVs (XLUUV) go even further as they will eventually be deployed entirely autonomously, mostly from shore bases. In 2017, Boeing was awarded a contract to supply the US Navy's ORCA XLUUV. The vision behind this new vehicle is a fully autonomous vessel able to operate over a long range and execute a wide array of missions, thanks in part to its high payload capacity.

With the increased operational range and mission duration of LDUUVs and XLUUVs, likely operating in GNSS denied environments, the need for a high performance, reliable, GNSS free navigation system is critical. iXblue has nurtured a culture of excellence in military submarine

strategic-level navigation solutions, with an extensive track record of providing primary navigation INS's to submarines world-wide to back this claim. Among other references, the company's Marins Series INS have made a name for themselves by providing strategic grade inertial navigation systems to some of the biggest and most technologically advanced navies worldwide. Combined with the company's know-how in autonomy and UUVs, it is only natural to provide these proven high performance and reliable solutions for upcoming LDUUVs and XLUUVs. Common interface specification with smaller iXblue INS and the favorable SWaP characteristics of these strategic grade INS make this progression a simple step forward.

Indeed, the size of LDUUVs and XLUUVs allow for the integration of such high performance INS, thus fulfilling the need for submarine-level systems on par with these large UUVs' capabilities, while offering a at sea proven and military strategic class inertial navigation solution. By selecting iXblue for a LDUUV or XLUUV inertial navigation system, you're selecting years of expertise in UUVs and military ship and submarine onboard inertial navigation systems.

iXblue's Navigation and Autonomy Solutions for all Sizes of UUVs

iXblue has a reputation of excellence when it comes to naval and maritime products. It is recognized worldwide throughout the industry for its pioneering work on the development of Fiber-Optic Gyroscope (FOG) technology that has revolutionized maritime Inertial Navigation Systems (INS).

iXblue navigation solutions, including the company's inertial navigation systems, as well as Netans navigation data distribution and computational systems (DDU), already equip surface ships, submarines, and unmanned vehicles in 40 national navies and coast guards. Those include major programs such as the Belgian and Royal Netherlands Navy's MCM Replacement Program, Spain's future F110-class multi-mission frigates, the French Navy's future frigates (Frégate de Défense et d'Intervention - FDI), the new Astute-class nuclear attack submarines and the Queen Elizabeth-class aircraft carriers of the UK Royal Navy, as well as the F123 (Brandenburg-class) frigates of the German Navy and the latest flight of the Freedom Class LCS for the US Navy.

iXblue can also provide safe navigation for a wide range of vessels thanks to its latest range of forward looking sonars: SeapiX-FLS Series. The iXblue FLS offerings are adaptable for vessels ranging from large tonnage warships and submarines to small unmanned surface vessels (USVs), this sonar has an innovative detection process, based on five main, fully autonomous steps: Detection, Tracking, Characterization, Classification, Avoidance. Should the need arise, this process' parameters can also be set manually. iXblue's FLS is easily integrated within the

IXBLUE HAS A REPUTATION OF EXCELLENCE WHEN IT COMES TO NAVAL AND MARITIME PRODUCTS.

BELGIUM NAVAL & ROBOTICS, A CONSORTIUM BETWEEN NAVAL GROUP AND ECA GROUP FOR THE BELGIAN-DUTCH MCMV PROGRAM, ALREADY TRUSTS IXBLUE.

Combat Management System and/or ECDIS, has a dedicated HMI, and can be integrated directly within the ship's hull or the USV's gondola or sensor suite. SeapiX-FLS Series use an innovative detection method to ensure a full water column coverage. Using 4 types of acoustic swaths, coupled with an extensive library of threat characteristics, it is able to provide forward bathy info, water column detection, seabed detection and target confirmation. With its 32kg weight in water and a 250x430mm diameter, SeapiX-FLS 5 is the lightest and smallest of the series. Do not let its size fool you: boasting a 150kHz frequency, it is able to finely detect objects within the water column thanks to its 2.5cm radial beam resolution and 0.2m3 at 100m volume resolution. Last but not least, its low power consumption (300W) makes it ideal for integration within a USV.

Belgium Naval & Robotics, a consortium between Naval Group and ECA Group for the Belgian-Dutch MCMV program, already trusts iXblue's SeapiX-FLS. Indeed, in 2021, the consortium selected iXblue's Forward Looking Sonars to equip the program's ECA made USVs with precise and real-time detection capabilities.

iXblue is also an expert in autonomy: it has put extensive efforts in R&D to develop new innovative autonomy technologies. A key focus for the company, resilient navigation solutions have thus been developed and iXblue is now considered a major actor of this new era of autonomous systems. Over the years, iXblue has developed long-lasting partnerships with various key industry players including private companies, research institutes and governments, to fully understand and anticipate the autonomy needs of the unmanned surface vessel (USV) market in order to remain at the forefront of autonomy technological advancements. By truly understanding all specific aspects of the unmanned market and its challenges, iXblue was thus able to develop the Phins Compact Series INS, especially designed to offer a scalable and highly accurate and reliable FOG-based inertial navigation solutions that enhances UUV and USV autonomy. ■

Marins Series

MILITARY AND STRATEGIC GRADES INERTIAL NAVIGATION SYSTEMS (INS)

FEATURES

- Genuine strapdown solid-state silent system
- High baud rate / low latency
- Fully configurable
- Web-based built-in interface
- IMO/IMO HSC certified
- MIL STD qualified: 810/461
- Free of ITAR component

BENEFITS

- Autonomous navigation without GNSS
- Low cost of ownership
- Stealth: no radiated noise during operation
- Flexible and evolutive interface
- Easy to set up and to operate
- Full range of INS performances

PERFORMANCE



	M5	M7	M9	M11
Position accuracy, no aiding	1 nm / 24h	1 nm / 72h	1 nm / 120h	1 nm / 360h
Velocity	0.6 knot	0.4 knot	0.4 knot	0.4 knot
Heading accuracy (RMS)	0.01 deg seclat	0.01 deg seclat	0.01 deg seclat	0.01 deg seclat
Roll/pitch accuracy (RMS)	0.01 deg	0.01 deg	0.01 deg	0.01 deg
Settling time	5 min for data availability / 15 min for full attitude			



SEAPIX-FLS SERIES:
NEXT GENERATION
OBSTACLE DETECTION & AVOIDANCE
FORWARD LOOKING SONAR

A key product of iXblue's naval offer, the SeapiX-FLS Series (FLS standing for "Forward Looking Sonar"), developed by the Sonar division in La Ciotat (France), is a 3D multi-beam Forward Looking Sonar that is particularly suited for obstacle avoidance, real-time seabed mapping and rapid environmental assessment (REA) applications. SeapiX-FLS Series, which embeds an Inertial Measurement Unit (IMU), provides a clear and precisely georeferenced picture of the surrounding environment. Thanks to its unique, three-dimensional coverage of the water column and bathymetric profile, SeapiX-FLS offers extremely accurate, real-time obstacle detection, as well as object analysis (based on position and kinematic, target strength index, acoustic measurements, etc.), ensuring the safe navigation of platforms operated by naval forces.

"Leveraging iXblue's expertise in navigation and subsea imaging, this new FLS technology offers highly reliable long-range detection (up to 600 meters for a -15 dB target), ensuring safety of navigation for surface vessels and submarines." explains Julien Guichard, Defense Program Manager at the

Sonar division. "Thanks to its innovative electronically steerable Mills Cross antennas, SeapiX-FLS Series provides unrivaled coverage of the entire water column, from surface to sea bottom. Each detection is then mapped in real-time within the surrounding environment, and autonomously provided to external systems, or displayed in 2D/3D within iXblue's operator oriented MMI. This system can also centralize and simultaneously display information gathered by multiple SeapiX-FLS. This is a particularly interesting feature for REA missions for instance, as naval forces will be able to send in a fleet of unmanned vessels to conduct the mission with more flexibility and safety. Another key feature of the SeapiX-FLS Series is the ability to generate a real-time obstacle detection probability map. This information is crucial for crew decision making, allowing them to adapt their speed according to their underwater environment, and thus navigate with more safety both for the crew and the platform."

Available in two versions, the SeapiX-FLS Series is perfectly suited for all types of carriers and covers a wide range of tasks. SeapiX-FLS 5, offering a range of 300m, is perfectly suited for USVs (Unmanned Surface Vessels) and other small auxiliary carriers. SeapiX-FLS 7, with a range of up to 600m, will be dedicated to surface vessels and submarines. SeapiX-FLS can also be installed on fixed platforms (buoys, tripods on the seabed, etc.) for port and subsea infrastructure surveillance missions.

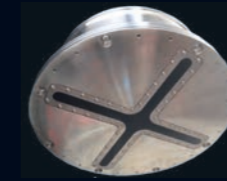
SeapiX-FLS 7 will equip future Belgian and Dutch Mine Countermeasures Vessels. Indeed, on top of iXblue inertial navigation systems, Belgium Naval & Robotics (consortium between Naval Group and ECA Group) selected iXblue's forward looking sonar to provide a precise and real-time detection of mines.

"All in all, our SeapiX-FLS Series truly brings superiority to naval forces as it provides crews with an intelligible representation of their full surrounding environment, which in turns helps them make informed decisions in a reduced timeframe." Continues Julien Guichard. "This is a real asset to conduct more efficient and safer operations, keeping both humans and strategic vessels out of harm's way." ■

Object Type	SeapiX-FLS 5 detection performance	SeapiX-FLS 7 detection performance
Water Column Object (-15dB)	>300m	>600m
Drifting Object (-15dB)	>300m	>450m
Bottom Object (-15dB)	>200m	>350m
Water Column Low TS Object (-25dB)	>250m	>520m

SeapiX-FLS Series

FORWARD LOOKING SONAR



SeapiX-FLS 5

FORWARD LOOKING SONAR FOR OBSTACLE AVOIDANCE, WATER COLUMN AND BATHYMETRY MAPPING OPVS and unmanned systems

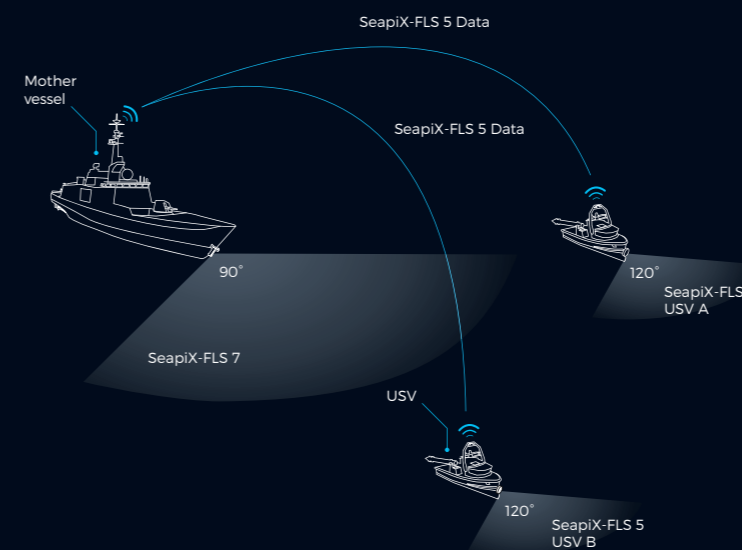


SeapiX-FLS 7

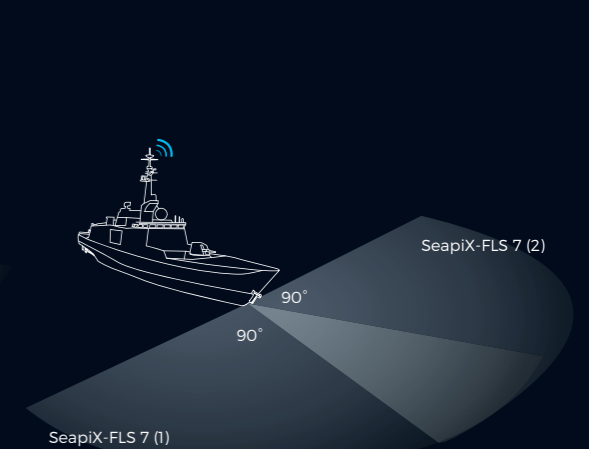
FORWARD LOOKING SONAR DESIGNED FOR MINE AND OBSTACLE AVOIDANCE Surface ships and submarines

Frequency	150 kHz	60 kHz
Modulation	CW and CHIRP	CW and CHIRP
Vertical track multibeam swath	256 channels stabilized	256 channels stabilized
Horizontal track multibeam swath	256 channels stabilized	256 channels stabilized
Beam stabilization	Electronically steerable TX + RX built-in IMU	Electronically steerable TX + RX built-in IMU
Beam resolution	1.6° angular / 2.5 cm radial	1.6° angular / 7.5 cm radial
Volume resolution	0.2 m ³ @ 100 m	0.6 m ³ @ 100 m
Volume coverage	120° x 120°	90° x 90°
Power consumption	300 W	1 KW

Combination of SeapiX-FLS 7 equipped warship and SeapiX-FLS 5 equipped UUVs



Warship equipped with a pair of SeapiX-FLS 7 for maximum coverage



TRACKING YOUR DIVERS

USING GAPS SERIES USBL



What is Gaps Series USBL?

Ultra Short Baselines (USBL) are acoustic positioning systems. Gaps M5 is the latest addition to iXblue USBL product range. Both Gaps M5 and Gaps M7 (previously known as Gaps) are USBL acoustic positioning systems that do not require any in-the-field calibration as they embed a motion sensor in their housing. Gaps M5 integrates an export-free Octans Nano AHRS based on iXblue FOG technology for stable heading roll and pitch compensation and a true North reference. Gaps M7 on the other hand, embeds a FOG-based Phins INS. This means that both Gaps M5 and Gaps M7 are calibration-free systems that do not need to be coupled with an external heading or attitude sensor, enabling very efficient operations. Smaller and lighter, Gaps M5 is easy to install and ready-to-use. It offers an accuracy better than 0.5% of the slant range up to 995m. In practice, this means that, when positioning a vessel at a 500m distance. Gaps M5

is accurate to a maximum of 2,5m. Another big benefit of Gaps M5 is that it is freely exportable and allows hassle-free shipment and operations. Last but not least, iXblue teams made sure Gaps is easy to repair, reducing cost and difficulty of maintenance. With the new Gaps M5, iXblue is now able to offer a cost-effective USBL system that is especially suited for subsea positioning needs of 1.000m or less.

Gaps M5 applications for special forces

Gaps M5 is suitable for any tracking operation under 1,000m, from diver- to multiple subsea assets- or inspection ROV- tracking.

Lightweight, it can be mounted beneath a special operations boats such as a Zodiac MILPRO, has a low power consumption and is resistant to shocks (XPX 10-812 class B). Using a small acoustic transponder directly carried by the diver, Gaps M5 is able to track his location accurately within

a 995m radius and a 200° field, ensuring vertical and horizontal tracking. Its easy-to-install feature allows for flexible and fast deployment. It can register up to 40 transponders for the operation and can follow simultaneously 10 of them. This allows for combinations such as a group of divers, a ROV, and an Oceano acoustic release to recover equipment. Any operator can use Gaps M5 as it is particularly user-friendly. It is controlled using any workstation (a laptop for instance) with Gaps' web-based user interface installed on it. The system can be delivered as a complete turnkey solution, including a GNSS receiver.

Gaps M5 can also be mounted on an Unmanned Surface Vehicle, such as iXblue's DriX. The latter can be remote controlled by an operator directly onsite or at the other side of the world and patrol the area with a wide array of sensors, while keeping track of divers. This solution insures increased safety for the men involved. ■

Gaps M5

ACOUSTIC SOLUTION FOR DIVERS' TRACKING

FEATURES

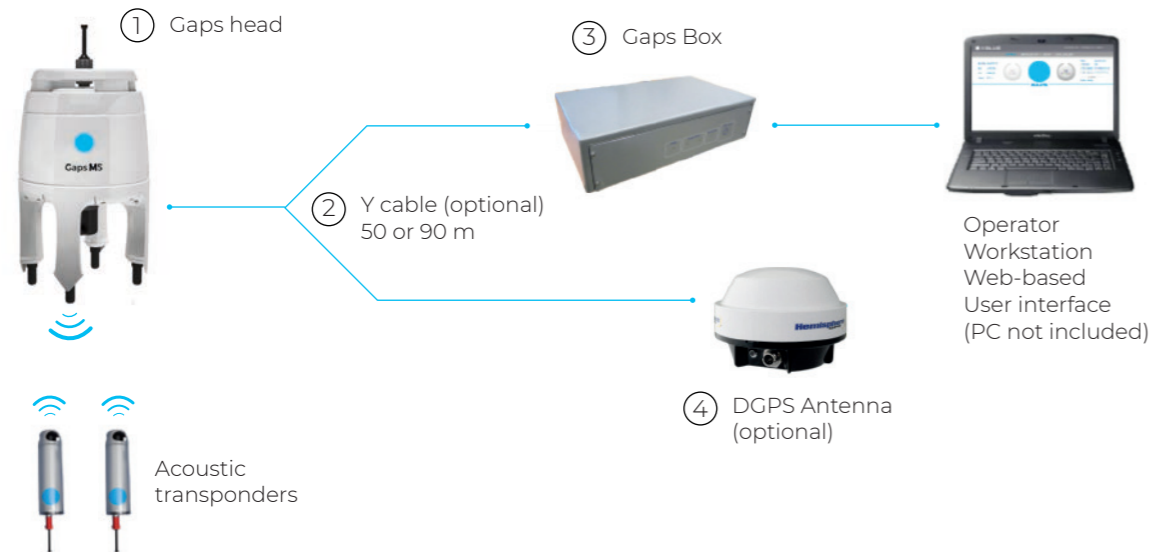
- 200° aperture: above horizontal tracking
- Not subject to export restrictions
- Robust true North finding sensor
- DP compatible LBL / USBL
- Third-party transponder compatible
- Acoustic communication (telemetry)
- 3D display software included (Delph Roadmap)

BENEFITS

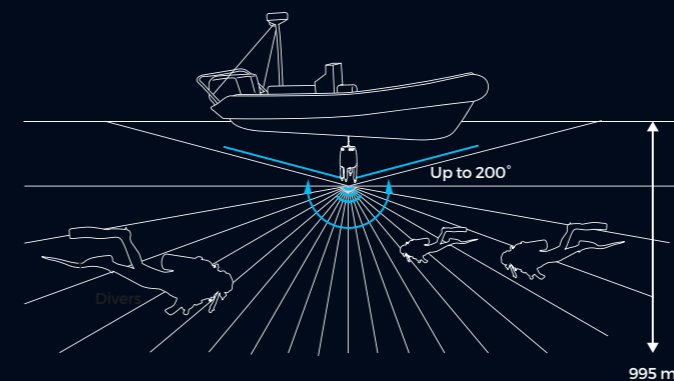
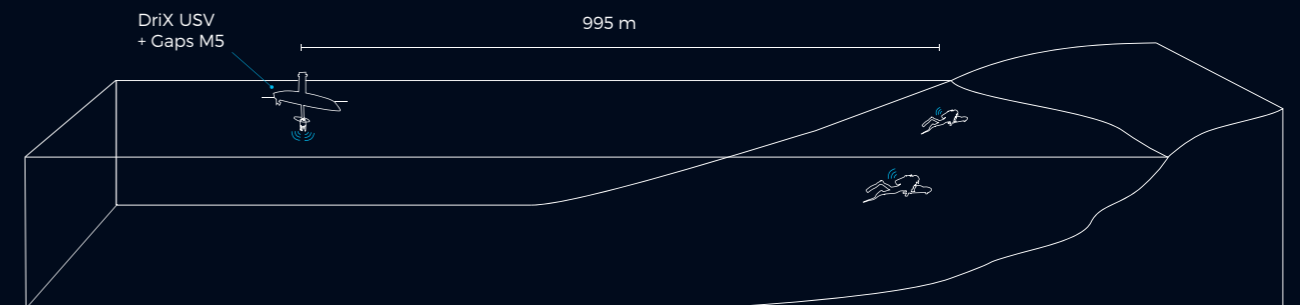
- Calibration-free
- Shallow water and horizontal tracking
- Highly accurate positioning (0.5% of the slant range)
- Easy to install, operate and repair for cost efficiency

MILITARY APPLICATIONS

- AUV tracking
- ROV tracking
- Diver tracking
- Activating acoustic releases



- ① Gaps head**
This is the main part of the Gaps system, which comprises the acoustic array to communicate with the transponder(s) installed on the target(s), the INS for motion compensation and absolute georeferencing, and all electronics and signal processing.
- ② Y cable**
20/50/90m long cable used to communicate with Gaps head. Possible options: ATEX, 95m and greater length using repeater Box.
- ③ Gaps Box**
Gaps Box designed to interface between the Gaps head and external peripherals. It includes power supply from mains & 28 Vdc, Ethernet connector, RS422 / 232 input/output and synchro in/out on BNC.
- ④ DGPS Antenna**
A complete turnkey solution is available on option, including a GPS receiver.





URSA U5: HOW TO BE RESILIENT TO GNSS DENIAL FOR YOUR TACTICAL VEHICLES

iXblue pioneered the Fiber-Optic Gyroscope (FOG) technology and has long since perfected it, reaching an unmatched level of performance, thanks to its expertise and developments of the FOG based INS over the years. iXblue has developed its Advans Series inertial navigation solutions on this foundation, covering the whole spectrum of land defense applications. This solution has already been trusted by several armies and industrials around the world for its positioning and pointing abilities.

IXBLUE KEPT ITS URSA U5 COST-EFFECTIVE, PROVIDING A HIGH LEVEL OF PERFORMANCE WHILE STILL BEING ABLE TO EQUIP AN ENTIRE FLEET

Although the need for a reliable, high performance INS is already accepted for long range radar, air-defense weapons and targeting systems as well as all calibers artillery launchers, INS for land vehicles' navigation are still catching up. So far, land forces mostly relied on GNSS (GPS, Galileo...) based solutions for its navigation needs. This proved effective enough for asymmetrical conflicts. With the increasing tensions between global and local superpowers, this might not be enough anymore. High intensity conflicts brings a whole new range of threats, among which spoofing and jamming. Loosing critical battlefield navigation due to the jamming of the GNSS signal could lead to failure of operations, or worse. Hence the need for a reliable, high performance, gnss-free option.

“True” Inertial Navigation for GNSS Denied Environments

Most INS for land forces installed in combat platform rely on GNSS to start-up and maintain navigation, whereas iXblue's INS work independently from external sources. It is the only fully gyrocompassing solution available for land vehicles. Thanks to its 3 fiber optics gyroscopes, iXblue's Advans Ursa U5 can register translation and rotation on 3 axis and provide accurate positioning with a low 0.4% drift of the distance traveled. So, for instance, for every 10km traveled, the INS will have a 40m drift maximum. A drift is common to all INS, no matter the technology, and can be fixed with a repositioning procedure, using a waypoint on the map (road layout for example). The advantage of iXblue's Ursa U5 is not only the full independence to external sensors, but also the outstanding performance in distance between each repositioning. In addition, by not relying on a GNSS, the vehicle's navigation is jamming & spoofing proof. iXblue's Ursa U5 INS is therefore the ideal, cost-effective choice to ensure the critical navigation of land vehicles.

Cost-effective, Ready to Equip Entire Fleets

High performance INS are common in land forces, but they were until now dedicated to systems requiring accurate pointing like long range radars, artillery launchers, etc. Their benefits easily justify their price. As a result, tactical vehicle like infantry fighting for example could not afford true INS (meaning INS able to start-up and navigate without GNSS), not only because the expected performance was not as

high, but also because the land programs' scope are higher. They can cover up to thousands of new or modernized vehicles. Budgets not being unlimited, the cost of equipping an entire fleet with inertial navigation systems can prove too high, for benefits that are still harder to grasp than in the radar or artillery programs.

iXblue kept its Ursa U5 cost-effective, providing a high level of performance while still being able to equip an entire fleet. True INS are now affordable for complete fleets of tactical vehicles. The benefit of an INS equipping vehicles is getting clearer as the international context and technology develop. With increasing collaborative combat capabilities (such as Scorpion program's SICS), the consequence of losing navigation can impact the whole network of connected vehicles on the front line. As mentioned earlier, it is a given that in a high intensity conflict, GNSS cannot be relied on to provide said navigation (easily jammed & spoofed). It is not far-fetched to extend this problematic to future asymmetrical combat neither.

INS are going to be a key element of combat vehicles. Ursa U5 is a mature, high performance, and cost-effective solution to ensure land operations remain unaffected by these new threats, and easily installed onboard complete fleets.

Installation Process and Maintenance: Less is More

Ursa U5 is a plug-&-play system. Weighting under 4kg, with a low volume of 166x160x136 (mm), it is easy to manipulate and install, using a web-based interface for configuration. Answering MIL-STD standards and resistant to shocks up to 40g/10ms, the INS is sturdy and answers the need for a rugged, no non-sense system. It can just as easily be removed from a vehicle. All of this without leaving the FOB, directly done by field level technical operators. This allows for increased flexibility, both to answer urgent situations and to carry out special operations.

Thanks to the FOG technology on which it is based, Ursa U5 doesn't require any periodic maintenance. Indeed, iXblue's INS do not have any moving part. With a mean time before failure of over 100,000 hours, Ursa U5 is among the most reliable land INS available. ■

Advans Series

INERTIAL NAVIGATION SYSTEMS FOR LAND DEFENSE APPLICATIONS



Advans Ursa
COST-EFFECTIVE INS FOR ALL TACTICAL VEHICLES



Advans Lyra
MID-GRADE INS FOR NAVIGATION AND POINTING



Advans Vega
HIGH-GRADE INS FOR LONG RANGE APPLICATIONS

FEATURES

- Wide range of performance
- Covers the full spectrum of applications from tactical navigation to high-grade artillery systems
- Identical integration architecture for each product (identical web interface, communication protocols, algorithm, functions and connections)

BENEFITS

- Fast and accurate alignment
- High bias stability over the long run
- Very high reliability
- Adapted to harsh environments
- Low cost of ownership
- No periodic maintenance

	Ursa U5	Lyra L7	Vega V5
Horizontal position (without GNSS)	0.4% DT	0.2% DT	0.1% DT
Heading	4 mils	1 mil	0.5 mil
Roll and pitch	1 mil	0.5 mil	0.2 mil

**UMIX SERIES:
THE SMALLEST
HIGH PERFORMANCE
INERTIAL MEASUREMENT UNIT
OF THE WORLD!**



What is UmiX

UmiX Series is the brand-new range of Inertial Measurement Units (IMU) developed by iXblue. Comprised of 3 Fiber-Optic Gyroscopes (FOG) and 3 vibrating-quartz accelerometers, UmiX provides ready to use 3D rotations and acceleration vectors for a full range of applications. UmiX achieves an unprecedented level of performance in a miniaturized package. UmiX Series is covering a wide application field: UmiX U5 is a dual use system, providing north seeking grade FOG suitable for a wide range of applications, including but not limited to high-end stabilization of optronic payloads, navigation and pointing on airborne, land & naval platforms. UmiX U9 is a military-grade version of the IMU, qualified to MIL environments. Last but not least, an export-free version will complete the range, intended for less demanding applications including aided navigation.

UmiX Series products are ready to use OEM IMUs, embedding all the necessary compensation processing, and providing inertial data in an orthogonal reference frame. Developed and manufactured in France, the UmiX Series IMUs are among the best ITAR free IMUs on the market.

Applications

Thanks to their compact size and high performance, UmiX Series IMUs can serve a full array of missions and can be mounted on any platform. UmiX is particularly suitable for high end stabilization and pointing within airborne and land sensor payloads (e.g. optronic and radars) or weapons (e.g. turret, RWS, anti-UAV). It can also be used for georeferencing and targeting purposes. On top of that: one of the key benefits of UmiX Series' unrivaled performance for its category is the ability for the IMU to be used for navigation purposes. UmiX Series fits in both tactical and short-term navigation classes of IMUs.

Easy to integrate and highly versatile, its powerful sensors can provide data to vehicles such as autonomous shuttles, cars, trains, industrial vehicles, helicopters, ROVs, and UAVs. It can even be used on pipe inspection, tunnelling and mining devices/vehicles, gimbals... AGVs, all the way up to missiles, torpedo, and rockets. There's no limit to the applications that UmiX Series can address.

IXBLUE'S LONG EXPERTISE WITH FOG TECHNOLOGY HAS MADE POSSIBLE THE MINIATURIZATION OF THE SENSORS WHILST ACHIEVING BEST OF CLASS PERFORMANCES.

Technology

FOG technology is at the heart of UmiX. iXblue's expertise in this domain is renowned, as it has been developed, optimized, and fully mastered by iXblue's teams over the past 30 years. Furthermore, iXblue designs, develops, and produces all critical sub-assemblies within its facilities, from the optical fiber to electro-optical modulators.

iXblue's long expertise with FOG technology has made possible the miniaturization of the sensors whilst achieving best of class performances. This solid-state technology is highly reliable and has great qualities for both gyrostabilization (bandwidth, latency, noise) and navigation applications (long term performance, undisturbed by mechanical solicitations).

As well as the FOG, UmiX's also incorporates iXblue's own iXal-S vibrating quartz accelerometers. They have great dynamic characteristics, guaranteeing the system's performance even in the harshest of environments.

Key features

iXblue develops and manufactures all key components of the sensors, enabling miniaturization whilst assuring continuous performance improvements. UmiX is free of ITAR components.

One of the main goals for iXblue in UmiX development was to produce an IMU that retains the high performance and north seeking capabilities that come with FOG, in a

more compact size. UmiX has an in-run bias of 0.03 °/h and a bias residual of 0.2 °/h, fitting in both tactical and short-term navigation classes of IMUs.

Its vibrating quartz accelerometers have a dynamic range of -100 g max, with navigation grade bias and scale factor, mostly unrivaled on such class of IMU.

This high degree of performance fits in a Ø88.9 × H75 mm device that has a low nominal consumption of 4 W, 7 W at peak. Efforts were also made to ensure proper cooling to avoid sensor damage. This results in UmiX being a small, robust, and high performance IMU.

UmiX is easy to integrate.

It boasts a single supply voltage, flexible digital output with adjustable baud and data rates, synchronous or asynchronous serial transmission, with synchronization top available. UmiX embed all the signal processing to provide ready to use inertial data: sensors are fully compensated, presented in an orthogonal frame at a reference point.

Thanks to its two mounting options and an hermetical casing, UmiX can be integrated onto any platform and still retain maximum reliability (MTBF of 120,000 hours) and long term performance. ■

UmiX Series

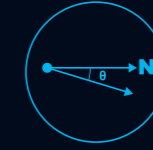
COMPLETE RANGE OF FIBER-OPTIC GYROSCOPE INERTIAL MEASUREMENTS UNITS

KEY PERFORMANCE IN NAVIGATION

- Autonomous and static alignment
- Capable of high heading precision (up to 0.3° seclat RMS)
- Long term performance stability
- Resilient to long GNSS dropout

KEY PERFORMANCE IN STABILIZATION

- Fast and accurate alignment
- High bias stability over the long run
- Very high reliability
- Adapted to harsh environments
- Low cost of ownership
- No periodic maintenance



	UmiX U5	UmiX U9
FIBER-OPTIC GYROSCOPES		
Dynamic	± 490 °/s	± 3000 °/s
Angular Random Walk	0.01 °/√h	0.01 °/√h
Bandwidth	> 5 kHz	> 5 kHz
Latency	200 μs	200 μs
In Run Bias	0.03 °/h 1σ	0.03 °/h 1σ
Residual Bias	0.2 °/h 1σ	0.2 °/h 1σ
Scale Factual Error	40 ppm 1σ	40 ppm 1σ
VIBRATING QUARTZ ACCELEROMETERS		
Dynamic	± 30 g %/s	± 100 g %/s
In Run Bias	<5 μg 1σ	<5 μg 1σ
Residual Bias	100 μg 1σ	100 μg 1σ
Scale Factual Error	40 ppm 1σ	40 ppm 1σ
INTERFACES		
Volume	ø 88.9 × H75 mm	ø 88.9 × H75 mm
Weight	< 770 g	< 770 g
Power Supply	+ 5 V DC	+ 5 V DC
Power Consumption	4 W nominal (7 W peak)	4 W nominal (7 W peak)

02

CUSTOMER STORIES

P.32
**EUROPEAN LEADER
IN NAVAL NAVIGATION**
Major successes in 2020

P.36
WEIBEL RADARS
Advans Vega onboard

P.38
**MINE COUNTER-
MEASURE VESSELS**
*iXblue equipping Belgian, Dutch,
and Polish navies*

P.44
DRIX IN THE US & FRANCE
Acquisition by the NOAA and trials by the SHOM



IXBLUE CONFIRMS ITS POSITION AS THE **EUROPEAN LEADER** IN **NAVAL NAVIGATION** IN 2020

The past year has been highly successful for iXblue's inertial navigation systems and Navigation Data Distribution & Computation Systems (NDDCS) that have been chosen by navies worldwide to equip their fleets. A major vote of confidence for iXblue's navigation technology, that keeps strengthening the company's position as a leader on the naval market and opens the door to other great successes.

**IXBLUE IS PROUD TO EQUIP
A WIDE ARRAY OF VESSELS,
PROVING THAT FOR EVERY
MISSION, IXBLUE
HAS A SOLUTION.**

- JEAN-MARC BINOIS, SALES DIRECTOR

Spanish Navy to Equip their F110-Class multi-mission Frigates with iXblue's Marins INS

A big milestone for the year 2020 is the contract sealed with Spain Directorate General for Armament and Material (DGAM) and the Spanish Navy, to provide Marins Series INS and Netans Series Naval Data Distribution and Computation Systems (NDDCS) to the brand new F110-Class multi-mission Frigates. Being developed by Navantia for the Spanish Navy, the multi-mission frigates and their anti-submarine warfare capabilities will be used for missions such as fleet protection and maritime security and will be deployed to counter conventional and asymmetric threats. The first frigate is expected to be deployed in 2026 while the remaining four will be delivered up until 2031. "The F110-Class multi-mission Frigates is a major European program that will meet the most demanding operational requirements in the naval industry. The advanced F110 frigates are indeed going to be equipped with the most advanced technologies available to naval platforms today and will need to be able to face cybersecurity challenges, as well the threats posed by the spoofing and jamming of GNSS signals", explains Carlos Lopes, Regional Sales Manager. "Our technology being already used on previous Spanish retrofit programs and having received very positive feedback from the crews, the Spanish Navy knew that our systems would meet their requirements for robustness and performance. Overall, to be chosen for such a program, that will take Spain naval capability to a whole new level, is a great endorsement of our technology and bodes well for other future naval opportunities."

French Navy's Defense and Intervention Frigates gets its first Marins INS

September 2020 saw the visit of the French Minister of the Armed Forces, Florence Parly, at iXblue headquarters in Saint-Germain-en-Laye. A visit during which the very first Marins cybersecure navigation system intended for the French Navy's Defense and Intervention Frigate (FDI) was delivered. It was back in November 2017 that iXblue Marins INS and Netans NDDCS were selected by Naval Group to equip the FDI state-of-the-art program for the renewal of French naval forces. With a delivery planned at the end of 2023, the five FDI frigates will be a new breed of digitally enabled vessels and will benefit from the most advanced

technology available to naval forces today. After years of a long-standing collaboration on several export programs, this was the first time that iXblue technology was chosen by Naval Group to equip a major new-built combat vessel intended for the French Navy.

The delivery of this first Marins inertial navigation system in the presence of the French Minister of the Armed Forces was thus a major milestone for both iXblue and Naval Group. Upon receiving the first Marins INS in September 2020, Olivier de la Bourdonnaye, Naval Group Program Director, said: "We are very pleased to have iXblue among our partners for this "all-digital" frigate program, the new generation frigates for the French Navy. We know we can count on their cutting-edge expertise in the field of navigational calculations and cybersecurity to equip defense and intervention frigates with the best possible systems, meeting the needs of the French General Directorate of Armament (DGA)."

iXblue onboard the Norwegian Coast Guard's new P6615 Jan Mayen class vessels

Most recent successes on the naval market include the choice, by Vard Group A/S, to select iXblue navigation technology to equip the Norwegian Coast Guard's new P6615 Jan Mayen class vessels. The Marins Series Inertial Navigation Systems (INS), Quadrans Gyrocompasses and Netans Navigation Data Distribution & Computation Systems (NDDCS) will thus equip the new series of vessels expected to be delivered in 2022.

"We're very proud to be supporting the Norwegian Coast Guard in securing Norway's exclusive economic zone (EEZ), internal and territorial waters." States Regis Blomme, Sales Director at iXblue. "The arctic zone, in which the new vessels will operate, is a very challenging environment and our Fiber-Optic Gyroscope (FOG) based INS and Netans NDDCS have already proven to offer highly accurate, resilient, and secure navigation in such Northern latitudes. We are particularly thankful for Vard strong vote of confidence in our technology and look forward to our collaboration with them."

French Navy Trusts iXblue for the Navigation of its Future BRF Supply Vessels

iXblue was selected by Naval Group to provide navigation systems to the four future tankers for the French Navy. Phins navigation systems and Netans navigation data distribution & computation systems will thus equip the future logistics support vessels, as part of the "Logistics Fleet" program (Flotte Logistique (FLOTLOG)) led by the European Organization for Joint Armament Cooperation (Organisation Conjointe de Coopération en matière d'Armement (OCCAR)) on behalf of the French Defense Procurement Agency DGA, and its Italian counterpart, NAVARM. This contract reinforces a long-standing collaboration with Naval Group, iXblue navigation solutions having already been selected by the defense contractor for French and export programs.

"The BRFs are an essential strategic component of the naval operations of France and its allies. They will enable the French Navy to operate at sea in theaters of operations far from the mainland or from support bases", explains Benoit Kerouanton, Head of iXblue's Navigation Division. "Reliable, resilient and high-performance navigational data is therefore essential to the success of the operations of these ships, on which the autonomy of French Navy combat vessels and aircraft depends. Our Phins navigation systems and our Netans navigation data distribution & computation systems satisfy this need for reliability and performance perfectly, whatever the environment, including in GNSS-denied situations. It is a source of pride for our company to have been selected by Naval Group and to continue to play a role in France's defense capacity by providing navigation systems to these four new BRFs."

Argentine Navy's new OPV87 offshore patrol vessels Powered by iXblue's Marins INS and Netans DDU

Kership, a joint venture founded by Naval Group and Piriou, and specializing in military shipbuilding, has selected iXblue navigation solutions to equip the three new offshore patrol vessels (OPV 87 type) being built for the Argentine Navy. The Marins inertial navigation systems and Netans NDDCS will provide the navigation for these three future ships. Already a partner of Naval Group and Piriou on various naval programs such as the future defense and intervention frigates (FDI) and multi-mission ships (B2M) of the

French Navy, this is the first time that iXblue navigation systems have been selected by shipbuilder Kership.

"Kership's choice of iXblue solutions for the navigation systems of the three new patrol vessels currently under construction is a source of pride for our group. These ships will join the Drummond-class corvettes (A69 type), Intrepida-class guided-missile patrol boats and MEKO-class Rosales frigate of the Argentine Navy which are already equipped with our technology," explains Jean-Marc Binois, Sales Director. "This contract is an endorsement of the reliability and performance of our technology, already adopted by more than 40 navies around the world."

Onboard more than 650 surface vessels and submarine platforms, the Marins navigation systems and Netans data distribution & processing units precisely meet the exacting requirements of the most modern combat ships. Based on iXblue fiber optic gyroscope technology, the Marins inertial navigation systems offer very high performance and provide highly accurate position, heading, roll, pitch and speed information in any environment, including when GNSS signals are inaccessible or jammed.

A central component of the navigation system, the Netans DDU interfaces directly with the ship's sensors, acquiring, analyzing, correlating and distributing data to all onboard systems. The Netans Series provides robust, consistent and accurate navigation information in the most challenging operating environments, while addressing the cybersecurity challenges faced by the world's leading navies.

Over 172 Quadrans to be Delivered by iXblue for the Swedish Navy's fleet of CB90 combat boats

It is no less than 172 Quadrans gyrocompasses that will be delivered in the next 4 years to the Swedish Navy to equip their fleet of high-speed crafts, mainly combat boats CB90. Those vessels, that can be used for reconnaissance, surveillance and intelligence gathering operations, indeed need the most reliable and accurate heading and attitude data to navigate safely. The Navigation division's Quadrans offering the required performance, as well as exceptional reliability, it was considered as the go-to technology by the Swedish Defence Materiel Administration (FMV). A major victory for iXblue, as the series of CB90 boats are currently in use by multiple naval forces in

Swedish navies SB90



Northern Europe, Malaysia and Latin America. A major victory for iXblue, as the series of CB90 boats are currently in use by multiple naval forces in Northern Europe, Malaysia and Latin America.

"Our technology is a perfect fit for those countries that want to bring maintenance costs down for those vessels, while keeping a high level of performance," explains Regis Blomme, Regional Sales Director. "Inertial systems are also key in the Northern Europe region, where vessels cannot rely on GNSS signals that keep being jammed and spoofed. The fact that our Quadrans have been selected by the Swedish Navy is a big vote of confidence and we hope it will open the door to new contracts with other countries in Northern Europe, Malaysia and Latin America." ■



ADVANS VEGA FOR THE INTERNATIONAL RADAR MARKET

**THROUGH A CONTRACT WITH DANISH
RADAR MANUFACTURER WEIBEL
SCIENTIFIC, IXBLUE ADVANS VEGA
INS WILL BE USED FOR RADARS FOR
A NEW MOBILE, GROUND-BASED
AIR DEFENSE SYSTEM FOR THE
INTERNATIONAL MARKET.**

6 Advans Vega INS were delivered this year to Weibel Scientific, a Danish engineering company specialised in the design and manufacture of doppler radar systems. This is part of a contract won by KONGSBERG. The unique capability of Weibel's ground-based air defense radars is to detect and track very low-flying, small and slow (LSS) drones at a long distance. Developed by Weibel for the Indonesian Air Force in 2016, this pioneering technology is a combination of surveillance and high-precision tracking.

Based on the FOG technology, iXblue Advans is an Inertial Navigation System (INS) designed for military applications requiring mobility and high accuracy. It provides immediate and continuous navigation and pointing information for radars, topographic systems and artillery launchers, howitzers and multiple rocket launchers. In this particular case, the Advans INS will assist the mobile air defence system which will be a solution with unique capabilities to combat modern airborne threats, as well as having the ability to integrate with networks with other sensors and weapons. The vehicle is highly mobile and strategically important for manoeuvre operations, it is ideal as a short-range air defence system which links in with current air defence capabilities, to include its C2 command and control. The INS forms part of the integral decision making as the fire control system collects real-time data, to support user decisions at speed and under pressure.

Neil Perriton, Sales for the Nordics market explains: "Weibel was impressed by the high performance of the INS during trials in Denmark and iXblue coordinated with KONGSBERG for the easy integration of the INS in the system architecture, which is now leading onto varied opportunities in the Scandinavian region. Due to the current threat picture increase, with spoofing and jamming, iXblue INS is now changing the way the land environment thinks and engages with enemy rather than traditional methods.

"We are very happy to enter the Scandinavian market for the land defence Advans product range. The Nordic armies are renewing and upgrading their equipment, and they now understand the need to have a NEW alternative solution to GNSS for their combat platforms whether radar, wheeled or tracked vehicles. With GNSS occurring more often on the battlefield, iXblue INS provide secure, accurate and reliable information to the platform, that can confirm their situation awareness and quickly and safely engage a target within seconds", adds Neil.

"iXblue now have a number of successful contracts secured in the Nordic countries (including Nexter's Caesar 155 Artillery piece for the Danish Army), we are confident that our products are now recognized by more militaries, as a strategic equipment we expect more orders coming in from this region due to the number of ongoing trials." ■

“
**OUR PRODUCTS ARE NOW RECOGNIZED BY
MORE MILITARIES AS A STRATEGIC EQUIPMENT**

- NEIL PERRITON, SALES FOR NORDICS MARKET

“



MINE COUNTER MEASURE VEHICLES:
IXBLUE TO ENSURE
SAFE
NAVIGATION
FOR BELGIAN, DUTCH AND POLISH NAVIES

MINE COUNTER MEASURE VEHICLES ARE INCREASINGLY USING UUVS AND USVS CARRIED BY A MOTHERSHIP TO DETECT MINES. INDEED, THEY CAN SURVEY AN AREA AND APPROACH POTENTIAL THREATS WITHOUT ENDANGERING THE CREW AND MAIN VESSEL.

Belgian & Dutch Mine Countermeasure Vessels Equipped with iXblue's Sonar and Navigation Technologies

The Belgian and Royal Netherlands Navies, recognized worldwide for their mine warfare expertise, are to be the first to deploy an unmanned systems-based Stand-off MCM capability to detect, identify, classify and neutralize sea mines. This innovative solution for robotic mine warfare will be developed by Belgium Naval & Robotics, a joint consortium formed by ECA Group and Naval Group. And iXblue naval technologies have just been tapped for what has been described as the largest European contract in naval robotics for the past 50 years.

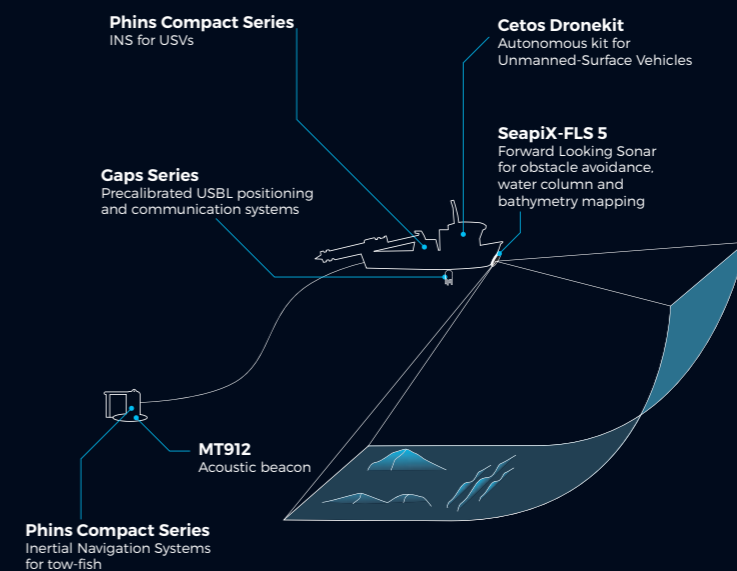
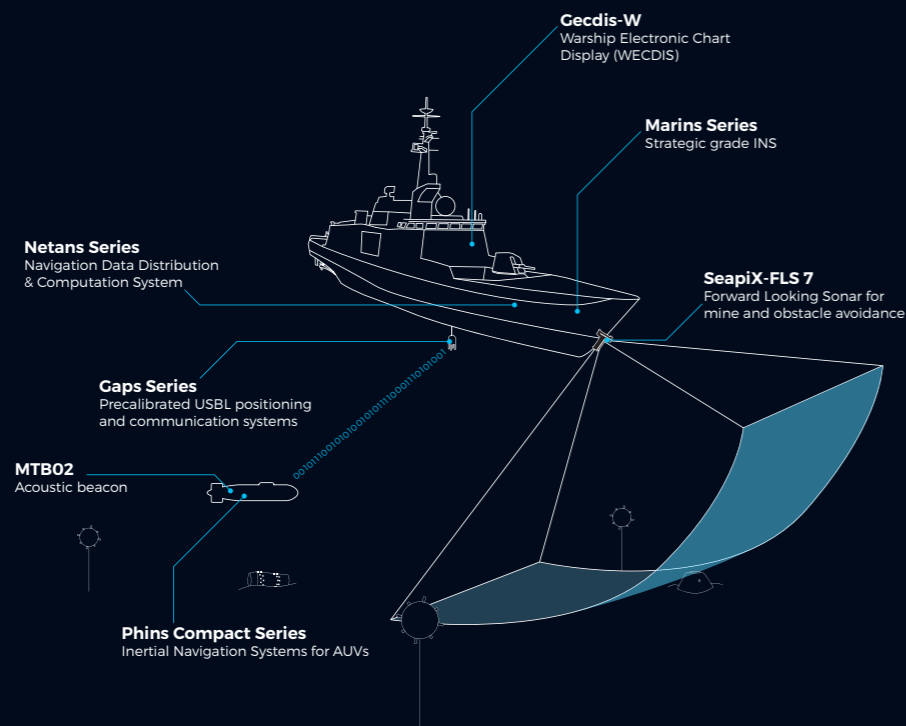
This cutting-edge solution will include 12 new generation minehunters developed by Naval Group and equipped with a Toolbox from ECA Group. This toolbox will consist of a variety of aerial, surface and underwater drones that will be deployed to perform autonomous mine clearance missions at sea. By combining the

latest generation of warships and a system of drones to counter mine risks at sea, this new innovative concept will keep humans out of danger, while ultimately increase the efficiency of MCM operations.

It is to assist ECA Group Toolbox drones in their missions and ensure their navigation, obstacle detection and avoidance, as well as subsea tracking and communication, that iXblue technologies have first been chosen.

SeapiX-FLS 5 Forward Looking Sonars, developed by the teams in La Ciotat, will thus be mounted on ECA Group USVs to perform obstacle avoidance, as well as real-time mapping, ensuring safety of navigation for the USVs.

The Acoustic division high-performance Gaps M7 USBL positioning and communication system and its respective transponders and beacons will also be mounted on the USVs and on the MCM ship of Naval Group to allow tracking of the AUVs and towed sonars. They will also ensure underwater communication



between the AUVs and the USVs or the ships. The Phins Compact Series of Inertial Navigation Systems developed by the teams in Saint-Germain-en-Laye will be providing highly accurate and robust navigation to ECA Group USVs, subsea drones and towed sonars.

“We are very pleased to partner with iXblue, a leading expert in the field of navigation, subsea positioning and imagery.” said Jean-Louis Sambarino, Program Director at ECA Group. “Our respective domains of expertise are complementary and our teams have already been working efficiently in the past. It is an important partnership for us and I am confident in the realization of our next steps within the Belgian-Dutch MCM program.”

Not only has iXblue naval navigation technology been chosen for ECA Group's toolbox, it will also be providing critical navigation capabilities to Naval Group new fleet of Mine Counter Measure (MCM) vessels, ensuring safer operations and bringing real superiority to the Belgium and Dutch Navies. On top of Inertial Navigation Systems, SeapiX-FLS 7 Forward Looking Sonars will be equipping each of the 12 new vessels, providing extremely accurate real-time mine and obstacle detection, as well as analysis of the seabed and detected objects, ensuring the protection of the MCM vessels and their crews.

“For our navigation and sonar technologies to be chosen to be onboard such a cutting-edge robotic mine warfare program is a major endorsement. It is furthermore worth noting that iXblue is now providing the entire navigation solutions for this innovative MCM program, from the surface vessels, to the USVs, AUVs and towed sonars,” States Jean-Baptiste Fruchart, Regional Sales Manager. “By providing resilient navigation and positioning, as well as extremely accurate real-time mine and obstacle detection and analysis of the seabed and detected objects, we are now offering a comprehensive and fully integrated navigation solution for naval forces that will help protect the MCM vessels and their crews. This will in turn ensure safer operations and bring real superiority to the Belgium and Dutch Navies. With many more MCM programs planned in the coming years, this bodes well for our naval technologies that could become the standard solutions for such programs.”

Polish Navy's Kormoran II to Benefit from High Performance Navigation Thanks to iXblue's INS

iXblue Inertial Navigation Systems have been selected to provide critical navigation capabilities to the Polish Navy's new-build Kormoran II class mine countermeasure vessels (MCMV). iXblue partner, THESTA, will be responsible for integrating and delivering the INS to PGZ Stocznia Wojenna, a member of the PGZ Group, the leading contractor of naval navigation, communications and combat systems in Poland.

Developed as part of the Polish naval modernization program, the new class of modern mine countermeasure vessels will improve maritime safety and security in Polish waters. The vessels will be used to combat naval mine threats in the Polish exclusive economic zone (EEZ) and will also be deployed by the tactical task forces in the Baltic Sea and North Sea regions.

“The Kormoran II Class vessels are an innovative mine hunting program that will embark advanced technologies and we are very proud for our Inertial Navigation Systems to have been chosen for such major program.” States Jens Higgen, Sales Director, at iXblue. “Equipped with our inertial navigation systems, the Polish Navy new vessels will benefit from reliable, robust, and highly accurate navigation information, regardless of the environment, including within GNSS denied areas, ensuring uninterrupted mine countermeasure operations.” ■



FOR OUR NAVIGATION AND SONAR TECHNOLOGIES TO BE CHOSEN TO BE ONBOARD SUCH A CUTTING-EDGE ROBOTIC MINE WARFARE PROGRAM IS A MAJOR ENDORSEMENT. IT IS FURTHERMORE WORTH NOTING THAT IXBLUE IS NOW PROVIDING THE ENTIRE NAVIGATION SOLUTIONS FOR THIS INNOVATIVE MCM PROGRAM, FROM THE SURFACE VESSELS, TO THE USVS, AUVS AND TOWED SONARS

- JEAN-BAPTISTE FRUCHART, REGIONAL SALES MANAGER

DRIX UNMANNED SURFACE VESSEL

TRUSTED BY US AND FRENCH NATIONAL HYDROGRAPHIC DEPARTMENTS

DRIX, IXBLUE'S UNMANNED SURFACE VEHICLE (USV), IS STILL SAILING FORWARD. PRODUCED AT LA CIOTAT'S SHIPYARD, IT IS GAINING RECOGNITION AMONGST SOME OF THE FINEST INSTITUTES AND HYDROGRAPHIC SERVICES. LATELY, IT WAS THE AMERICAN NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) AND THE FRENCH SERVICE HYDROGRAPHIQUE ET OCÉANOGRAPHIQUE DE LA MARINE (SHOM) THAT TOOK INTEREST IN DRIX.





DriX
Unmanned
Surface Vehicle

Thanks to great maneuverability and a gondola that can carry a wide range of sensors (made by iXblue or third parties), DriX can be used for multiple defense applications, such as seabed cartography, mine detection or surveillance.

DriX acquired by NOAA' Ocean Exploration Cooperative Institute

The Ocean Exploration Cooperative Institute (OECI), funded by NOAA's Office of Ocean Exploration and Research (OER) recently signed a purchase contract to acquire a DriX Unmanned Surface Vessel (USV) from iXblue. Signed over the summer of 2020, this contract consists of one DriX USV along with a novel custom-designed Universal Deployment System able to launch and recover the USV as well as other AUVs. The autonomous solution is expected to be put to sea by mid-2021.

Along with the innovative Universal Deployment System, other features that led to the selection of the DriX were its mission endurance, ability to operate at high-speed and excellent offshore seakeeping ability.

"The ability to launch and recover unmanned surface vessels as well as other autonomous systems like AUV's from the same launch and recovery system allows us to support a range of collaborative ocean exploration operations from a single research vessel, said Larry Mayer, Director of the Center of Coastal and Ocean Mapping and the University of New Hampshire's co-PI on the Ocean Exploration Cooperative Institute. "With these collaborative, multi-vehicle operations we hope to greatly expand the footprint and efficiency of ocean exploration."

The University of New Hampshire will operate the new DriX. The Ocean Exploration

Cooperative Institute is funded by NOAA's Office of Ocean Exploration and Research and is hosted at the University of Rhode Island in partnership with the University of New Hampshire, the University of Southern Mississippi, the Woods Hole Oceanographic Institution, and the not-for-profit Ocean Exploration Trust. This new five-year alliance is envisaged to extend NOAA's reach and capabilities for its ocean exploration portfolio.

"We want to thank NOAA for trusting iXblue in being part of their new unmanned systems strategy," states Marine Slingue, VP at iXblue, Inc. "We look forward to our continuous partnership and to helping them expand the development and operations of unmanned maritime systems in the U.S. coastal and world's ocean waters."

DriX trials by the SHOM

Shom, the French Navy's Hydrographic and Oceanographic service, conducted a test campaign of iXblue's DriX Unmanned Surface Vessel (USV) and its launch and recovery system (LARS) on board the Beautemps Beaupré (BHO) hydro-oceanographic vessel. iXblue's USV was tested in line with the "Future Hydrographic and Oceanographic Capacity (CHOF)" program, conducted by the French Directorate General of Armament (DGA) with the support of Shom. DriX assessment consisted in evaluating the added value and hydrographic performance of Unmanned Surface Systems compared to the existing launches and vessels currently in service, as well as in understanding the potential concept of use of such drones.

These tests, carried out under a contract between the French DGA and iXblue, consisted of bathymetric surveys reaching various depths (up to 200 m), with the aim of qualifying the overall performance of the DriX

USV. Several Shom reference areas were surveyed, attesting of the bathymetric data quality, even at high speeds (up to 14 knots) and in rough seas. Its autonomy (up to 10 days) enabled a total of over 2,000 km of survey lines to be completed during these trials.

The multiplication of Shom's hydrographic capacities, thanks in particular to the simultaneous use of several USVs, was also successfully tested for the first time. Two DriX were thus deployed simultaneously within survey areas close to the shore and worked both independently and collaboratively with the BHO Beautemps-Beaupré.

The intrinsic qualities of the DriX USV, such as its positioning and navigation capabilities, were also tested (anti-collision, stability, speed of execution, endurance, ability to navigate and work in high sea states, etc.).

"We are extremely proud to have carried out these DriX tests with Shom, the DGA and the French Navy as part of the CHOF program, and to have reached new milestones together, in particular the hydrographic work with several USVs," said Guillaume Eudeline USV and boats Business Development Manager at iXblue. "We would like to thank the Shom and the crew of the Beautemps-Beaupré for their unfailing investment and for the positive reception given to our USV during these trials, which were, from our point of view, a real success. » ■

