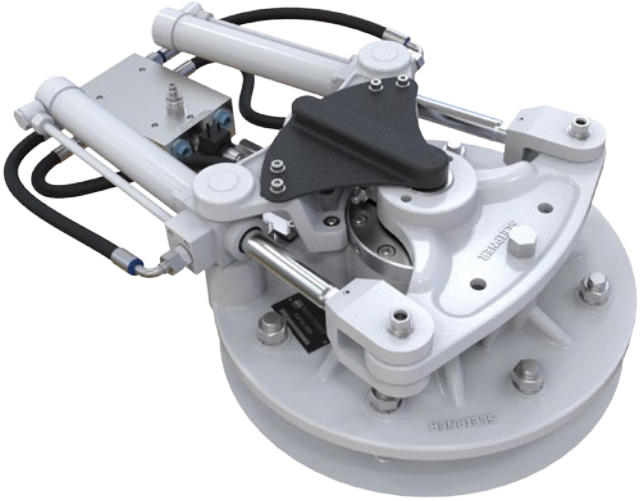
SIDE-POWER
Stabilizer Systems

vector FINS

With New System Components

Design and installation planning guide SPS 55B/66B/92B/93B actuators with vector fins™ Version 2.0.



2013 DAME DESIGN AWARD METS
OVERALL WINNER

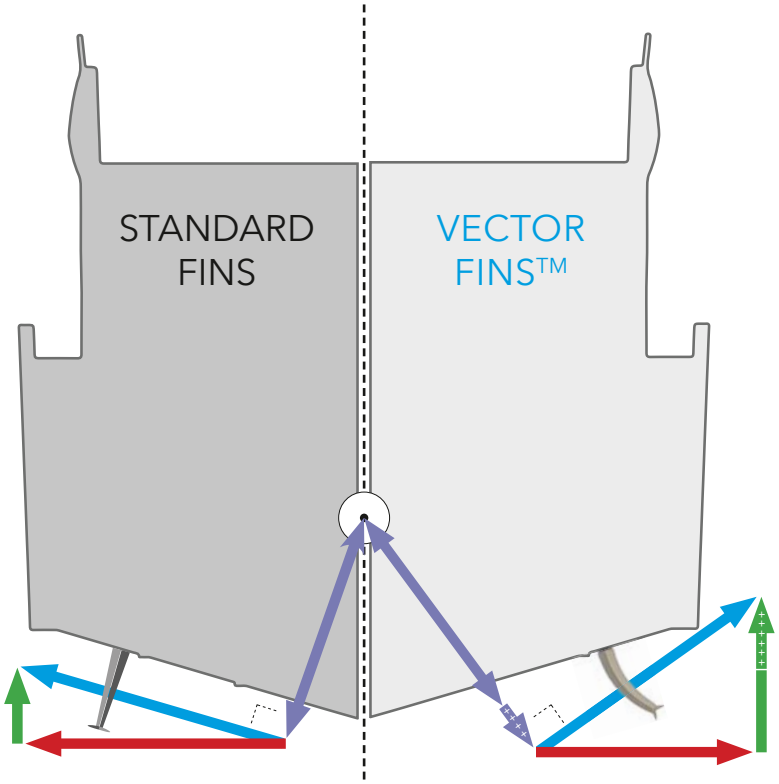
US Patent US9527556
AU Patent AU2013335369
Patent pending: PCT/NO2013/050067

Up to 50% more efficient*

*) typically 20-30% in cruising/40-50% at anchor with same size, inside space and power consumption

Up to 55% less side effects**

**) typically 30-35% in cruising/45-55% at anchor with same stabilization force and power consumption



- Force arm
- Added force arm
- Fin force
- Horizontal force component
- Vertical force component
- Added vertical force component

Introduction

This guide is made as a quick introduction and reference guide for designers and engineers with a good basic knowledge and understanding of boat building and good engineering practice. It does not cover all issues in all detail, and the complete installation manual contain more detailed information and should always be consulted for some details.

Stabilizer functions

The fin stabilizers function is to reduce the roll of the boat, and how efficiently they can do this will depend on several factors.
This guide contain the major considerations om positioning the stabilizers for the efficiency, especially as relates to the revolutionary Vector Fin stabilizers that have some different priorities and features than traditional straight fin stabilizers.

Installation planning

Please follow this general guide and the installation manual for steps to prepare and plan your design and installation process:

Find the best possible position of the fins based on the information provided in the sections about:

- Safety and General precautions
- Measurements
  - Please note the very flexible installation methods possible including off-set angle installation possible with Side-Power stabilizers as this might enable installation in positions more suited and efficient than possible with some other brands or types of fin stabilizers.
- Fin & actuator positioning
  - MAKE SURE to have reasonably easy service access
- Hull forces
  - Ensure that it is space to do the reinforcement of the hull

Plan the installation of the hydraulic parts including hose / pipe runs based on the information provided in the sections:

- Basic hydraulic installation
- AC power pack
- Noise considerations
- Principle hydraulic diagram

Plan the installation of the electrical parts including the control panel and wiring runs based on the information in the sections:

- Power supply
- S-link wiring
- Control panel installation

Typical component layout in the boat - STP. CAD files are available

A typical installation in a 75's size flybridge / fast cruiser will look something like this:

1 The actuators normally fit in the aft end of the living area, usually the owners stateroom or bathroom & wardrobe. This is where you can fit them with minor modifications to the interior, if any, by the SPS models being so compact and low. The actuators are also quiet so no problem to have in living space beneath the floor or furniture. See more detailed positioning recommendations later.

2 The proportional Fin valves (one for each actuator) makes some noise and should be placed outside of living space, in sound proofed area. If mounted onto the bulkhead towards living space, which is a typical position - make sure to mount on dampening material so no structural borne noise reach living space.

3 The Fin control unit (FCU) should be placed on a bulkhead or similar - close to the actuators and fin valve units. Avoid fitting to structures that have a lot of engine vibrations.

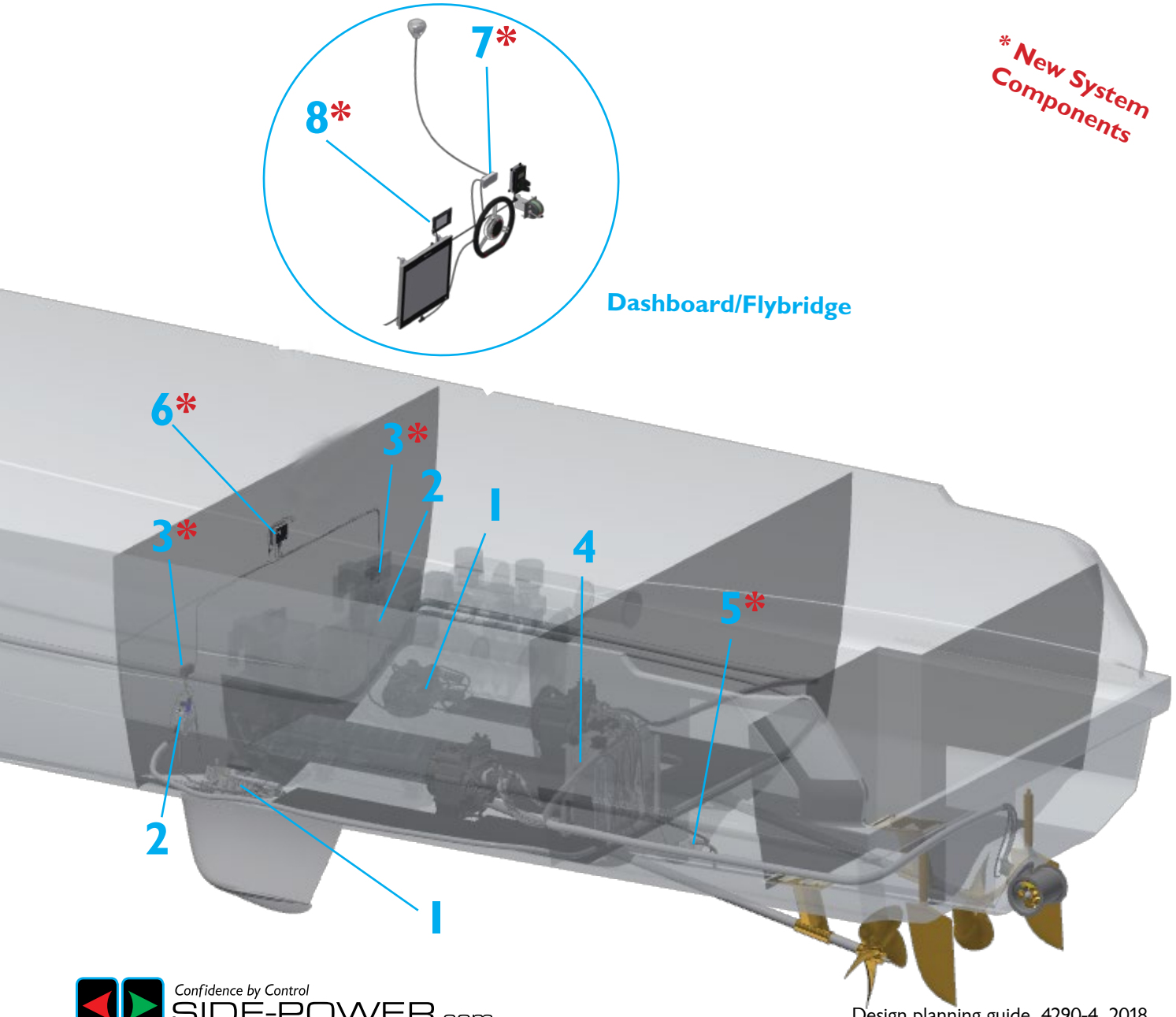
4 The electrohydraulic powerpack with tank, filtration and cooling is normally placed in the engine room. It can be placed really anywhere, but if an engine/gearbox driven pump for "cruising" without the generator running is fitted, ensure that the top oil level is higher than the position of the engine/gearbox pump. The air cooled powerpack should only be used if installed in spaces that stay below 45°C at all times (i.e. not engine rooms) and have decent ventilation.

5 The DC 24V electric cooling water pump, if fitted, is typically installed in an easily accessible, dry and identified position (because it often needs venting after the boat has been on land) well below the waterline - close to the powerpack.

6 The Stabilizer control unit (SCU) with sensors should be placed on a bulkhead - central in the boat is best - but not essential. Can be facing forward or aft - need to tell the system which during setup. Avoid fitting to structures that have a lot of engine vibrations.

7 The GW-1 should be placed relatively close to the dashboard(s) within 10m from the GPS receiver.

8 The Stabilizer operating panel can be fitted on the dashboard(s) from the front using four screws with a smooth plastic cover, or it can also be "flush-mounted" by rear-fitting using studs.



Actuators (2) Actuator Valve Unit.

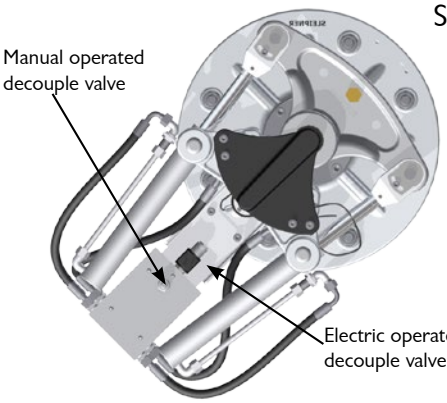
The valve have multiple functions:
1. Combiner for the cylinder hoses
2. Electric operated decouple valve
3. Manual operated decouple valve

Manual operation:
- Unlock valve by turning the lock nut anti-clockwise (19mm spanner)
- Open the valve by turning the adjustment anti-clockwise (1/4" Allen key)

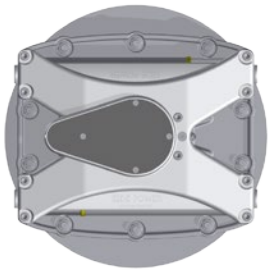
Fins are now free and can be move manually to required position.

Hose Connection:
If required, the electrical operated decouple valve coil can be removed during hose installation for better access to the hose fittings.

SPS66-92-93



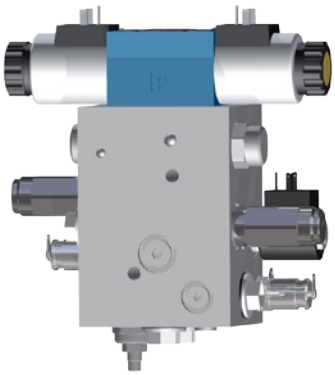
SPS55

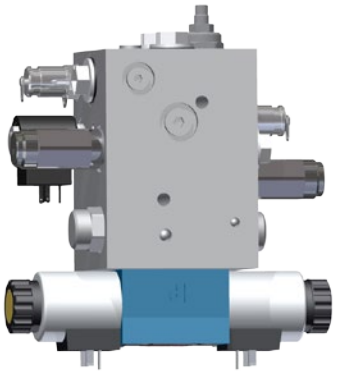


SPS55 Actuator Valve Unit: Electric operated decouple valve and Manual operated decouple valve. (Approx. 1,6kg)

Fin Valve Units (2).

The Fin Valve units are the proportional valves controlling the fins/actuators. They should principally be fitted as close to the fins as possible, but also outside of living space in the boat as they will cause a little noise.
It is also beneficial to fit the valve units onto a dampening material to avoid the frequency of the noise go directly into the boat structures.
If fitted more that 2,5m from the actuators, hard piping or very rigid hoses must be used for the majority of the pressure lines run to avoid "spungy" actuator movements. (Soft hoses expand in diameter/volume varying with pressure which must be avoided)





Hydraulic tank and powerpack

There are many different ways to do the hydraulic powering both for cruising and / or cruising and "AnySpeed" (at anchor) stabilization. However, there are two most common ways, as the vast majority of leisure craft today choose to have also "AnySpeed" stabilization.
These two different ways are then principally decided by if there are hydraulic thrusters or not in the boat. With hydraulic thrusters, the tank needs to be larger due to the high flow required by thrusters.
In a stand-alone stabilizer installation without thrusters, most prefer to have a secondary power source in addition to the AC from the generator, which in this case a single engine/gearbox driven pump can be fitted. If this is not possible, an Inverter that provides AC power for the AC motor can be mounted. This will normally cause reduced capacity, which is OK because the fins do not move as much in cruising as in "at anchor".
There is a water cooled (24V water pump included) that is typically fitted in the engine room, but also an aircooled version available, if there is a seperate colder place to install (max ambient temperature at any time, 50°C).

Fin Control Unit - FCU (2).

New System Component

The Fin Control Unit should be placed on a bulkhead or similar - close to the actuators and fin valve units. Avoid fitting to structures that have a lot of engine vibrations.

Stabilizer Control Unit - SCU.

New System Component

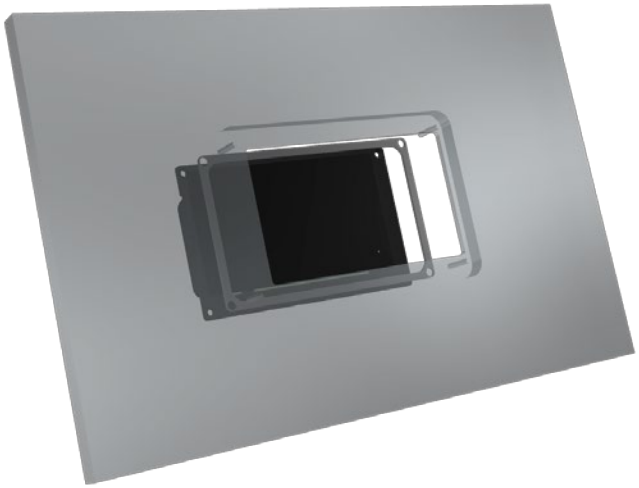
The main SCU with sensors should be placed on a bulkhead - central in the boat is best - but not essential. Can be facing forward or aft - remember to tell the system which position during setup. Avoid fitting to structures that have a lot of engine vibrations. The SCU LCD allows local control of parameters. Startup tasks can be performed directly from the user interface.

Stabilizer Operating Panel

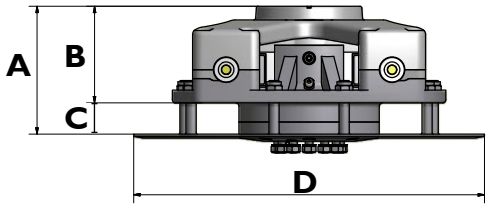
New System Component

The main operating panel can be fitted on the dashboard(s) from the front using four screws with a smooth plastic cover. It can also be "flush-mounted" by rear-fitting using studs. See installation manual/STP file for dimensions. The Stabilizer operating panel is a 4,3" sunlight readable touch panel, that is used for setup and operation of the stabilizer system as well as other parts of the S-link system.

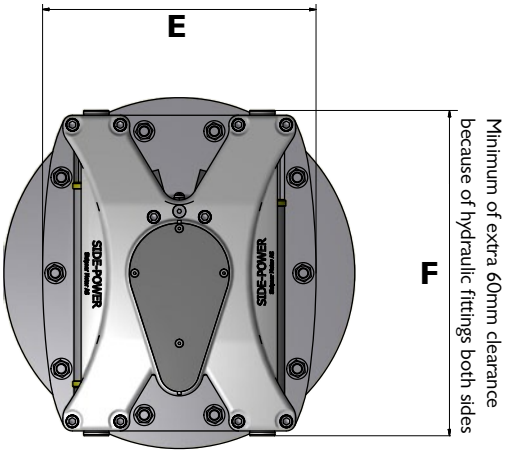
Example of "flush mounted": See details on page 15.



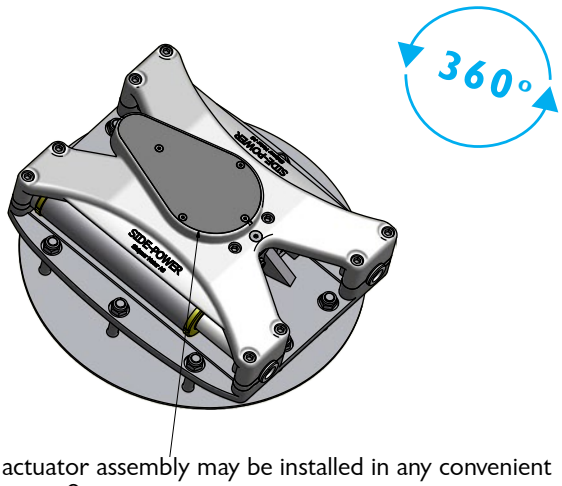
MEASUREMENTS SPS55



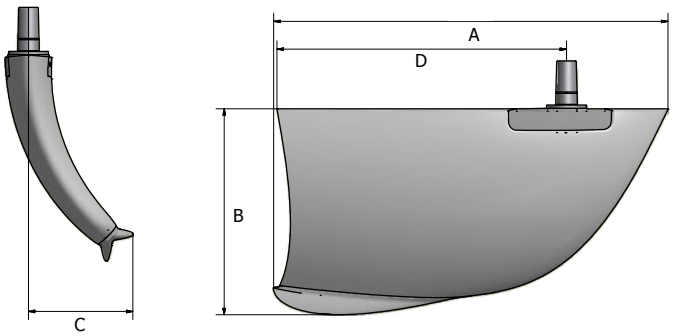
EXACT HULL THICKNESS!
when inside is finished it must be absolutely flat and average paralell to outside hull: Thickness 49mm(+0 / -3mm tolerance) remember to leave room for some sealant



Actuator:	SPS55	
A (mm):	201	
B (mm):	152	
C (mm):	49	
D (mm):	550	
E (mm):	429	
F (mm):	510	(+ 60mmx2)
Shaft Ø (mm):	64	
Weight* (kg)	100	
*Complete actuator assembly, per side		



Fin actuator assembly may be installed in any convenient radial 360° position in the hull.

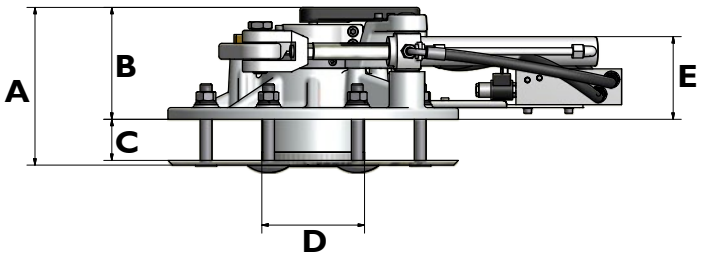


Vector fin:	VF650	VF800	VF1050
Size (m²):	0,65	0,80	1,05
A (mm):	1271	1395	1618
B (mm):	661	733	847
C (mm):	337	337	429
D (mm):	912	1035	1186

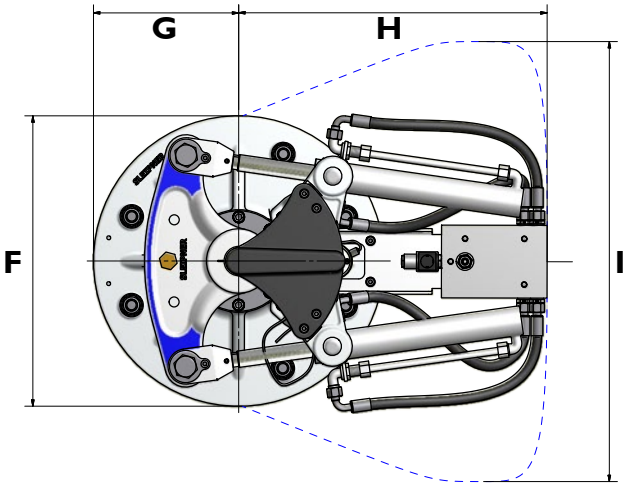
Fins have zero weight in water

US Patent US9527556
Patent pending: PCT/NO2013/050067

MEASUREMENTS SPS66-92-93

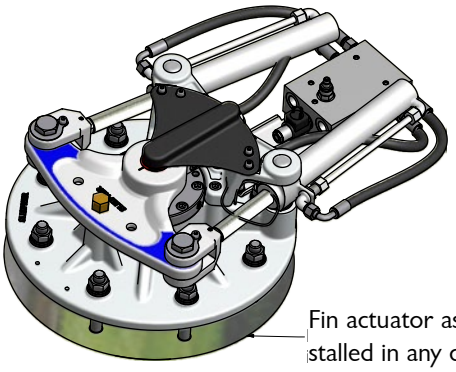


EXACT HULL THICKNESS!
when inside is finished it must be absolutely flat and average paralell to outside hull: Thickness 70mm/85mm**(+0 / -3mm tolerance) remember to leave room for sealant

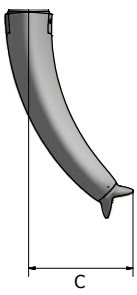


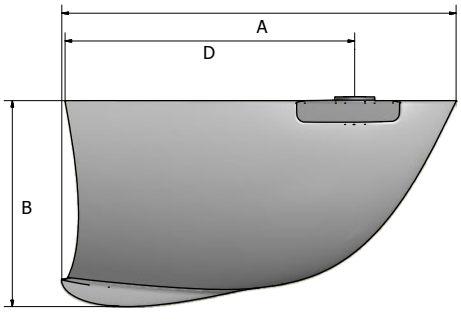
Actuator:	SPS66	SPS92	SPS93
A (mm):	260	340	346
B (mm):	190	250	260
C (mm):	70**	85**	85*
D (mm):	175	235	235
E (mm):	146	171	172
F (mm):	495	600	600
G (mm):	247,5	300	300
H (mm):	521	550	571
I (mm):	650	700	700
Shaft Ø (mm):	65	90	90
Weight* (kg)	105	180	183

*Complete actuator assembly, per side



Fin actuator assembly may be installed in any convenient radial 360° position in the hull.





Vector fin:	VF1050	VF1350	VF1650
Size (m^2):	1,05	1.35	1.65
A (mm):	1618	1835	2081
B (mm):	847	956,5	1054,1
C (mm):	429	485	533
D (mm):	1186	1345	1481

Fins have zero weight in water

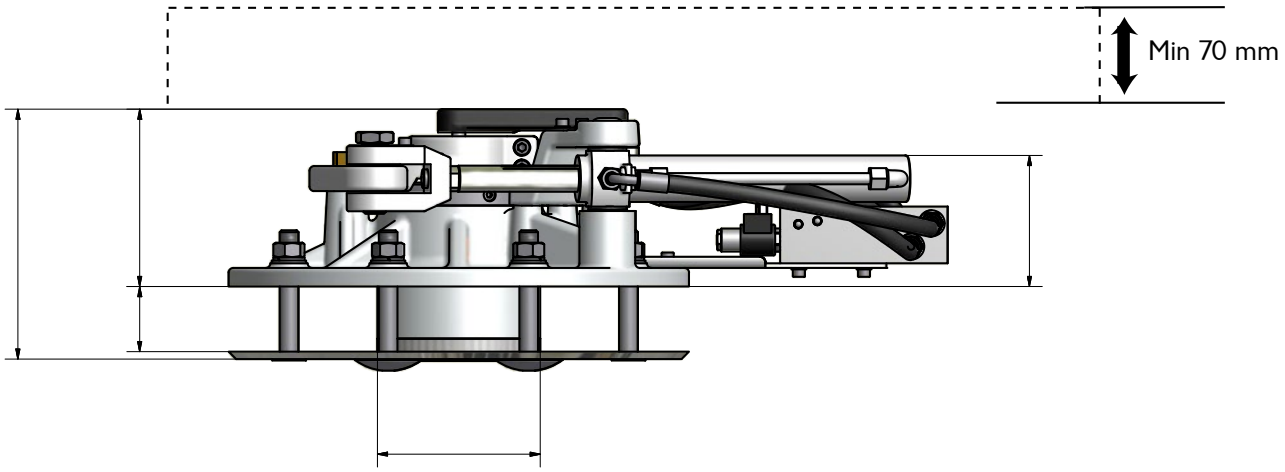
US Patent US9527556
Patent pending: PCT/NO2013/050067

Important Notice !

Ensure that all equipment with physical functions (actuators, valves, electrical & hydraulic connection points) are installed so that you allow space in the boat after reasonable dismantling of other parts or interior / furniture (fit service hatch or similar) for service access as per the following illustrations to get ample room for maintenance and any necessary service or repairs.
This is the installer / boatbuilders full responsibility.

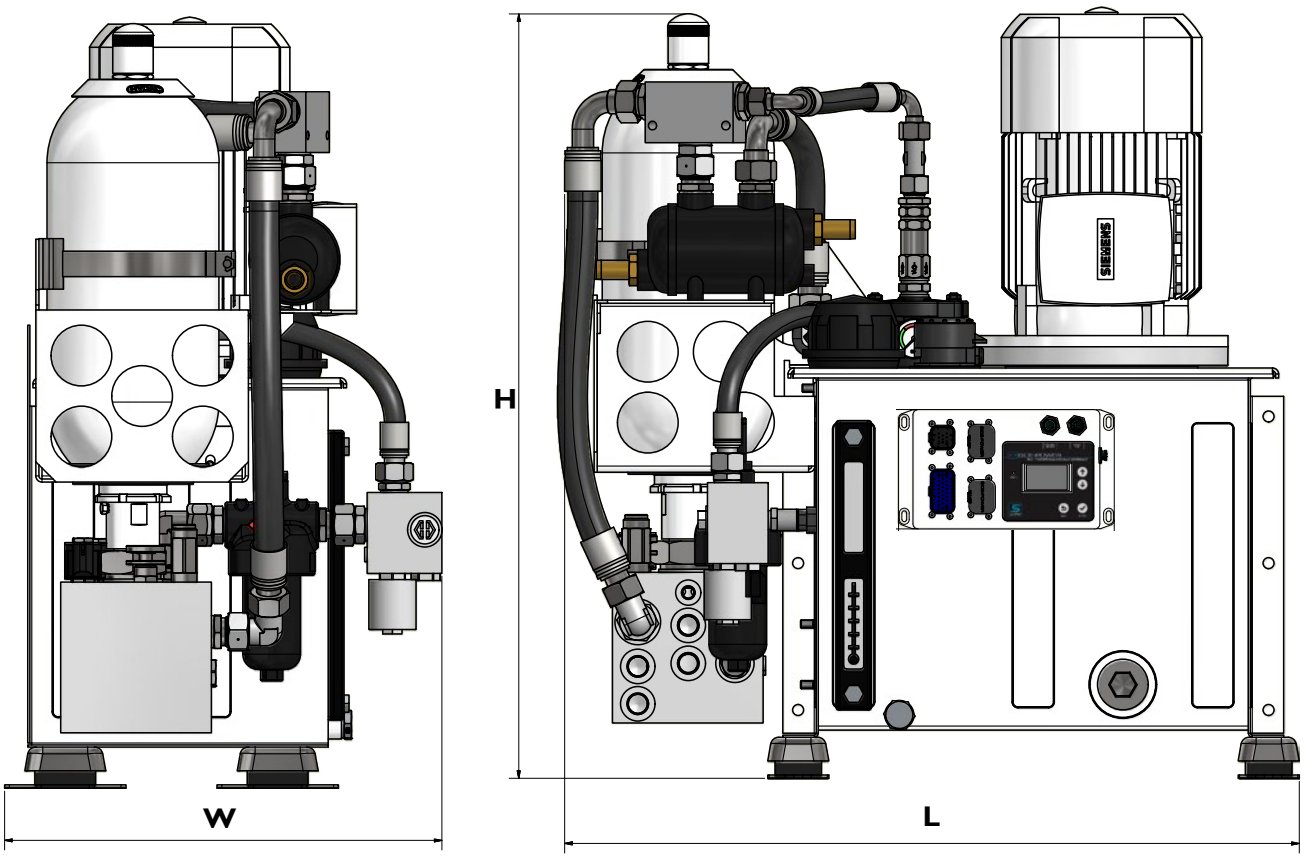
ACTUATORS

The actuators normally fit in the aft end of the living area, usually the owners stateroom or bath-room & wardrobe. This is where you can fit them with minor modifications to the interior, if any, by the SPS models being so compact and low. The actuators are also quiet so no problem to have in living space beneath the floor or furniture. See more detailed positioning recommendation later. After minimal dismounting of furniture / floors DO NOT GLUE together any furniture that must be removed for service / potential repair access !



POWERPACK for standalone installations.

The powerpack is designed to have all connections in only two directions (as seen) so it can be placed into a corner. Especially the end parts with the valveblock must be accessible at all times. The new PHC-3 is also now fitted to the powerpack unit.

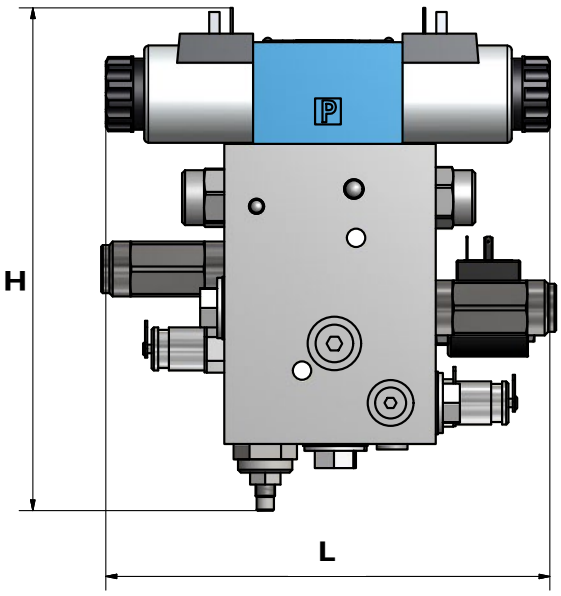


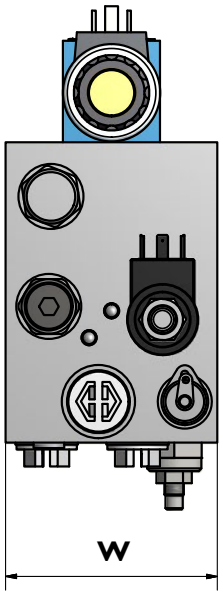
Powerpack:	10 4435xx	10 4450xx	10 4455xx	10 44110xx	10 44150xx
Output (kw)	3,5	4,6	5,5	11	15
Weight (kg/lbs)	111/245	116/256	135/298	N/A*	N/A*
L (mm)	726	726	780	1060*	1060*
W(mm)	432	432	465	480*	480*
H (mm)	762	756	790	890*	1010*
Generator load (kVA)	4,6	6	7	14,9	19,4
Actuator	SPS55	SPS55	SPS66	SPS9x	SPS9x

*Preliminary measurements

FIN VALVE UNIT

The proportional valves (one for each actuator) make some noise and should be placed outside of living space, in sound proofed area.
If mounted onto the bulkhead towards living space, which is a typical position - make sure to mount on dampening material so no structural borne noise reach living space.

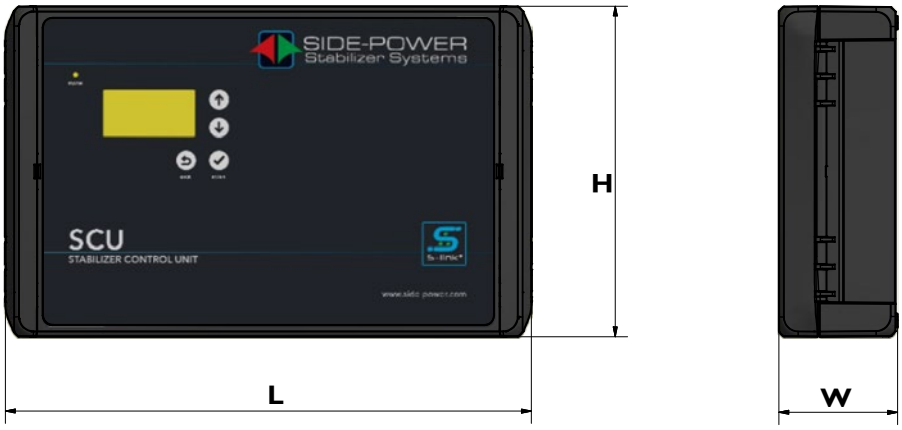




Fin Valve Unit:	32I226A	32I221A
Weight (kg/lbs)	14,5/31,9	6,6/14,55
L (mm)	306	206
W(mm)	86	98
H (mm)	295	233
Actuator	SPS90-93	SPS55-66

SCU - Part# SCU-I2 / SCU-I4(4-fins)

New System Component

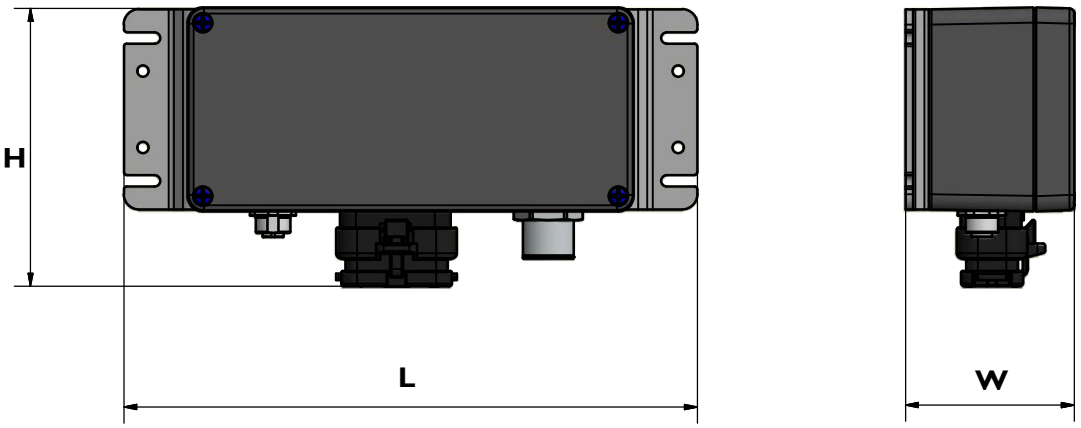


SCU

L (mm)	271
W(mm)	61
H (mm)	170

FCU - Part# FCU-I0

New System Component



FCU:

L (mm)	225
W(mm)	66
H (mm)	109

GW-1 - Part# GW-1

The GW-1 is enabling the use of GPS data for s-link devices. GPS messages can be received from NMEA2000 compatible GPS-receivers, or optionally through the NMEA0183 input connector provided on the unit. Avoid fitting to structures that have a lot of engine vibrations.

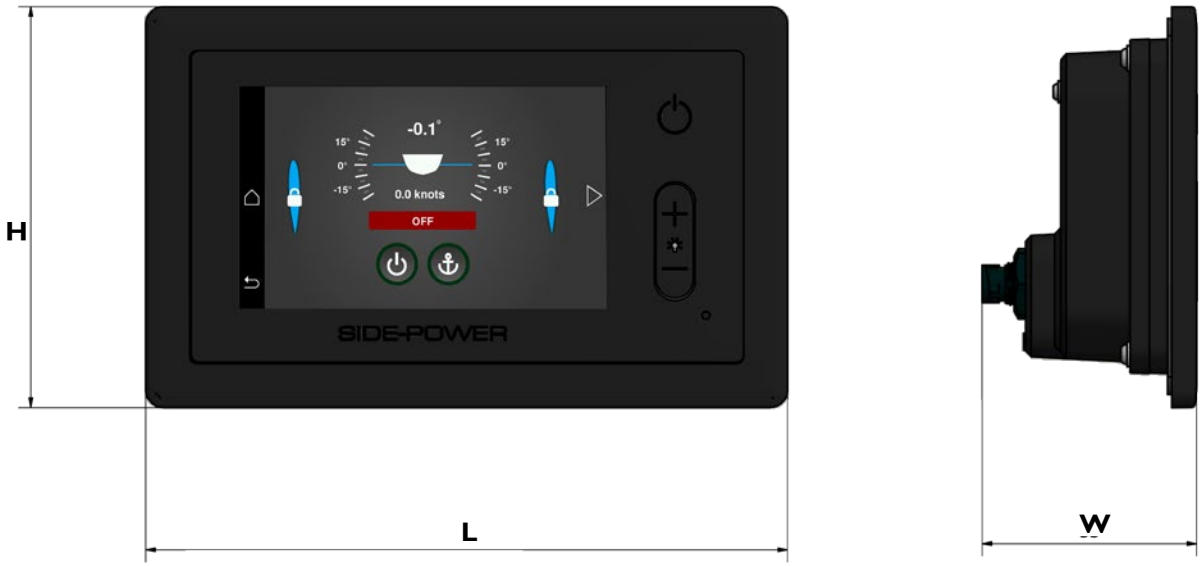
New System Component

GW-1

L (mm)	127
W(mm)	41
H (mm)	49

STABILIZER OPERATING PANEL - Part# TP-43A

New System Component

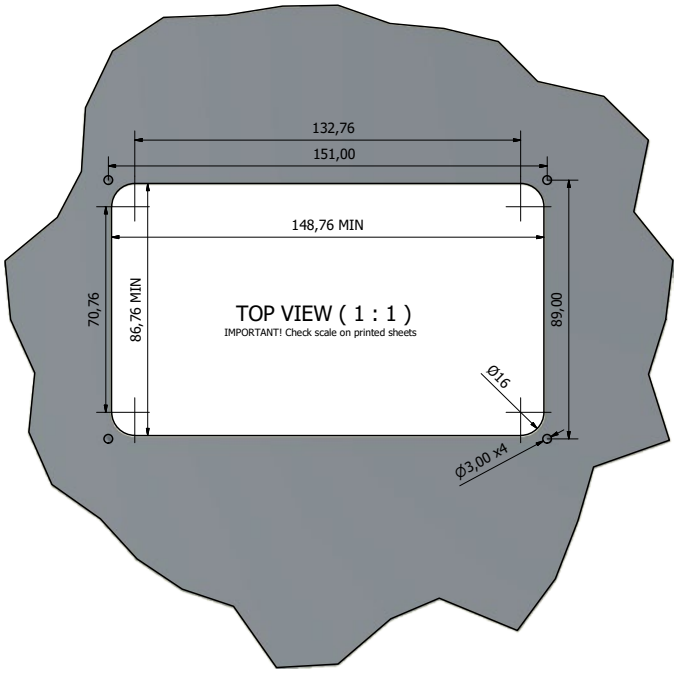


PANEL: Top

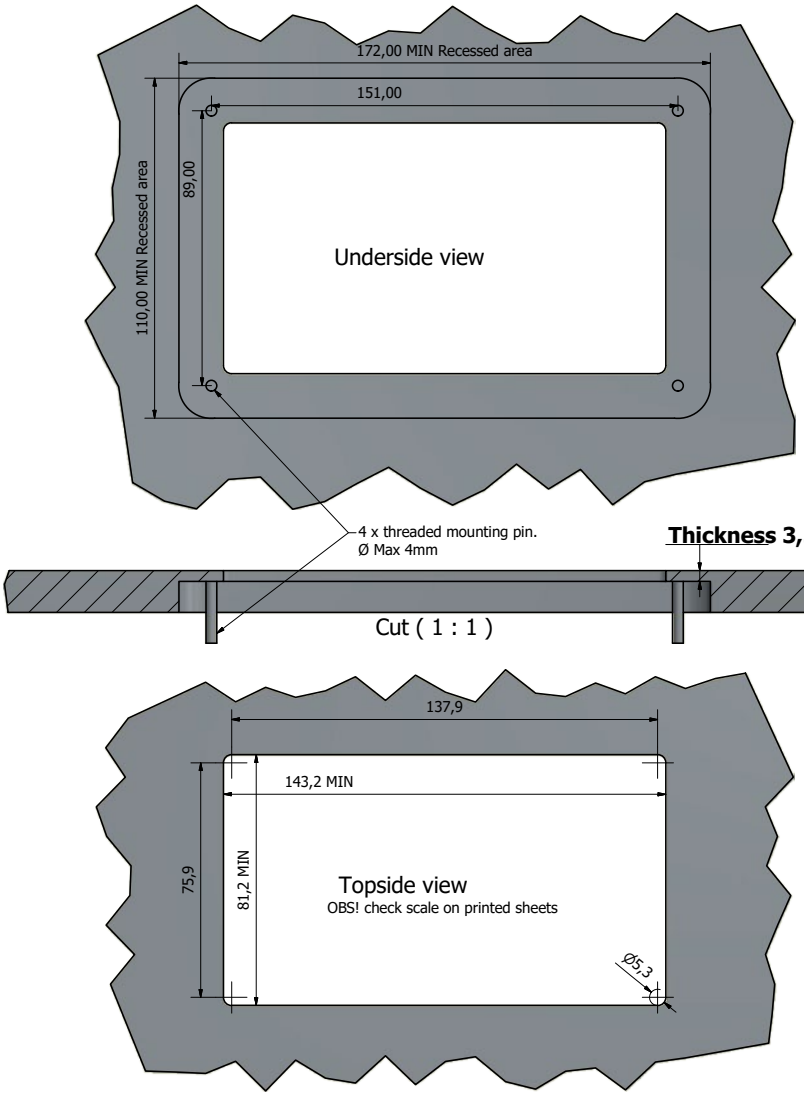
L (mm)	165
W(mm)	55
H (mm)	103

STABILIZER OPERATING PANEL - Mounting details (Illustrations are not 1:1)

Front mounting



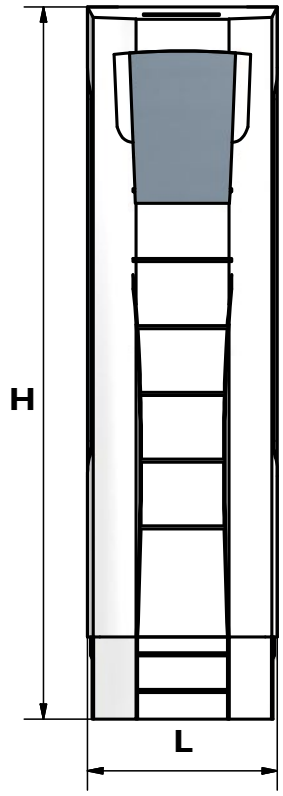
Rear mounting

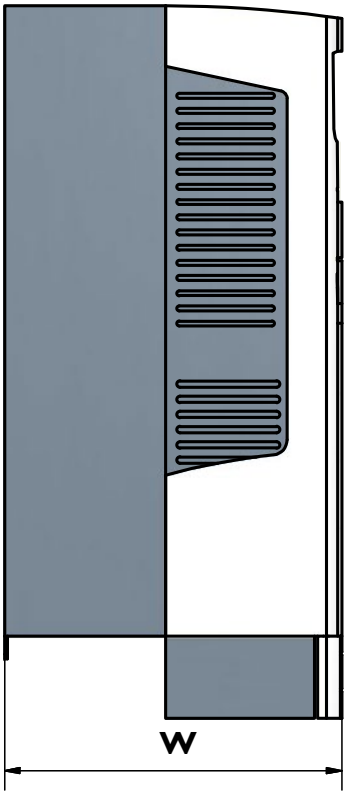


NOTE!
3,5mm is for perfect/flush fit of panel top surface

VFD

The VFD is NOT waterproof so it must be fitted in a securely dry position. Ensure EASY access at ALL TIMES, as some potential alarms might have to be re-set directly at the VFD.





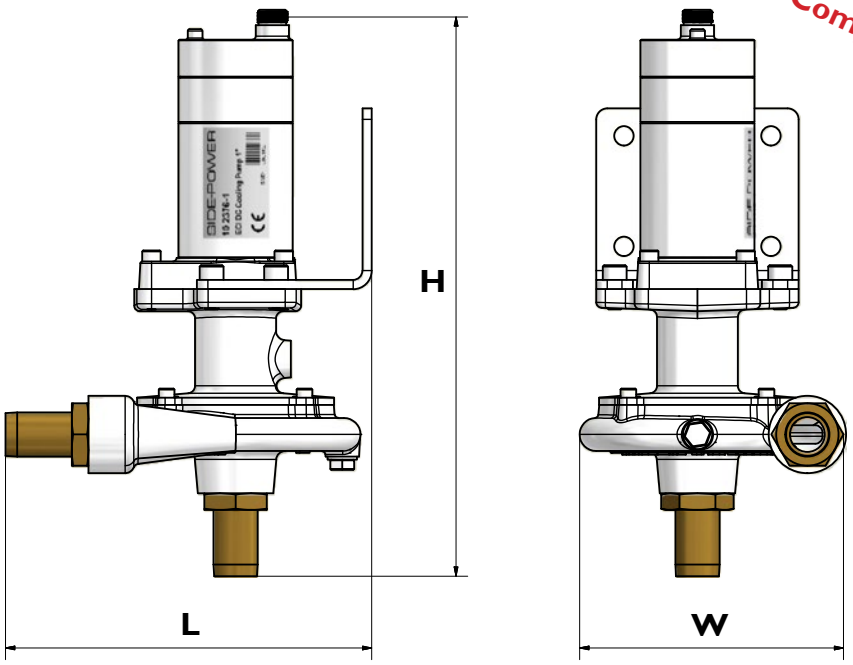
VFD:	ACS550-01-031A-2	ACS550-01-046A-2	ACS550-01-075A-2	ACS550-01-114A-2	ACS550-01-031A-4
Weight (kg/lbs)	9/19,9	16/35,3	24/52,9	24/52,9	16/35,3
L (mm)	125	203	203	203	203
W(mm)	222	231	262	262	231
H (mm)	469	583	689	689	583
Actuator	SPS55/VF650	SPS55/VF800 + SPS66/VF1050	SPS92/VF1350	SPS93/VF1650	SPS90/VF1350 3-fas/400V + SPS90/VF1650 3-fas/400V

COOLING PUMP

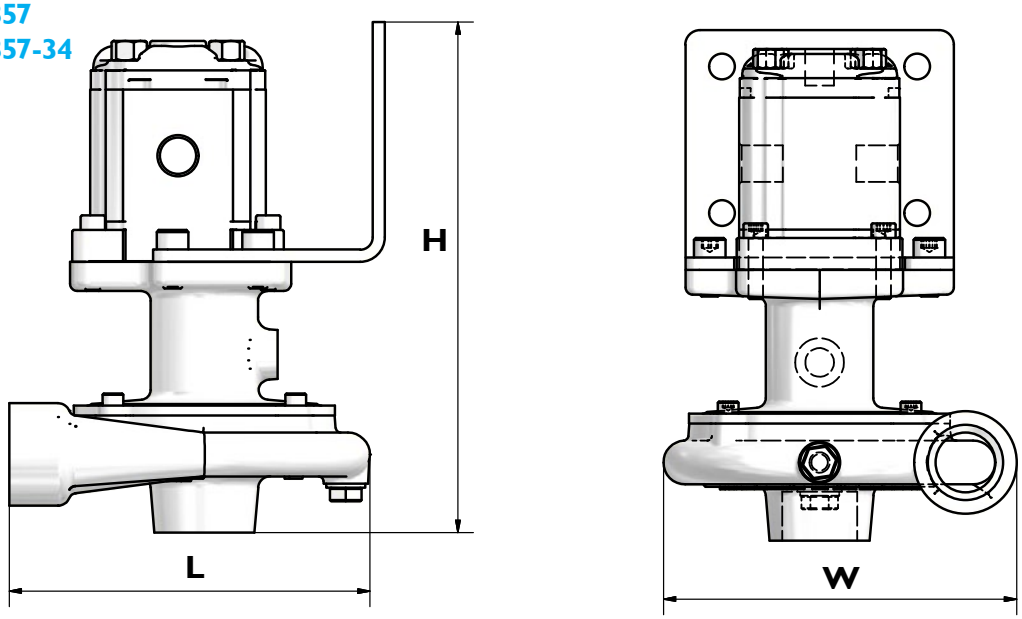
The DC 24V and hydraulic cooling water pump, if fitted, is typically installed in an easily accessible and identified dry position (because it often needs venting after the boat has been on land) well below the waterline - close to the powerpack.

DC -
Art# I0 2376-1
Art# I0 2376-4
(Communicates with the new PHC-3 controller)

New System Component



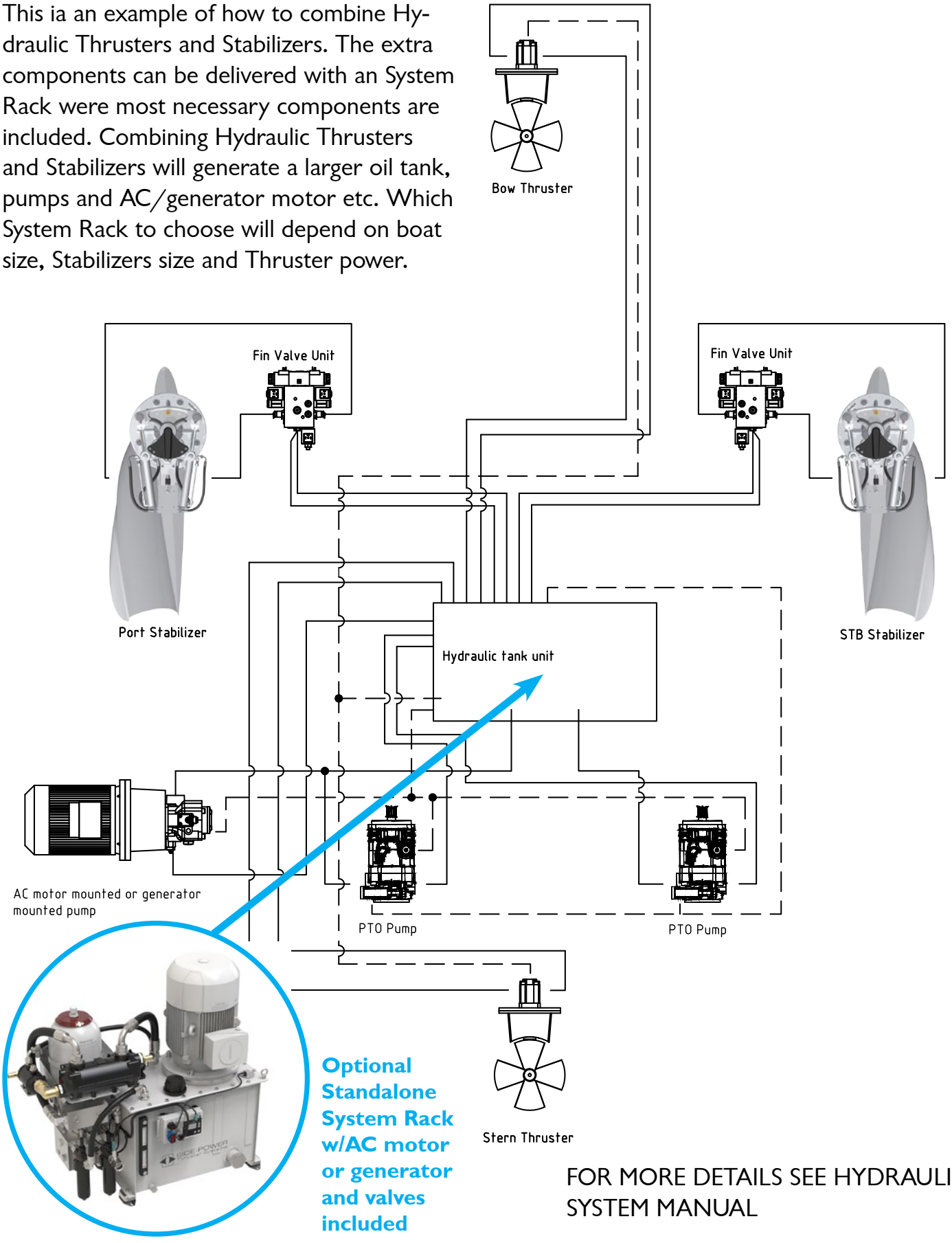
HYDRAULIC
Art# I0 2357
Art# I0 2357-34



Cooling Pumps:	DC -24V	HYDRAULIC
Weight (kg/lbs)	8,2/18,1	5,4/11,9
L (mm)	199	148
W(mm)	143	145
H (mm)	304	209

PRINCIPLE SYSTEM WITH HYDRAULIC THRUSTERS

This ia an example of how to combine Hydraulic Thrusters and Stabilizers. The extra components can be delivered with an System Rack were most necessary components are included. Combining Hydraulic Thrusters and Stabilizers will generate a larger oil tank, pumps and AC/generator motor etc. Which System Rack to choose will depend on boat size, Stabilizers size and Thruster power.



Optional Standalone System Rack w/AC motor or generator and valves included

FOR MORE DETAILS SEE HYDRAULIC SYSTEM MANUAL

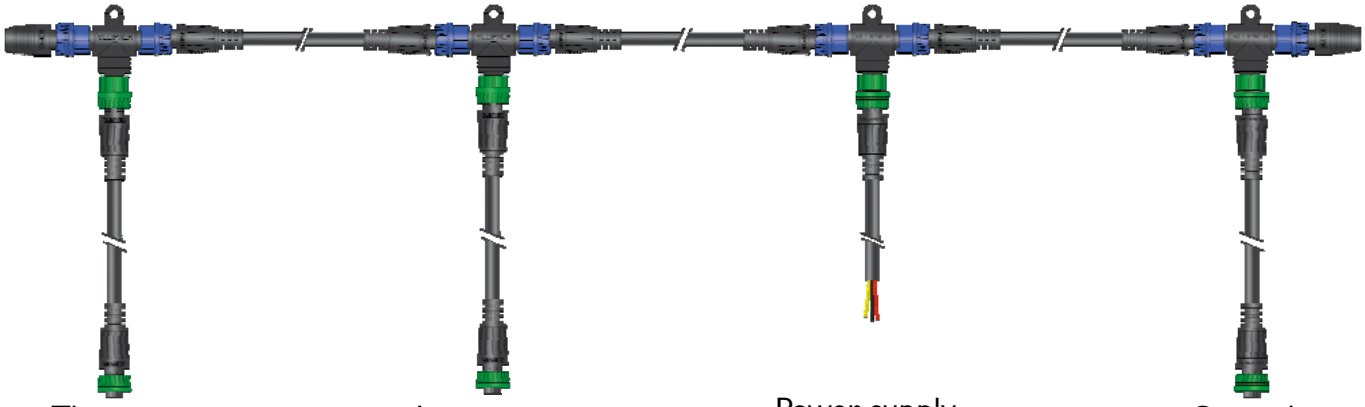
The S-link System

S-link is a ”CAN” based control system with full intelligent communication between all units in the system, much like a computer network.

Main advantages include:

- Round, compact and waterproof plugs with unique keying and color coding to avoid faulty hookup
- Unlimited number of commands or information transfer on a single cable
- User feedback at panel
- Intelligent troubleshooting

S-link cable component overview



Thruster
Stabilizer
Hydraulic system

Automatic
main switch
(When electric
thrusters only)

Power supply

Control panel

Backbone cables

Forms the main “loop” around the boat.

Part #: 6 1320-xxM (xx=length)
6 1320-0.2M (0.2m)
6 1320-2M (2.0m)
6 1320-4M (4.0m)
6 1320-7M (7.0m)
6 1320-15M (15.0m)
6 1320-20M (20.0m)

Spur cables

Must be used to connect all parts to the backbone cable (one for each component, no exceptions), recommended to be as short as practically possible.

Part #: 6 1321-xxM (xx=length)
6 1321-0.4M (0.4m)
6 1321-1M (1.0m)
6 1321-3M (3.0m)
6 1321-5M (5.0m)

Power cable

Must be one in each system, length 2.5m

Part #: 6 1328

Backbone extender

Connects two backbone cables to

extend length.

Part #: 6 1322

T-connector

Must be one for each spur, including power cable.

Part #: 6 1326

End terminator

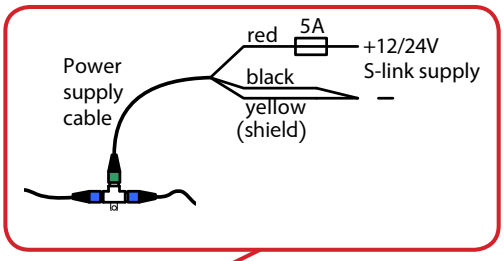
Must be one in each end of the backbone “loop”.

Part #: 6 1327

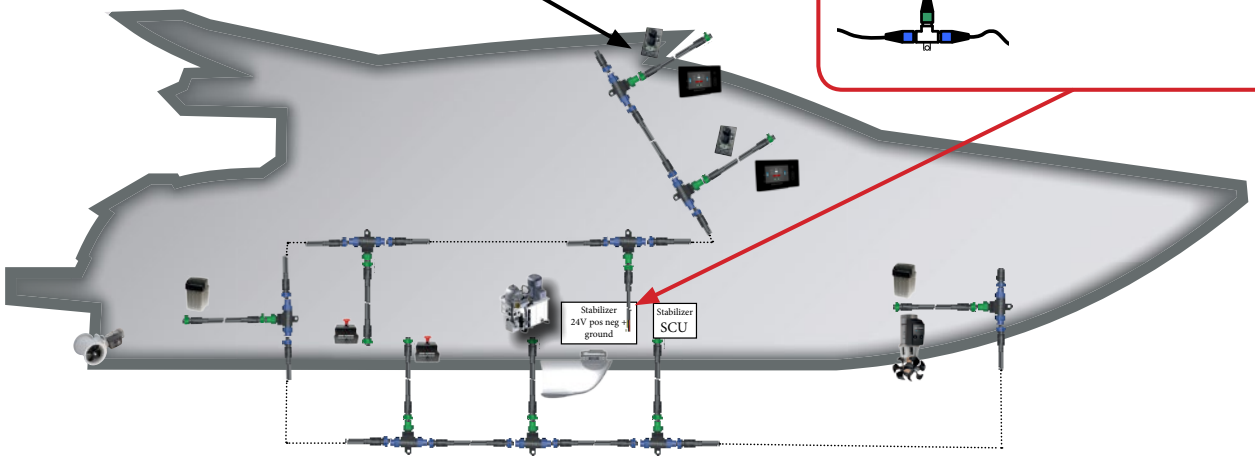
Example of S-Link wiring with Stabilizers and DC PRO Thrusters.

You need:
2 x 6 1327 End terminators
9 x 6 1326 T-connectors
1 x 6 1328 Power spur
8 x 6 1320-xxM Backbone cables
8 x 6 1321-xxM Spur cables

NOTE!
The yellow wire(shield) in the Power spur must be connected together with the black wire to Battery minus as in the drawing below.



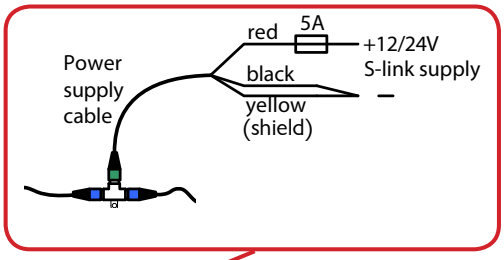
IMPORTANT!
Each S-link component needs it's own T-connector and Spur cable



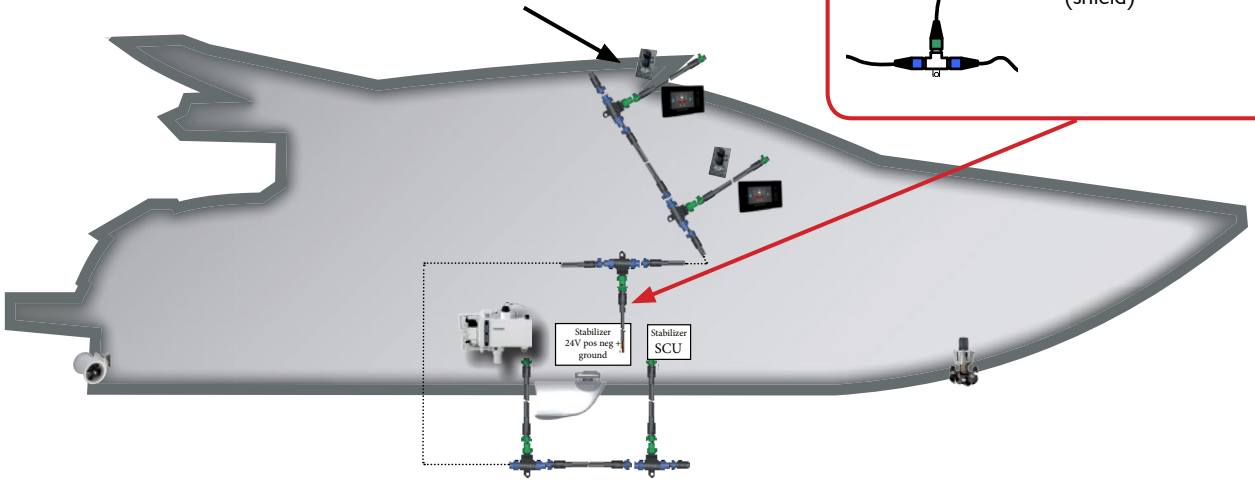
Example of S-Link wiring with Stabilizers and HYD Thrusters.

You need:
2 x 6 1327 End terminators
5 x 6 1326 T-connectors
1 x 6 1328 Power spur
4 x 6 1320-xxM Backbone cables
4 x 6 1321-xxM Spur cables

NOTE!
The yellow wire(shield) in the Power spur must be connected together with the black wire to Battery minus as in the drawing below.

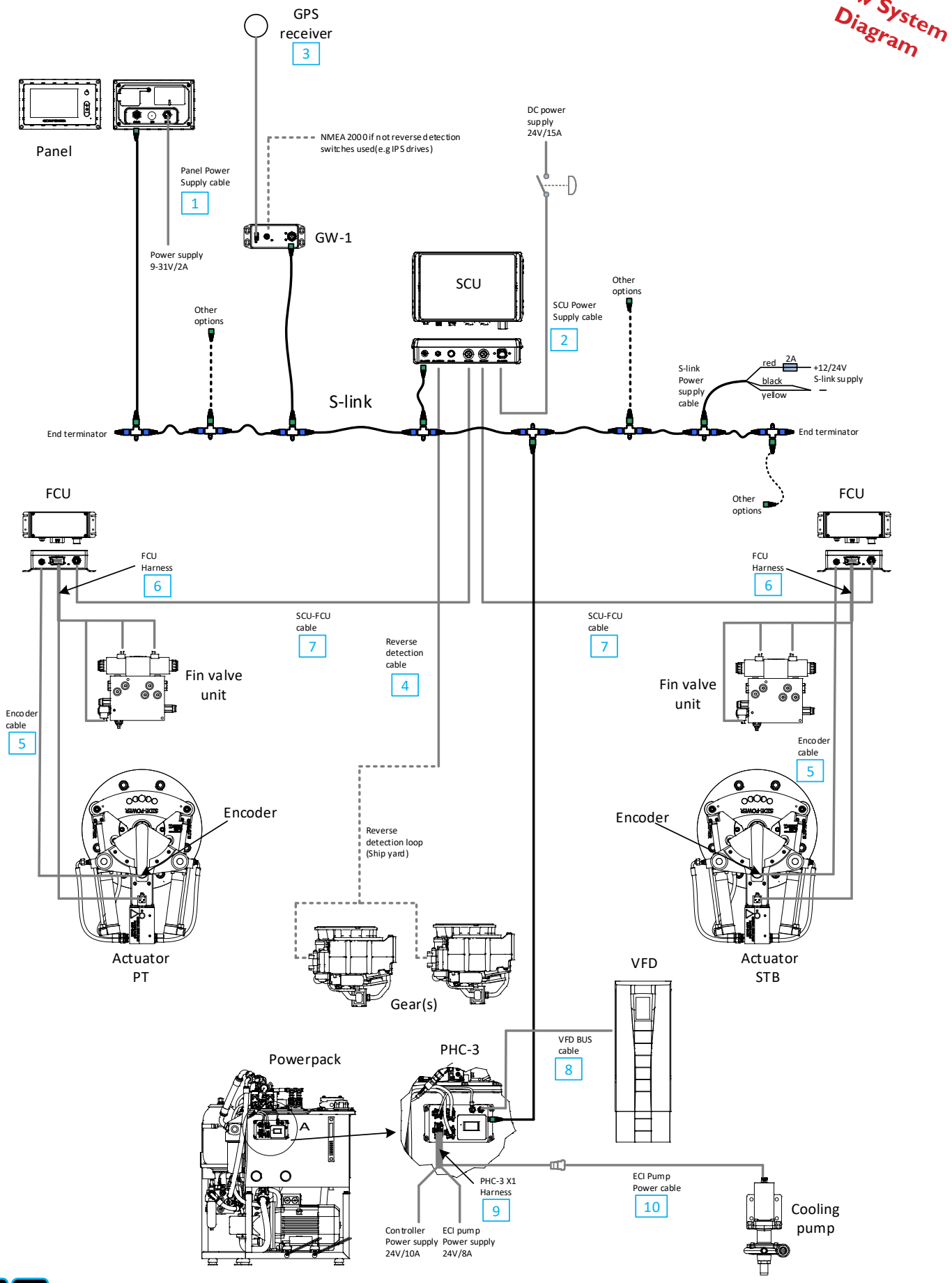


IMPORTANT!
Each S-link component needs it's own T-connector and Spur cable



PRINCIPLE ELECTRICAL SYSTEM

New System Diagram



ELECTRICAL SYSTEM CABLES

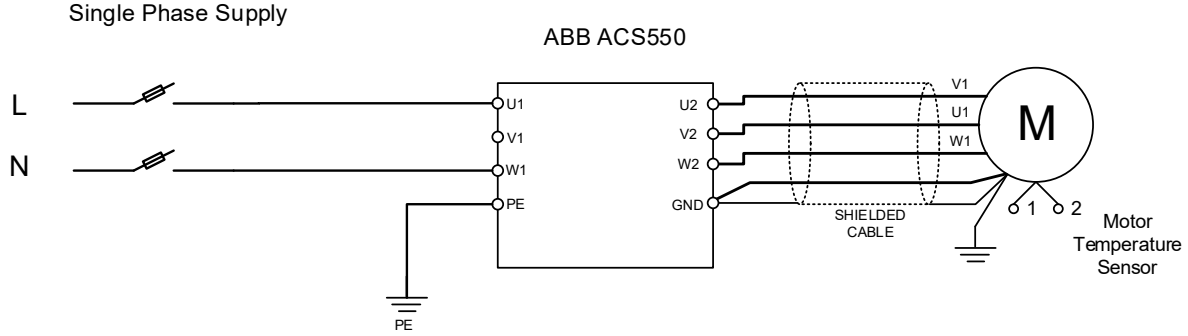
New System Components

1. Panel Power supply cable Part# 151090-020 - 2m
2. SCU Power supply cable Part# 151371-025 - 2,5m
3. GPS Receiver Part# 321711 - 10m
4. Reverse detection cable Part# 151375-100 - 10m
5. Encoder cable Part# 151271-015 - 1,5m
   Encoder cable Part# 151271-030 - 3m
6. FCU harness Part# 151272 - 0,6m+3m
7. SCU-FCU cable Part# 151370-040 - 4m
   SCU-FCU cable Part# 151370-070 - 7m
   SCU-FCU cable Part# 151370-100 - 10m
   SCU-FCU cable Part# 151370-150 - 15m
   SCU-FCU cable Part# 151370-200 - 20m
   SCU-FCU cable Part# 151370-250 - 25m
   SCU-FCU cable Part# 151370-300 - 30m
8. VFD BUS cable Part# 160311-050 - 5m
9. PHC-3 X1 Harness Part# 151470-1
10. ECI pump power cable Part# 151480-050 - 5m
    ECI pump power cable Part# 151480-100 - 10m

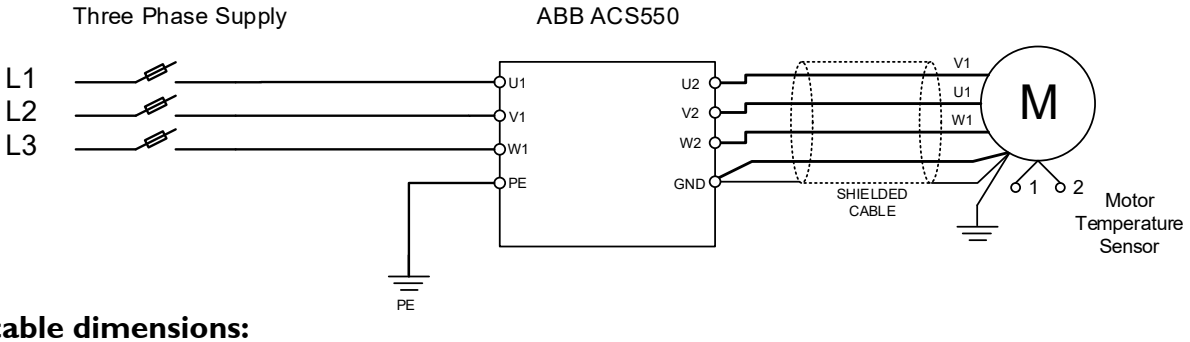
AC POWERPACK PRINCIPLE WIRING

In case of single phase supply systems, a Variable Frequency Drive (VFD) is delivered as part of the Power Pack. The VFD is used as an AC motor starter device, that supply 3 phase voltage for the AC motor.
A separate breaker is required for the VFD supply. Recommended breaker size and the wire gauges can be found in the VFD quick start guide. Cable from VFD to motor should be of screened type, suited for VFD use.
For further reference, see Quick Start Guide supplied with the VFD.

Single Phase Supply



Three Phase Supply



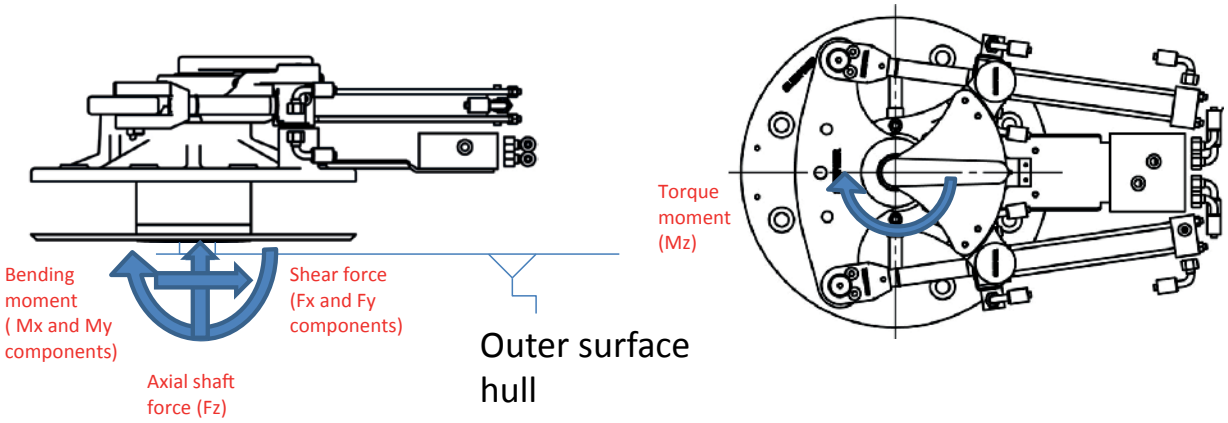
VFD cable dimensions:

*** Based on maximum 20 meters cable lengths.**

Motor power (kW)	Input Phases	Input Voltage (V)	Input Supply Current (A)	Motor Current (A)	Input Wire Size (mm^2)*	Motor Wire Size (mm^2)*
3,5	1	220	21,8	12,6	4	2,5
4,6	1	220	29,1	16,8	6	4
5,5	1	220	39,0	22,5	10	6
7,5	1	220	46,2	26,7	16	10
7,5	3	220	26,7	26,7	10	10
11	1	220	67,5	39,0	25	16
11	3	220	39,0	39,0	16	16
11	3	400	21,0	21,0	4	4
15	1	220	88,3	51,0	35	16
15	3	220	51,0	51,0	16	16
15	3	400	28,0	28,0	10	10

Changes or misprints might occur in information given.

IMPORTANT!
Responsible electrical technician must consider fitting method, temperature conditions and cable lengths before doing this electrical work. This table is just a general recommendation.



Note that all calculated values are nominal and found by equilibrium considerations and also that various coefficients are inaccurate as hull design etc will affect the actual fin effect. Dynamic effects such as jumps/impacts with waves, backflow closing of valve etc could further increase the hull/shaft loads. Therefore all dimensioning should account for this by using a safety factor.

The aft top face of the fin is deliberately made weaker than the rest of the fin so it will break easier in case of an impact with the hull. If the shaft bends by hitting something in the water or the ground, the fin is still a strong part.
We generally advice that the hull is strengthened, or at least made with materials suitable to sustaing impacts over the total length of the fin within an area of approximately 10 degrees fin rotation in each direction from center as an extra safety measure to be absolutely sure that the fin is prevented from breaking through the hull in a collision situation.

The Vector Fin design also has benefits in hull safety, with the fins being curved, any impact with the ground will not only bend the shaft backwards, but also outward, allowing the fin to break away with less stress on the hull.

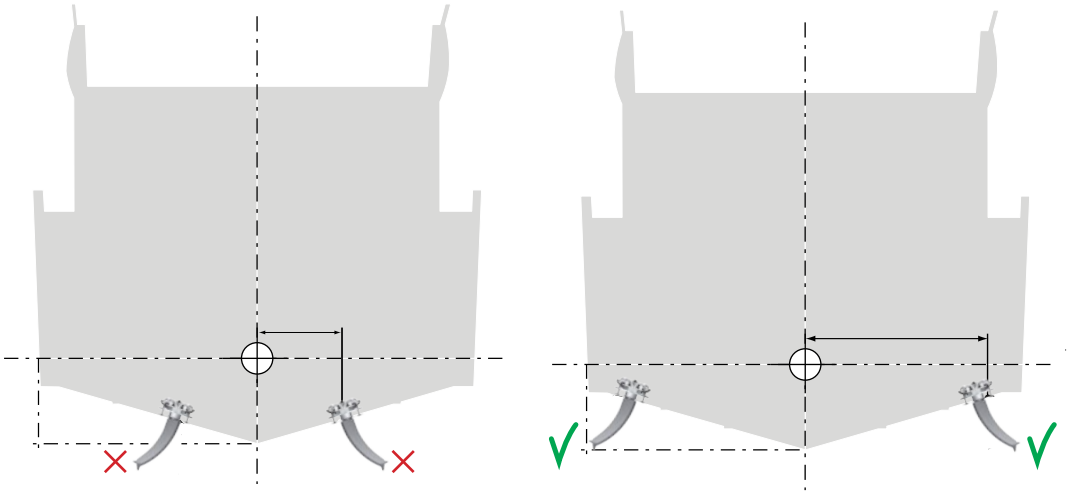
FIN LOADS ON HULL

Fin size	Speed	Bending moment (Mx+My)	Twisting torque (Mz)	Axial shaft (Fz)	Shear force (Fx+Fy)	Shaft breakaway
SPS55 VF 650	10 kn / Min	3500 Nm	2100 Nm	3200 N	9500 N	230 kN
	15 kn	4700 Nm	2700 Nm	5300 N	10800 N	230 kN
	20 kn	5600 Nm	2700 Nm	6400 N	11800 N	230 kN
	25 kn	6400 Nm	2700 Nm	7300 N	12700 N	230 kN
	30 kn	6600 Nm	2700 Nm	7800 N	15000 N	230 kN
	35 kn	6600 Nm	2700 Nm	7800 N	18000 N	230 kN
	40 kn	6600 Nm	2700 Nm	7800 N	18000 N	230 kN
SPS55 VF 800	10 kn / Min	4400 Nm	2700 Nm	4000 N	9300 N	230 kN
	15 kn	5000 Nm	2700 Nm	5200 N	10000 N	230 kN
	20 kn	6200 Nm	2700 Nm	6300 N	10500 N	230 kN
	25 kn	7100 Nm	2700 Nm	7300 N	12100 N	230 kN
	30 kn	7300 Nm	2700 Nm	7800 N	14000 N	230 kN
	35 kn	7300 Nm	2700 Nm	7800 N	19000 N	230 kN
	40 kn	7300 Nm	2700 Nm	7800 N	19000 N	230 kN
SPS55 VF1050	10 kn / Min	4600 Nm	2800 Nm	4400 N	8200 N	230 kN
	15 kn	5600 Nm	2800 Nm	5100 N	9100 N	230 kN
	20 kn	7200 Nm	2800 Nm	6400 N	10700 N	230 kN
	25 kn	8500 Nm	2800 Nm	7600 N	12700 N	230 kN
	30 kn	8500 Nm	2800 Nm	7800 N	14700 N	230 kN
	Maximum 30 knots top speed for SPS55 / VF1050 combination					

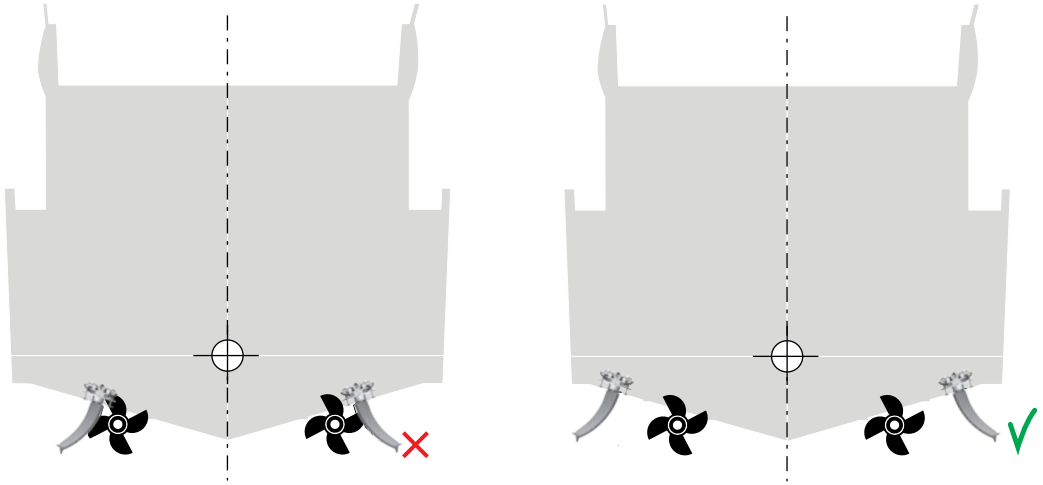
FIN LOADS ON HULL						
Fin size	Speed	Bending moment (Mx+My)	Twisting torque (Mz)	Axial shaft (Fz)	Shear force (Fx+Fy)	Shaft breaka-way
SPS66 VF1050	10 knots	5500 Nm	3400 Nm	5000 N	10200 N	350 kN
	15 knots	6500 Nm	3400 Nm	6000 N	11200 N	350 kN
	20 knots	8200 Nm	3400 Nm	7300 N	12200 N	350 kN
	25 knots	9600 Nm	3400 Nm	8600 N	14200 N	350 kN
	30 knots	10000 Nm	3400 Nm	9000 N	15500 N	350 kN
	35 knots	10000 Nm	3400 Nm	9000 N	23300 N	350 kN
	40 knots	10000 Nm	3400 Nm	9000 N	23300 N	350 kN

FIN LOADS ON HULL						
Fin size	Speed	Bending moment (Mx+My)	Twisting torque (Mz)	Axial shaft (Fz)	Shear force (Fx+Fy)	Shaft breaka-way
SPS92 VF1350	10 kn / Min	10500 Nm	7000 Nm	6500 N	19000 N	940 kN
	15 kn	12500 Nm	7000 Nm	10000 N	20000 N	940 kN
	20 kn	15000 Nm	7000 Nm	12000 N	21000 N	940 kN
	25 kn	17500 Nm	7000 Nm	13700 N	22500 N	940 kN
	30 kn	18000 Nm	7000 Nm	14600 N	27500 N	940 kN
	35 kn	18000 Nm	7000 Nm	14600 N	35000 N	940 kN
	40 kn	18000 Nm	7000 Nm	14600 N	35000 N	940 kN

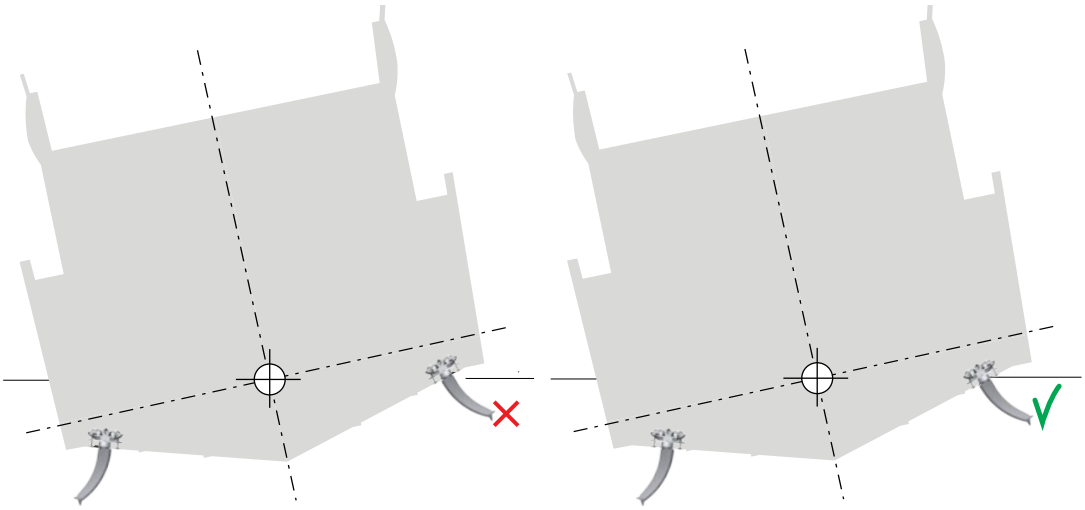
FIN LOADS ON HULL						
Fin size	Speed	Bending moment (Mx+My)	Twisting torque (Mz)	Axial shaft (Fz)	Shear force (Fx+Fy)	Shaft breaka-way
SPS93 VF1650	10 kn / Min	11500 Nm	7000 Nm	8000 N	18000 N	940 kN
	15 kn	13500 Nm	7000 Nm	10500 N	19000 N	940 kN
	20 kn	17500 Nm	7000 Nm	12500 N	21000 N	940 kN
	25 kn	20000 Nm	7000 Nm	14500 N	23000 N	940 kN
	30 kn	20500 Nm	7000 Nm	15000 N	28000 N	940 kN
	35 kn	20500 Nm	7000 Nm	15000 N	38000 N	940 kN
	40 kn	20500 Nm	7000 Nm	15000 N	38000 N	940 kN



Fins should ideally not extend outside the beam or below the keel when in neutral position.

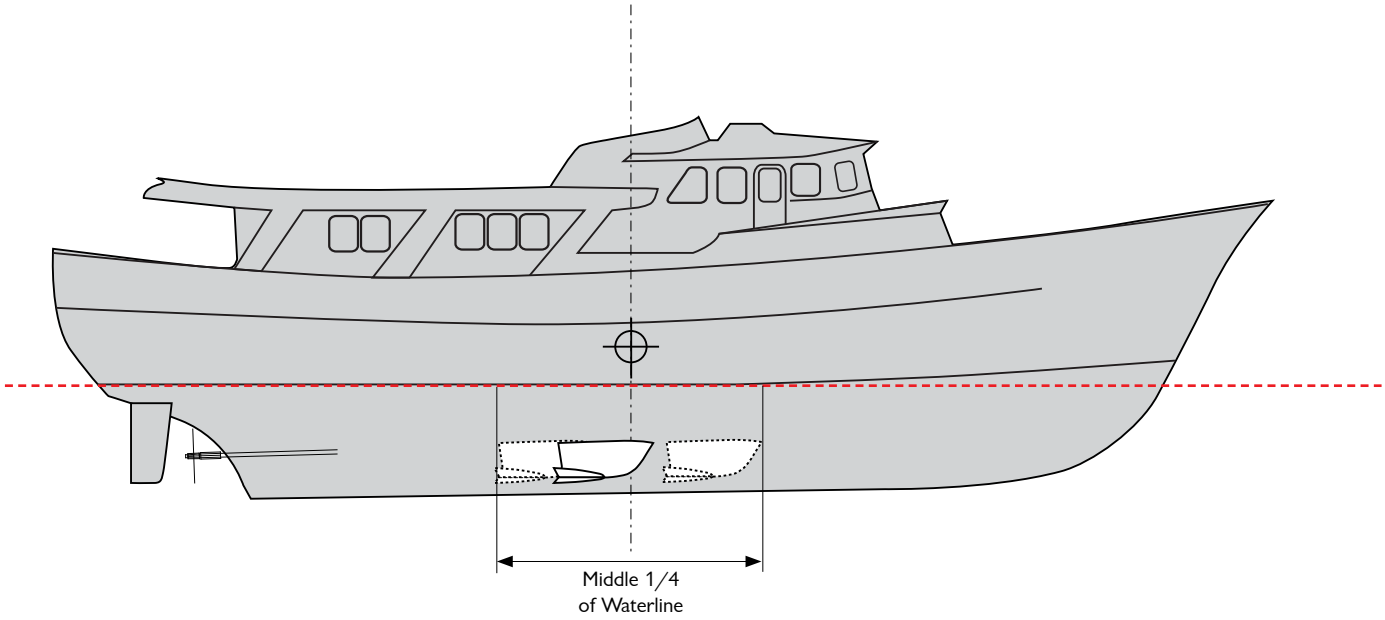


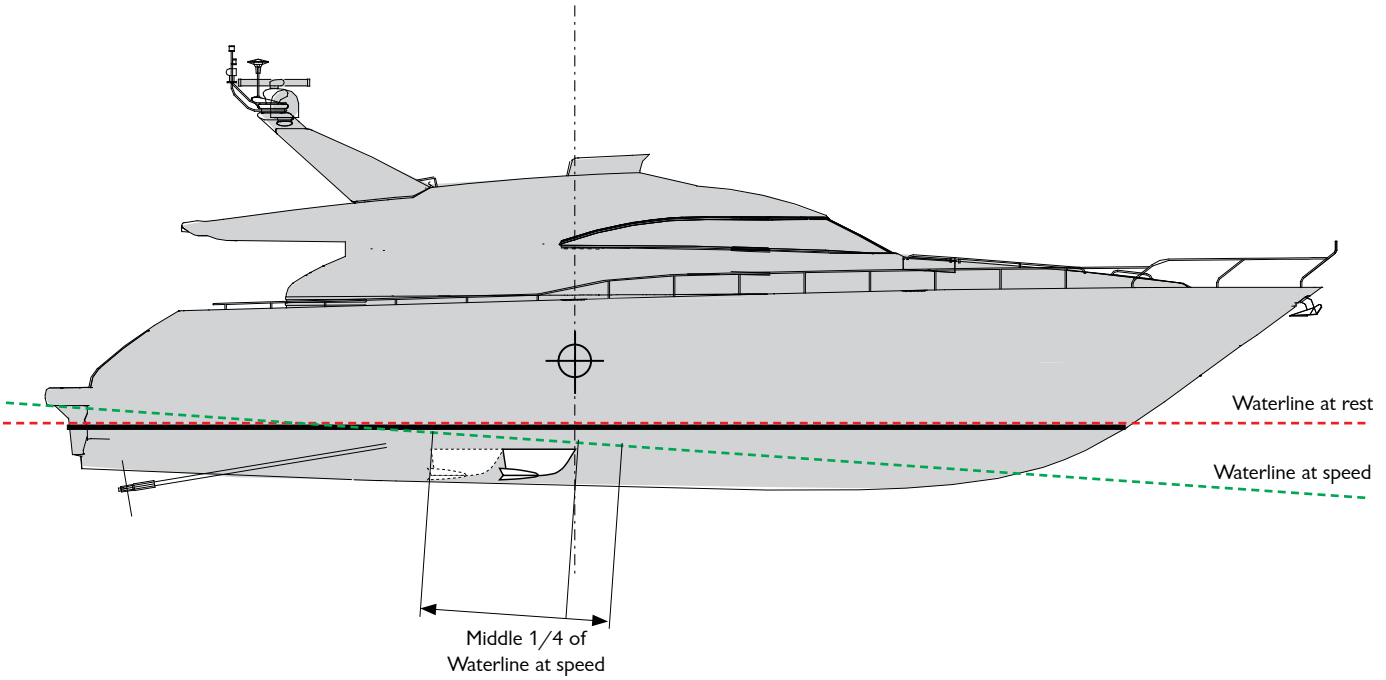
Fins should be placed as far outboard as possible, and NOT inline with the propellers, to ensure avoiding possible disturbance of the waterflow to the props which in the worst case can cause vibrations / cavitation.



No part of the fin should be above water level during normal roll motion/under normal sea conditions.

FIN POSITIONING





To avoid unwanted influences on the steering characteristics, the fins should be placed so that their forces are applied as close to the vessels longitudinal center of buoyancy as possible LCB (where the only really known position is the LCG which is in the same position in the length direction when the boat is not moving.
- If unknown, this is usually a few percent aft of 50% of the waterline length.

However, for high speed vessels / planning vessels, the longitudal center of buoyancy moves quite far aft when going fast, so that the fins should be placed with trailing/leading edge within middle 1/5 of waterline length at speed and never in front of the LCG.

When fitting Vector Fins™ you have some more flexibility than straight fins before negative effects occur because the Vector Fins™ have less side-effects (horizontal forces) than straight fins.

For vessels with top speed under 15 knots, fin may be placed within the middle 1/4 of waterline length.

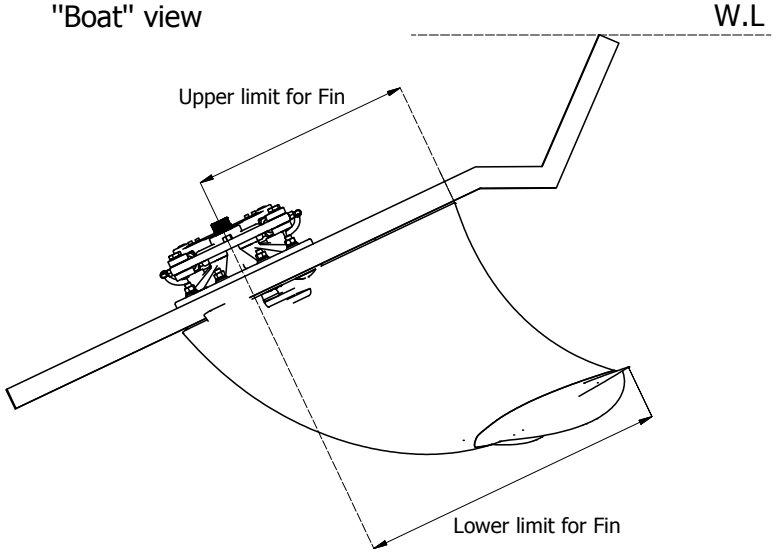
Transversal fin positioning of Vector Fins™

With Vector fins™ it is a priority to push the fins as far outboard as possible to achieve the most possible leverage for the fins forces (unlike standard fins, see illustration on front page).
With Side-Power stabilizers it is possible to install the fins so they have different stroke angles innboard and outboard as the locked center and cruising center is totally flexible because they are locked hydraulically.
Another point that is well worth considering as such is to avoid having to cut off any of the back top of the fin (normal on most fins on hard-chine boats) as this cut-away will cause added resistance/drag by the fin due to the ”bigger hole” this area will make in the water in higher speeds, as well as the big distance the aftward part of the fin (the most efficient area in at anchor stabilization) will loose force also as part of the water will pass easier between the hull and the fin.
Also, because of the outward ”bend” of the fins, keeping the lower part inside the boats ”envelope” will also result in the upper part of the fins being further inboard than they would on straight fins – so you will naturally have less of an outboard stroke in the upper part of the fin (along the hull).
There are many considerations for fin and actuator positioning, and often it is the inside configuration and space that ends up playing a major part of the decision.
In general – push the actuators as far as possible outboard – while keeping at least 22 degrees of outboard stroke as a minimum (if less, and lower part is within boat envelope, a small cut-away of the back upper part can be done as a compromise). If inside configuration / access to inside parts of actuators etc. dictates moving further inboard this is fine, but the performance will be reduced slightly due to less leverage arm for the stabilizing force applied by the fins.

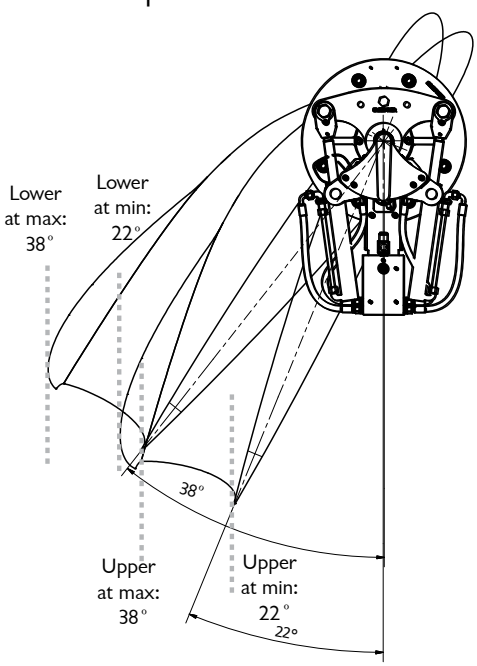
Measurements along hull bottom outwards to chine(upper) and outside boat ”envelope” (lower) in mm, center shaft to chine start / outside envelope:

Fin size	At maximum: 38° Upper / lower	At minimum : 22° Upper / Lower
VF650	575 / 810	350 / 625
VF800	642 / 900	390 / 695
VF1050	731 / 1016	444 / 791
VF1350	828 / 1150	504 / 897
VF1650	914 / 1305	557 / 1001

"Boat" view



“Top” view



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