

Installation and maintenance manual

SINGLE LEVER CONTROL

B 501



CH/B



CHT/BT



CHL/BL



CHTL/BTL

B 502



CH/B



CHT/BT



CHL/BL



CHTL/BTL

ENGLISH

ITALIANO

FRANÇAIS



ULTRAFLEX

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MEMBER

Setting Standards for Safer Boating



UK

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I

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ULTRAFLEX has been a leader in steering systems for pleasure and professional boats for many years. **ULTRAFLEX** production is since ever synonymous of reliability and safety.

All **ULTRAFLEX** products are designed and manufactured to ensure the best performance. To ensure your safety and to maintain a high quality level, **ULTRAFLEX** products are guaranteed only if they are used with original spare parts.

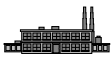
ULTRAFLEX and **UFLEX** Quality Management Systems are certified by the Det Norske Veritas - Germanischer Lloyd (DNV-GL), in conformity with the UNI EN ISO 9001:2015 rule.

The quality management system involves all the company resources and processes starting from the design, in order to:

- ensure product quality to the customer;
- maintain and improve the quality standards constantly;
- pursue a continuous process improvement to meet the market needs and to increase the customer satisfaction

ULTRAFLEX Environmental Management System is certified by the Det Norske Veritas - Germanischer Lloyd (DNV-GL), in conformity with the UNI EN ISO 14001:2015 rule.

Products for pleasure boats are constantly tested to check their conformity with the 2013/53/EU.



"**ULTRAFLEX** has over 80 years of experience in the marine industry and is a world leader in the production of mechanical, hydraulic and electronic steering systems, control boxes and steering wheels for any kind of pleasure, fishing or commercial boats.

The key factors which explain the increasing success of our products all over the world are the reliability of our products and the before and after sale service, the quality of the company organization and of the human resources and the continuous spending in research and development".

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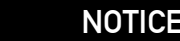

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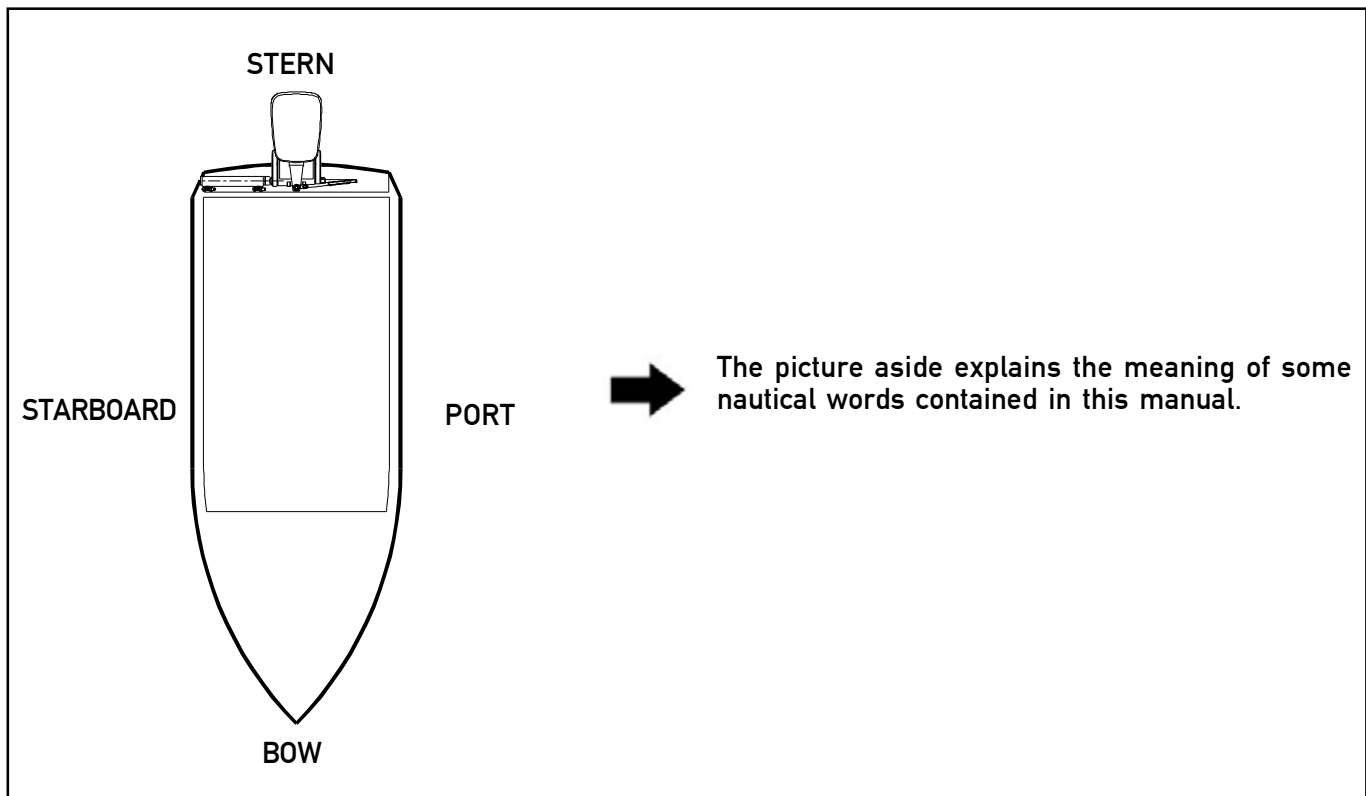
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USE OF THIS MANUAL AND SYMBOLS

THE INSTALLATION AND MAINTENANCE MANUAL is the document accompanying the product from sale to replacement and disposal, and should be considered an integral part of the product. Read the manual before undertaking ANY ACTIVITY involving the product, including movement and unloading from the vehicle on which it is delivered.

In order to protect the user's safety and guarantee correct functioning of the product, this manual uses the symbols described below.

-  **DANGER** → Immediate hazards which CAUSE severe personal injury or death.
-  **WARNING** → Denotes that a hazard exists which can result in injury or death if proper precautions are not taken.
-  **CAUTION** → Denotes a reminder of safety practices or directs attention to unsafe practices which could result in personal injury or damage to the craft or components or to the environment.
-  **NOTICE** → Important information for the correct installation and for maintenance, that does not cause any damage.
-  → Operations which should be performed by qualified or specialized personnel to avoid risks are identified by the symbol shown here. Provide the personnel who will be installing the product with appropriate training and make sure that they understand and implement the instructions provided.



INTRODUCTION

This installation and maintenance manual constitutes an integral part of the product and must be made easily accessible for personnel using the product and performing maintenance work on it.

The user must know the content of this manual.

ULTRAFLEX shall not be held liable for any inaccuracies due to printing errors in the manual.

Without altering the basic features of the product described **ULTRAFLEX** reserves the right to make any changes to descriptions, details and illustrations that it may consider appropriate for its improvement or for manufacturing or commercial reasons at any time, without being required to update this publication immediately.

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WARNING

The product must be installed by experienced personnel to ensure correct functioning of the product and its components. In the event of breakage of the components or malfunctioning, contact specialized personnel or our Technical Assistance Service.

TECHNICAL ASSISTANCE SERVICE

UFLEX S.r.l.

Via Milite Ignoto,8A
16012 Busalla (GE)-Italia
Tel: +39.010.962.01
Fax: +39.010.962.0333
Email: service@ultraflexgroup.it
www.ultraflexgroup.it

North - South - Central America: **UFLEX USA**

6442 Parkland Drive
Sarasota, FL 34243
Tel: +1.941.351.2628
Fax: +1.941.360.9171
Email: sales@uflexusa.com
www.uflexusa.com

WARRANTY

ULTRAFLEX warrants that its products are built according to the standards of good workmanship and are free of defects in materials and workmanship.

This warranty is valid for two years starting on the date of manufacture with the exception of cases in which products are installed and used on working vessels or on vessels commercial use, in which case the guarantee is limited to 1 year from the date of manufacture.

This warranty is limited to free replacement or repair of the item, which must be returned carriage paid, provided we find it to be effectively defective in materials and/or workmanship.

The warranty does not cover any direct or indirect damages. The warranty specifically does not cover, and we shall not be liable for (except for replacement or repair of defective items under the terms and conditions set forth above), malfunctioning of our products if their failure or poor functioning is attributable to incorrect installation or to negligent or improper use.

This warranty does not cover products installed on racing boats or used in a competitive context. The descriptions and illustrations in this manual are indicative only.

Please contact our Assistance Service for more detailed information.

The components of **ULTRAFLEX** steering and control systems with EC marked components as required by the Directive 2013/53 EU. Note that the **ULTRAFLEX** warranty shall be automatically forfeited if any **ULTRAFLEX** components are installed in a steering and control system along with products of other brands.



1 PRODUCT DESCRIPTION

1.1 Product description and recommendations for use

ENGLISH

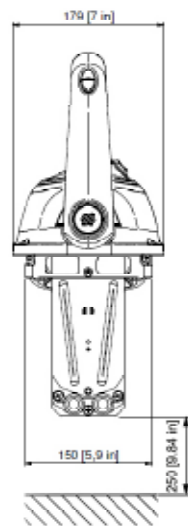
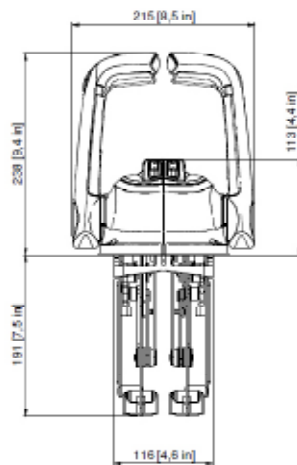
The B501 single engine and the B502 dual engine controls are designed as a single lever dual function per engine. They are specifically designed to operate with outboard, stern drive (I/O) and inboard marine propulsion engines. The controls can operate with all Ultraflex cables except the C4; **K59 kit is included with both the controls, necessary to install Ultraflex C2, C8, C0, and Mach 0 cables.**

For all the other cables the following kits are available on demand:

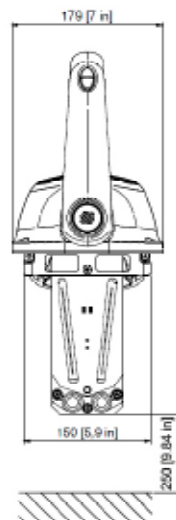
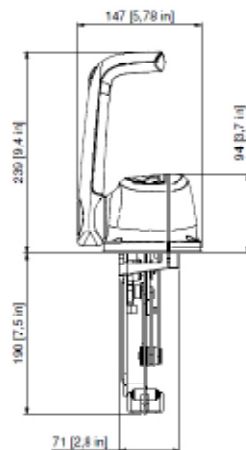
- K 60 for cables Ultraflex C5 - C16 - MACH 5;
- K 61 for cables Ultraflex C22;
- K 62 for cables Ultraflex C36 - MACH 36.
- The cables C14 and MACH14 require no installation kit.

1.2 Dimensions

The pictures below show the lever control B501 and B502 dimensions.



Minimum distance
to allow the
cable installation



Minimum distance
to allow the
cable installation



2 TRANSPORTATION

2.1 General warnings

The product and its packaging weigh about 3.4 kg (7.5 pounds) and can therefore be moved by hand.

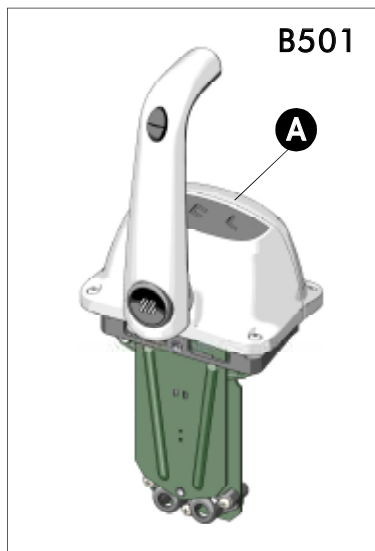
⚠ WARNING

Personnel handling the load must work with safety gloves and footwear.

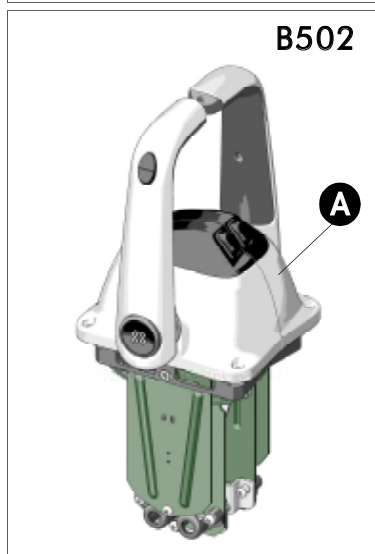
2.2 Package contents

Before using the device, check that it has not suffered damage during transportation or storage. Also check that all the components supplied with it are contained in the package (refer to list). If you identify any damage, notify the carrier and your supplier.

Contents of the control system packaging:

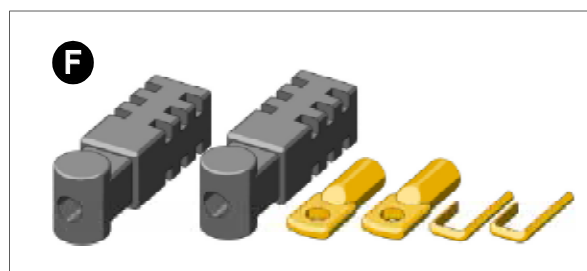
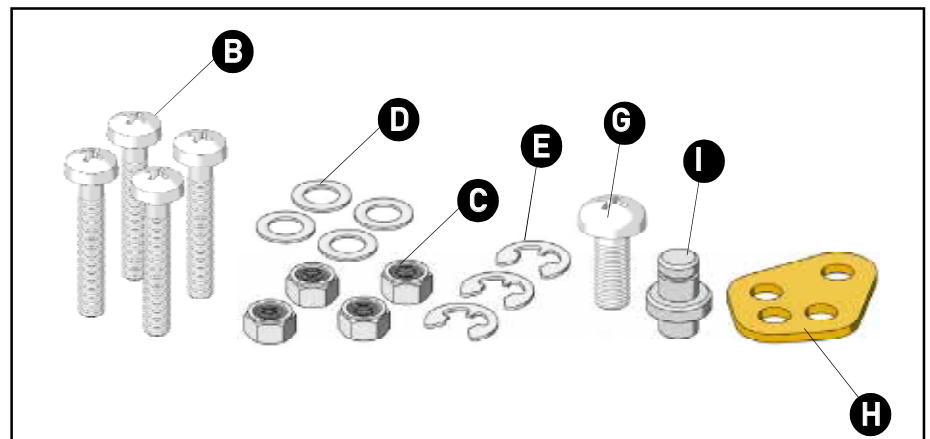


B501



B502

REF	B501	B502
A	1 lever control	1 lever control
B	4 screws M5x30	4 screws M5x30
C	4 nuts M5	4 nuts M5
D	4 washers	4 washers
E	3 snap rings	6 snap rings
F	1 kit K59 for cable installation	2 kits K59 for cable installation
G	1 screw M5x12	2 screws M5x12
H	1 plate	2 plates
I	1 pin	2 pins



⚠ WARNING

Dispose of packaging in accordance with the law.



3 INSTALLATION

3.1 Tools required

ENGLISH



Flat head screwdriver



Phillips screwdriver



Pliers



Open end wrench
8mm [0.31"]



Socket wrench
17mm [0.66"]

3.2 Control box installation



- 1 Install the control in a position that allows the lever to rotate free and take care that it can reach the full forward and full reverse stroke.
- 2 Refer to the overall dimensions given in paragraph 1.2 to check that the box can effectively be installed in the desired position.

⚠ WARNING

When the cable is installed avoid too narrow bends.

- 3 After determining the appropriate location, drill the holes required to assemble the control box using the template provided for single or dual control.

NOTICE

Connect the cables to the lever before fixing the lever control to the dashboard.

⚠ CAUTION

The use of a proper killing switch system is recommended for each ULTRAFLEX control system installation.

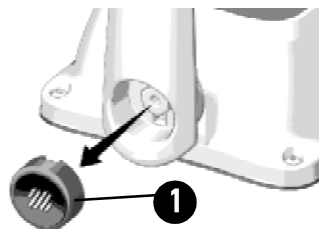
3.3 Adjustment of the lever inclination



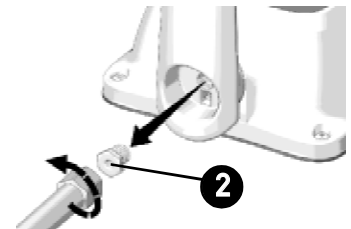
3.3.1 CH/B and CHT/BT versions

The lever angular position can be adjusted both forward and backward according to the control position. Follow the instructions below:

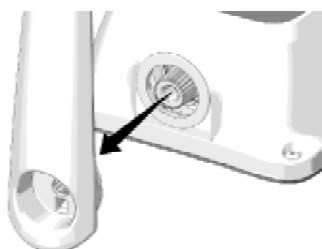
- 1 Remove the hub plug of the lever (1).



- 2 Take out the hexagonal head screw (2) with a 17 socket wrench.



- 3 Extract the lever and turn it to the desired position, then reinsert it into the spline pin shaft of the control.



- 4 Apply threadlocking low strength (Loctite 222) on the screw (2) and fasten it completely. Insert the hub plug by paying attention to position the plug cut upward as shown in the picture.



3.3.2 CHL/BL and CHTL/BTL versions



Controls with lock in neutral feature allow the possibility to change the lever inclination 15° backward following next steps. This configuration increases the forward stroke of the lever and as consequence raises the throttle mechanism stroke up to 76mm.

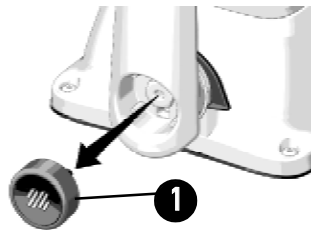
NOTICE

The use of this feature is highly recommended for inboard engines installation and all engines with throttle lever stroke higher than 55mm in order to let the engine reach maximum rpm.

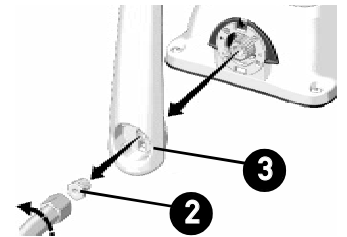
WARNING

Make sure the chosen angular position allows the correct stroke of the cable.

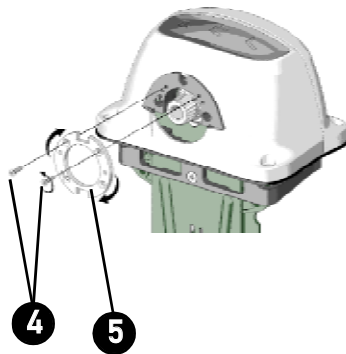
- 1 Remove the hub plug of the lever (1).



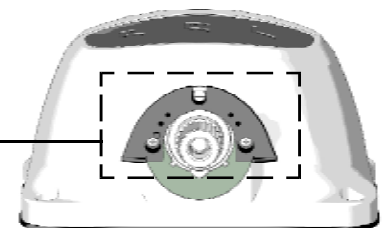
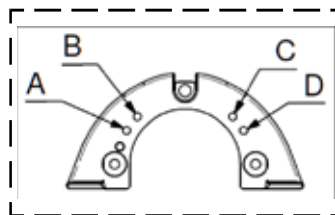
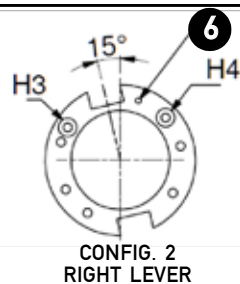
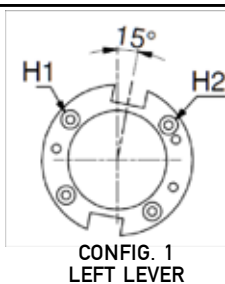
- 2 Take out the hexagonal head screw (2) with a 17 socket wrench and extract lever (3).



- 3 Take out two ST screws (4) with philips screwdriver, rotate the disc (5) (without changing side), please refer to config 1 for disc connection, align holes H1 with B and H2 with D. Insert the screws (4) previously removed in holes H1 and H2 and fasten them.



- 4 B502 CHL/BL For the right lever of double engine control B502 repeat the same procedure plus turning upside down the disc (side identification hole (6) must be visible). Please refer to config. 2 for disc connection, align hole H3 with A and H4 with C. Insert the screws (4) previously removed in holes H3 and H4 and fasten them.



- 5 Reinsert the lever into the spline pin shaft of the control paying attention to fit the notch on the lever in the hub lock on the mechanism, the lever should be inclined 15° backward.



- 6 Apply threadlocking low strength (Loctite 222) on the screw (2) and fasten it completely.

Insert the hub plug by paying attention to position the plug cut upward as shown in the picture.



3.4 Connecting control cable



- 1 Select a direct path with a minimum number of bends and without any obstacles.

⚠ WARNING

Avoid too narrow bends (the minimum bend radius is 203 mm (8")).

NOTICE

Outboard engine installations require an additional length of about 120 cm (47") of the cables to allow engine swing.

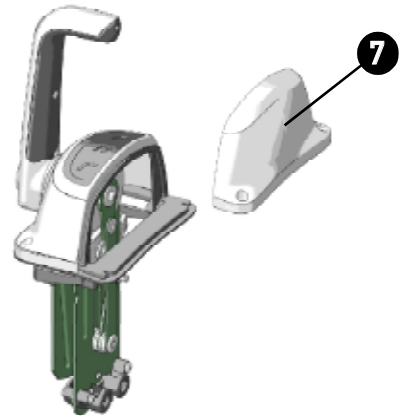
The cables can be fixed with suitable cable hangers (supplied separately) or routed through segments of conduit (supplied separately too) for long straight runs.

⚠ WARNING

To avoid the control stiffening, do not fix the cables near the control outlet (the minimum fixing distance is 500 mm) and in any case do not use fixing systems that can deform the cable conduit.

- 2 **CONTROL B501:** Remove the plastic cover (7) (if already placed) to easily reach the elements where the cables have to be fixed.

For **CONTROL B502** see the following paragraphs.



- 3 A specific fitting kit is available for each cable type, K59 kit is also included with both single levers B501 and B502.

To install the cables on the control/controls follow the instructions provided with each kit.
To install the cables C14 and MACH14 follow the instructions given below.

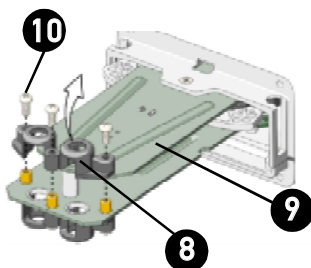
3.5 Installation of cables C14 and Mach14



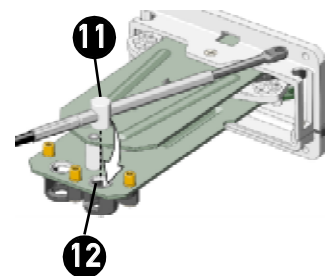
3.5.1 Shift cable connection

- 1 Position the control box on a plane surface as in the picture (the Ultraflex logo on the lever must be visible).

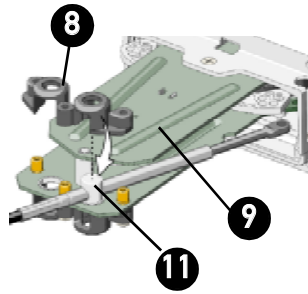
Remove the cable fastener (8) from the plate (9) through the screws (10).



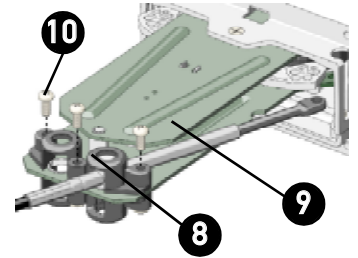
- 2 Mount the cable making sure the cable cylinder (11) is placed inside the plate hole (12).



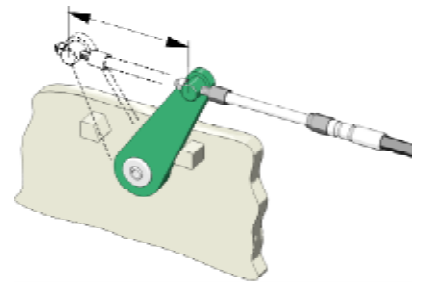
3 Remount the cable fastener (8) on the plate (9) aligning the cylinder of the connector (11) with the hole of the cable fastener.



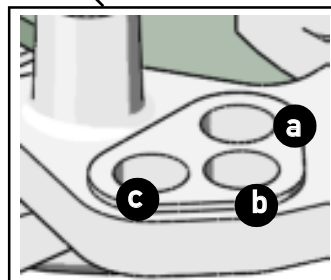
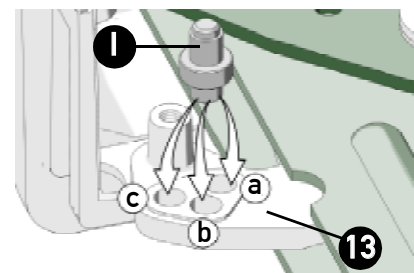
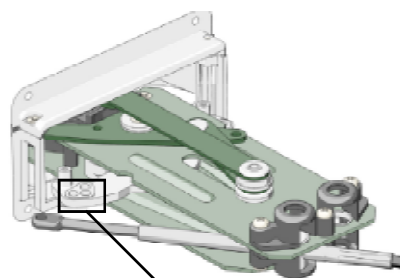
4 Fix the cable fastener (8) to the plate (9) with the screws (10).



5 Measure the engine shift lever stroke from the forward gear to the reverse gear. See the possible strokes on the control device and select the nearest one; for instance, if the stroke on the engine (from one end of stroke to the other) is 67 mm, the cable must be connected to the more internal hole (68 mm stroke). If a stroke of 70 mm is detected, check if the 68 mm stroke is sufficient otherwise connect the cable to the central hole (76 mm stroke); some millimeters (5-6) of surplus stroke on the control device are counterbalanced by the cable play.



6 Turn the control box upside down (internal mechanism looking upward). Put the pin (l) in one of the three holes (a), (b), or (c) of the lever (13).



NOTICE

The hole is chosen according to the stroke of the cable (see the table below).

HOLE	a	b	c
STROKE [mm]	68	76	82

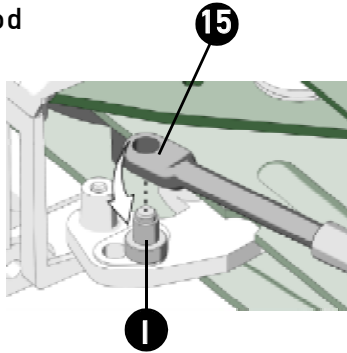
⚠ WARNING

Adjust the shift cable stroke in order to not force the top and the bottom of the engine stroke. The non-compliance with this recommendation causes the control system malfunction such as:

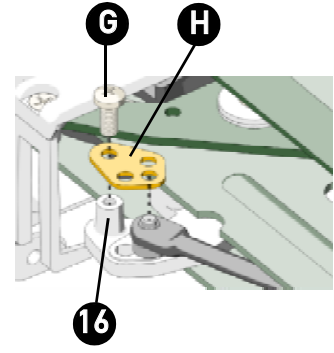
- High resistance to the lever operation
- Early wear of the mechanism that can cause its locking.



7 Engage the rod (15) on the pin (I).



8 Mount the plate (H) in the way shown in the picture and fix it with the screw (G) on the hole (16).



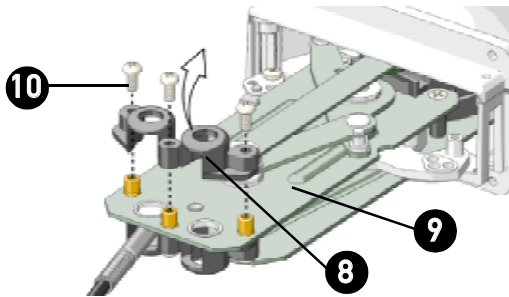
⚠ WARNING

Check the right setting of shift cable stroke and make sure that is compliant with the following conditions.

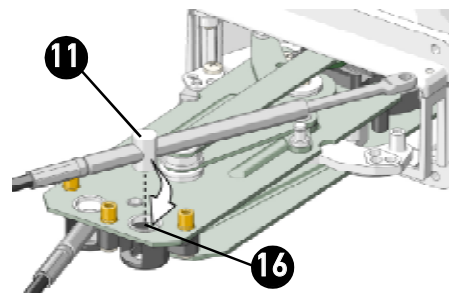
During the shift engagement, the lever movement must be always fluid with a constant resistance. The lever must no become stiffer during the throttle engagement, otherwise check that the control shift stroke corresponds to the engine one.

3.5.2 Throttle cable connection

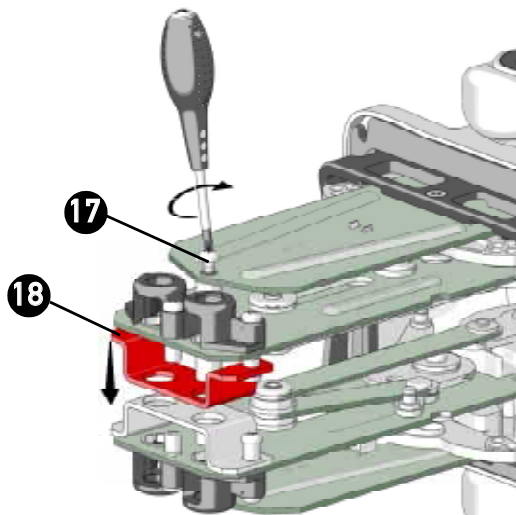
1 Remove the cable fastener (8) from the plate (9) removing the screws (10).



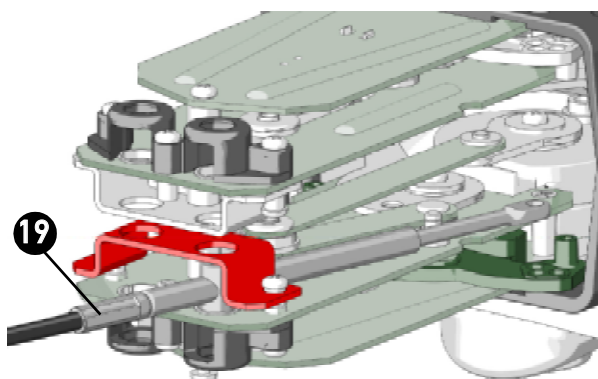
2 Mount the cable making sure the cable cylinder (11) is placed inside the plate hole (16).



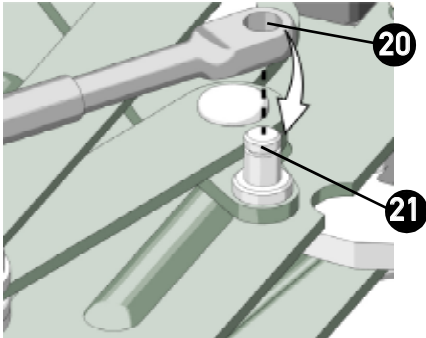
3 CONTROL B502: Unthighten not completley the M5 screw (17) without disconnecting. The cable clamp (18) becomes loose letting pass the cable fixing elements.



4 CONTROL B502: After turning upside down the control, mount the cable making sure the cable cylinder (19) is placed inside the plate hole.



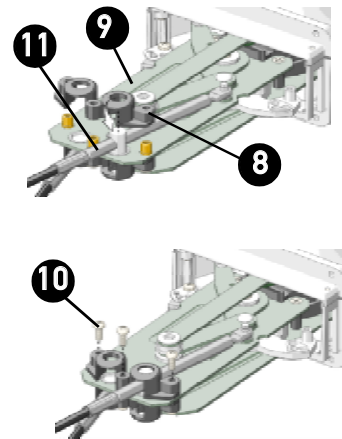
5 Engage the rod (20) on the pin (21).



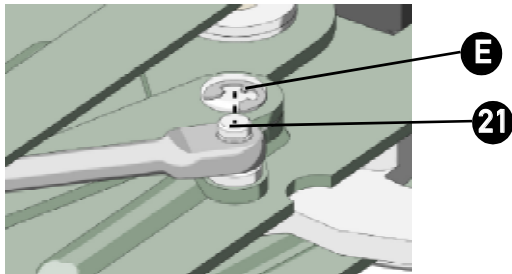
6 Remount the cable fastener (8) on the plate (9) aligning the cable cylinder (11) with the hole of the cable fastener.

Fix the cable fastener to the plate with the screws (10).

For **CONTROL B502** tighten screw M5 (17) aligning the cable cylinder to the holes of the cable fastener.

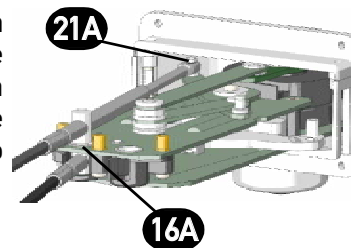


7 Fix the cable inserting the circlip (E) in the groove of the pin (21).



NOTICE

For push action throttle, connect the cable rod on the pin (21A) and insert the cable cylinder into the plate hole (16A).



3.6 Adjusting the clutch



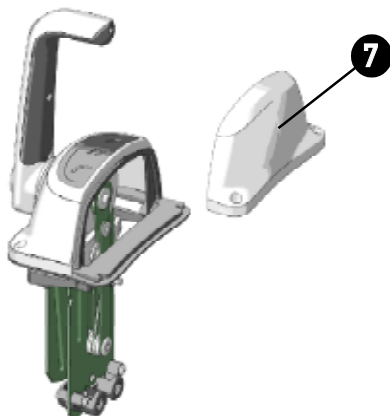
Both the control boxes B501 and B502 allow the adjustment of the clutch.

NOTICE

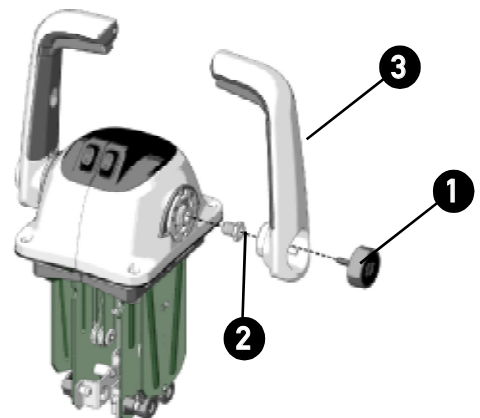
For Control B502 with trim (CHT/BT, CHTL/BTL) DUE TO THE COMPLEX dismounting operations the clutch adjustment is not recommended.

Follow the instructions below:

1 **CONTROL B501:** Remove the plastic cover (7) (if already placed).

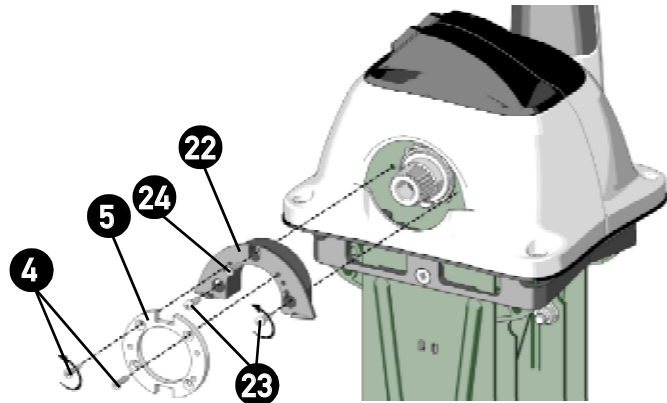


1 **CONTROL B502:** Remove the right lever hub plug (1), unscrew the hexagonal head screw (2) with a 17 socket wrench and extract the right lever (3).



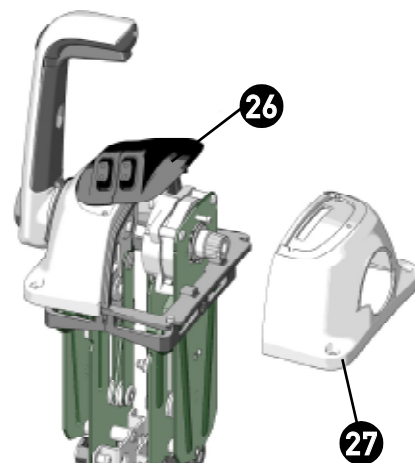
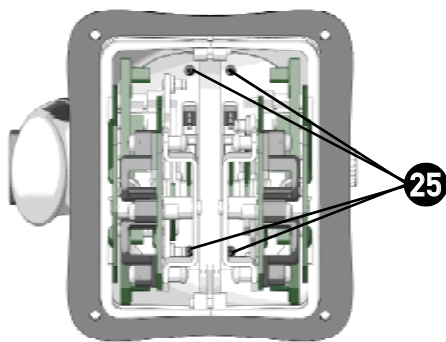
NOTICE

FOR B502 with lock feature versions extract the lock housing (22) and disc (5) by unscrewing two ST screws (4), two philips head M screws (23) and a flathead screw (24).



NOTICE

For B502 with trim feature versions turn upside down the control and untighten the 4 ST screws (25) in order to let the trim cover be loose. Paying attention to wires coming from switches, lift the cover (26) and turn it in order to remove the right plastic case (27).

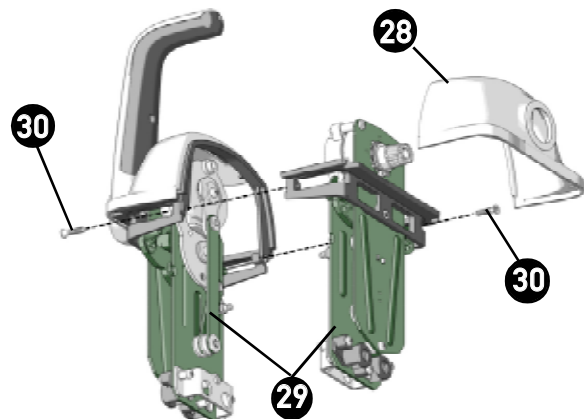


NOTICE

For controls without trim feature is possible to remove the plastic case soon after the lever extraction if lock is not present.

2 CONTROL B502:

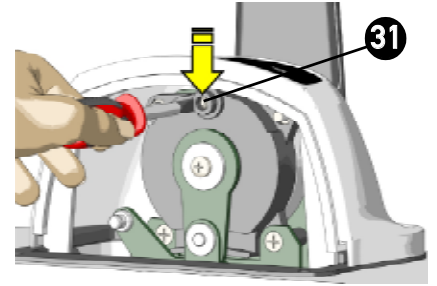
Remove the plastic case (28) and split the two mechanisms (29) by removing screws (30).



3 Rotate the lever to full throttle position.



4 Screw the dowel (31) to obtain the hardening of the clutch, or unscrew it to obtain a smoother movement. To check the friction of the lever, move it clockwise and counter clockwise. **THE CLUTCH ADJUSTMENT MUST BE PERFORMED WITH ENGINE TURNED OFF AND THE LEVER IN FULL THROTTLE POSITION.**

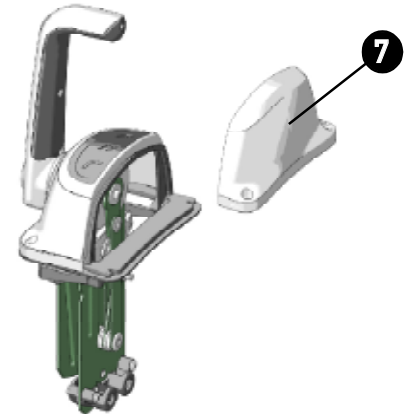


⚠ WARNING

DOING THIS SETTING IN GEAR POSITION CAN DAMAGE THE SYSTEM.

5 CONTROL B501:

Place the plastic cover (7) into its housing on the frame.



6 **CONTROL B502:** Connect the two mechanisms (29) with screws (30) and place the plastic case (28) into its housing on the frame.

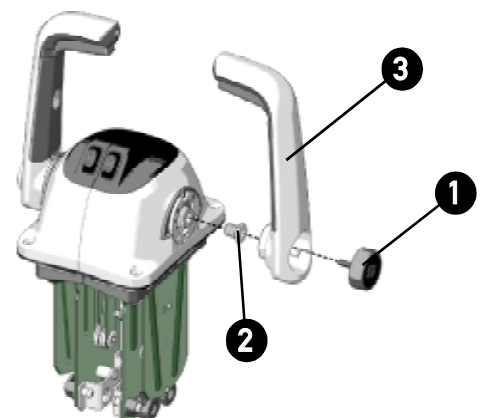
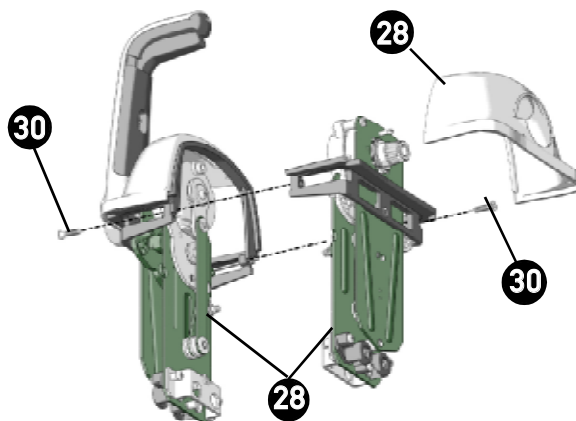
NOTICE

In B502 controls with trim feature versions fix the trim cover with the 4 ST screws (25) shown in par 3.6.

NOTICE

In B502 CHL/BL and CHTL/BTL versions, fix the lock housing as shown in the disassembly phase in Par 3.4 before going to the next step.

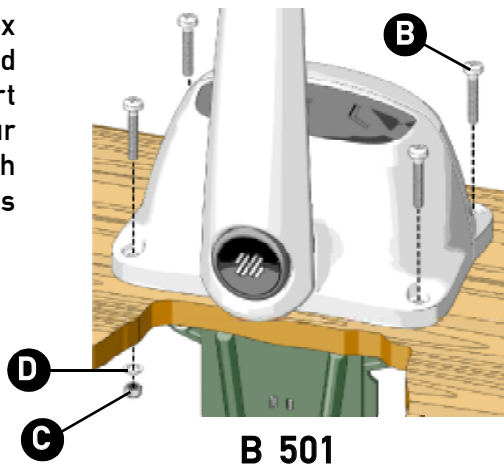
Insert lever (3) engaging the spline pin shaft. Put some threadlocker low strength (Loctite 222) on screw (2) and tighten it completely, then insert plug (1) into the hub checking that the plug cut is turned upwards as shown in Par. 3.3.



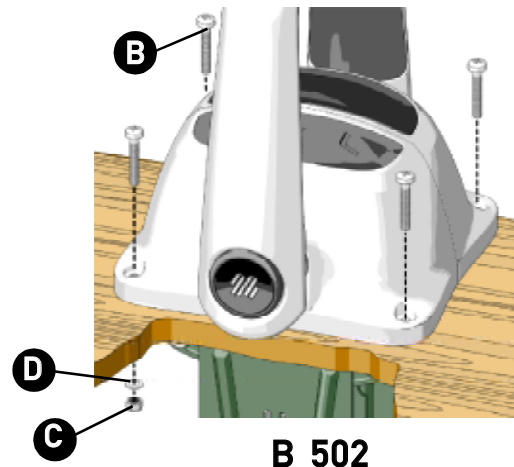
3.7 Lever control box mounting



1 Put the control box in the selected position, then insert and tighten the four screws M5x30 (B) with washers (D) and nuts (C).



B 501



B 502

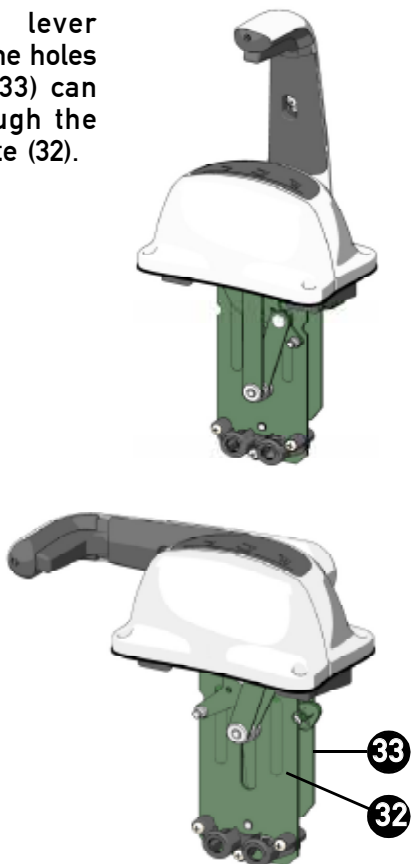
3.8 Installation of the neutral safety switch



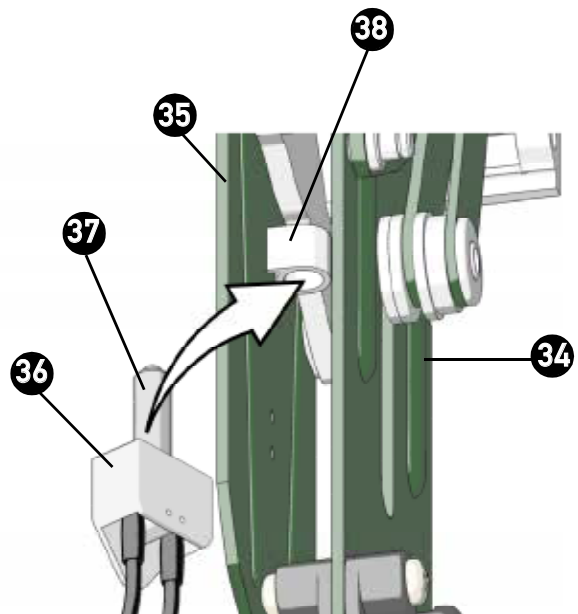
This optional device allows starting the engine only with the shift in neutral position, avoiding unexpected movements of the boat.

To assemble it do as follows:

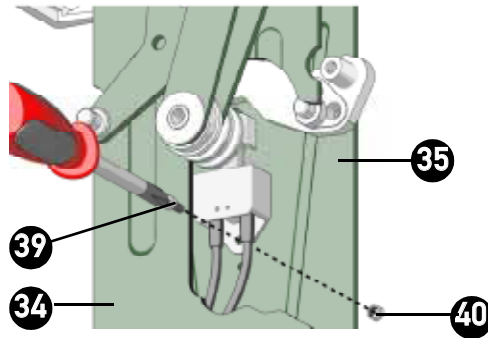
1 Put the lever forward until the holes on the plate (33) can be seen through the slot on the plate (32).



2 Position the device (36) on plate (35) inserting the cylinder (37) inside the plastic guide (38).

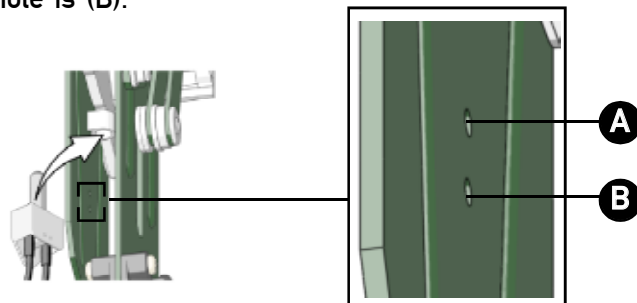


3 Through the slot located on the plate (34), insert the screw (39) in the switch hole through the hole of the plate (35). Insert the nut (40) from the outer side of the plate (35) and tighten the screw (39).



NOTICE

If you are installing the switch X12, the screw and the nut must be inserted inside the hole (A). For the switch X41, the reference hole is (B).



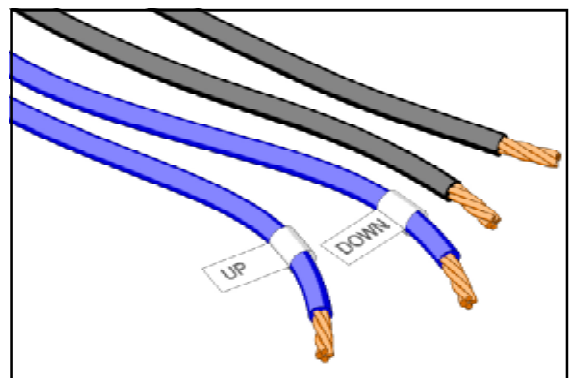
3.9 Trim electrical connections

Carry out the electrical connections of the cables coming from the lever following the diagrams shown below depending on the used engine.

CONTROL B501

The trim signal wires (blue wires) are marked with "UP" and "DOWN" flags.

The black wires must be connected to +12VDC of trim control unit.



CONTROL B502

For B502 control, six wires came from the frame. Please refer to the following scheme in order to identify wires to be connected to the engine.

	WIRE COLOR
+12VDC PORT	R
TRIM UP PORT	P
TRIM DOWN PORT	W
+12VDC STARBOARD	Bn
TRIM UP STARBOARD	Gy
TRIM DOWN STARBOARD	O



⚠ WARNING

Before fixing the cables definitively, check that the lever can move freely in all positions.

NOTICE

The following diagram is only a guideline for the most common engines.
For a specific detail of the wiring refer to the manuals of your boat.

	MERCURY MERCUISER MARINER	OMC STERNDRIIVE	SUZUKI	CHRYSLER I/O	VOLVO I/O	JOHNSON EVINRUDE YAMAHA
TRIM UP	P	B/O	Pk/R	Y	Bl	G
+12VDC	R	P	B with W line	P	P	R
TRIM DOWN	G	G/O	Bl	G	G	Bl
TILT switch necessity	YES	YES	NO	YES	YES	NO

G	Green	
R	Red	
B	Black	
W	White	
P	Purple	
O	Orange	
Pk	Pink	
Bl	Blue	
Y	Yellow	
Gy	Grey	
Bn	Brown	

SWITCH TECHNICAL DATA:

Resistive load: 6 Ohm 12V

Inductive load: 2A 12V

⚠ WARNING

The circuit diagram for MERCURY, MERCUISER and MARINER requires the use of Mercury solenoid kit and conductor complex.

⚠ CAUTION

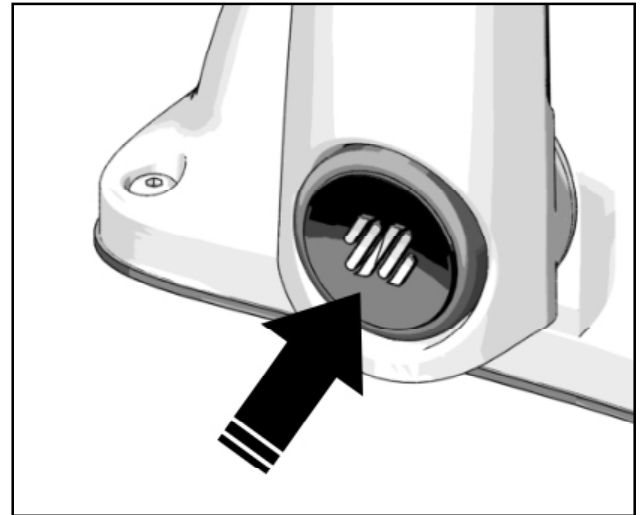
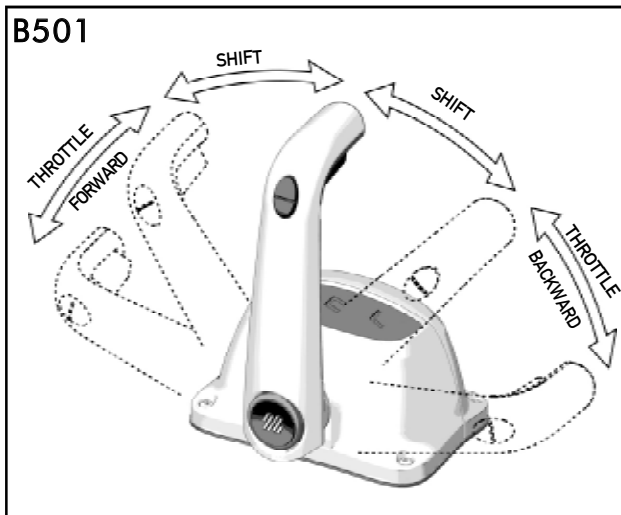
In case of high inductive load, we recommend to use a supporting relay in order to protect the switch.



4 USE

4.1 Lever use

The lever stroke is made up of two movements: operating the shift in the first 30° and the throttle in the rest of the stroke. The boat moves forward when the lever is in forward position, and it moves backward when the lever is put in reverse position. To unlock the throttle without engaging the gear press the button located on the lever hub and at the same time put the lever forward. To unlock the B501/B502 control lever CHL/BL and CHTL/BTL versions from the neutral position, pull the lock in neutral trigger located on the lower part of the handle and at the same time move the lever forward or backward.

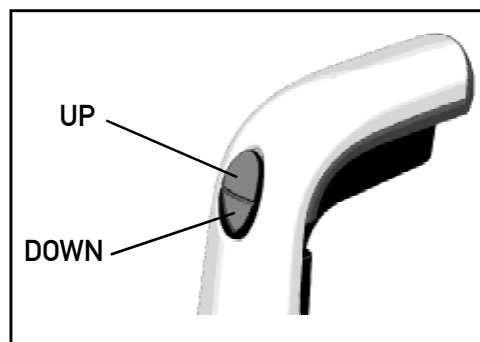


⚠ DANGER

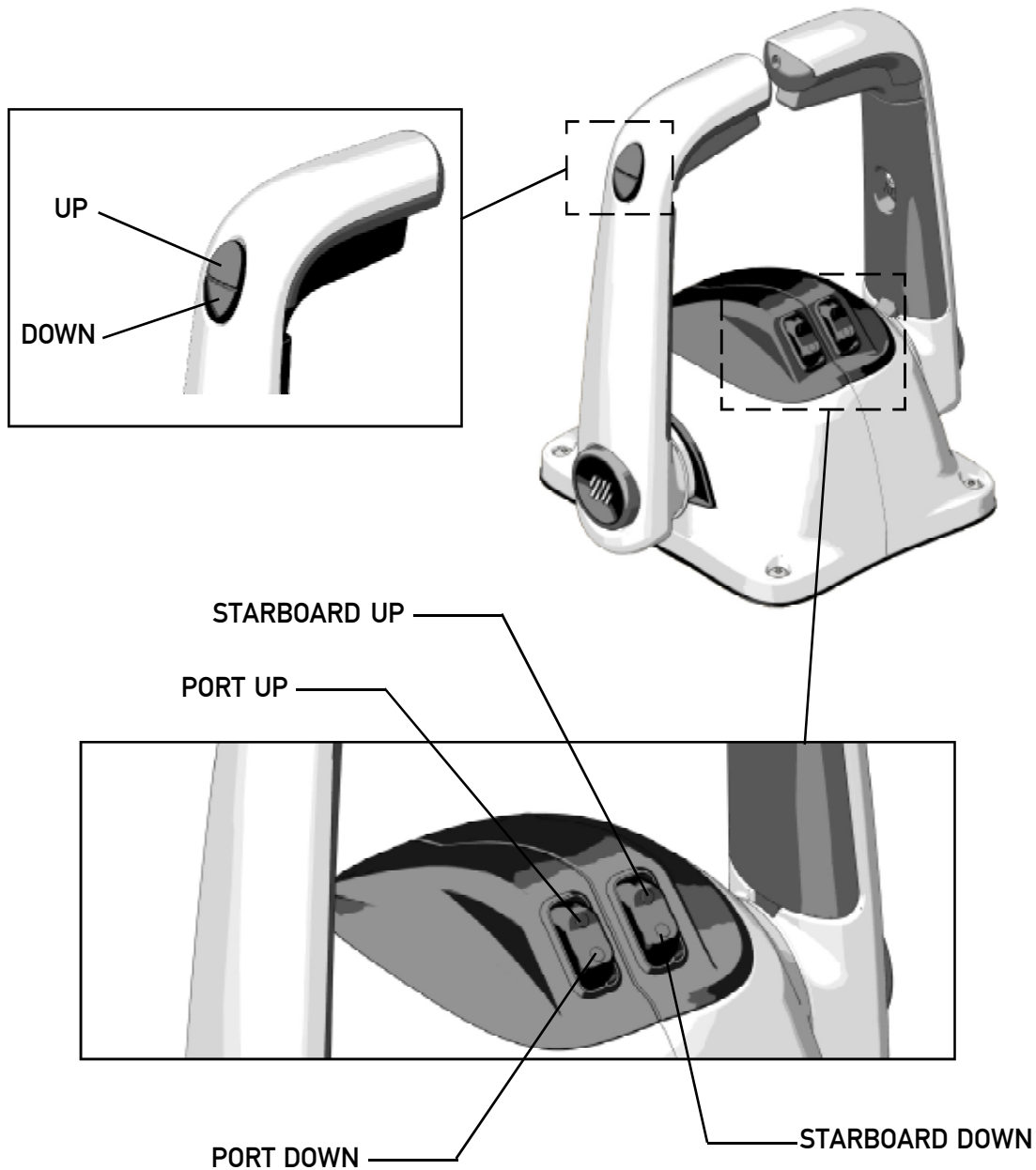
Before starting the engine, if the control is not provided with safety switch, make sure that the lever is in neutral position.

4.2 Trim operation

The trim buttons allow the adjustment of the engine position. Pressing the button "UP", the engines lift up; pressing the button "DOWN", the engines lower down.



Twin engines version allow to trim each engine independently using the switches on the control body. The buttons on the lever allows to trim both engines at the same time.



5 SAFETY WARNINGS

This section illustrates the safety regulations to be applied for proper use of the apparatus. Read this section very carefully and also read the manuals supplied with other components of the single lever control.

5.1 Safety warnings during installation and use

OBLIGATORY FOLLOW the precautions and safety criteria indicated below.

ULTRAFLEX shall not be held liable for the user's failure to observe these precautions and criteria and shall not be held liable for any negligence in use of the system.

DANGER

- **NEVER PUT HANDS BETWEEN THE MOVING PARTS.**
- Do not deactivate safety devices or render them inoperative.
- Do not modify the system or add devices to it without written authorization or the intervention of an **ULTRAFLEX** technician describing the change made in the description of the work performed.
- Do not use the apparatus for any purpose other than its intended purpose as specified in the installation and maintenance manual.
- Do not allow untrained personnel to perform installation.

WARNING

- During installation of the system, take particular care to keep everything clean to ensure that no foreign bodies can get into the system. Even a tiny object can cause permanent damage which may not be immediately obvious.
- Avoid cable curve radiuses of < 200 mm (8").
- Do not let cables come into contact with sharp corners or edges.
- Do not let cables come into contact with heat sources.

5.2 Clothing

WARNING

DO NOT wear necklaces, bracelets or any loose garments that could get caught in moving parts during installation, inspection or maintenance work.



6 MAINTENANCE

6.1 Ordinary maintenance

ENGLISH

WARNING

Failure to apply maintenance controls may result in loss of control when driving, which can result in damage to property and/or injury.

Maintenance requirements will vary depending on climate and frequency and type of use. Inspections must be conducted at least every two years by an experienced nautical mechanic.

Perform the following maintenance operations:

- Periodically wash components with fresh water and remove any salt deposits
- Once a month, check all nuts holding the system in place and tighten if necessary.

DANGER

Loosening or separation of nuts holding the system in place can cause not only malfunctioning of the single lever control but damage or injury.

- Periodically check the absence of corrosion on the metal parts of the cable terminals and of abrasions on the sheath.
- Replace damaged parts that may compromise the integrity of the single lever control.

6.2 Special maintenance

Technical Assistance

For any information or assistance with particular applications please contact our technical assistance service (See paragraph "Introduction").

7 DISMANTLING

7.1 Dismantling

If you intend not to use the single lever control system any more, dispose of it in an environmentally sound way.

Sheaths, hoses and components made of plastic or other non-metallic materials must be dismantled and disposed of separately.

