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Product Guide

Design and Installation Planning for SPS40E, SPS50E, SPS60E, SPS70E, SPS80E, SPS100E

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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:

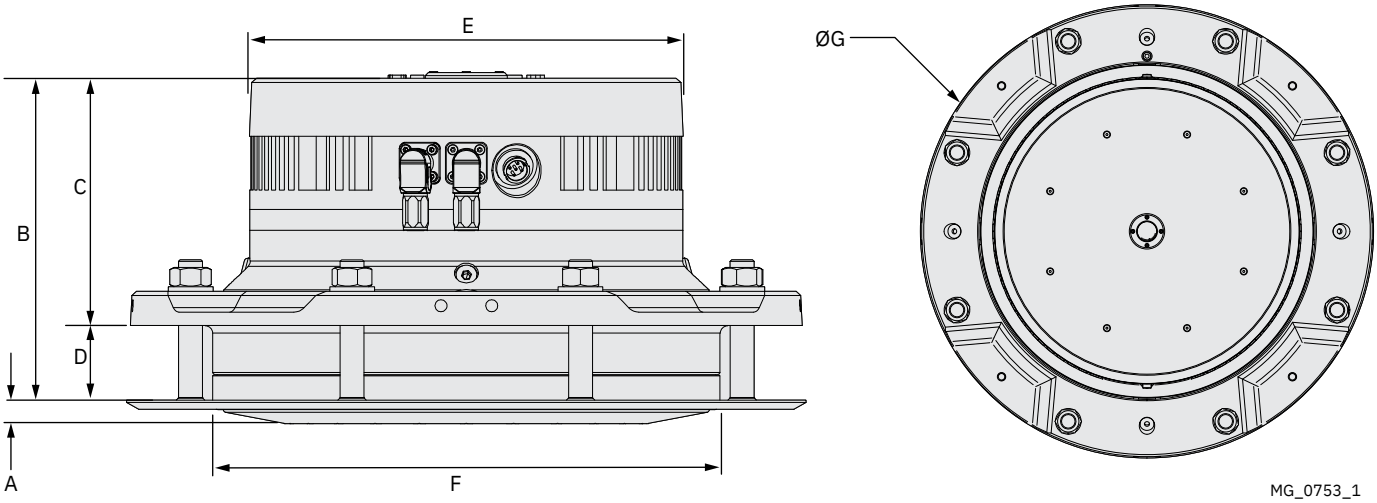
- Safety and General precautions
- Measurements
  Please note the very flexible installation methods possible including off-set angle installation possible with Side-Power stabilizers as this might enable installation in positions more suited and efficient than possible with some other brands or types of fin stabilizers.
- Fin & actuator positioning
  ENSURE 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 electrical parts including the control panel and wiring runs based on the information in the sections:

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

eVision Actuator
The electric drive component of the actuator system. The actuators are traditionally installed in the aft end of the living area or front section of the engine room. Due to the unique compact and low eVision design, installations require only minor modifications to the interior, if any. The actuators are also quiet so there is no problem to have in living spaces beneath the floor or furniture. They are available as both DC and AC versions.

Dimension code	Dimension descriptions DC version	SPS40E		SPS50E		SPS60E	
		mm	inch	mm	inch	mm	inch
A	Actuator height outside the hull	15.8	0.6	15.8	0.6	16.8	0.7
B	Total actuator height	219.5	8.6	223.1	8.8	286	11.3
C	Actuator height inside the hull	169.5	6.7	171	6.7	226	8.9
D	Hull thickness (sealant included)	50	2	55	2.17	64	2.5
ØE	Diameter of the actuator Motor	290	11.4	310	12.2	345	13.6
ØF	Diameter of the actuator through the hull	340	13.4	361	14.21	407.5	16.0
ØG	Diameter of the actuator base plate	450	17.7	471	18.54	564	22.2
	Weight (kg / lbs)	65 / 143.3		75 / 165.3		120 /264.9	



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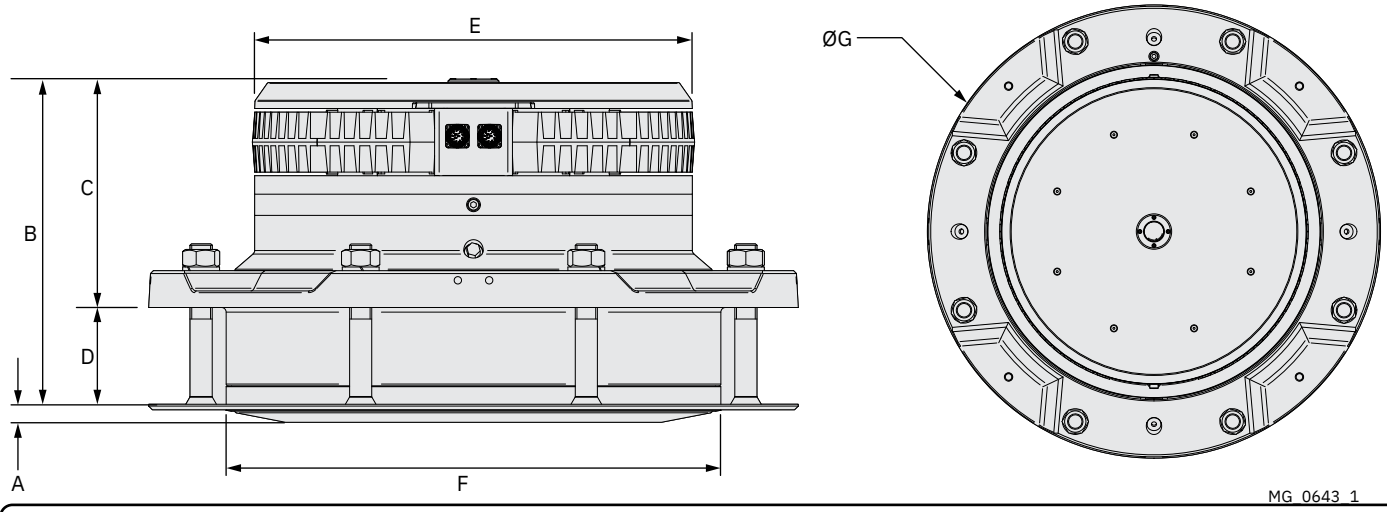
Dimension code	Dimension descriptions AC version	SPS60E		SPS70E		SPS80E		SPS100E	
		mm	inch	mm	inch	mm	inch	mm	inch
A	Actuator height outside the hull	16.8	0.6	16.8	0.6	20	0.8	23.5	0.9
B	Total actuator height	236	9.3	336	13.2	349	13.7	437.4	17.2
C	Actuator height inside the hull	172	6.8	256	10.1	249	10	287.4	11.3
D	Hull thickness (sealant included)	60	2.4	80	3.1	105	4.1	150	5.9
ØE	Diameter of the actuator Motor	350	13.8	405	15.9	475	18.7	559	22.0
ØF	Diameter of the actuator through the hull	408	16	457.5	18.0	537	21	629	24.8
ØG	Diameter of the actuator base plate	564	22.2	620	24.4	705	28	830	32.7
	Weight (kg/lbs)	118/260		194/428		296/653		490/1080	



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Actuator free space requirements

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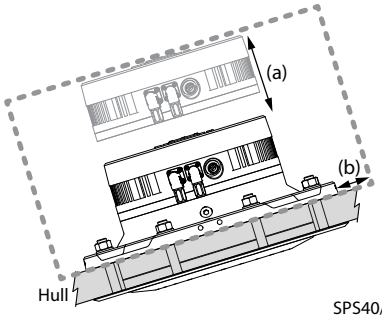
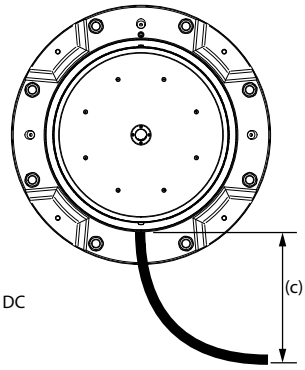
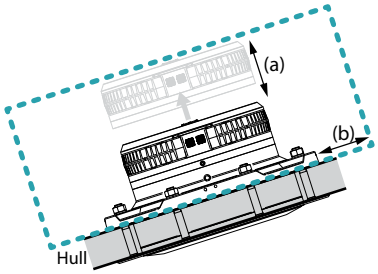
Consider and plan the positioning of the actuator for future service and appropriate area for cooling the electric motor. The ambient temperature is 40°C. The motor has temperature sensor and system will reduce power to avoid exceeding maximum allowed temperature.





SPS40/50/60E DC



SPS60/70/80/100E AC

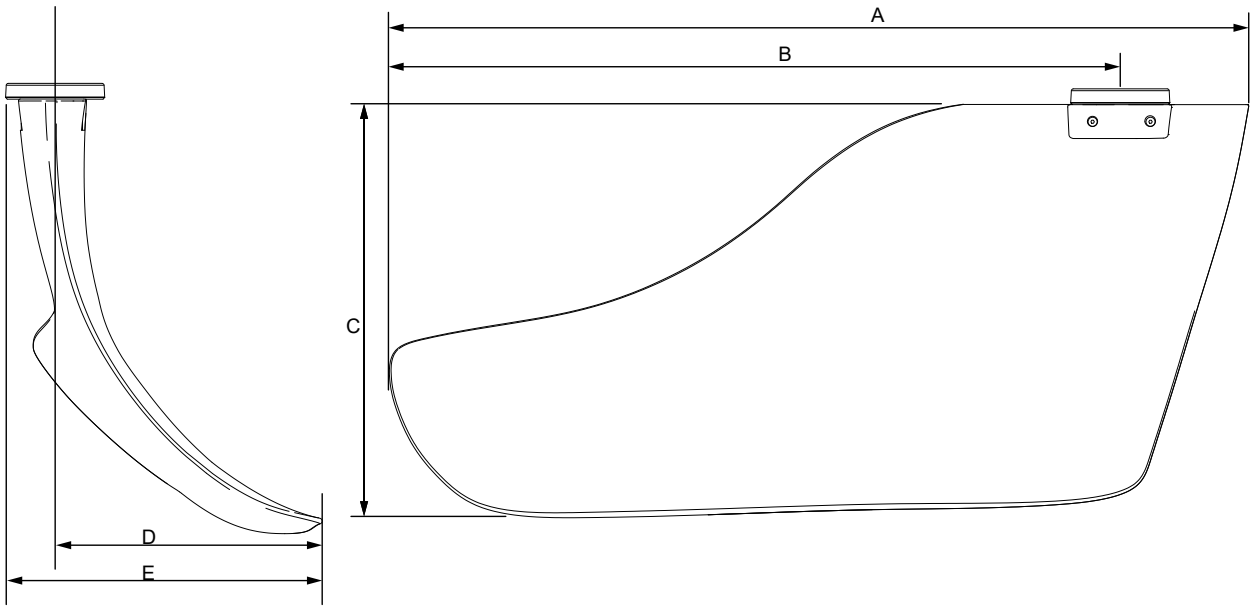
Dimension code	Dimension description	SPS40/50E		SPS60E		SPS80E	
		mm	inch	mm	inch	mm	inch
(a)	Free space for motor replacement	100	3.9	185	7	250	10
(b)	Base plate tooling clearance	50	2	50	2	50	2
(c)	151713-xxx (SCU) minimum cable bend clearance	200	7.9	200	7.9	200	7.9

eVision Actuator Fin
The 3rd generation Vector Fins™ are more efficient underway and at anchor. For faster boats the lift from the fins results in improved fuel efficiency compared to flat fins. The fins consume extensively less energy at anchor to achieve the same stabilization level as flat fins. By using the same energy, they stabilize more.

Fin Dimension MC_1025

Dimension code	Dimension descriptions	SPS40E				SPS50E				SPS60E					
		V4-8 ≤35 knots		V3-9 ≤23 knots		V4-8HS ≤40 knots		V4-12 ≤35 knots		V3-14 ≤23 knots		V4-15 ≤35 knots		V4-12HS ≤40 knots	
		mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	Total fin length	1342	52.8	1433	56.4	1342	52.8	1574	62.0	1751	68.9	1805	71.1	1574	62.0
B	Fin length to centre connection	1134	44.6	1220	48.0	1134	44.6	1330	52.4	1490	58.7	1525	60.0	1330	52.4
C	Total fin height	652	25.7	690	27.2	652	25.7	764	30.1	843	33.2	876	34.5	764	30.1
D	Fin width from centre connection	396	15.6	426	16.8	396	15.6	465	18.3	520	20.5	534	21.0	465	18.3
E	Total fin width	471	18.5	501	19.7	476	18.7	543	21.4	613	24.1	627	24.7	558	22.0

Dimension code	Dimension descriptions	SPS70E						SPS80E						SPS100E			
		V4-19 ≤35 knots		V4-15HS ≤40 knots		V4-21 ≤23knots		V3-23 ≤23 knots		V4-21HS ≤40 knots		V4-26 ≤35 knots		V4-26HS		V5-31 ≤23 knots	
		mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	Total fin length	2000	78.7	1805	71.1	2155	84.8	2256	88.8	2155	84.8	2329	91.7	2329	91.7	TBD	TBD
B	Fin length to centre connection	1690	66.5	1525	60.0	1821	71.7	1920	75.6	1821	71.7	1966	77.4	1966	77.4	TBD	TBD
C	Total fin height	970	38.1	876	34.5	1047	41.2	1086	42.8	1047	41.2	1131	44.5	1131	44.5	TBD	TBD
D	Fin width from centre connection	590	23.2	534	21.0	635	25.0	670	26.4	635	25.0	686	27.0	686	27.0	TBD	TBD
E	Total fin width	700	27.5	627	24.7	760	29.9	795	31.3	760	29.9	811	31.9	811	31.9	TBD	TBD



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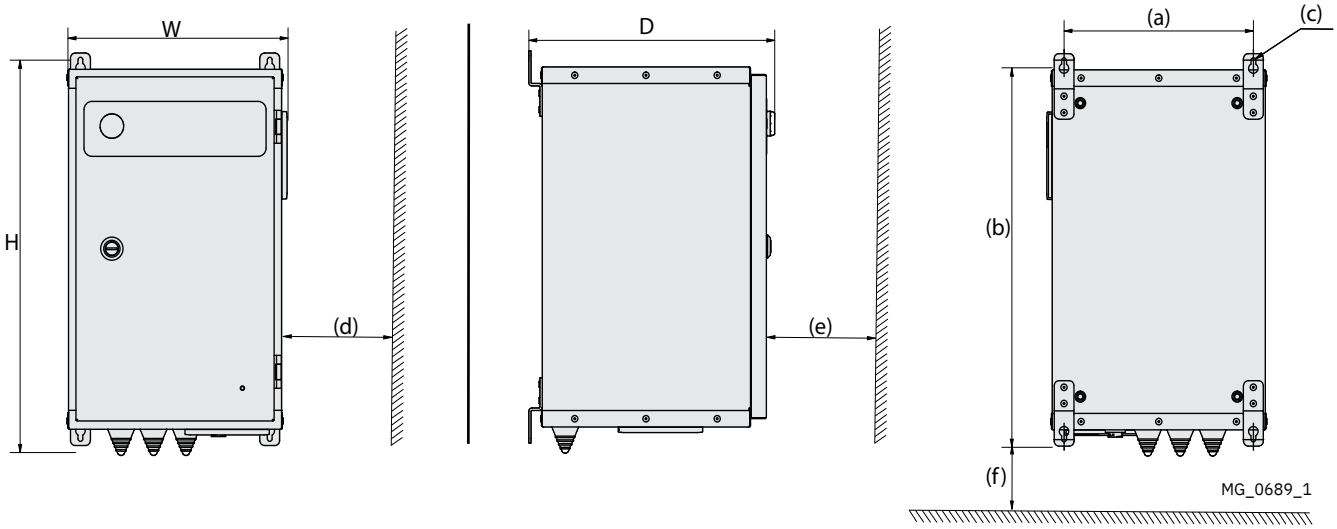
eVision eFD

The eFD is the control and power relay between the Actuator and the stabilizer control unit (SCU), used in the SPS60E and SPS80E systems. Supplied with 2.5 / 4.5 / 7 meter long encoder- and power cables for connection to the actuator. Mount the eFD in proximity of the actuator to ensure that the cables can be connected. Mount with the cables pointing down and in a ventilated area with maximum 50°C ambient temperature, IP56.

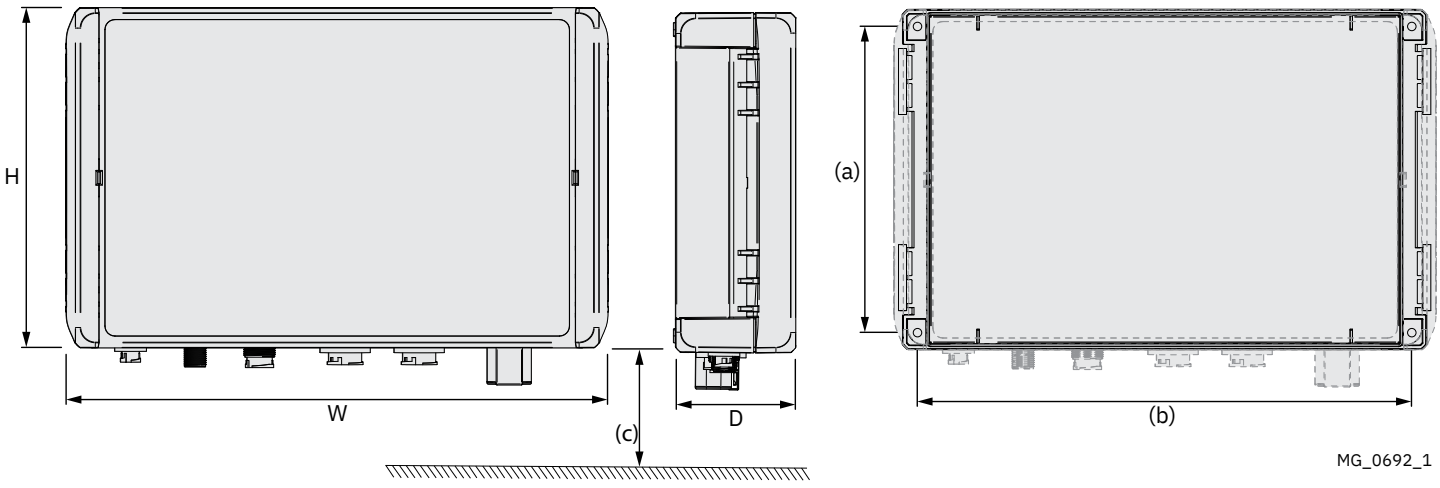
Dimension code	Dimension descriptions	mm	inch
H	Height	479	18.85
W	Width	278	10.94
D	Depth	311	12.24
(a)	Mounting hole height	463	18.22
(b)	Mounting hole width	239	9.41
(c)	Mounting hole diameter	6	0.24
(d)	Required sidewaye free space	278	10.94
(e)	Required front free space	500	19.6
(f)	Required cable crearance	250	10



Stabilizer Control Unit - SCU

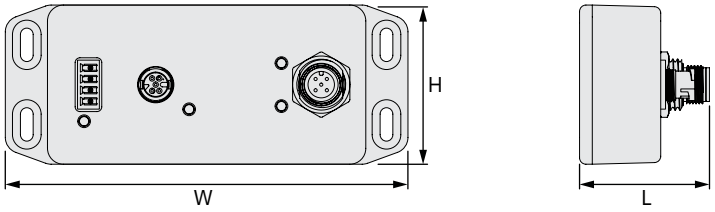
The main SCU with sensors should be placed on a bulkhead - as close to the vessel's boat roll centre - but not essential. Can be facing forward or aft, - remember to tell the system which position during setup. Avoid fitting to a vibrating structure as the unit contains the sensors used to register boat movement. The SCU LCD allows local control of parameters. Startup tasks can be performed directly from the user interface.

Dimension code	Dimension descriptions	mm	inch
H	Height	170	7
W	Width	271	11
D	Depth	60	2
(a)	Mounting hole height	153	6
(b)	Mounting hole width	247	9.7
(c)	Rerquired cable clearance	250	10



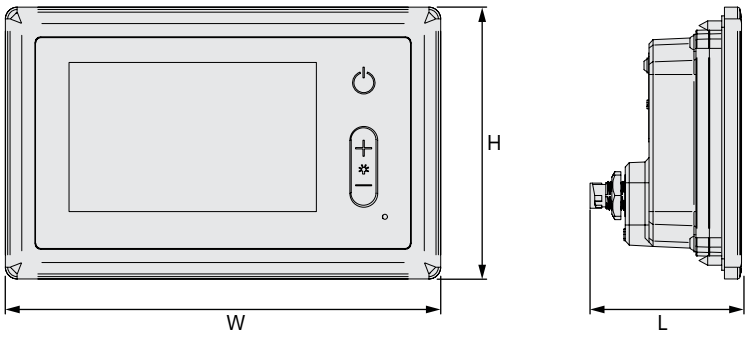
GW-1 'Gateway'
The GW-1 is enabling the use of GPS data for s-link devices. GPS messages can be received from NMEA0183 compatible GPS-receivers, or optionally through the NMEA2000 input connector provided on the unit. Avoid fitting to structures that have a lot of engine vibrations

Dimension code	Dimension descriptions	mm	inch
W	Widtht	127	5
H	Height	49	2
L	Lenght	41	1.6



TP-43 Stabilizer Operating Panel
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. 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.

Dimension code	Dimension descriptions	mm	inch
W	Widtht	165	6.5
H	Height	103	4
L	Lenght	55	2



Support Components

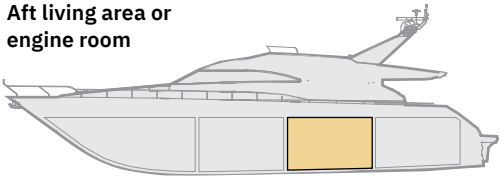
All of the components mentioned in this manual are necessary to operate the stabilizer system.
If your system is missing some of these components contact, a Sleipner dealer to obtain the latest model to complete your stabilizer installation.

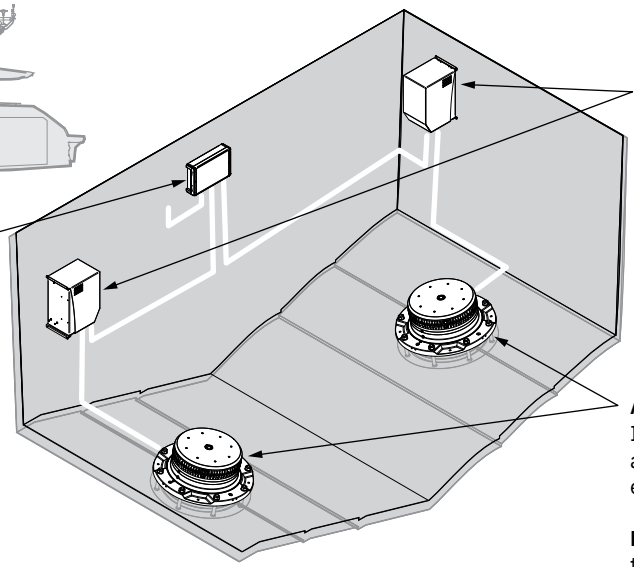
GPS receiver
Interfaced either through the NMEA 0183- or the NME 2000 port on GW-1. The GPS antenna should be installed where it can get a clear view of the sky and not be in the shadow of obstructions.

Aft living area or engine room
eVision Actuator, **eFD** and **SCU** are typically installed within the same compartment at the front of the engine room or aft of the cabin forward of the engine room. If these components are mounted on a bulkhead facing towards a living space, which is a typical position - ensure to mount on dampening material so no structural borne noise reach the living space.

Helm
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. The **GW-1** should be placed relatively close to the helm dashboard and within 10m from the **GPS receiver**.

Aft living area or engine room





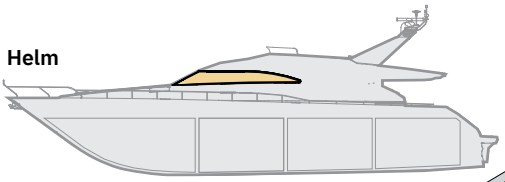
eFD
Installed on a bulkhead or similar - close to the actuator units. Avoid fitting to structures that have a lot of engine vibrations.

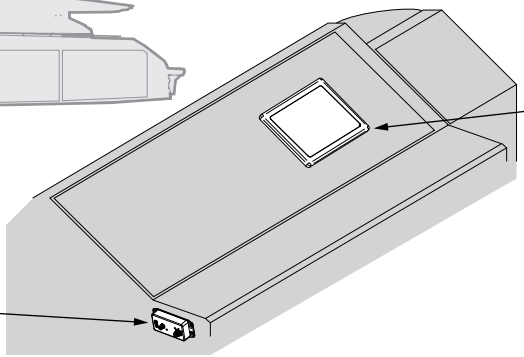
SCU
Installed on a bulkhead - as close to the vessel's boat roll centre facing forward or aft. Avoid fitting to structures that have a lot of engine vibrations.

Actuators
Installed on the bottom of the hull, and avoiding any modifications to stringers or elements effecting boat hull integrity.

NOTE: The hull must be reinforced where the actuators will be installerd to achieve the required hull strenght.

Helm





Stabilizer Operating Panel TP-43a
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.

GW-1
Installed relatively close to the dashboard within 10m from the GPS receiver. GW-1 is normally installed hidden under the dashboard and connects to S-Link backbone.
NOTE: The GPS receiver must be placed on the outside of the vessel.

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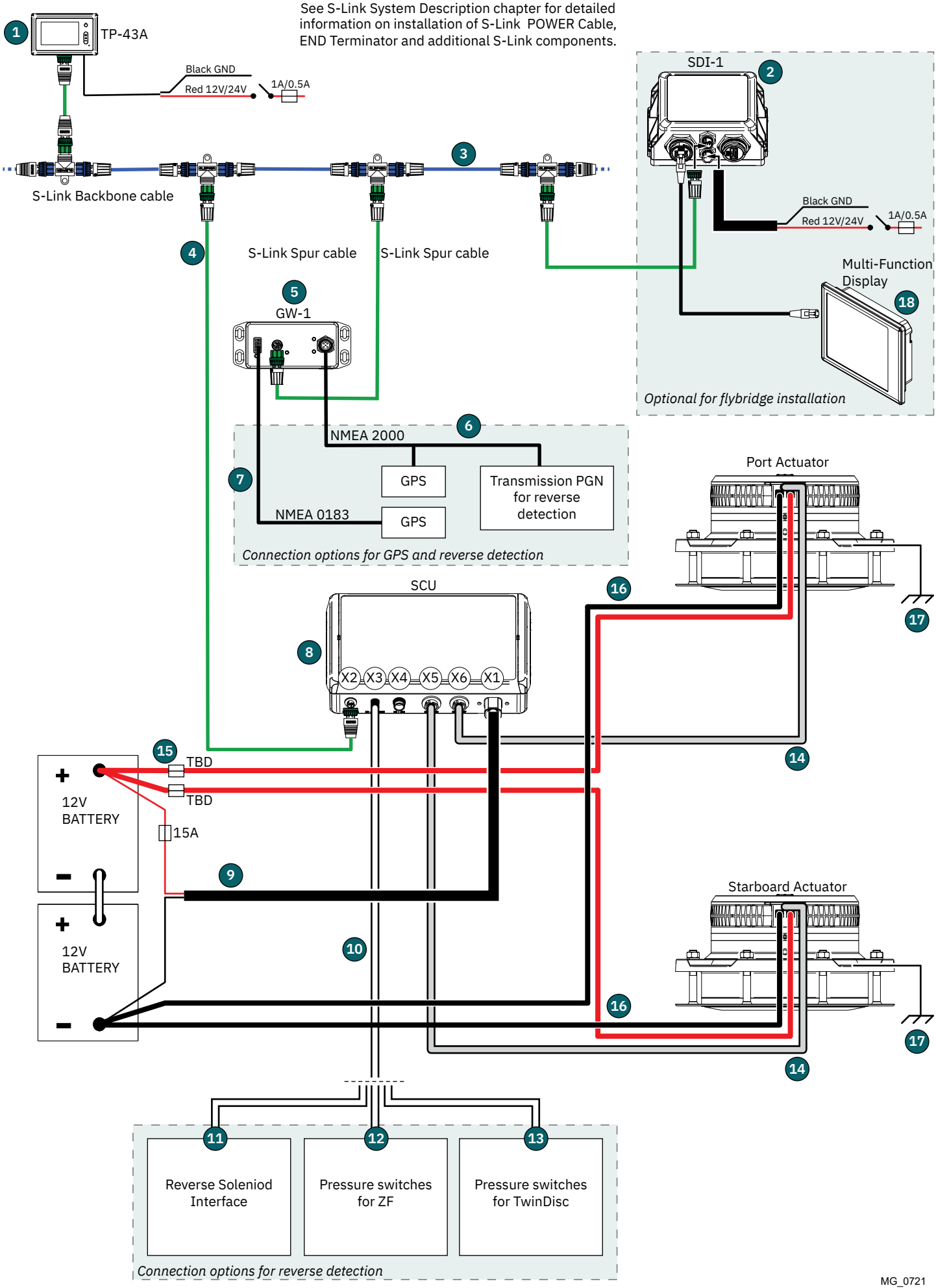
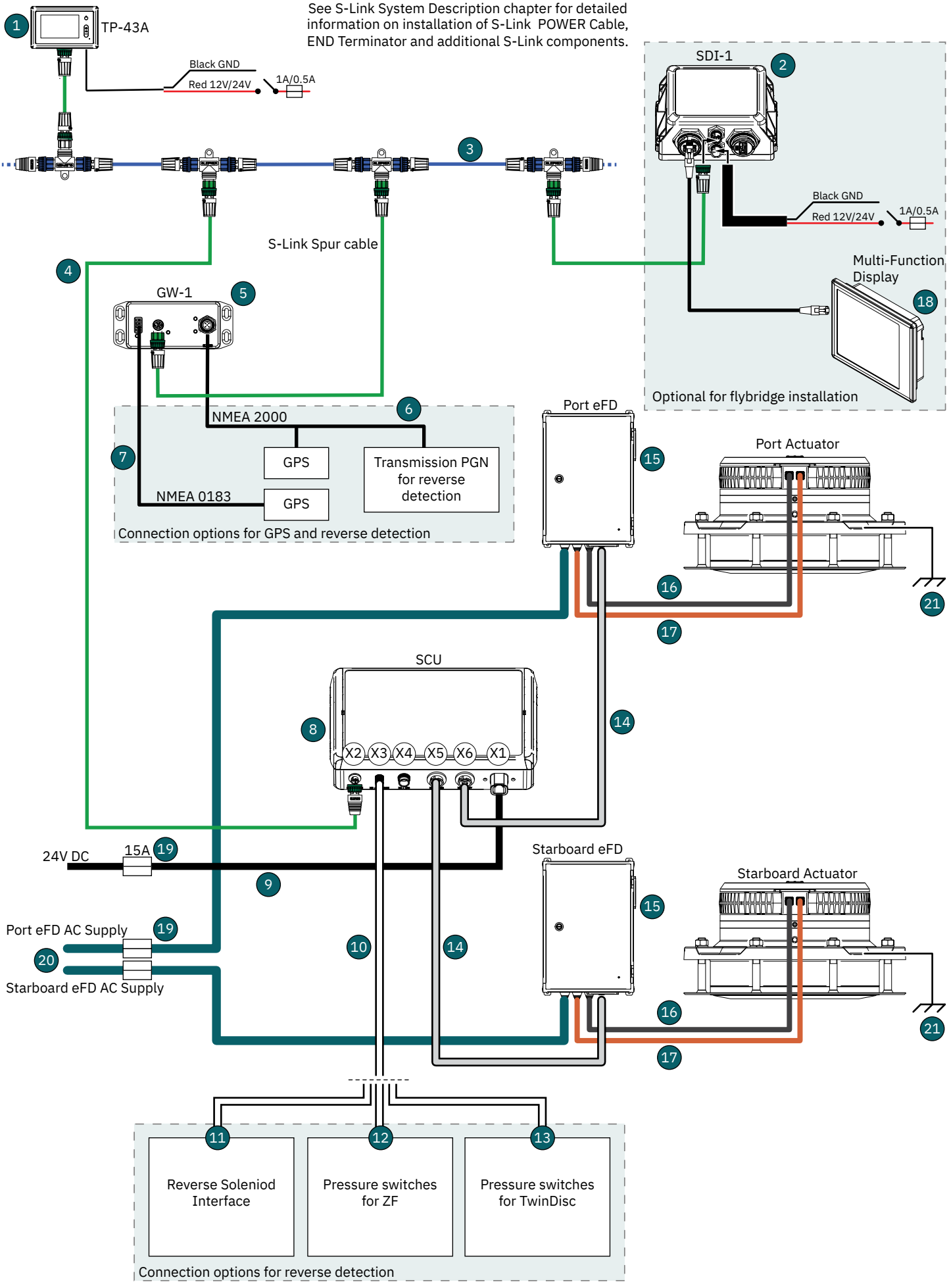
Wiring diagram for the DC actuators SPS40E, SPS50E & SPS60E



Wiring diagram for the AC actuators SPS60E, SPS70E, SPS80E & SPS100E



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S-Link system description

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S-Link is a CAN-based control system used for communication between Sleipner products installed on a vessel. The system uses BACKBONE Cables as a common power and communication bus with separate SPUR Cables to each connected unit. Only one S-Link POWER cable shall be connected to the BACKBONE Cable. Units with low power consumption are powered directly from the S-Link bus.

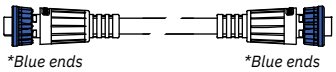
Main advantages of S-Link system:
- Compact and waterproof plugs.
- BACKBONE and SPUR Cables have different colour coding and keying to ensure correct and easy installation. BACKBONE Cables have blue connectors and SPUR Cables have green connectors.
- Different cable lengths and BACKBONE Extenders make the system scalable and flexible to install.

Installation of S-Link cables:
Select appropriate cables to keep the length of BACKBONE- and SPUR Cables to a minimum. In case of planned installation with total BACKBONE Cable length exceeding 100 meters please consult your local distributor. The S-Link cables should be properly fastened when installed to avoid sharp bend radius, cable chafing and undesired strain on connectors. Locking mechanism on connectors must be fully closed. To ensure long lifetime, cables, T-Connectors and Extenders should not be located so that they are permanently immersed in water or other fluids. It is recommended to install cables in such a way that water and condensation do not flow along the cables into the connectors. This can be done for example by introducing a u-shape bend before the cable enters the product connector.

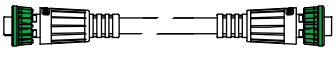
Ideally, the POWER Cable should be connected to the middle of the BACKBONE bus to ensure an equal voltage drop at both ends of the BACKBONE Cable. The yellow and black wire in the POWER Cable shall be connected to GND and the red wire connected to +12VDC or +24VDC.

To reduce the risk of interference, avoid routing the S-Link cables close to equipment such as radio transmitters, antennas or high voltage cables. The backbone must be terminated at each end with the END Terminator.

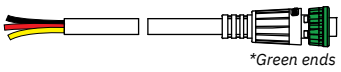
SPUR cables can be left unterminated to prepare for the installation of future additional equipment. In such cases, ensure to protect open connectors from water and moisture to avoid corrosion in the connectors.



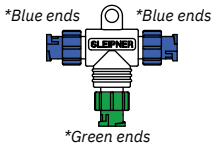
BACKBONE Cable
Forms the communication and power bus throughout a vessel. Available in different standard lengths.



SPUR Cable
Used to connect S-Link compliant products to the backbone cable. One SPUR Cable must be used for each connected component, with no exceptions. Recommended to be as short as practically possible. Available in different standard lengths.

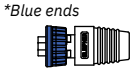


POWER Cable
Required in all installations for connection of BACKBONE Cable to a power supply and should be protected with a 2A fuse.

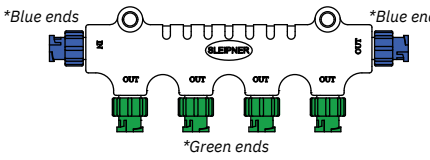


T-Connector
Used for connection of SPUR or POWER Cable to the BACKBONE Cable. One T-Connector for each connected cable.

BACKBONE Extender
Connects two BACKBONE Cables to extend the length.

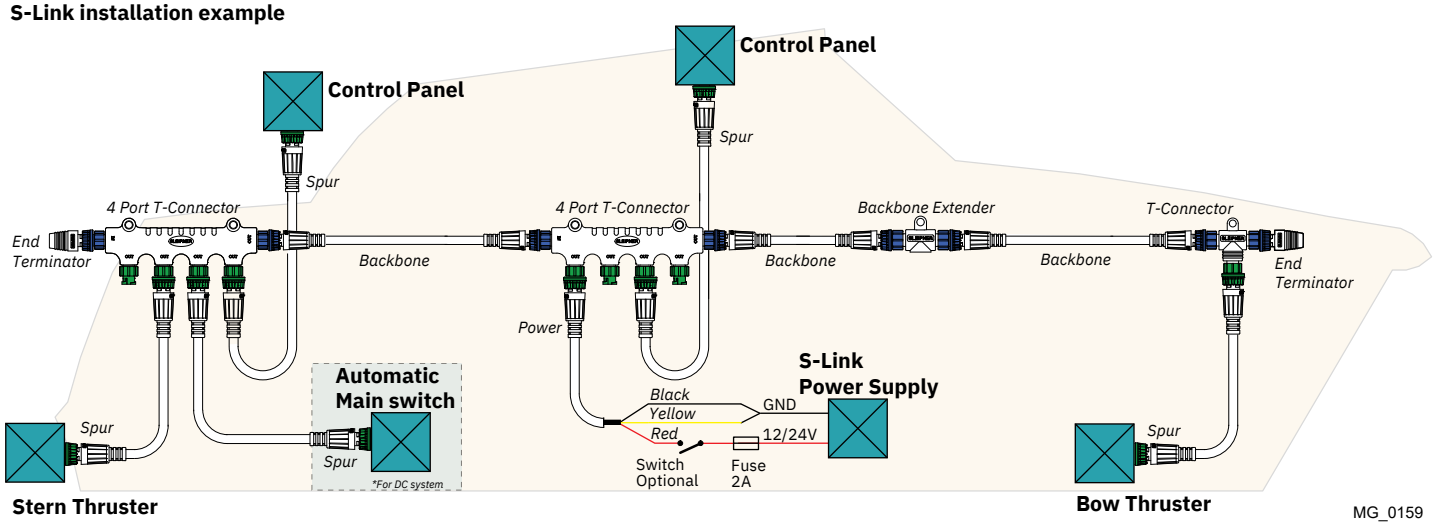


END Terminator
Must be one at each end of the BACKBONE bus.



4-Port T-Connector
The 4-PORT T-connector allows multiple SPUR Cables to be connected. The 4-PORT T-connector comes with two sealing caps to protect unused ports.

S-Link installation example



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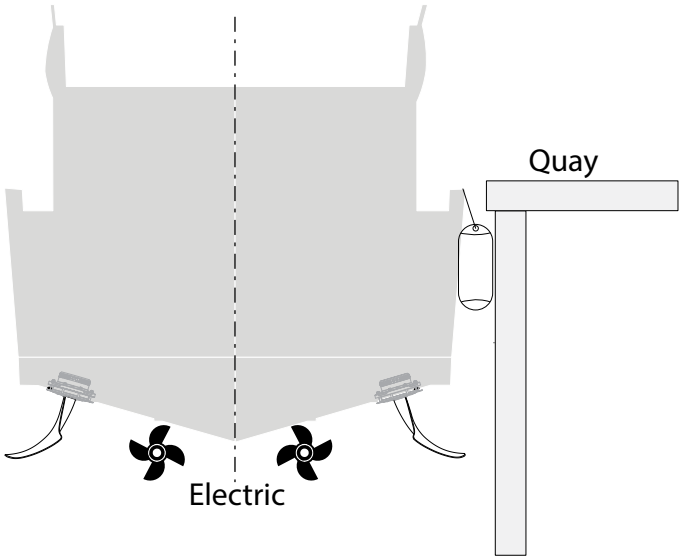
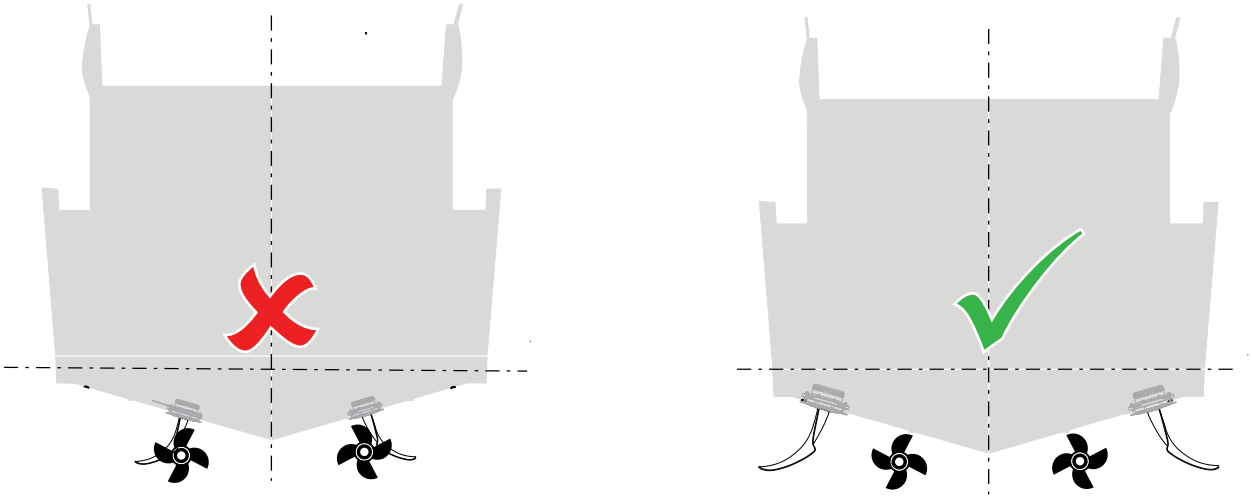
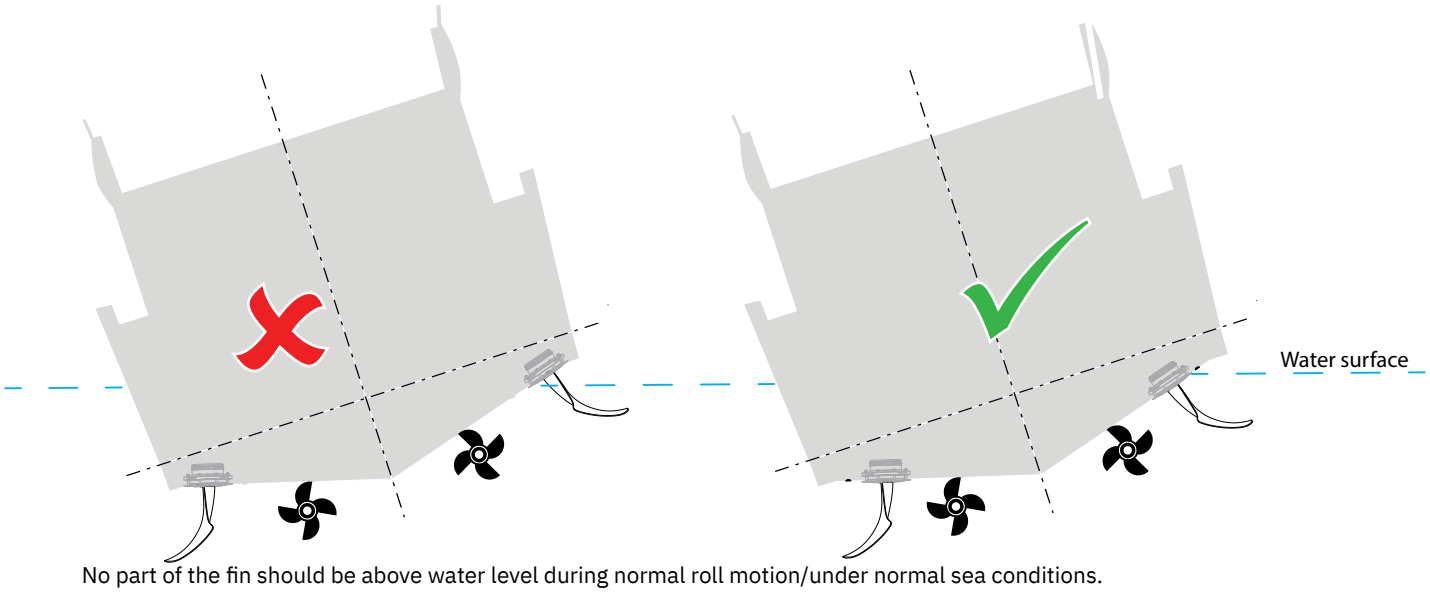


Fins should not extend outside the beam including the fenders, or below the keel/propeller when i neutral position.



Fins should be placed as far outboard as possible, and NOT in-line with the propellers, to ensure avoiding possible disturbance of the water flow 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.

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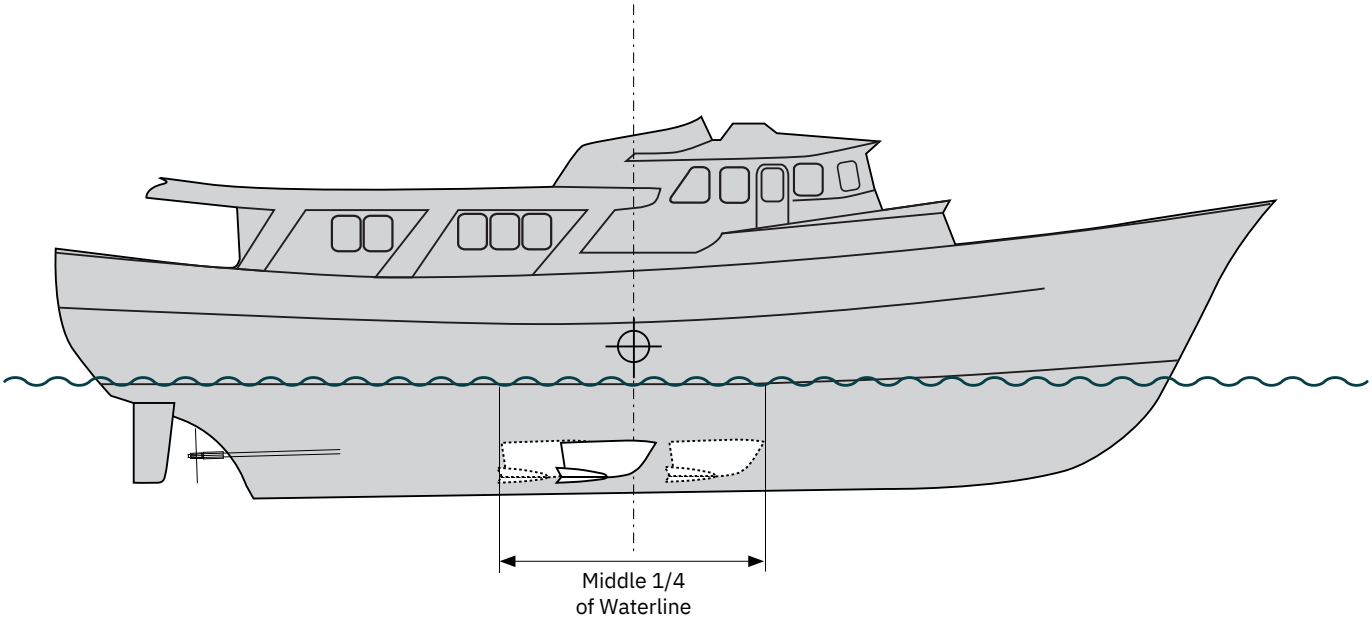
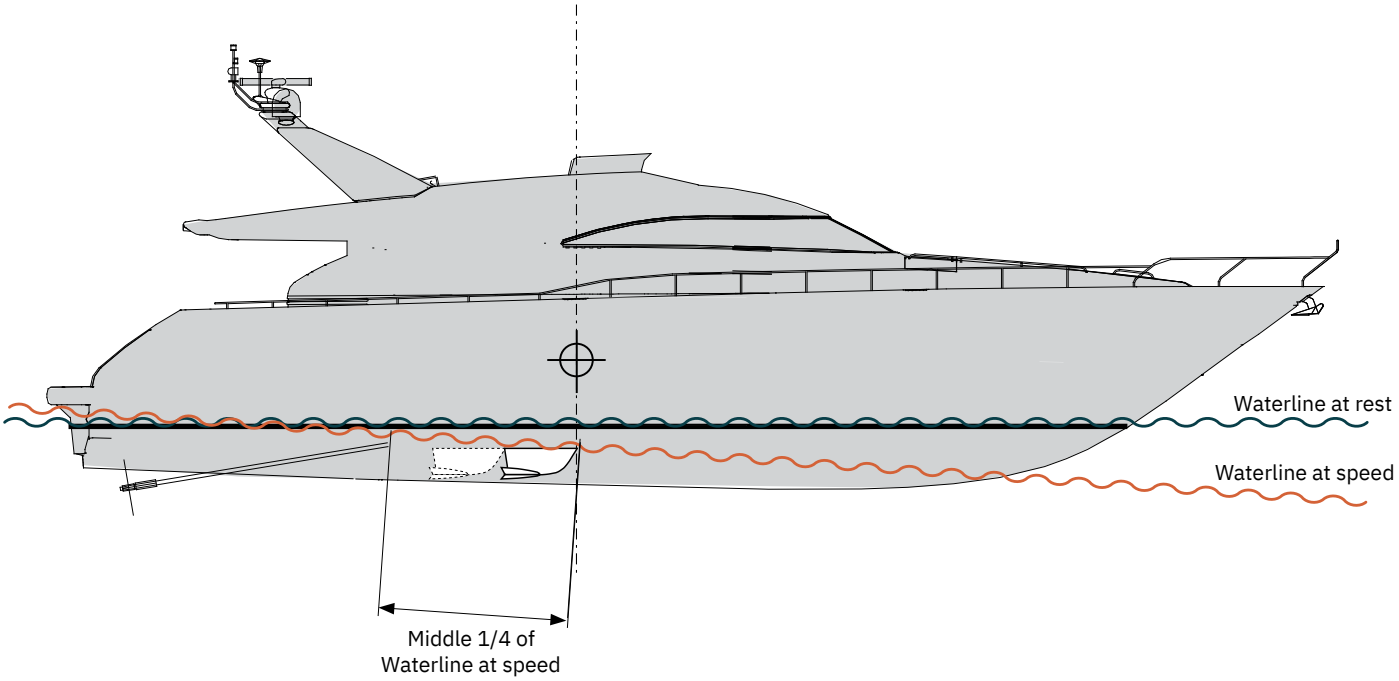




To avoid unwanted influences on the steering characteristics, the fins should be placed close to the vessel longitudinal centre of gravity (LCG)
- If unknown, this is usually a little aft of 50% of the waterline length.

For high speed vessels, the fins should be placed with trailing/leading edge within middle 1/4 of waterline length at speed and not in front of the LCG.

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

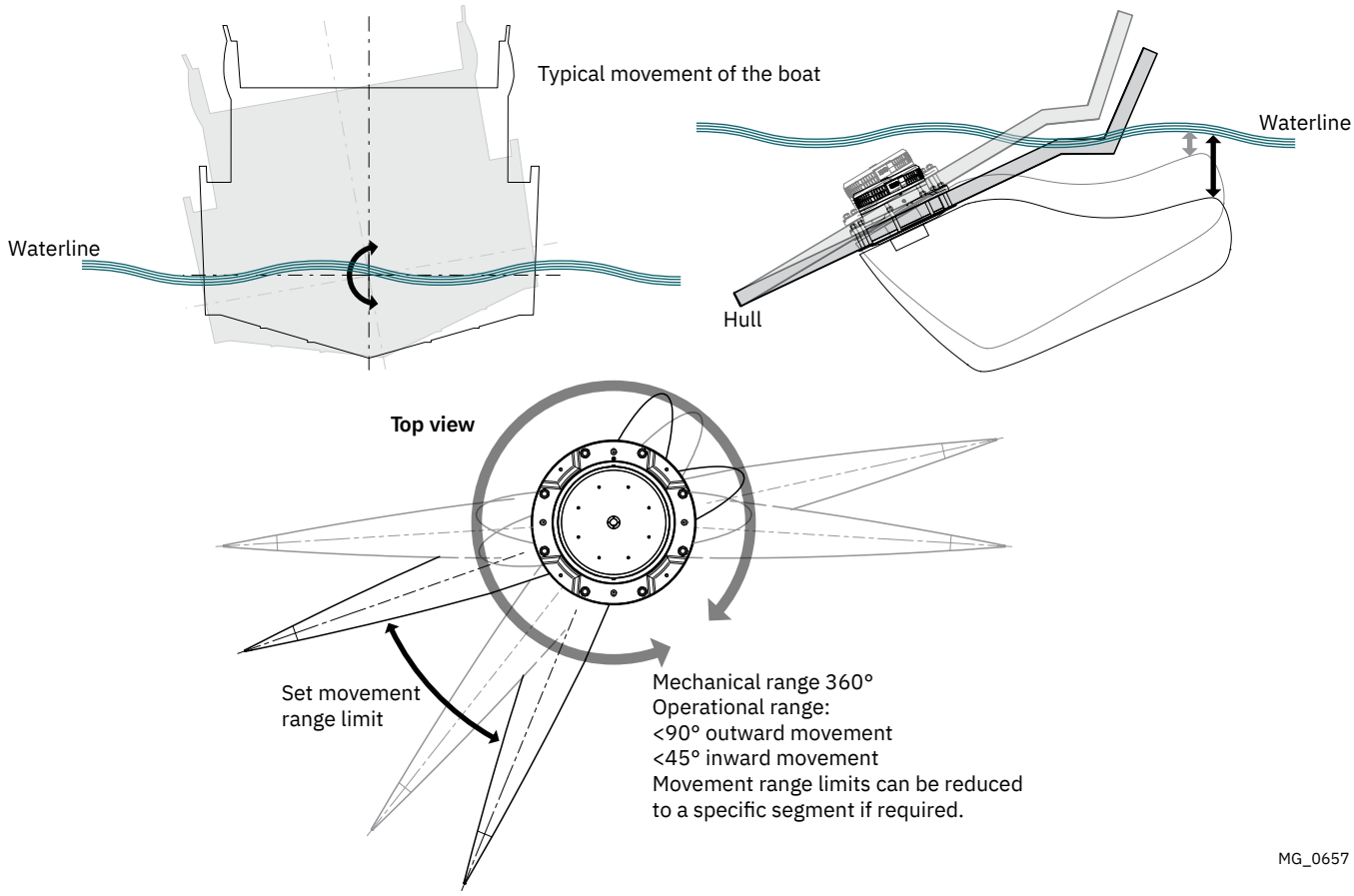
(NB: These are general guidelines and some hull types might allow for an installation position outside of this recommendation.)

Transversal fin positioning of Vector Fins™

With Vector finsTM it is a priority to push the fins as far outboard as possible to achieve the most leverage for the fins forces unlike standard fins.

Finding the best position for the fin and actuator positioning often is related to the inside configuration and space that is required for proper installation.

General Rules:
–Push the actuators as far as possible outboard, keeping at least 22 degrees of outboard stroke as a minimum. It is also acceptable installing the fins further inboard If inside configuration/ access to inside parts of actuators is required. ***(NB: Performance will be reduced slightly due to less leverage arm for the stabilizing force applied by the fins.)***



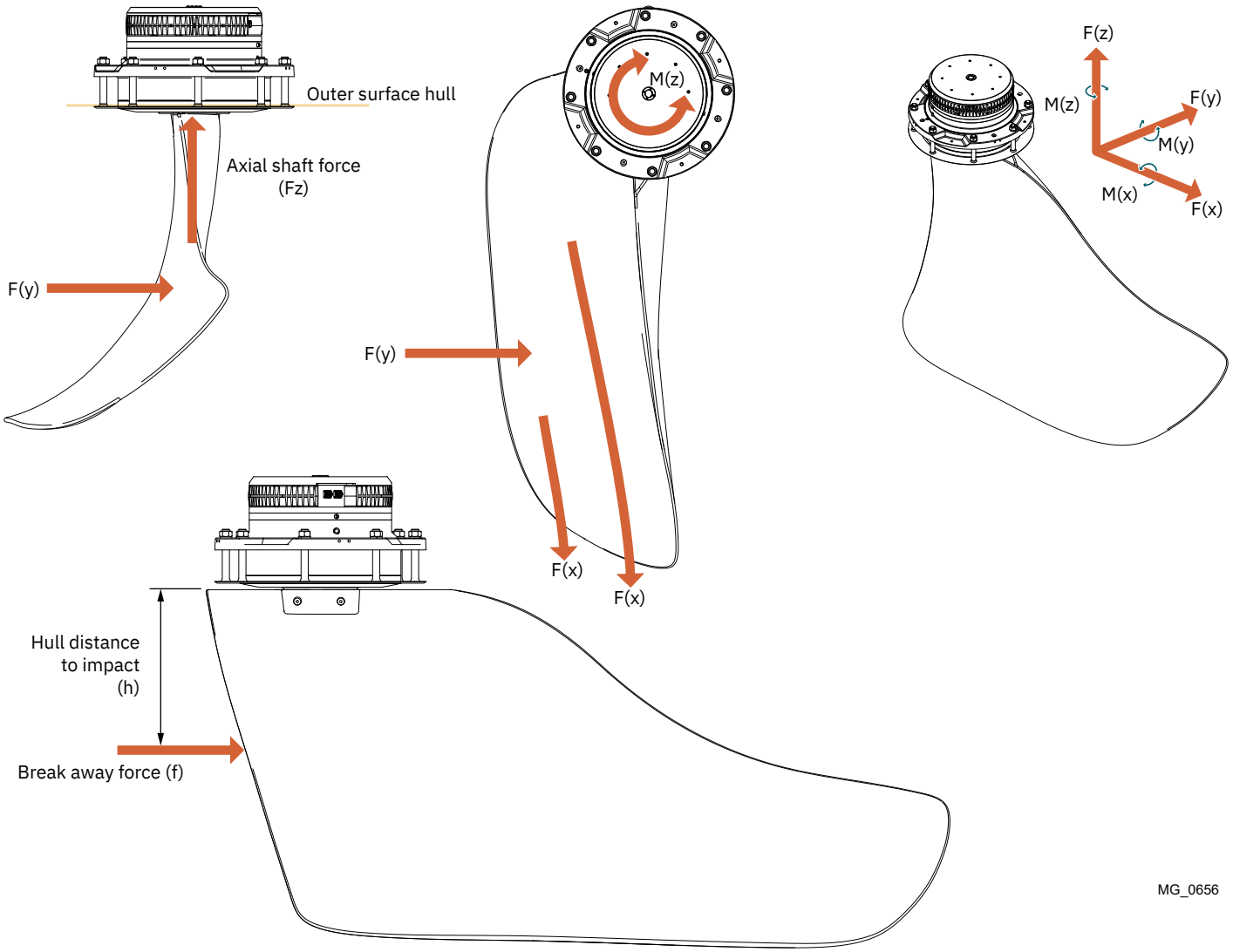
MG_0657

Hull Forces

MC_0658

All calculated values are normalised, determined 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, back flow closing of valve etc could further increase the hull/shaft loads. Therefore all dimensioning should account for this by using a safety factor.

Sleipner curved Vector Fin design comes with additional benefits in hull safety. Any impact with the ground will not only bend the shaft backwards and outward, allowing the fin to break away with less stress on the hull.



SPS40E							
Structural requirements V3-9		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	11,9	11,4	3,3	2,2	14,7	400	48
25	13,0	12,3	3,3	2,2	14,7		

SPS40E							
Structural requirements V4-8		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	12,4	11,2	4,0	2,2	17,2	400	61
30	16,6	13,1	4,0	2,2	24,0		
35	19,7	17,5	4,2	2,2	26,7		

SPS50E							
Structural requirements V4-12		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	16,1	15,6	4,9	2,2	19,6	450	83
30	22,4	21,7	4,9	2,2	27,3		
35	23,2	23,1	5,2	2,2	29,4		

SPS50E							
Structural requirements V4-8HS		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	12,4	11,2	4,0	2,2	17,2	400	61
30	16,6	13,1	4,0	2,2	24,0		
35	19,7	17,5	4,2	2,2	26,7		
40	22,8	21,9	4,4	2,2	29,4		

SPS60E							
Structural requirements V3-14		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	22,6	21,2	6,1	3,7	21,0	500	90
25	24,4	23,5	6,1	3,7	21,0		

SPS60E							
Structural requirements V4-15		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	27,0	25,4	8,4	3,7	25,9	500	109
30	28,2	27,7	8,4	3,7	30,6		
35	32,0	32,4	9,6	3,7	36,1		

SPS60E							
Structural requirements V4-12HS		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	19	19	4,5	3	18	450	83
30	29	28	7	3	32		
35	38	36	9	3	44		
40	42	38	9	3	46		

SPS70E							
Structural requirements V4-19		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	36,8	35,0	11,4	5,8	33,6	600	147
30	50,8	46,9	11,4	5,8	49,0		
35	52,9	52,5	11,9	5,8	53,4		

SPS70E							
Structural requirements V4-15HS		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	29,8	27,1	9,1	5,8	31,5	500	109
30	41,1	39,4	9,6	5,8	43,8		
35	45,1	43,8	10,1	5,8	48,1		
40	49,0	48,1	10,5	5,8	52,5		

SPS70E							
Structural requirements V4-21		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	41,5	40,3	12,3	5,8	36,8	700	218
25	44,8	45,1	14,0	5,8	43,8		

SPS80E							
Structural requirements V3-23		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	43,9	42,35	10,7	7,0	32	700	218
25	47,4	46,6	12,6	7,0	36,0		

SPS80E							
Structural requirements V4-26		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	52,9	50,75	15,8	7,0	40	700	218
30	72,3	70,9	18,0	7,0	60,0		
35	74,8	75,7	18,0	7,0	64,3		

SPS80E							
Structural requirements V4-21HS		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	45,7	43,8	14,4	7,0	39,0	700	218
30	63,4	62,1	16,4	7,0	56,2		
35	67,6	67,4	16,4	7,0	61,5		
40	71,8	72,6	16,1	7,0	66,9		

SPS100E							
Structural requirements 4-26HS		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
20	64,8	63,0	22,8	15,8	52,5	700	218
30	103,3	101,5	24,5	15,8	77,0		
35	110,3	107,6	25,4	15,8	86,6		
40	117,3	113,8	26,3	15,8	96		

SPS100E							
Structural requirements V5-31		Values to be considerated individually				Break away impact force	
Speed	Max bending moment (kNm)	Mx (kNm)	My (kNm)	Mz (kNm)	Fz (kNm)	h (mm)	f (kN)
15	61,8	57,8	17,3	15,8	38,2	800	243
20	84,9	81,4	19,3	15,8	45,9		
25	90,1	87,5	16,1	15,8	50,1		
30	105,5	103,4	15,8	15,8	56,9		

Cable description	Located
Panel Power supply cable Part# 151090-020 - 2m	Included in the SCU kit*
SCU Power supply cable Part# 151371-025 - 2,5m	Included in the SCU kit*
GPS Receiver Part# 321714 - 10m	Not included in the actuator kit
Reverse detection cable Part# 151375-100 - 10m	Included in the SCU kit*
SCU-eFD cable Part# 151370-040 - 4m SCU-eFD cable Part# 151370-070 - 7m SCU-eFD cable Part# 151370-100 - 10m SCU-eFD cable Part# 151370-150 - 15m SCU-eFD cable Part# 151370-200 - 20m SCU-eFD cable Part# 151370-250 - 25m SCU-eFD cable Part# 151370-300 - 30m	Not included in the actuator kit. Must be ordered separately depending on the actual installation.

*For details regarding the SCU kit, see the installation manual.

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