

USE AND MAINTENANCE  
USO E MANUTENZIONE  
UTILISATION ET ENTRETIEN  
BETRIEB UND WARTUNG  
USOY MANTENIMIENTO

# ELECTRONIC CONTROL SYSTEM

FOR MARINE APPLICATIONS



# **ELECTRONIC CONTROL SYSTEM**

## **FOR MARINE APPLICATIONS**

### **USE AND MAINTENANCE**

#### **INTRODUCTION**

Thank you for choosing FPT.

Before carrying out any operation, please carefully read the instructions given in this manual; compliance with them will ensure lasting and efficient operation.

The illustrations are only a guide.

The information provided below was current at the date of publication.

The Manufacturer reserves the right to make modifications at any time without prior notice, for technical or commercial reasons or to update the engines to comply with legal requirements in the various Countries.

The Manufacturer declines all liability for any errors or omissions.

Please remember that the FPT Technical Service Network is available to offer you its experience and professional skills, wherever you may be.

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## ■ GENERAL INFORMATION

### GUARANTEE

To obtain best performance and make use of the FPT warranty, make sure to carefully follow the instructions given in this publication; failure to do so may result in invalidation of the warranty.

### SPARE PARTS

The use of only FPT Original Spare Parts is a necessary condition for maintaining the original integrity of the system.

The use of non-original spare parts will not only invalidate the warranty, but also relieves FPT of any responsibility for the entire life of the system.

### LIABILITY

The Manufacturer will only be considered liable subject to performance of the control and maintenance operations indicated and described in this manual; to this effect, proof that these operations have been performed must be provided. Any special maintenance operations that may be necessary must be carried out by qualified technicians from Workshops in the FPT Network, using the instruments and equipment provided for the purpose.

### SAFETY

The following information is intended to ensure careful use of the system, so as to prevent injury or damage due to improper or incorrect behaviour.

- ❑ Any tampering, modification, and use of non-original spare parts can compromise proper operation of the system and safety during its use; **do not** make any modifications to the system's wiring and units or connect them to other electrical grids.
- ❑ Pay particular attention to hot parts and moving parts of the system; its electrical equipment has live components.
- ❑ The system must not be started up and used before the safety requirements for the machine in which it is installed have been met and the machine's compliance with local laws and regulations is in any case guaranteed.
- ❑ The operations required to guarantee the best use and efficiency of the system must only be carried out by personnel of proven experience equipped with tools whose suitability is recognised by FPT.

## ■ ELECTRONIC CONTROL SYSTEM

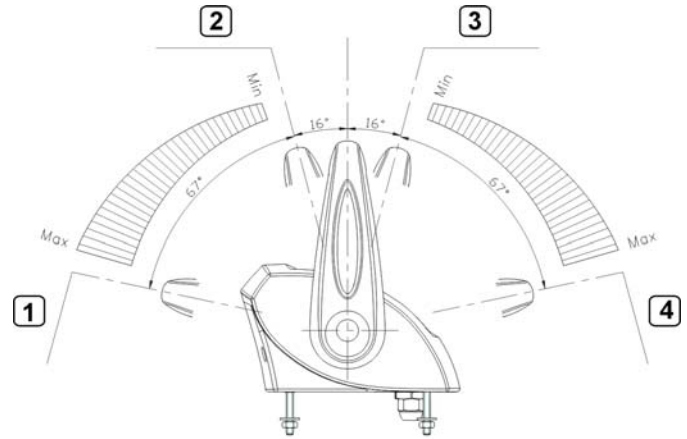
### GENERAL CHARACTERISTICS OF THE SYSTEM

The electronic control system mainly comprises 3 elements that vary for type and quantity according to installation requirements:

- ❑ electronic control hand levers;
- ❑ actuator;
- ❑ data transmission cables.

In its maximum configuration the system comprises 2 engines controllable by the actuator through 2 hand levers installable onboard.

### ELECTRONIC CONTROL HAND LEVER OPERATION



1. Forward maximum acceleration - 2. Forward - 3. Reverse - 4. Reverse maximum acceleration.

Each electronic control hand lever is arranged to control 1 or 2 engines.

Starting from the neutral position, after a movement of  $16^\circ$  forward or back, the forward gear or reverse gear is engaged respectively.

The throttle adjusts to a travel of  $62^\circ$  in both directions.

## CONTROL KEYPAD



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On the hand lever there is a membrane control keypad with 4 buttons and respective signalling LED's.

In systems with single engine, both green LED's at the Engine buttons refer to the same engine.

In systems with two engines, the Engine button and respective LED refer to the corresponding engine according to their position on the keypad (right LED for right engine, and likewise for the left side).

The LED corresponding to the Warm/ Sync button is orange, whereas that corresponding to the Command button is red.

The meaning of the LED's and buttons is given in the following table:

Button	LED	Meaning
	Engine (green)	If the LED is lit up, the corresponding engine is in neutral
	Command (red)	If the LED is off, the hand lever does not have control of the system. If the LED is lit up, the hand lever has control of the system.
	Warm/ Sync (orange)	If the LED blinks, Warm-up conditions exist, and the engines can be brought to operating speed because the gear is disengaged. The LED lit up indicates synchronised operation mode; the right hand lever controls both engines and the right flap device controls both flaps (when present)
	Command	Control of the system is obtained by keeping the button pressed for at least 3 seconds, provided the control hand lever is in neutral
	Warm/ Sync	Keeping the button pressed for at least 3 seconds activates the Warm-up function, provided the control hand levers are in neutral
	All LED's on with fixed light	Fault in system

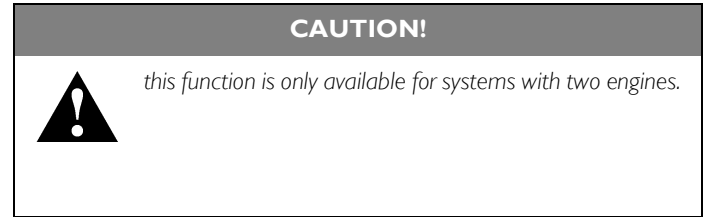
## ACQUISITION OF CONTROL

Control of the system can be obtained from any of the hand levers, by carrying out the following operations:

- ❑ with boat stationary;
  1. bring all the control hand levers to the neutral position;
  2. keep the Command button of one of the hand levers pressed for at least 3 seconds;
  3. the Command LED lights up and the Warm/Sync LED starts blinking;
  4. the Warm-up mode is now active (inverters disabled) and it is possible to accelerate for engine warm-up operations; the corresponding LED blinks;
  5. to definitely take control just bring the hand levers to the neutral position and keep the Warm/Sync button pressed for at least 3 seconds;
  6. the control hand lever is now enabled and ready to use.
  
- ❑ with boat in navigation;
  1. bring the required hand lever to the synchronism position (with an approximation of 10°) with respect to the hand lever that previously had control;
  2. the Engine LED's of both control hand levers start blinking;
  3. control can now be obtained by pressing the Command button of the hand lever for at least 3 seconds.

**Note:** Once the control acquisition procedure is over, the hand lever is enabled to control the boat.

## OPERATION IN SYNCHRONISED MODE

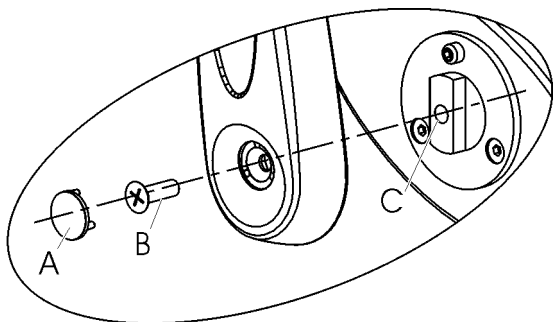


By activating this function the right hand lever can control both engines, which are thus adjusted to the same speed and in the same direction.

With the hand levers (right and left) in neutral and keeping the two Engine buttons pressed for at least 3 seconds, the control of both engines goes to the right hand lever. The synchronism condition is signalled by the Command and Warm/Sync LED's coming on with fixed light.

By bringing the two hand levers to neutral and pressing both Engine buttons again for at least 3 seconds, synchronised mode is exited and control returns to the respective hand levers.

## CLUTCH ADJUSTMENT



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To adjust the clutch of the hand lever, just remove the PVC cap (A), undo the hand lever fixing screw (B) and remove the hand lever. Then screw/unscrew the adjustment grub screw inside the hole (C) to make the hand lever clutch harder or softer. After adjusting, refit the hand lever and cap.

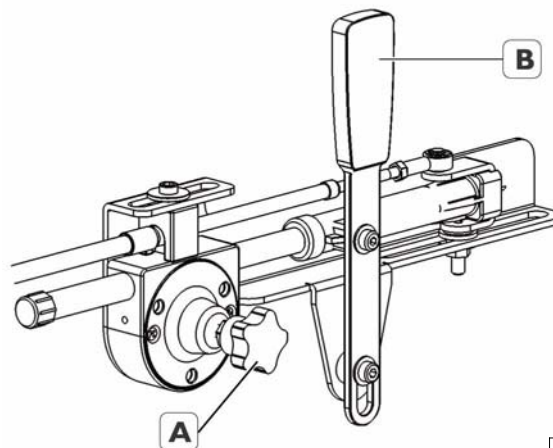
**Note:** In case of control hand lever for single engine, the clutch is present only in the right hand lever.

## SYSTEM FAULTS

In any situation whereby the engines switch off with the control hand levers not in neutral position, when the engines are switched on again, the electromechanical actuator will bring the inverters to the neutral position with throttle at minimum and control by hand levers will be disabled.

To re-enable the system, proceed as described in the section "Acquisition of control".

In case faults in the boat's electrical system, the boat can be controlled in emergency by using the hand levers on the electromechanical actuator.



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In emergency conditions the electronic system can be quickly deactivated and the engines controlled directly by the emergency mechanical levers which are already fitted on the electromechanical actuator. Just screw down the emergency knob A. This procedure will allow the inverter to be manually controlled by means of the levers B, and with gas at minimum.

To reinstate the system, fully unscrew the knob A. When the control lever is operated, the emergency lever will automatically return to its position prior to use in emergency mode.

## ■ BEHAVIOUR IN AN EMERGENCY

By following the instructions provided in this manual and the indications given on the labels, the user of the system will be working in safe conditions.

Should improper conduct result in accidents, always request the intervention of trained first aid specialists immediately.

In an emergency and while awaiting the arrival of first aid specialists, follow the instructions given below.

### System failures

If proceeding when the system is malfunctioning, pay maximum attention when manoeuvring and make sure the people on board are holding safe grips.

### In case of fire

Extinguish the fire using the fire-fighting equipment foreseen, and in the manner indicated by Fire prevention authorities (fire-fighting equipment for certain machines and equipment is compulsory under current safety legislation).

### Burns and scalds

1. Extinguish any flames on the burned person's clothing, by:
  - throwing water over them;
  - using a powder fire-extinguisher, without directing the jet at the person's face;
  - covering with blankets or rolling the victim on the ground.
2. Do not attempt to remove pieces of clothing that may have stuck to the skin;
3. In the case of scalding, immediately but carefully remove any clothing that may be soaked in the hot liquid;
4. Cover the burn with a special burn dressing or sterile bandage.

### Electrocution

The system's 12V electrical system does not involve risks electrocution, however, in case of a short-circuit caused, for example, by a metal tool, there is a risk of burns due to overheating of the object through which the electric current passes. In these circumstances:

1. Remove the object that caused the short-circuit, using means that provide sufficient heat insulation.
2. Switch off the power at the main switch, if there is one.

## **Injuries and fractures**

The vast number of possible circumstances and the specific nature of operations required means that the intervention of a medical team is necessary.

1. In the event of bleeding, keep the edges of the wound pressed together until help arrives.
2. If there is any suspicion of a fracture, do not move the injured part and only move the patient if absolutely necessary.

## **Caustic burns**

Caustic skin burns are caused by contact with extremely acid or alkaline substances.

For electric maintenance technicians these are typically caused by acid from batteries; in these circumstances, proceed as follows:

1. Remove any clothing soaked in the caustic substance.
2. Wash the area with lots of running water, avoiding parts that have not been burned.

If either battery acid, lubricants or diesel come into contact with the eyes: wash the eyes with water for at least 20 minutes, keeping the eyelids open so that the water flows over the eyeball (move the eye in all directions to wash more thoroughly).