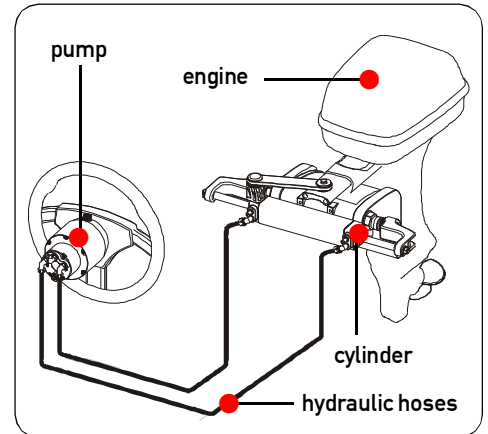


1 PRODUCT DESCRIPTION

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 $+77^{\circ}\text{C}$ ($+170^{\circ}\text{F}$). 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 located on the dashboard, 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 equipped with a nonreturn valve, which prevents outgoing fluid from returning along the same hose, allow the operation of the steering systems with two or more steering stations. The pumps series "NV" are not equipped with a nonreturn valve so they cannot be used with two or more steering systems. The cylinders are double-acting and they can be balanced or unbalanced. In unbalanced cylinders the two chambers have different volumes and therefore they require a different number of steering wheel turns and a different steering wheel rotation effort with the same movement in the two directions. The unbalanced cylinders cannot be used with the pumps series "NV". The balanced cylinders require the same number of turns of the steering wheel to move the helm from the centre to the end of stroke in the two opposed 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^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 [1.7 cu.in.] and the cylinder has a volume of 120 cm^3 [7.3 cu.in.], the formula looks like this: $120/28=4.2$. Accordingly, the steering wheel will turn about 4 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 not recommended, as the response of the boat to steer is slowly.

1.2 Warnings for the correct product use

⚠ DANGER

Do not modify the steering cylinder in any way to fit it to your 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 steering systems must not be installed on race boats.

⚠ WARNING

The pumps UP25NV F and UP33NV F cannot be used with unbalanced cylinders and with double steering system.



1.3 System configurations

The pumps UP25 - UP28 - UP33 - UP39 - UP45 can be installed in a single or double steering system and used with different types of configurations of front, side or inboard cylinders.

The pumps series "NV" cannot be installed in a double steering system and they cannot be used with unbalanced cylinders.

⚠ CAUTION

Always connect the hoses correctly as indicated in the installation and maintenance manuals of the corresponding hydraulic cylinders.

1.4 Pump description

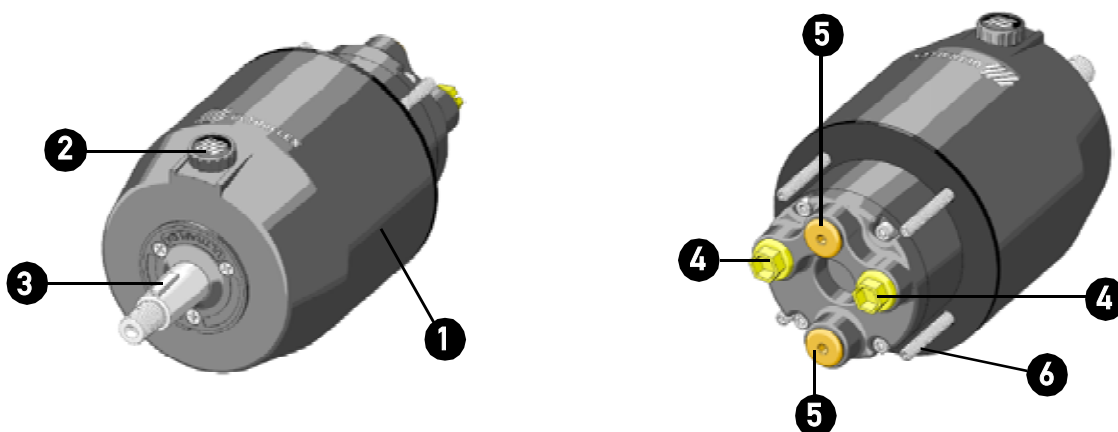
The pumps UP25 - UP28 - UP33 - UP39 - UP45 have been designed and manufactured to be used as a component in the hydraulic steering systems, as described in the previous paragraph.

The pumps UP25 F - UP28 F - UP33 F - UP39 F - UP45 F - UP25NV F - UP33NV F must be installed on the front part of the boat dashboard or semi-built-in through flanges X64 or X57 (supplied separately), the pumps UP28 R - UP33 R - UP39 R - UP39-I R - UP45 R - UP45-I R must be assembled on the rear part of the boat dashboard, and the pumps UP25 T - UP28 T - UP33 T - UP39 T - UP45 T must be assembled by means of tilt X52 (supplied separately).

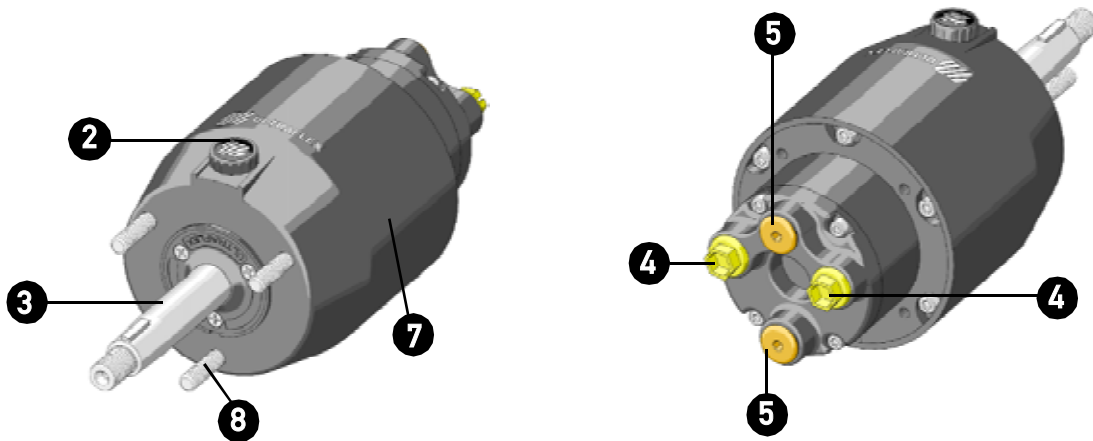
The following pictures show the main pump components:

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Pump UP25 F - UP28 F - UP33 F - UP39 F - UP45 F - UP25NV F - UP33NV F 2 Tank plug with bleed 3 Steering wheel connection shaft 4 Connections to the cylinder/s 5 Connections to the additional stations (that can be used with series "NV") | <ul style="list-style-type: none"> 6 M6 dowels for fixing the pump to the dashboard 7 Pump UP28 R - UP33 R - UP39 R - UP39-I R - UP45 R - UP45-I R 8 M8 dowels for fixing the pump to the dashboard 9 Pump UP25 T - UP28 T - UP33 T - UP39 T - UP45 T 10 Connection shaft to tilt X52 |
|---|--|

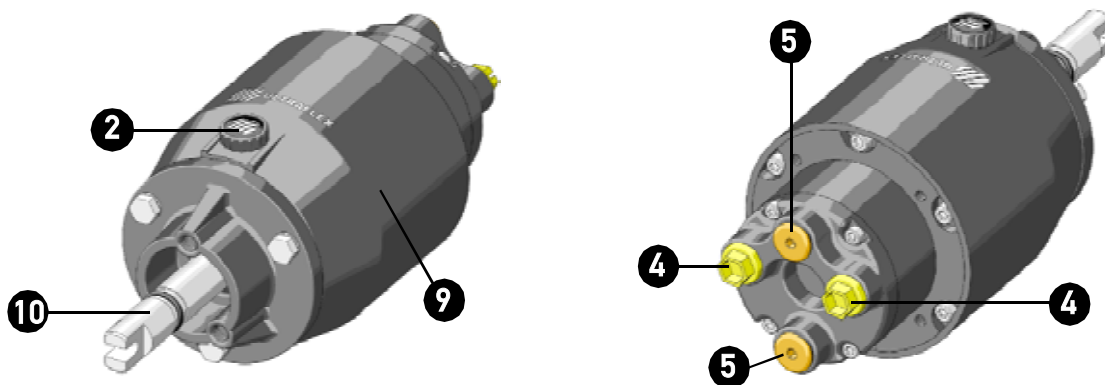
UP25 F - UP28 F - UP33 F - UP39 F - UP45 F - UP25NV F - UP33NV F



UP28 R - UP33 R - UP39 R - UP39-I R - UP45 R - UP45-I R



UP25 T - UP28 T - UP33 T - UP39 T - UP45 T



1.5 Pump technical features

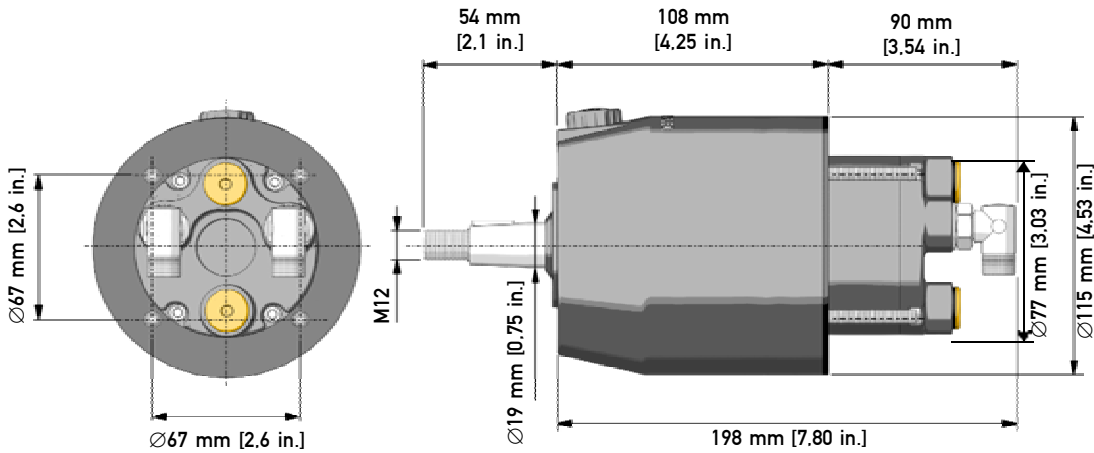
SPECIFICATIONS	PUMP UP25 F	PUMP UP25NV F	PUMP UP28 F	PUMP UP33 F	PUMP UP33NV F	PUMP UP39 F	PUMP UP45 F
Capacity	23,5 cc/rev. - 1,4 cu.in/rev.	23,5 cc/rev. - 1,4 cu.in/rev.	28 cc/rev. - 1,7 cu.in/rev.	33 cc/rev. - 2,0 cu.in/rev.	33 cc/rev. - 2,0 cu.in/rev.	39 cc/rev. - 2,4 cu.in/rev.	45 cc/rev. - 2,7 cu.in/rev.
Pressure relief valve release pressure	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)
No. of pistons	5	5	5	7	7	7	7
Max. steering wheel diameter	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)
Max. steering wheel height	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)
Weight	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)
Oil	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex

⚠ CAUTION

The release pressure of the pressure relief valves does not correspond to the system normal pressure but it represents only the use limits.



UP25 F - UP28 F - UP33 F - UP39 F - UP45 F - UP25NV F - UP33NV F

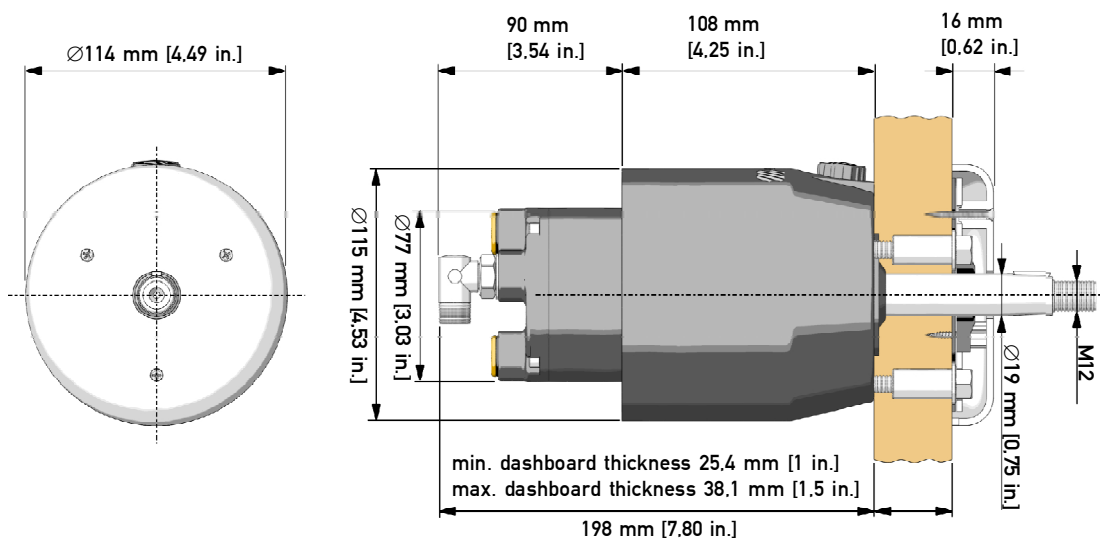


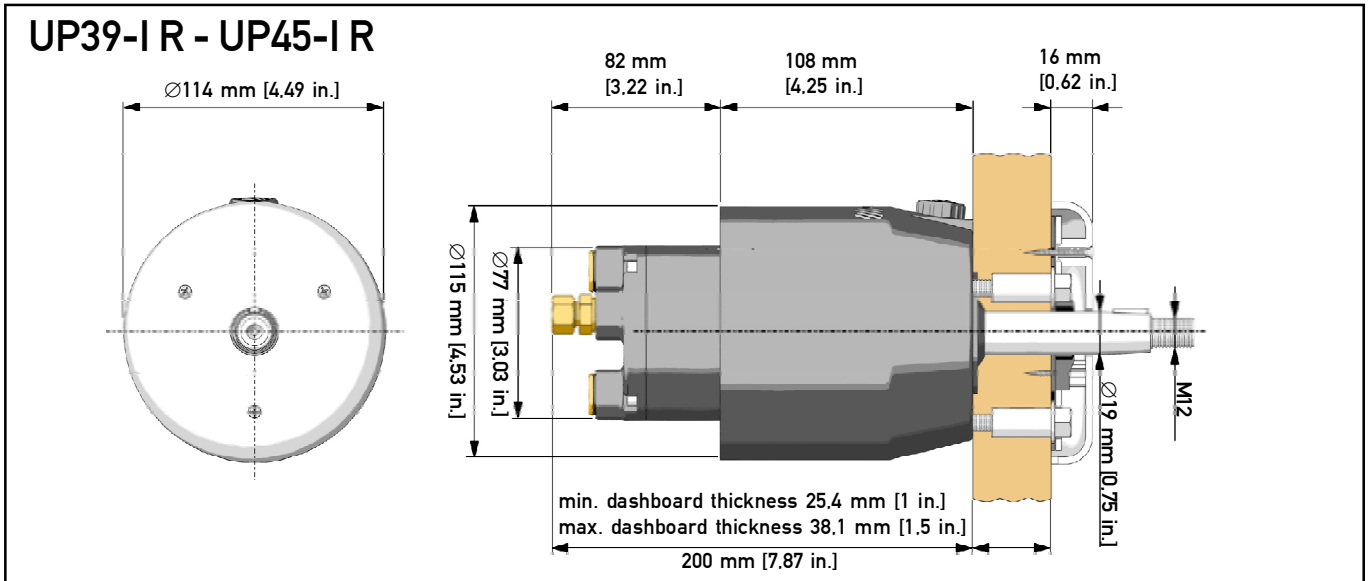
SPECIFICATIONS	PUMP UP28 R	PUMP UP33 R	PUMP UP39 R	PUMP UP45 R	PUMP UP45-I R
Capacity	28 cc/rev. - 1,7 cu.in/rev.	33 cc/rev. - 2,0 cu.in/rev.	39 cc/rev. - 2,4 cu.in/rev.	45 cc/rev. - 2,7 cu.in/rev.	45 cc/rev. - 2,7 cu.in/rev.
Pressure relief valve release pressure	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)
No. of pistons	5	7	7	7	7
Max. steering wheel diameter	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)	711 mm (28 in.)
Max. steering wheel height	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)
Weight	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)
Oil	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex

⚠ CAUTION

The release pressure of the pressure relief valves does not correspond to the system normal pressure but it represents only the use limits.

UP28 R - UP33 R - UP39 R - UP45 R

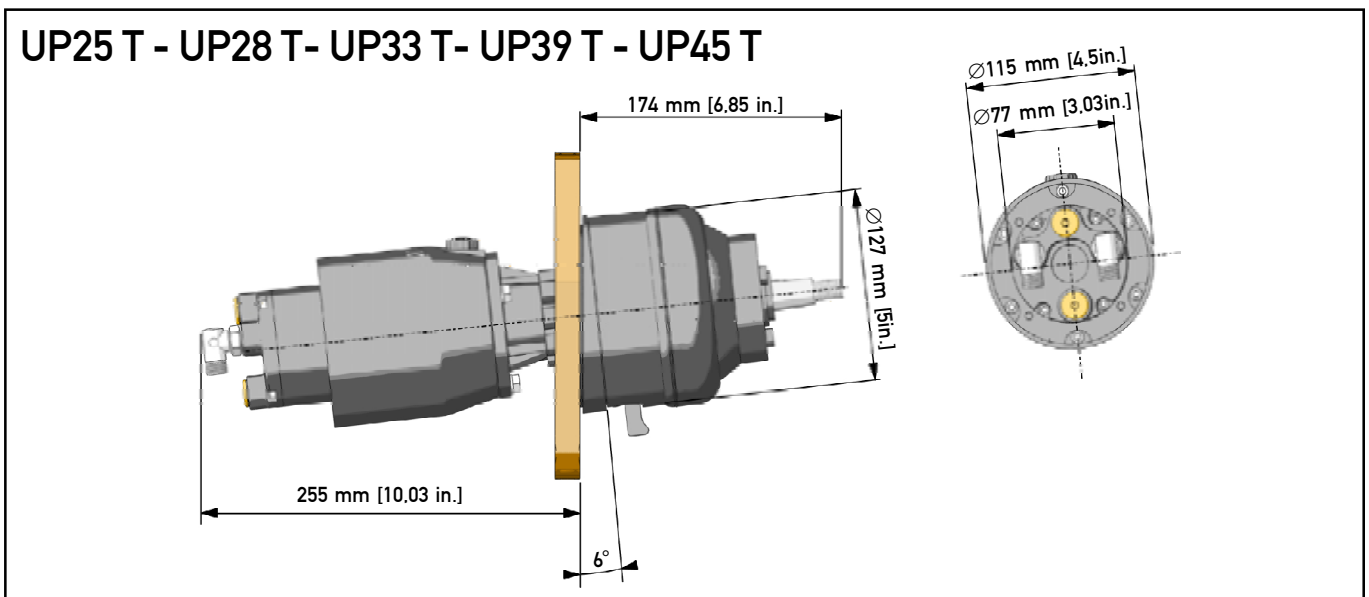




SPECIFICATIONS	PUMP UP25 T	PUMP UP28 T	PUMP UP33 T	PUMP UP39 T	PUMP UP45 T
Capacity	25 cc/rev. - 1,5 cu.in/rev.	28 cc/rev. - 1,7 cu.in/rev.	33 cc/rev. - 2,0 cu.in/rev.	39 cc/rev. - 2,4 cu.in/rev.	45 cc/rev. - 2,7 cu.in/rev.
Pressure relief valve release pressure	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)	70 bar (1000 psi)
No. of pistons	5	5	7	7	7
Max. steering wheel diameter	406 mm (16 in.)	406 mm (16 in.)	406 mm (16 in.)	406 mm (16 in.)	406 mm (16 in.)
Max. steering wheel height	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)	152 mm (6 in.)
Weight	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)	5 kg (11 lbs)
Oil	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex	OL150 Ultraflex

⚠ CAUTION

The release pressure of the pressure relief valves does not correspond to the system normal pressure but it represents only the use limits.



⚠ CAUTION

The pumps UP25 T - UP28 T - UP33 T - UP39 T - UP45 T can only be used with tilt **ULTRAFLEX X52** (supplied separately).



2 TRANSPORT

2.1 General warnings

The pumps UP25-UP28-UP33-UP39-UP45 weight with their packaging is 5kg (11 pounds) and so they can be handled manually.

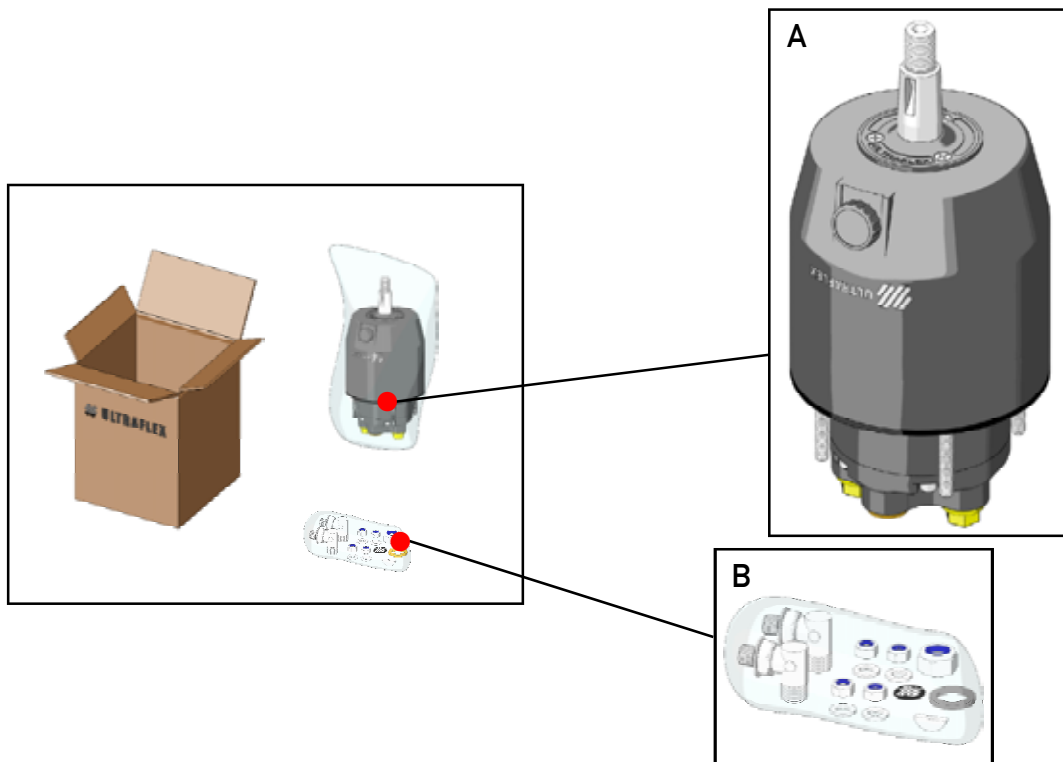
⚠ WARNING

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.

UP25 F - UP28 F - UP33 F - UP39 F - UP45 F - UP25NV F - UP33NV F



THE STANDARD PACKAGING CONTAINS:

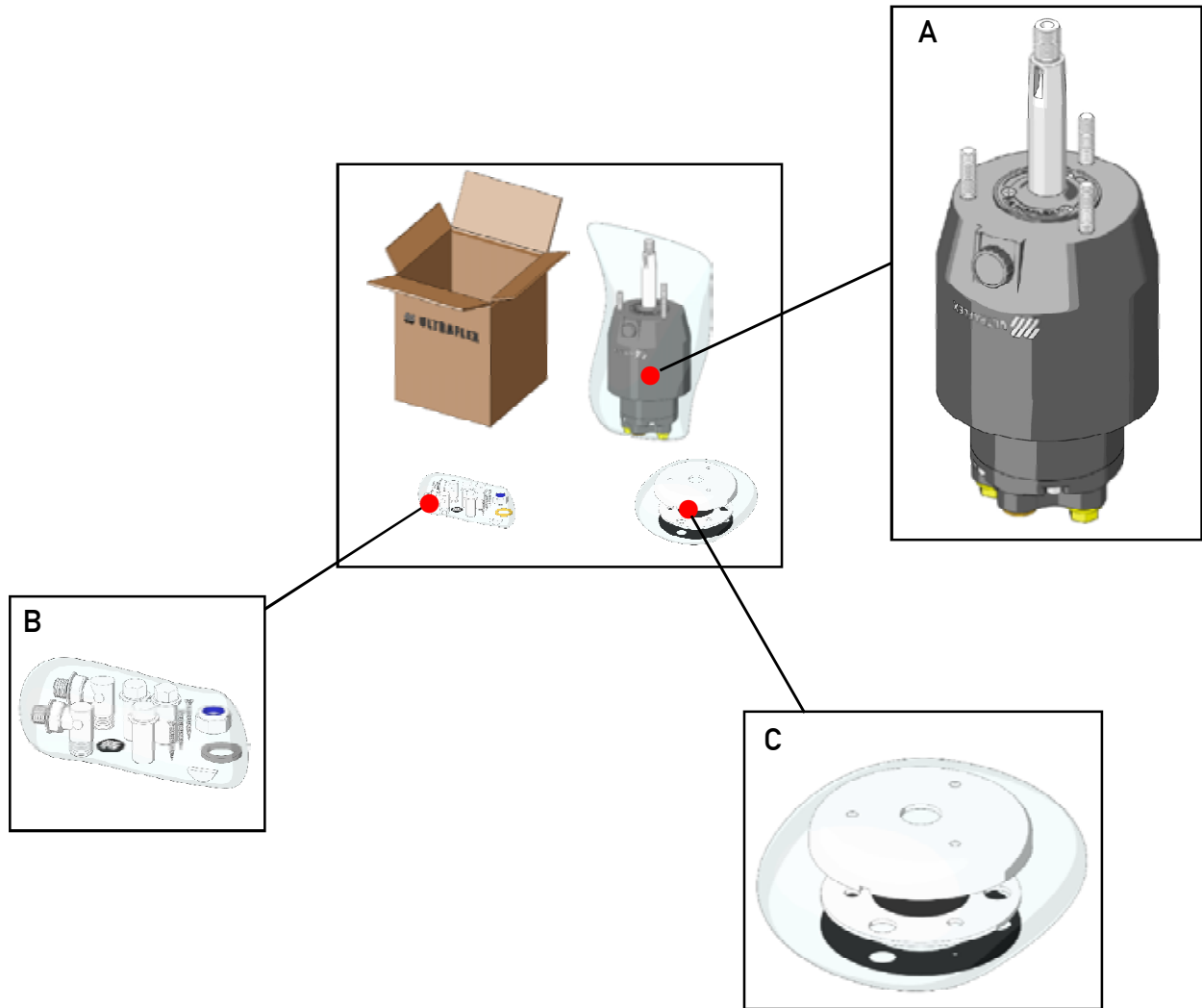
A) No.1 pump UP25 F or UP28 F or UP33 F or UP39 F or UP45 F or UP25NV F or UP33NV F with gaskets to fix it to the instrument panel.

B) No. 2 90° swinging unions to connect the Kit OB hoses (supplied separately);

- No. 4 nuts for fixing the pump to the dashboard;
- No. 4 washers for fixing the pump to the dashboard;
- No. 1 nut for steering wheel tightening;
- No. 1 washer for steering wheel tightening;
- No. 1 key for steering wheel tightening;
- No. 1 label for plug.



UP28 R - UP33 R - UP39 R - UP39-I R- UP45 R - UP45-I R



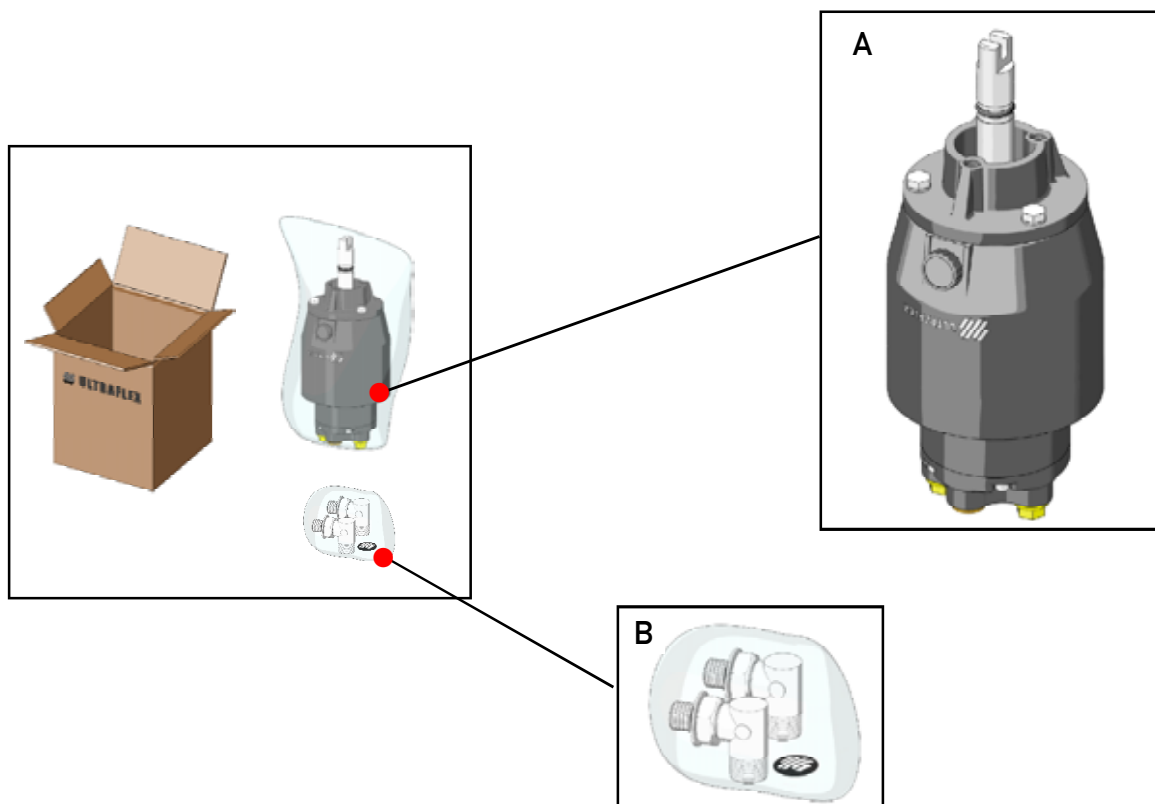
THE STANDARD PACKAGING CONTAINS:

- A) No. 1 pump UP28 R or UP33 R or UP39 R or UP39-I R or UP45 R or UP45-I R.
- B) No. 2 2 90° swinging unions (except pumps UP39-I R and UP45-I R) to connect the Kit OB hoses (supplied separately):
 - No. 3 special screws for fixing the pump to the dashboard;
 - No. 3 self-tapping screw for hub-cap fixing;
 - No. 1 nut for steering wheel tightening;
 - No. 1 washer for steering wheel tightening;
 - No. 1 key for steering wheel tightening;
 - No. 1 label for plug;
- C) No. 1 gasket;
 No. 1 flange;
 No. 1 hub-cap.

NOTICE

Versions UP39-I R and UP45-I R are supplied with a special 1/4 NPT straight union for Ø 12 mm metal pipe.



UP25 T - UP28 T - UP33 T - UP39 T - UP45 T

THE STANDARD PACKAGING CONTAINS:

A) n°1 pump UP25 T or UP28 T or UP33 T or UP39 T or UP45 T.

B) n°2 90° swinging unions to connect the Kit OB hoses (supplied separately):
n°1 label for plug.

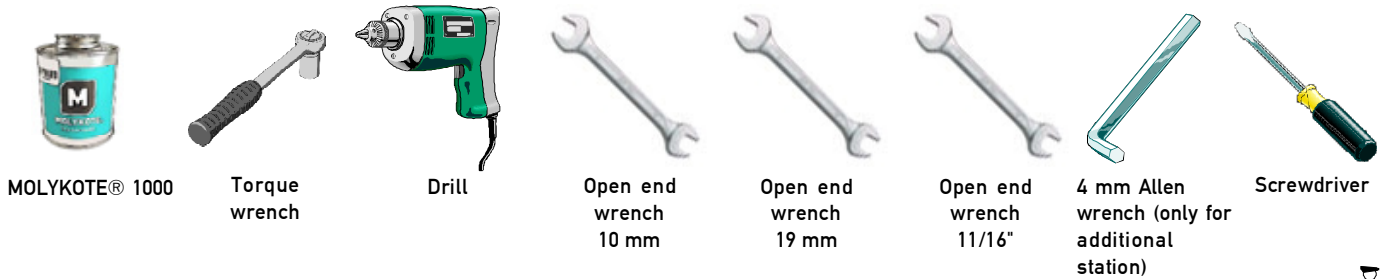
⚠ CAUTION

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



3 INSTALLATION

3.1 Tools necessary for the installation of pumps UP25 F - UP28 F - UP33 F - UP39 F - UP45 F - UP25NV F - UP33NV F

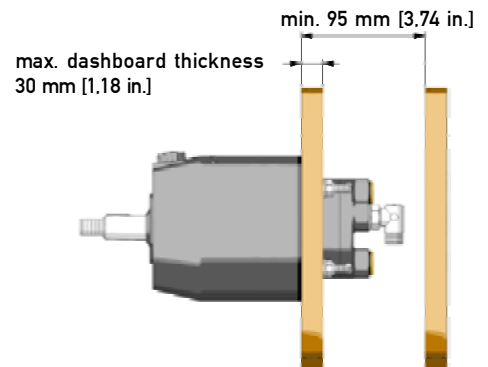


3.2 Pump UP25 F - UP28 F - UP33 F - UP39 F - UP45 F - UP25NV F - UP33NV F installation

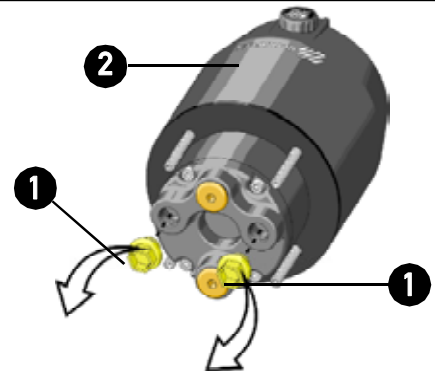
1 Select a suitable place for the steering station. Make sure that there is enough manoeuvring space for the steering wheel and for the steering pump and its pipes and fittings.

⚠ WARNING

In order to fix the pump properly, the maximum dashboard thickness must be 30 mm [1.18 in.]. Different thicknesses could compromise the driving safety. Make sure that the breaking ring of the 4 self-locking nuts supplied is engaged by the dowel thread.



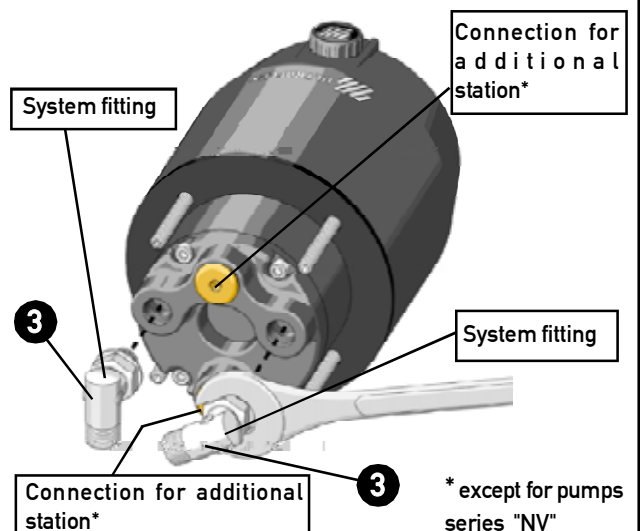
2 Remove the plugs (1) from the pump (2) by using a screwdriver.



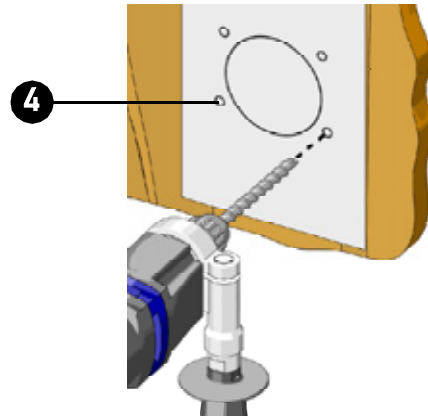
3 Screw the nuts completely on the corresponding 90° unions (3). Fit and screw the unions manually as indicated in the picture until they are inserted completely. Turn them until they are positioned correctly with respect to the pipes by unscrewing them no more than one revolution, then tighten the nuts with a 11/16" Allen wrench with a torque of 17.6 Nm (13 lb ft) until the washer touches the nut.

⚠ WARNING

DO NOT USE teflon tape or adhesive tape.
DO NOT PUT any thread sealant like Loctite 542 or similar products.



4 By using the proper template supplied with this manual, make the holes (4) required by the installation in the suitable position on the dashboard.



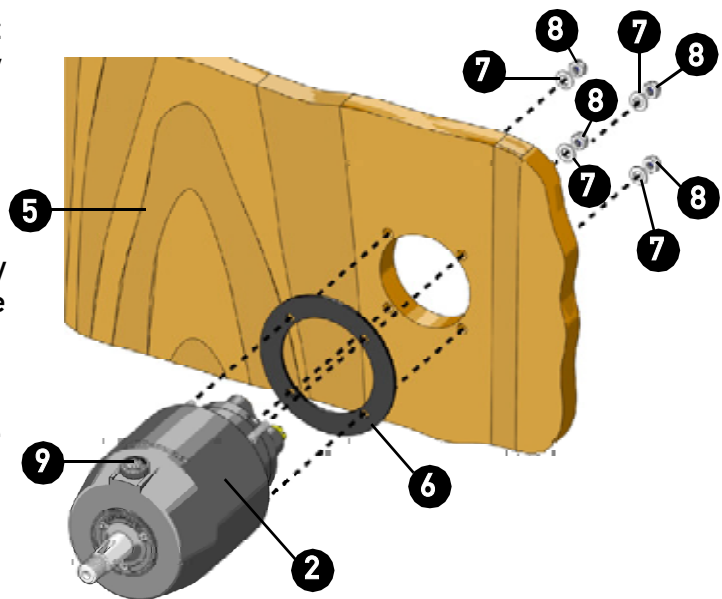
5 Position the pump (2) on the dashboard front side (5) interposing the gasket (6) and fix it by inserting the 4 washers (7) and by tightening the 4 self-locking nuts (8) with a 10 mm wrench and a torque of 10 Nm (7.4 lb ft).

⚠ CAUTION

If the self-locking nuts are disassembled (8), they must be replaced. (Contact our assistance service, see page 6).

⚠ WARNING

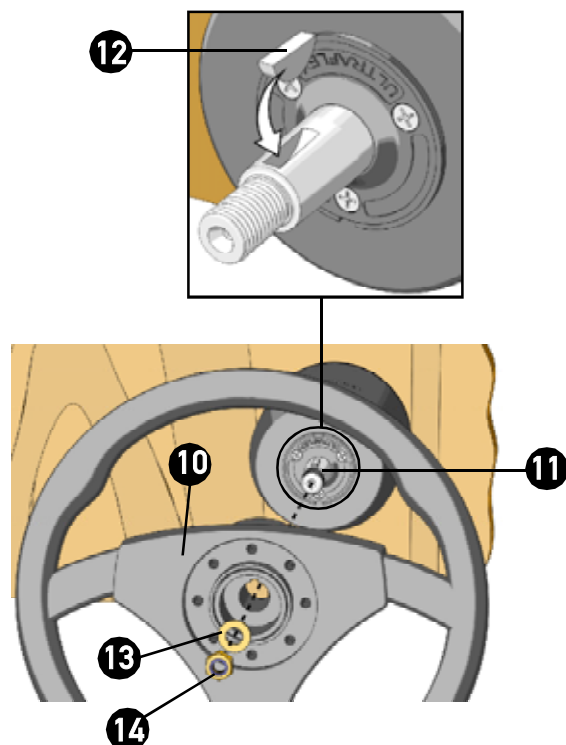
Install the pump by positioning the filling hole (9) towards the top (see the picture) for the right pump operation and to allow filling and purging the system completely (see par. 3.11).



6 Position the steering wheel supplied separately (10) on the pump shaft (11) by using the suitable key (12). Insert the washer (13) and tighten the self-locking nut (14) with a 19 mm open end wrench and with a torque of 40 Nm (29.5 lb ft); then grease the thread by using some anti-seize grease MOLYKOTE® 1000 or a similar one.

⚠ CAUTION

If the self-locking nut (14) is disassembled, it must be replaced. (Contact our assistance service, see page 6).



3.3 Tools necessary for the installation of pumps UP28 R - UP33 R - UP39 R - UP45 R



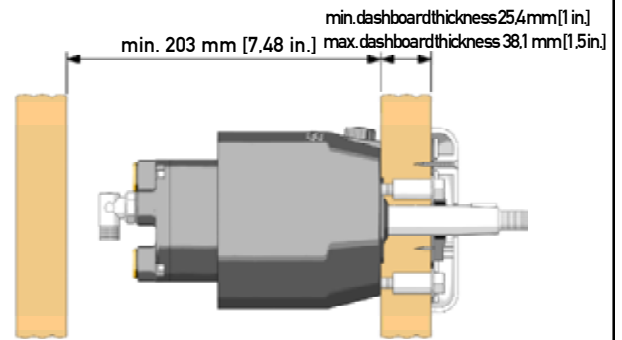
3.4 Pump UP28 R - UP33 R - UP39 R - UP45 R installation



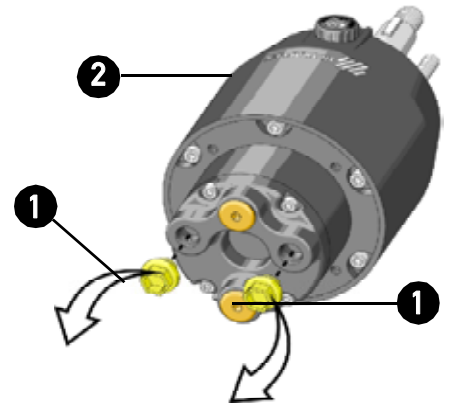
1 Select a suitable place for the steering station. Make sure that there is enough manoeuvring space for the steering wheel and for the steering pump and its pipes and fittings.

⚠ WARNING

In order to fix the pump properly, the minimum dashboard thickness must be 25.4 mm [1 in.] and the maximum dashboard thickness must be 38.1 mm [1.5 in.]. Different thicknesses could compromise the driving safety.



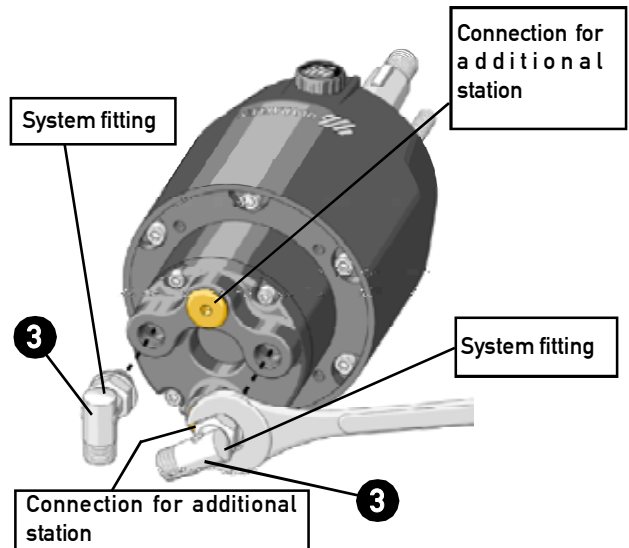
2 Remove the plugs (1) from the pump (2) by using a screwdriver.



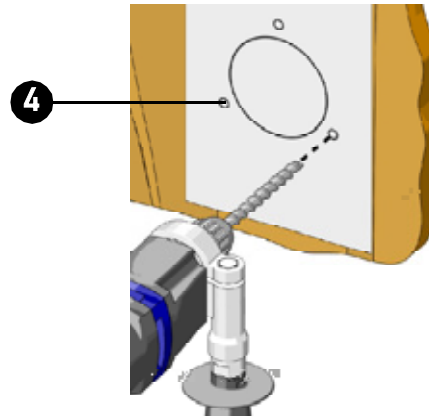
3 Screw the nuts completely on the corresponding 90° unions (3). Fit and screw the unions manually as indicated in the picture until they are inserted completely. Turn them until they are positioned correctly with respect to the pipes by unscrewing them no more than one revolution, then tighten the nuts with a 11/16" Allen wrench with a torque of 17,6 Nm (13 lb ft) until the washer touches the nut.

⚠ WARNING

DO NOT USE teflon tape or adhesive tape.
DO NOT PUT any thread sealant like Loctite 542 or similar products.



4 By using the proper template supplied with this manual, make the holes required by the installation in the suitable position on the dashboard.



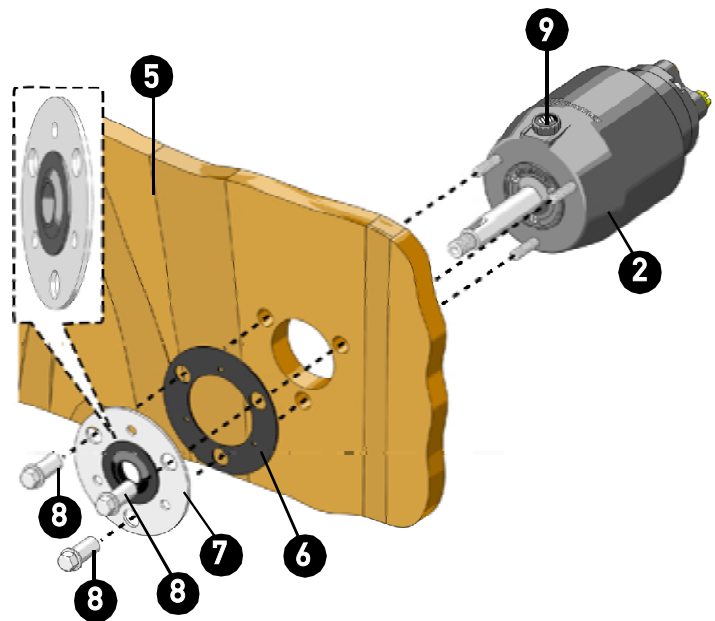
5 Position the pump (2) on the dashboard rear side (5). Then position the gasket (6) as shown in the picture and the flange (7) with the protective projecting part towards the dashboard outside. Fix the pump (2) with the 3 special screws (8) with a torque of 25 Nm (18.5 lb ft).

⚠ CAUTION

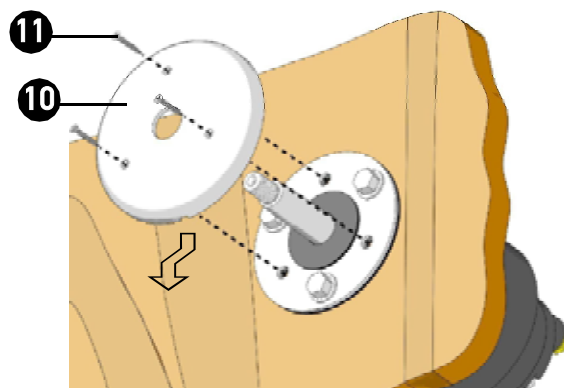
Make the shaft pass through the flange equipped with gasket by preventing the key seat from damaging the gasket itself.

⚠ WARNING

Install the pump by positioning the filling hole (9) towards the top (see the picture) for the right pump operation and to allow filling and purging the system completely (see par. 3.11).



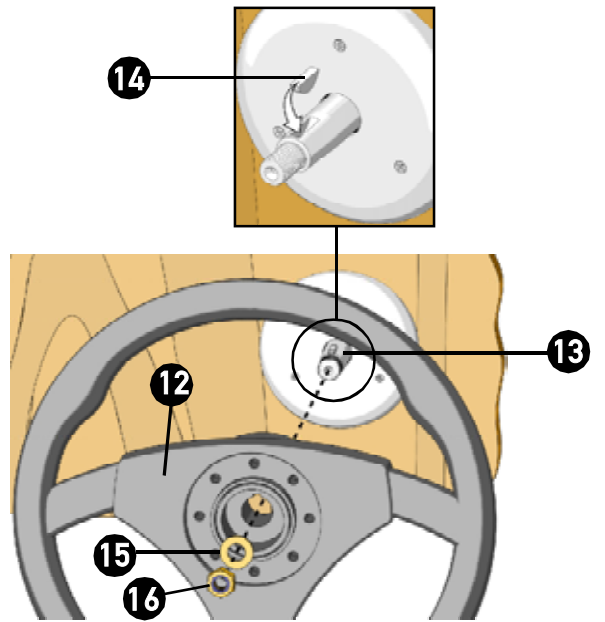
6 Position the plastic hub-cap (10) with the water discharge towards the bottom and fix it with the 3 self-tapping screws (11) supplied with a 1.5Nm (1.13 lb ft) torque.



7 Position the steering wheel supplied separately (12) on the pump shaft (13) by using the suitable key (14). Insert the washer (15) and tighten the self-locking nut (16) with a 19 mm open end wrench and with a torque of 40 Nm (29.5 lb ft); then grease the thread by using some anti-seize grease MOLYKOTE® 1000 or a similar one.

⚠ CAUTION

If the self-locking nut (16) is disassembled, it must be replaced. (Contact our assistance service, see page 6).



3.5 Tools necessary for the installation of pumps UP39-I R - UP45-I R



Loctite 542/545



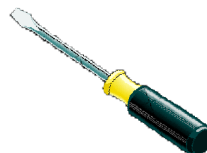
MOLYKOTE® 1000



Torque wrench



Drill



Screwdriver



Open end wrench 13 mm



Open end wrench 19 mm



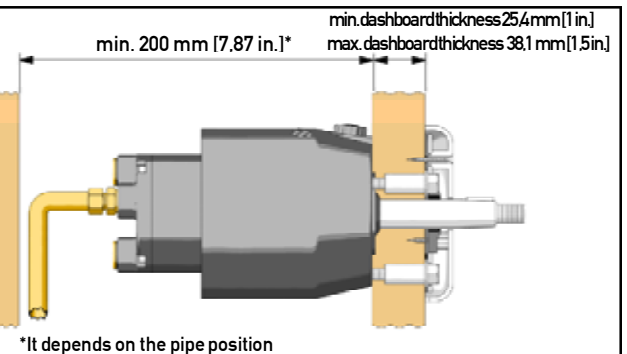
Open end wrench 7/16"

3.6 Pumps UP39-I R - UP45-I R installation

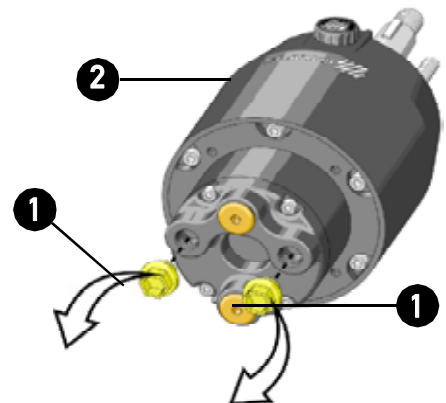
1 Select a suitable place for the steering station. Make sure that there is enough manoeuvring space for the steering wheel and for the steering pump and its pipes and fittings.

⚠ WARNING

In order to fix the pump properly, the minimum dashboard thickness must be 25.4 mm [1 in.] and the maximum dashboard thickness must be 38.1 mm [1.5 in.]. Different thicknesses could compromise the driving safety.



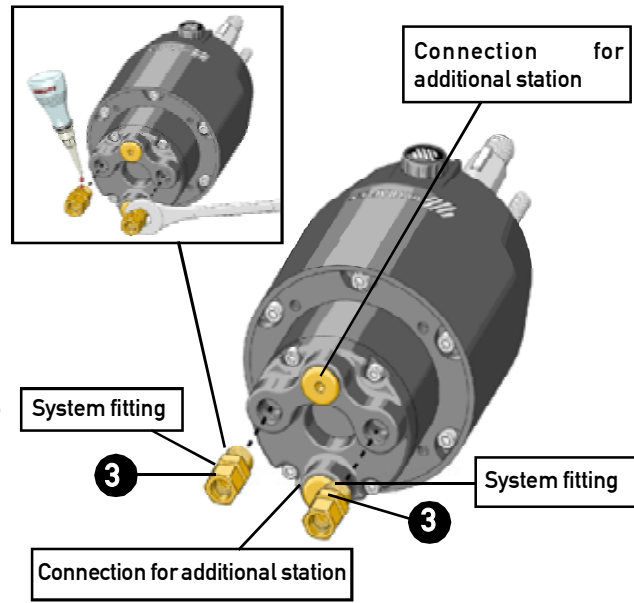
2 Remove the plugs (1) from the pump (2) by using a screwdriver.



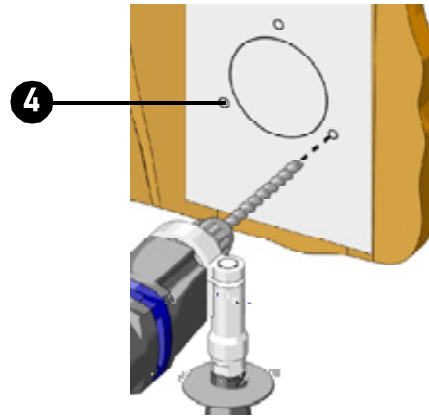
3 Put some fitting sealant type Loctite 542 or Loctite 545 on the thread. Fit and screw manually the conical fittings (3) until they are completely inserted; then tighten them with a 7/16" open end wrench with a torque of 17.6 Nm (156 lb ft).

⚠ WARNING

Do not use teflon tape or adhesive tape. Pay attention to the sealant positioning: if it is inserted into the system, it could block it and make it unusable.



4 By using the proper template supplied with this manual, make the holes required by the installation in the suitable position on the dashboard.



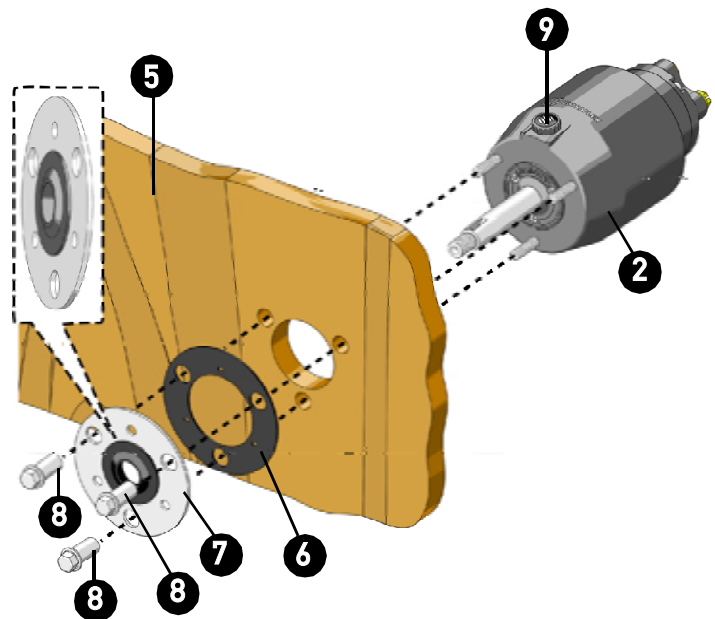
5 Position the pump (2) on the dashboard rear side (5). Then position the gasket (6) as shown in the picture and the flange (7) with the protective projecting part towards the dashboard outside. Fix the pump (2) with the 3 special screws (8) with a torque of 25 Nm (18.5 lb ft).

⚠ CAUTION

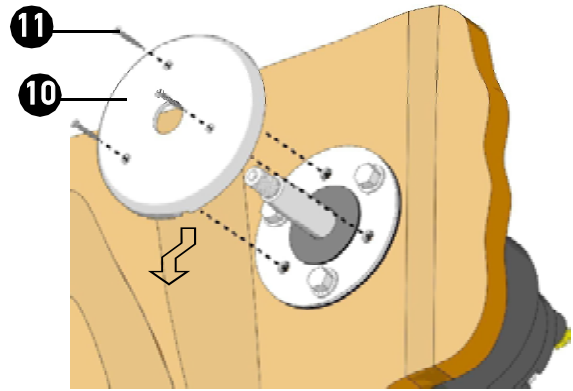
Make the shaft pass through the flange equipped with gasket by preventing the key seat from damaging the gasket itself.

⚠ WARNING

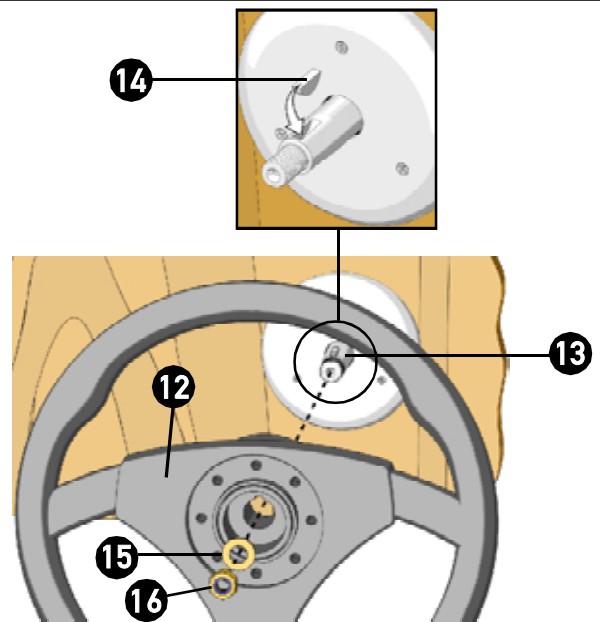
Install the pump by positioning the filling hole (9) towards the top (see the picture) for the right pump operation and to allow filling and purging the system completely (see par. 3.11).



6 Position the plastic hub-cap (10) with the water discharge towards the bottom and fix it with the 3 self-tapping screws (11) supplied.



7 Position the steering wheel supplied separately (12) on the pump shaft (13) by using the suitable key (14). Insert the washer (15) and tighten the self-locking nut (16) with a 19 mm open end wrench and with a torque of 40 Nm (29.5 lb ft); then grease the thread by using some anti-seize grease MOLYKOTE® 1000 or a similar one.



⚠ CAUTION

If the self-locking nut (16) is disassembled, it must be replaced. (Contact our assistance service, see page 6).

3.7 Tools necessary for the installation of pumps UP25 T - UP28 T - UP33 T - UP39 T - UP45 T



Open end wrench
11/16"



Screwdriver

* The tools to assemble tilt X52 are listed in the manual enclosed to tilt X52.

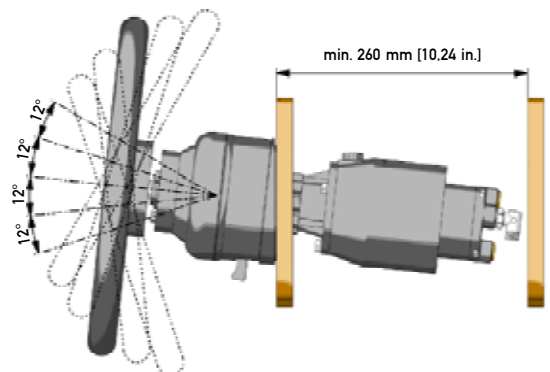
3.8 Pump UP25 T - UP28 T - UP33 T - UP39 T - UP45 T installation



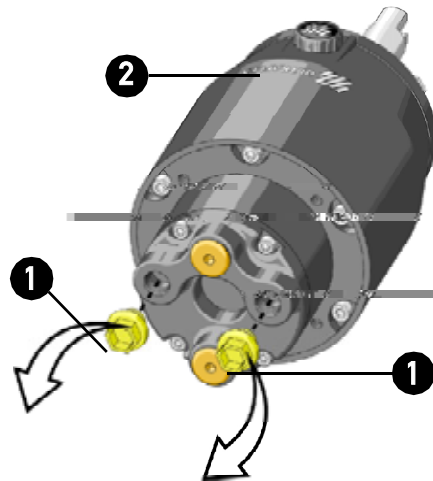
⚠ CAUTION

The tilt X52 mechanism is supplied separately.

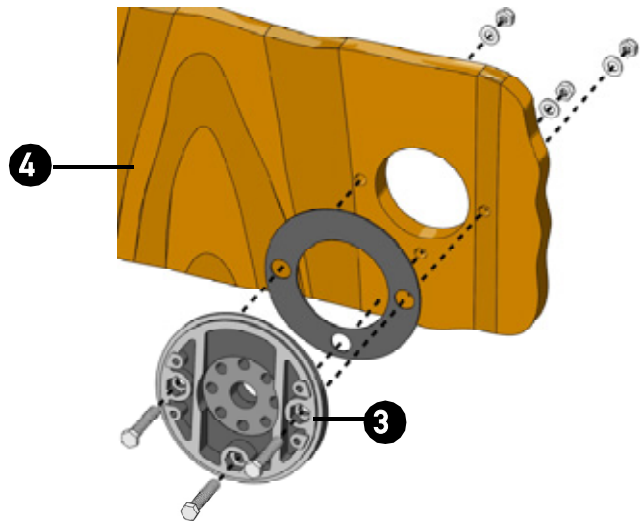
1 Select a suitable place for the steering station. Make sure that there is enough manoeuvring space for the steering wheel and for the steering pump and its pipes and fittings.



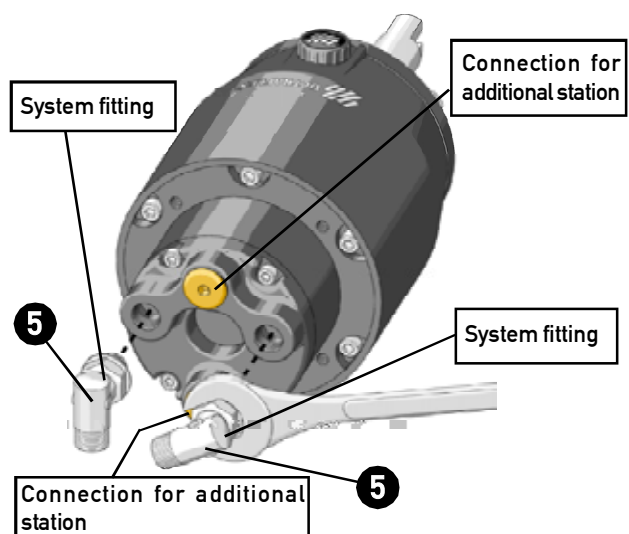
2 Remove the plugs (1) from the pump (2) by using a screwdriver.



3 Fix the bracket (3) supplied with tilt X52 to the dashboard (4) by following the instructions enclosed to tilt X52.



4 Screw the nuts completely on the corresponding 90° unions (3). Fit and screw the unions manually as indicated in the picture until they are inserted completely. Turn them until they are positioned correctly with respect to the pipes by unscrewing them no more than one revolution, then tighten the nuts with a 11/16" Allen wrench with a torque of 17.6 Nm (13 lb ft) until the washer touches the nut.



⚠ WARNING

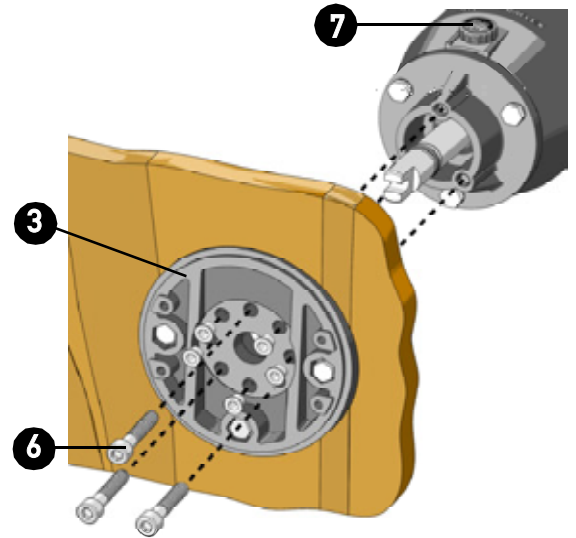
DO NOT USE teflon tape or adhesive tape.
DO NOT PUT any thread sealant like Loctite 542 or similar products.



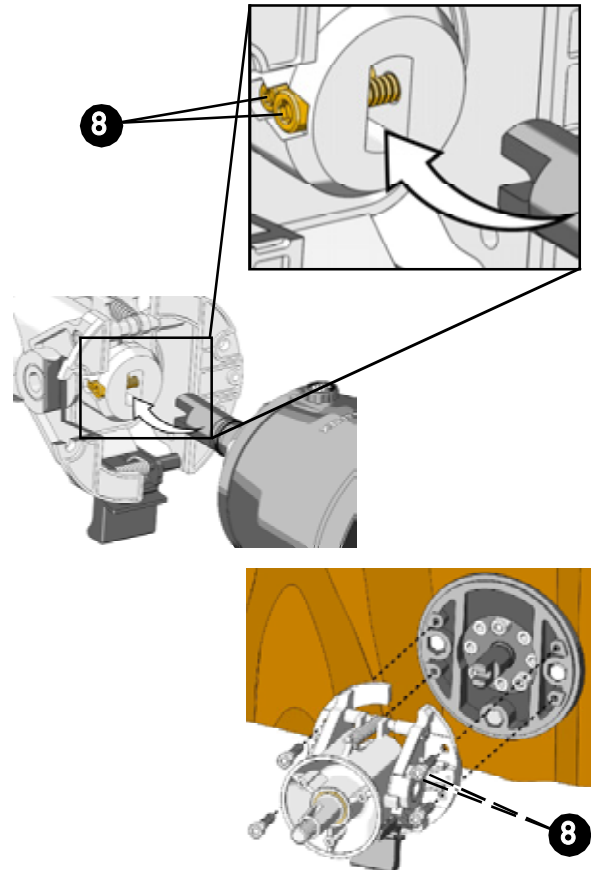
5 Fix the pump to the bracket (3) supplied with tilt X52 by using the 3 M8 screws (6) supplied with tilt X52 according to the instructions enclosed to tilt X52.

⚠ WARNING

Install the pump by positioning the filling hole (7) towards the top (see the picture) for the right pump operation and to allow filling and purging the system completely (see par. 3.11).



6 Align and insert the tilt universal joint into the pump shaft by loosening about 1-1.5 turns the screws (8) on the universal joint itself always according to the procedure described in the installation manual supplied with tilt X52. Retighten the screws (8) and fix the tilt.



NOTICE

The kit **ULTRAFLEX** supplied separately (see the corresponding instructions) can be used on pumps UP28 R-UP33 R-UP39 R - UP39-I R - UP45 R - UP45-I R and UP25 T-UP28 T-UP33 T-UP39 T - UP45 T to simplify the hydraulic system filling and purging.



3.9 Types of installation

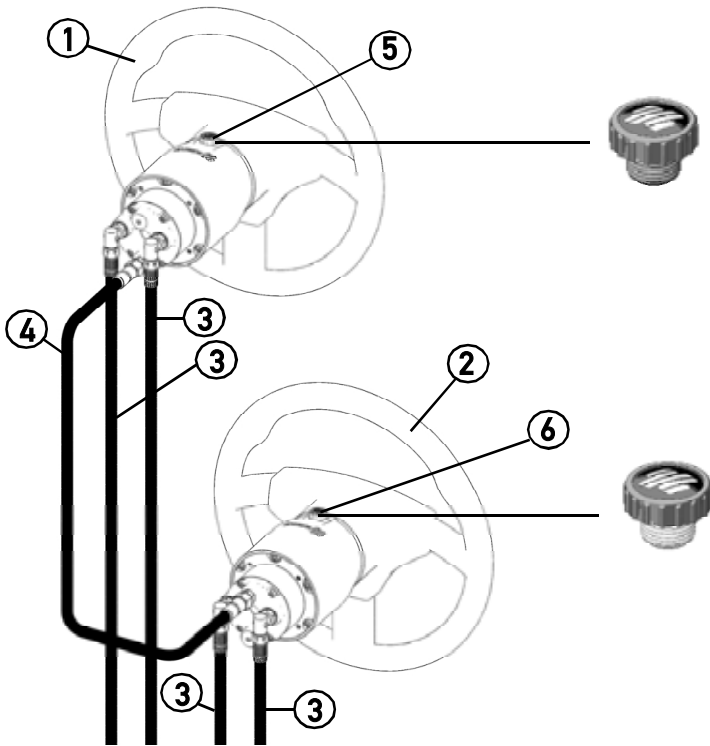


The pumps UP25-UP28-UP33-UP39-UP45 can be installed in a single or dual station (except the pumps series "NV") and they can be used with different types of front mount, side or inboard cylinder configurations. The pumps series "NV" cannot be used with unbalanced cylinders.

⚠ CAUTION

Connect hoses as shown in the installation and maintenance manual of the corresponding hydraulic cylinders.

MODELS UP 25 F-R-T, UP 28 F-R-T, UP 33 F-R-T, UP 39 F-R-T, UP 45 F-R-T

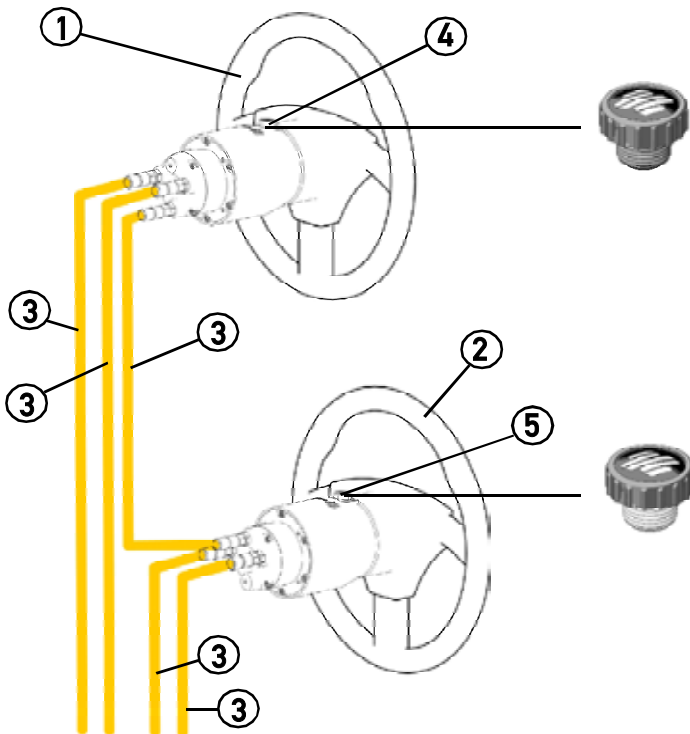


1. main steering station
2. additional steering station (not usable with pumps series "NV")
3. kit OB
4. 3/8" pipe included kit OB-2S
5. vent plug (black plug)
6. plug without vent (grey plug)

NOTICE

Kit OB-2S is supplied separately in case of applications with double station.

MODELS UP39-I R and UP 45-I R



1. main steering station
2. additional steering station (not usable with pumps series "NV")
3. rigid metal pipe
4. vent plug (black plug)
5. plug without vent (grey plug)

NOTICE

Kit OB 120 U-2S is supplied separately in case of applications with double station.



3.10 Hose connection to the system

3.10.1 Hose connection to the system for models UP 25 F-R-T, UP 28 F-R-T, UP 33 F-R-T, UP 39 F-R-T, UP 45 F-R-T



ENGLISH

- 1 Connect the hydraulic hoses **ULTRAFLEX** kit OB (supplied separately) joining the pump and the cylinder by following the instructions given in the installation manual of the kit OB.
- 2 If one or more additional steering stations are installed (except the pumps series "NV"), use the kit OB-2S by following the suitable instructions.

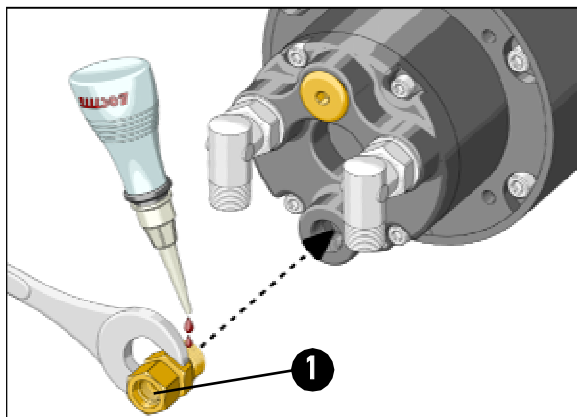
Position 3/8" straight unions (1) on the pumps as indicated in the picture.

Put some fitting sealant type Loctite 542 or Loctite 545 on the thread. Fit and screw manually the fittings (1) until they are completely inserted; then tighten them with a 7/16" open end wrench with a torque of 17.6 Nm (156 lb ft).

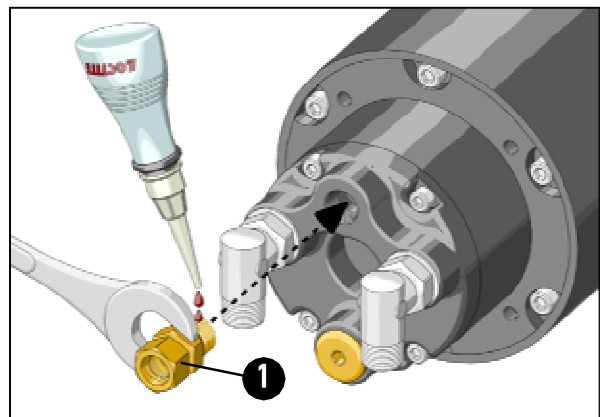
⚠ WARNING

Do not use teflon tape or adhesive tape. Pay attention to the sealant positioning: if it is inserted into the system, it could block it and make it unusable.

MAIN STEERING STATION

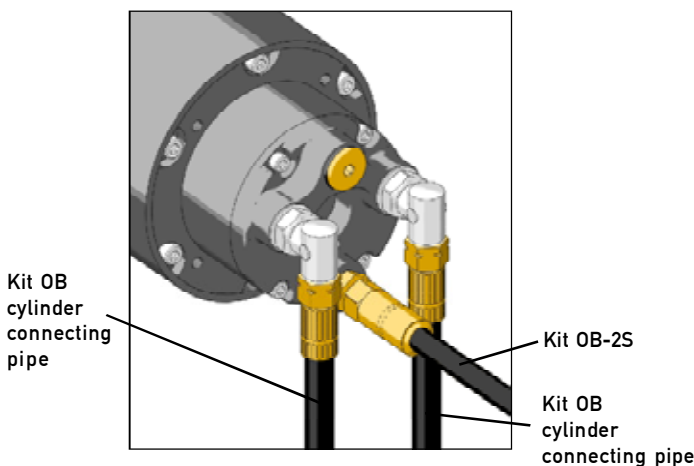


ADDITIONAL STEERING STATION

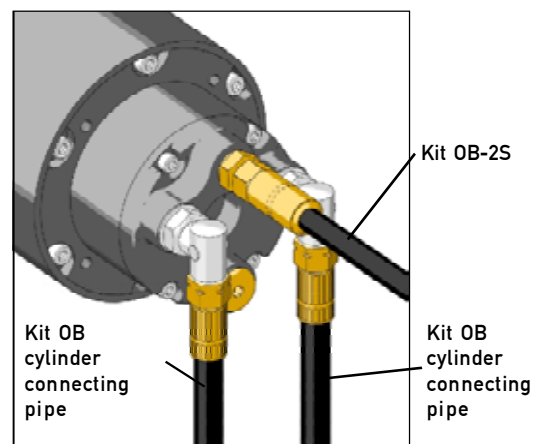


- 3 Connect pipes as shown in picture following the manual instructions.

MAIN STEERING STATION



MAIN STEERING STATION



⚠ WARNING

Keep the pipes far from heat sources and from chemical substances. Protect the pipes that must pass through bulkheads by using suitable thru hulls. The bends must be perfectly smooth: any bent pipe or dent would prevent the hydraulic oil passage.

⚠ WARNING

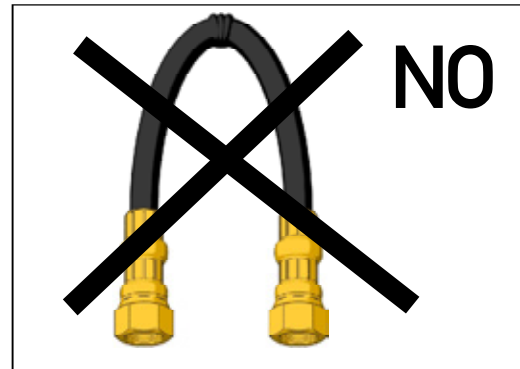
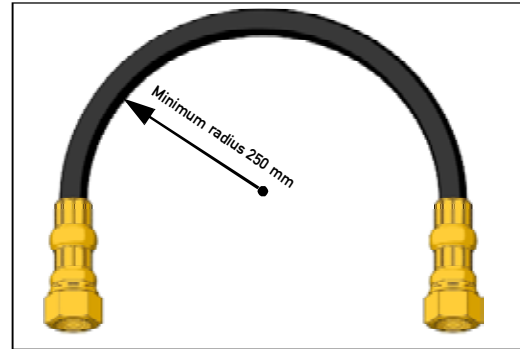
Keep clean. Make sure that working areas are free from dust and dirt. The protective plugs of threaded holes must be removed only before the connection of fittings and pipes. Make sure that pipes are perfectly clean and free from swarf. If copper or steel pipes are used, cleaning is mandatory. If the installer uses pipes that are different from Kit OB, he must take full responsibility for it.

⚠ WARNING

At the end of the installation make sure that the pipes do not interfere with the engine and with fixed or mobile parts of the boat or of the steering system itself.

⚠ WARNING

The minimum bending radius of the pipes is 250 mm. Any excessive pipe bending could break them by compromising the good operation of the system. If necessary, replace the damaged pipe.



3.10.2 How to choose the rigid pipes for models UP39-I R and UP 45-I R



PIPE MATERIAL: STEEL	SPECIFICATIONS	STRUCTURE	CONDITIONS	TOLERANCE BETWEEN EXT. DIAM./WALL THICKNESS	SURFACE
St. 37.4 (=St 35.4, 1.0255)	DIN 2391/ DIN 1630	Cold-drawn without welding	NBK, DIN 2391-2	DIN 2391-1-C	Phosphated, lubricated or A3C (coated with zinc and yellow chromium-plated)
E 235 (= 1.0308)	EN 10305-4		+N (=normal annealed)	EN 10305-4	
R37	ISO 3304		NBK (=normal annealed)	ISO 3304	
St 52.4 (= 1.0580)	DIN 2391		NBK, DIN 2391-2	DIN 2391-1	
E355 (= 1.0580)	EN 10305-4		+N (=normal annealed)	EN 10305-4	
R50	ISO 3304		NBK (=normal annealed)	ISO 3304	

PIPE MATERIAL: STAINLESS STEEL	SPECIFICATIONS	STRUCTURE	CONDITIONS	TOLERANCE BETWEEN EXT. DIAM./WALL THICKNESS	SURFACE
1.4571 (= TP 316 Ti)	DIN 2391	Cold-drawn without welding	Soft annealed DIN 17458	DIN 2391-1	Smooth
1.4541 (= TP 321)			Soft annealed	D4/T3 (EN ISO 1127)	
1.4404 (= TP 316L)	EN ISO 1127 o Astm A269				
1.4301 (= TP 304)		EN ISO 1127	Weld-in pipe	DIN 17457-K2 for 6-12 mm ext. diam., cold-drawn welded (CDW) with smooth external surface for 14-42 mm ext. diam.	Smooth, almost invisible welding
1.4401 (= TP 316)					
1.4301 (= TP 304)					
1.4541 (= TP 321)					

PIPE MATERIAL: COPPER	SPECIFICATIONS	STRUCTURE	CONDITIONS	TOLERANCE BETWEEN EXT. DIAM./WALL THICKNESS	SURFACE
R 290	EN 1057	Weldless pipe	EN 1057	EN 1057	Clean and smooth



NOTICE

This table is only indicative.

ULTRAFLEX cannot be held responsible for the pipe choice, since the installer must do this according to the operating pressure.

⚠ WARNING

ULTRAFLEX UP Series pumps are provided with a valve protecting them against overpressure when the pressure is higher than about 70 bar (1000 PSI).

The references to the standards are updated at the date of issue of this document. The installer must make sure that there are no other updates.

3.10.3 Hose connection to the system for models UP39-I R and UP45-I R



- 1 Connect the rigid pipes (12 mm external diameter) to connect the pump to the cylinder.
- 2 If one or more additional steering stations are installed (except the pumps series "NV"), use the kit OB 120 U-2S by following the suitable instructions.

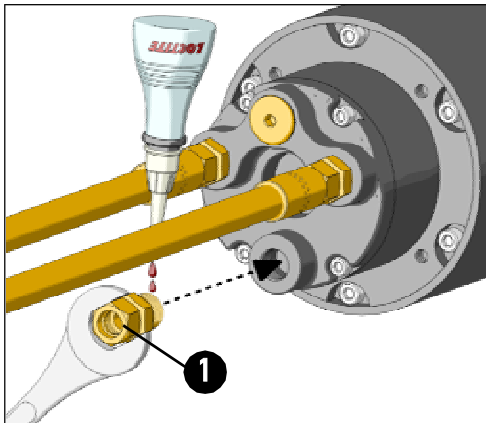
Position 3/8" straight unions (1) as indicated in the picture.

Put some fitting sealant type Loctite 542 or Loctite 545 on the thread. Fit and screw manually the fittings (3) until they are completely inserted; then tighten them with a 7/16" open end wrench with a torque of 17.6 Nm (156 lb ft).

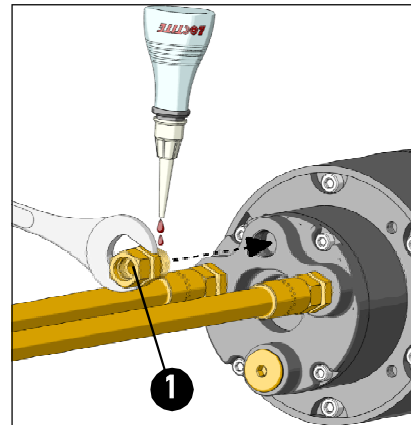
⚠ WARNING

Do not use teflon tape or adhesive tape. Pay attention to the sealant positioning: if it is inserted into the system, it could block it and make it unusable.

MAIN STEERING STATION

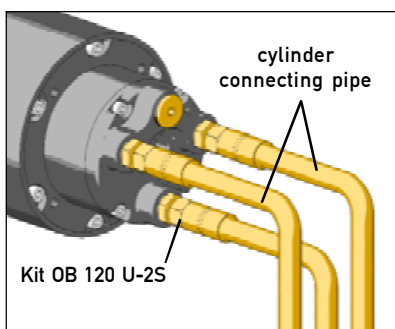


ADDITIONAL STEERING STATION

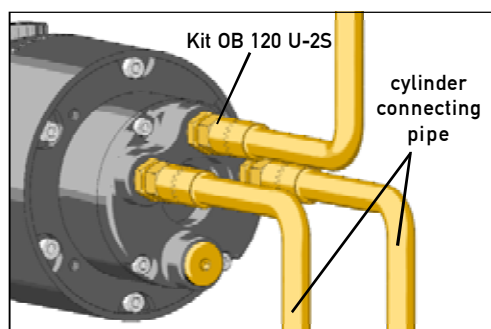


- 3 Connect pipes as shown in picture and tighten them with a proper torque according to the pipe manufacturer specifications.

MAIN STEERING STATION



ADDITIONAL STEERING STATION



NOTICE

Kit OB 120 U-2S is supplied separately for applications with double station and it includes all the necessary unions for 12 mm copper pipe.

The copper pipe must be bought separately.

⚠ DANGER

The unions assembled on the pump are NOT swinging. If they are unscrewed they get broken and the pump cannot be used anymore.

NOTICE

The rigid pipe assembly (cutting, bending and bulkhead passage) must be carried out by skilled staff according to the manufacturer's instructions. In case of copper or steel pipes flushing is compulsory.

3.11 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

NOTICE

The filling and purging operations can be facilitated by using the automatic purging equipment BUBBLE BLUSTER® (supplied separately).

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



3.11.1 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.

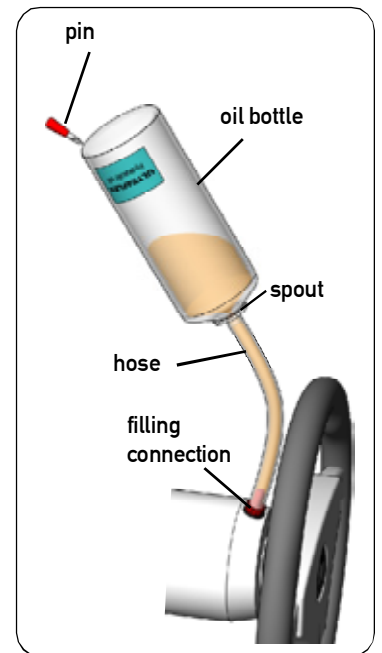
- Remove the pump cap and insert the fittings.
- Attach the spout to a new bottle of hydraulic oil and connect the hose to the fittings and the bottle spout.
- Turn the bottle upside down and pierce it with the pin, as shown in the picture, to ease the oil passage towards the pump. Fill the pump until 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.



3.11.2 Purging procedure

NOTICE

Carry out the purging procedure as indicated in the installation and maintenance manual of the cylinder used. Then check that the oil level is suitable by turning 1/2 turn the steering wheel and by making the oil come out of the bleed valve. Close the valve and check the system.

3.12 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/s or the helm/s 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 too much, 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.

⚠ WARNING

Check the system response by moving the pump.

⚠ DANGER

After 24 hours repeat the purging and make sure there are no leaks.



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.
- In case of installation with double station DO NOT use both stations. As a matter of fact the two stations are always enabled on the steering compartment. The effect of the rudden rotation on both stations will double causing an undesired manoeuvre.

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 3.11 and in the bleeding procedure of **ULTRAFLEX** cylinders. 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.

⚠ DANGER

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.

⚠ CAUTION

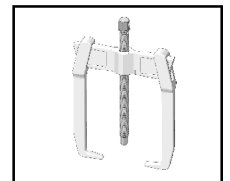
If the self-locking nuts are disassembled, they must be replaced. (Contact our assistance service, see page 6).

5.2 Steering wheel disassembly

To remove the steering wheel from the pump shaft, use a suitable extractor.

⚠ WARNING

Do not use a hammer or other tools that could seriously damage the pump.



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"> Blockage in the hoses between steering system and cylinder. 	<ul style="list-style-type: none"> Replace hoses. <p>⚠ DANGER</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"> Air in the system. 	<ul style="list-style-type: none"> 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.
	<ul style="list-style-type: none"> Leaks from the cylinder bleeder. 	<ul style="list-style-type: none"> Tighten the bleeder on the cylinder.
	<ul style="list-style-type: none"> Coiled hose. 	<ul style="list-style-type: none"> Uncoil and straighten the hose.
	<ul style="list-style-type: none"> Helm has been mounted upside down. 	<ul style="list-style-type: none"> Mount the helm with the filling hole in up position.



<p>The steering system is stiff and hard to turn, even when the boat is not moving.</p>	<ul style="list-style-type: none"> • Restrictions in hoses or fittings. 	<ul style="list-style-type: none"> • Look for and remove the restriction.
<p>The steering system is stiff and hard to turn, even when the boat is not moving.</p>	<ul style="list-style-type: none"> • Air in oil. 	<ul style="list-style-type: none"> • Repeat the filling and the bleeding procedure of the system.
<p>The steering system is stiff and hard to turn, even when the boat is not moving.</p>	<ul style="list-style-type: none"> • Wrong oil has been used. 	<ul style="list-style-type: none"> • Drain the filling and bleeding system. <p>⚠ WARNING ULTRAFLEX is not responsible for damage caused by fluids that are not recommended in this manual and so the warranty is cancelled.</p>
<p>The steering system is stiff and hard to turn, even when the boat is not moving, if unbalanced cylinders are used.</p>	<ul style="list-style-type: none"> • Dirt in the valve. 	<p>⚠ WARNING 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"> • The steering wheel is too small. 	<ul style="list-style-type: none"> • Replace the steering wheel with a bigger one.
	<ul style="list-style-type: none"> • Incorrect setting of the torque tab. 	<p>⚠ WARNING</p> <ul style="list-style-type: none"> • Only within the maximum dimensions allowed by the helm.
	<ul style="list-style-type: none"> • Air in oil. 	<ul style="list-style-type: none"> • Adjust the torque tab.
<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"> • Air in the system. 	<ul style="list-style-type: none"> • Check the oil level and repeat the bleeding procedure as explained in this manual.
	<ul style="list-style-type: none"> • Oil leak. 	<ul style="list-style-type: none"> • Repeat the filling and bleeding procedure of the system.
	<ul style="list-style-type: none"> • Helm mounted upside down. 	<ul style="list-style-type: none"> • Look for the leak and contact specialized staff.
<p>Leaks from steering system fittings.</p>	<ul style="list-style-type: none"> • Bad tightening or low torque of the fittings. 	<ul style="list-style-type: none"> • Mount the helm with the filling hole in up position.
	<ul style="list-style-type: none"> • Lack of fitting sealant. <p>⚠ WARNING Never use teflon tape or adhesive tape on any fitting.</p>	<ul style="list-style-type: none"> • Tighten the fittings with a maximum torque of 20Nm (15 in.lbs). <p>⚠ WARNING 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"> • Bad tightening of the plug. 	<ul style="list-style-type: none"> • Repeat the filling and bleeding procedure of the system.
	<ul style="list-style-type: none"> • The vent plug on the additional helm is in the lower position. 	<ul style="list-style-type: none"> • Tighten the plug.
	<ul style="list-style-type: none"> • Worn and damaged seal. 	<ul style="list-style-type: none"> • Replace the vent plug with the plug for the additional helm kit.
	<ul style="list-style-type: none"> • Too high oil level. 	<ul style="list-style-type: none"> • Replace the plug.
		<ul style="list-style-type: none"> • Follow the procedure to maintain the suitable oil level, which is described in the pump manual.



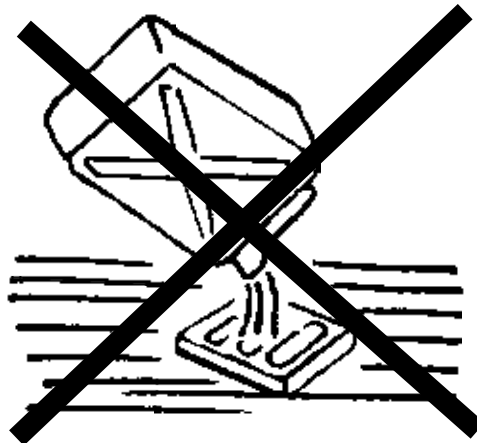
6 DISMANTLING

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.*



NOTES
