



PME Mare Srl – Klik EVO

Invisible Mooring Buoy System

European Patent EP4091929B1

Smart mooring system with invisible buoys for marine areas and buoy fields

Technology, visual order, environmental protection, and advanced mooring control

Klik EVO introduces a new generation of mooring infrastructure: intelligent, motorized, and controlled buoys designed to remain submerged when not in use and resurface only when needed. An advanced system for buoy fields, marinas, nautical resorts, and environmentally sensitive areas.

Project Vision

A new generation of intelligent moorings

Klik EVO is a mooring system with intelligent, motorized buoys, conceived to simplify, speed up, and improve the safety of the buoy pick-up maneuver by vessels. The system principle is simple yet highly innovative: the buoy does not remain permanently visible on the surface but can stay submerged and resurface in a controlled manner only when required.

In this way, the buoy field appears more orderly, less exposed to external agents, and visually less intrusive compared to traditional systems. Klik EVO is not designed as a simple nautical accessory, but as a true technological platform for assisted mooring, intended to generate a complete range of products and services for marinas, buoy fields, resorts, sensitive marine areas, professional operators, and distribution partners.

As restrictions on anchoring in sensitive seabeds increase and attention to coastal landscape grows, it becomes increasingly important to adopt authorized, intelligent, low-impact, and environmentally compatible mooring systems. In this context, the value of Klik EVO is twofold: seabed protection and reduction of visual impact.

Klik EVO enables the transformation of a buoy field from a simple passive infrastructure into an advanced, controllable, and differentiating system, capable of improving service quality, the order of the water surface, and the premium positioning of the facility that adopts it.



The problem Klik EVO solves

Why rethink buoy fields

In marine areas, mooring fields, and high-value coastal environments, traditional mooring systems show increasingly evident limitations. Buoys remain constantly visible, impact the landscape, may be subject to unauthorized use, and offer limited levels of control, digital integration, and service differentiation.

In addition, there are growing operational and management challenges:

- significant visual impact ;
- high assistance and maintenance costs ;
- unauthorized use of buoys ;

- limited digitalization ;
- difficulty integrating with booking systems ;
- damage to *Posidonia oceanica* ;

The issue is particularly relevant in areas where free anchoring is progressively restricted in order to protect seabeds covered by *Posidonia oceanica* and other vulnerable marine habitats. In these contexts, buoy fields represent a valid alternative, but they must evolve toward solutions that are more orderly, less intrusive, and easier to manage.



Klik EVO was developed precisely to address this transformation. The system reduces the permanent presence of visible floating elements, enhances operator control, improves the boating experience, and makes buoy fields fully aligned with the environmental, landscape, and operational requirements of more advanced contexts.



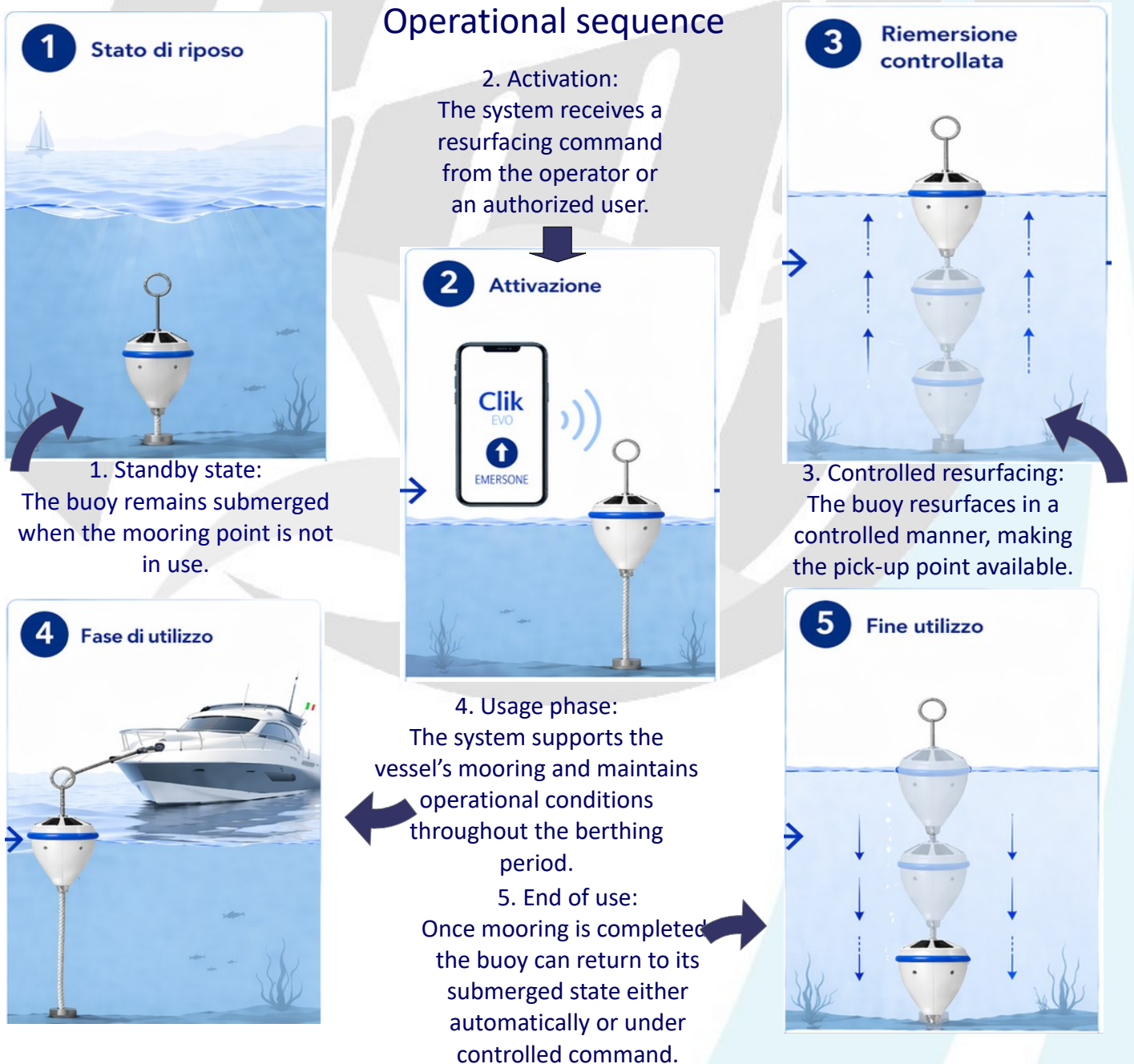
How Klik EVO works

Klik EVO is designed to manage the entire operational cycle of the buoy in a controlled manner. The system allows the buoy to remain submerged when not in use, to resurface on command to make the pick-up point available, to support the vessel during the mooring phase, to maintain operational conditions while moored, and to return below the surface once use is completed.

The technical architecture is based on a watertight floating body housing a cable winding and unwinding system connected to a seabed anchor block. Cable actuation is performed بواسطة an internal motor, with mechanical transmission to a spool.

Inside the buoy, there is an electronic control unit responsible for managing sensors, motorization, operating cycles, and communication with external units. The system can communicate via radio frequency when the device is at the surface and via ultrasonic transmission when submerged. Activation can take place through a remote control unit, a dedicated portable device, a smartphone, or another compatible external interface.

The result is a more advanced mooring infrastructure in which the pick-up point is not continuously exposed at the surface but appears only when authorized, improving visual order, system control, and overall service quality.



System architecture and communication logic



Clik EVO is based on a two-level intelligent architecture: operational sinking buoys and a pilot buoy for supervision and communication.

The sinking buoys, equipped with a pole and mooring eye, are the elements that perform the mooring function: they remain submerged when the mooring point is not in use and resurface in a controlled manner only when necessary. These devices communicate exclusively with the pilot buoy.

The pilot buoy is the central node of the system. It remains permanently afloat, is powered by solar panels, and integrates:

- ultrasonic transducers, for communication with the sinking buoys;
- a Wi-Fi antenna, for connection with external systems.

It is therefore the pilot buoy that connects the buoy field with:

- smartphones via app;
- dedicated handheld devices;
- PCs with control, management, and booking software;
- synoptic panels for operational supervision.

Communication between the pilot buoy and external devices always takes place via Wi-Fi, while the connection with the sinking buoys is managed through the dedicated communication system defined by the project.

This architecture allows all connectivity and supervision functions to be concentrated in the pilot buoy, while the sinking buoys are responsible for executing the operational functions of surfacing, submerging, and mooring. The result is a more orderly, manageable system that can be more easily integrated with selective control logic and advanced services.

Operational continuity

The dedicated handheld device is not only a tool for standard management, but can also be used to directly command the resurfacing and submersion of the buoys in the event of a sudden failure of one or more pilot buoys. In this way, the system can continue operating even under abnormal conditions, ensuring service continuity and higher operational reliability.



Hooking function and rope detection

One of the most distinctive features of Klik EVO is its hooking function, designed to make buoy retrieval simpler, more accessible, and consistent with an advanced mooring experience. The system includes a service pole, at the top of which the mooring eye is positioned. The purpose of the pole is to bring the hooking point closer to the user during manoeuvring, improving system accessibility and facilitating interaction with the vessel.

This design choice is not only mechanical in nature but is driven by a precise usage logic: reducing the time required to secure the buoy, increasing user convenience, and simplifying operations in contexts where speed and operational comfort are an essential part of service quality.

Klik EVO also integrates a rope detection function based on periodic rotation of the pole and measurement of resistive torque. An increase in torque compared to the reference value is interpreted as the presence of a mooring line. However, rope detection is not limited to the hooking phase: it also enables the system to recognize the end of the mooring operation and automatically command the buoy to submerge, without requiring operator intervention after each use.

The same function also allows the actual buoy status to be linked to the authorized usage time. If the mooring period exceeds the paid duration, the system can signal a case of unauthorized occupancy to the operator, both on the dedicated handheld device and on the management and control software.

The hooking and detection function therefore represents a strategic component of the system, as it directly affects usability, operational reliability, and perceived value of the solution. It is not a simple structural detail, but a key element of the Klik EVO experience.

Service pole with mooring eye:

Brings the mooring point closer to the user during manoeuvring.



Periodic pole rotation:

The system performs a controlled scanning cycle to detect the presence of the mooring line.

Rope detection:

An increase in resistive torque compared to the reference value indicates the presence of the mooring line.



Sensors, control, and communication

Onboard intelligence and advanced operational cycle management

Clik EVO is designed as an intelligent mooring system, equipped with a control logic capable of managing the buoy's surfacing, usage, and re-submersion cycles. For system supervision and operational cycle control, it integrates several types of sensors, including:

- pressure sensor;
- level sensor;
- winding system position sensor;
- twilight sensor;
- mooring line presence sensor;
- GPS module for georeferencing the anchoring point within the bay.

In addition, the system includes visual and acoustic signalling devices, as well as a programmable timing function for managing the surfacing and submersion phases. The goal is to make the buoy monitorable, controllable, and integrable into a broader infrastructure management framework.

The GPS data enables identification of the anchoring point and its use for both operational management and user interaction. Through the app, boaters can locate their assigned mooring point and be guided to the correct buoy. The same information also enables surfacing only when the user is within a controlled distance window—between 15 meters and 30 meters—so as to prevent collisions during resurfacing and allow activation only under correct approach conditions.

Georeferencing also introduces an advanced safety function: the system can generate an alarm if the buoy moves from its anchoring position, for example due to theft, detachment from the seabed block, or displacement of the anchor itself.

Communication with external systems takes place through different technologies depending on the device's operational state, always interacting with the pilot buoy:

- radio frequency, when the buoy is at the surface;
- ultrasonic transmission, when the buoy is submerged.

The system can be interfaced with:

- remote control and management software;
- dedicated handheld device;
- smartphone.

Activation of each individual buoy can occur through unique identification, allowing selection of the desired mooring point within multi-buoy configurations. In this perspective, Clik EVO is not only a motorized floating object, but a connected platform designed for selective control, authorized management, and integration with software, apps, and booking systems.



Sensori integrati



Sensore di pressione



Sensore di livello / presenza liquido



Sensore di posizione del sistema di avvolgimento



Sensore crepuscolare



Sensore presenza linea di ormeggio



Modulo GPS / georeferenziazione punto di ancoraggio



Segnalazione luminosa/acustica



Temporizzazione programmabile



Unità di controllo

Unità elettronica programmabile per coordinare sensori, motore, stati operativi, temporizzazioni e comunicazioni.



ID univoco



Controllo selettivo

For the boater

For the end user, Klik EVO makes mooring simpler, faster, and more orderly. It reduces the stress of manoeuvring compared to free anchoring, improves the perception of safety, and delivers a more advanced user experience, also thanks to the possibility of booking and managing buoy surfacing directly via a smartphone app. In areas where anchoring in the bay is restricted or prohibited, the system also provides a solution that is compatible with environmental protection requirements while offering a higher-level service.

For marinas, buoy fields, and coastal operators

For the operator, Klik EVO enables the provision of a more orderly, technologically advanced infrastructure aligned with the growing focus on seabed protection, *Posidonia oceanica*, and coastal landscape preservation. The system allows free anchoring to be replaced or integrated with a controlled mooring model, reduces the permanent presence of visible floating elements, strengthens the premium positioning of the facility, and opens the way to a more digital, selective, and differentiated management of berthing spaces.

For authorities, public administrations, and sensitive areas

In environmentally or landscape-protected contexts, Klik EVO helps protect vulnerable marine habitats by reducing damage caused by direct anchoring and promoting forms of use that are more compatible with conservation measures already adopted in many regions.

At the same time, it provides a technological solution suitable for areas where the visual impact of offshore installations is subject to increasing scrutiny from a landscape preservation perspective.

For partners and distributors

For industrial partners, concessionaires, and distributors, Klik EVO represents a high-tech proprietary product with strong differentiation and significant growth potential. It is not designed as a simple buoy, but as an integrated smart mooring system, with opportunities for industrialization, accessories, control units, software, and connected services. This increases its commercial value and its ability to generate a complete B2B product line.

In summary, Klik EVO enables the evolution of buoy fields from standard infrastructure into an intelligent system—more controllable, more orderly, and more aligned with the new requirements of the nautical market and sensitive marine areas.





Product configurations: ONE, SENSE, MAX

The three versions of Klik EVO—**One**, **Sense**, and **Max**—do not correspond to three different buoys in the core system, but rather to three commercial configurations derived from the same technical platform. The buoy body, internal mechanics, and base electronics remain unchanged; what varies is the product configuration level, with the aim of creating three clearly defined usage and price segments.

This approach allows for optimized industrial development, streamlined production, and strong product consistency, while at the same time offering a commercial range capable of addressing different targets, from entry-level segments to more advanced and demanding applications.

The product line logic can be interpreted as follows:

Klik EVO One: essential version, designed for standard installations, simplified use, and as the entry point to the range;

Klik EVO Sense: intermediate version, featuring a higher level of system control and intended for most marina and buoy field applications;

Klik EVO Max: the most complete and robust version, designed for more demanding uses, harsher environments, and high-performance applications

It is important to distinguish between:

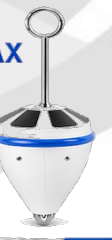
The functional capacity of the surfacing/submersion system, meaning the buoy's ability to manage its own cable, internal mechanisms, and operational cycle;

The mooring capacity of the berth, meaning the load that the overall mooring system can withstand. This value also depends on the deadweight anchor, chain or rope catenary, metocean conditions, and safety factor coefficient.

Configuration	HMPE braided rope	Mooring line sensor	Commercial positioning	Recommended vessel range	Recommended working load on the connection	Reference maximum structural load
One	Ø 10 mm	No	Entry level	boats up to 6–8 m	500–1000 kg	2000–3000 kg
Sense	Ø 14 mm	Yes	Mid range	boats up to 10–12 m	1500–3000 kg	4500–9000 kg
Max	Ø 18 mm	Yes	Top range	boats up to 14–16 m	4000–8000 kg	12000–24000 kg

CONFIGURAZIONI PRODOTTO ONE · SENSE · MAX

Una piattaforma tecnica, tre configurazioni commerciali

PIATTAFORMA TECNICA COMUNE - Corpo del gavitello invariato - Meccanica interna invariata - Elettronica di base invariata	ONE  10 mm SENSE  14 mm MAX  18 mm	VANTAGGI DI GAMMA - Sviluppo industriale ottimizzato - Produzione razionalizzata - Coerenza di prodotto e gamma commerciale estesa
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Cambiano il diametro della cima in trecciato HMPE e la presenza del sensore cima

ONE • Entry level • Ø 10 mm • Senza sensore cima • Installazioni standard	SENSE • Mid range • Ø 14 mm • Con sensore cima • Marina e campi boe	MAX • Top range • Ø 18 mm • Con sensore cima • Impieghi più gravosi
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PORTATA FUNZIONALE DEL SISTEMA Capacità del gavitello di gestire cavo, organi interni e ciclo di immersione / emersione.	CAPACITÀ DI ORMEGGIO DEL POSTO BARCA Carico sostenibile dal sistema di ormeggio complessivo, in funzione di corpo morto, catenaria o cima, condizioni meteomarine e coefficiente di sicurezza.
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Tre configurazioni commerciali ottenute dalla medesima piattaforma tecnica.

The information contained in this brochure is of a preliminary descriptive nature.