



SteeringPower

Hydraulic Steering



Hydraulic steering systems

SLEIPNER MOTOR

Have developed and manufactured high quality technical solutions for the marine industry since 1908. The Steering Power line of hydraulic steering systems has been manufactured since 1991 and an extensive development program have resulted in the 2005 series, perhaps the best manual hydraulic system available today. Sleipner Motor is also the manufacturer of the world leading Side-Power thruster systems.



Construction

What is the advantage with a hydraulic steering system?

The alternative to hydraulic steering is a mechanical steering by either a push-pull cable or other varieties of mechanical cable/chain system.

Operation

The typical problems with mechanical steering systems are:

- The wear will cause heavy, sloppy, and unsafe steering
- Most mechanical systems demand the operator to hold the steering wheel and take the "beating" at all times.

Quality

With SteeringPower these problems are history.

Advantages with hydraulic steering system includes:

- Because there is principally no wear, a hydraulic steering system will maintain its high precision and ease of steering throughout its extensive lifetime with minimal service requirements.
- The non-return valve in the pump ensures a stable ride with minimal effort as the steering stays where you left it.
- Unlimited steering positions, without any complexity or reduced steering comfort.
- Autopilots operate more effectively if they can control the rudder, outboard, sterndrive or jet drive with a hydraulic steering system
- Unsurpassed safety as there is principally no wear that can result in loss of steering or reduced steering accuracy and comfort.

Maintenance

Autopilot

Most people find the difference in comfort between a mechanical steering and a hydraulic steering system in a boat to be more pronounced than the difference between a direct and a power assisted steering in a car.



Different steering systems

Boats with outboard engines, rudders or stern drives demand different types of steering cylinders, while the helm-pumps and principle solutions and thereby advantages are the same.

SteeringPower for outboard engines

Historically, hydraulic steering systems have been most common in boats with rudder steering. However, in our opinion, boats with outboard engines are perhaps the types where the most benefit can be achieved. The reason is of course, that an outboard engine has its propulsion attached to "the rudder", so that the forces you have to manually counteract are often far greater than with a rudder steering. Another important factor is that outboard boats are normally faster than rudder boats, and thereby basically requires a higher level of steering safety as the consequence of losing the steering increases exponentially with speed.

SteeringPower for rudders and jet drives

A wide variety of boats use traditional rudders to steer. From small slow double-enders, to the super-fast superyachts, one or two rudders, the principal is the same, but the required steering force can be very different. SteeringPower thereby offers a large range of solutions to match your boats requirements.



Steering cylinders designed for rudder applications can also in most cases be used for steering jet drives. The selection of different pump sizes and installation methods is important so that you can find the ultimate solution for your needs.

SteeringPower for stern-drives

In the SteeringPower range we also offer several specially designed cylinders for the most common stern-drives. Whilst most stern-drives today are delivered with an integrated power assisted steering, to control the integrated steering with hydraulic steering have many benefits over the traditional push-pull cable.

Helmpumps



Precision

Comfort

Choice of design

SteeringPower helm pump

The helm pump is the "heart" of a hydraulic steering system. It is the most complex part and where you find the most important differences between different brands. The helm pump is where the power you exercise on the steering wheel is transformed into moving the hydraulic oil with a certain speed and pressure so that the cylinder ram at the other end of the system moves. Thereby, every little detail is important so as not to waste energy and power, and maximize efficiency and accuracy.

The new series is the result of an extensive R&D program, and is perhaps the most accurate and comfortable helm pump available today.

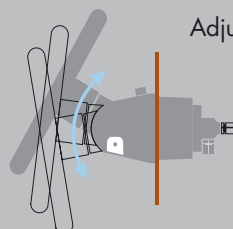
The 3 different installation and user designs are:



With a flange for recessed installation



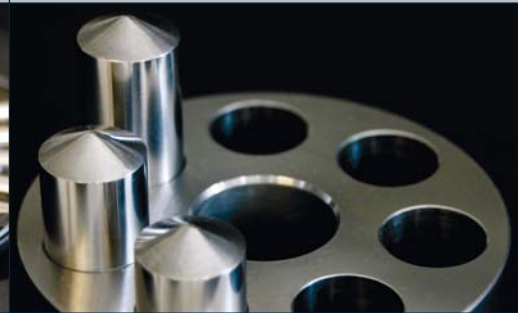
External for more steering wheel offset



Adjustable tilt version

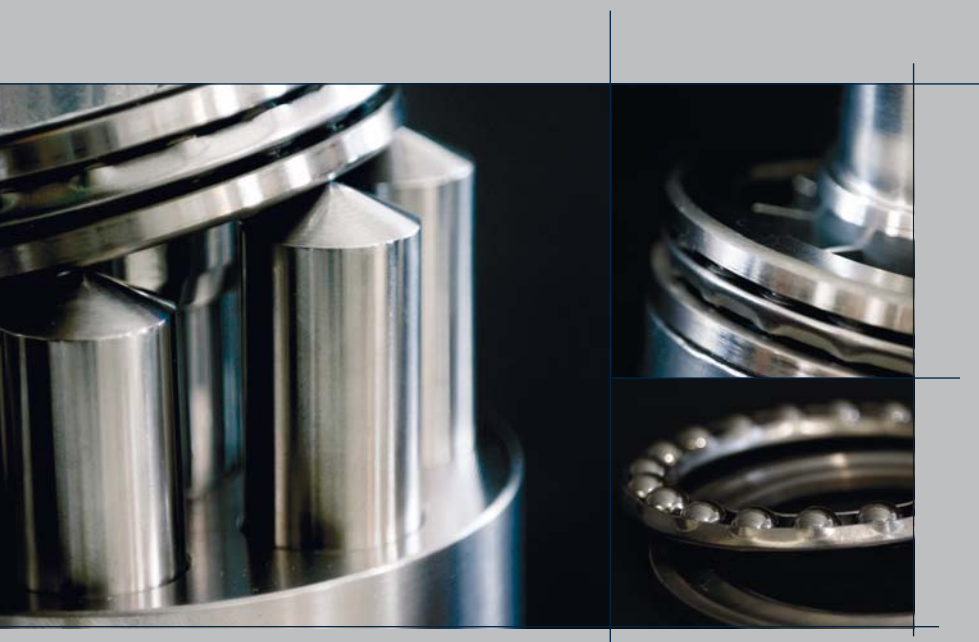
The tilt can be placed in 5 different positions: -10°, 0°, 10°, 20° and 30°.





Technically speaking, the SteeringPower helm pump features include:

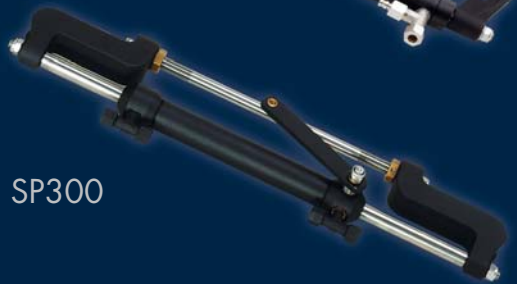
- Axial piston pump with fine-tuned piston angles
- 7 hardened and ground pistons
- Stable and rigid bearing system with 4 ball bearings
- Integrated non-return valve
- Large internal oil reservoir
- All non-corrosive materials
- The adjustable tilt version has no protruding handles
- 3 different designs for different boat and dashboard designs
- 3 different pump volumes for choice of wheel turns with different cylinders
26 cm³ - 35 cm³ - 43 cm³
- Additionally we offer a larger, 70 cm³ helm pump with 10 pistons for our largest cylinders.
This is only available in recessed version.



Outboard



SP150



SP300



Complete kit for outboards



SteeringPower outboard

For those who want a modern steering system for increased enjoyment and safety.

Suited for most boat and outboard engine combinations, the SteeringPower hydraulic steering system will change your boating experience.

- Maximum safety and comfort
- Balanced cylinders for equal steering in both directions
- Minimal service and maintenance
- Easy installation on most outboard engines
- Easy air-bleeding
- Compact, yet rugged and durable design
- Approved by Det Norske Veritas

SteeringPower SP150

Designed for outboard engines up to 150 Hp. The balanced cylinder fits most outboard engines and is easy to install.

This steering is also available as a DIY kit that includes the cylinder, helm pump, necessary hose fittings, oil and 2 x 6 meter hydraulic hose that you can cut to the desired length without special tooling.

For technical details and dimensions, see page 10.

SteeringPower SP300

This larger cylinder is designed for outboard engines up to 300 Hp, but can also be used for smaller engines. The balanced cylinder fits most outboard engines and is easy to install.

For technical details and dimensions, see page 10.

Rudders and Jet drives

Sleipner Steering Power for rudders



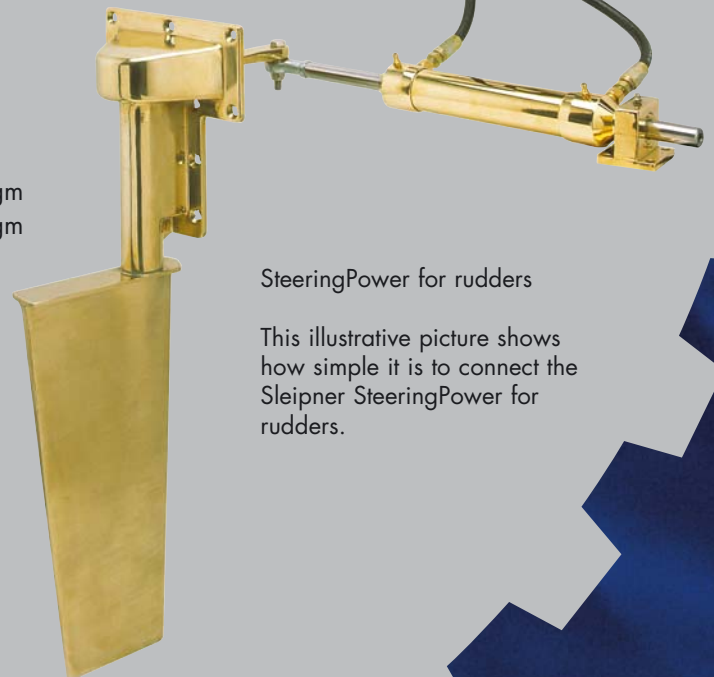
SteeringPower for rudders and jet drives

The cylinders used for rudders and jet drives come in many sizes. They have a pivotal foot that is fastened to the boat, and a pivotal joint that you fit to the tiller arm on the rudder or the jet drive. This makes these cylinders very flexible in terms of installations so that the usage is only limited by the installers imagination. To find the right steering cylinder for boats with rudders, you must calculate the rudder torque. The calculation formula is shown on page 10. For jet drives or other applications, consult your SteeringPower dealer to find the right size.

- Maximum safety and comfort
- Best technology with an autopilot
- Multiple steering positions without any disadvantages
- Rugged and durable construction in stainless steel and brass
- Easy air bleeding
- Approved by Det Norske Veritas

Available sizes

- SP40 for rudder torque up to 40 kgm
- SP60 for rudder torque up to 60 kgm
- SP 90 for rudder torque up to 90 kgm
- SP 155 for rudder torque up to 155 kgm
- SP 250 for rudder torque up to 250 kgm

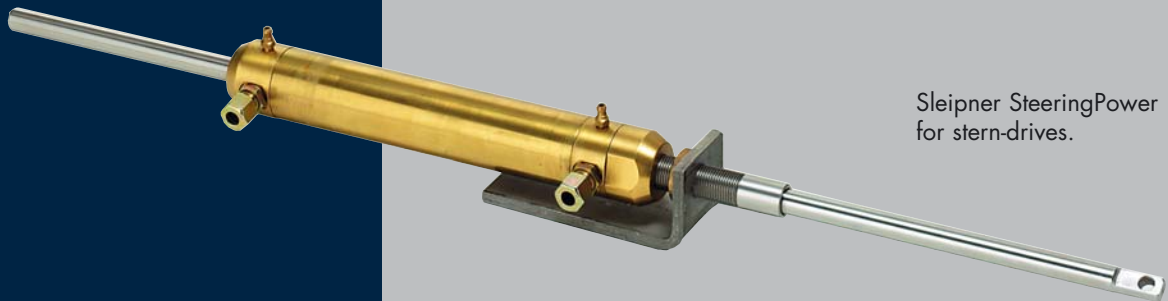


SteeringPower for rudders

This illustrative picture shows how simple it is to connect the Sleipner SteeringPower for rudders.



Stern-drives



Sleipner SteeringPower for stern-drives.

SteeringPower for stern-drives

Designed for Volvo Penta drives, most Mercruiser, Yamaha and OMC stern drives both with and without integrated power assisted steering.

For boats with sterndrives without integrated power assisted steering, the benefits from having a hydraulic steering system is as important as for outboard engines. While the benefits are less for stern drives with integrated power assisted steering, there are still many important advantages that makes a hydraulic steering better than a mechanical push-pull steering. These includes the important factors of safety and comfort, as well as lifetime, reliability and less service and maintenance. There are also many of the early integrated power assisted systems in the sterndrives that are so inaccurate that it is better to replace this totally with a direct hydraulic steering system.

Also boats with more than one steering position will benefit greatly from a hydraulic steering system even if they also have a well functioning power assisted steering system in their stern drive.

- Maximum safety and comfort
- Easy installation onto the original steering adaptor.
- Best option for good autopilot function
- Multiple steering positions without loss of comfort or accuracy
- Minimal service requirements
- Choice of helm pump design
- Approved by Det Norske Veritas



Accessories

Hydraulic hoses

The hoses are a very important integral part of the steering system. The saying "nothing is stronger than the weakest link" is an accurate way of describing the hoses in a hydraulic steering system. Sleipner Motor recognize this, and have through an extensive R&D program come up with a special hose that ensures optimal performance and safety for steering applications.

We recommend that all SteeringPower systems use this hose

- Minimal expansion under pressure prevents "sloppy" steering (almost as rigid as piping).
- Steel reinforced for minimal risk of mechanical wear and tear
- Rated for 155bar by EN10592
- Can be delivered with either ready crimped-on fittings or with screw fittings for easy and fast hose length adjustments in the boat..

Hose fittings

Sleipner Motor offers a variety of hose fittings, union fittings and other installation parts. Both plated steel and stainless steel versions are available for various installation needs, including screw fittings for easy and fast installation without special tooling. Please see our pricelist or website for details of available parts.

Steering lock

Excellent anti-theft guard for boats with hydraulic steering.

- Makes it impossible to operate the boat in locked position
- Fast and easy activation by key so that you lock it also if you only leave the boat for a short period of time.

Hydraulic oil

Special oil for SteeringPower hydraulic systems.

- Long life hydraulic oil, viscosity 15
- Available in 1,0 and 2,5 ltr. containers.



Sleipner Hydraulic Steering Power

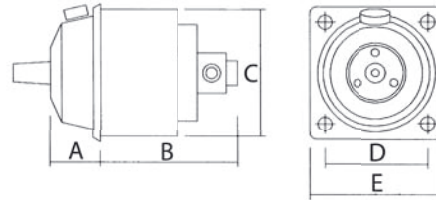
Technical Information

Steering Power Helm pumps

Dimensions (mm):

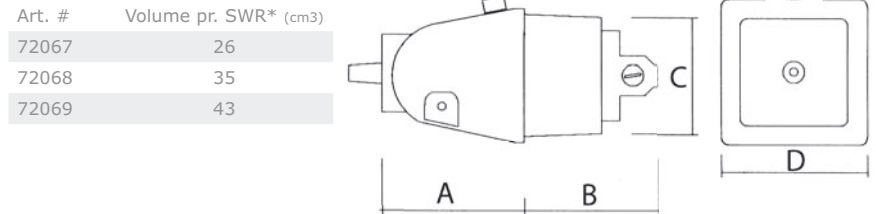
Type	A	B	C	D	E
HELM PUMP recessed unit	47	130	121	96	127
HELM PUMP recessed unit 70cm ³	47	130	121	120	155
HELM PUMP w. tilt	140.5	132.3	121	133	-
HELM PUMP, surface mounted unit	120	57	120	120	-

Helm pump, recessed unit



Art. #	Volume pr. SWR* (cm ³)
72061	26
72062	35
72063	43
72070	70

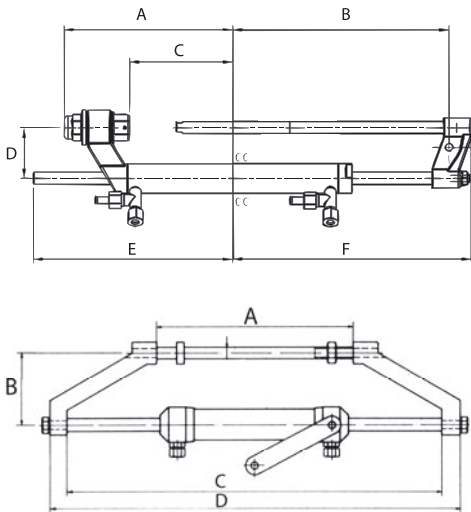
Helm pump with tilt



Helm pump, surface mounted unit



SteeringPower for Outboard



Dimensions(mm):

Type	A	B	C	D	E	F
SP150	217	277±100	133	65	256±100	306±100
SP 300	330	83	570	635	-	-

Technical specifications:

Type	Pump type (cm ³)	Cylinder volume (cm ³)	Wheel rev.	Max. pressure (kg/cm ²)	Hose diam.	Cylinder stroke (mm)	Cylinder type
SP 150	26	110	4.2	50	10 mm	230	71600
SP 300	26	118	4.5	50	3/8"	240	71800

Rudder torque

The rudder torque of your boat can be calculated with the following formula: Torque in Kgm= $V^2 \times H \times W \times ((W/2 - E) \times 6)$

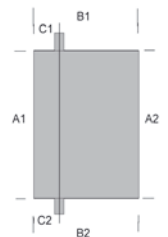
V= Top speed(knots)

A= Rudder height (m)

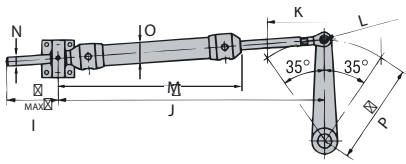
B= Rudder width (m)

C= Balance part of rudder blade (m)

For an exact calculation, contact your distributor.



SteeringPower for rudders



Lock to lock steering wheel revolutions with different helm pump and cylinder combinations:

Art. #	Cylinder	Helm pump			
		26 cm ³	35 cm ³	43 cm ³	70 cm ³
71030	SP 40	4.2	3.1	-	-
71060	SP 60	4.8	3.6	-	-
71090	SP 90	8.3	6.1	5	-
71140	SP 155	-	-	8	4.9
71220	SP 220	-	-	-	8.1

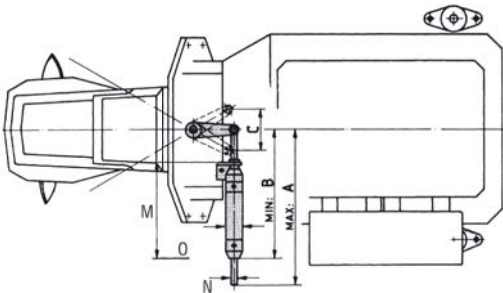
Dimensions (mm):

Type	A Ø	B	C	D	E	F	G	I (MAX)	J	K	L	M	N	O	P
SP 40	114	170	25	65	44	36	125	158	425	175	10	265	16	38	150
SP 60	114	170	25	65	44	36	125	180	455	200	12	290	16	38	180
SP 90	114	170	25	65	44	36	125	180	465	200	12	290	20	48	180
SP 155	114	170	25	35	44	36	125	165	492	200	14	300	20	57	180
SP 250	135	203	40	62	63	38	150	175	520	200	16	315	25	75	180

Technical specifications:

Type	Cylinder, Art. #	Max. rudder torque (kgm)	Cylinder, volume (cm ³)	Cylinder, stroke (mm)	Max. rudder angle (°)	Pressure at rated torque (kg/cm ²)	Hose diam., internal	Cylinder, weight (kg)
SP 40	71030	40	110	175	70	50	3/8"	3.0
SP 60	71060	60	125	200	70	50	3/8"	3.2
SP 90	71090	90	215	200	70	50	3/8"	4.1
SP 155	71140	155	345	200	70	50	12 mm	5.7
SP 250	71220	250	565	200	70	50	12 mm	10.4

SteeringPower for stern drives



Dimensions (mm):

Type	A	B	C	M	N	O
VOLVO 290 (-'94)	440	260	180	315	15.8	47.5
VOLVO 290 ('94-)	496	406	180	335	15.8	47.5
VOLVO w. servo	370	307	180	275	15.8	35
YAMAHA/OMC w. servo	325	325	155	250	16	35
MERCRUISER w. servo	352	325	155	250	16	35
MERCRUISER wo. servo	625	495	130	274	16	35

Lock to lock steering wheel revolutions with different helm pump and cylinder combinations:

Art. #	Cylinder Type	Volume	Helm pump		
			26 cm ³	35 cm ³	43 cm ³
71105	Mercruiser Bravo 1 & 4 w. servo	73 - 102	2.8 - 3.9	-	-
71110	OMC/Yamaha w. servo	70 - 102	2.7 - 3.9	-	-
71112	Mercruiser wo. servo	152	5.8	4.3	-
71115	Volvo Penta w. servo	87 - 123	-	-	-
71200	Volvo 290	197	7.6	5.6	4.6
71215	Volvo 42/290	234	9	6.7	5.4

Technical specifications:

Type	Cyl. volume (cm ³)	Max. pressure (kg/cm ²)	Hose diam.	Art. #
VOLVO 290 (-'94)	197	50	3/8"	71200
VOLVO 290 ('94-)	234	50	3/8"	71215
VOLVO w. servo	87-123	50	3/8"	71115
YAMAHA/OMC w. servo	70-102	50	3/8"	71110
MERCRUISER w. servo	73-102	50	3/8"	71105-71106
MERCRUISER wo. servo	152	50	3/8"	71112



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