

# Installation and Maintenance manual

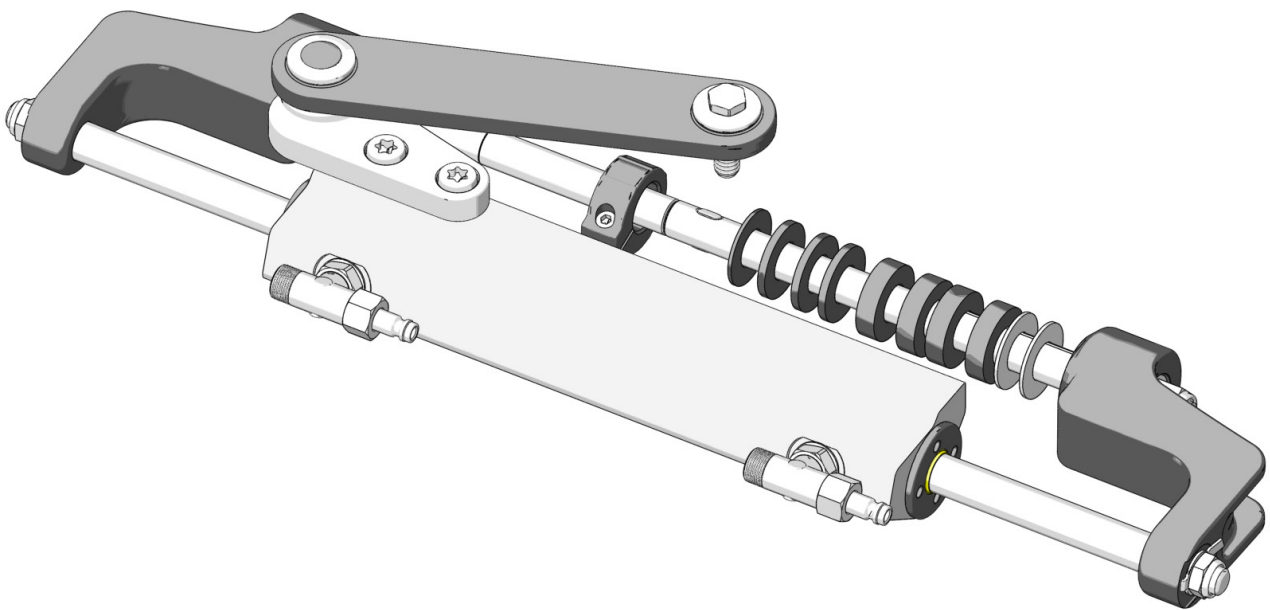
HYDRAULIC CYLINDER  
FOR OUTBOARD ENGINES

## UC 95-0BF

ENGLISH

ITALIANO

FRANÇAIS



# ULTRAFLEX

**UK**  
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PARTNER





Dear Customer,

We would like to thank you for choosing an **ULTRAFLEX** product.

**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 85 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".

**ULTRAFLEX Sp.A.**

14015 Casella (Genova) Italia - Via Crose, 2

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**IMPORTANT:**

The additional documents "Application Guide" and "Spare Parts List" are attached to this manual.









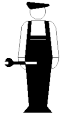

## DOCUMENT REVISIONS

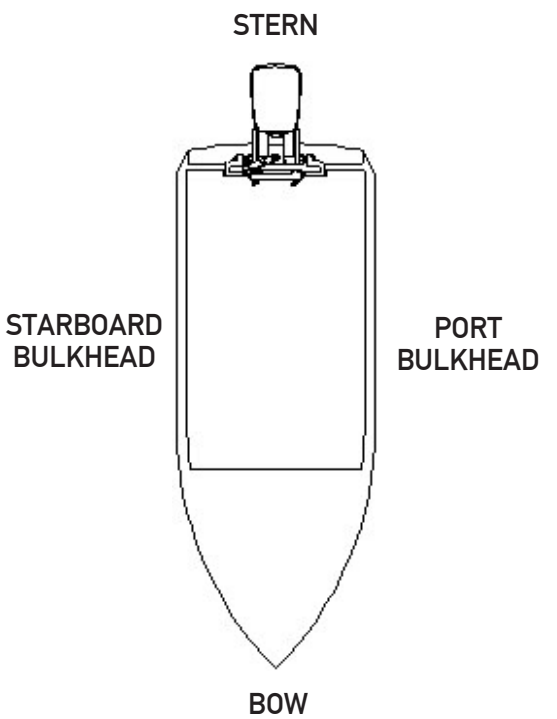
Rev.	Date	Revision description
0	10/07/2020	First edition


### USE OF THE MANUAL AND SYMBOLS USED

THE INSTALLATION AND MAINTENANCE MANUAL is the document accompanying the product from its sale to its replacement and discharge. The manual is an important part of the product itself. It is necessary to read carefully the manual, before ANY ACTIVITY involving the product, handling and unloading included.

In this manual the following symbols are used to ensure the user safety and to guarantee the correct operation of the product:

		Immediate hazards which CAUSE severe personal injury or death.
		Denotes that a hazard exists which can result in injury or death if proper precautions are not taken.
		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.
		Important information for the correct installation and for maintenance, that does not cause any damage.
		The symbol aside indicates all the operations which must be carried out by qualified or skilled staff, in order to avoid hazards. We recommend training the staff in charge of the product installation and checking their knowledge.



 The picture aside explains the meaning of some nautical words contained in this manual.

**LEGEND**

m.p.h. = miles per hour  
 km/h = kilometres per hour

10 m.p.h. = 8,69 knots  
 10 m.p.h. = 16,1 km/h  
 10 knots = 11,5 m.p.h.  
 10 knots = 18,5 km/h  
 10 km/h = 6,21 m.p.h.  
 10 km/h = 5,4 knots



## INFORMATIVE LETTER

This installation and maintenance manual represents an important part of the product and must be available to the people in charge of its use and maintenance.

The user must know the content of this manual.

**ULTRAFLEX** declines all responsibility for possible mistakes in this manual due to printing errors.

Apart from the essential features of the described product, **ULTRAFLEX** reserves the right to make those modifications, such as descriptions, details and illustrations, that are considered to be suitable for its improvement, or for design or sales requirements, at any moment and without being obliged to update this publication.

ALL RIGHTS ARE RESERVED. Publishing rights, trademarks, part numbers and photographs of **ULTRAFLEX** products contained in this manual are **ULTRAFLEX** property.

Great care has been taken in collecting and checking the documentation contained in this manual to make it as complete and comprehensible as possible. Nothing contained in this manual can be interpreted as warranty either expressed or implied - including, not in a restricted way, the suitability warranty for any special purpose. Nothing contained in this manual can be interpreted as a modification or confirmation of the terms of any purchase contract.

### WARNING

To ensure the correct product and component operation, the product must be installed by qualified staff. In case of part damage or malfunction, please contact the qualified staff or our Technical Service.

### TECHNICAL SERVICE

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## WARRANTY

**ULTRAFLEX** guarantees that its products are well designed and free from manufacturing and material defects, for a period of two years from the date of manufacturing.

For the products which are installed and used on working or commercial boats the warranty is limited to one year from the date of manufacturing.

If during this period the product proves to be defective due to improper materials and/or manufacture, the manufacturer will repair or replace the defective parts free of charge.

Direct or indirect damage is not covered by this warranty. In particular the company is not responsible and this warranty will not cover the damage resulting from incorrect installation or use of the product (except for replacement or repair of defective parts according to the conditions and terms above).

This warranty does not cover the products installed on race boats or boats used in competitions.

The descriptions and illustrations contained in this manual should be used as general reference only.

For any further information please contact our Technical Service.

**ULTRAFLEX** steering system components are marked **CE** according to the Directive 2013/53/EU.

We remind you that only **CE** marked steering systems must be used on the boats marked **CE**.

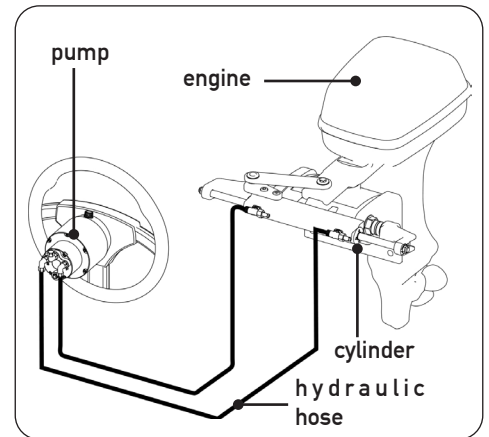
We inform you that the **ULTRAFLEX** warranty is null if some **ULTRAFLEX** components are installed on a steering system together with products of other brands.



# 1 PRODUCT DESCRIPTION

## 1.1 Hydraulic steering system operation

All **ULTRAFLEX** hydraulic steering systems are designed in conformity with UNI-EN-ISO 10592 and A.B.Y.C. P21 regulations. All **ULTRAFLEX** steering systems can operate at temperatures between -18°C (0°F) and +77°C (+170°F). All the components are made for the marine environment, using materials and working processes which offer long life and safety under the most extreme conditions. A hydraulic steering system consists of a steering pump, a cylinder tied to the rudder or to the outboard or sterndrive engine and the connecting hoses (see picture). Under normal operating conditions, a turn of the steering wheel will pump the oil, which flows in through the hoses to the cylinder, according to the turn direction. With the consequent cylinder movement the oil will flow to the pump through the hoses and at the same time moves the engine or the helm which are connected to the cylinder. The pumps are equipped with a nonreturn valve, which prevents outgoing fluid from returning along the same hose. It also allows the operation of the steering systems with two or more steering stations. The cylinders are double acting and may be balanced or unbalanced. In the unbalanced cylinders the two chambers have different volumes and so they need a different number of turns of the steering wheel and a different rotation effort. The balanced cylinders have same number of steering wheel turns in order to move the helm from the center to the end stroke in the two opposite directions. A well balanced steering system needs a correct choice of the pump for the cylinder. **ULTRAFLEX** produces different pump models, which have different capacity (cm<sup>3</sup> of oil moved each steering wheel turn) and for each type of installation. While choosing the pump it is important to consider the cylinder volume. The number of starboard and port turns is determined by the ratio between the cylinder volume and the pump capacity.



Example: if the pump has a capacity of 20 cm<sup>3</sup> [1.2cu.in.] and the cylinder has a volume of 94cm<sup>3</sup> [5.7cu.in.], the formula looks like this:  $94/20=4.7$ . Accordingly, the steering wheel will turn 4 times and a half before the cylinder will completely turn from one side to the other. In case of installations with double cylinders connected in parallel the cylinder volume must be added. Applications with less than 4 turns are not recommended, as they need a higher effort, also applications with more than 8 turns are also not recommended, as the response of the boat to steer is slowly. The maximum operating pressure is 7.0MPa (70 bar) (1000 PSI).

## 1.2 Warnings for the correct product use

### ⚠ WARNING

Before beginning the installation, check the mounting compatibility of the UC95-0BF cylinder to the engine by consulting the attached document "Application Guide" contained in the packaging.

### ⚠ DANGER

Do not modify the steering cylinder in any way to fit it to your engine application, otherwise the cylinder will no longer operate in safety and it will endanger the boat and the occupants.

### ⚠ WARNING

All **ULTRAFLEX** steering systems must not be installed on boats equipped with engines whose maximum horsepower is higher than the horsepower rating approved by boat manufacturer.

### ⚠ WARNING

**ULTRAFLEX** hydraulic steering systems must not be installed on race boats.

### ⚠ DANGER

It is forbidden to disassemble the components which are supplied preassembled to avoid compromising the product integrity.

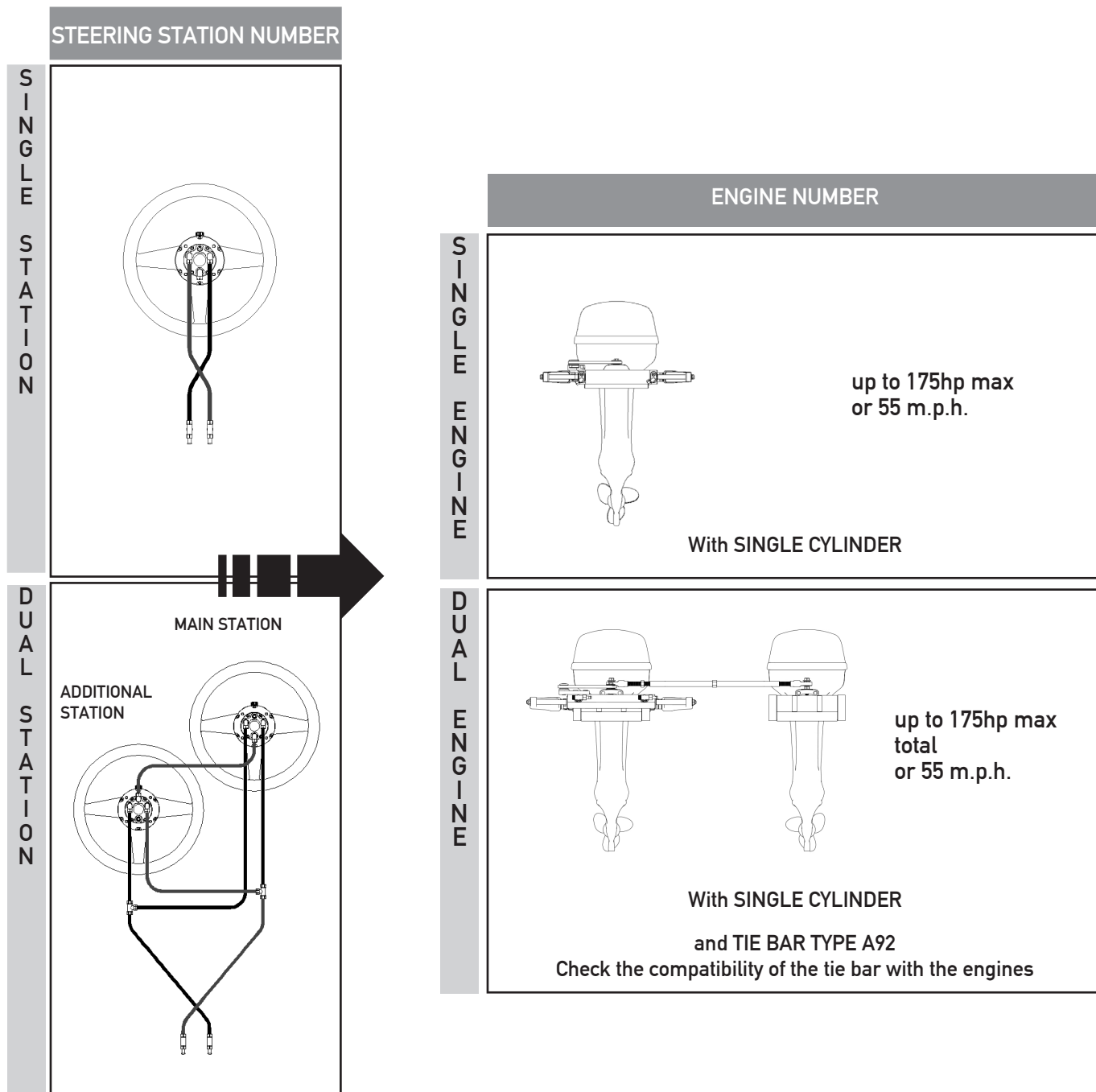


### 1.3 Configurations

The hydraulic cylinder for outboard engine UC95-OBF model can be installed on boats equipped with single or dual engine and with single or dual steering station.

The maximum power of the single engine or the total (combined) maximum power of the two engines must not exceed 175 hp.

ENGLISH



#### ⚠ CAUTION

Also in case of single engine applications with a horsepower which exceeds 175hp or 55 m.p.h., it is necessary to assemble the **ULTRAFLEX** UC 128-OBF or UC128-SVS cylinder.



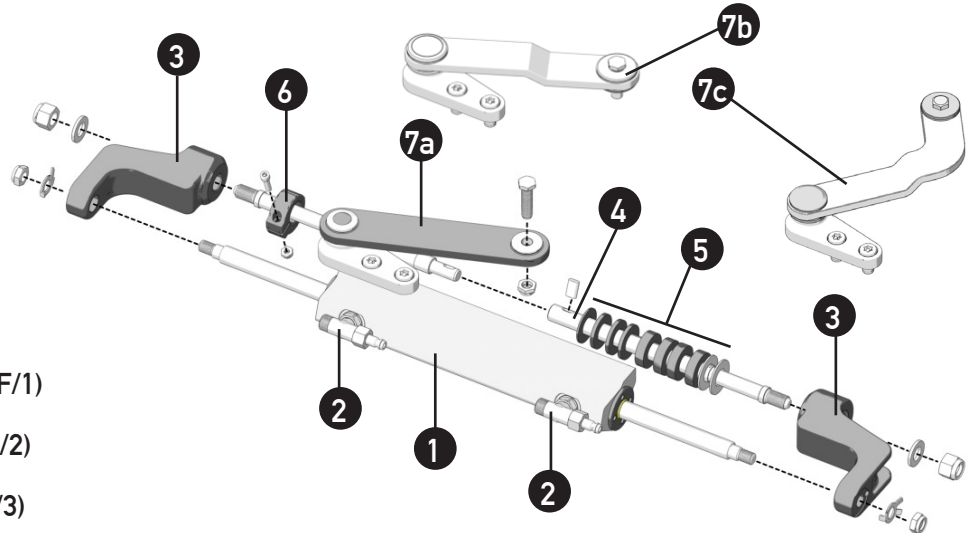


### 1.4 UC95-OBF cylinder description

UC95-OBF is a hydraulic outboard front mount cylinder which has been designed and manufactured to be used as a component in the hydraulic steering systems, as described in the previous paragraph.

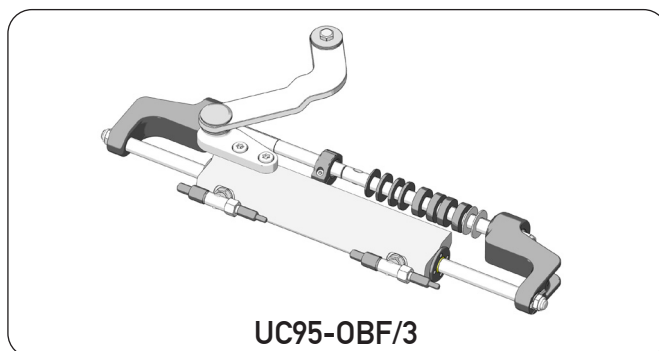
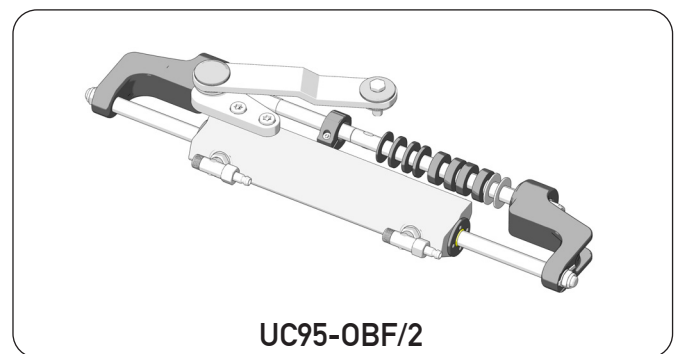
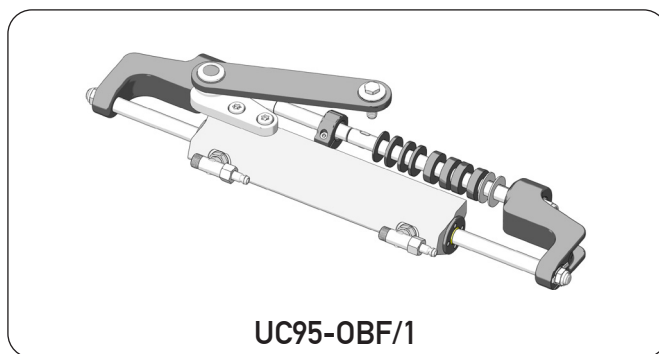
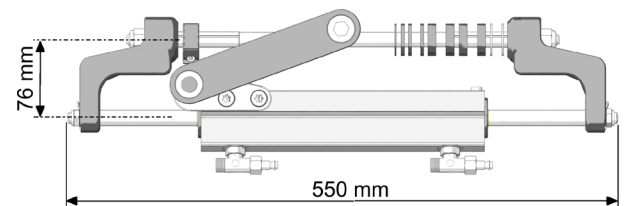
The cylinder is installed to the tilt tube rod of the available engines on the market as shown in the attached document "Application guide". It is possible to meet all the different cylinder applications due to the three different link arms and a proper spacer kit. For the dual engine application, the single cylinder must be mounted with a tie bar (see par. 1.3). The following picture shows the main cylinder components:

- 1 Cylinder body
- 2 Fittings and bleed valves
- 3 Bull horns
- 4 Tilt tube rod
- 5 Spacers
- 6 Adjustment collar
- 7a Straight link arm (UC95-OBF/1)
- 7b Shaped link arm (UC95-OBF/2)
- 7c Curved link arm (UC95-OBF/3)



### 1.5 Technical features

SPECIFICATIONS	UC95-OBF/1 -/2 -/3
Volume	94 cc - 5.7 cu. in
Max. cylinder thrust*	354 Kg - 780 lbs (@70 bar)
Inside diameter	30 mm - 1.18"
Stroke	186 mm - 7.3"
Oil	OL150 Ultraflex



#### ⚠ CAUTION

\* The cylinder thrust shown above is a theoretical value calculated considering a pressure system of 70 bar (1000 psi). This value is not the one considered for the system normal use but for the system use in extreme conditions.



## 2 TRANSPORT

### 2.1 General warnings

The product weight with its packaging is 8kg (18 pounds) and so it can be handled manually.

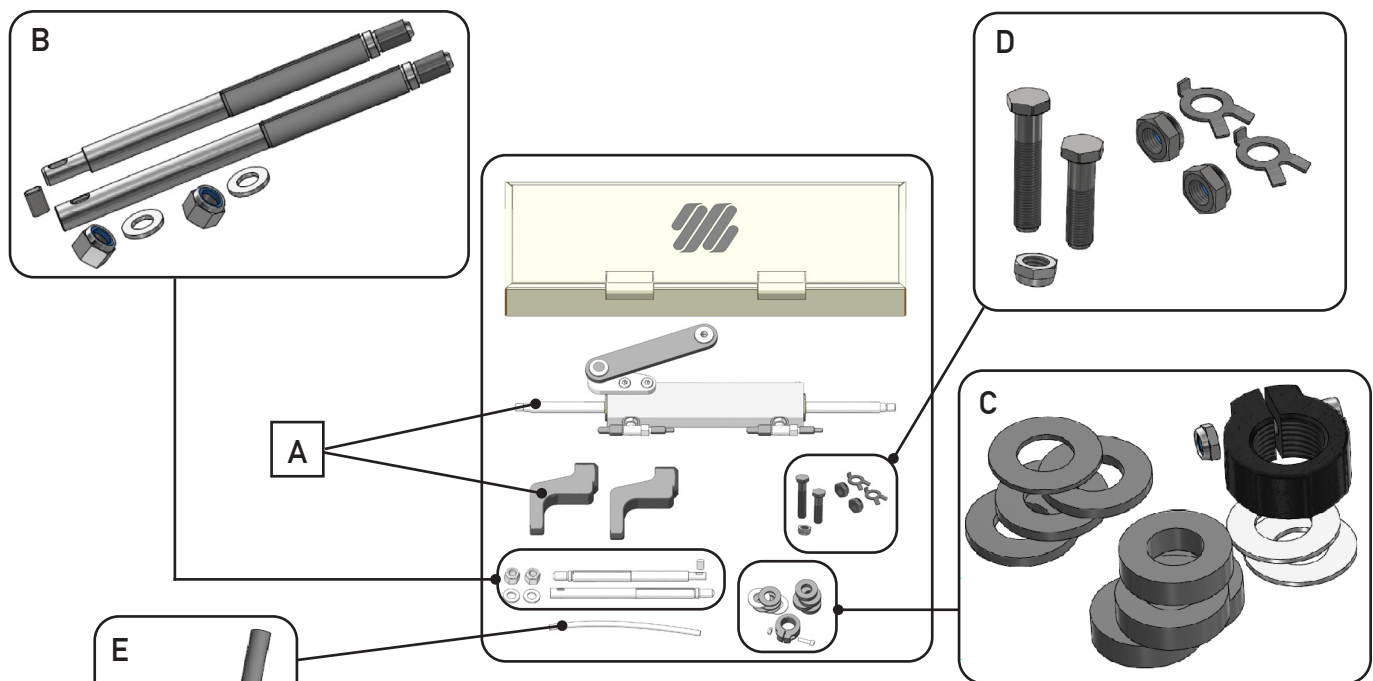
#### **⚠ WARNING**

The staff in charge of handling must operate with protective gloves and safety shoes.

### 2.2 Packaging contents

Before using the equipment check that the product has not been damaged during transport.

Also make sure that all the standard components are in the packaging (see list). In case of damage, notify the claim to the forwarder and inform the supplier.



#### CONTENTS OF THE STANDARD PACKAGING:

- A) No.1 cylinder body with rod, fittings and bull horns;
- B) No.1 link arm kit composed of:
  - tilt tube rod (2 pieces) + No.1 lockpin
  - No.2 locknuts + No.2 washers;
- C) No. 1 spacer kit composed of:
  - No.8 plastic spacers;
  - No.2 steel spacers;
  - No.1 ring nut for adjustment collar;
- D) No.1 kit composed of:
  - No.2+1 locknuts;
  - No.2 lock washers;
  - No.1 short hexagon headed screw
  - No.1 long hexagon headed screw (code 73584U);
- E) No.1 plastic hose for the hydraulic circuit bleeding;

#### **⚠ CAUTION**

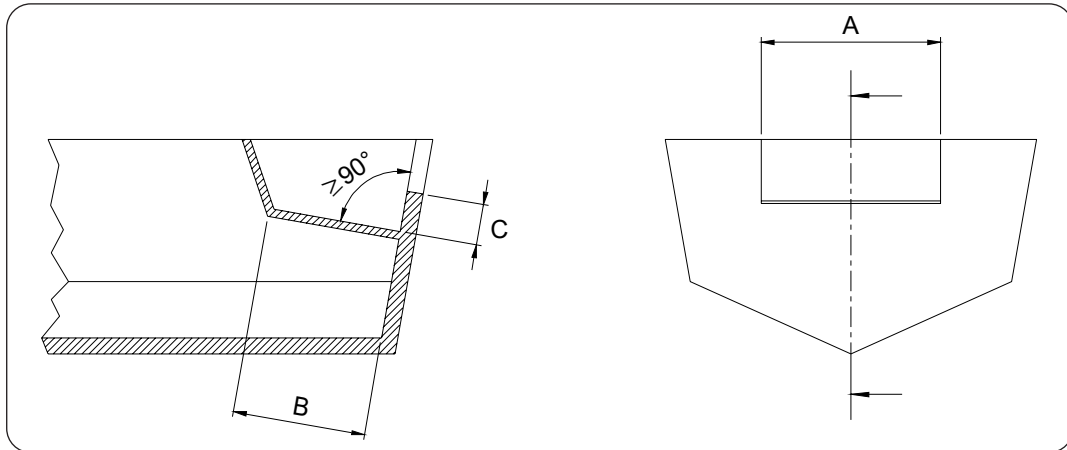
The packaging must be disposed of according to the existing laws.



# 3 INSTALLATION

## 3.1 Minimum transom requirements

The following picture shows the minimum splash well dimensions. These dimensions must be respected in order to prevent the cylinder from being damaged when the outboard engine is completely tilted upwards. The picture shows also the minimum transom dimensions, needed for the installation and the correct operation of the engine steering cylinder.



MINIMUM SPLASH WELL DIMENSION REQUIREMENTS			
Engine No.	A	B	C
1	560 mm - 21.25"	305 mm - 12"	152 mm - 5.98"
2	1110 mm - 43.70"	305 mm - 12"	152 mm - 5.98"

**⚠ WARNING**

**ENGINE JACK PLATE APPLICATION TO THE TRANSOM.**

A jack plate installation will change all the application clearances. A new clearance check must be completed with the tilting of the engine in conjunction with the vertical movement of the jack plate in all the possible positions. If the steering cylinder comes into contact with the splash well, transom and/or jack plate, stop the installation immediately! Use the jack plate manufacturer's instructions to limit the upper or lower direction in which the interference occurs. If this is not possible please contact specialized staff.

## 3.2 Necessary tools



Allen wrench  
4 mm [5/32"]



Open end wrench  
3/4"



Open end wrench  
14mm



Open end wrench  
11/16"



Open end wrench  
5/8"



Pliers



Torque wrench



MOLYKOTE® 1000

**⚠ CAUTION**

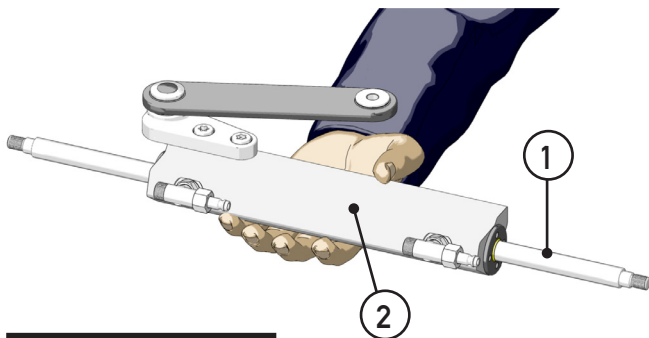
During installation use only stainless steel tools to prevent the corrosion of the metal parts.



### 3.3 Cylinder installation



- 1 After removing the protective caps of the fittings, manually center the rod (1) on the cylinder body (2).

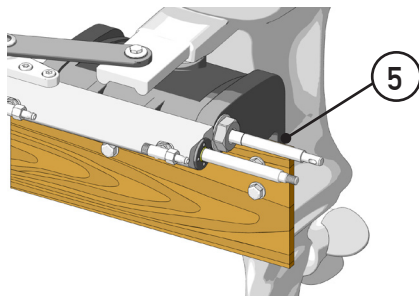


#### ⚠ CAUTION

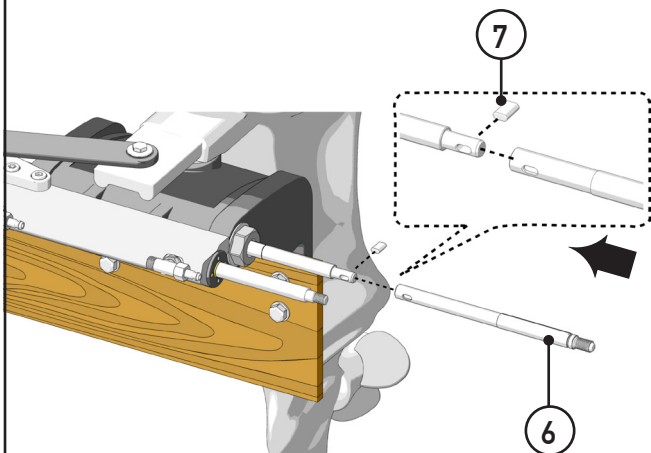
During this phase an oil leak from the fittings can occur. This oil must not be discharged into the sea in any case.

- 4 Grease the two parts of which the tilt tube rod is made up (5) and (6), by using marine grease to prevent the corrosion of the metal parts.

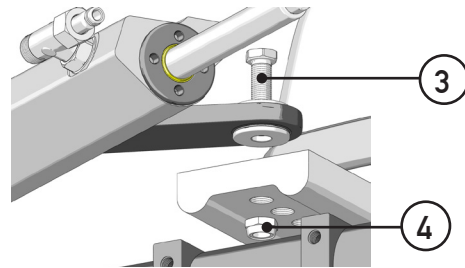
- 5 Insert the first part of the tilt tube rod (5) into the tilt tube.



- 6 Insert the second part of the tilt tube rod (6) by locking it by means of the pin (7), then holding the pin with your hand continue to insert the tilt tube rod into the tilt tube.



- 2 Position the engine straight so that its arm is perpendicular to the transom.



- 3 With reference to the application instructions contained in the Application Guide, position the screw (3) contained in the D bag (see par. 2.2) and connect the link arm to the tiller arm. Tighten the screw with a torque of 40[Nm] (29.5 [lb-ft]). Thread on the locknut (4) and tighten it with a torque of 25[Nm] (18.5 [lb-ft]). After tightening the locknut (4), check for the right torque 40[Nm] (29.5 [lb-ft]) of the screw (3).

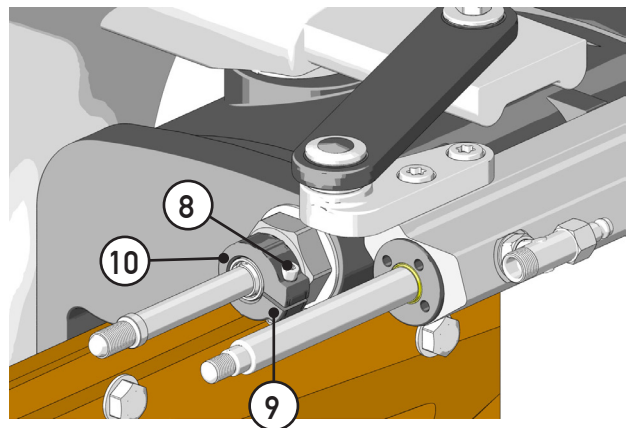
#### ⚠ WARNING

To tighten the screw (3) and the locknut (4) on the tiller arm ask your mechanic for the maximum torque allowed. If it is lower than the one indicated in this manual, tighten with the torque indicated by the mechanic.

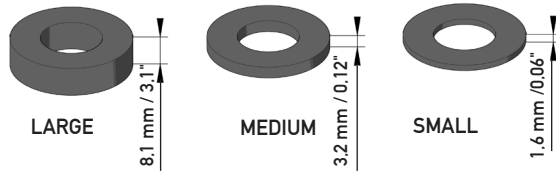
#### ⚠ WARNING

It is important to check periodically, at least every 3 months (or every month for professional uses), the right torque of this screw (3) and of the locknut (4).

- 7 Position the bolt (8) and the nut (9) on the adjustment collar (10) and screw it to the right side of the tilt tube until it comes into contact with the tilt tube stop nut.



8 With reference to the "Application Guide" choose the spacers for the tilt tube rod.



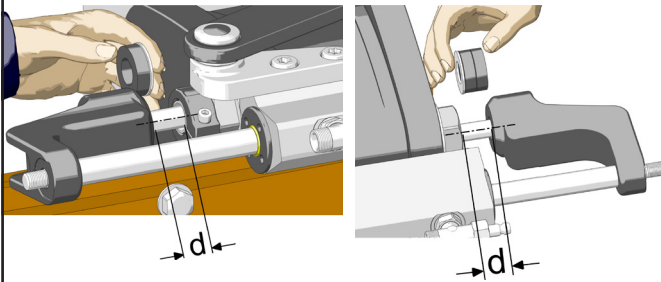
**WARNING**

The number and position of the spacers shown in the Application Guide is only indicative.

**NOTICE**

In this phase ensure that the cylinder body is centered on the rod and that the engine is perpendicular to the transom.

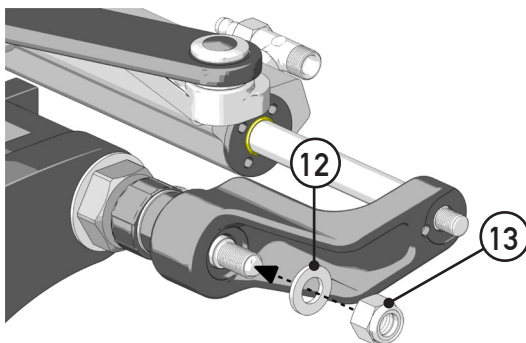
10 Choose the spacers to fill the gap between ring nut and bullhorn  $d_1$  and  $d_2$  between tilt tube and bullhorn considering the thickness of the stainless washer.



**WARNING**

Always leave a minimum clearance between spacers and bullhorn in order to allow the rod tilting in the tilt tube.

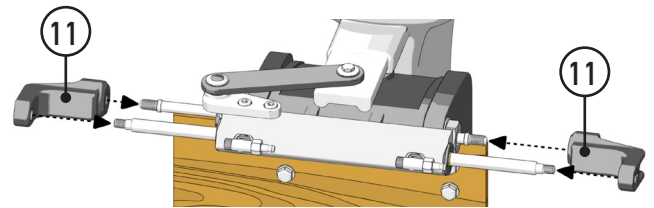
14 Insert the washers (12) on the two ends of the tilt tube rod and tighten the nuts (13), with a torque of 70[Nm] (52[lb-ft]). after greasing them with marine grease.



**WARNING**

Check the correct torque of both nuts.

9 Insert the right and left bull horns (11) by connecting the rod and the tilt tube rod as shown in the picture.



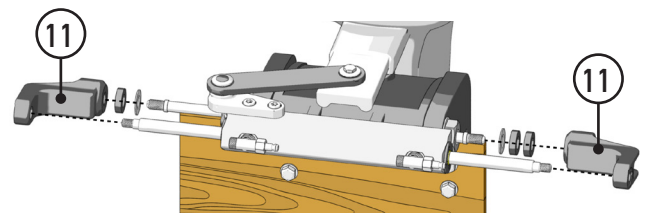
11 Once the correct spacers have been chosen, remove the bull horns.

12 Insert the plastic and stainless steel spacers and the two stainless washer on the tilt tube rod..

**NOTICE**

Both the stainless steel spacers must be positioned towards the tilt tube on the opposite side of the bull horns to avoid their wear during engine lifting and lowering.

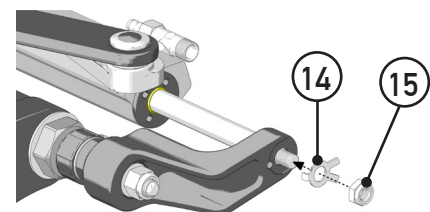
13 Insert the right and left bull horns (11) by connecting rod and tilt tube rod as shown in the picture.



15 Position washers(14) and tighten both locking nuts (15) with a torque of 60[Nm] (44 [lb-ft]).

**NOTICE**

The lock washer tabs must be bent afterwards (see point 20).



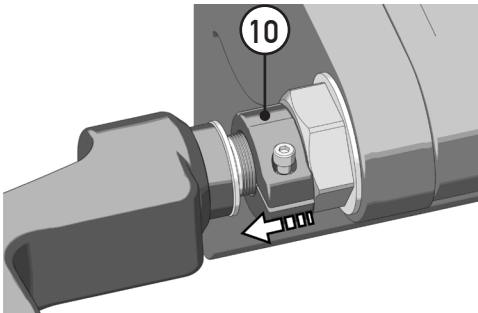
16 Check the correct tilting of the engine.

**WARNING**

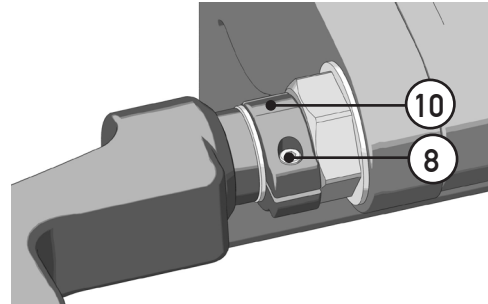
If while tilting the engine is blocked, reduce the overall dimensions of the spacers.



**17** Unscrew the adjustment collar (10) and bring it into contact with the stainless washer, until the clearance is eliminated.



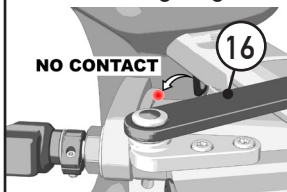
**19** Tighten the set screw (8) on the adjustment collar (10) with a torque of 3[Nm] (2 [lb-ft]).



**18** Check the correct cylinder installation by moving manually the engine on the right and on the left.

**NOTICE**

The rotation must be as symmetric as possible so that the steering angle is the same on both sides.



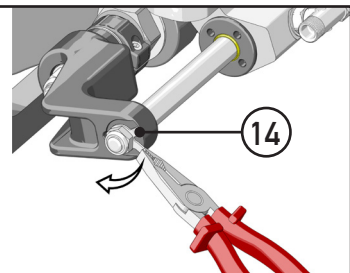
**⚠ WARNING**

The engine must stop through the cylinder end stroke without coming into contact with the mechanical stop (16) on the engine.

**NOTICE**

Otherwise it is necessary to modify the installation, by changing the thickness of the spacers and by repeating the procedure from point 13.

**20** Bend the tabs of the lock washers (14) bringing them into contact with the screw head and taking care not to damage the bull horns while using the pliers.



**21** Check again the correct engine movement both during the right/left rotation and during the tilting.

**⚠ WARNING**

In this phase clearance should be enough to avoid frictions but it should not be excessive since it could cause engine instability. In case of contact with the transom, stop the installation and contact the specialized staff.

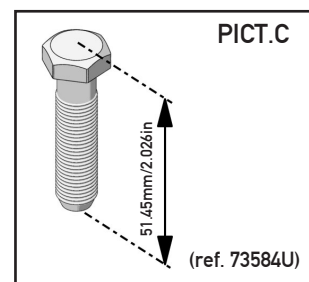
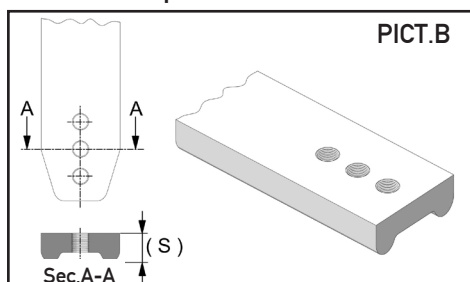
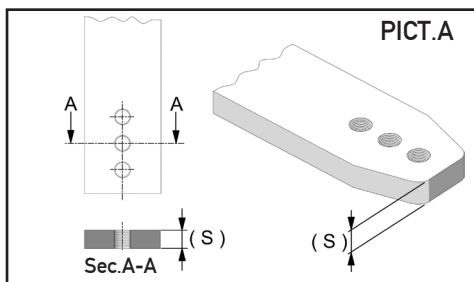
**NOTICE FOR INSTALLATION**

The bolt identified with the reference 73584U (Pict.C) is the connection screw between the cylinder's link arm and the engine's tiller arm that must be used with the following engines:

- SUZUKI 100-115-140 (2008 - to date).
  - Engines with the tiller arm shaped like in Pict.A and thickness (S) between 10 and 22 mm (0.4" and 0.85").
- For the other engines with tiller arm shaped like in Pict.A and thickness (S) max. 10 mm (0.4"), please use the standard bolt (shorter than ref. 73584U).

When the link arm is shaped like in Pict.B the KIT ref. 41954W (not included in the present kit), containing the dedicated spacer, must be used.

In case the tiller arm differs from the above measures, please contact our after sales service.



**⚠ CAUTION**

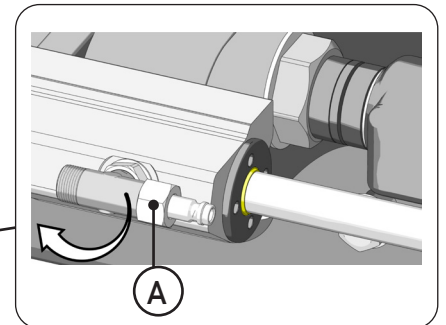
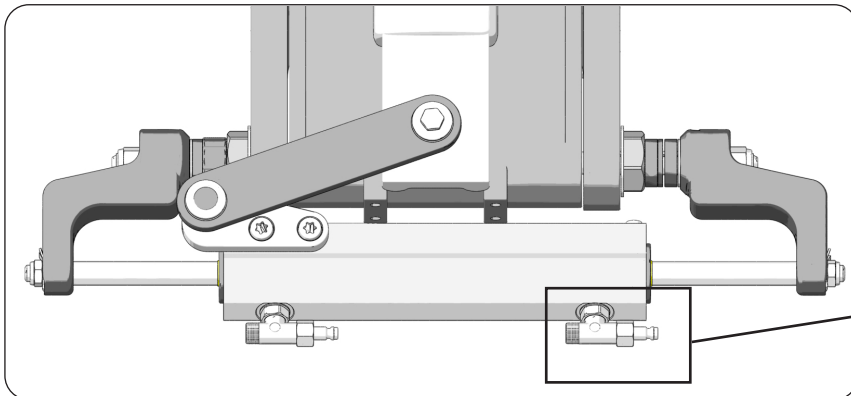
After installation, check that the nylon part of the self-locking nut is tightened on the screw thread.



### 3.4 Hose installation



The two fittings mounted on the cylinder body are already oriented and are ready to be used. If for practical reasons the orientation must be changed, do as follows:



1. loose the stop nut (A) by using an 11/16" wrench;
2. orient the fittings according to the requirements;

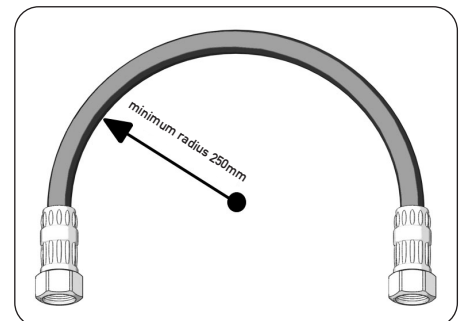
#### **⚠ DANGER**

Do not unscrew the fittings more than one turn (360°).

3. tighten again the stop nut with a torque of 20[Nm] (15[lb-ft]) until the washer comes into contact with it.

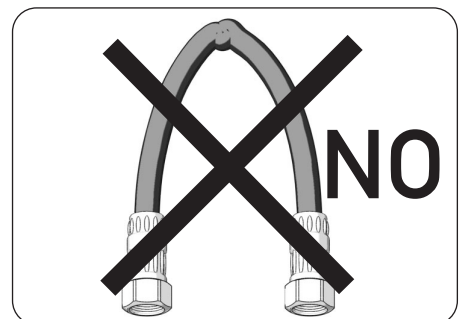
Screw the hoses on the cylinder fittings with a torque of 20[Nm] (15[lb-ft]) according to the following instructions:

- minimum hose bend radius 250 mm;
- no interference during engine tilting;
- no interference with the transom;



#### **⚠ WARNING**

An excessive hose bend could result in its internal breaking which will cause a bad operation of the system. In this case it is necessary to replace the damaged hose.



ENGLISH



### 3.5 Type of installation

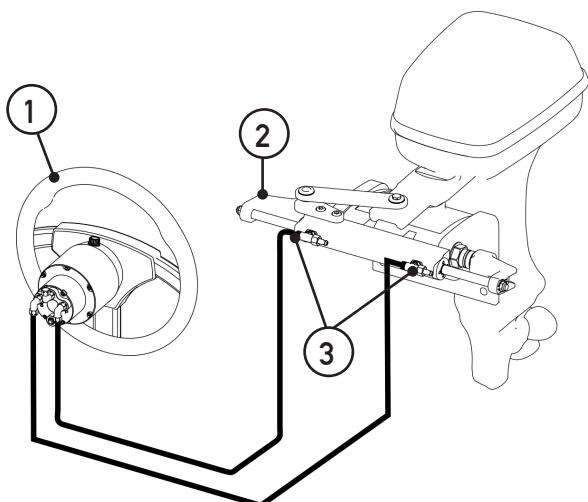


The UC95-OBF hydraulic cylinder for outboard engines can be installed with a single or dual steering system. The possible configurations are:

#### ⚠ CAUTION

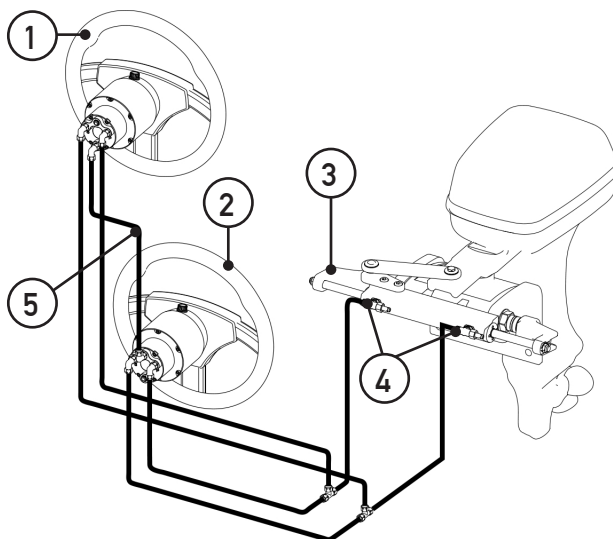
Connect hoses as shown in the following pictures:

#### SINGLE STATION / SINGLE CYLINDER:



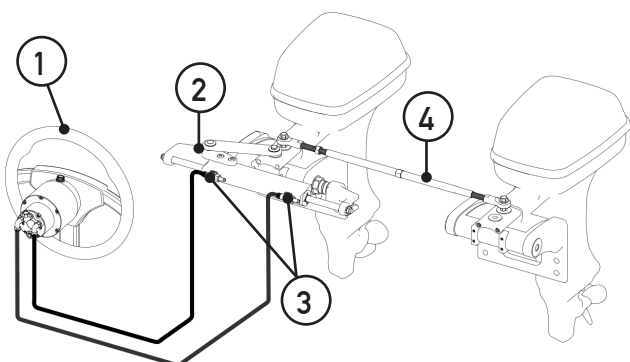
1. helm
2. cylinder
3. bleed valves

#### DUAL STATION / SINGLE CYLINDER:



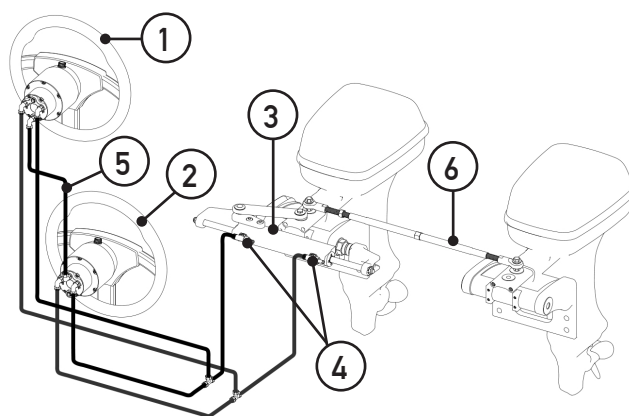
1. upper station helm
2. lower station helm
3. cylinder
4. bleed valves
5. kit OB-2S

#### SINGLE STATION / SINGLE CYLINDER / DUAL ENGINE:



1. helm
2. cylinder
3. bleed valves
4. tie bar type A92

#### DUAL STATION / SINGLE CYLINDER / DUAL ENGINE:



1. upper station helm
2. lower station helm
3. cylinder
4. bleed valves
5. kit OB-2S
6. tie bar type A92





## 3.6 Filling and purging



After the first installation and after maintenance operations it is necessary to fill the system with hydraulic oil. This operation must avoid the air in the system, to ensure the good system operation. The hydraulic system must be filled from the highest point of the system, which means from the upper steering station.

### ⚠ CAUTION

To avoid air bubbles in the oil, it is necessary to fill the tank slowly.

### ⚠ WARNING

The filling and bleeding operations must be carried out at least by two operators.

### ⚠ DANGER

Use **ULTRAFLEX** oil or other compatible oils.

Hydraulic oil OL150 has been specifically formulated for **ULTRAFLEX** to ensure high quality performance level of **ULTRAFLEX** products throughout time.

Its special "Zinc Free" formula enhances protection against marine oxidation. The special mix of anti-wear and stabilizing components of OL150 allow ensuring great results as far as the product duration and performances are concerned in several environmental conditions.

**ULTRAFLEX** hydraulic oil complies with standard ISO 10592 concerning hydraulic steering systems. **ULTRAFLEX** is not to be held responsible for any damages or performance deterioration if oils different from OL150 are used.

### ⚠ DANGER

Do NOT use ATF Dexron II transmission oils or brake oils which could cause the steering system seizing.

Oils which are compatible with OL150 **ULTRAFLEX** are:

- Shell Tellus T15 and Shell Tellus T22
- Mobil DTE 11M

### NOTICE

**ULTRAFLEX** will not be able to ensure the compatibility of the above mentioned oils with OL150 if the oil manufacturers vary their formulation; in particular, it will not be able to ensure its compliance with standard ISO 10592 concerning hydraulic steering systems. Under no circumstances **ULTRAFLEX** is to be held responsible for any damages or performance deterioration.

In the days after the filling, check the oil level; if necessary top off the system.

At the beginning the oil level can lower, as small amounts of air can be released in a homogeneous way.

### ⚠ DANGER

After 24 hours repeat the purging and check the absence of leaks.

## 3.6.1 Positioning of the oil bottle

The oil filling must be carried out by using the proper kit (including spout, flexible hose, fitting and pin) which is NOT supplied.

- Remove the pump cap and insert the fitting.
- Attach the spout to a new bottle of hydraulic oil and connect the hose to the fitting and the bottle spout.
- Turn the bottle upside down and pierce it with the supplied pin, as shown in the picture, to ease the oil passage towards the pump. Fill the pump until no air bubbles are visible in the hose.

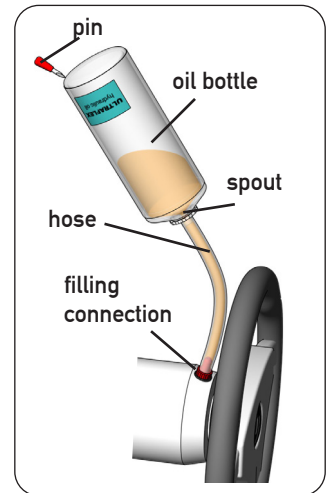


### ⚠ WARNING

While replacing the oil bottle, during the filling process, close all the bleed valves on the cylinder/s. To bleed the system, check that oil is always present in the filling hose. If some air is in the system during the bleeding process, the whole bleeding process must be started again.

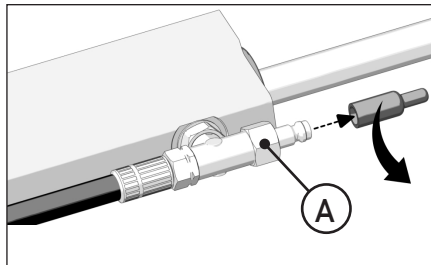
### ⚠ CAUTION

Replace the bottle before it empties and use recovered oil only after 24 hours.



## 3.6.2 Single steering station/ single cylinder

- Unscrew the two bleed valve protections and loosen 1.5 turns max. the nuts "A" of the two bleed valves.

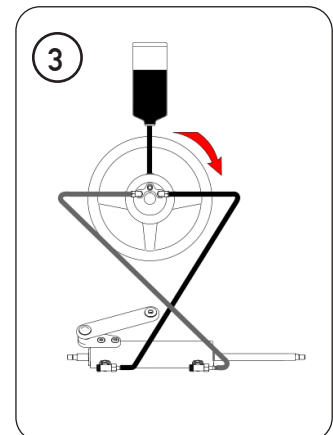
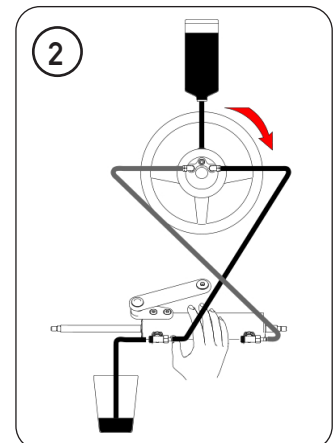
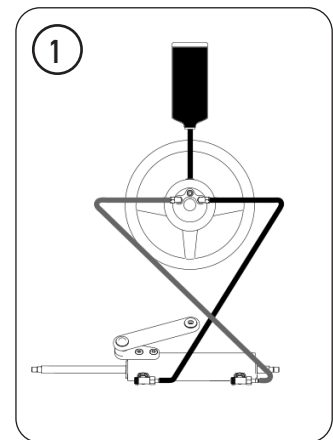


- Manually push the cylinder body to one side until it stops as shown in picture 1.
- Position the oil bottle as explained in paragraph 3.6.1.
- Close the bleed valve on the cylinder end stroke side and put a purged oil tank near the other bleed valve (as shown in picture 2).
- Turn the steering wheel slowly (as shown in picture 2) so that the oil can come out of hoses.

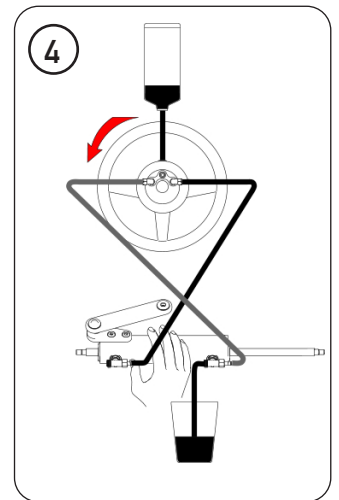
### NOTICE

Hold the cylinder body with the hand to prevent movements caused by the air present in the cylinder chamber (picture 2).

- When the oil comes out of the bleed valve (without air bubbles), close the bleed valve and continue to turn the steering wheel in the same direction to fill the cylinder chamber (picture 3). During this phase the cylinder body will move to the opposite direction up to the end stroke.



- Open the other bleed valve and move purged oil tank to the other side. Holding the cylinder body in this position, turn the steering wheel as shown in picture 4, until oil without air bubbles comes out of the bleed valve. Then close the bleed valve.
- Repeat the entire procedure to ensure the absence of air in the system.



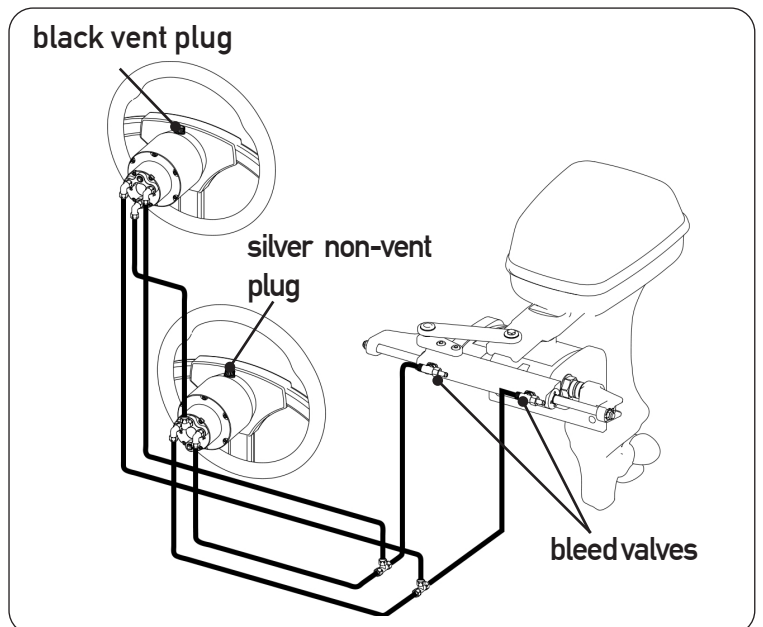
### 3.6.3 Dual steering station/ single cylinder

- Manually unscrew the two bleed valves on the cylinder and push the cylinder to one side up to the end stroke.
- Position the oil bottle near the main steering station (upper) according to what is described in paragraph 3.6.1.

**⚠ WARNING**

Wait until the oil reaches the lower tank and both tanks are filled.

- Follow the same bleeding procedure described in paragraph 3.6.2 starting from the lower station and repeat it for the upper station.



**⚠ WARNING**

For the additional steering station (lower) tank use only the silver non-vent plug (supplied with the "kit OB-2S"). For the main steering station (upper) tank use only the black vent plug.

- Repeat the procedure at least 3 times to ensure the absence of air in the system.



## 3.7 General recommendation

**⚠ WARNING**

It is very important to check the absence of air in the system before using the boat! We recommend trying to manually move the engine towards port and starboard, making sure that there is no movement of the cylinder body on the main cylinder shaft.

If the cylinder body moves more than 1/6 inches (15mm), there is still air in the system. The air presence in the system can cause bad responses to the controls and so it can cause damage, injuries or death.



## 4 SAFETY WARNINGS

This section shows the safety rules which must be followed for the correct equipment operation. We recommend reading carefully this section and also the other manuals supplied with the steering system components.

### 4.1 Safety warnings during use and installation

RESPECT STRICTLY the following safety rules:

**ULTRAFLEX** declines all responsibility in case the user does not follow these rules and it is not responsible for negligence during the use of the system.

#### DANGER

- DO NOT PUT HANDS BETWEEN THE MOVING PARTS.
- Do not disable the safety devices.
- Do not modify or add devices to the system, without **ULTRAFLEX** written authorisation or technical intervention which will prove the modification.
- Do not use the equipment for a purpose different from the one it has been designed for, which is specified in the installation and maintenance manual.
- Do not let non-specialized staff perform the installation.
- Do not disassemble the hydraulic connections before bleeding the oil in the system completely. The hoses can contain high pressure oil.

#### WARNING

- Do not put the feet on the cylinder.
- Check the system after the installation and the purging but before operating the vessel. Turn the steering wheel until the cylinder/s reaches/reach the end stroke.
- Turn the steering wheel to the opposite direction. Repeat on each installed helm to verify the correct installation and the system operation.
- Carefully use sealing fluid (such as Loctite). If it reaches the hydraulic system, it may cause damage and mechanical failure.
- Do not use teflon tape or adhesive tape to seal the fittings, as this material may be injected, by causing the system fail.
- During the system installation, prevent foreign matters from entering the system. Even a little object may cause lasting damage that are not detected immediately.
- Avoid too narrow bend radius of hoses.
- Avoid the hose contact with edges or sharp corners.
- Avoid the hose contact with heat sources.

### 4.2 Clothing

#### WARNING

During installation, inspection or maintenance.

IT IS STRICTLY FORBIDDEN to wear necklaces, bracelets or clothes which could get caught in the moving parts.



## 5 MAINTENANCE

### 5.1 Ordinary maintenance

#### **⚠ WARNING**

Poor installation and maintenance may result in loss of steering and cause property damage and/or personal injury. Maintenance requirements change according to climate, frequency and the use. Inspections are necessary at least every year and must be carried out by specialized marine mechanics. Check the cylinder fittings and the seals and the helm gaskets to prevent leaks. Replace them if necessary. To keep a suitable oil level in the tank, fill and bleed the system as described in this manual in paragraph 3.6.

Check the hose and the entire system wear, the nut and bolt tightening every six months and make sure that they are not damaged. Clean the system using water and non-abrasive soap.

#### **⚠ WARNING**

Use only compatible hydraulic oils, indicated in the paragraph "technical features" and "filling and purging". Do not use brake oils or automatic transmission fluid (ATF) in any case.

#### **⚠ WARNING**

After the first 10 hours of use and then periodically check the connection integrity and tightening.

#### **⚠ CAUTION**

If the locknuts are disassembled, replace them. (Contact our assistance service, see page 6).

### 5.2 Head replacement

If, after some time, oil leakages due to normal wear or poor maintenance are detected from head gaskets, replace them.

#### **⚠ WARNING**

If worn heads are not replaced, the cylinder cannot work properly, thus jeopardizing the safety of the user.

**ULTRAFLEX** supplies a proper kit containing the components to be used for replacement.

#### **NOTICE**

The kit is supplied with the replacement instructions.



### 5.3 Troubleshooting

**⚠ WARNING**

Whenever the following checks need the removal and/or disassembly of the steering system components, such work must be carried by specialized staff. **ULTRAFLEX** offers general information only and is not responsible for any consequences resulting from incorrect disassembly.

PROBLEM	CAUSE	SOLUTION
During the filling, the steering system becomes completely jammed.	<ul style="list-style-type: none"> <li>Blockage in the hoses between steering system and cylinder.</li> </ul>	<ul style="list-style-type: none"> <li>Replace hoses.</li> </ul> <p><b>⚠ WARNING</b></p> <p>The damaged hose must be replaced, otherwise it may cause loss of steering and severe personal injury or property damage.</p>
The system is very difficult to fill. Air keeps bubbling at the top of the steering system tank even after filling the system completely.	<ul style="list-style-type: none"> <li>Air in the system.</li> </ul>	<ul style="list-style-type: none"> <li>Repeat the filling and the bleeding procedure of the system.</li> <li>Install horizontally the hoses and in any case with a maximum inclination of 3cm each meter.</li> </ul>
	<ul style="list-style-type: none"> <li>Leaks from the cylinder bleeder.</li> </ul>	<ul style="list-style-type: none"> <li>Tighten the bleeder on the cylinder.</li> </ul>
	<ul style="list-style-type: none"> <li>Coiled hose.</li> </ul>	<ul style="list-style-type: none"> <li>Uncoil and straighten the hose.</li> </ul>
	<ul style="list-style-type: none"> <li>Helm has been mounted upside down.</li> </ul>	<ul style="list-style-type: none"> <li>Mount the helm with the filling hole in up position.</li> </ul>
The steering system is stiff and hard to turn, even when the boat is not moving.	<ul style="list-style-type: none"> <li>Restrictions in hoses or fittings</li> </ul>	<ul style="list-style-type: none"> <li>Look for and remove the restriction.</li> </ul>
	<ul style="list-style-type: none"> <li>Air in oil</li> </ul>	<ul style="list-style-type: none"> <li>Repeat the filling and the bleeding procedure of the system.</li> </ul>
The steering system is stiff and hard to turn, even when the boat is not moving.	<ul style="list-style-type: none"> <li>Wrong oil has been used.</li> </ul>	<ul style="list-style-type: none"> <li>Drain the filling and bleeding system.</li> </ul> <p><b>⚠ WARNING</b></p> <p><b>ULTRAFLEX</b> is not responsible for damage caused by fluids that are not recommended in this manual and so the warranty is cancelled.</p>
The steering system is stiff and hard to turn, even when the boat is not moving, if unbalanced cylinders are used.	<ul style="list-style-type: none"> <li>Dirt in the valve.</li> </ul>	<p><b>⚠ WARNING</b></p> <p>Do not use the boat and contact a specialized technician for the valve cleaning.</p>



<p>The steering system is easy to turn at the dock but becomes hard to turn when the boat is in motion.</p>	<ul style="list-style-type: none"> <li>The steering wheel is too small.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the steering wheel with a bigger one.</li> </ul> <p><b>⚠ WARNING</b> Only within the maximum dimensions allowed by the helm.</p>
	<ul style="list-style-type: none"> <li>Incorrect setting of the torque tab.</li> </ul>	<ul style="list-style-type: none"> <li>Adjust the torque tab.</li> </ul>
	<ul style="list-style-type: none"> <li>Air in oil.</li> </ul>	<ul style="list-style-type: none"> <li>Check the oil level and repeat the bleeding procedure as explained in this manual.</li> </ul>
<p>When the steering wheel is turned, the rod (movable rod cylinders) or the body (fixed cylinder rod) of the cylinder do not move.</p>	<ul style="list-style-type: none"> <li>Air in the system.</li> </ul>	<ul style="list-style-type: none"> <li>Repeat the filling and bleeding procedure of the system.</li> </ul>
	<ul style="list-style-type: none"> <li>Oil leak.</li> </ul>	<ul style="list-style-type: none"> <li>Look for the leak and contact specialized staff.</li> </ul>
	<ul style="list-style-type: none"> <li>Helm mounted upside down.</li> </ul>	<ul style="list-style-type: none"> <li>Mount the helm with the filling hole in up position.</li> </ul>
<p>Leaks from steering system fittings.</p>	<ul style="list-style-type: none"> <li>Bad tightening or low torque of the fittings.</li> </ul>	<ul style="list-style-type: none"> <li>Tighten the fittings with a maximum torque of 20Nm (15 in.lbs).</li> </ul>
	<ul style="list-style-type: none"> <li>Lack of fitting sealant.</li> </ul> <p><b>⚠ WARNING</b> Never use teflon tape or adhesive tape on any fitting.</p>	<ul style="list-style-type: none"> <li>Drain and disassemble the steering system. Remove the fittings and remove the oil from threads. Put the sealant on the fittings and tighten them, install the helm.</li> </ul> <p><b>⚠ WARNING</b> After this operation it is necessary to carry out another bleeding.</p>
<p>Leaks from the tank plug.</p>	<ul style="list-style-type: none"> <li>Bad tightening of the plug.</li> </ul>	<ul style="list-style-type: none"> <li>Tighten the plug.</li> </ul>
	<ul style="list-style-type: none"> <li>The vent plug (black) on the additional helm is in the lower position.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the vent plug (black) with the plug for the additional helm kit (silver).</li> </ul>
	<ul style="list-style-type: none"> <li>Worn and damaged seal.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the plug.</li> </ul>
	<ul style="list-style-type: none"> <li>Too high oil level.</li> </ul>	<ul style="list-style-type: none"> <li>Follow the procedure to maintain the suitable oil level, which is described in the pump manual.</li> </ul>





## 6 DISMANTLING

### 6.1 Dismantling

When for any reason, the steering system is put out of service, it is necessary to follow some rules in order to respect the environment.

Sheaths, pipelines, plastic or non-metallic components must be disassembled and disposed of separately.

The steering system **CONTAINS POLLUTING OILS**  
which must be disposed of according to the rules in force in the country.



**RECYCLE**  
BECACTE

