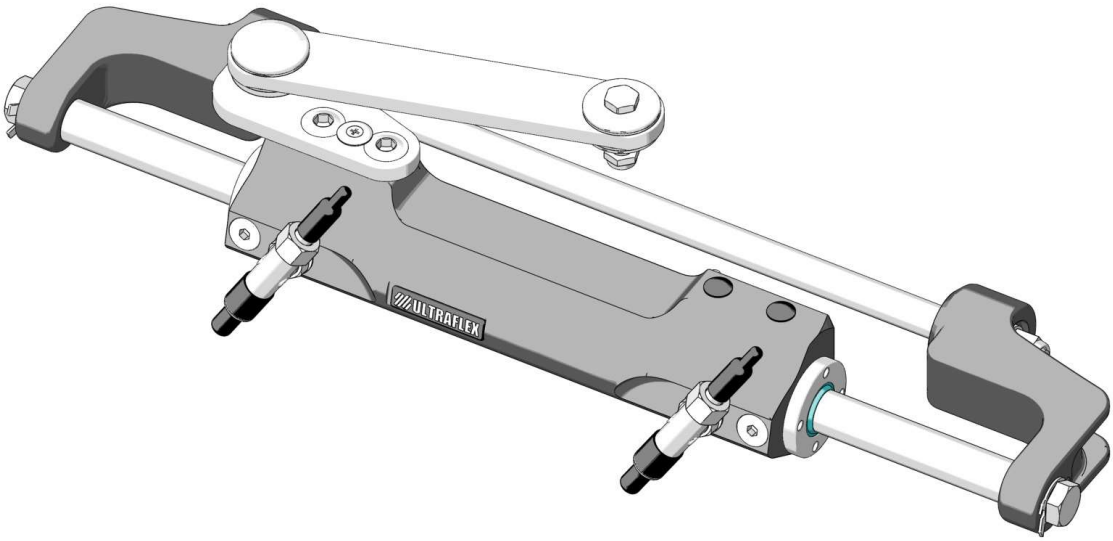
Installation and Maintenance Manual

HYDRAULIC CYLINDER FOR OUTBOARD ENGINES

UC 128-TS



CE

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MEMBER ABYC Setting Standards for Safer Boating®

(REV. 1)

(Dr. No. 22635/r 19/05/2022)

Dear Customer,

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

ULTRAFLEX SpA has been a leader in steering systems for pleasure and professional boats for many years.

All **ULTRAFLEX** SpA products are designed and manufactured to ensure the best performance.
To ensure your safety and to maintain a high quality level, **ULTRAFLEX** SpA products are guaranteed only if they are used with original spare parts (see attached document "Application Spare Parts").

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;
- constantly test the products to verify their conformity with the 2013/53/EU.

"Established in 1989 **UFLEX** USA is a leader in steering and control systems for the marine industry.
With full manufacturing capabilities in Sarasota, Florida, **UFLEX** USA can support all sectors of the marine industry regardless of volume and/or product requirements. And, as an affiliate of the **ULTRAFLEX** Group, **UFLEX** USA has tremendous resources to draw upon for new product development in hydraulics, electronics and many other technologies.

Innovative product design and unparalleled dedication to quality customer service and products continue to be cornerstone of **UFLEX** USA's growth. Today our products can be found as originally installed equipment on many of the most widely known and respected boat brands in the world.
Aftermarket parts can be sourced from trained and experienced distributor network throughout North and South America.

Our dedication to providing the highest quality products and service is only matched by our commitment to developing new products employing the latest materials and technology to enhance our customer's boating experience. From steering wheels to sophisticated electronic controls, **UFLEX** USA has everything you need to make sure that your boat looks and perform it's best for many, many years."

UFLEX USA

Sarasota, FL 34243 - 6442 Parkland Drive

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

DOCUMENT REVISIONS

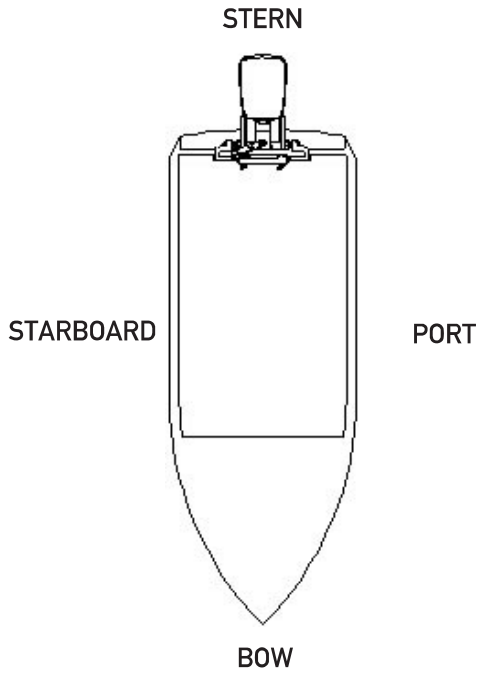
Rev.	Date	Revision description
0	20/02/2006	First edition
1	27/07/2018	New version with removable heads

MANUAL USE 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:

⚠ 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.
	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

INTRODUCTION

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.
UFLEX declines all responsibility for possible mistakes in this manual due to printing errors.
Apart from the essential features of the described product, **UFLEX** 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.

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 Assistance Service.

TECHNICAL ASSISTANCE SERVICE

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

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16012 Busalla (GE)-Italy
Tel: +39.010.962.01
Fax: +39.010.962.0333
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WARRANTY

1. Two Year Limited Warranty. **UFLEX** USA, Inc. warrants that all products manufactured by **UFLEX** USA, Inc. or **UFLEX** S.p.A. and sold by **UFLEX** USA to the retail purchaser ("Purchaser") that for two (2) years after the date of manufacture to be free from defects due to material or workmanship, subject to the exclusions below. Improper installation AVOIDS this warranty. Installation should only be attempted by a trained and qualified technician.

2. Exclusions. This limited warranty does not cover and does not extend to any of the following:
   (a) Failure caused by normal wear and tear, climatic conditions, misuse, neglect, lack of proper maintenance, accident, fire or other casualty damage, racing, overloading, negligence, modification, beaching or grounding of vessel, collision, impact, towing, acts of war or hostilities;
   (b) components not manufactured by **UFLEX** USA, Inc., or its affiliates;
   (c) cost of removal or reinstallation of any component (including components manufactured by **UFLEX** USA, Inc.) or disassembly or reassembly of the unit containing the component;
   (d) components not manufactured by **UFLEX** USA, Inc. or **UFLEX** S.p.A., whether or not warranted by the other manufacturer;
   (e) any product which has not been properly installed.

3. Limitations. THE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS SHALL BE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND **UFLEX** USA, INC.'S SOLE AND EXCLUSIVE LIABILITY UNDER THIS WARRANTY. LABOR FOR REPLACEMENT IS NOT INCLUDED. **UFLEX** USA, Inc.'s obligation under this warranty is limited to the repair or replacement (at **UFLEX** USA, Inc.'s sole election) of any covered item found to be defective, when delivered by Purchaser pursuant to written authorization and instructions from **UFLEX** USA, Inc., shipping prepaid to **UFLEX** USA, Inc.'s plant or other designated repair facility. Repaired or replaced items are warranted as provided herein for the unexpired portion of the applicable warranty period.
THIS WARRANTY, AND THE RIGHTS AND REMEDIES UNDER IT, IS EXCLUSIVE AND IS GIVEN IN PLACE OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WHETHER ARISING BY LAW, CUSTOM, CONDUCT OR USAGE OF TRADE. PURCHASER'S REMEDIES SHALL BE LIMITED AS STATED HEREIN AND **UFLEX** USA, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES OR LOSSES RESULTING FROM DEFECTS. THE RETAIL SELLER IS NOT A CO-WARRANTOR AND IS NOT AUTHORIZED BY **UFLEX** USA, INC. TO AMEND OR MODIFY THIS LIMITED WARRANTY IN ANY MANNER.

4. Transferability of Warranty. This limited warranty may not be transferred to subsequent purchasers.

5. Miscellaneous. **UFLEX** USA, Inc. is an affiliate of **UFLEX** S.p.A. **UFLEX**, USA, Inc., reserves the right to make changes in the design and construction of its products at any time, without notice and without any obligation to incorporate such changes into products of prior manufacture. This limited warranty applies to new components sold by **UFLEX** USA, Inc.. This limited warranty contains the entire agreements between **UFLEX** USA, Inc. and Purchaser and supersedes all prior agreements, discussions, negotiations, commitments and representations, whether oral or written, between them regarding **UFLEX** USA, Inc's warranty. If any provision of this limited warranty, or the application of it, is determined to be invalid of unenforceable for any reason, the remainder of this limited warranty and the application of it shall not be affected.

6. Ultron 3000 and PowerC. The Ultron 3000 and "PowerC - User and Installation Manual" describes activities, operations, technical specifications which must be followed during the installation and/or usage of the product, in order to keep a valid warranty. Descriptions and drawings in that manual are suitable to allow installation and use of the product to skilled persons. In case of doubt and/or for any information, please contact our Technical Service.

All communications and notices from Purchaser regarding this limited warranty should be sent to: **UFLEX** USA, INC., 6442 Parkland Drive, Sarasota, FL 34243; (941) 351-2628.

Return policy

Any product that is presumed defective should be reported to **UFLEX** USA within 48 hours of receipt or discovery in the field. Upon notification **UFLEX** USA will attempt to troubleshoot the problem with our customer over the phone. If we are unable to resolve the problem **UFLEX** will issue a Return Goods Authorization number and we require that the product in question be returned to **UFLEX** with all its parts in its original packaging. The product should be returned freight prepaid to:

UFLEX USA
RGA Department - RGA #
6442 Parkland Drive
Sarasota, Florida 34243

Upon receipt **UFLEX** will examine the product to determine the cause of the defect. If the product is determined to have a defect in workmanship or material, it will be repaired at our discretion.

Our warranty does not cover labor, towing or other expenses. Further, it does not cover products that have been improperly installed, damaged in installation, misapplied, or misused.

Our products are not intended for use in racing applications.

1 PRODUCT DESCRIPTION

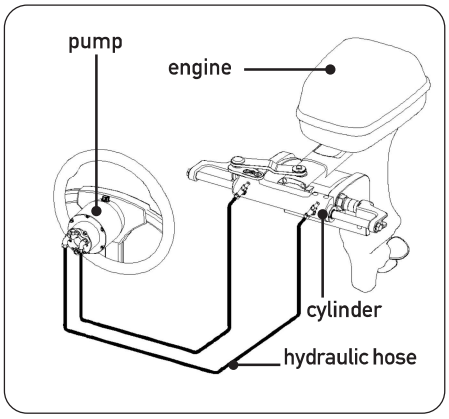
1.1 Hydraulic steering system operation

All **UFLEX** hydraulic steering systems are designed in conformity with UNI-EN-ISO 10592 and A.B.Y.C. P21 regulations.

All **UFLEX** 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 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.

UFLEX produces different pump models, which have different capacity (cm^3 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 28 cm^3 [1,7cu.in.] and the cylinder has a volume of 120 cm^3 [7,3cu.in.], the formula looks like this: 120/28=4,2. Accordingly, the steering wheel will turn 4,2 times 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 Operation in safety conditions

The safety warnings below give information about any risk that could occur during the boat operation and the prescriptions for a safe navigation.
In no event shall **UFLEX** be held responsible for material or physical damage due to the non-compliance with these prescriptions.

⚠ WARNING

Before beginning the installation, check the mounting compatibility of the UC 128-TS cylinder to the engine by consulting the attached document "Application Guide" contained in the packaging.
It is also necessary to read and understand the instructions contained in this manual as well as any other documentation supplied with the boat.
We recommend keeping on the boat a copy of the Application Guide and/or of this manual to consult it immediately if necessary.

⚠ DANGER

Do not modify the steering cylinder in any way to fit it to your engine application: the cylinder will not operate safely and will endanger the boat (causing possible impacts and capsizing) and its occupants (causing physical injuries that can lead to death).

⚠ WARNING

All **UFLEX** 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

UFLEX 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.

⚠ WARNING

The boat must be used EXCLUSIVELY by users knowing its features and controls. All the people on the boat must wear the personal protective equipment approved by the Maritime Authorities.

⚠ DANGER

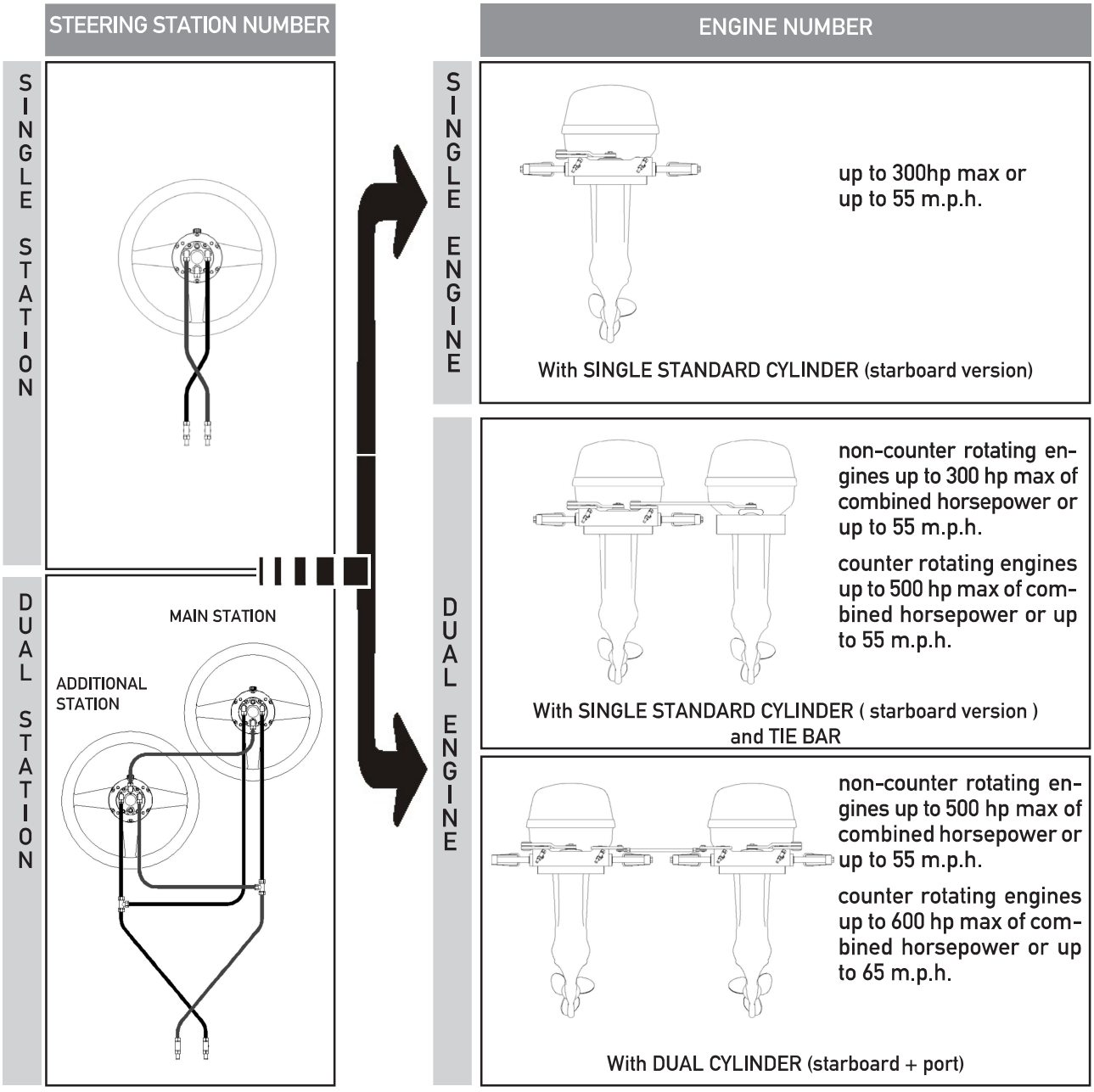
The boat must NEVER be driven by people under the influence of alcohol or drugs.

⚠ WARNING

After using the boat, its components must be rinsed with clean and low pressure fresh water.
It is not allowed to use any water-jet pipe or pressure washing equipment. Do not use detergents containing acetone, ammonia, acids or other corrosive substances.
In particular, it is necessary to prevent the components from coming into contact with some specific detergents used for cleaning fiberglass hulls since they could corrode the stainless steel components.

1.3 Configurations

The hydraulic cylinder for outboard engine UC128-TS model can be installed with different configurations according to the number and the type of engines used with a single or dual engine steering system.
The possible configurations are:



NOTICE

On request, triple outboard engine applications are available. For detailed information, please contact **UFLEX** Assistance Service.

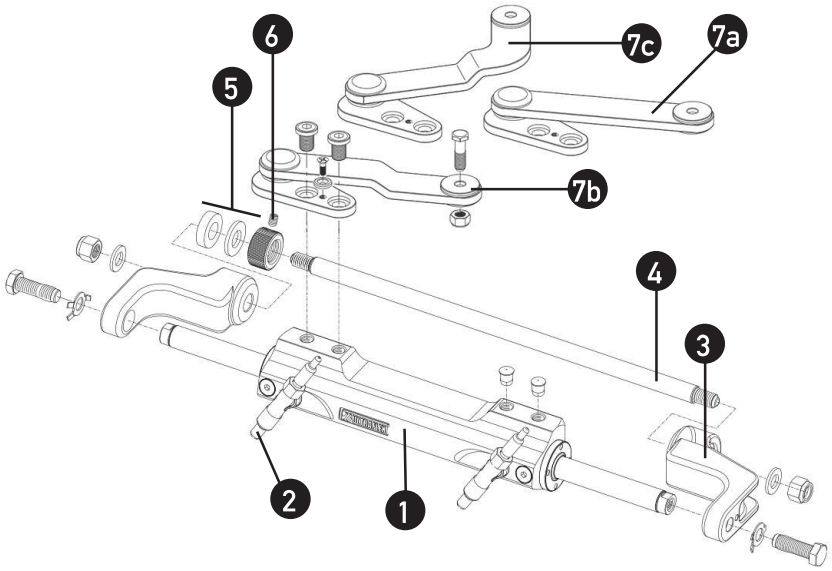
⚠ DANGER

Dual engine installations require the use of a tie bar.

1.4 UC128-TS cylinder description

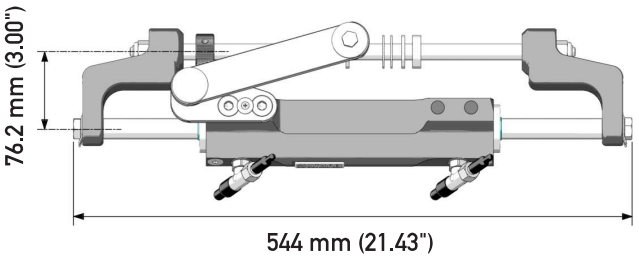
UC128-TS is a hydraulic outboard front mount cylinder which has been designed and manufactured to be used as a component in the hydraulic steering systems, as described in the previous paragraph.
The cylinder is installed to the tilt tube rod of the available engines on the market as shown in the attached 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) or two cylinders (standard + port) connected by a tie bar can be used. In the standard version the link arm is mounted on the starboard side, while in the port version it is mounted on the port side (see picture in par. 1.5). The following picture shows the main cylinder components:

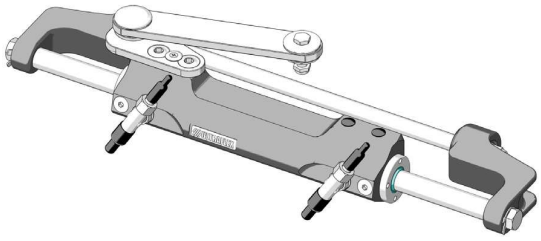
1. Cylinder body
2. Bleeders
3. Bull horns
4. Tilt tube rod
5. Spacers
6. Adjustment collar
7a. Straight link arm (UC128-TS/1)
7b. Shaped link arm (UC128-TS/2)
7c. Curved link arm (UC128-TS/3)



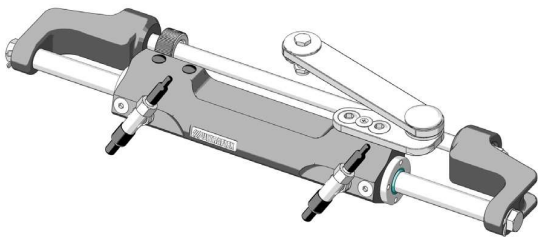
1.5 Technical features

SPECIFICATIONS	UC128-OBF/1 -/2 -/3
Volume	120 cc - 7.8 cu. in
Output force	450 Kg - 992 lbs (@70 bar)
Inside diameter	35 mm - 1.37"
Stroke	198 mm - 7.79"
Oil	OIL15 Uflex





STANDARD VERSION (STARBOARD)



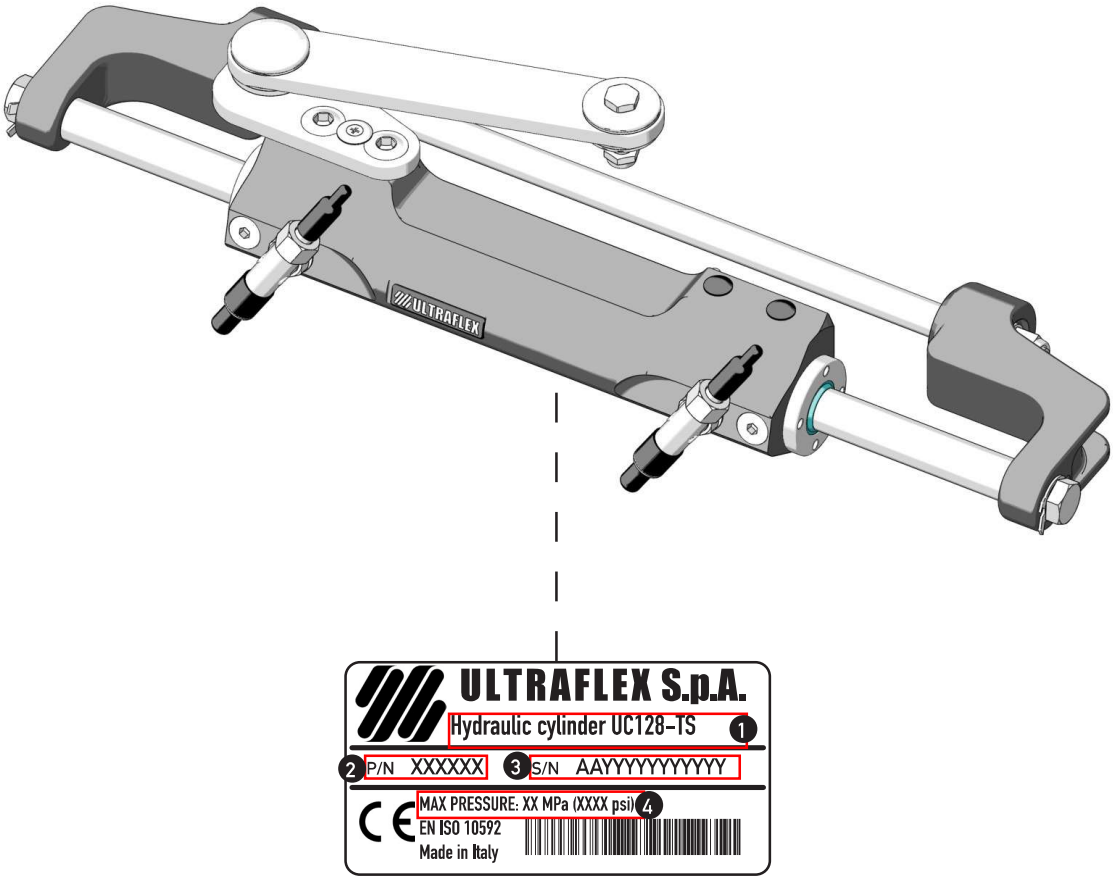
PORT VERSION

⚠ CAUTION

*The cylinder output force is a theoretical force with a system pressure of 105 bar. This force does not correspond to the one normally used by the system but it represents the limiting conditions of use.

1.6 Marking and safety stickers

The CE conformity plate is positioned on the cylinder. It contains the manufacturer's logotype and several product data (see the picture below).
The plate must not be removed at all.
For any communication with the manufacturer always mention the serial number (indicated on the plate itself).



1. Component type and model
2. Component code
3. Year of manufacture and serial number
4. Maximum operating pressur

2 TRANSPORT

2.1 General warnings

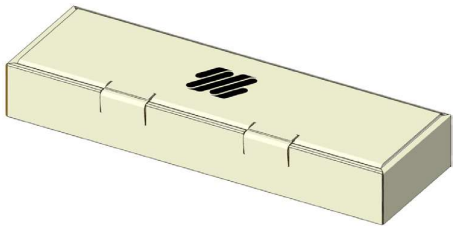
The product weight with its packaging is 8kg (18 pounds) and so it can be handled manually.

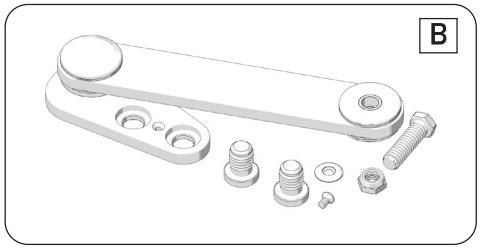
⚠ WARNING

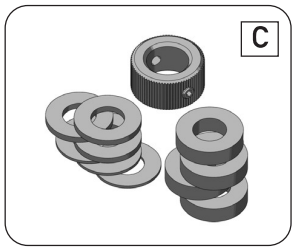
The staff in charge of handling must operate with protective gloves and safety shoes.

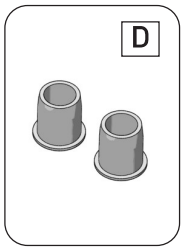
2.2 Packaging contents

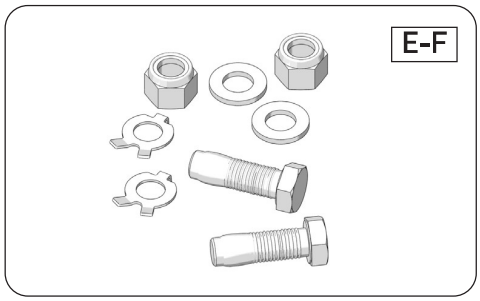
Before using the equipment check that the product has not been damaged during transport.
Also make sure that all the standard components are in the packaging (see list). In case of damage, notify the claim to the forwarder and inform the supplier.

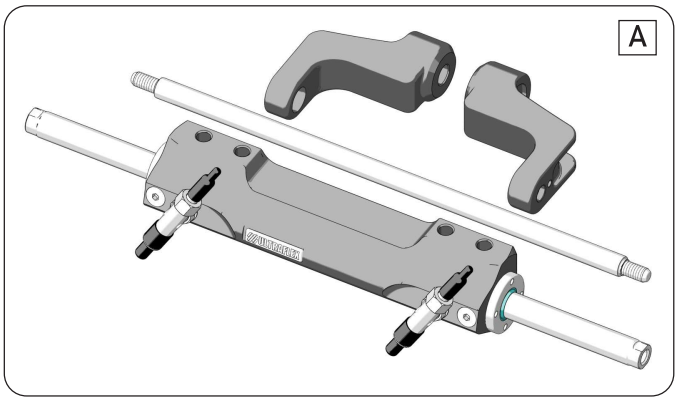












CONTENTS OF THE STANDARD PACKAGING:
A) No.1 cylinder body with rod, fittings and bull horns;
B) No.1 link arm kit composed of:
- No.1 link arm;
- No.2 allen screws with No.1 safety screw and lock washer;
- No.1 bolt + nut;
- No.1 kit for Suzuki engines (not TS/3 version);

C) No. 1 spacer kit composed of:
- No.8 plastic spacers;
- No.2 steel spacers;
- No.1 ring nut for adjustment collar;

D) No.2 caps for the cylinder body;
E) No.2 bolts + No.2 lock washers;
F) No.2 locknuts + n°2 washers;

⚠ CAUTION

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

3 INSTALLATION

3.1 Safety rules for installation

RESPECT STRICTLY the following safety rules.
UFLEX 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

- The hydraulic components must not be installed in places where the operating temperature is over 80°C.
- DO NOT PUT HANDS BETWEEN THE MOVING PARTS.
- Do not disable the safety devices.
- Do not modify or add devices to the system, without **UFLEX** written authorisation or technical intervention which will prove the modification. Any replacement or unauthorised addition can compromise the equipment performances, reliability and safety.
- 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.
- The equipment must not be installed by unskilled staff but only by the manufacturer or by an authorised dealer.
- Do not disassemble the hydraulic connections before bleeding the oil in the system completely. The hoses can contain high pressure oil.

⚠ WARNING

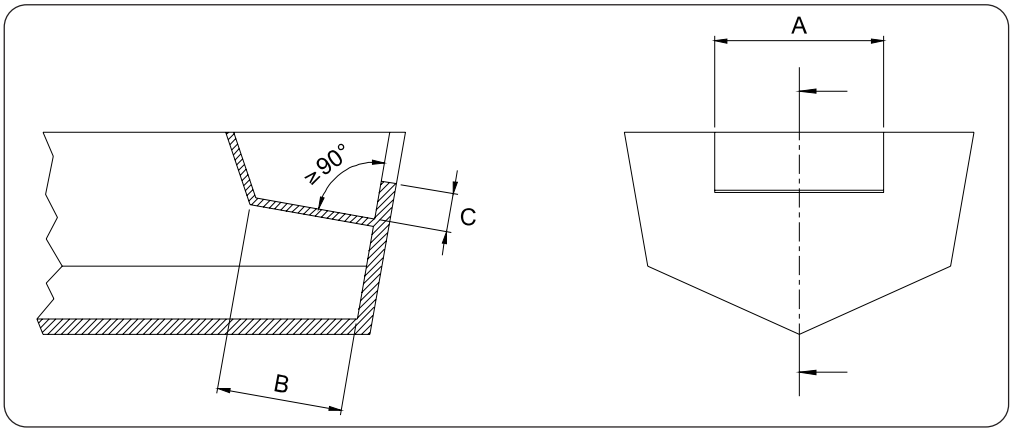
- Read and understand the instructions given in this manual as well as any other documentation supplied with the boat indicating installation procedures. If an instruction is not very clear or contradictory and in case of doubts, contact **UFLEX** Customer Service.
- Make sure all the necessary components are available for installation.
- Do not put the feet on the cylinder.
- Be careful not to scratch the cylinder rod to avoid any water infiltrations.
- Do not connect any switch on the steering wheel to prevent the cables from twisting.
- During installation, make sure to tighten the connectors correctly in compliance with the tightening torques recommended for the different components. Any incorrect fastening could cause a loss of control and possible boat impacts and/or capsizing with material damage and physical injuries that could lead to death.
- After installing and purging the system, check before starting the navigation. Turn the steering wheel until the cylinder or the cylinders installed reach the end of stroke. Repeat this operation turning the steering wheel in the opposite direction. Repeat this operation with all the steering systems until you are sure they are installed correctly and the system works properly.
- 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 injested, 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.
- Check the system and eliminate any interferences (see par. 4.1.2)
- Avoid too narrow bend radius of hoses.
- Avoid the hose contact with edges or sharp corners.
- Avoid the hose contact with heat sources.
- During installation, inspection or maintenance, IT IS STRICTLY FORBIDDEN to wear necklaces, bracelets or clothes which could get caught in the moving parts.

NOTICE

- The installation must be carried out according to the prescriptions of the system manufacturer. The hydraulic lines must be fixed by means of clips, belts or any other system preventing damage due to friction or vibrations. The clips, the belts or the other devices must be corrosion resistant and must be conceived to avoid cuts, abrasions or damage to the hydraulic lines. They must also be compatible with the materials making up the hydraulic line.
- The hydraulic lines must not go below the waterline.
- During the first installation, in case of changes to the system components and when maintenance requires disconnecting/connecting mechanical or hydraulic interfaces, some tests must be carried out to check the integrity and the good operation of each steering system installed on the boat. In particular, these tests must ensure the absence of any type of interference (see par. 4.1.1 and 4.1.2) and of leaks from the hydraulic and mechanical components by submitting the system to a precise test pressure for about 60 seconds.

3.2 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.

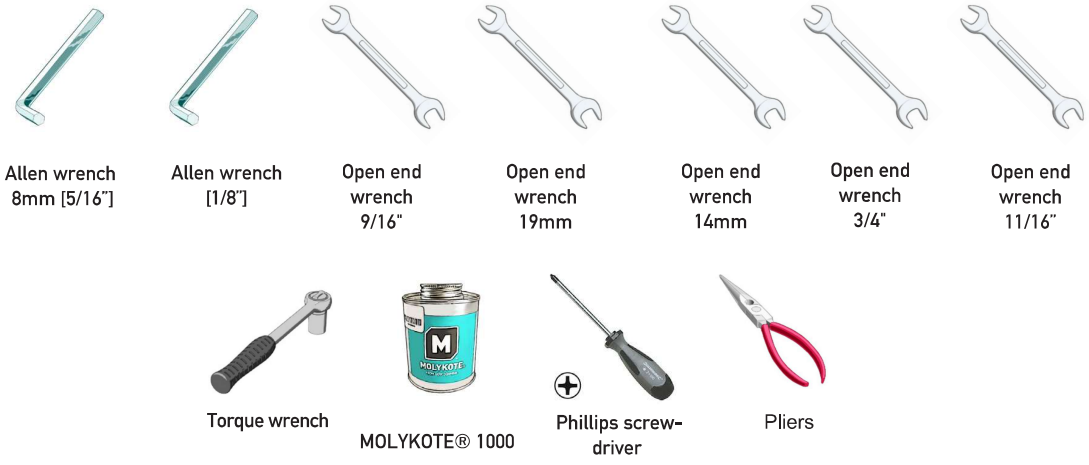


MINIMUM SPLASH WELL DIMENSION REQUIREMENTS			
Engine No.	A	B	C
1	560 mm - 21.25"	152 mm - 5.98"	152 mm - 5.98"
2	1110 mm - 43.70"	152 mm - 5.98"	152 mm - 5.98"

⚠ 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.

3.3 Necessary tools



Allen wrench 8mm [5/16"] | Allen wrench [1/8"] | Open end wrench 9/16" | Open end wrench 19mm | Open end wrench 14mm | Open end wrench 3/4" | Open end wrench 11/16"

Torque wrench | MOLYKOTE® 1000 | Phillips screw-driver | Pliers

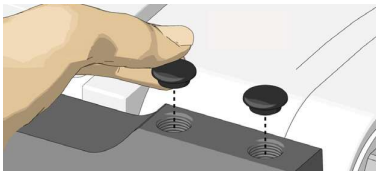
3.4 Standard (starboard) cylinder installation

NOTICE

Unless expressly stated, for the tightening torques consider a tolerance of ±5% as to the value indicated..

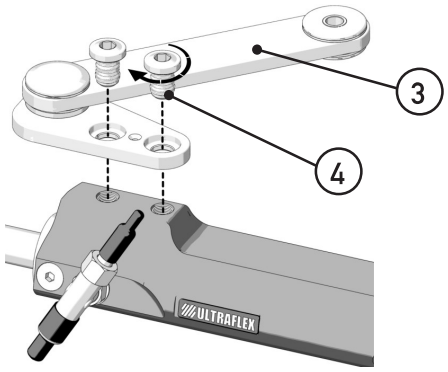
⚠ CAUTION

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



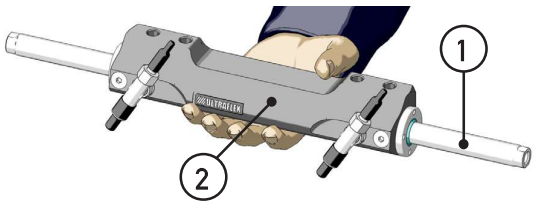
1 In case of single cylinder installation mount the supplied caps on the cylinder body as shown in the picture.

3 Mount the link arm (3) on the cylinder body as shown in the picture by means of the supplied screws (4). Tighten the supplied screws by using a 8mm Allen wrench with a torque of 76[Nm] (56 [lb·ft]).



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

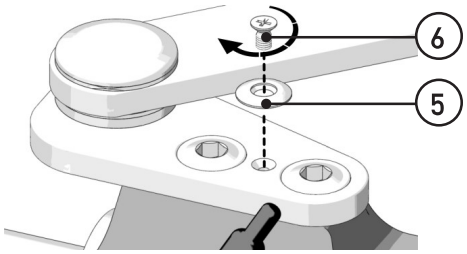
2 After removing the protective caps of the fittings, manually center the rod (1) on the cylinder body (2).



⚠ 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 Position the lock washer (5) and tighten it with the screw (6), by using Loctite 270 (torque 3[Nm] (2 [lb·ft]).



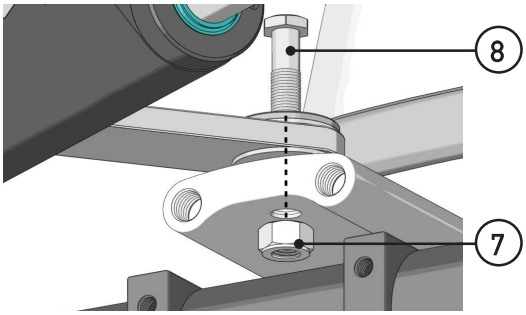
⚠ WARNING

The operations described in points 3 and 4 must be carried out only during the first installation. The choice of the link arm depends on the engine type (see attached Application Guide). Do not disassemble the arm from the cylinder body in any case.

6 With reference to the application instructions contained in the Application Guide, connect the link arm to the tiller arm by means of the screw (8), tighten it by using a 14mm wrench with a torque of 54[Nm] (40 [lb·ft]). Tighten the self-locking nut (7) by using a 9/16" wrench with a torque of 27[Nm] (20 [lb·ft]). After tightening the locknut (7), check for the right torque 54[Nm] (40 [lb·ft]) of the screw (8).

⚠ WARNING

If the locknut is tightened incorrectly, this could result in a loss of control of the boat causing impacts and/or capsizing and material damage and physical injuries that could lead to death.



⚠ WARNING

In order to tighten screw (8) and the self-locking nut (7) on the tiller arm, ask your mechanic the maximum allowed torque. If it is lower than that shown in this manual, always use the torque indicated by your mechanic.

⚠ CAUTION

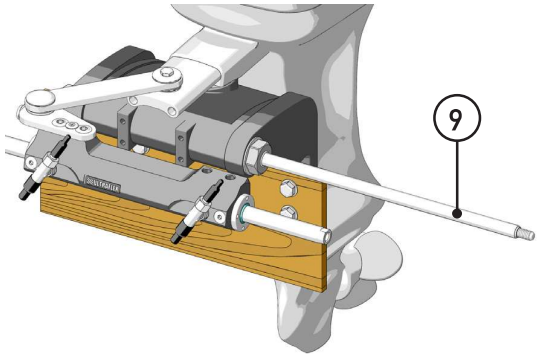
If the locknut (4) is disassembled, it must be replaced with a locknut of the same type. (Contact our customer care, see page 6).

⚠ WARNING

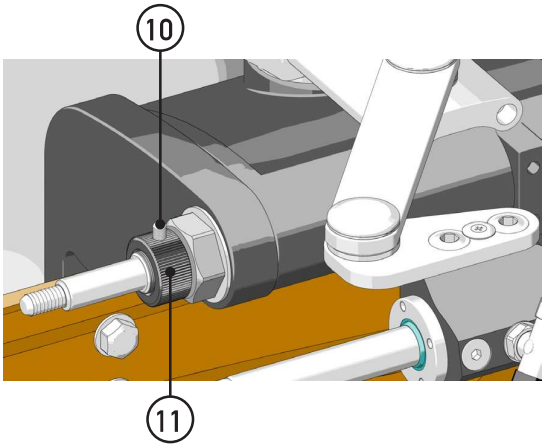
It is important to check periodically, at least every 3 months (or every month for professional uses), the right torque of this screw (8) and of the locknut (7).

7 Grease the tilt tube rod (9), by using marine grease.

8 Insert the tilt tube rod (9) into the tilt tube.



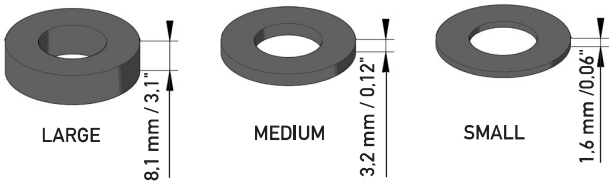
9 Fit the set screw (10) on the adjustment collar (11) and screw it to the right side of the tilt tube until it comes into contact with the tilt tube stop nut, even in case of port applications.



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

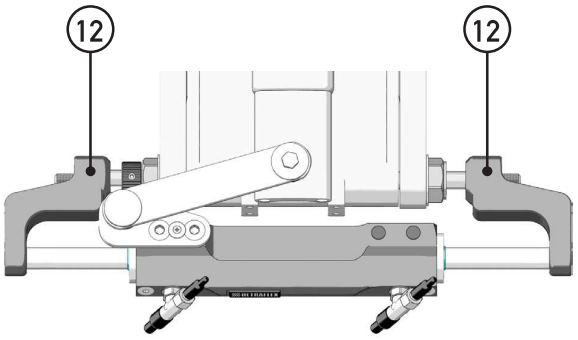
NOTICE

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

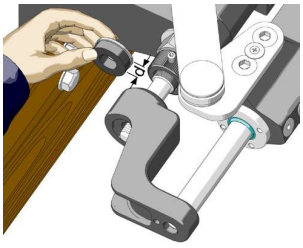


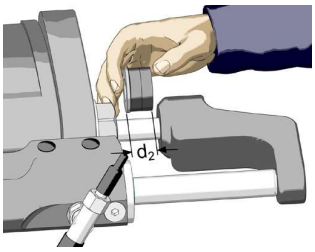
The number and position of the spacers shown in the Application guide are indicative only.

11 Insert the right and left bull horns (12) by connecting the rod and the tilt tube rod as shown in the picture without tightening them.



12 Choose and check the spacers to fill gap "d" between ring nut and bullhorn and gap "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.

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

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

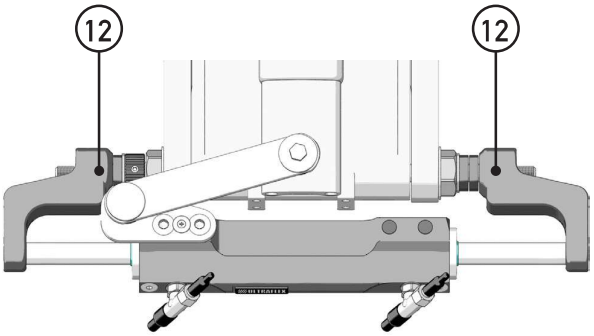
NOTICE

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.

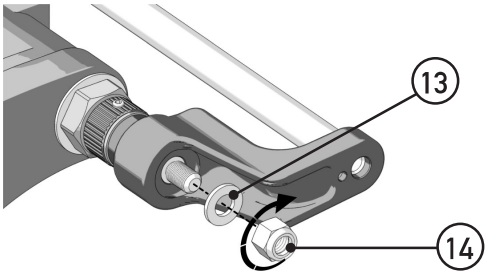
NOTICE

An incorrect positioning of the spacers can reduce or make the turning radius non-symmetric, compromising the system calibration.

15 Insert the right and left bull horns (12) by connecting rod and tilt tube rod as shown in the picture.



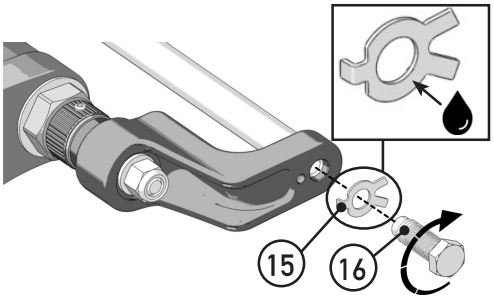
16 Insert the washers (13) on the two ends of the tilt tube rod, grease the nut thread (14) with some anti-seize grease type MOLYKOTE® 1000 or a similar one, screw them by using a 3/4" wrench and tighten them with a torque of 70[Nm] (52[lb·ft]).



CAUTION

If the self-locking nuts (14) are disassembled, replace them. (Contact our technical assistance service, see page 6).

17 Position the lock washers (15) and lock screw (16) by using a 19mm wrench with a torque of 70[Nm] (52 [lb·ft]). Apply a small amount of anti-seize grease such as MOLYKOTE 1000 or a similar one on the outer surface of the lock washer (15), between the washer and the locking screw (16).



NOTICE

The lock washer tabs must be bent afterwards (see point 22).

18 Check the correct tilting of the engine.

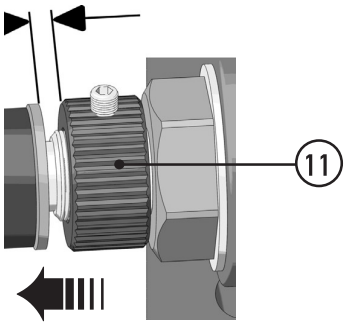
WARNING

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

19 Unscrew the adjustment collar (11) and bring it into contact with the stainless washer, until the clearance is eliminated.

CAUTION

Do not use any tool for this operation.



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

NOTICE

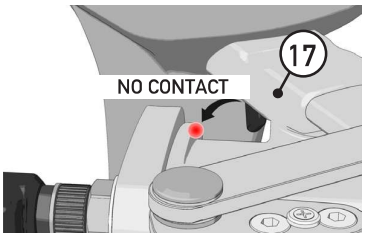
The rotation must be as symmetric as possible between port and starboard so that the steering angle is the same on both sides.

WARNING

The engine must stop through the cylinder end stroke without coming into contact with the mechanical stop (17) on the engine.

NOTICE

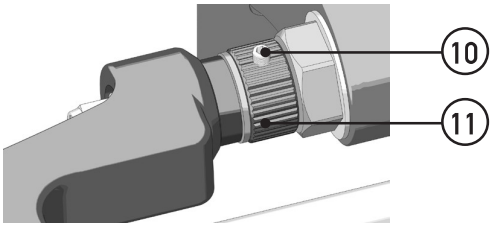
Otherwise repeat the installation or please contact Technical Assistance Service.



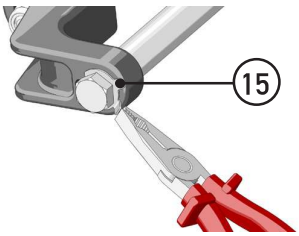
21 Tighten the set screw (10) on the adjustment collar (11) by a 1/8" Allen wrench with a torque of 3[Nm] (2 [lb·ft]).

NOTICE

Check periodically the clearance absence between the ring nut and the tilt tube otherwise eliminate the clearance through the adjustment ring nut (11).



22 Bend the tabs of the lock washers (15) bringing them into contact with the screw head and taking care not to damage the bull horns while using the pliers.



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

WARNING

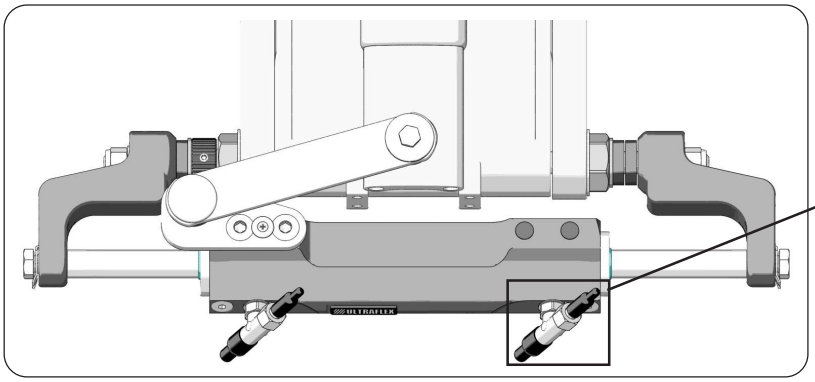
In this phase clearance should be enough to avoid frictions but it should not be excessive since it could cause engine instability. In case of contact with the transom, stop the installation and contact the specialized staff.

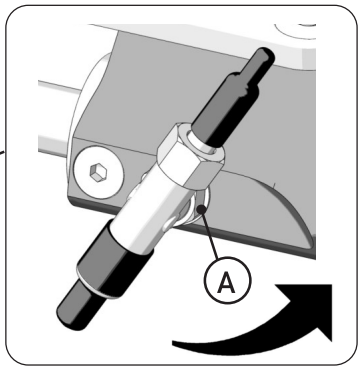
3.5 Hose installation

NOTICE

Unless expressly stated, for the tightening torques consider a tolerance of ±5% as to the value indicated

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 locknut (A) by using a 11/16"wrench;

2. orient the fittings according to the requirements;

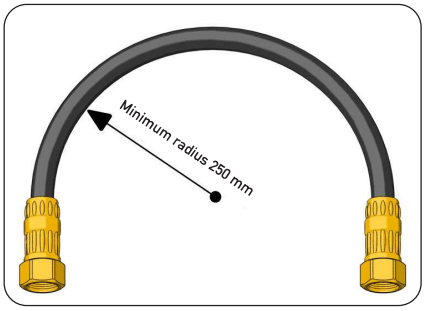
⚠ DANGER

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;

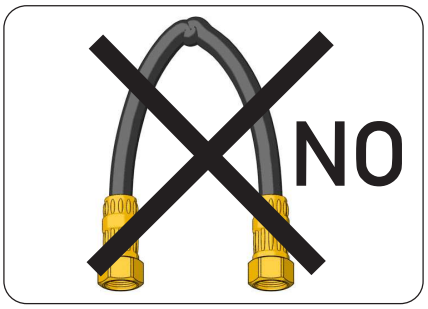


NOTICE

In case of systems with more than one engine, identify the port cylinder and the starboard cylinder and their connections to distinguish them easily if necessary.

⚠ 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.



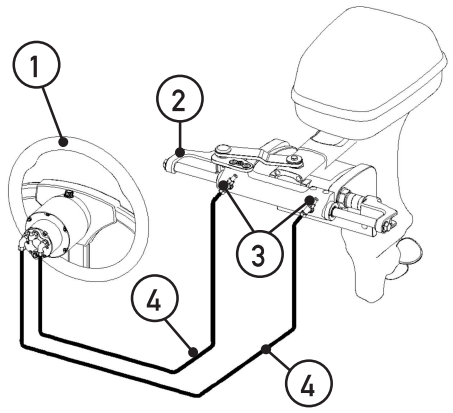
3.6 Type of installation

The UC128-TS hydraulic cylinder for outboard engines can be installed with different configurations according to the number and the type of engines used with a single or dual steering system. The possible configurations are:

CAUTION

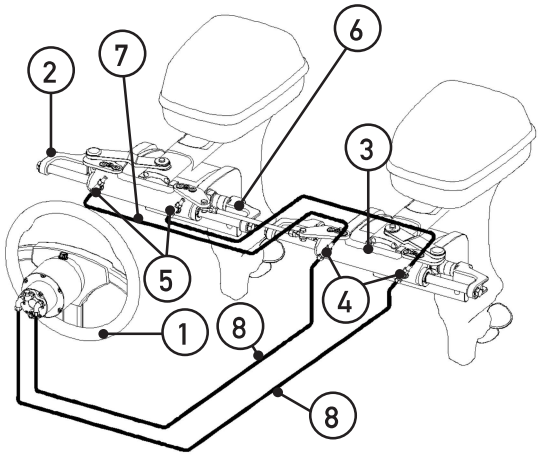
Connect hoses as shown in the following pictures:

SINGLE STATION / SINGLE CYLINDER:



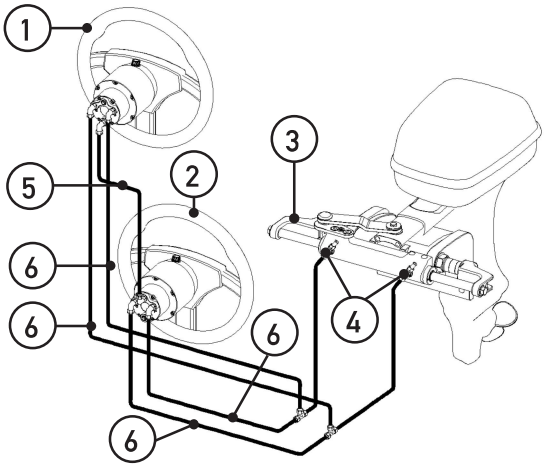
1. helm
2. starboard cylinder
3. "T" fittings
4. kit OB

SINGLE STATION / DUAL CYLINDER:



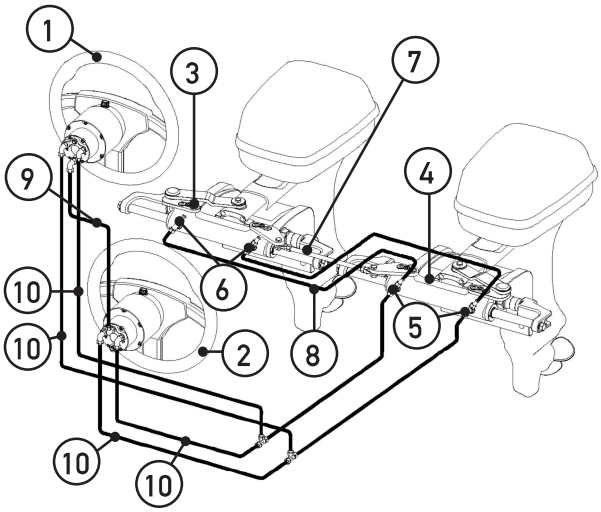
1. helm
2. starboard cylinder
3. port cylinder
4. "T" fittings
5. "T" fittings
6. tie bar
7. kit OB-2C
8. kit OB

DUAL STATION / SINGLE CYLINDER:



1. upper station helm
2. lower station helm
3. starboard cylinder
4. "T" fittings
5. kit OB-2S
6. kit OB

DUAL STATION / DUAL CYLINDER:



1. upper station helm
2. lower station helm
3. starboard cylinder
4. port cylinder
5. "T" fittings
6. "T" fittings
7. tie bar
8. kit OB-2C
9. kit OB-2S
10. kit OB

3.7 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 **UFLEX** oil or other compatible oils.

Hydraulic oil OIL15 has been specifically formulated for **UFLEX** to ensure high quality performance level of **UFLEX** products throughout time.
The special mix of anti-wear and stabilizing components of OIL15 allow ensuring great results as far as the product duration and performances are concerned in several environmental conditions. **UFLEX** hydraulic oil complies with standard ISO 10592 concerning hydraulic steering systems. **UFLEX** is not to be held responsible for any damages or performance deterioration if oils different from OIL15 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 OIL15 **UFLEX** are:
- Shell Tellus T15 and Shell Tellus T22
- Mobil DTE 11M

NOTICE

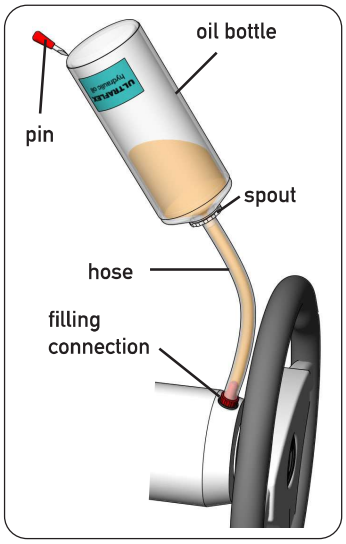
UFLEX will not be able to ensure the compatibility of the above mentioned oils with OIL15 if the oil manufacturers vary their formulation. Under no circumstances **UFLEX** is to be held responsible for any damages or performance deterioration.

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. According to the types of installation, it is necessary to carry out the different bleeding procedures, as it follows.

3.7.1 Positioning of the oil bottle

To carry out this operation, it is necessary to use the oil filling kit (1 needle, 1 transparent pipe, 1 pipe connection and 1 spout for the oil bottle). This kit is NOT supplied.

- Remove the pump cap and insert the fittings.
- Attach the spout to a new bottle of hydraulic oil and connect the hose to the fittings and the bottle spout.
- Turn the bottle upside down and pierce it with the 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

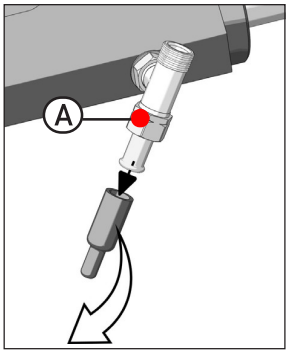
While replacing the oil bottle, during the filling process, close all the bleed valves of the cylinder/s. To bleed the system, check that oil is always present in the filling hose. If some air is in the system during the bleeding process, the whole bleeding process must be started again.

⚠ CAUTION

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

3.7.2 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.

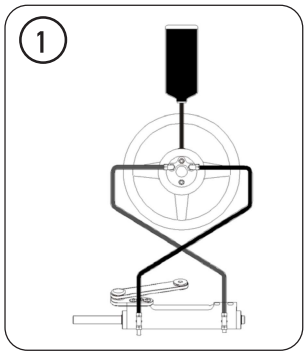


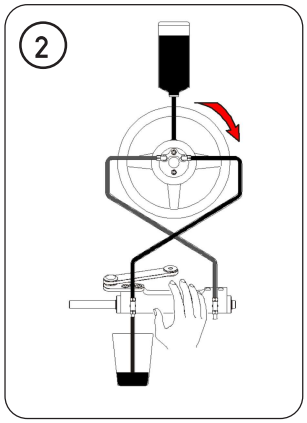
- Unscrew the two bleed valves and manually push the cylinder body to one side until it stops as shown in picture 1.

- Position the oil bottle as explained in paragraph 3.7.1.

- 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.

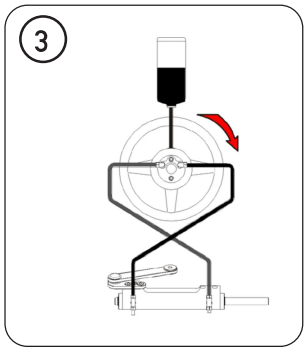




NOTICE

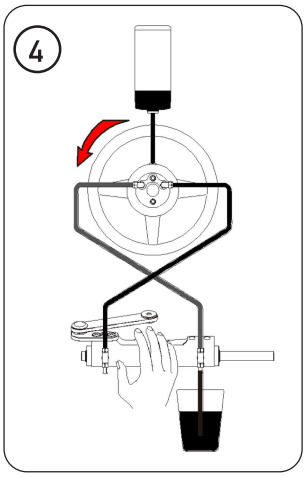
Hold the cylinder body with the hand to prevent movements caused by the air present in the cylinder chamber (picture 2).

- 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.



NOTICE

The described procedure is the same even in case of single station, dual engine, single cylinder and tie bar.

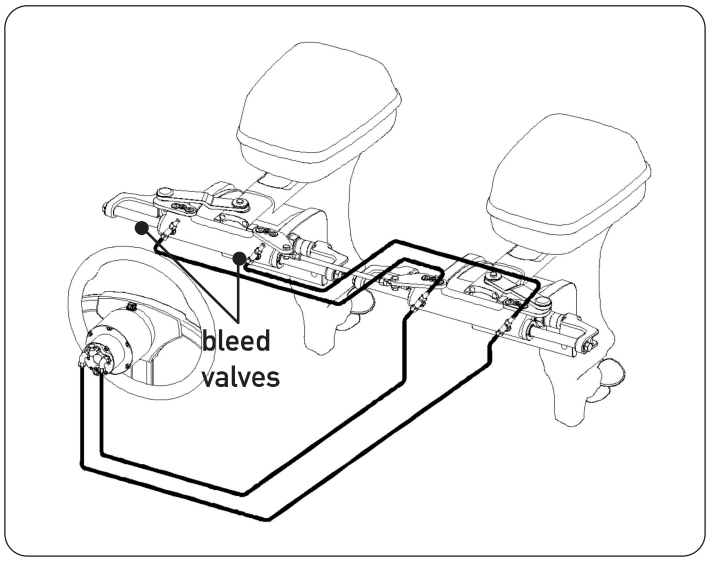
3.7.3 Single steering station/ dual cylinder

- Manually unscrew the two bleed valves on the cylinder "T" fittings and push the cylinders to one side up to the end stroke.

- Position the oil bottle as described in paragraph 3.7.1.

- Follow the same bleeding procedure described for the single steering station / single cylinder (paragraph 3.7.2).
  While turning the steering wheel be careful because both cylinders move.

- Repeat the entire procedure several times to ensure the air absence in the system.



3.7.4 Dual steering station/ single cylinder

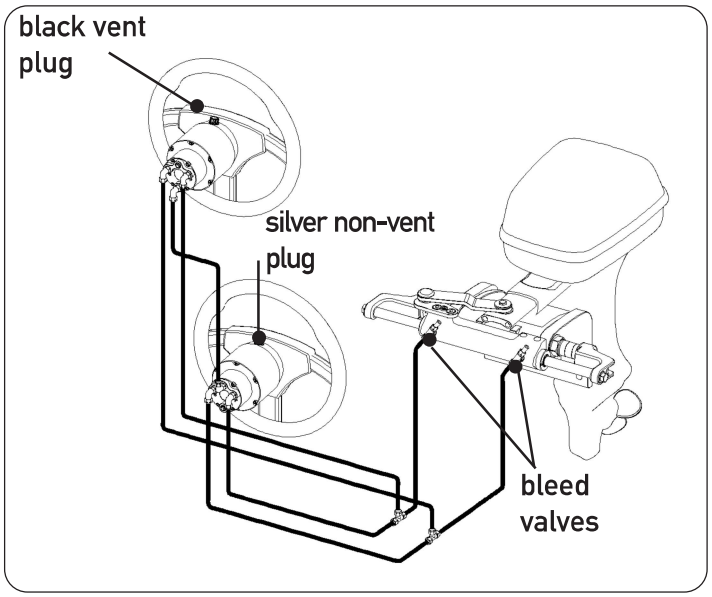
- Manually unscrew the two bleed valves on the cylinder "T" fittings and push the cylinder to one side up to the end stroke.

- Position the oil bottle near the main steering station (upper) according to what is described in paragraph 3.7.1.

⚠ WARNING

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

- Follow the same bleeding procedure described in paragraph 3.7.2 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.

NOTICE

The purging procedure is the same for dual station, dual motor, single cylinder and tie bar.

3.7.5 Dual steering station/dual cylinder

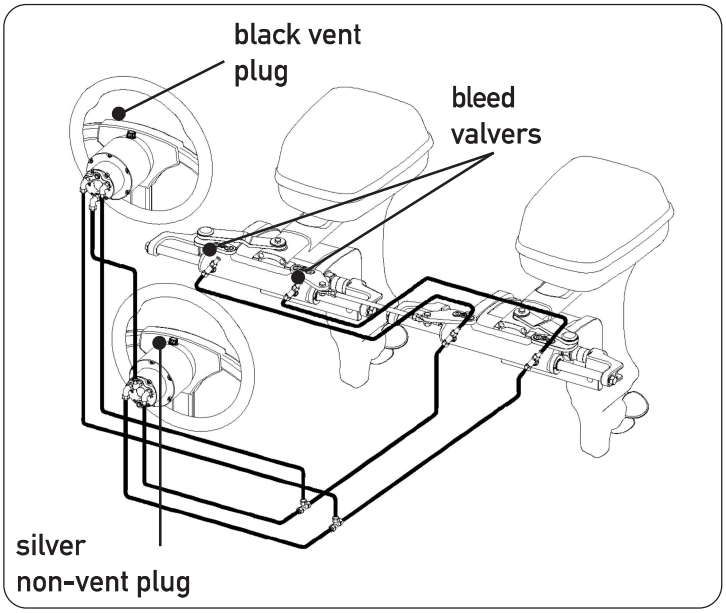
- Manually unscrew the two bleed valves on the cylinder "T" fittings and push the cylinders to one side up to the end stroke.

- Position the oil bottle near the main steering station (upper) according to what is described in paragraph 3.7.1.

WARNING

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

- Follow the same purging procedure described in paragraph 3.7.2 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 entire procedure at least 4 times to ensure the absence of air in the system.

3.8 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 SYSTEM USE

4.1 First use

Before starting the boat for the first time do as follows:

- Consult section 1 "Product description" in this manual to find information about the position and the function of the different components of the system. The operator must read and understand this information before starting the boat.

- Check the system as described in paragraph 4.1.1

- The first navigation must be carried out with calm sea conditions. After checking that all occupants wear the personal protective equipment, drive at a moderate speed checking the response of the boat controls. After reaching safe waters, steer the boat at different speeds until you master the boat completely.

4.1.1 System check

To check the system correctly follow the instructions below.

⚠ DANGER

If these instructions are not followed, this may result in a loss of control causing possible impacts and/or capsizing of the boat with material damage and physical injuries that could lead to death.

- Check the steering response when the steering wheel is turned in port and starboard position.

- Check the pipes and any connecting cables are not damaged. Check the connections are tightened correctly and the cable bending complies with the instructions in paragraph 3.5.
  Check the mechanical components are not damaged and worn out.

- Check the cylinder and the corresponding connections move freely during the steering. The cylinder and the steering wheel movement must be smooth. In case of systems with more than one engine, this check must be carried out on all steering stations.

- Check the control levers move freely and the motors work correctly according to the control. Also check the throttle and inverter cables move freely and they are not damaged, worn out or corroded.

4.1.2 Check of interferences

Check there are no interferences among components such as cylinders, tie bars, engines, etc. according to the instructions below. Also check that the cables can move freely with a bending radius not lower than 250 mm.

⚠ DANGER

If the instructions below are not followed, this may damage the cylinder compromising the correct operation of the steering system.

- With the engine completely lowered, turn the steering wheel slowly in one direction and then in the opposite one up to the end of stroke and check the absence of all types of interferences. Repeat the same operation after lifting the engines too..

- After lifting the engine, check the distance between the lower part of the cylinder and the transom and the engine fixing bolts. If the cylinder comes into contact with any fixed part, immediately stop tilting and contact **UFLEX** Customer Care

- In case of boats with more than one engine, lower them and put them towards the bottom in port position and towards the top in starboard position. Turn the steering wheel slowly in one direction and then in the opposite one up to the end of stroke and check the absence of all types of interferences. Repeat the same operation after reversing the engine position.

- Check that no combination of trim, tilt and steer can create interferences. Otherwise, contact **UFLEX** Customer Care.

4.2 System operation

⚠ WARNING

Never start and use the system if any component does not work correctly: this may result in a loss of control causing impacts and/or capsizing of the boat with material damage and physical injuries that could lead to death.

⚠ WARNING

While the boat is moving, avoid moving from one steering station to the other one. Put the engine in neutral position and wait until the boat stops.

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 3.7. 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 bleeding ". 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 self-locking nuts 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.

CAUTION

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

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

NOTICE

The kit is supplied with the replacement instructions.

5.3 Troubleshooting

⚠ DANGER

Every time any malfunction or damage is detected in the system, immediately stop navigating, take the boat to a safe place and contact **UFLEX** Customer Care.

⚠ WARNING

Whenever the following checks need the removal and/or disassembly of the steering system components, such work must be carried by specialized staff. **UFLEX** 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.	• Blockage in the hoses between steering system and cylinder.	• Replace hoses. **⚠ WARNING** The damaged hose must be replaced, otherwise it may cause loss of steering and severe personal injury or property damage.
The system is very difficult to fill. Air keeps bubbling at the top of the steering system tank even after filling the system completely.	• Air in the system.	• Repeat the filling and the bleeding procedure of the system. • Install horizontally the hoses and in any case with a maximum inclination of 3cm each meter.
	• Leaks from the cylinder bleeder.	• Tighten the bleeder on the cylinder.
	• Coiled hose.	• Uncoil and straighten the hose.
	• Helm has been mounted upside down.	• Mount the helm with the filling hole in up position.
The steering system is stiff and hard to turn, even when the boat is not moving.	• Restrictions in hoses or fittings.	• Look for and remove the restriction.
	• Air in oil	• Repeat the filling and the bleeding procedure of the system.
The steering system is stiff and hard to turn, even when the boat is not moving.	• Wrong oil has been used.	• Drain the filling and bleeding system. **⚠ WARNING** **UFLEX** is not responsible for damage caused by fluids that are not recommended in this manual and so the warranty is cancelled.
The steering system is stiff and hard to turn, even when the boat is not moving, if unbalanced cylinders are used.	• Dirt in the valve.	**⚠ WARNING** Do not use the boat and contact a specialized technician for the valve cleaning.

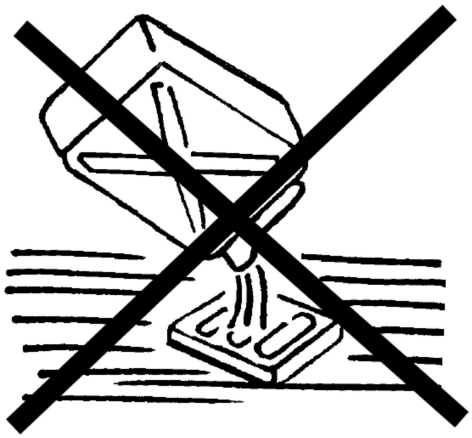
PROBLEM	CAUSE	SOLUTION
The steering system is easy to turn at the dock but becomes hard to turn when the boat is in motion.	• The steering wheel is too small.	• Replace the steering wheel with a bigger one. **⚠ WARNING** Only within the maximum dimensions allowed by the helm.
	• Incorrect setting of the torque tab.	• Adjust the torque tab.
	• Air in oil.	• Check the oil level and repeat the bleeding procedure as explained in this manual.
When the steering wheel is turned, the rod (movable rod cylinders) or the body (fixed cylinder rod) of the cylinder do not move.	• Air in the system.	• Repeat the filling and bleeding procedure of the system.
	• Oil leak.	• Look for the leak and contact specialized staff.
	• Helm mounted upside down.	• Mount the helm with the filling hole in up position.
Leaks from steering system fittings.	• Bad tightening or low torque of the fittings.	• Tighten the fittings with a maximum torque of 20Nm (15 in.lbs).
	• Lack of fitting sealant. **⚠ WARNING** Never use teflon tape or adhesive tape on any fitting.	• 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. **⚠ WARNING** After this operation it is necessary to carry out another bleeding.
Leaks from the tank plug.	• Never use teflon tape or adhesive tape on any fitting.	• Tighten the plug.
	• The vent plug (black) on the additional helm is in the lower position.	• Replace the vent plug (black) with the plug for the additional helm kit (silver).
	• Worn and damaged seal.	• Replace the plug.
	• Too high oil level.	• Follow the procedure to maintain the suitable oil level, which is described in the pump manual.

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.



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