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Electronic  
control  
systems



# ELECTRONIC CONTROL 3500 SERIES 4500 SERIES

Electronic control systems Series 3500 and Series 4500 combine mechatronic solutions and digital communication technologies which permit to build modular systems, flexible, reliable and easy to install.



Just a few devices create a complete electronic control system. The electronic system fundamentally consists of 4 elements which vary in amount and type, depending on installation requirements:

- control stations
- actuators
- data transmission cables to connect together actuators and control stations
- cables between actuator and motor and between actuator and gearbox.

The link between the various devices is via a simple 4-pin cable that carries all the information thru digital CANBus communication.

In case of motors with mechanical interface, push-pull cables transfer the motion from the actuators to the throttle on the motor and on the gearbox.

In the case of motors and gearboxes with electronic interface, a simple electrical wire performs their connection to the actuator.

On all Flexball electronic control systems can be mounted either lever Series 3500 or lever Series 4500.

The systems are configured to interface to different types of motors and gearboxes and their possible combinations.

## MOTORS COMPATIBILITY

- Voltage: Cummins, Detroit Diesel, Scania, FNM, Lombardini, Deutz Vetus
- 4-20 mA current: MAN, MTU, Isotta Fraschini
- PWM: Caterpillar, Scania.

## KEY FEATURES

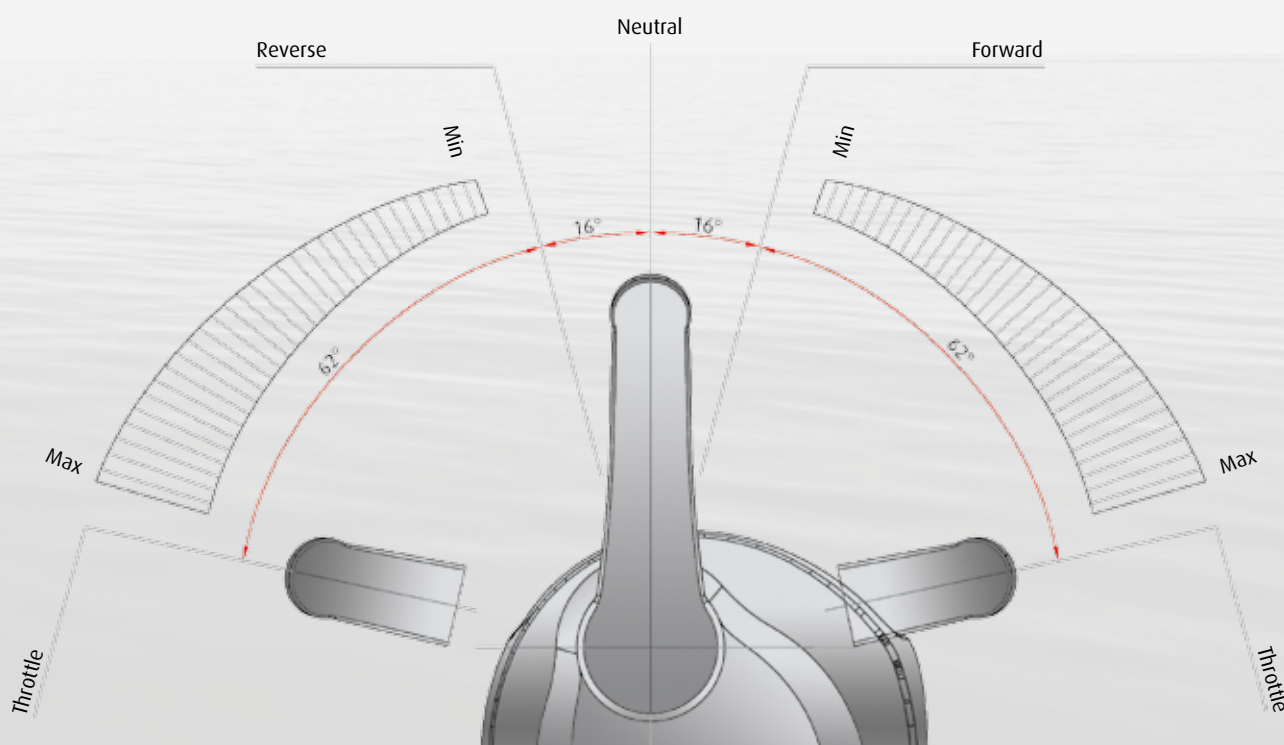
- With up to 3 control stations in the basic version, the system can be extended up to 7 control stations
- Fast Start-up Mode Function
- Synchro function that can be activated either in neutral or when sailing
- Trolling control
- Trim/Flap and Synchro Trim/Flap function
- Starting inhibition if the gear isn't in neutral
- Advanced functions for fast and safe commissioning
- Interface to frequency converters in hybrid propulsion systems
- Programmable delays at clutch in or clutch out
- Emergency safety devices directly on the actuator, in the case of systems with mechanical interface.

## MAIN FEATURES

- Electronic control system in drive by wire technology
- Maximum distance between deck and engine room can be more than 60 meters
- Fast and easy installation
- EMC and CE Certified
- Operation with instant plug and play
- Limited number of components
- Digital Data Transmission
- Setting of operating parameters either via keypad or via PC.

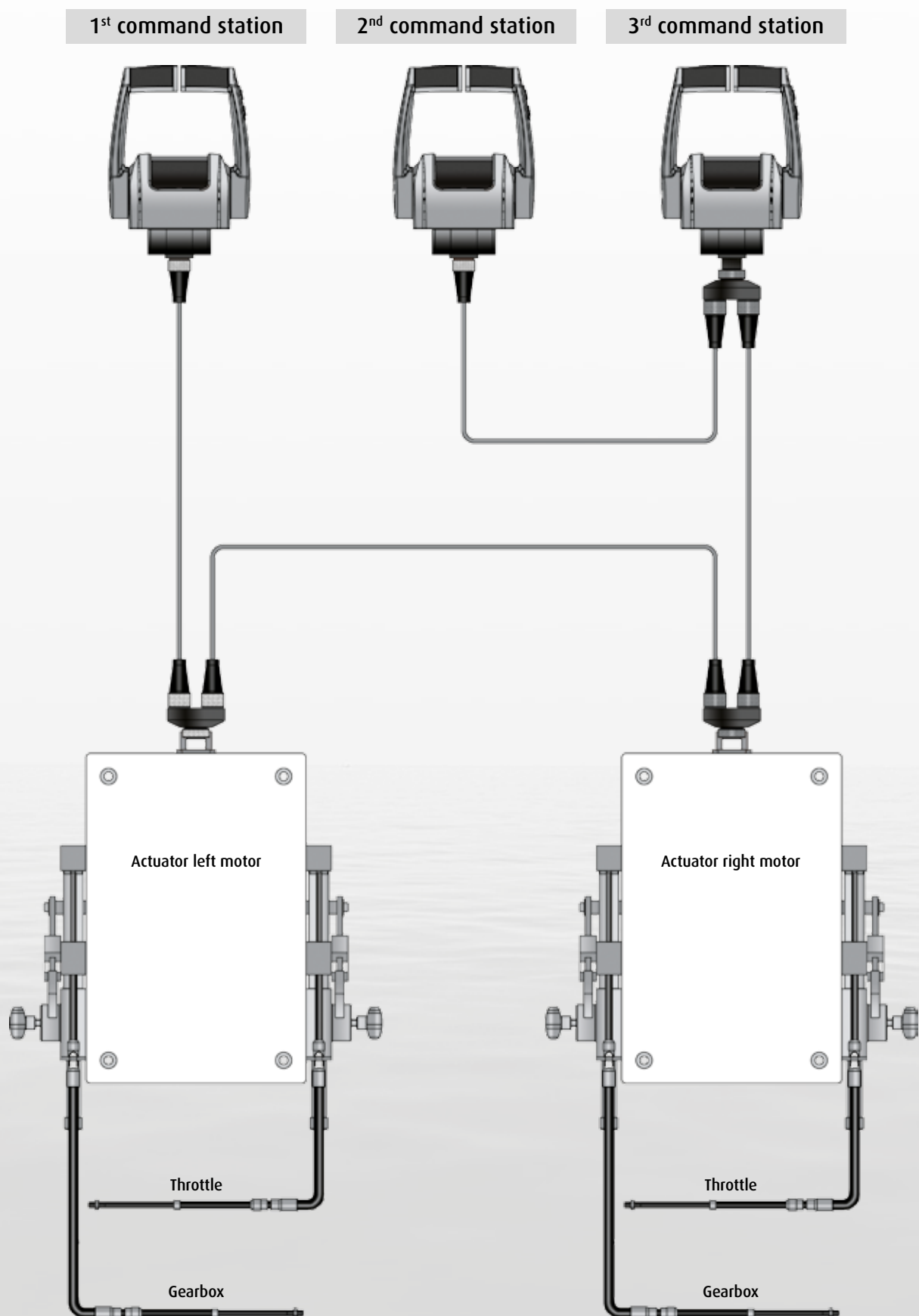
## TECHNICAL FEATURES

- Supply voltage from 9.0 to 32 Vdc (multi-voltage supply)
- Max input current: 5 A
- Current at idle: 0.5 A
- Operating temperature: -10 to + 85 °C
- Mechanical generated force at nominal conditions: 250 N (25 kg) with absorption of 1.5 A
- Maximum generated force: 450 N (45 kg) with absorption of 5 A and for a time less than 1 second
- Gearbox stroke – forward: it can be set between 5 and 40 mm
- Gearbox stroke – reverse: it can be set between 5 and 40 mm
- Maximum throttle stroke: 80 mm.



The diagram below represents a system configured with:

- n. 2 actuators • n. 3 control stations
- data transmission cables between levers, lever and actuator and between actuators
- motor and gearbox connection cables which, depending on the type of motor and gearbox, can be mechanical or electronic.





# SYSTEM CONFIGURATIONS

The system types listed below always refer to the diagram on the previous page and are based on the following conditions:

- The distance between the various devices and specifically the distance between levers, lever and actuator or between actuators is = 7.5 m; in case you need longer cables (especially between the deck and the engine room) they must be defined when ordering.
- All electrical wirings to connect the actuator to the motor and the actuator to the gearbox, are as standard 3 meters. If longer cables were required, it must be communicated when ordering. There are specific cablings for mo-

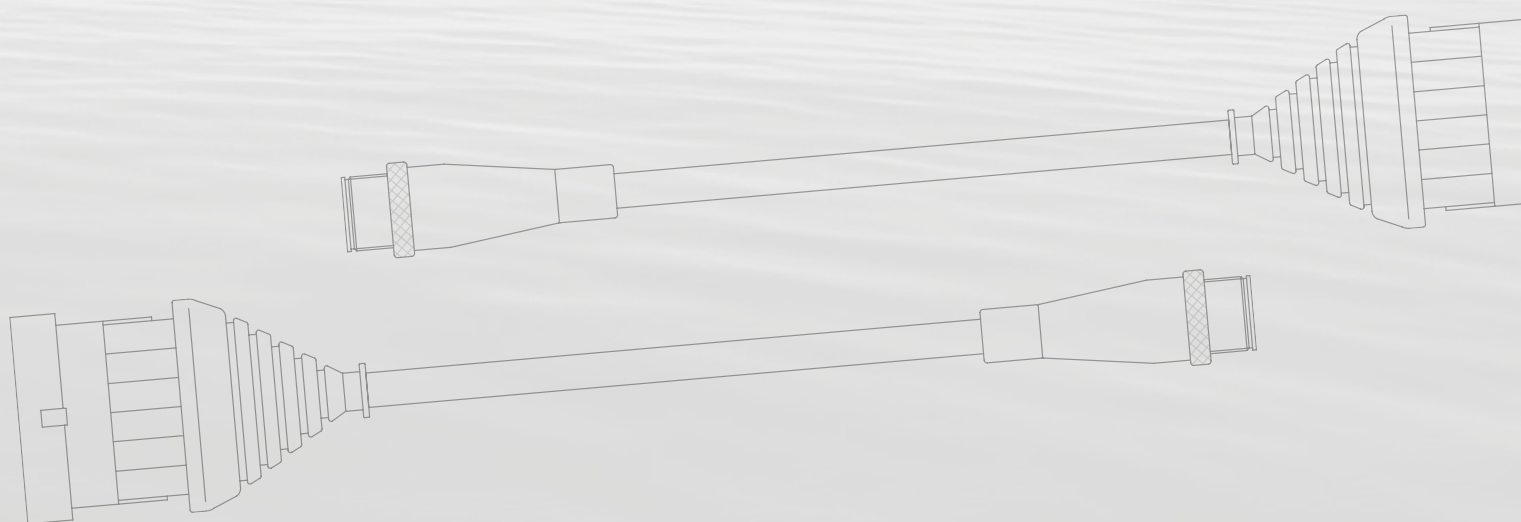
tors like FNM, FPT, Nanni Diesel, Vetus, etc. In this case you must communicate the specific type of motor you need to command.

The system configurations are classified according to the possible combinations of:

- motor types
- gearbox types
- number of engines
- number of levers
- options.

The following table lists all the types of electronic systems. The most common ones are highlighted in gray.

SYSTEM TYPE	ID
• Mechanical throttle and mechanical gearbox	MM
• Electronic voltage throttle and mechanical gearbox	VM
• CANBus throttle and mechanical gearbox	CM
• Electronic PWM throttle and mechanical gearbox	WM
• Electronic current throttle and mechanical gearbox	IM
• Mechanical throttle and electronic gearbox	ME
• Electronic voltage throttle and electronic gearbox	VE
• CANBus throttle and electronic gearbox	CE
• Electronic PWM throttle and electronic gearbox	WE
• Electronic current throttle and electronic gearbox	IE
• Electronic voltage throttle and trolling gearbox	VT
• CANBus throttle and trolling gearbox	CT
• Trim/Flap option	F
• Interface towards frequency converter on hybrid propulsion systems	T



Now it follows a list of complete system configurations. The prefix 3500 or 4500 defines the type of control lever to be mounted on the boat. For example, the 4500-MM22F indicates a system with two mechanical motors, two mechanical gearboxes, trim/flaps option and two control stations 4500 Series.

**COD. MM** Electronic control systems compatible with mechanical motors and mechanical gearboxes

TROTTL MECHANICAL – GEARBOX MECHANICAL			
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP	WITH HYBRID MOTOR OPTION
• 1 motor, 1 command station	3500-MM11 4500-MM11	3500-MM11F 4500-MM11F	3500-MM11H 4500-MM11H
• 1 motor, 2 command stations	3500-MM12 4500-MM12	3500-MM12F 4500-MM12F	3500-MM12H 4500-MM12H
• 2 motors, 1 command station	3500-MM21 4500-MM21	3500-MM21F 4500-MM21F	3500-MM21H 4500-MM21H
• 2 motors, 2 command stations	3500-MM22 4500-MM22	3500-MM22F 4500-MM22F	3500-MM22H 4500-MM22H
• 2 motors, 3 command stations	3500-MM23 4500-MM23	3500-MM23F 4500-MM23F	3500-MM23H 4500-MM23H

**COD. VM** Electronic control systems compatible with electronic voltage motors Hyundai, Deutz, FNM, Vetus, Nanni Diesel, Lombardini, Cummins, etc. and mechanical gearboxes

TROTTL ELECTRONIC (V) – GEARBOX MECHANICAL			
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP	WITH HYBRID MOTOR OPTION
• 1 motor, 1 command station	3500-VM11 4500-VM11	3500-VM11F 4500-VM11F	3500-VM11H 4500-VM11H
• 1 motor, 2 command stations	3500-VM12 4500-VM12	3500-VM12F 4500-VM12F	3500-VM12H 4500-VM12H
• 2 motors, 1 command station	3500-VM21 4500-VM21	3500-VM21F 4500-VM21F	3500-VM21H 4500-VM21H
• 2 motors, 2 command stations	3500-VM22 4500-VM22	3500-VM22F 4500-VM22F	3500-VM22H 4500-VM22H
• 2 motors, 3 command stations	3500-VM23 4500-VM23	3500-VM23F 4500-VM23F	3500-VM23H 4500-VM23H

**COD. CM** Electronic control systems compatible with CANBus motors FPT, Nanni Diesel, Toyota, VM, etc. and mechanical gearboxes

TROTTL CANBUS – GEARBOX MECHANICAL		
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP
• 1 motor, 1 command station	3500-CM11 4500-CM11	3500-CM11F 4500-CM11F
• 1 motor, 2 command stations	3500-CM12 4500-CM12	3500-CM12F 4500-CM12F
• 2 motors, 1 command station	3500-CM21 4500-CM21	3500-CM21F 4500-CM21F
• 2 motors, 2 command stations	3500-CM22 4500-CM22	3500-CM22F 4500-CM22F
• 2 motors, 3 command stations	3500-CM23 4500-CM23	3500-CM23F 4500-CM23F

**COD. WM** Electronic control systems compatible with electronic PWM motors Caterpillar, Deutz, Scania, etc. and mechanical gearboxes

TROTTLER PWM – GEARBOX MECHANICAL		
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP
• 1 motor, 1 command station	3500-WM11 4500-WM11	3500-WM11F 4500-WM11F
• 1 motor, 2 command stations	3500-WM12 4500-WM12	3500-WM12F 4500-WM12F
• 2 motors, 1 command station	3500-WM21 4500-WM21	3500-WM21F 4500-WM21F
• 2 motors, 2 command stations	3500-WM22 4500-WM22	3500-WM22F 4500-WM22F
• 2 motors, 3 command stations	3500-WM23 4500-WM23	3500-WM23F 4500-WM23F

**COD. IM** Electronic control systems compatible with electronic current motors Caterpillar, Deutz, Isotta Fraschini, etc. and mechanical gearboxes

TROTTLER CURRENT (I) – GEARBOX MECHANICAL		
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP
• 1 motor, 1 command station	3500-IM11 4500-IM11	3500-IM11F 4500-IM11F
• 1 motor, 2 command stations	3500-IM12 4500-IM12	3500-IM12F 4500-IM12F
• 2 motors, 1 command station	3500-IM21 4500-IM21	3500-IM21F 4500-IM21F
• 2 motors, 2 command stations	3500-IM22 4500-IM22	3500-IM22F 4500-IM22F
• 2 motors, 3 command stations	3500-IM23 4500-IM23	3500-IM23F 4500-IM23F

**COD. ME** Electronic control systems compatible with mechanical motors and electronic solenoid gearboxes

TROTTLER MECHANICAL – GEARBOX ELECTRONIC			
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP	WITH HYBRID MOTOR OPTION
• 1 motor, 1 command station	3500-ME11 4500-ME11	3500-ME11F 4500-ME11F	3500-ME11H 4500-ME11H
• 1 motor, 2 command stations	3500-ME12 4500-ME12	3500-ME12F 4500-ME12F	3500-ME12H 4500-ME12H
• 2 motors, 1 command station	3500-ME21 4500-ME21	3500-ME21F 4500-ME21F	3500-ME21H 4500-ME21H
• 2 motors, 2 command stations	3500-ME22 4500-ME22	3500-ME22F 4500-ME22F	3500-ME22H 4500-ME22H
• 2 motors, 3 command stations	3500-VM23 4500-VM23	3500-VM23F 4500-VM23F	3500-VM23H 4500-VM23H



**COD. VE**

Electronic control systems compatible with electronic voltage motors Hyundai, Deutz, FNM, Vetus, Nanni Diesel, Lombardini, Cummins, etc. and electronic solenoid gearboxes

TROTTLER ELECTRONIC (V) – GEARBOX ELECTRONIC			
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP	WITH HYBRID MOTOR OPTION
• 1 motor, 1 command station	3500-VE11	3500-VE11F	3500-VE11H
	4500-VE11	4500-VE11F	4500-VE11H
• 1 motor, 2 command stations	3500-VE12	3500-VE12F	3500-VE12H
	4500-VE12	4500-VE12F	4500-VE12H
• 2 motors, 1 command station	3500-VE21	3500-VE21F	3500-VE21H
	4500-VE21	4500-VE21F	4500-VE21H
• 2 motors, 2 command stations	3500-VE22	3500-VE22F	3500-VE22H
	4500-VE22	4500-VE22F	4500-VE22H
• 2 motors, 3 command stations	3500-VE23	3500-VE23F	3500-VE23H
	4500-VE23	4500-VE23F	4500-VE23H

**COD. CE**

Electronic control systems compatible with CANBus motors FPT, Nanni Diesel, Toyota, VM, etc. and electronic solenoid gearboxes

TROTTLER CANBUS – GEARBOX ELECTRONIC			
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP	WITH HYBRID MOTOR OPTION
• 1 motor, 1 command station	3500-CE11	3500-CE11F	3500-CE11H
	4500-CE11	4500-CE11F	4500-CE11H
• 1 motor, 2 command stations	3500-CE12	3500-CE12F	3500-CE12H
	4500-CE12	4500-CE12F	4500-CE12H
• 2 motors, 1 command station	3500-CE21	3500-CE21F	3500-CE21H
	4500-CE21	4500-CE21F	4500-CE21H
• 2 motors, 2 command stations	3500-CE22	3500-CE22F	3500-CE22H
	4500-CE22	4500-CE22F	4500-CE22H
• 2 motors, 3 command stations	3500-CE23	3500-CE23F	3500-CE23H
	4500-CE23	4500-CE23F	4500-CE23H

**COD. WE**

Electronic control systems compatible with electronic PWM motors Caterpillar, Deutz, Scania, etc. and electronic solenoid gearboxes

TROTTLER PWM – GEARBOX ELECTRONIC		
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP
• 1 motor, 1 command station	3500-WE11	3500-WE11F
	4500-WE11	4500-WE11F
• 1 motor, 2 command stations	3500-WE12	3500-WE12F
	4500-WE12	4500-WE12F
• 2 motors, 1 command station	3500-WE21	3500-WE21F
	4500-WE21	4500-WE21F
• 2 motors, 2 command stations	3500-WE22	3500-WE22F
	4500-WE22	4500-WE22F
• 2 motors, 3 command stations	3500-WE23	3500-WE23F
	4500-WE23	4500-WE23F

**COD. IE**

Electronic control systems compatible with electronic current motors Caterpillar, Deutz, Isotta Fraschini, etc. and electronic solenoid gearboxes

TROTTLER CURRENT (I) – GEARBOX ELECTRONIC		
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP
• 1 motor, 1 command station	3500-IE11 4500-IE11	3500-IE11F 4500-IE11F
• 1 motor, 2 command stations	3500-IE12 4500-IE12	3500-IE12F 4500-IE12F
• 2 motors, 1 command station	3500-IE21 4500-IE21	3500-IE21F 4500-IE21F
• 2 motors, 2 command stations	3500-IE22 4500-IE22	3500-IE22F 4500-IE22F
• 2 motors, 3 command stations	3500-IE23 4500-IE23	3500-IE23F 4500-IE23F

**COD. VT**

Electronic control systems compatible with electronic voltage motors Hyundai, Deutz, FNM, Vetus, Nanni Diesel, Lombardini, Cummins, etc. and trolling gearboxes

TROTTLER VOLTAGE (V) – GEARBOX TROLLING		
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP
• 1 motor, 1 command station	3500-VT11 4500-VT11	3500-VT11F 4500-VT11F
• 1 motor, 2 command stations	3500-VT12 4500-VT12	3500-VT12F 4500-VT12F
• 2 motors, 1 command station	3500-VT21 4500-VT21	3500-VT21F 4500-VT21F
• 2 motors, 2 command stations	3500-VT22 4500-VT22	3500-VT22F 4500-VT22F
• 2 motors, 3 command stations	3500-VT23 4500-VT23	3500-VT23F 4500-VT23F

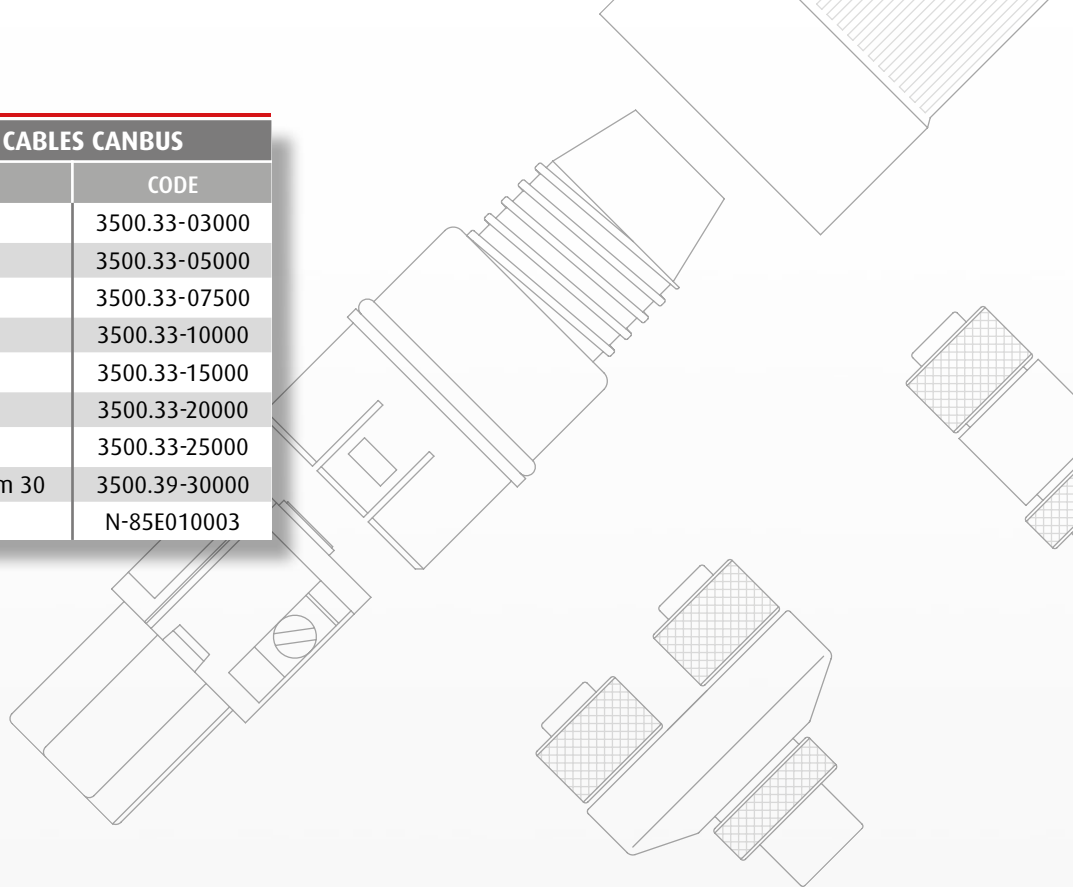
**COD. CT**

Electronic control systems compatible with CANBus motors FPT, Nanni Diesel, Toyota, VM, etc. and trolling gearboxes

TROTTLER CANBUS – GEARBOX TROLLING		
	WITHOUT TRIM/FLAP	WITH TRIM/FLAP
• 1 motor, 1 command station	3500-CT11 4500-CT11	3500-CT11F 4500-CT11F
• 1 motor, 2 command stations	3500-CT12 4500-CT12	3500-CT12F 4500-CT12F
• 2 motors, 1 command station	3500-CT21 4500-CT21	3500-CT21F 4500-CT21F
• 2 motors, 2 command stations	3500-CT22 4500-CT22	3500-CT22F 4500-CT22F
• 2 motors, 3 command stations	3500-CT23 4500-CT23	3500-CT23F 4500-CT23F

## DATA TRANSMISSION CABLES CANBUS

DESCRIPTION	CODE
• Length m 3	3500.33-03000
• Length m 5	3500.33-05000
• Length m 7.5	3500.33-07500
• Length m 10	3500.33-10000
• Length m 15	3500.33-15000
• Length m 20	3500.33-20000
• Length m 25	3500.33-25000
• Extension cable male/female m 30	3500.39-30000
• CANBus "T" splitter	N-85E010003



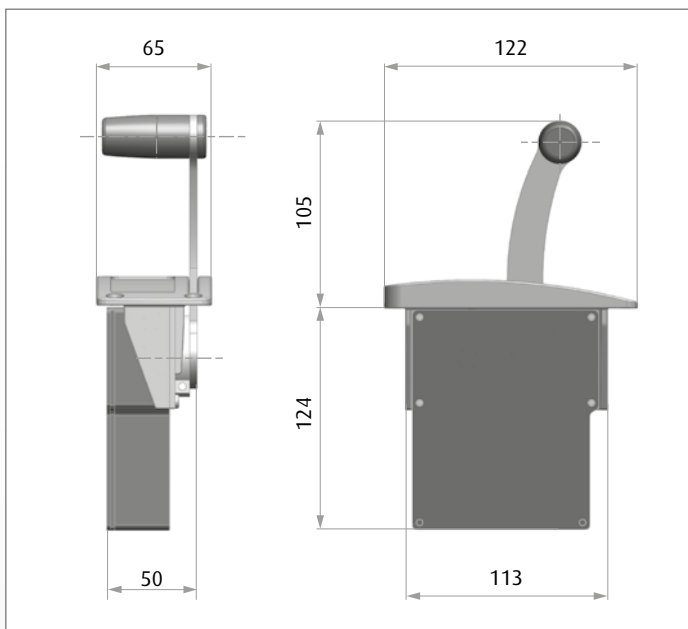
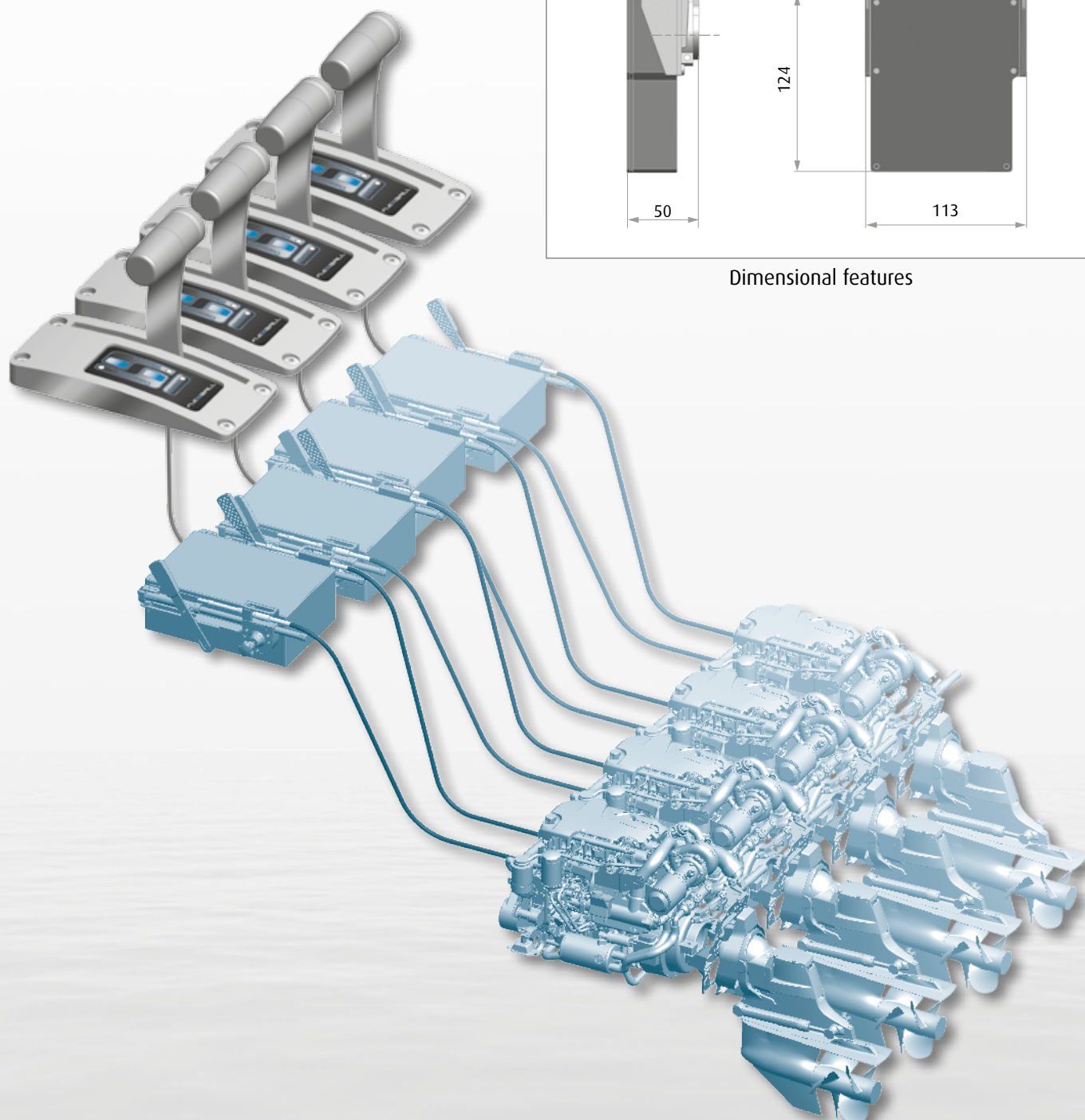
# ELECTRONIC CONTROL 4000 SERIES

Modular control for single and side by side mounting.



- Suitable for all types of engines
- Easy mounting
- Reliable
- Precise
- Simple
- Reactive

## INSTALLATION SCHEME



Dimensional features



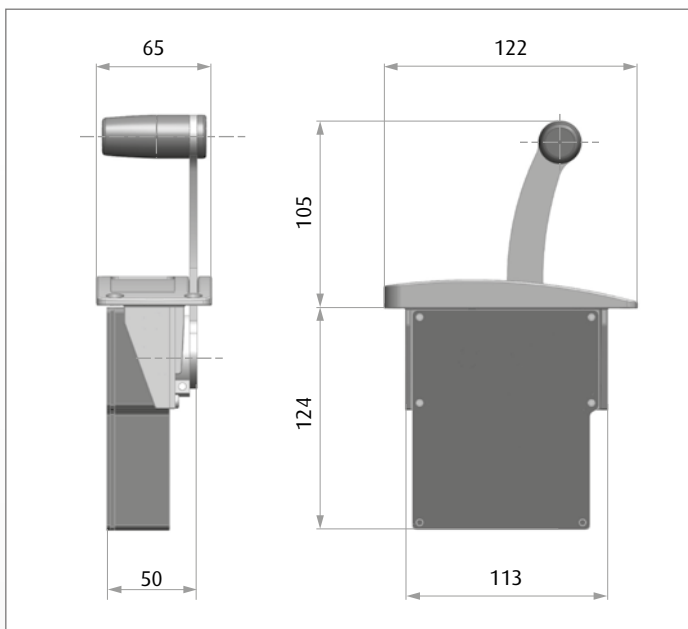
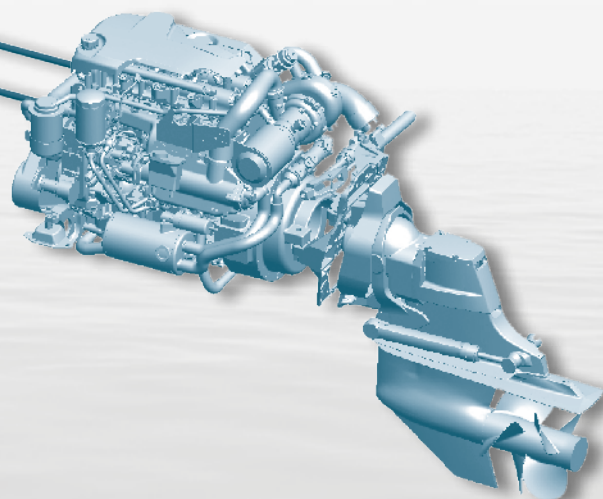
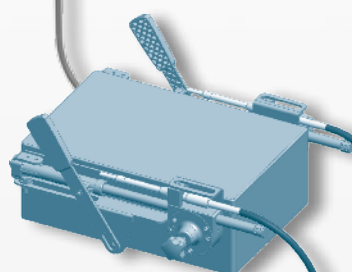
# 4000 WAVE

Make your navigation easier.  
Your good old engine  
has never been so easy  
to control.  
Enjoy the new Flexball  
electronic control.



- Affordable price
- Suitable for all types of engines with mechanical control
- Easy mounting
- Reliable
- Precise
- Simple
- Reactive

## INSTALLATION SCHEME



Dimensional features

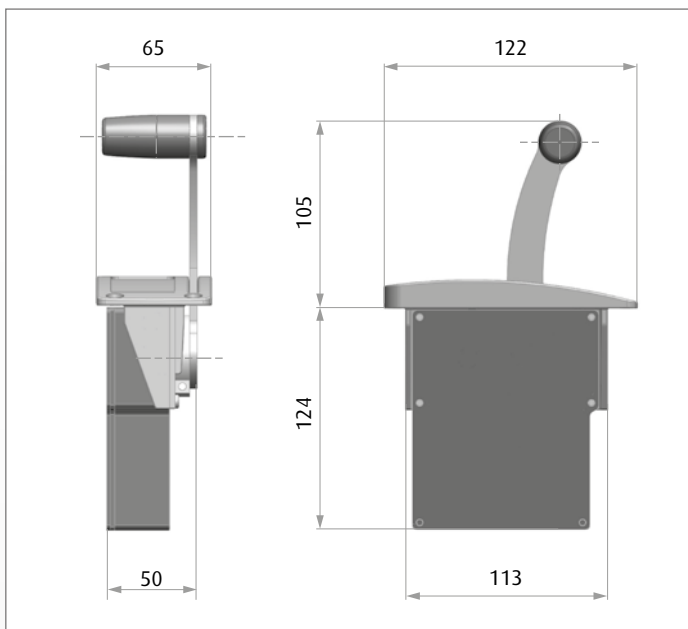
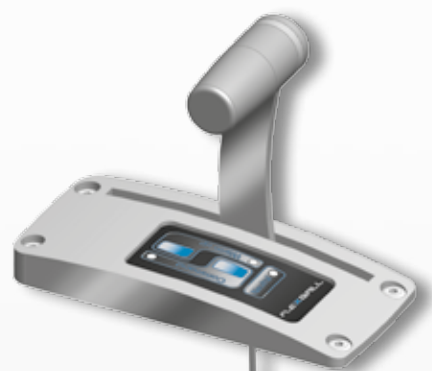
# 4000 HYDROJET

All functions in a single lever.  
Enjoy the new Flexball  
electronic control.

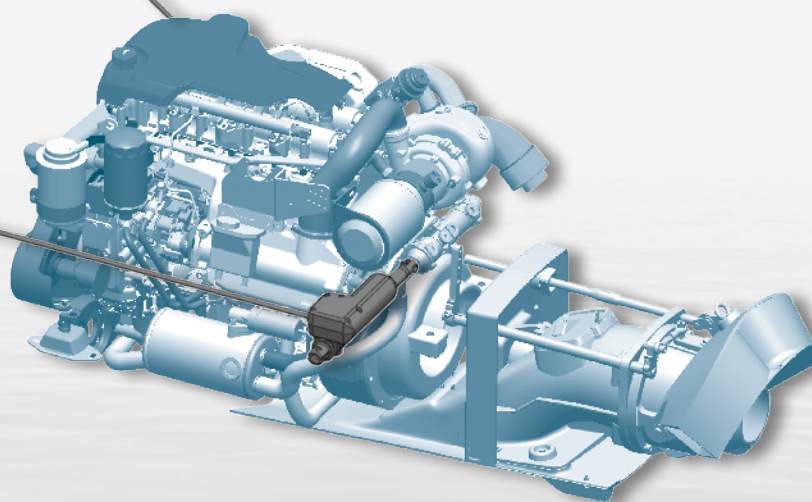
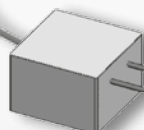


- Suitable for all type of engines
- Easy mounting
- Reliable
- Precise
- Simple
- Reactive

## INSTALLATION SCHEME



Dimensional features







Electronic  
and hybrid  
propulsion



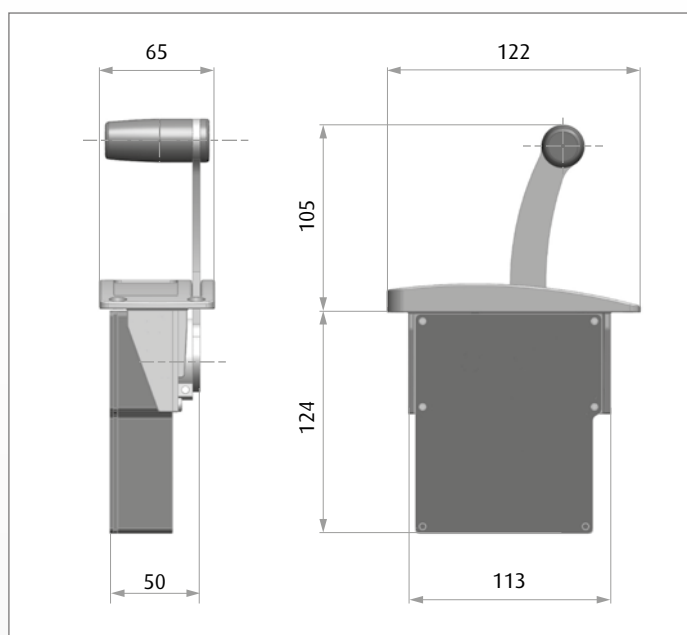
# ▼ 4000 ELT

Make your navigation easier.  
Your electric motor has never  
been so easy to control.  
Enjoy the new Flexball  
electronic control.



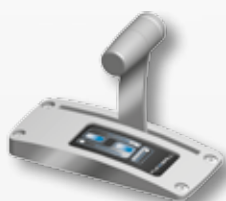
- Suitable for all types of electric motors
- Easy mounting
- Reliable
- Precise
- Simple
- Reactive

## INSTALLATION SCHEME

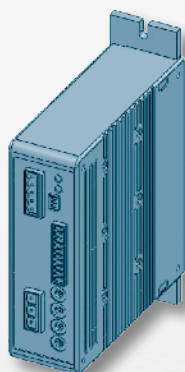


Dimensional features

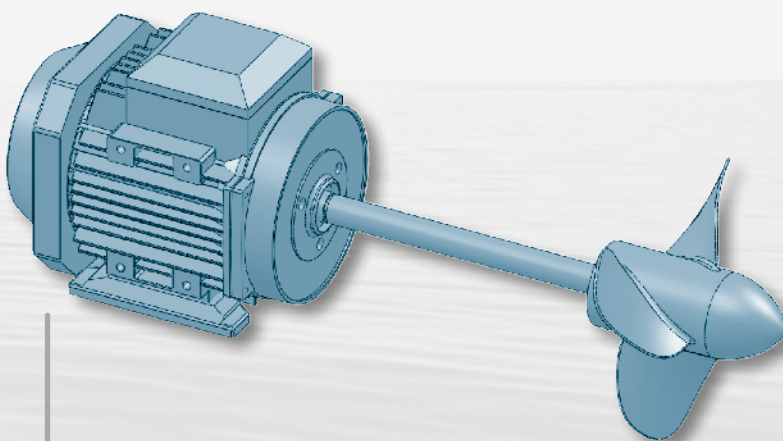
4000 ELT



MOTOR CONTROLLER



ELECTRIC MOTOR



- Power supply from 9 to 32 Vdc
- Voltage, current or CANBus signals towards the motor controller
- 3 relay output free programmable, typically used for Forward, Reverse and Neutral commands