



XENTA

Operations Manual

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1 Warnings and limitations

The control station contains a permanent magnet. Do not use any instrument sensitive to magnetic fields close to the control station.

Never open the **XENTA** system units.

Any unauthorized service will void the warranty.

XENTA system allows the pilot to take full advantage of the vessel's intrinsic maneuverability with automatic control. However, pilots are strongly advised to familiarize themselves with all aspects of the vessel's standard operation in all weather conditions.

XENTA reserves the right to make changes in any part or units of its products without any prior notice.

This document contains confidential and proprietary **XENTA** information. Release or disclosure of the information within this document to any third party is not permitted.



2 X-STEER

The **X-STEER** system is designed to help the captain to turn the boat without any stress and preventing him to apply a strong force on the wheel, in such a way allowing the captain to drive even the largest boat. This kind of boats, in fact, are usually equipped with large cylinder that can result very hard to turn, especially in rough seas conditions.

The **X-STEER** system can be installed in single or multi station configuration. In the multi station configuration, it is possible to activate the different control stations in order to drive the boat from the desired dashboard.

In a multi station installation, only one station at time can control the steering system, for safety reasons.

The installation of the **X-STEER** system is much easier than the installation of the most common hydraulic systems.

The **XENTA X-STEER** system can be easily integrated with the existing autopilot system allowing the captain to choose between them at any time he prefers.

The **X-STEER** system also independently controls the rudders in order to achieve the best possible performance of the boat, also moving them independently in case of non-coupled rudders.

The captain has just to turn the steering wheel and the **X-STEER** system will move the rudders in the best position to achieve the requested maneuver.

The angle sensor, connected to each RD unit, constantly acquires the real position of the rudders, allowing the **X-STEER** system to move the rudders according to the position of the steering wheel.

Since it is electronic based, the **X-STEER** system can be tuned according to the desires of the captain. In particular, it is possible to modify the force to apply to rotate the steering wheel and the number of revolution according to the speed of the boat.

A dedicated feature also allows the captain to control the independent rudders as they were mechanically coupled, according to the situation and to the requested maneuver, thanks to a virtual electronic bar.

2.1 Control procedure

2.1.1 X-STEER activation

The **X-STEER** system is automatically activated when turning ON the ignition keys.

The system, after a short start up procedure, is ready to work.

In order to activate the **X-STEER**, it is first necessary to take control from the throttle of the related control station: the helm/ will then be activated and it will then be possible to maneuver the rudders according to the desired maneuver.



When the **X-STEER** system is active and the captain rotates the steering wheel, the system acquires the speed of the boat and automatically changes the number of revolutions and the force to be applied to the wheel.

In this way, the captain can have always the best feeling according to the cruise speed.

If the rudders are not mechanically coupled, the systems also controls them independently in order to always achieve the best performance from the boat. When turning the boat at high speed, for example, it could be necessary to have one of the rudders more turned than the other.

2.1.2 Autopilot activation

When activating the autopilot, the **X-STEER** system automatically sets itself as a bypass, shutting OFF the own signals, in such a way allowing the autopilot to directly control the rudders.

When autopilot is active, it can be deactivated by using the STANDBY button on the autopilot control panel or by simply moving the rudder wheel. In the latter case, the autopilot system may report an error due to the rudders not following the autopilot commands, but rather those of the X-STEER system.

When switching from the **X-STEER** to the autopilot or vice versa, the rudders remain in the last reached position.

2.2 Warnings

The **X-STEER** system allows the captain to perform easily turns while cruising with the vessel. However, pilots are strongly advised to familiarize themselves with all aspects of the vessel's standard operations in all weather conditions.

IT IS ANYWAY ALWAYS CAPTAIN RESPONSIBILITY TO VERIFY THE CORRECT BEHAVIOR OF THE XENTA SYSTEMS INSTALLED ON-BOARD. IF IT IS HIS FEELING THE SYSTEM IS NOT RESPONDING IN THE RIGHT WAY, IT IS HIS EXCLUSIVE RESPONSIBILITY TO STOP USING THE XENTA SYSTEM.

Although the **XENTA** system is able to actuate engines, thrusters, rudders... according to the signals received by the control stations (joysticks, throttle levers, steering wheels...) it is always exclusive responsibility of the customer to verify that the vessel is responding in the correct way.

The maintenance of the **XENTA** system is exclusive responsibility of the operator. **XENTA** is not responsible for any problem related to bad maintenance.

The service on all the **XENTA** products must be performed only by a qualified **XENTA** technician or under the authorization of a qualified XENTA service center. A service performed by an unauthorized technician will void the warranty.

3 X-POWER

3.1 Control panel

The following Figure shows an image of the throttle levers control panel with close detail of its components.



Throttle levers control panel.

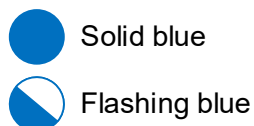
5. SINGLE LEVER button
6. COMMAND button
7. WARM UP button
8. TROLLING button
9. Control indicator – port
10. Throttle indicators – port
11. Gear and mode indicators – port
12. Control indicator – starboard
13. Throttle indicators – starboard
14. Gear and mode indicators – starboard

- **SINGLE LEVER button** (5): it activates the **SINGLE LEVER** mode (prior authorization by **COMMAND** button).
- **COMMAND button** (6): it activates the throttle levers station and allows to confirm the activation of all the other operative modes.
- **WARM UP button** (7): it activates the **WARM UP** mode (prior authorization by **COMMAND** button).
- **TROLLING button** (8): it activates the **TROLLING** mode (prior authorization by **COMMAND** button). The **TROLLING** mode is an optional feature.
- **Control indicator** (9 and 12): it indicates the status of the port/starboard lever and reports the errors.
- **Throttle indicators** (10 and 13): they indicate the level of throttle requested by port/starboard lever. The more throttle is requested, the higher is the number of lights activated.
- **Gear and mode indicators** (11 and 14): In **THROTTLE** mode, they are both ON in solid blue if the port/starboard lever is in neutral. When the port/starboard lever is in forward position, the top one is ON in solid blue and the bottom one is OFF. When the port/starboard lever is in backward position, the top one is OFF and the bottom one is ON. In **SINGLE LEVER** mode they are both ON in solid blue if the control lever is in neutral. When the control lever is in forward position, the top one is ON in solid blue and the bottom one is OFF. When the control lever is in backward position, the top one is OFF and the bottom one is ON in solid blue. In **WARM UP** and **TROLLING** modes they flash giving an indication on the active operational mode.
-

3.2 Signals

The lights on the throttle levers control panel provide information on the operational condition of the system.

In the following sections, the colors of the lights will be indicated as shown below:



3.3 Control procedure

All the main throttle functions are controlled by four different buttons located on the throttle panel: **SINGLE LEVER** (5), **COMMAND** (6), **WARM UP** (7) and **TROLLING** (8). These buttons control the functions listed in the following paragraphs of this manual.

3.3.1 Activating the system (ON)

To activate the **X-POWER** system follow this procedure:

1. Make sure the levers on the control station is in neutral.
2. Turn both engine ignition keys to the ON position.
3. Wait for the system to finish the start-up process. When complete, the system will set itself in **STANDBY** mode.

Make sure to be in a safety condition and turn ON both the engines. The lights on the throttle levers are in the following configuration:



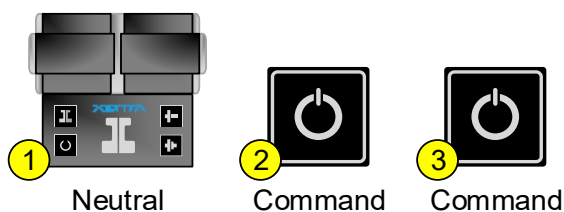
If a throttle station is in **STANDBY** mode, it is not active, thus cannot be used to drive the vessel.

3.3.2 THROTTLE mode (activation of a throttle station)

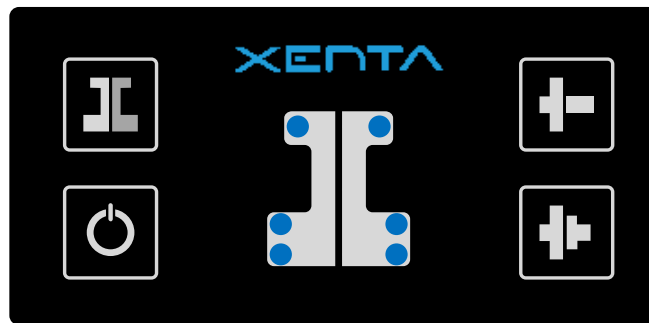
When a throttle station is activated, it is possible to use it to control shifters and rpm level of the engines.

To activate the **THROTTLE** mode, proceed as follows:

1. Make sure the throttle levers are in neutral;
2. Push the **COMMAND** button once;
3. Push the **COMMAND** button again.



Make sure the lights are in the following configuration:



If the throttle levers are not in neutral when activating **THROTTLE** mode, the request will be aborted to prevent the vessel from performing involuntary maneuvers.

If a multi-station vessel is in **THROTTLE** mode and a maneuver is under way, the system will not accept request to change modes from a second station: the active station will remain in command to allow the maneuver under way to be completed.

If the pilot chooses to switch to **THROTTLE** mode in a vessel with more than one station, the other station(s) will be automatically switched to the **OFF** mode.

When moving the levers forward or backward, the lights appear as reported below.



Throttle levers forward



Throttle levers backward

The configuration of the «throttle indicators» changes according to the position of the throttle levers. The more throttle is requested, the more lights are ON.

3.3.3 WARM UP mode

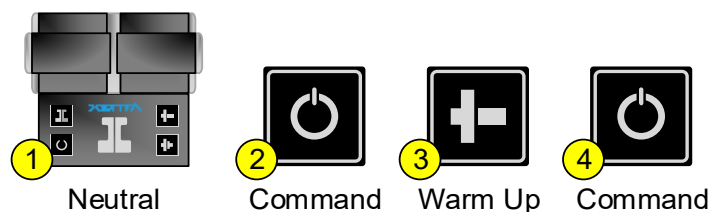
The **WARM UP** mode allows to increase the RPM of both the engines without engaging the gears. For this above reason, it is not possible to drive the boat when in **WARM UP** mode.

The RPM level of each engine is proportional to the displacement of the relative lever.

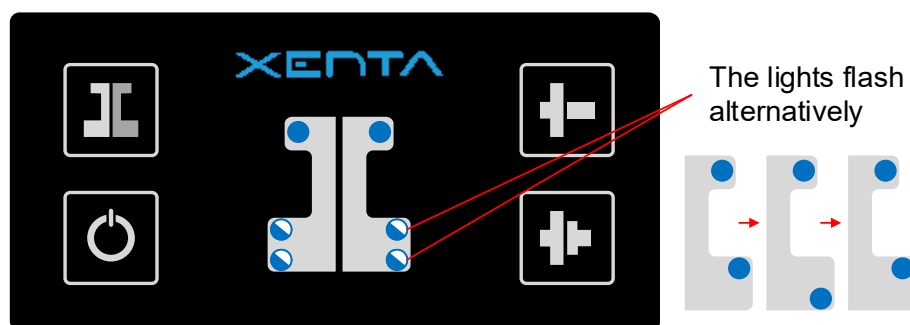
To activate the **WARM UP** mode proceed as follows:

1. Make sure the throttle levers are in neutral;
2. Push the **COMMAND** button;

3. Push the **WARM UP** button to select the **WARM UP** mode;
4. Push the **COMMAND** button to confirm the **WARM UP** mode activation.



Make sure the lights are in the following configuration:



DO NOT ACTIVATE THE **WARM UP** MODE WHEN IT IS REQUIRED TO DRIVE THE BOAT WITH THE THROTTLE LEVERS, WHEN CLOSE TO OBSTACLES OR IN ANY OTHER SITUATION REQUIRING THE PILOT TO DRIVE THE BOAT WITH THE THROTTLE LEVERS.

When **WARM UP** mode is active, the captain must stay close to the throttle levers in order to take activate the **THROTTLE** mode if necessary.

3.3.4 SINGLE LEVER mode

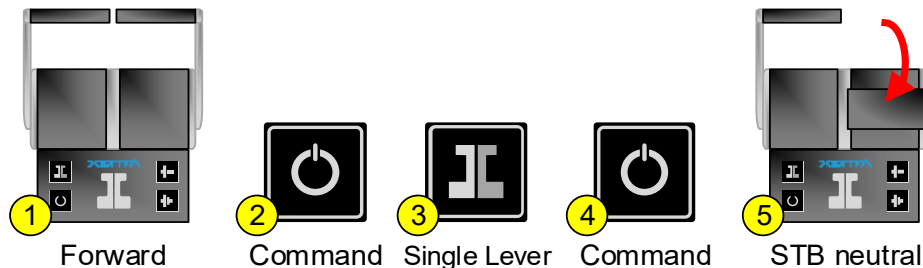
The **SINGLE LEVER** mode allows the captain to control both the engines with just one lever. When activating the **SINGLE LEVER** mode, it is possible to choose which one of the levers will be used to control both the engines.

Use the **SINGLE LEVER** mode only when cruising and do not use it when docking or close to obstacles.

SINCE A SEPARATE CONTROL OF THE ENGINES IS NOT POSSIBLE WHEN THE **SINGLE LEVER** MODE IS ACTIVE, DO NOT ACTIVATE THE **SINGLE LEVER** MODE WHEN DRIVING THROUGH TIGHT CHANNELS, WHEN LEAVING THE DOCK OR IN ANY OTHER MANEUVER REQUIRING A SEPARATE AND ACCURATE CONTROL OF THE ENGINES.

To activate the **SINGLE LEVER** mode and control both the engines with the port lever proceed as follows:

1. Push both the throttle levers in forward position (the level of rpm is not significant);
2. Push the **COMMAND** button to enter the **SELECTION** mode;
3. Push the **SINGLE LEVER** button to select the **SINGLE LEVER** mode;
4. Push the **COMMAND** button to confirm the **SINGLE LEVER** mode activation;
5. Bring back the starboard lever to the neutral position.



Make sure the lights are in the following configuration:



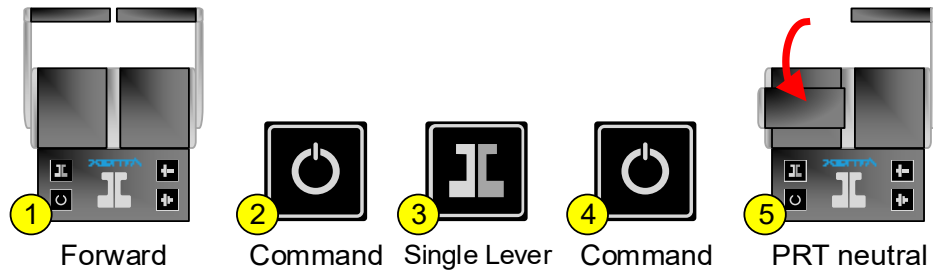
Port throttle lever as control lever – forward

The configuration of the «throttle indicators» changes according to the position of the port lever. The more throttle is requested, the more lights are ON.

To activate the **SINGLE LEVER** mode and control both the engines with the starboard lever proceed as follows:

1. Push both the throttle levers in forward position (the level of rpm is not significant);
2. Push the **COMMAND** button to enter the **SELECTION** mode;
3. Push the **SINGLE LEVER** button to select the **SINGLE LEVER** mode;
4. Push the **COMMAND** button to confirm the **SINGLE LEVER** mode activation;

5. Bring back the port lever to the neutral position.



Make sure the lights are in the following configuration:



Starboard throttle lever as control lever – forward

The configuration of the «throttle indicators» changes according to the position of the starboard lever. The more throttle is requested, the more lights are ON.

3.3.5 TROLLING mode (optional)

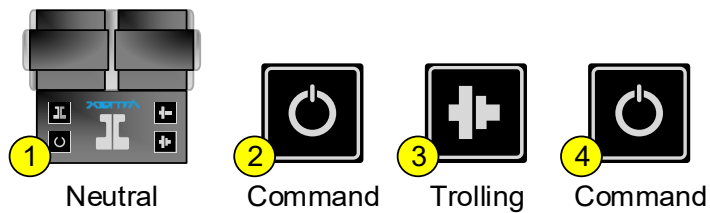
The **TROLLING** mode allows the captain activate the trolling valves while using the throttle levers, in this way smoothing the movement of the vessel.

When in **TROLLING** mode, the maximum reachable level of RPM is limited.

DO NOT USE THE **TROLLING** MODE IN THOSE SITUATIONS REQUIRING A HIGH SPEED FROM THE BOAT.

To activate the **TROLLING** mode, proceed as follows:

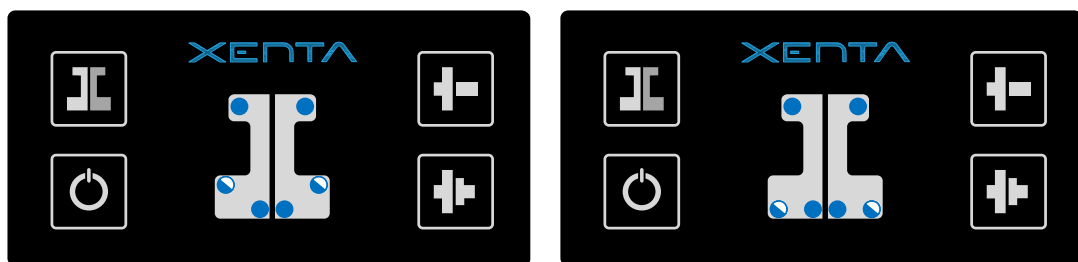
1. Make sure the throttle levers are in neutral;
2. Push the **COMMAND** button;
3. Push the **TROLLING** button to select the **TROLLING** mode;
4. Push the **COMMAND** button to confirm the **TROLLING** mode activation.



Make sure the lights are in the following configuration:



When moving the levers forward or backward, the lights appear as reported below.



Throttle levers forward

Throttle levers backward

The configuration of the «throttle indicators» changes according to the position of the throttle levers. Anyway, it is not possible to have more than one indicator ON for each side, since the maximum level of rpm is limited.

3.3.6 Switching off (OFF)

A throttle lever station automatically switches to **OFF** mode when the paired joystick is set on **MANEUVER** mode or if another throttle lever station is in command.

The system, moreover, automatically switches **OFF** when switching **OFF** both the keys.

4 X-DOCK (option)

4.1 Control panel

The following Figure shows an image of the joystick control panel with close detail of its components.



Joystick panel.

1. Joystick;
2. Command button (C);
3. Thruster button (T);
4. Engine button (E).



- **Joystick (1)**: Controls all maneuvers.
 - **Control status indicator (C) (2)**: A light indicating the operational status of the entire system. Normally blue, it turns red if there is a problem.
 - **Thruster status indicator (T) (3)**: A light indicating the operational status of the thruster. Normally blue, it turns red if there is a problem.
- Engine status indicator (E) (4)**: A light indicating the operational status of the engines. Normally blue, it turns red if there is a problem.

4.2 Signals

The three lights on the **X-DOCK** control panel provide information on the operational condition of the system. They display both the system status and possible faults, providing information for basic troubleshooting:

C :	indicates the overall system status;
T :	indicates operational status of the thruster;
E :	indicates operational status of the engine.

In the following sections, the colors of the lights will be indicated as shown below:



Solid blue



Flashing blue

4.3 Control procedure

All the main **X-DOCK** functions are controlled by the buttons **C**, **T** and **E** located on the control station panel. These buttons control the functions listed below:

4.3.1 Activating the system (ON)

To activate **X-DOCK** follow this procedure:

1. Make sure the joystick on the control station is in **neutral**.
2. Turn both engine ignition keys to the ON position.
3. Wait for **X-DOCK** to finish the start-up process.



4. When complete, **X-DOCK** will set itself in **STANDBY** mode.
Make sure to be in a safety condition and turn ON both the engines.
The lights on the joystick panel are in the following configuration:



If the system is equipped with **DYNAMIC POSITIONING** option, it will take some time to acquire the GPS signal after the start up.

Until the GPS signal is lower than the expected value, the **DYNAMIC POSITIONING** is not available and the lights on the joystick are in this configuration:



While in this configuration, it is still possible to activate the **MANEUVER** or **TILLER-THRUSTER** mode, following one of the following procedures.

The **C** button flashes red in **STANDBY** mode, after the start up, also during the compass initialization.

While the system is initializing the compass, it is not possible to activate the **MANEUVER** mode.

If a **X-DOCK** station is in **STANDBY** mode, it is not active, thus cannot be used to drive the vessel. Activate the station using one of the procedures described in the following sections.

4.3.2 SELECTION mode

The **SELECTION** mode allows the captain to activate the desired operative mode.

To activate the **SELECTION** mode, proceed as described below:

1. Make sure the Joystick is in **neutral**;
2. Press once the **C** button.

Make sure the lights on the joystick panel are in the following configuration:



In the following sections, the described procedures already include the activation of the **SELECTION** mode.

It is possible to choose the desired mode by pressing the **T** button, switching across the different available modes on the top of the display placed on the dashboard, or even just touching the relative button on the display.

The available modes are shown below:



Maneuver mode



Tiller-Thruster mode



Cruise mode

4.3.3 MANEUVER mode

The **MANEUVER** mode allows the captain to control at the same time both the engines and the thrusters, carrying out very complex and precise maneuvers in restricted water with ease.

While performing a side shift in **MANEUVER** mode, the system automatically acquires the information of the heading from the compass and compensates possible undesired rotations caused by wind or current action.

IT IS ANYWAY ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO KEEP FULL CONTROL OF THE HEADING BY COMBINING THE DIFFERENT MANEUVERS ACCORDING TO THE MOVEMENT EXPECTED BY THE VESSEL.

To activate the **MANEUVER** mode, proceed as follows:

3. Make sure the Joystick is in **neutral**;
4. Push the **C** button to enter the **SELECTION** mode;
5. Press again the **C** button to confirm the activation of the **MANEUVER** mode;



Make sure the light indicators start blinking faster until they reach the status shown below



If the joystick is not in neutral when activating **MANEUVER** mode, **X-DOCK** will abort the request to prevent the vessel from performing involuntary maneuvers.

In case of thruster failure or malfunction, the **X-DOCK** will automatically activate the **MANEUVER POWERTRAIN** mode allowing the pilot to control the boat with the engines. This mode provides limited operability.

In case of engine failure it is still possible to activate **TILLER-THRUSTER** mode, controlling the thruster directly with the joystick.



If the pilot chooses to use the lever system to control the main engines directly, **X-DOCK** automatically releases control switching to **TILLER-THRUSTER** mode.

In **MANEUVER** mode, the station is in control and the pilot performs any maneuver within the design limits of the vessel and current, weather and environmental conditions.

By moving the joystick, the vessel moves at a speed proportional to the span of the movement of the lever itself. The more extended the movement of the joystick, the faster the speed of the craft.

IT IS UNDER CAPTAIN'S RESPONSIBILITY TO CHECK ALWAYS THE SURROUNDING WHILE PERFORMING ALL KIND OF MANEUVERS.

The following sections detail **X-DOCK** basic maneuvers and their operation.

4.3.3.1 Forward

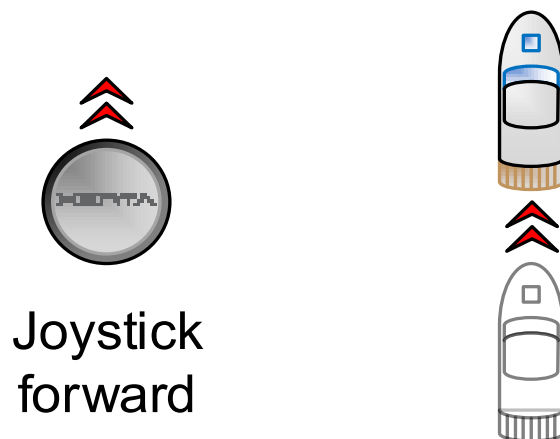
Moving the joystick forwards moves the vessel forward. In addition, the farther forward the pilot moves the joystick, the higher the speed of the vessel.

In the first part of the movement, **X-DOCK** regulates the gearboxes controlling the speed of the craft or, if the boat is equipped with trolling valves, **X-DOCK** controls the level of the trolling. In the second part it keeps the forward gear constant and regulates the RPMs to increase the thrust and therefore the speed of the vessel.

X-DOCK also regulates actions that might damage the engines and gearboxes, such as, for example engaging the forward gear too suddenly or shifting from forward to reverse gear too rapidly. It is anyway always under captain's responsibility use the joystick considering the reaction time of the engines.

In this type of maneuver, small side shifts of the joystick from the vertical axis are ignored to allow the vessel to keep the chosen direction.

When the boat is moving forward, **X-DOCK** automatically compensates for unwanted bow movements, making it easier to keep the vessel on course. In some conditions, especially strong winds, you may need to use a combined rotation maneuver. It is anyway always under captain's responsibility to keep the direction of the boat.



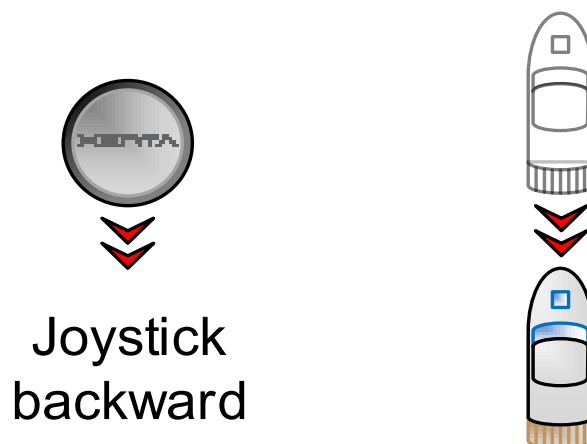
4.3.3.2 Reverse

Moving the joystick backwards reverses the vessel's movement. In addition, the farther backwards you move the joystick, the higher the speed of the vessel.

In the first part of the joystick movement, **X-DOCK** regulates the gearboxes controlling the speed of the craft or, if the boat is equipped with trolling valves, **X-DOCK** controls the level of the trolling. In the second part, it keeps the gear constant and regulates the RPMs to increase the thrust, and therefore the speed, of the vessel.

X-DOCK also regulates actions that might damage the engines and gearboxes, such as, for example engaging the reverse gear too suddenly or shifting from forward to reverse gear too rapidly. It is anyway always under captain's responsibility use the joystick considering the reaction time of the engines.

In some conditions, especially strong winds, you may need to use a combined rotation maneuver to maintain the heading of the boat.



4.3.3.3 Side shift

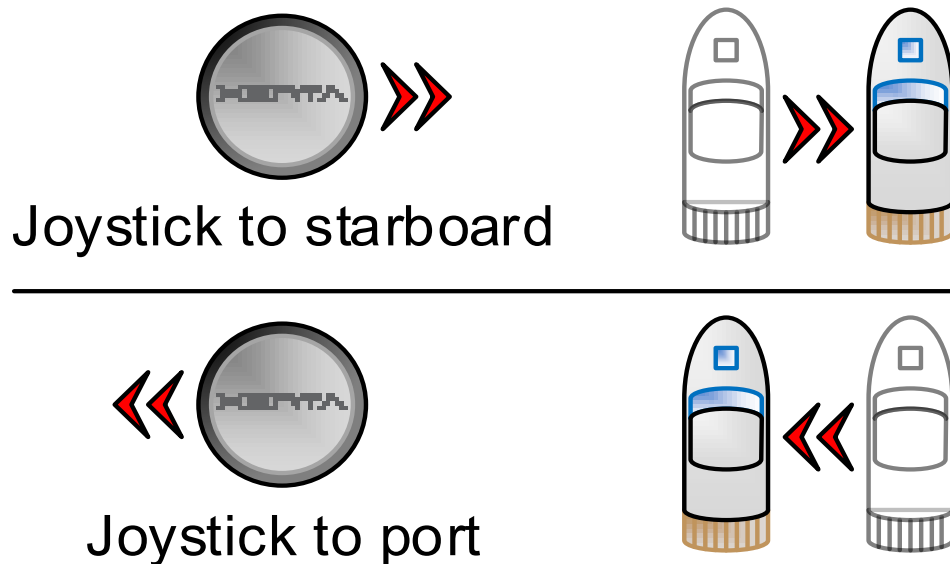
Shifting the joystick to the right moves the vessel sideways to starboard. Similarly, shifting the joystick to the left moves the vessel sideways to port. In addition, the farther sideways you move the joystick, the higher the speed of the vessel.

In those installations with bow and stern thruster, it is also possible to tune the boat in order to start sideways movement with the thrusters and then, when pushing farther the knob, to also use the engines.

During this sideways movement, **X-DOCK** automatically compensates for side movements of the bow, making it easier to keep the vessel on course. Nevertheless, it is extremely difficult to maintain the vessel's direction, especially when reaching a certain speed. In some conditions, especially high winds, you may need to compensate manually with a combined rotation maneuver. It is anyway always under captain's responsibility to keep the direction of the boat.

THE SIDE SHIFT REQUIRES AN INTENSE USE OF THE THRUSTER. THE ELECTRICAL THRUSTERS OVERHEAT IF THEY ARE USED TOO MUCH AND THE BUILT-IN THERMAL PROTECTION WILL TEMPORARILY BLOCK THEIR OPERATION. WE STRONGLY RECOMMEND LIMITING THIS MANEUVER AS MUCH AS POSSIBLE. IT IS ANYWAY ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO MONITOR THE STATUS OF THE THRUSTER AND TO REACT IN CASE OF THERMAL PROTECTION.

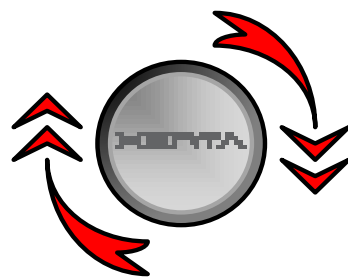
It is strongly recommended to start the side shift maneuver when the boat is at rest or in a slow, longitudinal motion to minimize the dynamic effects of the hull and to make the shift easier. It is anyway always under captain's responsibility to compensate any undesired dynamic effects.



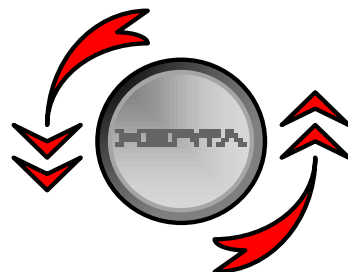
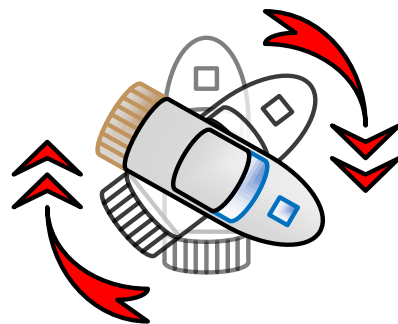
4.3.3.4 Rotation

Rotating the head of the joystick turns the craft around its center of gravity at a speed proportional to the angle of the joystick's rotation. It is anyway always under captain's responsibility to make sure the boat is rotating around its center.

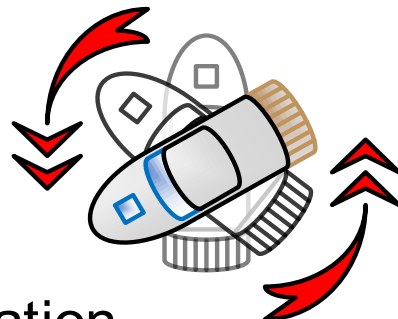
In those installations with bow and stern thruster, it is also possible to tune the boat in order to start rotation with the thrusters and then, when rotating farther the knob, to also use the engines.



Clockwise rotation



Counterclockwise rotation



The combination of the basic movements (forward, reverse, side shift) with the rotation, enables the pilot to perform complex maneuvers very easily.

4.3.3.5 Diagonal shift

Moving the joystick forward or backward during a sideways shift, will help the captain to compensate undesired effects of a possible front/rear wind or current, or to compensate any other forward/backward inertial movement.

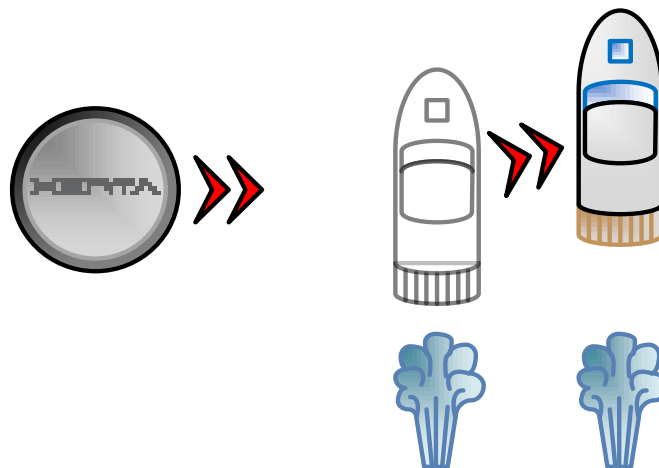
During the diagonal shift, **X-DOCK** automatically compensates for side movements of the bow, making it easier to keep the vessel on course. Nevertheless, it is extremely difficult to maintain the vessel's direction, especially when reaching a certain speed. In some conditions, especially when it is windy, you may need to compensate manually with a combined rotation maneuver. It is anyway always under captain's responsibility to keep the direction of the boat.

The diagonal shift requires an intense use of the thruster.

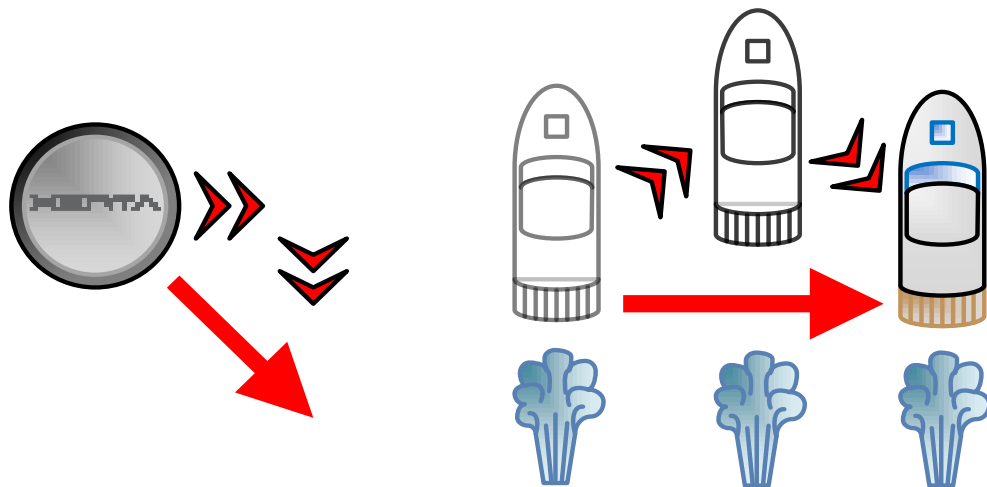
THE ELECTRICAL THRUSTERS OVERHEAT IF THEY ARE USED TOO MUCH AND THE BUILT-IN THERMAL PROTECTION WILL TEMPORARILY BLOCK THEIR OPERATION. WE STRONGLY RECOMMEND LIMITING THIS MANEUVER AS MUCH AS POSSIBLE. IT IS ANYWAY ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO MONITOR THE STATUS OF THE THRUSTER AND TO REACT IN CASE OF THERMAL PROTECTION.

The recommended use of the diagonal shift is to compensate a forward or backward movement of the boat during a sideways movement.

The following pictures shows in detail how the diagonal shift is supposed to be used.



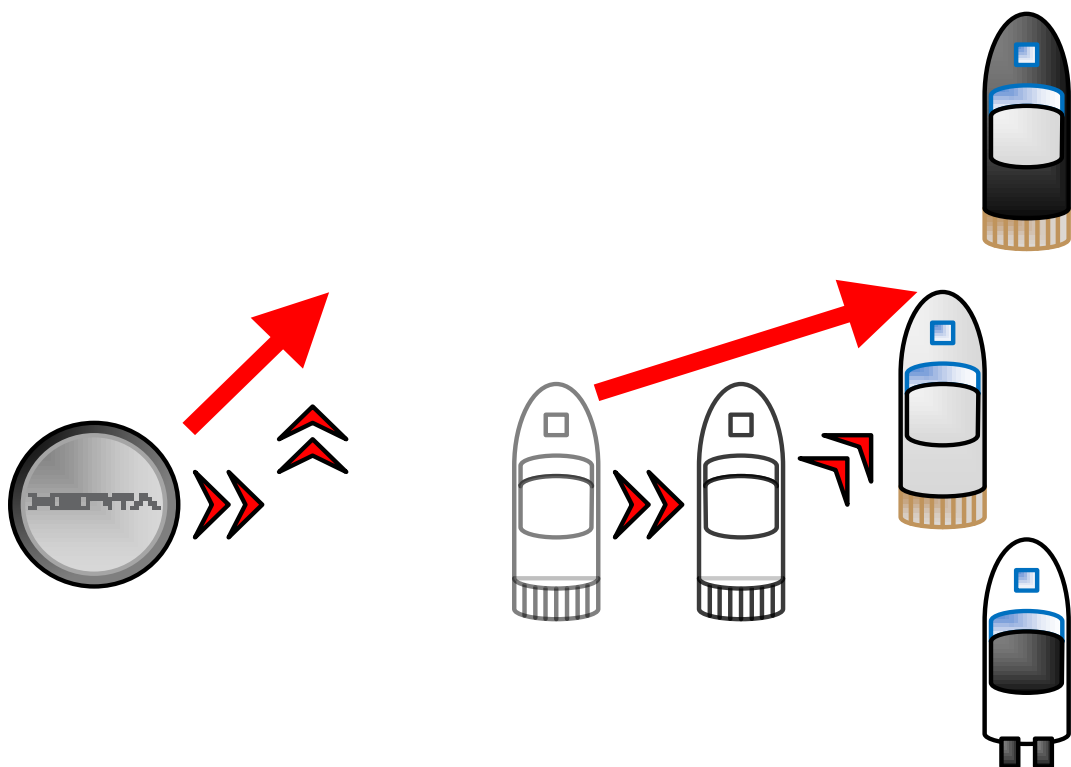
Start the sideways shift moving the joystick to port or starboard (starboard in the example). If a rear wind or current is present, the system will help to keep the heading but the boat will also gain a forward movement.



While keeping the joystick to the port or starboard direction (starboard in the example), push the joystick backward in order to compensate the wind or current effect.

The same compensation can be operated for a front current or wind, by pushing forward the joystick.

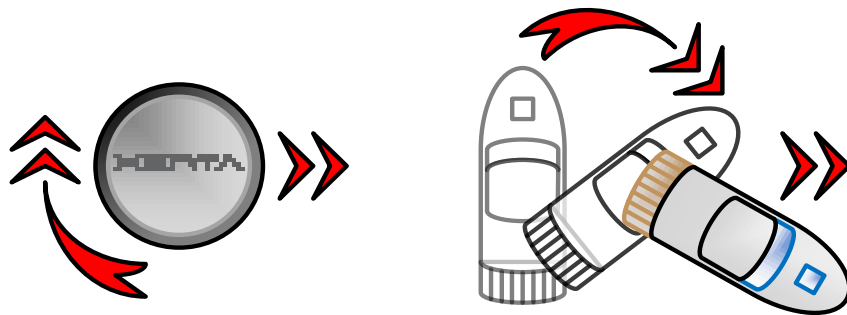
The diagonal movement may be also used to adjust the direction of the boat while docking.



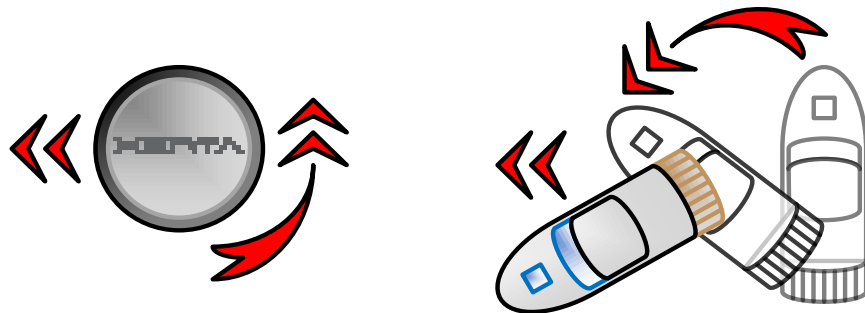
4.3.3.6 Rotoshift

It is possible to combine any kind of shift with a rotation movement (**rotoshift**) by combining movements of the joystick.

IT IS UNDER CAPTAIN'S RESPONSIBILITY TO CHECK ALWAYS THE SURROUNDING WHILE PERFORMING ALL KIND OF MANEUVERS.



Clockwise rotoshift

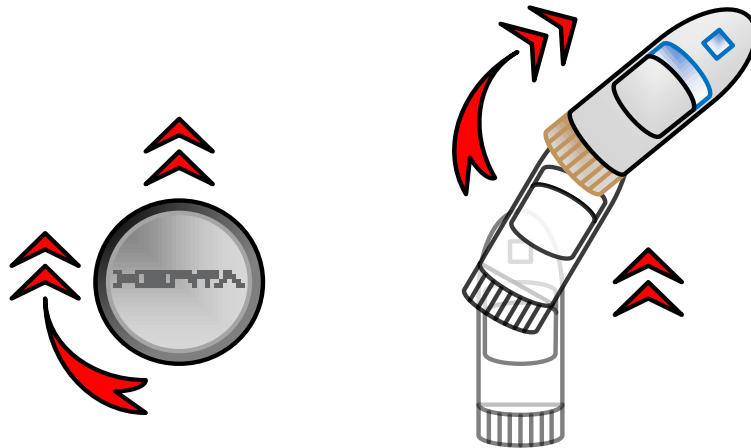


Counter clockwise rotoshift

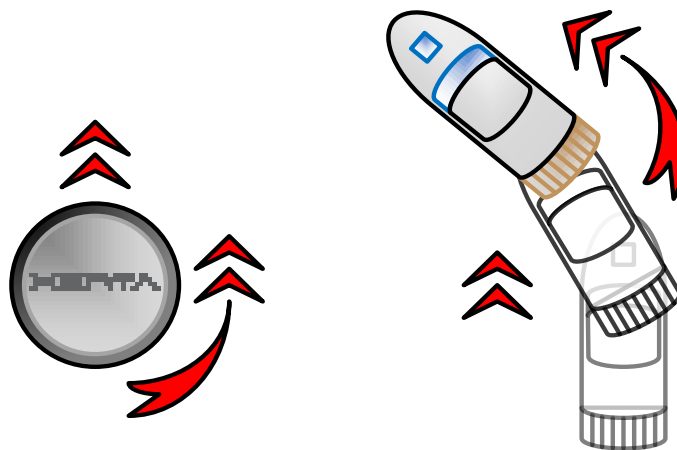
4.3.3.7 Turning

In order to turn the vessel, move the joystick forwards and at the same time twist it in the desired direction.

IT IS UNDER CAPTAIN'S RESPONSIBILITY TO CHECK ALWAYS THE SURROUNDING WHILE PERFORMING ALL KIND OF MANEUVERS.



Turning to starboard



Turning to port



4.3.4 TILLER-THRUSTER mode

The **TILLER-THRUSTER** mode allows the captain to control the bow thruster or the rudders while piloting the boat with the throttle levers.

To activate the **TILLER-THRUSTER** mode while in **STANDBY** mode, proceed as follows:

1. Make sure the Joystick is in **neutral**;
2. Press **C** button to open **SELECTION** mode;
3. Press the **T** button to select the **TILLER-THRUSTER** mode;
4. Press **C** to confirm the selection

The configuration of the lights while in **TILLER-THRUSTER** mode depends on the speed of the boat.

If the joystick is not in neutral during **TILLER-THRUSTER** mode activation, **X-DOCK** will remain in its current mode.

If the thruster fails, it is still possible to use **X-DOCK** by activating **MANEUVER POWERTRAIN** mode allowing the pilot to control the vessel using only the main engines. This mode provides limited operability.

In **TILLER-THRUSTER** mode, the pilot controls only the thruster and the rudders with the **X-DOCK** joystick and must use the engine lever controls to complete the maneuver.

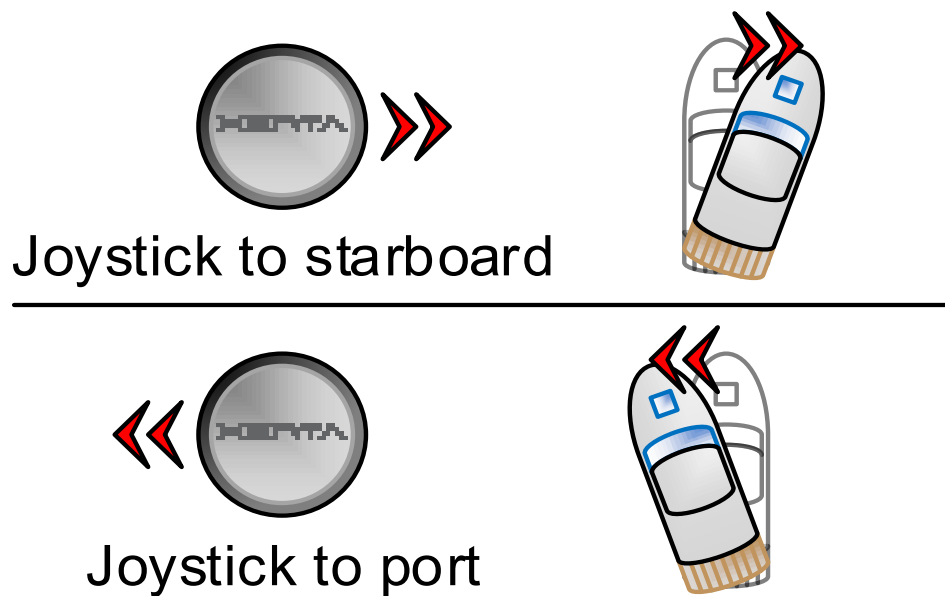
In **TILLER-THRUSTER** mode, **X-DOCK** operates in different ways according to the speed of the boat.

4.3.4.1 Low speed: bow thruster and rudders

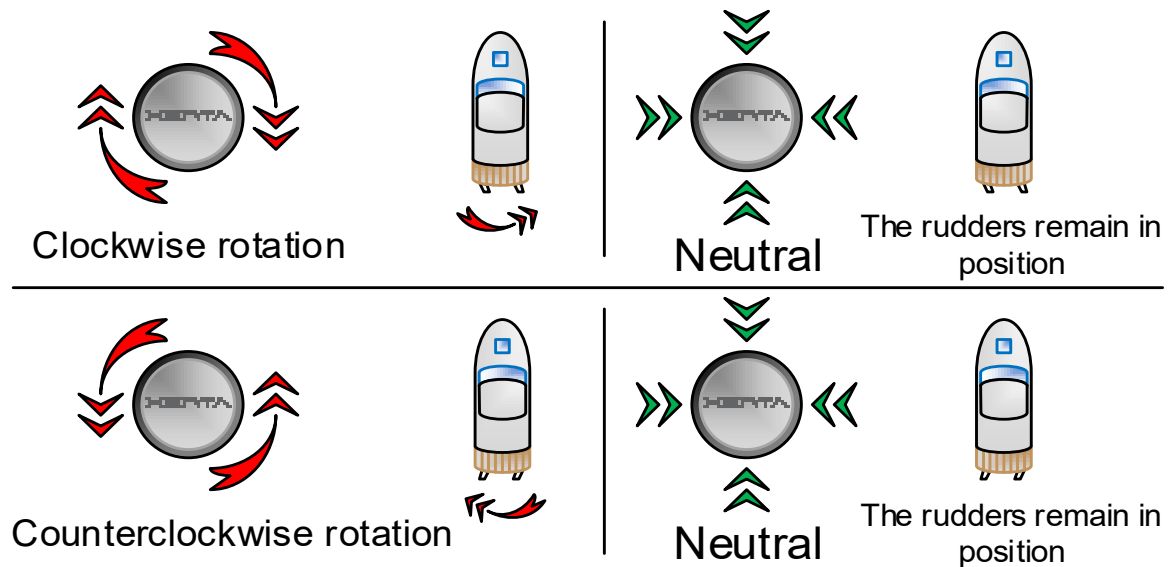
The lights of the joystick, when the **TILLER-THRUSTER** mode is active and the boat is at low speed, are in the following configuration:



The pilot can move the joystick to the left to make the thruster move the bow to port. Similarly, he can move the joystick to the right to make the thruster move the bow to starboard.



Rotating the knob clockwise will move the rudders to starboard. Rotating the knob counterclockwise will move the rudders to port. When releasing the knob, the rudders will maintain the position they have reached.

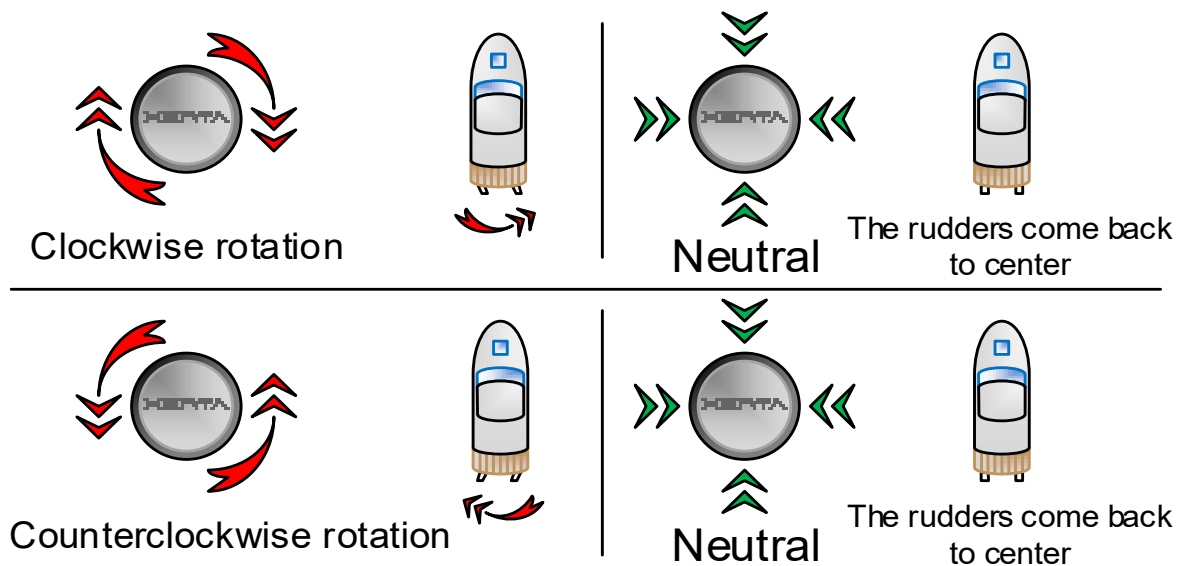


4.3.4.2 High speed: rudders with auto center

The lights of the joystick, when the **TILLER-THRUSTER** mode is active and the boat is at high speed, are in the following configuration:



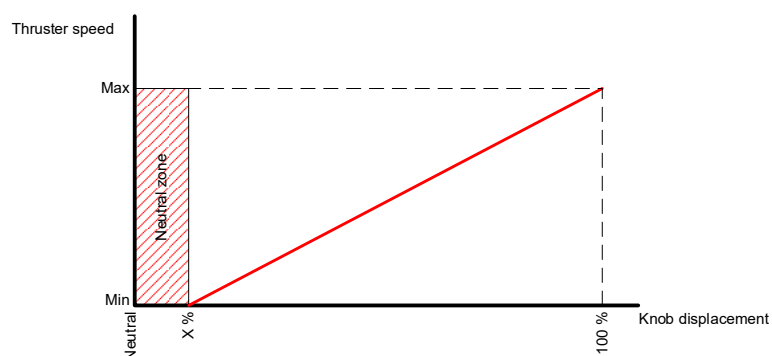
When at high speed, the system will automatically avoid the use of the thruster. In this situation, rotating the knob clockwise will move the rudders to starboard while rotating the knob counterclockwise will move the rudders to port. When releasing the knob, the rudders will return to center.



4.3.4.3 Proportional thrusters activation

The **X-DOCK** system allows the captain to control the proportional thrusters.

In this kind of installation, the more the knob of the joystick is pushed out from the neutral, the higher is the speed of the thruster.



4.3.5 TILLER mode

The **TILLER** mode allows the captain to control the rudders with the joystick.

To activate the **TILLER** mode, proceed as follows:

1. Make sure to be in **TILLER-THRUSTER** mode and the joystick is in **neutral**;
2. Press the **T** button to scroll through the activable modes and select the **TILLER** mode;

The configuration of the lights while in **TILLER** mode depends on the speed of the boat.

If the joystick is not in neutral during **TILLER** mode activation, **X-DOCK** will remain in its current mode.

In **TILLER** mode, the pilot controls only the rudders with the **X-DOCK** joystick and must use the engine lever controls to complete the maneuver.

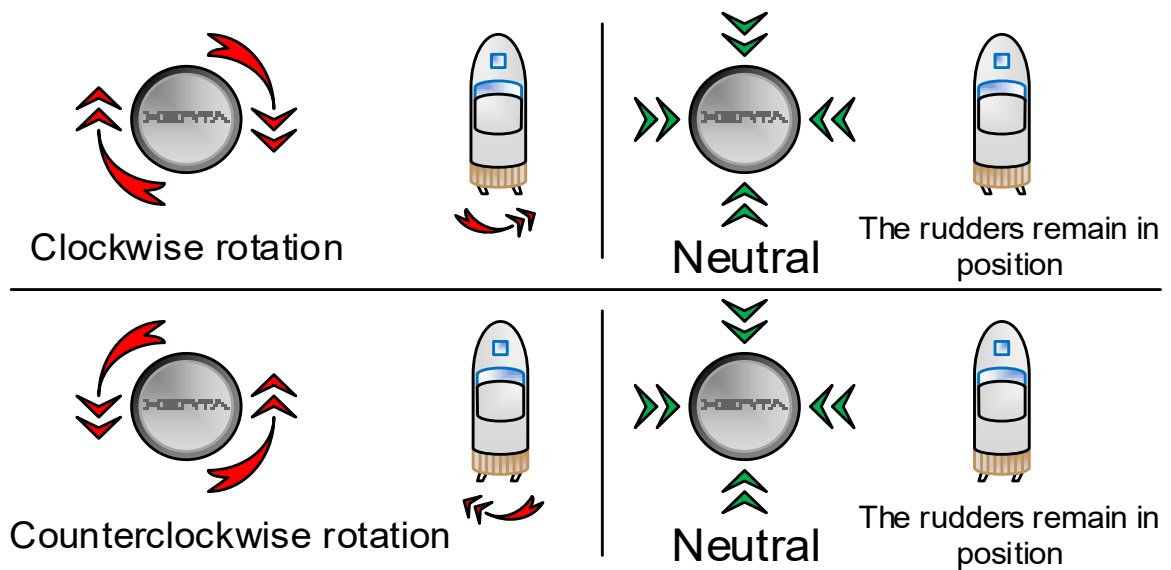
In **TILLER** mode, **X-DOCK** operates in different ways according to the speed of the boat.

4.3.5.1 Low speed: rudders

The lights of the joystick, when the **TILLER** mode is active and the boat is at low speed, are in the following configuration:



Rotating the knob clockwise will move the rudders to starboard. Rotating the knob counterclockwise will move the rudders to port. When releasing the knob, the rudders will maintain the position they have reached.

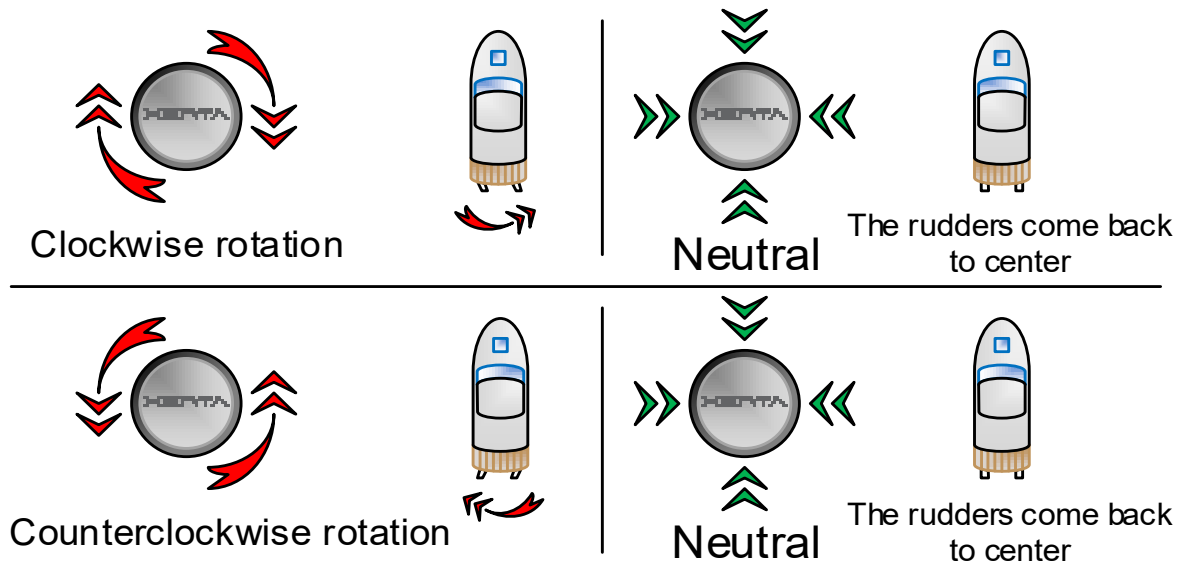


4.3.5.2 High speed: rudders with auto center

The lights of the joystick, when the **TILLER** mode is active and the boat is at high speed, are in the following configuration:



When at high speed, rotating the knob clockwise will move the rudders to starboard while rotating the knob counterclockwise will move the rudders to port. When releasing the knob, the rudders will return to center.



4.3.6 THRUSTER mode

The **THRUSTER** mode allows the captain to control both the bow and the stern thruster with the joystick.

To activate the **THRUSTER** mode, proceed as follows:

1. Make sure to be in **TILLER-THRUSTER** mode and the joystick is in **neutral**;
2. Press the **T** button to scroll through the activable modes and select the **TILLER** mode;



4.3.7 CRUISE mode (option)

The **CRUISE** mode allows the captain to pilot the boat at speed using the joystick control station.

In **CRUISE** mode, the engines are synchronized to maintain a certain constant rpm level, simply like with the traditional throttle levers systems. The system controls the rudders together with the engines in order to turn the boat promptly and fast.

The more the captain moves the joystick forwards the more the engine RPM increase. The RPM increasing rate increases accordingly on how much the pilot is moving forward the joystick.

When the joystick is released, the RPM remain at the value reached. A further forward movement of the joystick, will continue to increase the RPM until the maximum is reached.

To decrease the boat speed, how much the pilot moves the joystick backwards determines the rate the RPM decrease.

The boat speed continues to decrease until the RPMs of the engines go to minimum and the gearbox goes to neutral.

Once at neutral, the system returns in **MANEUVER** mode.

When going backward, the **CRUISE** mode cannot be activated, for safety reasons.

To steer the boat when the **CRUISE** mode is activated, the captain can move or rotate the joystick to the left or to the right, according to the desired direction.

Since the **CRUISE** works synchronizing both the engines and not using the thrusters, it provides limited maneuverability.

IT IS STRONGLY RECOMMENDED TO NOT USE THE **CRUISE** MODE WHILE CLOSE TO THE DOCK OR OBSTACLES, DOCKING OR UNDOCKING THE VESSEL, IN NARROW CHANNELS AND IN ANY OTHER SITUATIONS THAT MAY REQUIRE A SEPARATED AND PRECISE USE OF ENGINES AND THRUSTERS.

IT IS ALWAYS UNDER THE CAPTAIN'S RESPONSIBILITY TO KEEP CONTROL OF THE BOAT'S MOVEMENTS AND OF THE SURROUNDING AREA, TAKING CARE OF ANY OBSTACLES OR DANGERS.

To activate the **CRUISE** mode, proceed as follows:

1. Check that the joystick is in **MANEUVER** mode
2. Move the joystick forward
3. Once the boat is moving, press twice the **C** button

Check that the lights are in the configuration shown below.



More the captain moves the joystick forward more the engine RPM increase. The RPM increasing rate increases accordingly on how much the pilot is moving forward the joystick.

When the joystick is released, the RPM remain at the value reached. A further forward movement of the joystick will continue to increase the RPM until the maximum is reached.

To decrease the boat speed, how much the pilot moves the joystick backwards determines the rate the RPM decrease.

The boat speed continues to decrease until the RPMs of the engines go to minimum and the gearbox goes to neutral.

Once at neutral, the system returns in **MANEUVER** mode.

4.3.8 Switching off (OFF)

Before deactivating the **X-DOCK** system, we strongly recommend to make sure the boat is in a safe area and there are no close obstacles. It is captain's responsibility to check the surroundings and to decide if the system can be switched **OFF**.

The **OFF** mode is indicated with three lights **OFF**, as illustrated below:



The system automatically switches **OFF** when both the engine keys are turned to the **OFF** position.

5 X-DP (option)

The **DYNAMIC POSITIONING** mode, when active, maintains the position and the heading of the boat.

IT IS ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO KEEP UNDER CONTROL THE MOVEMENTS OF THE BOATS AND THE SURROUNDINGS, WATCHING FOR OBSTACLES OR ANY OTHER KIND OF DANGER. IT IS CAPTAIN'S SOLELY RESPONSIBILITY TO ALWAYS STAY CLOSE TO THE CONTROL STATION AND REACT TO ANY KIND OF DANGER THAT MAY OCCUR.

Before activating the **DYNAMIC POSITIONING** mode, carefully read sections **5.1** and **5.2**. By activating the **DYNAMIC POSITIONING** mode, the captain confirms he has read and understood sections **5.1** and **5.2** and he accepts all the limitations reported.

To activate the **DYNAMIC POSITIONING** mode, proceed as follows:

1. Make sure the Joystick is in **neutral**;
2. Press the **C** button to open the **SELECTION** mode;
3. Press **T** button to scroll through the activable modes
4. Press **C** to confirm the **DYNAMIC POSITIONING** mode activation.

The display will first show a disclaimer and then the **DYNAMIC POSITIONING** screen.

Check that the lights are in the configurations shown below. In addition, an intermittent sound will confirm activation of the **DYNAMIC POSITIONING** mode.



On the joystick where DP
has been activated



If the GPS or inertial sensors fail, the system will automatically return to **MANEUVER** mode on the joystick from where the **DYNAMIC POSITIONING** mode has been activated and the intermittent sound will immediately stop.

If the joystick is not in neutral during the activation of **DYNAMIC POSITIONING** mode, **X-DOCK** will abort the request to prevent the boat from moving involuntarily.

If a second **X-DOCK** station is in **MANEUVER** or **TILLER-THRUSTER** mode and a maneuver is under way, **X-DOCK** will not accept the mode change request.

If the thruster fails, it is still possible to activate **MANEUVER POWRTRAIN** mode, allowing the pilot to steer the boat with the engines alone.

If the engines fail, it is still possible to activate **TILLER-THRUSTER** mode, allowing the pilot to control the thruster directly with the joystick.

Switching to **MANEUVER** mode one of the control stations will deactivate all the others.

5.1 General information about **DYNAMIC POSITIONING** mode

In calm wind conditions, with low currents, the **DYNAMIC POSITIONING** mode allows the pilot to hold the vessel steady within 5 meters (15 feet, 95% confidence) of a selected position. When **DYNAMIC POSITIONING** is active, the vessel's heading will also remain steady (accuracy 10°, 95% confidence).

DYNAMIC POSITIONING is based on GPS and compass data. **X-DOCK** automatically controls engines, gearboxes and thrusters to maintain the selected position and heading. This allows the captain to keep the vessel almost steady when, for example, waiting for refueling, for a bridge to open or where anchoring is not allowed or feasible.

IT IS ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO KEEP UNDER CONTROL THE MOVEMENTS OF THE BOATS AND THE SURROUNDINGS, WATCHING FOR OBSTACLES OR ANY OTHER KIND OF DANGER. IT IS CAPTAIN'S SOLELY RESPONSIBILITY TO ALWAYS STAY CLOSE TO THE CONTROL STATION AND REACT TO ANY KIND OF DANGER THAT MAY OCCUR.

When **DYNAMIC POSITIONING** is active, the pilot can still use the joystick to perform every action, as in **MANEUVER** mode. When the joystick is put back in neutral, the system detects the vessel's new position and heading and automatically controls engines, gearboxes and bow thruster to keep the position and heading steady.

Thanks to the integrated electronic compass, GPS antenna and inertial sensors, the **X-DOCK** system compensates for undesired movements caused by wind or drift.

If the GPS or inertial sensors fail, the system will automatically return to **MANEUVER** mode on the joystick from where the **DYNAMIC POSITIONING** mode has been activated and the intermittent sound will immediately stop. It is captain's solely responsibility to react to this situation.



5.2 Cautions

DYNAMIC POSITIONING must not be used when close to the quay, other vessels or any other kind of obstacles. Since the accuracy is 5 meters (15 feet, 95% confidence) from the selected position (heading accuracy 10°, confidence 95%), collisions could occur.

When **DYNAMIC POSITIONING** is active, swimmers must be kept away from the vessel because the engines and thruster may cause sudden and dangerous water movements. The captain must make this clear to passengers before activating **DYNAMIC POSITIONING**.

When **DYNAMIC POSITIONING** is active, the captain must always be prepared to take control of the vessel since, if the system suddenly fails, the vessel will not hold its position and could move in any direction, causing damage and injuries.

When **DYNAMIC POSITIONING** is active, **X-DOCK** could occasionally and suddenly increase engine RPMs, causing passengers to lose their balance, increasing the risk to fall.

Before activating **DYNAMIC POSITIONING**:

- 1) Inform passengers that **DYNAMIC POSITIONING** mode is about to be activated and can cause sudden or abrupt multi-directional movements.
- 2) Check that no one is in the water near the vessel.
- 3) Check that no one is sitting or standing where it could be possible to fall overboard during sudden or abrupt multi-directional movements.

While in **DYNAMIC POSITIONING**:

- 1) The performance of **DYNAMIC POSITIONING** can be strongly affected by the environment, the quality of the GPS signal and by the physical limitations of the vessel and its components. It is captain's responsibility to know the limits of the vessel, such as limited power and operating time from electric thrusters which can easily overheat while in heavy wind or strong current.
- 2) **DYNAMIC POSITIONING** does not relieve the captain of the responsibility of safe operation of the vessel. The captain should stay close to the engine controls and pay close attention to the area around the boat.
- 3) Always be ready to immediately disengage the **DYNAMIC POSITIONING** at any time for any reason you determine could cause an unsafe situation (i.e. change in environment, low or lost GPS signal, diminished thruster performance due to low batteries, thermal protection or any other causes affecting the performance of the vessel). These examples could cause the boat to not hold the position.
- 4) Follow the normal safety procedures applicable when engines and thrusters are running.

Do not activate **DYNAMIC POSITIONING**:

- 1) When close to the dock, swimming people or any other kind of obstacles.
- 2) When the anchor is in the water.

If the vessel is headed at right-angles to the direction of the current, and the current is moving at a speed of over 2 knots (2.3 mph), the vessel will not be able to avoid drifting with the current. Under these conditions, if you are in **DYNAMIC POSITIONING** mode, we suggest rotating the vessel so that the bow is headed in the direction of the current.

GPS data usually guarantee a position accuracy of about 5 meters (15 feet, 95% confidence) in all of the areas covered by WAAS (Wide Area Augmentation System). If the WAAS is not available, the accuracy of the GPS data is reduced. Nevertheless, **DYNAMIC POSITIONING** can still hold the vessel within a radius of 20 meters (60 feet) of the desired position.

The performance of the system, when **DYNAMIC POSITIONING** mode is active, could be strongly limited by the thruster model. The **DYNAMIC POSITIONING** mode could require an intense use of the thruster, leading to the thermic protection of the thruster itself.



NO SITTING ON EDGES



WATCH FOR SUDDEN
MOVEMENTS



NO DPS WHEN PEOPLE
ARE IN THE WATER



NO SWIMMING



CAUTION FOR FALLING



NO DIVING

6 X-AID (option)

X-AID automatically controls engine, gearboxes and thrusters to perform high-precision maneuvers, by carrying out controlled movements.

This allows the captain to have total control of the boat no matter how restricted the waters they maneuver in or the environmental conditions are. In fact, by integrating the management of engines and thrusters, **X-AID** has the ability to counter wind and current, making the use of the joystick even more effective, safe and intuitive.

IT IS ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO KEEP UNDER CONTROL THE MOVEMENTS OF THE BOATS AND THE SURROUNDINGS, WATCHING FOR OBSTACLES OR ANY OTHER KIND OF DANGER. IT IS CAPTAIN'S SOLELY RESPONSIBILITY TO ALWAYS STAY CLOSE TO THE CONTROL STATION AND REACT TO ANY KIND OF DANGER THAT MAY OCCUR.

Before activating the **X-AID**, carefully read sections **6.1** and **6.2**.

By activating the **X-AID**, the captain confirms he has read and understood sections **6.1** and **6.2** and he accepts all the limitations reported.

To activate the **X-AID**, proceed as follows:

1. Make sure the Joystick is in **neutral**;
2. Press the **C** button to open the **SELECTION** mode;
3. Press **T** button to scroll through the activable modes
4. Press **C** to confirm the **X-AID** activation.

Check that the lights and the status icon on the display are in the configurations shown below. In addition, an intermittent sound will confirm activation of the **X-AID**.



If the joystick is not in neutral during the activation of the **X-AID**, the system will abort the request to prevent the boat from moving involuntarily.



When **X-AID** is active, the pilot can use the joystick to perform every action, as in **MANEUVER** mode. When the joystick is put back in neutral, the system slows the vessel down until it stops and it at this point automatically controls engines, gearboxes and bow thruster to keep the position and heading steady.

X-AID controls the acceleration and speed of movements for maximum safety, therefore it is recommended to activate **X-AID** just in the final stages of docking and it is recommended to use instead **MANEUVER** mode, when faster movements are necessary.

If any problem or malfunction would occur, the intermittent sound will be faster and may become fixed and prolonged.

IT IS CAPTAIN'S SOLELY RESPONSIBILITY TO REACT TO THIS SITUATION AND TAKE CONTROL OF THE BOAT'S COMMANDS.

6.1 General information about X-AID

Thanks to a sophisticated inertial platform, **X-AID** estimates the boat's position, speed, accelerations and orientation without the need for external references and acquires the information in real time, estimating the perturbations that may affect its maneuvering, generated by wind and sea currents. **X-AID** autonomously adapts the system to them, effectively cancelling out any possible interference.

In addition, **X-AID** intervenes on the vessel's inertia, facilitating its stopping. The result is that, as soon as the joystick is released in the neutral position, the boat stops in a controlled and predetermined manner and **X-AID** keeps it in the stopping point and direction until the next command.

IT IS RECOMMENDED TO ACTIVATE **X-AID** IN THE FINAL STAGES OF DOCKING WHERE MAXIMUM PRECISION AND SPEED-CONTROLLED IN HANDLING AND MOVEMENT IS REQUIRED.

IT IS ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO KEEP UNDER CONTROL THE MOVEMENTS OF THE BOATS AND THE SURROUNDINGS, WATCHING FOR OBSTACLES OR ANY OTHER KIND OF DANGER. IT IS CAPTAIN'S SOLELY RESPONSIBILITY TO ALWAYS STAY CLOSE TO THE CONTROL STATION AND REACT TO ANY KIND OF DANGER THAT MAY OCCUR.



6.2 Cautions

X-AID IS ABLE TO CONTROL THE MANEUVER AND MAINTAIN POSITION WITHIN THE VESSEL'S CAPACITY LIMITS.

IF THE LIMITS ARE EXCEEDED, THE CAPTAIN MUST BE READY TO TAKE THE COMMAND AND CONTINUE THE MANEUVER IN THE TRADITIONAL WAY.

When **X-AID** is active, swimmers must be kept away from the vessel because the engine and thrusters may cause sudden and dangerous water movements. The captain must make this clear to passengers before activating **X-AID**.

Before activating **X-AID**:

- 4) Inform passengers that **X-AID** mode is about to be activated and can cause sudden or abrupt multi-directional movements.
- 5) Check that no one is in the water near the vessel.
- 6) Check that no one is sitting or standing where it could be possible to fall overboard during sudden or abrupt multi-directional movements.

While **X-AID** is active:

- 5) It is captain responsibility for safe operation of the vessel. The captain should stay close to the engine controls and pay close attention to the area around the boat.
- 6) Always be ready to immediately disengage the **X-AID** at any time for any reason you determine could cause an unsafe situation (i.e. change in environment, low or lost GPS signal, diminished thruster performance due to low batteries, thermal protection or any other causes affecting the performance of the vessel).
- 7) Follow the normal safety procedures applicable when engine and thrusters are running.

Do not activate **X-AID**:

- 3) When fast movements are necessary.
- 4) When swimming people or any other kind of obstacles.
- 5) When the anchor is in the water.
- 6) When the vessel is tied or restricted in movements.

IT IS RECOMMENDED TO ACTIVATE X-AID IN THE FINAL STAGES OF DOCKING WHERE MAXIMUM PRECISION AND SPEED-CONTROLLED IN HANDLING AND MOVEMENT IS REQUIRED

IT IS ALWAYS UNDER CAPTAIN'S RESPONSIBILITY TO KEEP UNDER CONTROL THE MOVEMENTS OF THE BOATS AND THE SURROUNDINGS, WATCHING FOR OBSTACLES OR ANY OTHER KIND OF DANGER. IT IS CAPTAIN'S SOLELY RESPONSIBILITY TO ALWAYS STAY CLOSE TO THE CONTROL STATION AND REACT TO ANY KIND OF DANGER THAT MAY OCCUR.



NO SITTING ON EDGES



WATCH FOR SUDDEN
MOVEMENTS



NO X-AID WHEN PEOPLE
ARE IN THE WATER



NO SWIMMING



CAUTION FOR FALLING



NO DIVING

7 Emergency procedures

7.1 BACK-UP panel

7.1.1 Warnings and limits of use

The **XENTA** system can be integrated with a **BACK-UP** control system that ensures the boat's maneuverability in case of failure of the main electronic system.

READ CAREFULLY ALL THE INSTRUCTIONS AND INDICATIONS BEFORE PROCEEDING TO USE THE BACK-UP. THE DISREGARD OF ONE OR MORE PROCEDURES CONTAINED IN THIS MANUAL CAN RESULT DANGEROUS AND CAUSE INJURIES TO THINGS AND PERSONS.

It is always under the captain's responsibility to keep control of the boat's movements and of the surrounding area, taking care of any obstacles or dangers. It is captain's exclusive responsibility to stay next to the control station and promptly react in case of danger.

7.1.2 BACK-UP control panel

The following Figure shows the **BACK-UP** control panel to close detail of its components:

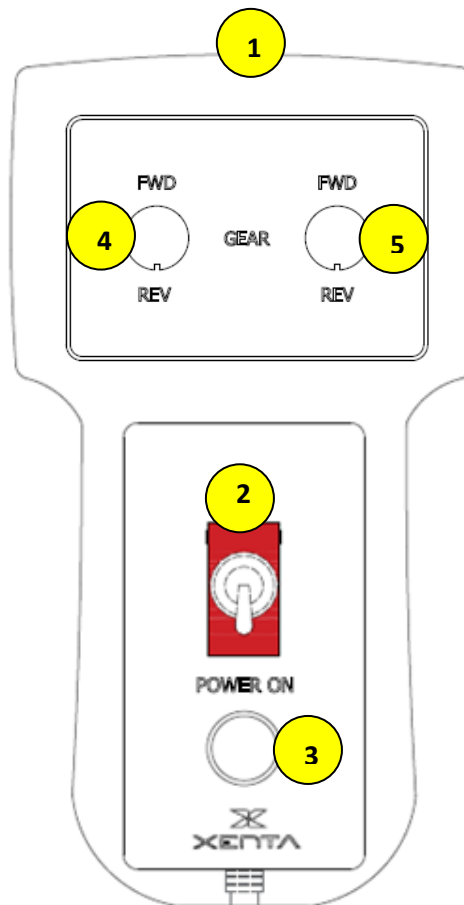




Figure **BACK-UP** panel

1. Panel;
2. Gear commands power switch (protected by a safety guard);
3. Gear commands operation LED indicator;
4. Port gear switch;
5. Starboard gear switch;

- **BACK-UP panel** (1): ensures navigation with reduced functionalities in case of **XENTA** system malfunction
- **Power switch** (2): activates the engines back-up commands
- **LED operative indicator** (3): a red light indicates the ignition and operation of the engines back-up commands
- **Port gear switch** (4): activates the left engine control
- **Starboard gear switch** (5): activates the right engine control

7.1.3 Functionalities

Connect the **BACK-UP** panel to the relative connector installed on the dashboard. Activate the **BACK-UP** system, lifting the safety guard and bringing up the power switch of the back-up commands to be activated: the relative LED will light red to signal the activation of the required back-up commands.

Through the two switches (4 and 5) it is possible to gear the port and starboard engines forwards and backwards respectively, with a limited number of revolutions.

7.2 PowerPack by-pass

In case of main electronic system's malfunction and of the impossibility to move one or both rudders with the **X-STEER**, it is possible to release the PowerPack cylinders, activating the **by-pass valves** fitted on the steering rams pipeline. In this way, the rudders will be released and they will be free to move, aligning themselves with the flow of water from which they are invested when the boat is maneuvered using the main engines' control system.

IT IS ALWAYS UNDER THE CAPTAIN'S RESPONSIBILITY TO KEEP CONTROL OF THE BOAT'S MOVEMENTS AND OF THE SURROUNDING AREA, TAKING CARE OF ANY OBSTACLES OR DANGERS.

To open the cylinder by-pass it is necessary to rotate clockwise the handles on the PowerPack valve blocks. To close it, instead, it is necessary to rotate the handle counterclockwise, as described in the following picture:

