HYDROSTA

Maritieme catalogue

Hydrosta has been active on the hydraulics market for more than 25 years. In this time it has developed a complete line of products for nautical maritime applications.

Steering installations

In addition to the standard range it is possible to build the steering systems to customers' specific requirements with CE certification or standard classification.

- Servo control (power-assisted steering)
- Joystick control
- Autopilot control
- Multiple steering positions

Bow and stern thrusters

The counter-rotating Sider bow and stern thrusters are made of seawater-resistant material and have the following properties:

- High thrust in two directions
- Thrusters are counter rotating
- Well-considered design with double water sealing and labyrinth to protect the seals against small fishing lines
- Full galvanic isolation in relation to the hull
- Maintenance free (lifetime grease lubrication)
- Especially compact design

Available in different versions as fixed and Swing.

Propulsion installation

Navigating with a hydraulic Hy-Prop installation is a completely new sensation.

- The Hy-Prop is characterised by:
- Continuously adjustable and vibration-free drive
- Continuously variable optimal transmission
- Propeller speed adjustable from approx. 10 rpm to maximum trust.
- Steerable 2 x 90°
- Rotation direction of the propeller can be reversed immediately (emergency stop)
- Single-lever operation
- Turning circle is the length of the water line

This gives superior manoeuvrability and navigation properties.

Windlasses

Hydrosta sells various brands of windlasses, which are converted into a hydraulic drive version, which results in:

- Low noise level
- Continuous switching
- Adjustable hauling speed
- Adjustable maximum pull force

Hydraulic system

All desired functions are fit and combined into a compact, customised total hydraulic system.

The system is made up primarily with a reservoir, a pump and one or more valve blocks.

- Reservoir: a universal reservoir made of aluminium or steel is our basic setup. This is standard mounted on vibration dampers and is equipped with a visual level gauche with thermometer, return line filter and a low level switch.
- Pump: the system is fed by a variable hydraulic “load-sensing” pump. This type of pump supplies oil depending upon the hydraulic power demand and is therefore energy saving. The pumps can be fitted on a standard PTO of the main engine or drive clutch, or in line with the engine crankshaft.
- Valve blocks: a valve block is designed as a modular system. Each valve section can be separately adjusted such that the user can set at maximum flow and pressure. In combination with a steering installation, priority is always given to the steering installation.

The system can be assembled for various hydraulic functions such as:

- Mast lowering installation
- Spud legs
- Gangways
- Sailing functions
- Capstans/winches
- Deck cranes
- Generators

Electronic control

To have an excellent control of the vessel in combination with the available power of the engine and the hydraulic system, Hydrosta has developed various programmable control units. As central regulation units, this processor devices can coordinate many things, such as:

- Operation of main engine
- Operation of propulsion drive line
- Operation of steering installation
- Operation of bow/stern thrusters

Navigation devices and alarm functions can also be integrated in the system when combined with a Navio screen and particularly user friendly operation will be achieved.

Contents

This catalogue was compiled with care; however it is subject to printing and typesetting errors. If you see anything that is unclear, please contact us.

Hydrosta BV supplies under the conditions of the Metaalunie; these are sent upon request.
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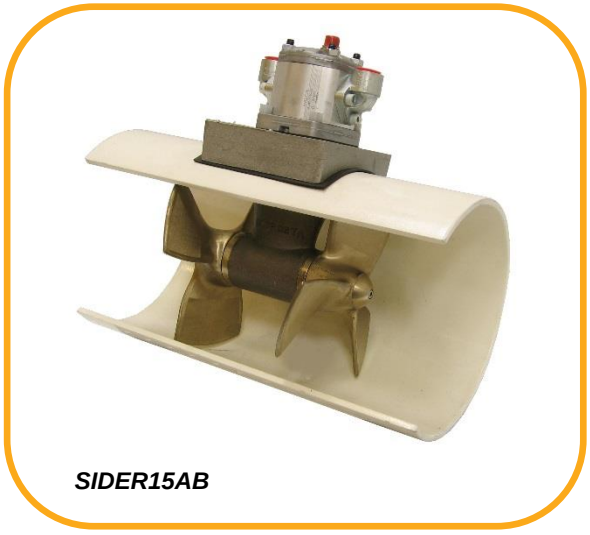
SIDER bow and stern thrusters

The Hydrosta bow thruster range is made out of high-quality materials. The range includes hydraulically driven bow thrusters and bow thrusters equipped with an electric motor. The hydraulic models are supplied in 10, 15, 22, 35, 45, 60, 80, 100, 125, 150, 175 and 200 HP and the electrically driven Sider in 5, 11, 20, 35, 45, 60, 75, and 90 kW.

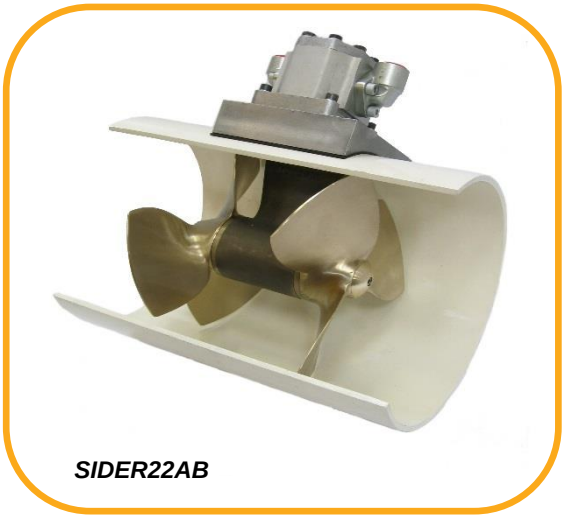
SIDER005E-AB



SIDER15AB

Design

The Sider is characterised by compactness and robustness, whilst to the hydrodynamic shape of the tailpiece and propellers the water resistance is minimised and increased the efficiency.
Because of the counter-rotating propeller concept the thrust is increased in relation to the specific diameter of the tunnel.
The hydraulic bow thrusters are suitable for continuous operation. The electric bow thrusters have a limited duty cycle which depends upon several factors. Normal duty cycle is about 10 min each hour. However, this depends on the variations of the thrusters. Ask for detailed information.



SIDER22AB

Technical

By using a special grease as lubrication for the bearings and drives the Sider thrusters are maintenance free. The bigger power thrusters are also available with oil bath lubrication on request.
A labyrinth construction between the propeller and the housing is protecting the double sealing against small fishing lines, etc.
The thruster installation is secured by two bolts. The tailpiece centres itself in the tunnel.
The 15, 22 and 35 HP variants are supplied with a geared motor. The 45 to 200 HP variants are supplied with a axial piston motor.

SIDER60AB

Control options, hydraulic

The Siders can be operated in three ways:

- On/off : Zero - full power (switching with tiller or buttons)
- 2-position : Zero - half power - full power (with 2-position tiller)
- Proportional : Proportional adjustment from 0 to full power in combination with proportional joystick

Proportional control is hardly recommended for Sider 22 HP and above.
With the 2-position tiller it is possible to set the half-power position as required.

- Hold function With proportional operation it is possible to hold the current thrust by using a pushbutton.

Operation, electric

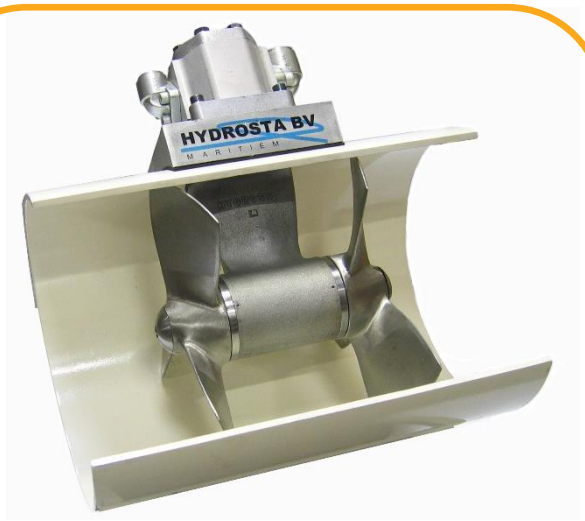
The electric Siders are controlled by using a frequency controller. This frequency controller comes with a special program. This program ensures that the electric motor runs at the correct speed at maximum power and that the propeller characteristic is incorporated in operation. As a result the power of the bow thrusters is linear in line in operation with the control joystick.

SIDER020E-AL

Materials

The Siders are made out of excellent materials that is resistant to the harsh environment of seawater. The housing and the propellers are made of "zinc-free" aluminium bronze*.
The Sider thrusters are also available in seawater-resistant aluminium. The aluminium versions must be coated before to use under water. In this variant the propellers are made of stainless steel or aluminium bronze.

* aluminium bronze (CuNiAl) in accordance with DIN 1714



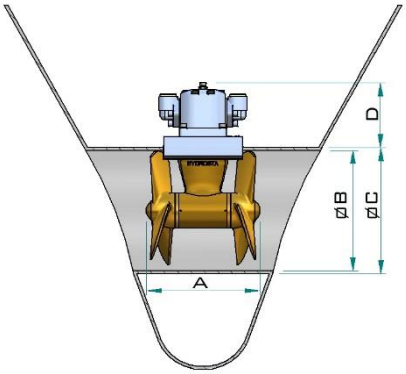
Sider 35HP, aluminium version

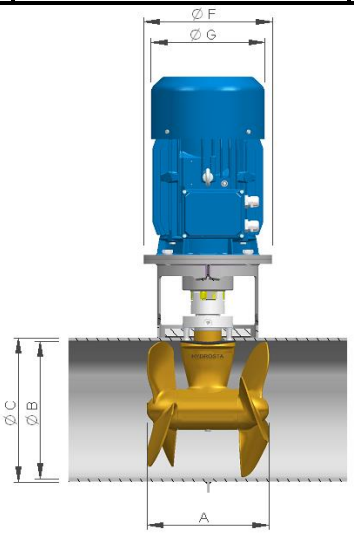
Dimensions, hydraulic bow thrusters

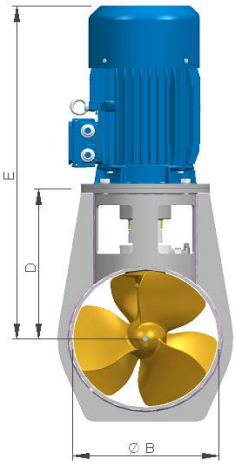
See table and drawing below for the overall dimensions of the Sider bow thrusters. Reserve free space above the Sider for assembling the hydraulic motor and to connect the hoses to the hydraulic motor.

Dimension	10/15 hp	22/35 hp	45/60 hp	80/100 hp	125/150 hp	175/200hp
A mm	262	285	365	465	533	748
B mm	257	340 (342 alu)	441	539	636	789
C mm	273	356 (358 alu)	457	559	660	813
D mm	135	165	235	305	310	580

Specifi-cations	10 hp	15 hp	22 hp	35 hp	45 hp	60 hp		80 pk			100 hp			125 hp			150 hp			175 hp	200 hp
Flow input l/min	22	34	44	70	94	137	146	135	145	175	155	167	200	195	210	250	225	240	305		445
Pres input Bar	195	215	225	225	230	225	200	295	275	230	320	295	250	285	265	220	295	275	245		220
prop. output kW	7,3	11	16	26	33	44		60			74			92			110				150
Weight AB [kg]	20,2		35		72			135						174						416	
Weight AL [kg]	17,7		32		65			125						155						345	







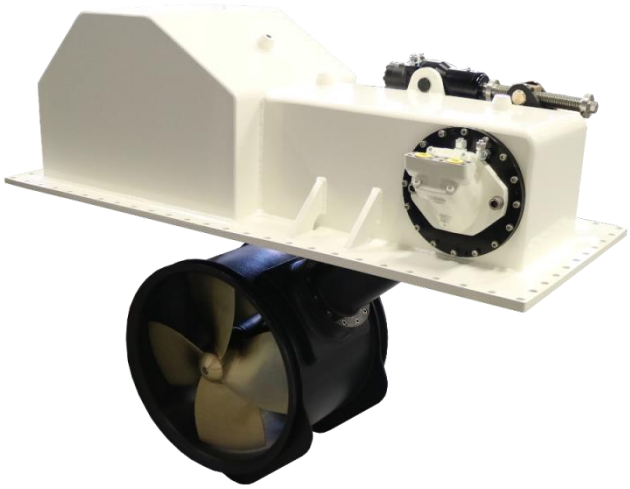
Dimensions, electric bow thruster

For the electric Siders reserve free space for mounting the drive motor for assembling. For the greater Siders the bell housing piece must be supported to the hull.

Dimensions	5 kW	7.5 kW	10 kW	18 kW	20 kW	26kW	33/44 kW	60/75 kW	90 kW	150 kW
A mm	262	262	262		285	285	360	465	530	
B mm	257	257	257	342	342	342	439	540	636	
C mm	273	273	273	358	358	358	457	559	660	
D mm	173	173	173	370	370	370	..	..	590	
E mm	489	523	523	821	821	916	..	..	1,345	
F mm	200	200	200	300	400	300	..	..	450	
G mm	205	225	233	270	270	315	..	..	490	

Technical

Up from 45 HP the Sider is also available in a retractable (Swing) version. Swing bow & stern thrusters are mainly used on sailing boats for which the hull of the boat should be closed when the unit is not in use. While the yacht is manoeuvring, the bow and stern thrusters are swung down so that the yacht can be moored. The section of the hull that opens is constructed to the outside of the tunnel of the thrusters. Each Swing is based upon a tailpiece with the same propellers that are used in a normal fix tunnel version of our standard bow thrusters. In the Swing version, a so-called extension arm is fitted on the mounting flange. The length of the extension arm in combination with the rotation angle is determined in consultation with the naval architect and depends upon the application. By the use of a bevel gear witch is fitted in the centre of the pivot the hydraulic motor can be fitted inside the yacht. The supply of a Swing includes a design process in which the specifications are established and the installation drawings to be delivered to our engineering team.



Counter-rotating Sider Swing 150

Materials

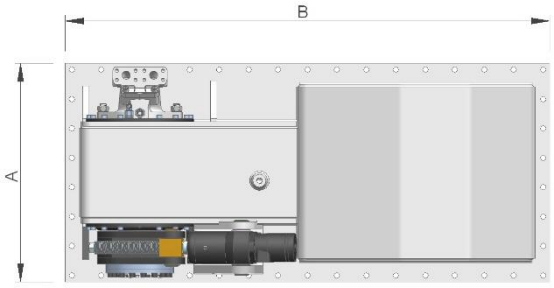
The Swing bow and stern thrusters can be supplied with an aluminium bronze or aluminium Sider. As a standard, the bow thruster housing is made of aluminium, the tailpiece of cast aluminium and the propellers of stainless steel our aluminium bronze.

Counter-rotating Sider Swing 200

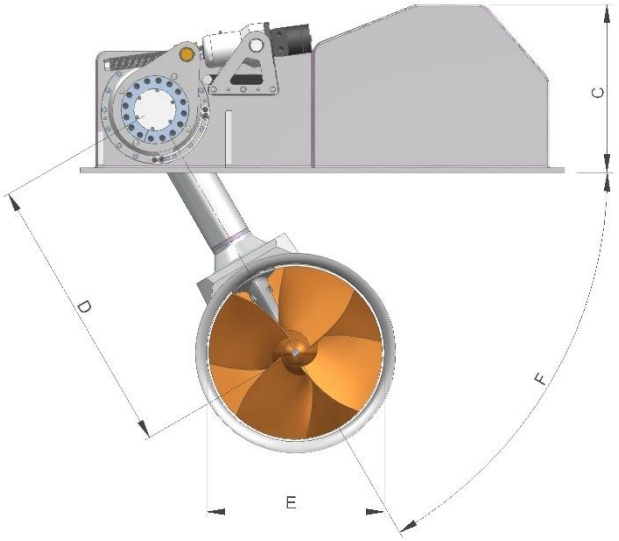
Dimensions

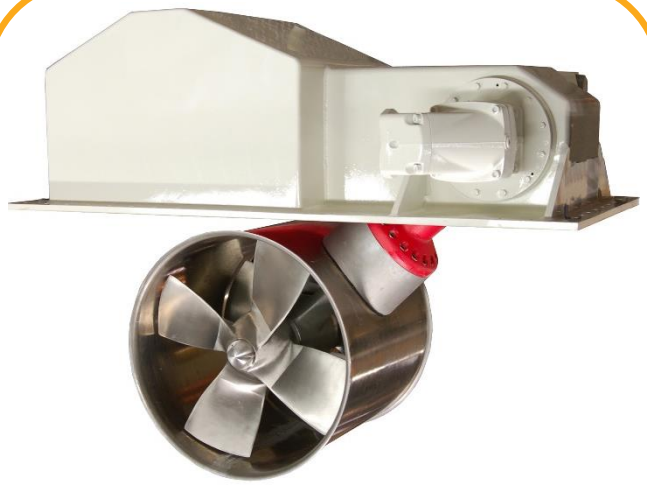
As described in the technical paragraph, the precise dimensions of a Swing are determined in consultation with the naval architect. This documentation only gives the main dimensions.

Contact us for specific information and digital construction drawings.



Dimension	45/ 60 HP	80/ 100 HP	125/ 150 HP	175/ 200 HP
A mm	525	650	800	1000
B mm	1325	1500	1875	2000
C mm	450	525	600	675
D mm	800	860	1075	1100
E mm	439	540	636	789
F °	30 ° - 60°			

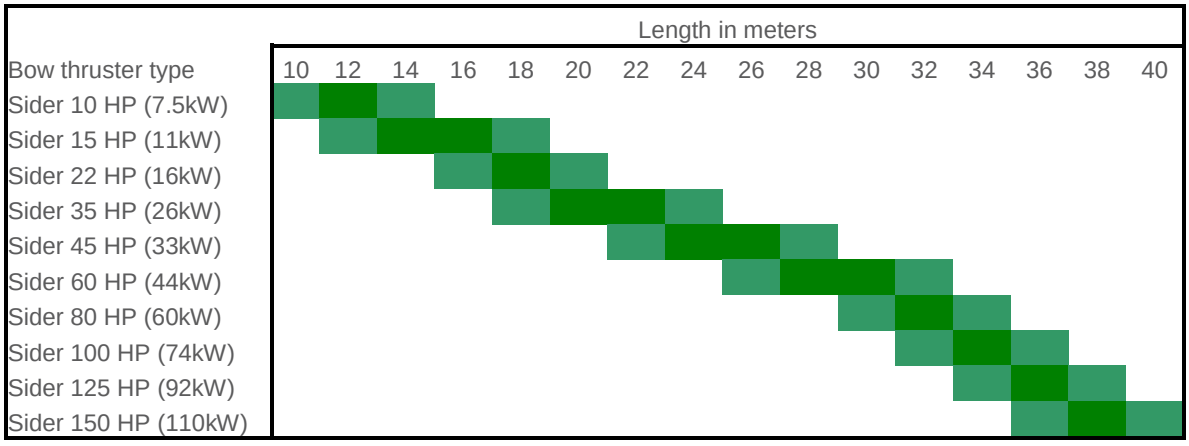




Counter-rotating Sider Swing 200 HP

Bow thrusters selection

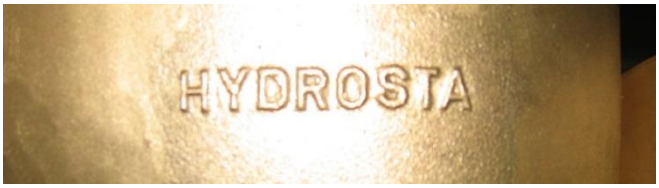
The choice of bow thruster will depend upon various factors. The length, weight and the degree of wind catch of the ship is a decisive factor. The table below is based upon the length of the ship. If the weight and wind catch is quit high, than take the left side of the range. This table serves only as a guide.



General information

The Hy-Prop is a hydraulic propulsion system that is available in a range from 35 to 300 HP.
It has the following major benefits in relation to normal propulsion:

- Excellent manoeuvrability by steering 2 x 90 degrees, forwards and backwards by reversing propeller.
- Propulsion and rudder in 1 unit.
- The Hy-Prop is simple to fit with the support of a standard mounting foundation.
- The Hy-Prop is suspended in rubber so that resonance of the hull is minimised.
- The diesel can be positioned at any desired location on board (space saving).
- Installation in a completely closed box is also possible, which helps to reduce the noise level.
- Thanks to the use of the hydraulic drive, damage is avoided in the event of propeller impact.



Unique own cast product

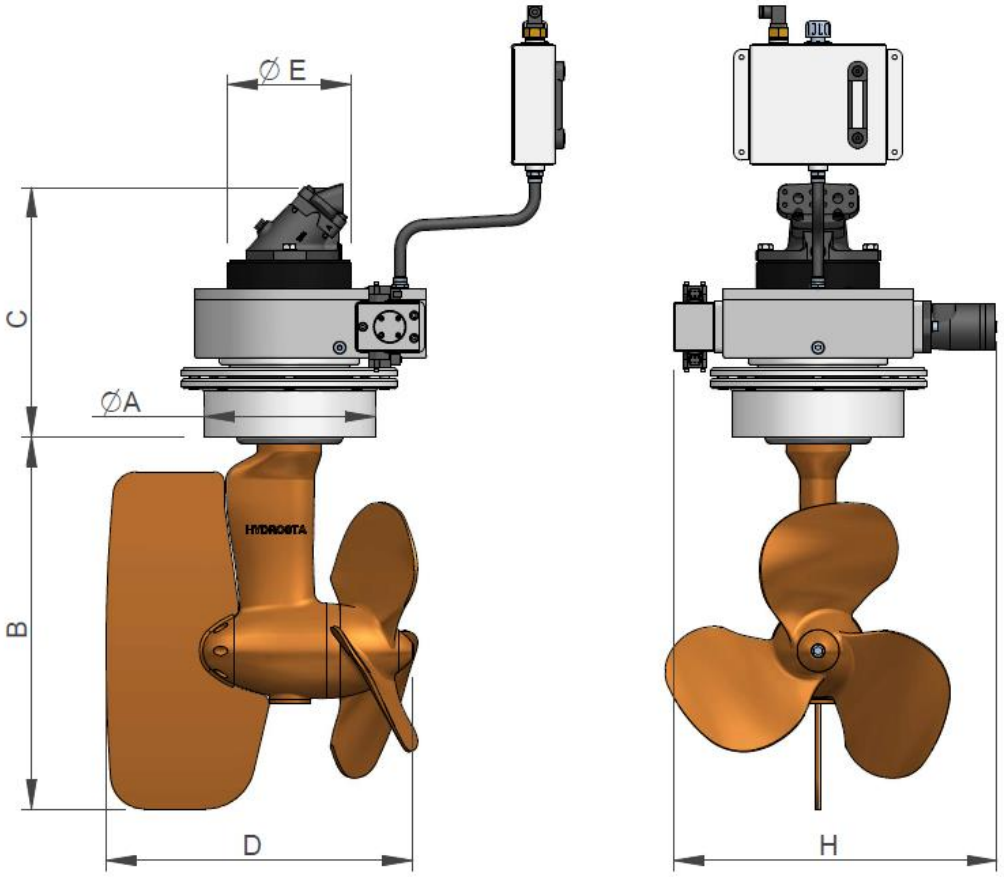
Example Hy-Prop 200

The Hy-Prop represents as a very good alternative to the standard propeller shaft and rudder constructions.
Because of the 180 degree steering angle it dispenses the need of a stern thruster.

Illustration Hy-Prop 250, manoeuvrable through 2x90 degrees

Example Hy-Prop 100

Dimensions



Dimension	35/50 HP		75/100 HP		160/200 HP		250/300 HP	
Ø A mm	324		324		385		385	
B mm	547		715		710		980	
C mm	523		640		715		955	
H mm	567		613		605		625	
Ø E mm	264		234		160		360	
Propellor	18x15.5 RH		23x15 RH		28x20 RH		32x24 RH	
D mm	484		584		760		930	
Specifications	35 HP	50 HP	75 HP	100 HP	160 HP	200 HP	250 HP	300 HP
Flow input l/min	100	100	155	190	275	320	550	550
Pressure input bar	160	225	240	245	260	280	205	245
Propeller output kW	26	37	55	74	118	157	184	221
Propellor output kW	26	37	55	74	118	184	184	221
Gewicht AB kg	220		260		435		850	

Note:
The hull shape and speed are decisive for determining the diameter and speed of the propeller. The characteristic of the diesel engine determines the hydraulic components (pump and motor). When combined with a Navio engine management system, the hydraulic transmission can be regarded as a continuously variable control unit (reversing clutch and variable gearbox in one). Ask Hydrosta about the options.

General information

The basic steering system comprises a range of steering systems from 300 DaNm up to 800 DaNm with a steering angle of 2x45 degrees, 2 x 60 degrees or 2x90 degrees. Up to 2x60 degrees, 2 cylinders are used with one or two yokes, depending upon the number of rudders. Rotation of 2x90 degrees is only achieved by a chain steering system with a single parallel cylinder.

Standard steering system with one yoke

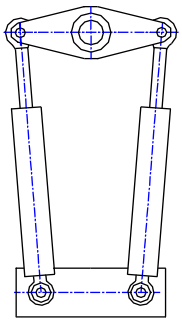
Standard chain steering system

Design

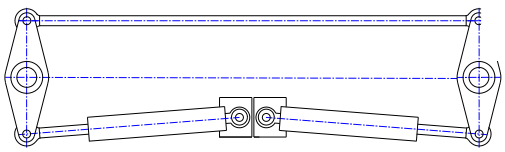
A Hydrosta steering system is characterised by robustness and flexibility. Hydrosta can determine the rudder Torque of your ship based upon its specific data. The following information is needed for the calculation:

- type of boat (motor yacht or sailing yacht),
- number of rudders and number of propellers,
- hull speed,
- rudder angle (2x45, 2x60 or 2x90 degrees or other),
- dimensions of rudder (height, length and length of balance part).

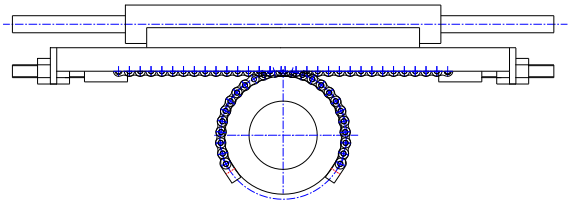
Installation options



Standard 1 yoke

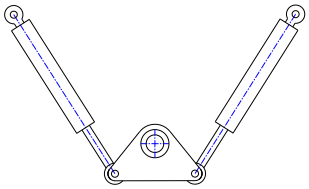


Standard 2 yokes

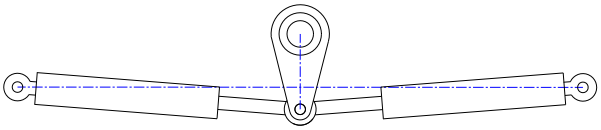


Chain steering system

General dimensions



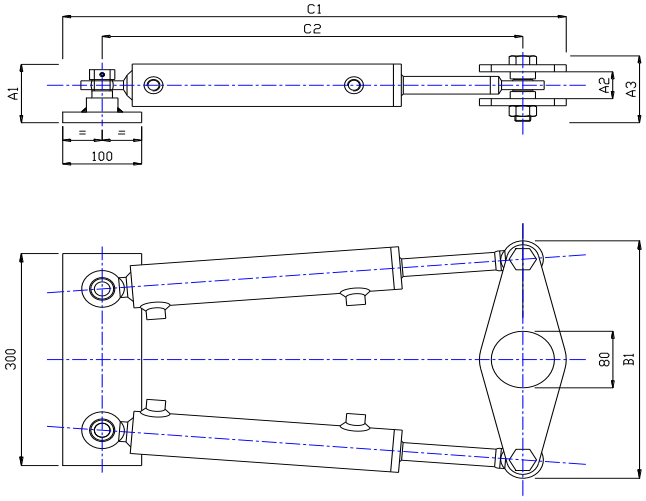
Variant 1



Variant 2

Dimensions

	A1	A2	A3	B1	C1	C2
SWC300KGM2x45	83	37	87	344	638	533
SWC400KGM2x45	83	37	87	414	713	608
SWC600KGM2x45	88	41	91	414	713	608
SWC800KGM2x45	93	41	91	414	713	608
SWC300KGM2x60	88	41	91	344	713	608
SWC400KGM2x60	88	41	91	414	765	660
SWC600KGM2x60	93	41	91	414	713	608
SWK300KGM2x90	Dimensions upon request					
SWK400KGM2x90						
SWK600KGM2x90						
SWK800KGM2x90						



Advice

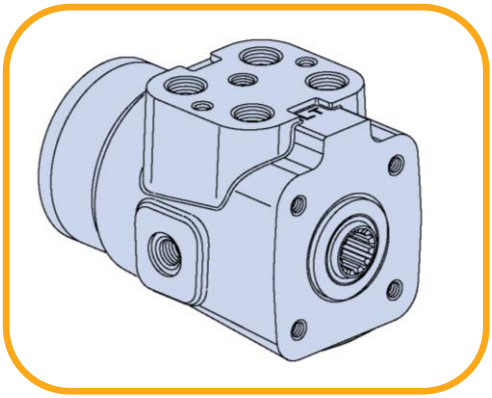
You can choose from the above-mentioned steering system versions, but different rudder torques and angles are also possible. Ask our maritime sales representative for the options.
For the steering set see Hydrosta power pack and steering control unit.

Technical info + order codes

Single yoke	Double yoke	Torque [daNm]	Rudder angle [deg]	Delivery distance [mm]	Flow [l/min]	Working pressure [bar]	Power [kW]
SWC300KGM2x45S	SWC300KGM2x45D	300	2x45°	142	3.4	88	0.6
SWC400KGM2x45S	SWC400KGM2x45D	400	2x45°	177	4.3	94	0.8
SWC600KGM2x45S	SWC600KGM2x45D	600	2x45°	177	6.2	98	1.3
SWC800KGM2x45S	SWC800KGM2x45D	800	2x45°	177	8.4	96	1.7
SWC300KGM2x60S	SWC300KGM2x60D	300	2x60°	142	6.2	85	1.1
SWC400KGM2x60S	SWC400KGM2x60D	400	2x60°	177	7.5	93	1.5
SWC600KGM2x60S	SWC600KGM2x60D	600	2x60°	177	10.3	100	2.1
SWK300KGM2x90		300	2x90°	225	5.1	93	1.0
SWK400KGM2x90		400	2x90°	250	7.4	86	1.3
SWK600KGM2x90		600	2x90°	275	10.3	92	2.0
SWK800KGM2x90		800	2x90°	300	13.9	91	2.6

General information

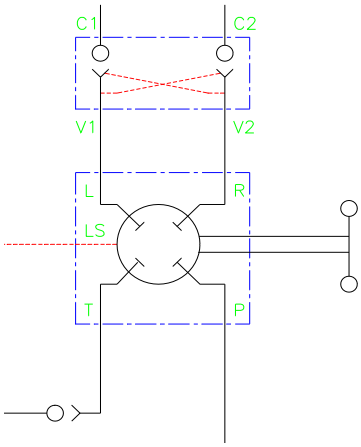
A power steering installation consists of a tank, pump, control valves and a power Steering Control Unit. Hydrosta uses standard dynamic steering control unit with a LS-connection. These connect perfectly to the standard Hydrosta maritime power packs. The steering control employs a rotary motion to control the quantity of oil supplied to the steering system on command to each direction. For emergency the steering control unit even works without servo-assistance (i.e. without pumps). However, in this mode steering is much heavier and powered with hand.



The number of strokes from side to side is determined by the size of the steering control unit and the capacity of the selected steering system. The desired steering control unit can be selected from the table below. You select the desired steering system size in the horizontal row along the top, then look up the desired number of strokes in the same vertical column, and finally read off the correct steering control unit at the left of the row.

Steering Control Unit	cc	SWC300KGM2x45	SWC400KGM2x45	SWC600KGM2x45	SWC800KGM2x45	SWC300KGM2x60	SWC400KGM2x60	SWC600KGM2x60	SWK300KGM2x90	SWK400KGM2x90	SWK600KGM2x90	SWK800KGM2x90
263-4054	75	9.1										
263-4055	95	7.2	9.1									
263-4056	120	5.7	7.2						8.5			
263-4057	145	4.7	5.9	8.6		8.6			7.0			
263-4058	160	4.3	5.4	7.8		7.8	9.4		6.4	9.3		
263-4059	185		4.6	6.7	9.1	6.7	8.1		5.5	8.0		
263-4060	230		3.7	5.4	7.3	5.4	6.5	9.0	4.4	6.4	9.0	
263-4077	295			4.2	5.7	4.2	5.1	7.0	3.5	5.0	7.0	9.4
263-4088	370			3.4	4.5	3.4	4.1	5.6	2.8	4.0	5.6	7.5
263-4089	460				3.7		3.3	4.5		3.2	4.5	6.0
263-4090	590							3.5			3.5	4.7
263-4091	740							2.8				3.8

Connection information:



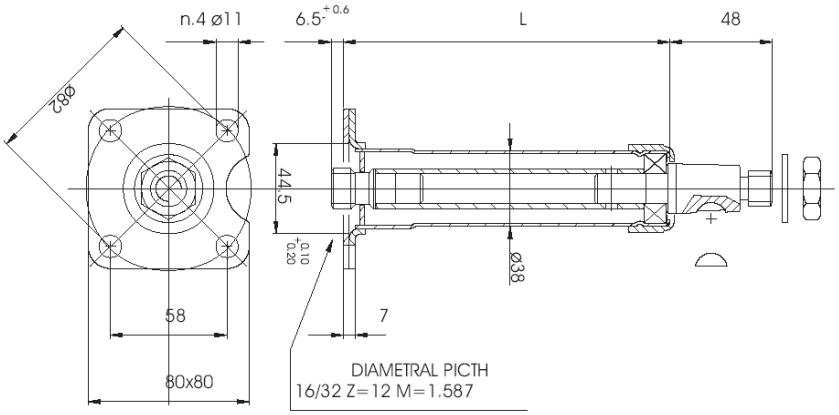
Connections:		
P	Right front	G 1/2” BSP
T	Left rear	G 1/2” BSP
L (A)	Right rear	G 1/2” BSP
R (B)	Left front	G 1/2” BSP
LV	Left	G 1/4” BSP

The code is on the steering control unit (cast into the housing).

Installation

For optimum operation of the steering control unit a non-return check valve is to be advised to install in the return (T) line back to the reservoir. Back pressure from other users must be avoided in the hydraulic system. Pilot operated check valves in the A and B lines ensure that the oil cannot escape through the orbitrol in combination with parallel electric steering valve options such as joystick, follow-up or autopilot options.
The position of this valves must be as close as possible to the steering control unit. For this kind of valves, see the Chapter "Cartridge valves".

The orbitrol has a universal internal spline adapter with 12 teeth 16/32 pitch. Hydrosta supplies a range of control rods that can be fitted through the dashboard to adapt the steering wheel.



Order number:	CSF0110075
Cone:	1:20
Length L:	75mm
Steering wheel:	Stazo with adapter
Bolts:	4 off 3/8 x 1" UNC

Capstans Winch
Hydraulic driven

HYDROSTA

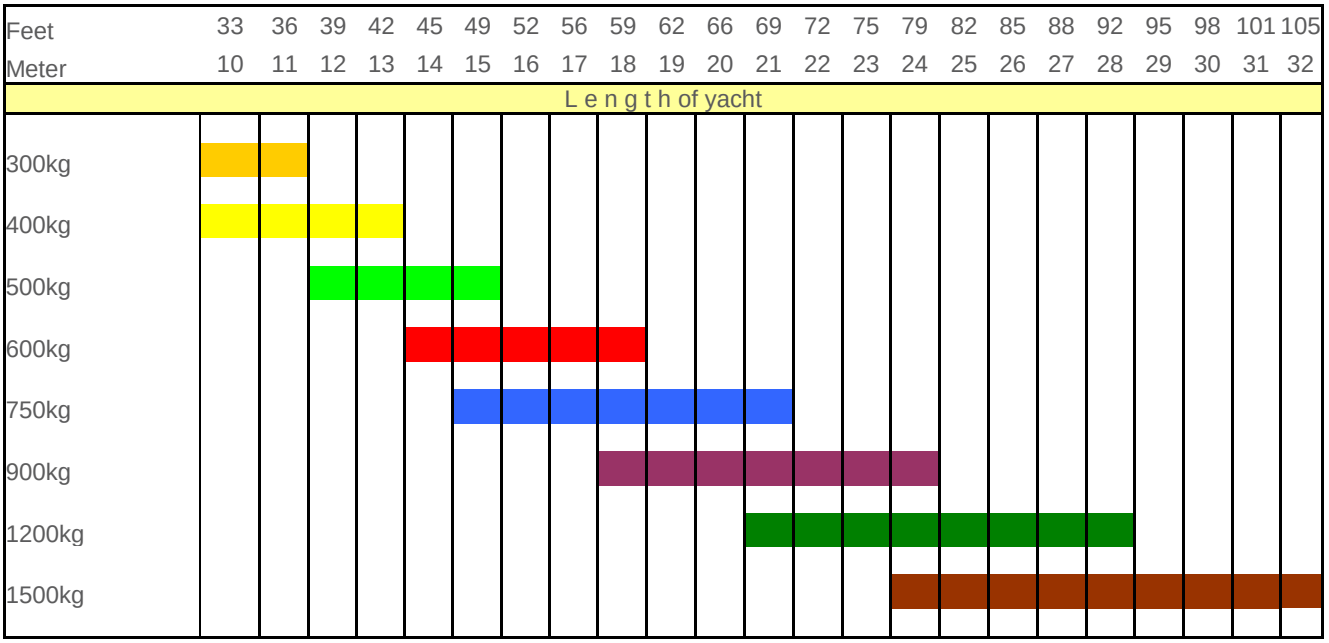
General information

A capstan winch is a simple unit witch makes it very easy to moor a yacht with less hand power. A stainless steel or aluminium drum driven with a hydraulic motor mounted on a stainless or aluminium mouthing flange provides lateral force.

The hydraulic motor can be incorporated into the hydraulic system with a hydraulic sectional valve.

The range of Capstans winch comprises the following types:

Model	kg	300	400	500	600	750	900	1200	1500
Model number	UK	300	400	500	600	750	900	1200	1500
Motor capacity	cc	80	100	130	160	195	245	305	395
Drum diameter	mm	115	115	115	115	115	115	115	115
Working pressure	bar	140	140	140	140	140	140	140	140
Speed	l/min	1.2	1.5	2.0	2.4	2.9	3.7	4.6	5.9
Hydraulic power	kW	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.4
Boat length	metres	-12	10-14	12-16	14-19	15-22	18-25	21-29	24-33



General information

The Hydrosta product range of stabilizers is available in various dimensions. Stabilizers oppose the rolling movement caused by swell during sea journeys. Hydrosta stabilizers reduce this roll effect by more than 90% witch result in comfort and as result, reducing the chance of seasickness. To operate this stabilizers set it can be combined with the standard Hydrosta hydraulic system. Hydrosta provides both hydraulic and electronic drives as a complete working system.

Design:

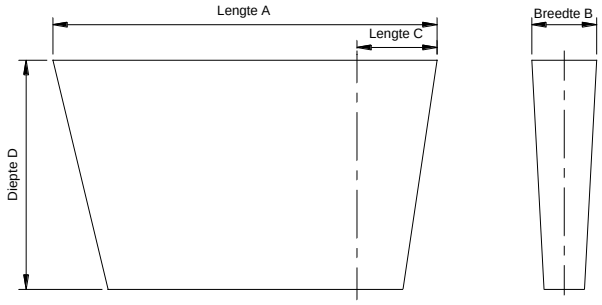
Fin	The range of stabilizer blades was designed for ships from 15 up to 40 metres (50-135ft) based upon the Naca 15 profile. The fin design includes a good hydrodynamic shape so that resistance is kept to a minimum in the water. The working point of the blade is favourably positioned, meaning that the efficiency is high. The fin shaft is made out of seawater-resistant stainless steel.
Mounting	To mount the stabilizer Hydrosta supply a set of basic inserts depending on the material of the hull. Inside the insert the bearing support can be mounted with a special set of seals witch we know from the Hy-prop construction. The great benefit of this design is that there is no metallic contact with the hull of the vessel, which results in a very silent operation of the stabilizers.
Cylinders	A yoke with taperlock fastening system is affixed to the fin shaft, when this is mounted on the bearing support. A fastening plate on the bearing bush keeps the cylinders securely affixed to the underside. The electronic rudder-position sensor is also affixed to the plate. A set of cylinders each fin ensure reliable operation; the low working pressure combined with the lack of metallic contact ensure silent operation. The stroke of the cylinder is much greater than the steering range of the fins so a build-up of pressure due to the limit stop being reached will never occur.

Stabilizer - demo model for which the fin has also been painted (standard the fin's are not painted). Equipped with cylinders and trunnion, the hull insert is also shown as open model.

Technical

The steering cylinders of the stabilizer were designed for a low working pressure with a relatively high oil flow. The stabilizers, which continuously adapt the maximum pressure of the hydraulic system, are extremely well suited in combination with hydraulic bow and stern thrusters. The stabilizers require no steering blocks for this, and the steering section can simply be positioned in the main hydraulic system.
The rolling motion of the boat is measured by a Navio gyro. This gyro is positioned at the bottom of the boat. The rolling motion is smoothed out by moving the two fins in the opposite direction of the rolling direction. The proportional valves ensure a flexible and smooth operation.

Dimensions of fins



Dimensions [mm]				
Surface area	Length A	Width B	Length C	Depth D
0.53m²	1007	170	210	590
0.78m²	1215	200	260	725
1.15m²	1475	240	300	880
1.52m²	1696	280	350	1012

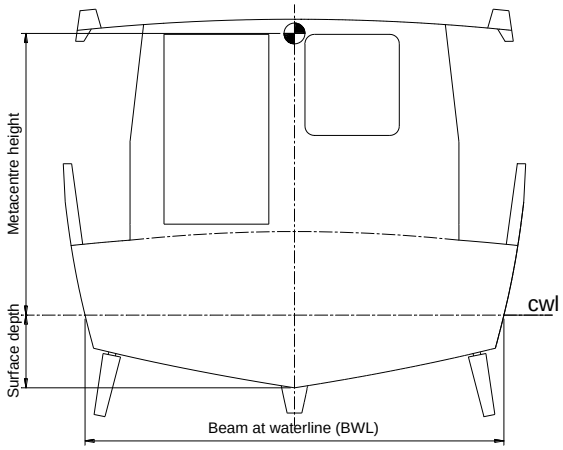
Order codes			
Code	Material Insert	Surface area	Fin material
ROD	AL (aluminium)	05 (0.53m²)	Stainless steel
		07 (0.78m²)	
	ST (steel)	11 (1.2 m²)	
		15 (1.52m²)	

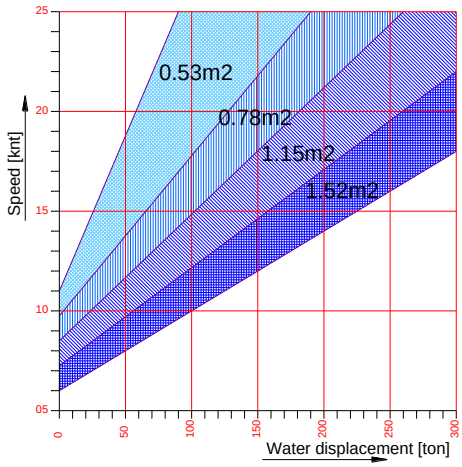
The design data of the ship are important when determining the size of the fin. Hydrosta needs the following information to perform a stability calculation:

- Length over all (LOA)
- Beam at waterline of ship (BWL)
- Surface depth
- Metacentric height (MCH)
- Water displacement (in tonnes)
- Design speed of stabilizers (knt)

Based upon this information, Hydrosta can determine the correct fin dimension.

You can also use the graph to estimate the fin dimension.





Electronics

The associated electronics comprise:

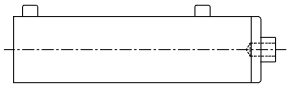
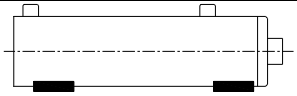
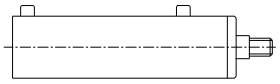
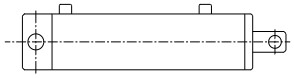
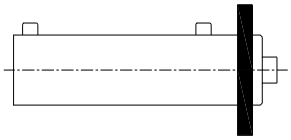
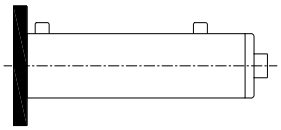
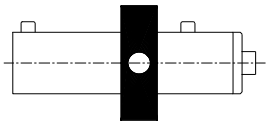
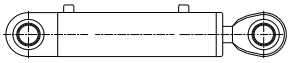
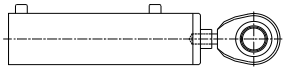
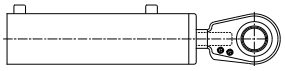
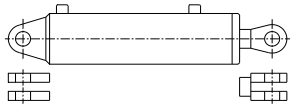
- Control monitor 5.7" screen Navio 301
- Heading gyro solid state Navio 820
- Inclinometer absolute MD ANS30
- Control unit Navio750.
- Angle encoders supplied with steering system

All electronic components are connected together with our standard Can-bus.

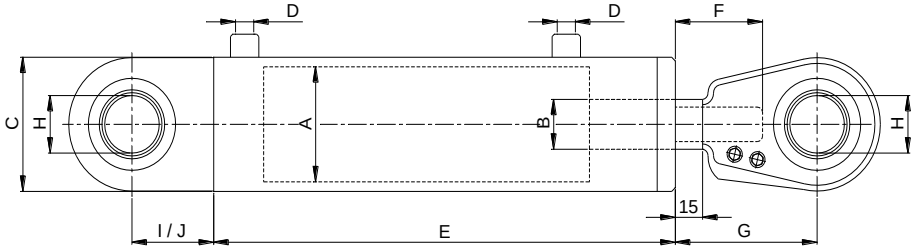
General information

Hydrosta has a large range of hydraulic cylinders in its product range. The double-acting cylinders can be supplied in steel or stainless steel (including seawater-resistant 316). The steel cylinders must be painted by the customer. Hydrosta can also supply some single-acting or telescopic cylinders. The stroke of the cylinder can be freely specified.

The fastening options are (combinations also possible):

 None / thread in rod	 Side fastening flanges	 Thread on rod	 Hole in rod/hole in base
 Front flange	 Base flange	 Trunnion	 Fixed eye (rod/base)
 Spherical eye (rod/base)	 Spherical eye in rod, adjustable	 Spherical eye on rod, adjustable	 Forks (rod and/or base)

Dimension										Forces in kN at ... bar							
										Thrust				Tractive force			
A	B	C	D	E	F	G	H	I	J	100	150	175	200	100	150	175	200
30	20	40	G1/4"	135	31	53	20.0	38	15	6.9	10.4	12.1	13.9	3.9	5.8	6.7	7.7
40	20	50	G1/4"	142	31	53	20.0	38	20	12.3	18.5	21.6	24.7	9.2	13.9	16.2	18.5
40	25	50	G1/4"	142	31	53	20.0	38	20	12.3	18.5	21.6	24.7	7.5	11.3	13.1	15.0
40	30	50	G1/4"	142	31	53	20.0	38	20	12.3	18.5	21.6	24.7	5.4	8.1	9.4	10.8
50	25	60	G3/8"	142	31	53	20.0	38	20	19.3	28.9	33.7	38.5	14.4	21.7	25.3	28.9
50	30	60	G3/8"	142	31	53	20.0	38	20	19.3	28.9	33.7	38.5	12.3	18.5	21.6	24.7
60	30	70	G3/8"	142	31	60	25.0	45	25	27.7	41.6	48.5	55.5	20.8	31.2	36.4	41.6
60	35	70	G3/8"	142	31	60	25.0	45	25	27.7	41.6	48.5	55.5	18.3	27.4	32.0	36.6
60	40	70	G3/8"	142	31	60	25.0	45	25	27.7	41.6	48.5	55.5	15.4	23.1	27.0	30.8
70	35	82	G1/2"	168	31	60	25.0	45	25	37.8	56.6	66.1	75.5	28.3	42.5	49.6	56.6
70	40	82	G1/2"	168	31	60	25.0	45	25	37.8	56.6	66.1	75.5	25.4	38.1	44.5	50.9
80	40	92	G1/2"	168	37	66	30.0	51	30	49.3	74.0	86.3	98.6	37.0	55.5	64.7	74.0
80	50	92	G1/2"	168	37	66	30.0	51	30	49.3	74.0	86.3	98.6	30.0	45.1	52.6	60.1
90	45	105	G1/2"	168	37	76	35.0	61	35	62.4	93.6	109.2	124.8	46.8	70.2	81.9	93.6
90	50	105	G1/2"	168	37	76	35.0	61	35	62.4	93.6	109.2	124.8	43.1	64.7	75.5	86.3
90	60	105	G1/2"	168	37	76	35.0	61	35	62.4	93.6	109.2	124.8	34.7	52.0	60.7	69.3
100	50	115	G3/4"	190	50	84	40.0	69	40	77.0	115.6	134.8	154.1	57.8	86.7	101.1	115.6
100	60	115	G3/4"	190	50	84	40.0	69	40	77.0	115.6	134.8	154.1	49.3	74.0	86.3	98.6
100	70	115	G3/4"	190	50	84	40.0	69	40	77.0	115.6	134.8	154.1	39.3	58.9	68.8	78.6



Consult Hydrosta Engineering regarding the application of the cylinder and availability.

General

A maritime system differs from the other units by the use of a load-sensing pump and valve block. This pump can be driven either with an electric motor or with a combustion engine. Combinations of those two is also possible.

Because of the versatile options and compact construction it make's the Hydrosta Load Sensing Powerpack a unique set. The Load Sensing PowerPack is often used in combination with a Load Sense pump driven by a diesel engine. These PowerPacks are excellently suited for long-term and intensive use and are made up of the following components as standard:

- Reservoir (steel or aluminium), as standard or custom build,
- Filler cap with venting,
- Sight level glass with temperature gauge integrated,
- Multifunctional valve block with integral return line filter,
- Vibration cushioning,
- LS pump to the diesel engine (PTO/ front or rear mounting),
- Possibly supplemented by electric pump set for backup,
- Possibly designed with optional priority valve.

The Load Sensing design can be expanded for several user functions. The specific pressure and flow can be adjusted for each single function. With this Load Sensing design the sections are compactly assembled.

Maritime hydraulic Reservoir with valve block on top

Custom build hydraulic reservoir, aluminium, 8kW total.

Advice

There are several valves that require adjustment on both side, front and back. All users are hydraulically connected on the backside. It is recommended that space must reserved here for service and installation. The return filter is located inside the valve block. It must be possible to replace this filter, therefore extra space is needed above the reservoir. The sight level glass must be readable and the drain plug accessible for service.

Choice of pump

The required output determines the layout of the pump. This output is called the 'flow'; and is announced as litres per minute (lpm). The formula for the calculation of the displaced volume is:

$$\frac{\text{Maximum desired flow} * 1000}{\text{number of motors} * \text{idle speed of diesel engine}} = \text{displaced volume of pump}$$

The options for pumps are listed in the Chapter 'Pumps'.

Custom built power packs

There are lots of customer-specific options – please contact our system department to find out about the options. A few examples of customer-specific systems are shown below:

Extra-high tank, spray-painted in RAL9010

Standard dimensions of tank, but in aluminium and with emergency control set.

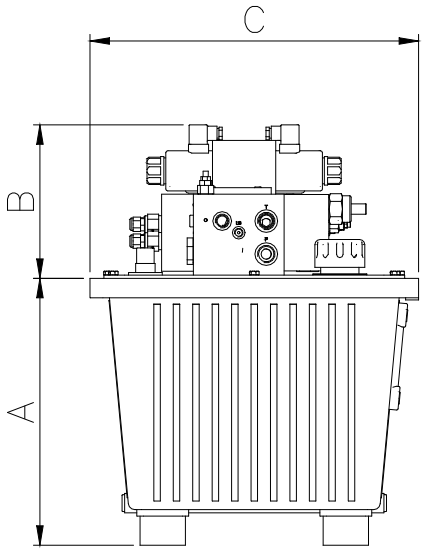
Maritime control system with 230V electric motor and 24 V DC backup system

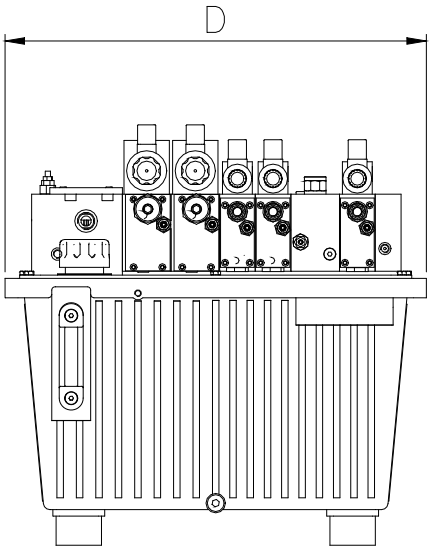
Mobile power pack equipped with drain reservoir, 5 functions and control cabinet with remote control.

Maritime system, long design 160 litre reservoir equipped with 24 V DC electric motor, suction connection and customer-specific location of sight glass.

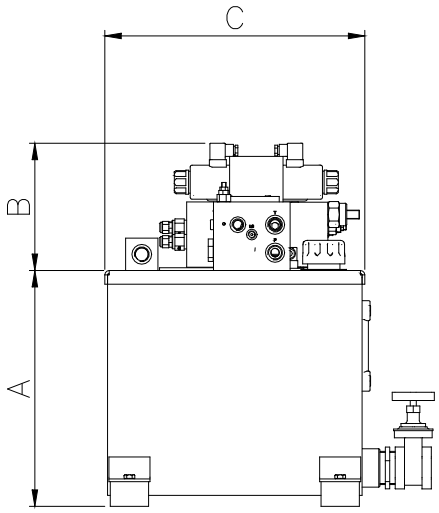
Maritime system, long design 160 litre reservoir

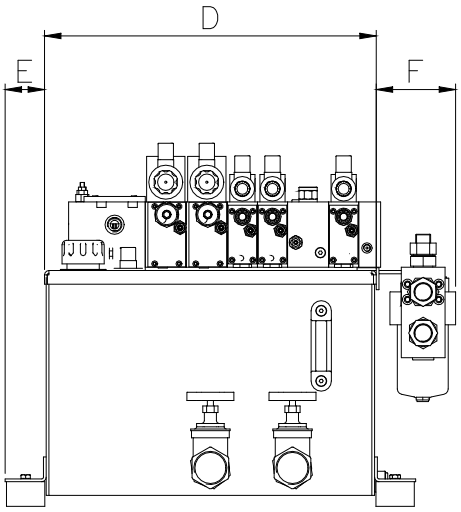
Table of power pack dimensions





Tank size	A	B	C	D
70 litres	410	340*	507	650





Tank size	A	B	C	D	E	F
110 litres	420	400*	475	610	75	150
150 litres	420	400*	515	785	75	150
160 litres	420	400*	390	1010	75	150
200 litres	530	400*	500	780	75	150
250 litres	410	400*	650	1020	75	150
300 litres	460	400*	650	1020	75	150

* depending upon the valve block, the height is ± 250 mm for standard valve blocks. However, account must be taken of the replacement of the return line filter, and so a free height above the return filter lid of at least 400 mm is recommended.

Once the size of the hydraulic tank is known, the customer-specific details are discussed with Hydrosta representative. To determine the connection(s) for the pump(s), the location of the sight level glass, etc. As standard, the reservoir is spray-painted in RAL 1007 (yellow).

General information

Hydrosta offers a wide range of valves and regulation blocks. The blocks are used to control the hydraulic oil correctly from the pump to all different users. A so-called valve block can be simply assembled based upon the functions that are operated hydraulically. Of course it is possible to assemble functions based upon the customer's own specifications – just ask about the possibilities!

A Hydrosta valve block is assembled and tested by own engineers. Each function is adjusted to the desired maximum pressure and the required flow. The pump module contains a maximum pressure relieve valve to protect all functions.

Example of valve block

General information

A PowerPack is an electrically driven hydraulic unit that can operate several users. The electric motor drives a gear pump. As a standard, the Power packs are made up of the following components:
Reservoir, steel (55 litres) or aluminium (44 / 70 litres),
Electric motor (24V, 240V of 400V),
Filler cap/venting,
Sight level glass with temperature gauge fitted,
Multi-functional basic valve block,
Vibration dampers.

In the column below, the capacity of the electric motor and the size of the tank follow from the desired maximum pressure and the required litres per minute.

PowerPack 70 litres, 7 functions

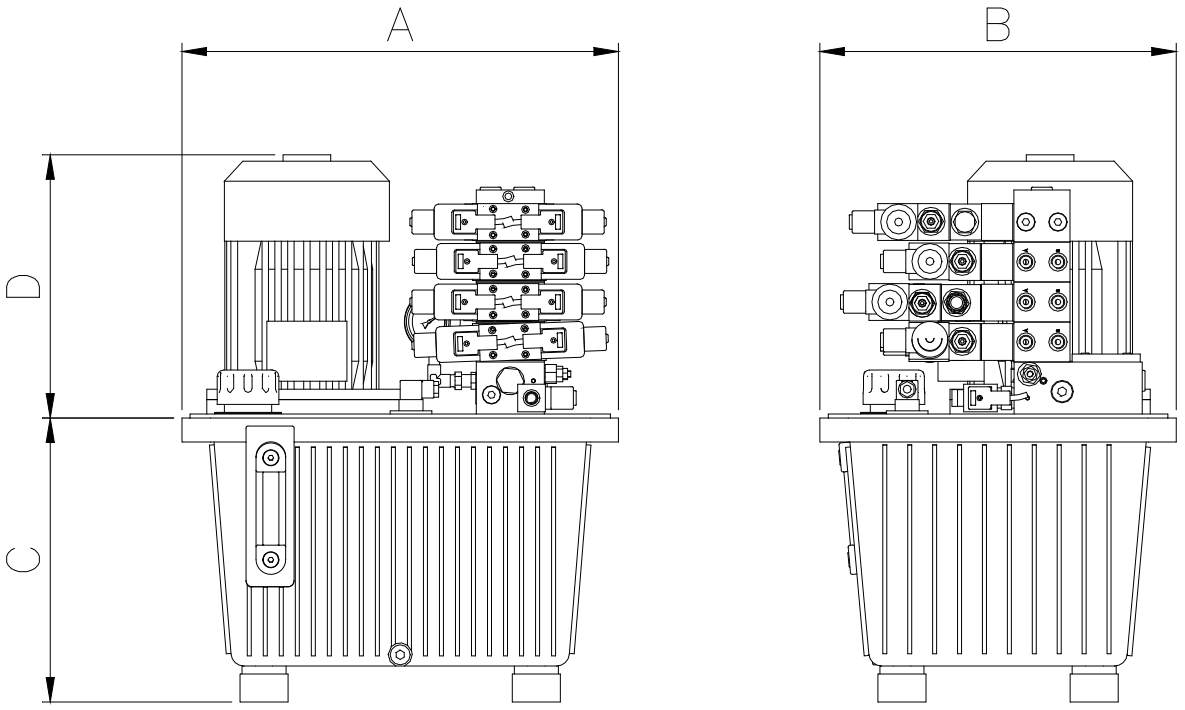
Pressure / flow	3	lpm	6	lpm	9	lpm	12	lpm	15	lpm	20	lpm
Tank size	44	litres	44	litres	44	litres	44	litres	55	litres	70	litres
100 bar	0.75	kW	1.1	kW	2.2	kW	2.2	kW	3	kW	4	kW
150 bar	1.1	kW	2.2	kW	3	kW	3	kW	4	kW	5.5	kW
175 bar	1.1	kW	2.2	kW	3	kW	4	kW	5.5	kW	7.5	kW
200 bar	1.1	kW	2.2	kW	4	kW	5.5	kW	5.5	kW	7.5	kW
250 bar	1.5	kW	3	kW	4	kW	5.5	kW	7.5	kW	11	kW

The PowerPack unit can control a number of users, for example cylinders and/or hydraulic motors. You can set the requirements for each user regard to pressure, flow and control. With our multi-functional sectional system each configuration can be compactly assembled. As shown in the illustration, the valve blocks are stacked up vertically from the tank lid up wards.

General dimensions

Dimensions		A	B	C
Aluminium reservoir	44 litres	543	443	320
	70 litres	650	507	370
Steel reservoir	55 litres	560	370	395
Design		24 V DC	240 V AC	400 V AC
Dimensions		D	D	D
Electric motor + flange *	0.75 kW	325	285	260
	1.1 kW	325	325	280
	1.5 kW	375	350	310
	2.2 kW	375	445	335
	3 kW	325	445	335
	4 kW	355 / 415		350
	5.5 kW			445
	7.5 kW			445

Dimensions in mm.
* Extra damping ring is optional, height + ± 50 mm.



Order code:

PP - 2.2 - 09 - 024V

PP - Power Pack

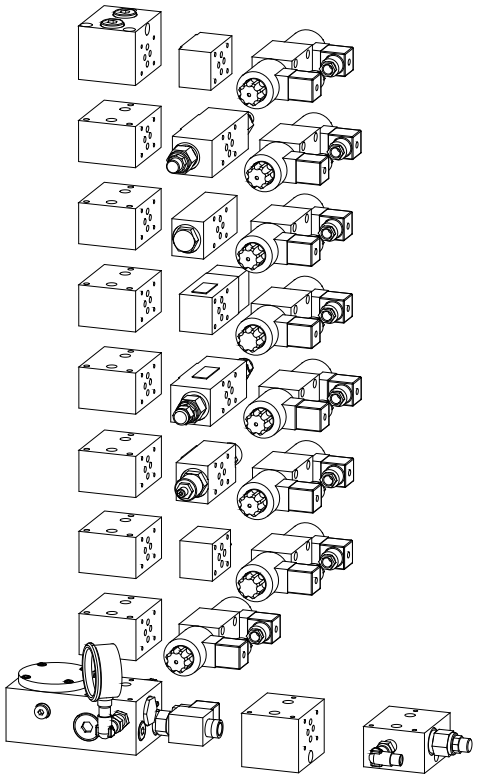
0.75 – 0.75 kW
1.1 – 1.1 kW
1.5 – 1.5 kW
2.2 – 2.2 kW
3 – 3 kW
4 – 4 kW
5.5 – 5.5 kW
7.5 – 7.5 kW

03 – 3 litres per minute
06 – 6 litres per minute
09 – 9 litres per minute
12 – 12 litres per minute
15 – 15 litres per minute
20 – 20 litres per minute

024 V – 24 V DC
230 V – 230 V AC
400 V – 400 V AC

General information

Example of valve block with possible functions

	Base section	Intermediate structure function	Valve	
8	NG06 end section	Non-return valve in return	PTAB closed 1C	
7	NG06 intermediate section	Cross over A + B	PTAB open 2C	
6	NG06 intermediate section	Controlled non-return valve double/ Controlled non-return valve A/ Controlled non-return valve B	ABT open 4C	
5	NG06 intermediate section	Reduction A/ Reduction B	PT open 8C	
4	NG06 intermediate section	Double brake valve/ Single brake valve A/ Single brake valve B	Prop. PTAB closed 1C	
3	NG06 intermediate section	Supply choke/ Supply choke fine/ Outlet choke/ Outlet choke fine	Prop. ABT open 4C	
2	NG06 intermediate section	External shuttle valve	ABT open 4C	
1	NG06 intermediate section		ABT open 4C	
0	Filter block with circulation pump function and manometer connection / start section / start section with pressure limitation, manometer connection			

Combinations of the above-mentioned sectional functions are also possible. The table contains the most common intermediate section functions, other functions upon request.

Compact Unit

A compact unit is an electrically driven hydraulic unit with small user(s) and a tank size of up to ±15 litres. The electric motor (12V, 24V, 240V) drives a gear pump. Design upon request.

Compact Unit 240VAC

Compact Unit 24VDC

General information

Hydrosta offers a very extensive range of Eaton, Sunfab and Parker axial piston pumps. These pumps can be used for the hydraulic installations in this catalogue. The options are summarised in the table below. Each pump is available with various standardised installation flanges and shafts. It is also possible to assemble so-called tandem pumps. This means that a pump has a union PTO flange on the back to adapt a second pump on his rear. Ask Hydrosta about the options. There are also various options in pump compensators. Depending upon the application, the pump can have a load-sensing control, constant-pressure control or a fixed-output pump control. Ask Hydrosta about the options.

Eaton 70122, 70422, 70423, and 70523 series plunger pumps

Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
19	41.6	2500	280	8	70122
38	98.4	2700	280	12.3	70422
45	125	3000	280	11.8	70423
69	159	2500	280	35.4	70523

Eaton 220 series mobile pumps

Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
28	80	3000	280	16.3	AEC028

Eaton 420 series mobile pumps

Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
41	109	2650	280	22.9	ADU041
49,2	128	2650	280	22.9	ADU049
62,3	158	2600	280	23.8	ADU062
80	172	2200	210	24.2	ADU080

Eaton 420 series mobile pumps

Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
74	172	2400	280	43.5	ADY074
98	209	2200	280	45.9	ADY098

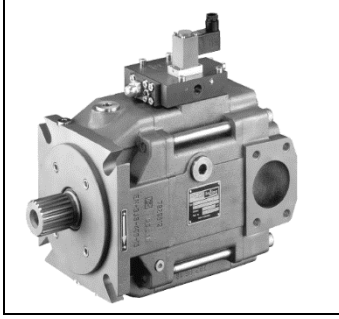
Sunfab SVH series plunger pumps

Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
62	150	2500	350	24	SVH-062
92	205	2300	350	27	SVH-092
112	239	2200	350	30	SVH-112
130	265	2100	350	30,8	SVH-130

Eaton Duraforce plunger pumps

Maximum displaced volume in cm3/r	Target output @ 1450 rpm in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
55	144	2700	420	39	HPR055
75	189	2600	420	39	HPR075
105	234	2300	420	50	HPR105
135	301	2300	420	65	HPR135
165	336	2100	420	89	HPR165
210	407	2000	420	116	HPR210
280	485	1800	420	165	HPR280

Hawe inline plunger pumps D-series



Maximum displaced volume in cm3/r	Target output @ 1450 rpm in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
45	65	2600	350	46	V30D-045
75	109	2400	350	66	V30D-075
95	139	2200	350	76	V30D-095
115	167	2000	250	76	V30D-115
140	206	2200	350	91	V30D-140
160	238	1900	250	91	V30D-160
250	365	1800	350	136	V30D-250

Hawe Inline plunjer pompen E-serie

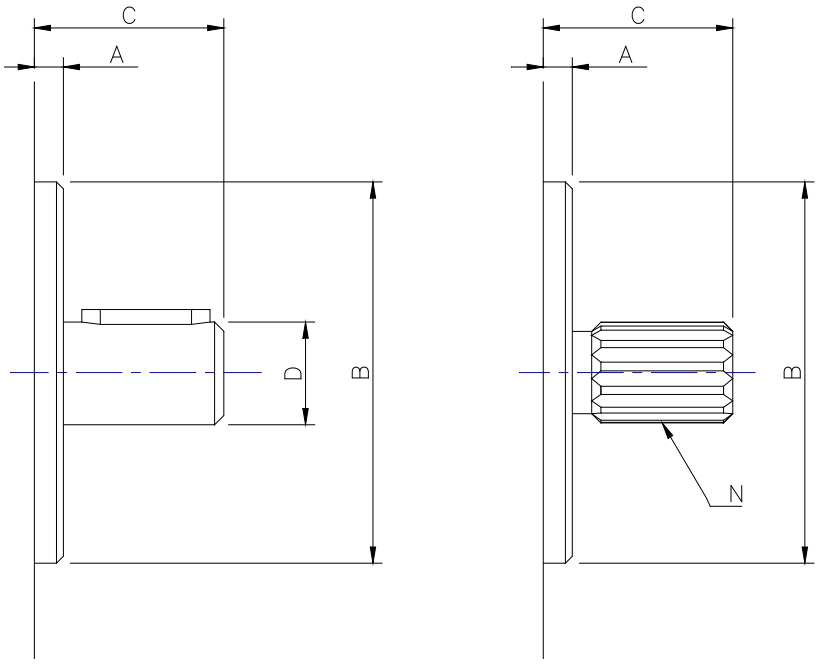
Maximaal slagvolume in cm3/r	Maximale opbrengst @ max. toerental in lpm	Maximaal toerental in tpm	Maximale werkdruk in bar	Gewicht in kg	Model code
95	230	2500	350	54	V30E-095
160	326	2100	350	74	V30E-160
270	498	1900	350	126	V30E-270

Table Pumps / flanges / shafts.

	SAE-A				SAE-B				SAE-C					SAE-D		SAE-E			SAE-F	
	Cyl.		Spline		Cyl.		Spline		C	Spline				Spline		Spline			Spline	
	19.05mm	22.2mm	9T-16/32	13T-16/32	22.2mm	25.4mm	13T 16/32	15T 16/32	31,8mm	14T 12/24	17T 12/24	21T 16/32	23T 16/32	13T 8/16	27T 16/32	13T 8/16	27T 16/32	17T 8/16	15T 8/16	
70122	•	•	•	•																
70422-70423					•	•	•	•												
70523									•	•										
AEC028					•	•	•	•												
ADU041, 49 & 62					•	•	•	•	•	•										
ADU080						•		•	•	•										
ADY074 & 098									•	•	•									
SVH-062							•	•		•										
SVH-092										•										
SVH-112 & 130										•		•								
HPR055										•										
HPR075										•		•								
HPR105											•		•							
HPR135											•			•	•	•	•			
HPR165														•	•	•	•			
HPR210																	•		•	
HPR280																			•	
V30D-045 & 075										•										
V30D-095 t/m 250														•						
V30E-95 &160														•						
V30E-270														•				•		

General information

Overview of dimensions of flanges and shafts with the permitted maximum torque.



Flange	Shaft	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	N [-]	Max torque [Nm]
SAE-A	19,05 (¾")	6,3	82,52	44,4	19,05	21,08		113
	22,2 (7/8")			41,1	22,23	24,94		209
	9T 16/32 DP						9	209
	13T 16/32 DP						13	209
SAE-B	22,2 (7/8")	9,5	101,57	41,1	22,23	24,94		209
	13T 16/32 DP						13	209
	25,4 (1")			46	25,4	28,09		337
	15T 16/32 DP						15	337
SAE-C	31,8 (1¼")	12,7	127	55,6	31,8	35,2		641
	14T 12/24 DP			56			14	641
	17T 12/24 DP			56			17	765
	21T 16/32 DP			56			21	
	23T 16/32 DP			38.5			23	
SAE-D	13T 8/16 DP	12,7	152,4	75,6			13	1701
	27T 16/32 DP			88			27	1655
SAE-E	13T 8/16 DP	12,7	165.1	75,6			13	1701
	27T 16/32 DP			62			27	1655
	17T 12/24 DP			62			17	1217
SAE-F	15T 8/16 DP	12,7	224	75			15	2221

General information

Eaton medium duty 70160 pumps						
	Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
	20.3	64.3		210	9.5	70160-20
	23.6	75.7		210	9.5	70160-24

Eaton medium duty 70360 pumps						
	Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
	40.6	140	3600	210	14.1	70360-40
	49.2	169	3600	172	14.1	70360-49

Eaton medium duty 72400 pumps						
	Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
	40.6	140		210	28	72400-40
	49.2	169		172	28	72400-49

	Charge pump			Union options					
				SAE-A				SAE-B	
	Internal	6.9 cc	13.8 cc	9t spline 16/32	11t spline 16/32	35t spline 48/96	9t spline 20/40	13t spline 16/32	41t spline 48/96
70160-20	•	•	•	•	•	•	•		
70160-24	•	•	•	•	•	•	•		
70360-40	•	•	•	•	•			•	•
70360-49	•	•	•	•	•			•	•
72400-40	•	•	•	•	•			•	•
72400-49	•	•	•	•	•			•	•

Eaton Duraforce HPV gesloten systeem pompen						
	Maximaal slagvolume in cm3/r	Maximale opbrengst @ max. toerental in lpm	Maximaal toerental in tpm	Maximale werkdruk in bar	Gewicht in kg	Modelcode
	55	175	3300	420	46	HPV-55
	75	223	3100	420	49	HPV-75
	105	292	2900	420	66	HPV-105
	135	350	2700	420	72	HPV-135
	165	396	2500	420	95	HPV-165
	210	464	2300	420	132	HPV-210
	280	538	2000	420	164	HPV-280

General information

Eaton Heavy Duty Series 1 pumps						
	Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
	54	233	4510	240	62.6	3323
	64	255	4160	240	62.6	3923
	75	300	4160	240	62.6	4623
	89	318	3720	240	85.3	5423
	105	375	3720	240	85.3	6423
	124	333	2775	240	101.7	7630

	Charge pump				Charge pump union options					Union
	13.9 cc	21.0 cc	27.9 cc	34.7 cc	p-port	SAE-A	SAE-B	Compression filter connection	Installation of compression filter connection	SAE-C (standard)
3323	•	•	•		•	•	•	•	•	•
3923	•	•	•	•	•	•	•	•	•	•
4623	•	•	•	•	•	•	•	•	•	•
5423	•	•	•	•	•	•	•	•	•	•
6423	•	•	•	•	•	•	•	•	•	•
7630		•	•	•	•	•	•	•	•	•

Vickers Hydrokraft TVW variable pump						
	Maximum displaced volume in cm3/r	Maximum output @ max. speed in lpm	Max. speed in rpm	Max. working pressure in bar	Weight in kg	Model code
	130	234	1800	350	160	TVW-130
	180	324	1800	350	165	TVW-180
	250	450	1800	350	235	TVW-250
	360	648	1800	350	240	TVW-360
	500	900	1800	350	420	TVW-500
	750	1125	1500	350	460	TVW-750

	Flange									Shaft								
	SAE-A	SAE-B	SAE-C	22.2 mm	25.4 mm	38.1 mm	44.4 mm	13t spline 16/32	13t spline 8/16	14t spline	15t spline 16/32	19t spline	20t spline	21t spline	23t spline	27t spline	35t spline 48/96	41t spline 48/96
Medium duty																		
70160-20	•			•				•									•	
70160-24	•			•				•									•	
70360-40		•		•	•			•			•							•
70360-49		•		•	•			•			•							•
72400-40		•			•			•			•							•
72400-49		•			•			•			•							•
Heavy duty																		
3323			•			•				•		•	•	•	•			
3923			•			•				•		•	•	•	•			
4623			•			•				•		•	•	•	•			
5423			•			•				•		•	•	•	•			
6423			•			•						•	•	•	•			
7630			•				•		•							•		

General information

Salami gear pumps							
 	Displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. power [kW]	Max. moment [Nm]	Weight [kg]	Model code
	2.1	3500	250	3.1	8.3	01:08	1.5MB
	2.6	3500	250	3.8	10.3	01:11	
	3.1	3500	250	4.5	12.3	01:14	
	3.6	3250	230	4.5	13.2	01:17	
	4.2	3250	230	5.2	15.4	1:20	
	4.9	3250	230	6.1	17.9	01:24	
	5.8	3250	210	6.6	19.4	01:30	
	7.5	3000	280	10.5	33.4	01:41	
	3.2	4000	250	5.3	12.7	2.1	2MB
	4.5	4000	250	7.5	17.9	2.1	
	6.2	4000	250	10.3	24.6	2.1	
	8.3	3500	250	12.1	33.0	02:25	
	11.3	3500	250	16.5	44.9	2.5	
	13.8	3500	250	20.1	54.9	2.5	
	16	3000	250	20.0	63.6	2.75	
	19	3000	220	20.9	66.5	2.95	
	22.5	2750	200	20.6	71.6	3.1	
	26	2500	180	21.5	74.4	03:25	
	21	3000	250	26	83	5.1	3MB
	27	3000	250	34	107	5.3	
	33	3000	250	41	131	5.8	
	38	3000	250	48	151	6.0	
	46	2750	245	52	179	7.0	
	55	2500	210	48	184	7.3	
	65	2500	200	54	207	8.0	

Hydrosta has its own test and repair centre where pumps can be altered, tested and repaired.

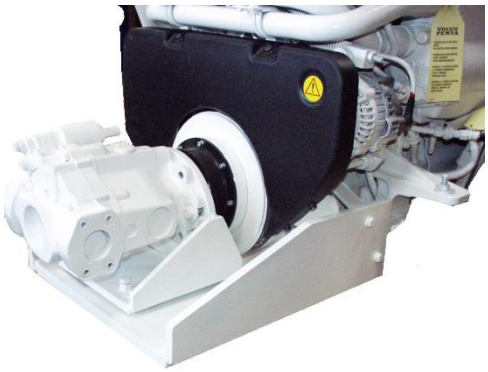
General information

Hydrosta has various solutions for mounting pumps to a diesel engine.

- PTO connection of the engine or gear box
- Pump front installation in line with crankshaft
- Pump rear installation direct on flywheel side

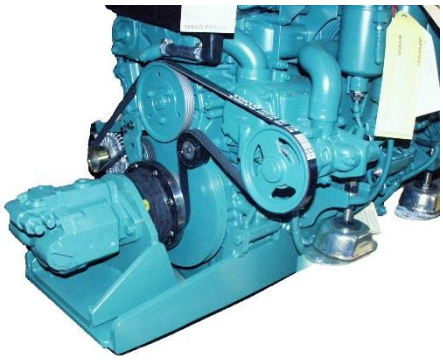
PTO connection to diesel engine or gear box

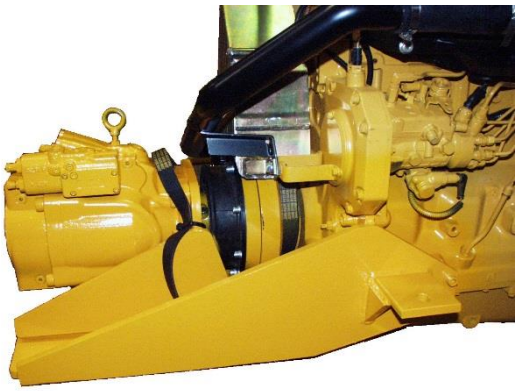
The simplest way of adapting a hydraulic pump to a diesel engine or gear box is direct on the PTO. PTO stands for Power Take Off, the ideal connection to take power from a diesel engine. There are various PTO sizes. Commonly used sizes are the SAE-B and SAE-C pomp paths. Contact Hydrosta to discuss the options.



Pump front installation in line with crankshaft

If a PTO connection is not available, a pump can be installed in line with the crankshaft. Standard pump frames are made for various pumps to lined up with the crankshaft.
An installation frame is made for a wide range of diesel engines. The installation frame is preferably precise connected to the diesel engine at our workshop.





Pump rear installation on flywheel side

If the diesel engine is only used for the generation of hydraulic power, the pump is direct connected on the flywheel side behind the diesel engine. The picture shows a hydraulic pump for the closed loop system in combination with a load-sensing pump for the open loop system.

General information

Hydrosta do have a wide range of hydraulic motors. The range consist of radial and axial piston motors as fixed and variable versions and also orbit motors and gear motors. We supply them with quality labels such as Parker/VOAC, Eaton/Char-lynn, Sunfab, SAI and Black Bruin for every application there is a match.
An overview:

Eaton Duraforce							
	Displaced volume [cc/rev]	Net displaced volume [cc/rev]	Max. speed continuous [rpm]	Max. Pressure continuous [bar]	Max. power continuous [kW]	Weight [kg]	Model code
	28	28.6	4500	420	54	16	HMV028
	35	35.6	4500	420	67	16	HMV035
	55	54.8	4100	420	94	19	HMV055
	75	75.9	3800	420	120	26	HMV075
	105	105.0	3500	420	153	33	HMV105
	135	135.6	3200	420	540	39	HMV135
	165	165	3100	420	657	75	HMV165
	210	210	2700	420	836	100	HMV210
	280	280	2400	420	1115	146	HMV210
Application:	Propulsion (Hy-Prop or direct on propeller shaft)						

Sunfab SCM							
	Displaced volume [cc/rev]	Net displaced volume [cc/rev]	Max. speed continuous [rpm]	Max. Pressure continuous [bar]	Max. power continuous [kW]	Weight [kg]	Model code
	012	12.6	8000	350	20	8.5	SCM-012
	017	17.0	8000	350	25	8.5	SCM-017
	025	25.4	6300	350	40	9.5	SCM-025
	034	34.2	6300	350	55	9.5	SCM-034
	047	47.1	5700	350	65	16.5	SCM-047
	056	56.0	5700	350	80	16.5	SCM-056
	064	63.5	5700	350	90	16.5	SCM-064
	084	83.6	4700	350	100	28.0	SCM-084
	108	108.0	4700	350	130	30.5	SCM-108
	130	130.0	4700	300	135	30.5	SCM-130
Application:	Propulsion (Hy-Prop or direct on propeller shaft) Generator drive Fan drive						

Eaton heavy duty variable							
	Displaced volume [cc/rev]	Net displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. power [kW]	Weight [kg]	Model code
	54	0 – 54.4	5380	350	169	63.5	3343
	64	0 – 63.7	5380	350	201	63.5	3943
	75	0 – 75.3	5380	350	235	63.5	4643
	89	0 – 89.1	4810	350	250	86.2	5443
	105	0 – 105.5	4810	350	295	86.2	6443
	125	0 – 124.8	3425	350	250	102.6	7640
Application:	Propulsion (Hy-Prop or direct on propeller shaft) Generator drive						

Heavy duty fixed							
	Displaced volume [cc/rev]	Net displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. power [kW]	Weight [kg]	Model code
	54	54.4	5380	350	169	63.5	3333
	64	63.7	5380	350	201	63.5	3933
	75	75.3	5380	350	235	63.5	4633
	89	89.1	4810	350	250	86.2	5433
	105	105.5	4810	350	295	86.2	6433
	125	124.8	3425	350	250	102.6	7630
Application:	Propulsion (Hy-Prop or direct on propeller shaft) Generator drive						

Eaton medium duty fixed							
	Displaced volume [cc/rev]	Net displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. power [kW]	Weight [kg]	Model code
	12	12.3	4500	210	13.8	4.9	74111
	20	20.3	3600	210	23.2	4.9	74118
	33	32.9	3600	210	35	9.1	74315
	40	40.6	3600	210	43	9.1	74318
	80	82.6	1500	240	43.3	10.9	74624
Application:	Propulsion (Hy-Prop or direct on propeller shaft) Generator drive						

Eaton orbit motors							
  	Series	Net displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. moment [Nm]	Weight [kg]	Model code
	10000	345 480 665 940	501 354 254 179	205 205 205 190	1040 1475 2085 2700	43.5 45.4 45.4 47.7	119- 120- 121-
	6000	195 245 310 390 490 625 985	775 615 485 387 307 241 153	205 205 205 205 205 170 140	575 735 930 1155 1445 1480 1685	24.9 25.2 25.6 26.3 27.0 28.5 30.4	112- 113- 114-
	4000	110 130 160 205 245 310 395 495 625	697 722 582 459 383 303 239 191 151	205 205 205 205 205 205 190 140 115	320 375 485 600 705 850 930 945 970	17.9 18.1 17.9 18.1 18.69 19.5 20.4 21.8 23.0	109- 110- 111-
	2000	80 100 130 160 195 245 305 395 490	799 742 576 477 385 308 246 191 153	205 205 205 205 205 205 205 155 120	235 295 385 455 540 660 765 775 845	10.0 10.2 10.4 10.7 11.1 11.6 12.0 12.5 12.9	104- 105- 106-
Application:	Travel gearbox Conveyor belt drive						

Orbit motors type H (T)

Series	Net displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. moment [Nm]	Weight [kg]	Model code
H (T is also avail-able	36 46 59 74 97 120 146 159 185 231 293 370 739	1021 969 953 760 585 469 385 353 304 243 192 152 74	124 124 124 124 124 124 117 114 110 100 93 86 41	56 73 91 118 155 192 221 233 265 302 351 407 389	5.0 5.0 5.1 5.1 5.3 5.4 5.5 5.5 6.3 6.5 6.9 6.6 7.0	H = 101- T = 158-

Application:	Conveyor belt drive

Eaton orbit motors type J

Series	Net displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. moment [Nm]	Weight [kg]	Model code
J	8.2 12.9 19.8 31.6	2065	140	16 25 38 50	2.0 2.1 2.2 2.3	129-

Application:	Worm box drive

Salami gear motors

Displaced volume [cc/rev]	Max. speed [rpm]	Max. pressure [bar]	Max. power [kW]	Max. moment [Nm]	Weight [kg]	Model code
2.1 2.6 3.1 3.6 4.2 4.9 5.8 7.5	3500 3500 3500 3250 3250 3250 3250 3000	250 250 250 230 230 230 210 280	3.1 3.8 4.5 4.5 5.2 6.1 6.6 10.5	8.3 10.3 12.3 13.2 15.4 17.9 19.4 33.4	01:08 01:11 01:14 01:17 1:20 01:24 01:30 01:41	1.5MB
3.2 4.5 6.2 8.3 11.3 13.8 16 19 22.5 26	4000 4000 4000 3500 3500 3500 3000 3000 2750 2500	250 250 250 250 250 250 250 220 200 180	5.3 7.5 10.3 12.1 16.5 20.1 20.0 20.9 20.6 21.5	12.7 17.9 24.6 33.0 44.9 54.9 63.6 66.5 71.6 74.4	2.1 2.1 2.1 02:25 2.5 2.5 2.75 2.95 3.1 03:25	2MB
21 27 33 38 46 55 65	3000 3000 3000 3000 2750 2500 2500	250 250 250 250 245 210 200	26 34 41 48 52 48 54	83 107 131 151 179 184 207	5.1 5.3 5.8 6.0 7.0 7.3 8.0	3MB

Application:	Cooler fan drive

General information

With the Navio control systems you can steer and navigate your ship comfortably and reliably.

Any kind of configuration is possible.

- Automatic pilot (sea-pilot)
- Gyro (river pilot)
- Servo follow-up steering
- Connection to way-point
- Choice of steering lever

NAVIO 155 steering follow-up

NAVIO 150 steering follow-up unit
To be used for:

- gyro or
- servo mode steering

Navio 202 autopilot comes complete with:

- selection buttons for servo, gyro or automatic control.
- Course setting.
- Rudder-position indicator by LEDs
- Display of actual heading, set course or rudder angle displayed on LCD screen.

Navio 202 autopilot

Navio 260 throttle lever

Hydrosta has developed a line of throttle levers. These levers, the Navio 260 and Navio 262, are robust and elegant and CAN-bus controled. The Navio 260 is a single throttle and the Navio 262 is a double throttle.

Navio 260

Navio 262

Entirely a flush bottom

Throttle lever with a travel of 2 x 90 degrees

General information

Hydrosta also supplies the control levers and electronics for a bow/stern thruster or windlass.

On / Off switch

2-position

Proportional 60mm

Proportional 120 mm

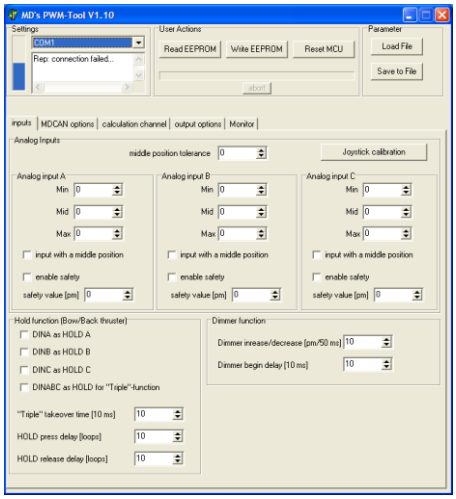
Order codes:

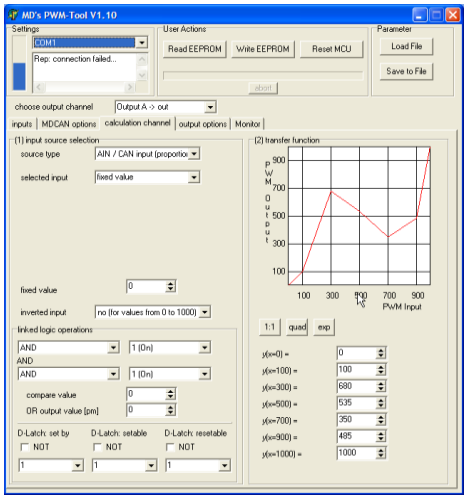
Order code	Description
XD2PA12	Joystick on/off with friction hold
XD2PA22	Joystick on/off with spring return
XD2GA8241	Joystick 2-position with spring return
XD2GA8251	Joystick 2-position with friction hold + spring return
S14-01RP-MC	Joystick proportional with friction hold and NO contact
S14-01ZP-MC	Joystick proportional with spring return and NO contact
S22-01RP-MC	Joystick proportional with friction hold and NO contact
S22-01ZP-MC	Joystick proportional with spring return and NO contact

Look at the NAVIO pages for dashboard panels

Navio613

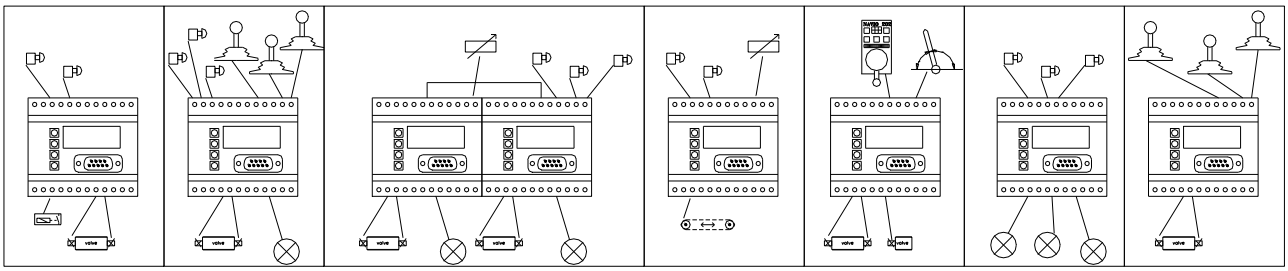
For simple adjustments, the Navio610 is an excellent alternative to the MD-can series. It is easy to configure the control system with the aid of a Windows program and a laptop with RS232 port. It is also possible to run through the configuration in steps with the aid of the knobs and the display.
The Navio613 has 4 digital and 3 analogue inputs and 4 solenoids can be actuated. The main thing about the Navio613 is that the control characteristic can be adjusted. Non-linear valves can thus be programmed linearly. A bow or stern thrusters control characteristic can also be simply adjusted.





Most important settings:
Calibrate analogue inputs (automatic or manual);
Tolerances of analogue inputs;
Coupling of analogue/Can parameters to PWM outputs;
Coupling of digital functions to PWM outputs;
On- and off-delays of PWM outputs;
Output characteristics of PWM outputs.

You can dream up a thousand and one options with the Navio613. It is extremely well suited to route-dependent control installations or bow/stern thruster operation, but the Navio613 can also dim the lights of your ship or adjust the speed of your conveyor belt. Several Navio613s can also be connected for data transfer.



Overview

Whether you want an automatic pilot, stabilizers or a motor management system, you can complete your ship's control system with the new Navio range. All Navio products can be connected together via the Can-bus system. Connectors are used for this, which simplifies the installation. The entire Navio line is watertight.
The various dashboard components all have a consistent design. All buttons and displays illuminate blue in the dark.

Navio 120

The Navio 120 is a dashboard panel for the installation of the S14 joystick. Equipped with integral 'hold' button. Ideal for proportional bow thruster operation.

Navio 122

The Navio 122 is the double version of the Navio 120. Ideal for proportional bow and stern thruster operation.

Navio150

The control knob from the Navio 150 series is a route-dependent control knob especially developed for manoeuvring with a rudder. A scale of 2x35 degrees is engraved onto this knob. The knob is made of massive grey anodised aluminium. Upon request we can also anodise this in black.

Navio 151

This control knob was specially developed for manoeuvring with a Hy-Prop. The scale is thus 2x90 degrees. The knob is massive black anodised aluminium. This is also available in grey upon request.

Navio 155

This control knob has the same specifications as the Navio 151 except that it is equipped with a lever. Also available in grey anodised version.

Navio 165

Just like the knobs of the 150 series, the Navio 165 is a control knob. The difference is in the size. The control knob is larger and the square aluminium baseplate is equipped with a striped scale of 2x90º.

Navio 202

The Navio 202 is a complete control lever with various functions and visualisation options. The Navio 202 is only used in combination with an autopilot and giro pilot. These control modes can be selected with the keys. The rudder position is displayed by LEDs. Compass course, depth, speed, etc. can be shown on the LC display.

Overview

Navio 260

For the control of a combustion engine and electric coupling we use the Navio 260 throttle lever. When this is combined with a hydraulically driven coupling it is possible to navigate in trolling mode. The Can-bus provides the communication, a four-wire connection is therefore sufficient. The position of the throttle lever is determined by non-contact measurement, which means that the probability of mechanical defects is low.

Navio 262

Identical to the Navio 260, but with double lever for the control of 2 diesel engines.

Navio 301

Measured values such as depth, speed, course, etc. can be graphically displayed on this screen. Furthermore, autopilot, engine management functions, etc. can be operated by 6 buttons. The screen is 5.7" and monochrome. The buttons and LCD illuminate blue.

Navio 304

The Navio 304 is a remote control. The screen is based upon the Navio 301. Equipped with a steering knob, like the one on the Navio 202, and throttle lever. Also equipped with S14 joystick for the control of the bow thruster.

Navio 310

A 10" screen based upon computer technology. Both Windows-based and Linux-based software packages can be installed. The Navio 310 can communicate directly with all other Navio products. A special Linux-based software package can, for example, display your engine data. All functions can be operated with 8 buttons.

Navio 315

This is the big brother of the Navio 310. This screen is 15" and has 12 function buttons on the edge. Here, too, the buttons illuminate blue so that they can be seen in the dark.

Navio 613

Digital PWM amplifier RS232/CAN 10-30V

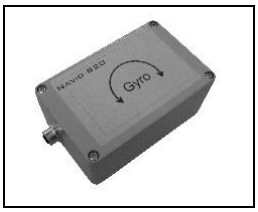
Navio 750

Multi control box

Overview

Navio 815

Electronic compass via Can-bus. This compass also has the option of transmitting GPS data. This compass makes it possible to navigate on autopilot. The autopilot is generally an open-water pilot. A river pilot uses the Navio 820 or a giro sensor.



Navio 820

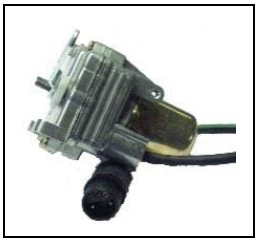
A giro sensor measures the angle turn per time unit of the ship. By adjusting the rudder against the angle turn, we can minimise the turn. This means that the ship can be steered dead straight down a river without any intervention.

Navio 850

For the measurement of depth, speed and water temperature we use a NMEA2000 sensor from Airmar. The advantage of NMEA2000 is that this can be connected directly to our bus system. The data can then be simply displayed in one of our displays.

Navio 871

The rudder position is measured by the Navio 871. This is a robust device with a reliable bearing. The housing is made of anodised aluminium.



Navio 920

For the control of the fuel motor we use a rotating servo motor. This actuator can be supplied for both a 12 and 24 Volt system. The Navio 920 can be fitted to almost any combustion engine. The full stroke can be travelled within ¼ second. This means that you feel the acceleration immediately, even when accelerating electronically. The Navio 920 can also be used to drive lightweight rudder installations.

General information

There are a lot of options with Navio control systems. We have listed a few common installations.

Autopilot 1:

The operation of this autopilot is fully integrated into the control lever(s).

Requirements:

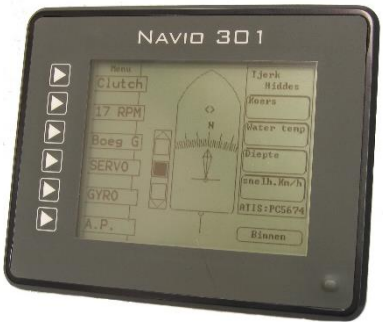
- 1x Navio 202 steering lever (several steering positions possible);
- 1x Navio 800 compass;
- 1x Navio 820 giro sensor;
- 1x Navio 871 rudder-position indicator.
- 1x Navio 750 control.

Several options are possible:

- Bow and stern thruster operation;
- Engine management;
- Stabilizers

Autopilot 2:

Operation of the autopilot is also possible from the Navio 301 display. With the Navio 301 we can fulfil several wishes.



Requirements:

- 1x Navio 150 (several steering positions possible);
- 1x Navio 301 (several possibilities);
- 1x Navio 800 compass;
- 1x Navio 820 giro sensor;
- 1x Navio 871 rudder-position indicator;
- 1x Navio 750 control.

Several options are possible:

- Bow and stern thruster operation;
- Engine management;
- Stabilizers.

Overview

The acceleration method depends upon the type of engine. Electronic acceleration is often possible for modern combustion engines. This can be achieved by voltage/amperage or Can-bus signal. If electronic acceleration is not available, we use the Navio920.

The coupling must also be electronic. Ask about the options if not present.
If the coupling permits, navigation in trolling mode is possible.

Requirements:

- 1x Navio 260 throttle lever;
- 1x Navio 920 servo motor;
- 1x Navio 754 control.

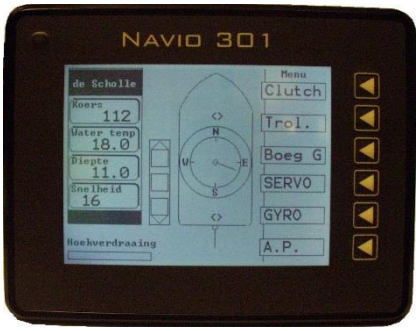
We will be happy to discuss special requirements with you.

Stabilizers:

Hydrosta stabilizers are normally supplied with a Navio301 display. The sensitivity and adjustment can be controlled on this display.

Requirements:

- 1x Navio 301 display;
- 1x Navio 820 giro sensor;
- 1x Navio 830inclino sensor
- 1x Navio 750 control.

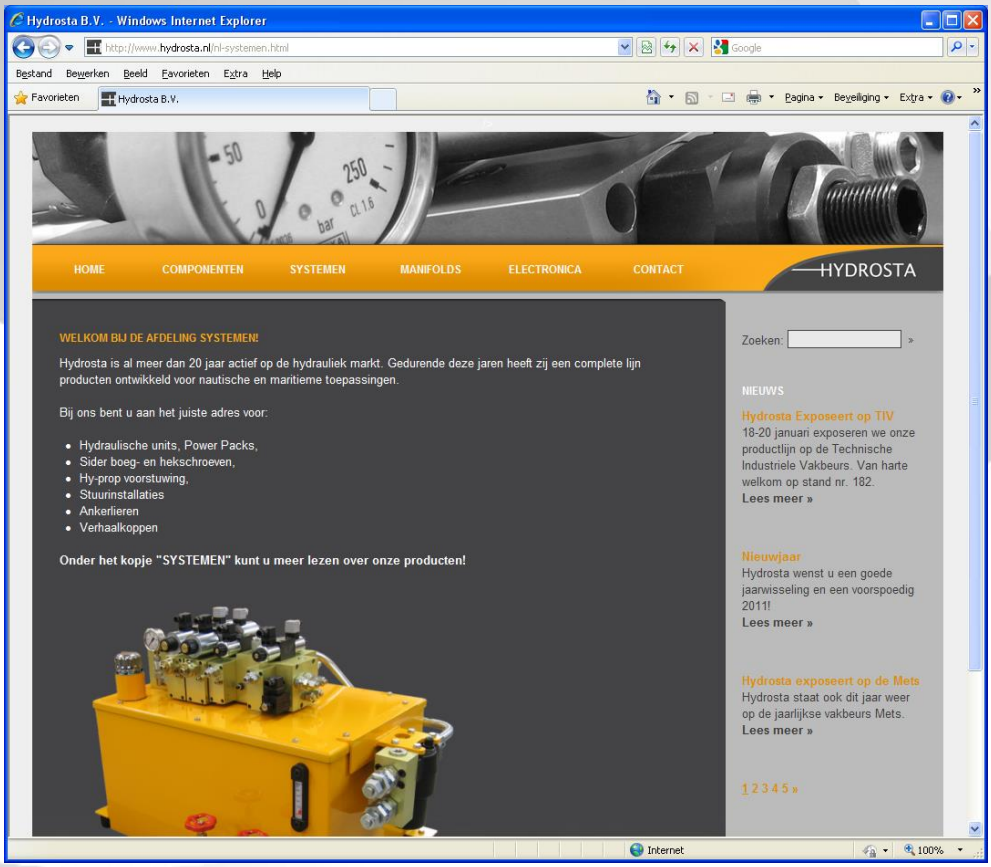


Remote control:

Your entire ship can be controlled using the remote control depicted. With the Navio 202 you can operate the various steering modes (servo, giro and AP) and with the knobs you can operate the coupling. Bow and stern thrusters operation is possible. With the attractive and subtle throttle lever you have the engine power at your command.
The remote control is not wireless (we don't recommend this for safety reasons). The cable has just four wires (power supply, Can-bus) and is therefore flexible.

With this remote control you can control the ship both from the bow and from the stern.

Visit our website for up-to-date information



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