HYDRAULIC STEERING SYSTEMS

As a result of more than 50 years of experience, Twin Disc steering systems are a synthesis between selected materials, innovative design and state-of-art technical solutions.

All components are built with high precision systems and tooling to meet the requirements of the best survey authorities such as Rina Lloyd's Register, ABS and Bureau Veritas. As a further guarantee of efficiency and durability, certificates for special applications are also available upon request.

Conforming with "the Standard 94/25/CE", as amended by "the Standard 2003/44/CE", and also included in the Type Accepted of Program NMMA, the Twin Disc line of hydraulic pumps and cylinders covers any type of application: outboard, stern-drives and inboard systems for pleasure and commercial vessels.

In order to achieve the best control with minimum effort, the steering system must match the specific vessel's requirements. A standard steering system in its basic composition is composed of three major elements:

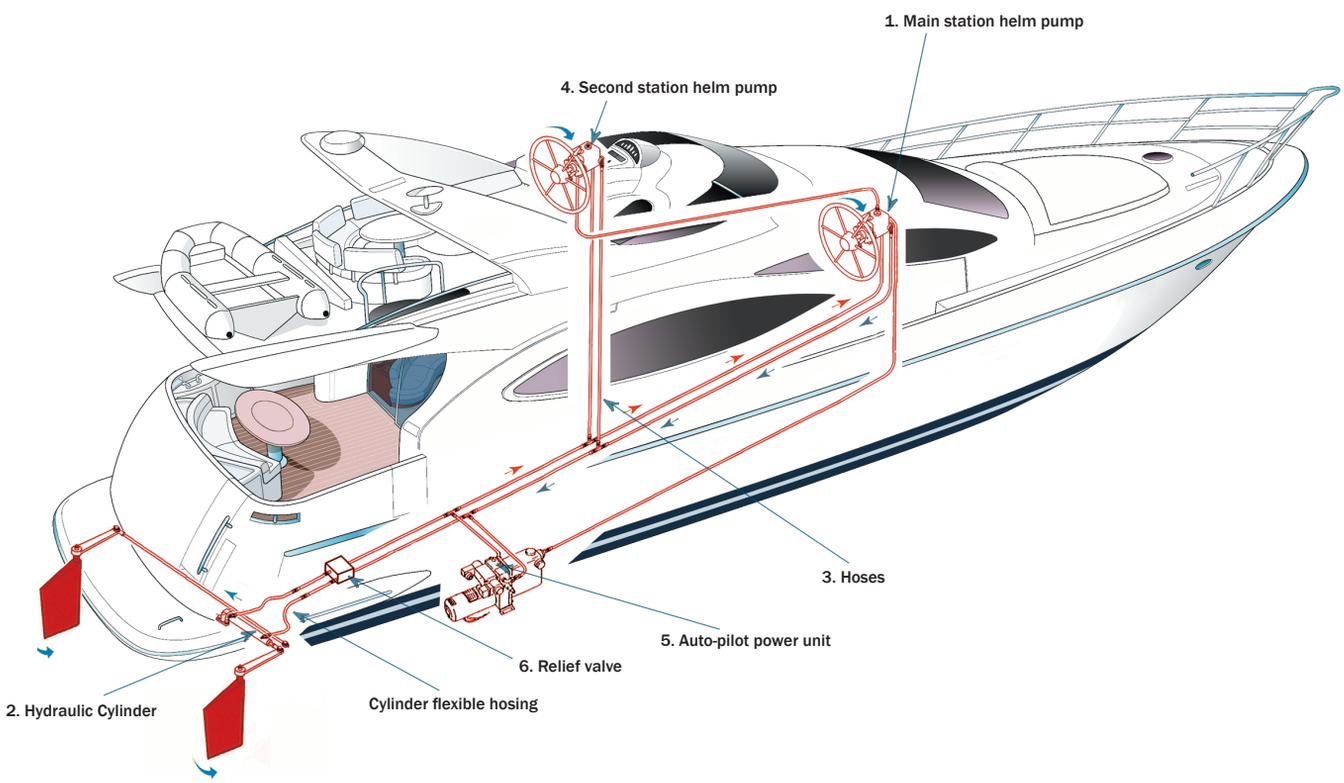
- **Hydraulic Helm Pump** (1) of the axial piston type pumps oil into the system each time the steering wheel is turned. The pump is provided with a non-return (lock) valve to prevent any uncontrolled movement of the rudder, and with a relief valve to protect the steering system from any sudden and excessive pressure increase.
- **Hydraulic Cylinder** (2), which is the real rudder actuator and determines the power of the system. It is therefore important to select the right cylinder model suitable for the required torque.

The pump and cylinder are connected by:

- **Rigid or Flexible Hoses** (3) suitable for hydraulic applications and sized according to the pump displacement. The rigid piping system guarantees the best steering performance. A flexible host system can be used for rudder torque less than 290 Kg/m (24.675 in/lb)

To satisfy different needs or adapt to specific solutions, this basic configuration can be integrated with many other steering components such as:

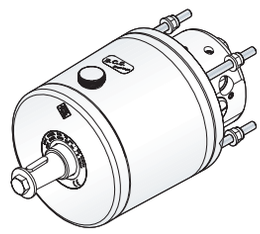
- **Hydraulic helm pumps for additional control stations** (4)
- **Auto-pilot power units** (5), available in a wide range of displacements and can be combined with different steering cylinders with a capacity up to 3900 cc
- **Valves and accessories** (6)



HELM PUMPS

Main Features:

- Compact design and easy installation
- Range of displacements: 20 cc – 30 cc – 42 cc
- Mounting configurations: FRONT, INTERMEDIATE, REAR and with SPORT TILT
- Built-in lock valve to prevent any rudder feedback
- Built-in relief valve to protect the system from over-pressure
- Cast aluminium housing for a high resistance to corrosion
- Pump shaft with ABYC 3/4 taper
- Built according to quality criteria and CE approved
- Provided with elbow fittings
- Provided with no-bleeder cap for possible additional control station



Frontal Mount Helm (Basic Helm)

FRONTAL MOUNTING HELM - TECHNICAL SPECIFICATIONS

Imperial Fittings
Metric Fittings

Model	Mounting Configuration	Non return valve	Relief valve	Displacement	No. of pistons	Relief valve setting pressure	Fittings included	Min. wheel	Max. wheel	Weight
P20BAP P20BA	Frontal	Yes	Yes	20 cc/rev 1.22 cu.in/rev	5	70 bar 1000 psi	1/4"NPTF - 3/8" D.E. G1/4'' - hose d. 10	350 mm 13,78 in.	711 mm 28 in.	2.6 Kg 5.8 lb
P30BAP P30BA	Frontal	Yes	Yes	30 cc/rev 1.83 cu.in/rev	5	70 bar 1000 psi	1/4"NPTF - 3/8" D.E. G1/4'' - hose d. 10	350 mm 13,78 in.	711 mm 28 in.	3.0 Kg 6.7 lb
P42BAP P428A	Frontal	Yes	Yes	42 cc/rev 2.56 cu.in/rev	7	70 bar 1000 psi	1/4"NPTF - 3/8" D.E. 1/4"NPTF - 1/2" D.E. G1/4 - hose d. 10 G1/4 - hose d. 12	450 mm 17,72 in.	711 mm 28 in.	3.0 Kg 6.7 lb

HEAVY DUTY HELM PUMPS

Main Features:

- Axial piston helm pumps
- Stainless steel helm shaft for maximum resistance and best performance
- Available in several displacements: 63 cc, 89 cc, 105 cc, 151 cc, 191 cc
- Available with extra oil tank
- High quality materials to ensure durability, even in the toughest service conditions
- Multiple control station can be easily installed
- Meets ABYC standard requirements and CE approved
- Satisfies the requirements of RINA, Lloyd's Register of shipping, American Bureau of Shipping and Bureau Veritas

HEAVY DUTY HELM PUMPS - TECHNICAL SPECIFICATIONS

Model	Mounting	Non return valve	Relief valve	Displacement	No. of pistons	Fittings provided	Min.Wheel Diameter	Max. Wheel Diameter	Weight
P63T	Rear & Front	No	No	63 cc/rev 3.84 cu.in/rev	5	/	700 mm 27,56 in.	1016 mm 40 in.	8,7 Kg 19.2 lb
P89T	Rear & Front	No	No	89 cc/rev 5.5 cu.in/rev	7	/	700 mm 27,56 in.	1016 mm 40 in.	8,9 Kg 20.0 lb

HEAVY DUTY HELM PUMPS WITH OIL TANK - TECHNICAL SPECIFICATIONS

Model	Mounting	Non return valve	Relief valve	Displacement	No. of pistons	Fittings provided	Min.wheel diameter	Max. wheel diameter	Weight
P63S	Rear & Front	No	No	63 cc/rev 3.84 cu.in/rev	5	/	700 mm 27,56 in.	1016 mm 40 in.	9,3 Kg 20.5 lb
P89S	Rear & Front	No	No	89 cc/rev 5.5 cu.in/rev	7	/	700 mm 27,56 in.	1016 mm 40 in.	9,5 Kg 21.0 lb
P105	Rear	No	No	105 cc/rev 6,4 cu.in/rev	5	G1/2"-18 mm O.D.	1000 mm 39,37 in.	1220 mm 48 in.	21,5 Kg 47,39 lb
P151	Rear	No	No	151 cc/rev 9,2 cu.in/rev	7	G1/2"-18 mm O.D.	1000 mm 39,37 in.	1220 mm 48 in.	23,2 Kg 51,14 lb
P191	Rear	No	No	191 cc/rev 11,7 cu.in/rev	7	G1/2"-18 mm O.D.	1000 mm 39,37 in.	1220 mm 48 in.	24,5 Kg 54,00 lb

TECHNICAL SPECIFICATIONS

INBOARD STEERING CYLINDERS

Model	Code	Stroke	Rudder Torque	Thrust at 70 bar - 1000 psi	Volume	Tiller	Angle	Fittings	Weight
CTA40U	15649	178 mm	57.83 Kgm	455 Kgf	115.7 cc	153 mm	35° +35°	1/4" NPT - 3/8" O.D.	2,2 Kg
		7.0 in	5008 in/lb	1002 lbf	7.1 cu.in	6 in.			4,85 lb
CTA65U	12677	178 mm	83.81 Kgm	659.4 Kgf	167.68 cc	153 mm	35° +35°	1/4" NPT - 3/8" O.D.	2,6 Kg
		7.0 in	7257 in/lb	1453 lbf	10.23 cu.in	6 in.			5,73 lb
CTA75U	15763	200 mm	94.17 Kgm	659.4 Kgf	188.4 cc	175 mm	35° +35°	1/4" NPT - 3/8" O.D.	3,0 Kg
		7.78 in	8155 in/lb	1453 lbf	11.5 cu.in	6.9 in.			6,61 lb
CTA80U	12682	228 mm	107.36 Kgm	659.4 Kgf	214.78 cc	200 mm	35° +35°	1/4" NPT - 3/8" O.D.	3,2 Kg
		9.0 in	9297 in/lb	1453 lbf	13.11 cu.in	7.8 in.			7,05 lb

NOTE: The inboard cylinders mod. CTA are not suitable for installations on racing boats.

HEAVY DUTY INBOARD STEERING CYLINDERS

Model	Code	Stroke	Rudder Torque	Thrust at 70 bar - 1000 psi	Volume	Tiller	Angle	Fittings	Weight
CTC200	12695	200 mm	249.93 Kgm	1750 Kgf	500 cc	175 mm	35° +35°	G1/2" - d.12mm	13,2 Kg
		7.87 in.	21643 in/lb	3857 lbf	30.5 cu.in	6.9 in.			29,10 lb
CTC230	12698	228 mm	284.92 Kgm	1750 Kgf	570 cc	200 mm	35° +35°	G1/2" - d.12mm	15,3 Kg
		9 in.	24674 in/lb	3857 lbf	34.78 cu.in	7.8 in.			33,73 lb
CTC300	12701	300 mm	374.89 Kgm	1750 Kgf	750 cc	260 mm	35° +35°	G1/2" - d.12mm	17,7 Kg
		11.81 in.	32465 in/lb	3857 lbf	45.77 cu.in	10.2 in.			39,02 lb
CTC400	15697	400 mm	499.85 Kgm	1750 Kgf	1000 cc	350 mm	35° +35°	G1/2" - d.12mm	20,0 Kg
		15.75 in.	43287 in/lb	3857 lbf	61.02 cu.in	13.7 in.			44,1 lb

NOTE: The inboard cylinders mod. CTA are not suitable for installations on racing boats

Model	Code	Stroke	Rudder Torque	Thrust at 70 bar - 1000 psi	Volume	Tiller	Angle	Thread	Weight
CTD310	15698	200 mm	421 Kgm	2954 Kgf	844 cc	175 mm	35° +35°	1/2"	23 Kg
		7.87 in.	36459 in/lb	6510 lbf	51,50 cu.in	6.9 in.			50,70 lb
CTD450	15699	300 mm	633 Kgm	2954 Kgf	1266 cc	260 mm	35° +35°	1/2"	25,6 Kg
		11.81 in.	54818 in/lb	6510 lbf	77,25 cu.in	10.2 in.			56,43 lb

NOTE: The inboard cylinders mod CTC are not suitable for installations on racing boats. They are provided with flexible hoses type SAE100 R1.

Model	Code	Stroke	Rudder Torque	Thrust at 70 bar - 1000 psi	Volume	Tiller	Angle	Thread	Weight
CTE600	15700	200 mm	659 Kgm	4616 Kgf	1318 cc	175 mm	35° +35°	1/2"	38,5 Kg
		7.87 in.	57069 in/lb	10173 lbf	21598 cu.in	6.9 in.			85 lb
CTE900	15701	300 mm	988 Kgm	4616 Kgf	1978 cc	260 mm	35° +35°	1/2"	38,8 Kg
		11.81 in.	85560 in/lb	10173 lbf	32413 cu.in	10.2 in.			85,5 lb
CTE1200	15702	400 mm	1318 Kgm	4616 Kgf	2637 cc	350 mm	35° +35°	1/2"	42,0 Kg
		15.75 in.	114138 in/lb	10173 lbf	43213 cu.in	13.7 in.			92,6 lb

NOTE: The inboard cylinders mod CTE are not suitable for installations on racing boats. They are provided with flexible hoses type SAE100 R1.

Model	Code	Stroke	Rudder Torque	Thrust at 70 bar - 1000 psi	Volume	Tiller	Angle	Thread	Weight
CTF1600	15703	400 mm	1928 Kgm	6750 Kgf	3857 cc	350 mm	35° +35°	1/2"	78,8 Kg
		15.75 in.	166964 in/lb	14850 lbf	235,27 cu.in	13,77 in.			173,72 lb

NOTE: The inboard cylinders mod CTF are not suitable for installations on racing boats. They are provided with flexible hoses type SAE100 R1.

MAIN FEATURES OF ALL STEERING CYLINDERS

- Piston rod in stainless steel for a high corrosion resistance
- Adjustable base either horizontally or vertically
- Supplied with bleeders
- Meet ABYC standards

CTA FEATURES

- Cylinder body in anodized aluminum
- Available in a range of volumes between 115 and 215 cc

CTC FEATURES

- Cylinder in stainless steel and brass painted
- Stainless steel cylinder base
- Available in a range of volumes between 500 and 1000 cc

CTD FEATURES

- Cylinder in stainless steel and brass painted
- Available in a range of volumes between 844 and 1266 cc

CTE FEATURES

- Cylinder in stainless steel and brass painted
- Available in a range of volumes between 1318 and 2637 cc

CTF FEATURES

- Cylinder in stainless steel and brass painted
- Available in a range of volumes from 3857 cc

Specifications subject to change without prior notice in the interest of continual product improvement.
Contact your local Twin Disc representative for engineering specifications.

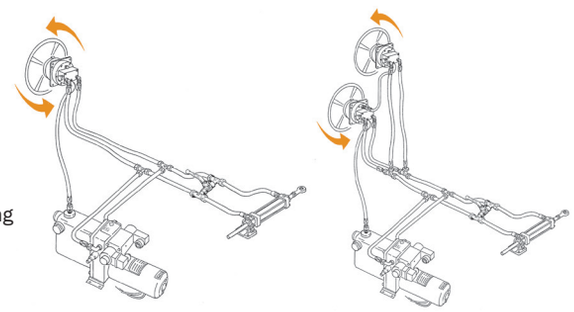
Scan QR code to see Twin Disc's entire marine-based product line.

AUTO-PILOT POWER UNITS

Automatic pilot and other electronic navigation systems are very popular, even on small vessels. The equipment must exchange information and work together to guarantee safe navigation. Twin Disc has developed a complete range of auto-pilot power units as the best interface for your auto-pilot. While simple in principle and installation, Twin Disc auto-pilot power units are extremely reliable and accurate.

Main Features:

- Interface with any auto-pilot
- Reduced dimensions
- Models for any kind of application
- High quality materials and components for the best reliability and performance
- Steering automatic filling device available on certain models for an easier and faster bleeding
- Reversible and solenoid-valve power units



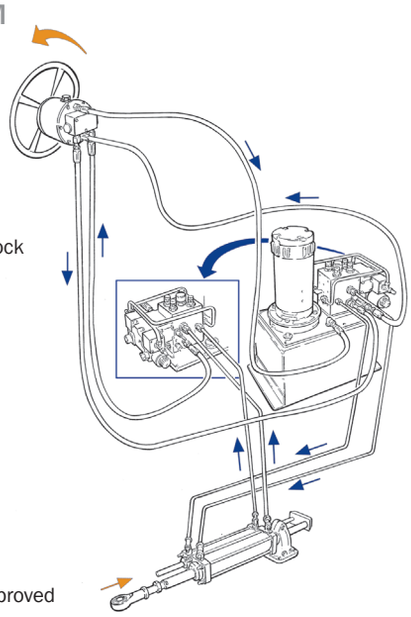
Types of units:

- Solenoid-valve power units
- Solenoid-valve power units with automatic filling
- Reversible power units

POWER-ASSISTED INBOARD STEERING SYSTEM

Main Features:

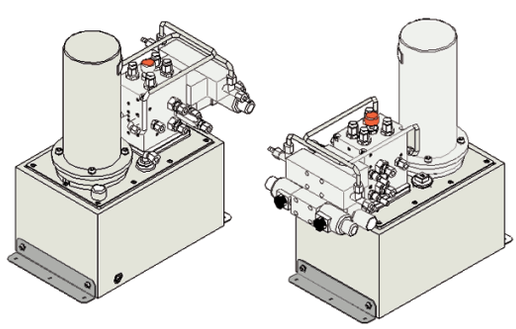
- Totally independent from the vessel propulsion system
- Effortless navigation comfort in any condition
- High quality, safety and reliability
- 3 basic system elements vs. 6-7 elements in competitors'
- 30% reduction in installation time
- Prompt responsiveness and total control in just 3.5 turns lock-to-lock (this number can vary)
- Cooling system is NOT necessary
- Supplied with interface for the auto-pilot
- Special device for automatic filling of the system
- Easy and fast bleeding procedure
- Steering helm pump available in 5 displacements and 4 mounting configurations
- Provided with automatic manual back-up steering
- Service and repair procedures are simplified as the system is not pressurized
- Helm pumps and cylinders meet ABYC standards and are CE approved



POWER-ASSISTED ELECTRO-HYDRAULIC POWER UNITS

Main Features:

- Totally independent from the boat's main engine
- Extremely compact
- Can be immediately excluded from the steering system into a manual steering system at any time



Composed of:

- Hard plastic tank, allowing the oil level to be easily checked
- Electric motor hydraulic pump
- Filter group
- Necessary valves for steering operation and safety

Provided with:

- Interface for the auto-pilot
- Special device for automatic filling of the system to make the bleeding procedure easy and fast
- Speed adjuster, which can be adapted to any auto-pilot manufacturer's requirements

United States of America • Australia • Belgium • Canada • China • India • Italy • Singapore • Switzerland

Twin Disc offers to boat builders and design engineers a complete "package" of products such as propulsion systems, gearboxes, transmissions, control and steering systems, together with customized solutions and efficient technical support. Twin Disc offers global customer service for the development and realization of the whole kinematics system. A dynamic team of engineers, technicians and professionals are devoted to help customers from the development phase to service on board.

HYDRAULIC STEERING SYSTEMS
ELECTRONIC STEERING SYSTEMS
COMPLETE SHAFT LINES
TRIM TAB SYSTEMS
BOW & STERN THRUSTERS
HYDRAULIC ACTUATORS
MULTI-FUNCTION ELECTRO-HYDRAULIC POWER UNITS

Twin Disc, Incorporated
Racine, Wisconsin 53403 USA
Phone +1-262-638-4000
Fax +1-262-638-4482
www.twindisc.com

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