

ANCHOR **G**UARDIAN



Data Sheet
AnchorGuardian
SYA-G1 (preliminary)



ANCHOR GUARDIAN

Swiss Ocean Tech Ltd.
Industriestrasse 163
CH-8957 Spreitenbach
Switzerland

info@anchorguardian.com
www.anchorguardian.com

DRAFT



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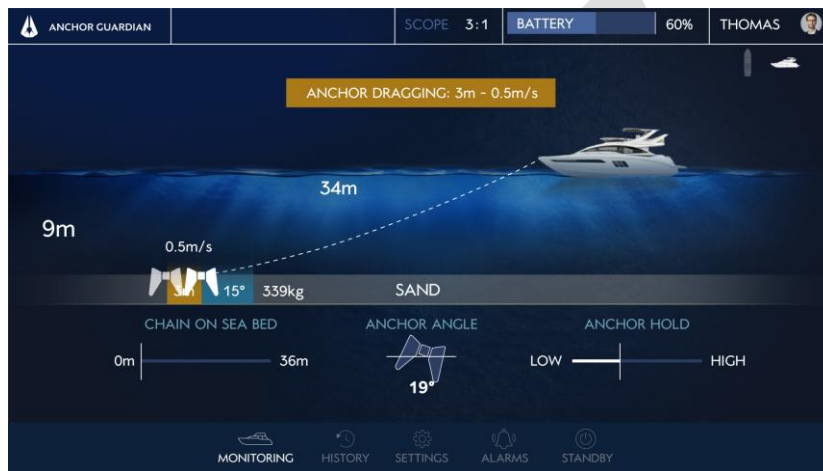


1 Introduction

AnchorGuardian is an anchor monitoring system that uses revolutionary technology to bring safety to anchoring for sailor, ship and sea. It makes anchoring smarter and safer, providing users with data and intelligence throughout the entire anchoring process. This reference outlines the technical specifications of AnchorGuardian.

2 Key Features

AnchorGuardian provides information while laying the anchor, at anchor, and while lifting the anchor. All information is displayed on the graphical user interface.



Information provided while laying the anchor:

- Anchor depth: How deep the anchor is in the water
- Anchor on sediment: When the anchor reaches the seafloor
- Scope: The ratio of anchor chain length to water depth
- Anchor angle: Whether the anchor head is at the correct angle to achieve maximum hold
- Anchor force: Measurement of the force applied to the anchor during the dig-in process

Information provided at anchor

- Anchor dragging: Detecting if the anchor is dragging, by how much and how fast.
- Anchor force: The force measured at the anchor
- Anchor chain angle: Whether the chain lifts at the anchor arm, for example, under peak force
- Anchor hold: Whether the anchor is properly set to achieve maximum holding power, based on roll angle, chain angle and force.

Information provided while lifting the anchor:

- Distance to anchor: When to lift the anchor
- Anchor aweigh: when the anchor leaves sediment, and the ship is free to manoeuvre.
- Anchor stowed: If the anchor has reached the stow position and charging starts.



3 System Overview

AnchorGuardian is based on five hardware modules distributed in the boat:

1. **Anchor Module:** The Anchor Module is the core sensory component of AnchorGuardian, powered by proprietary algorithms and advanced sensor fusion technology. It is mounted at the end of the anchor shank, between the anchor shackle and the anchor chain.
2. **Acoustic Module:** The Acoustic Module consists of a through hull mount ultrasound Boat Transducer and an Acoustic Modem for underwater communication between Anchor Module and boat.
3. **Data Hub Module:** The Data Hub unit is installed to collect and display data from AnchorGuardian modules, as well as existing onboard instrumentation such as AIS, ECDIS, and GPS.
4. **Display Module:** A standalone display providing the user with all AnchorGuardian information on the AnchorGuardian graphical user interface.
5. **Charging Module:** The Charging Module is a wireless inductive charging system to charge the battery of the Anchor Module while the anchor is stowed in the hawse pipe or on the bow roller. The Charging Module consists of the charger box and an inductive charging coil.

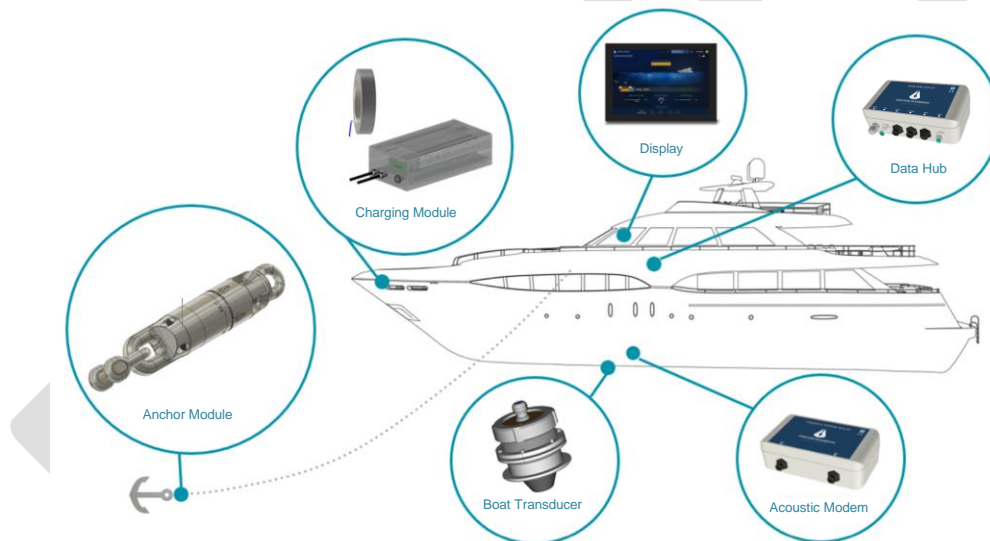


Figure 1, AnchorGuardian modules distributed in the vessel.



4 System Specification

4.1 Anchor Monitoring

#	Parameter	Range	Remarks
4.1.1	Anchor Drag Distance	0 – 1000 m	Accuracy 0.5 m or 10% ¹ Absolute accuracy 5 m or 10% ² Resolution 0.1 m ³
4.1.2	Anchor Dragging Velocity	0 – 2.1 m/s	Accuracy 0.1 m/s Resolution 0.01 m/s ³
4.1.3	Anchor Roll Angle ⁴	+/-180 °	Accuracy 2° Resolution 1° ³
4.1.4	Anchor Chain Angle ⁵	0 - 90 °	Accuracy 2° Resolution 1° ³
4.1.5	Anchor Force	0 – 10'000 kg	Accuracy: 50 kg Resolution 20 kg ³
4.1.6	Anchor Depth	2 – 100 m	Accuracy: 2 m Resolution 0.5 m
4.1.7	Anchor Distance to Boat	0 – 250 m	Accuracy: 3 m or 5 % Resolution: 1 m ³
4.1.8	Anchor Chain Length	3 – 250 m	Accuracy: 3 m or 5% Resolution: 1 m ³
4.1.9	Anchor Chain Scope	1:1 to 20:1	
4.1.10	Anchor Chain on Seabed	Estimation	Qualitative visualization - low to high
4.1.11	Anchor Hold	Estimation	Qualitative visualization - low to high

Notes:

- 1 The drag distance accuracy is defined as the deviation between a true anchor drag of 5 m in a line and the distance measured by AnchorGuardian. Test conditions: Plate anchor on sand sediment, 40 m chain length, scope 5:1, anchor pulled with engine.
- 2 The absolute drag distance accuracy is defined as the deviation between the real anchor drag distance and the distance measured by AnchorGuardian over 24 hours at anchor. Test conditions: Plate anchor, sand sediment, 40 m chain length, scope 5:1, strong wind, heavy swaying.
- 3 The displayed measurement resolution is dynamically adjusted as measurement values increase.
- 4 The anchor roll angle refers to the rotation of the anchor head around the longitudinal axis of the anchor arm.
- 5 The anchor chain angle refers to the angle of the force applied to the anchor arm relative to the sediment surface.

4.2 User Defined Alarms

#	Alarm Source	Alarm Range	Remarks
4.2.1	Anchor Dragging Distance	0 – 1000 m	Alarm is generated if set dragging distance is reached
4.2.2	Anchor Dragging Velocity	0 – 2 m/s	Alarm is generated if dragging speed exceeds set limit
4.2.3	Anchor Module Chain Angle	0 – 90°	Alarm is generated if the chain pitch angle is above set threshold
4.2.4	Anchor Force	0 – 10'000 kg	Alarm is generated if the anchor force is above set threshold



4.3 Anchor Monitoring Indicators

#	Indicator	Type	Remarks
4.3.1	Anchor on Sediment	Pop-up Window on GUI	Appears if the anchor module lies on sediment
4.3.2	Is the Anchor Laid	Pop-up Window on GUI	Appears if the anchor laying process is finished. upon confirmation it switches to monitoring state
4.3.3	Anchor Aweigh	Pop-up Window on GUI	Appears if the anchor is lifted from sediment
4.3.4	Battery Warning	Pop-up Window on GUI	Appears if the battery is below 5 %
4.3.5	Ultrasound Signal Lost Warning	Pop-up Window on GUI	Appears if ultrasound data link is interrupted

4.4 Battery Operation

#	Parameter	Value	Remarks
4.4.1	Anchor Module Battery Voltage	14.4V	
4.4.2	Battery Capacity	72 Wh	5000 mAh
4.4.3	Operation Time	24 h – 72 h	Autonomous operation time between charging, depending on environmental condition
4.4.4	Charging Time 0% – 100%	5 – 7 h	Depending on wireless charging coil installation topology
4.4.5	Charging Time 20% - 80%	3 – 4 h	Depending on wireless charging coil installation topology

4.5 Bluetooth Interface

#	Parameter	Value	Remarks
4.5.1	Bluetooth LE	2.4 GHz	Used for maintenance and charging
4.5.2	Communication Distance	0.2 m	Bluetooth dongle required
4.5.3	Data rate	1 Mbit/s	

4.6 Acoustic Underwater Communication

#	Parameter	Value	Remarks
4.6.1	Communication Distance	5 - 250 m	Line of Sight
4.6.2	Communication Speed	125 bit/s	
4.6.3	Communication Interval	1.5 – 300 s	Dynamic adaptation to environment
4.6.4	Number of Anchors	2	Support of communication with two anchors per ship



5 Anchor Module SYA-D16-107kN

The Anchor Module serves as the core sensory component of AnchorGuardian. Engineered with precision, it is crafted from solid rolled bars of duplex steel using advanced metal-cutting techniques. Its robust housing protects the integrated electronics and sensors, ensuring durability in harsh marine environments. The module is designed for seamless attachment to the anchor crown shackle via its integrated sliding shackle. On the chain side, a standard shackle or a Kenter-type shackle is used to securely connect the module to the chain.



Key Features:

- Smart Anchor Swivel
- Stainless Duplex Steel UNS S81803
- 107 kN Proof Load
- Inertial Motion Unit
- Speed and Distance Sensor
- Anchor Force Sensor
- Ultrasound Data Communication to Boat
- Bluetooth Interface for Configuration & Maintenance

5.1 Specification

#	Parameter	Value	Remarks
5.1.1	Break Load Axial	150 kN	Tensile test
5.1.2	Proof Load Axial	107 kN	Tensile test
5.1.3	Proof Load Lateral	107 kN	Three-point lateral force test
5.1.4	Anchor Size	Stockless: 450 kg HHP: 325 kg SHHP: 225 kg	Fits to anchors with proof load ≤ 107 kN
5.1.5	Nominal Chain Size	16 mm stud link (U2)	
5.1.6	Supported Chain Size	14mm, 16 mm, 17.5 mm, 19 mm (U2) 22 mm (U1)	
5.1.7	Diameter	86 mm	
5.1.8	Overall Length	412 mm	
5.1.9	Installation Length	320 mm	Between end of anchor shackle and windlass or chain roll
5.1.10	Material	UNS S31803 (Duplex 1.4462)	
5.1.11	Weight	9 kg	
5.1.12	Water depth	0 – 100 m	20 bar proof pressure, permanent immersion
5.1.13	Ambient temp.	-10°C to 55 °C	Normal operation temp. in water 0°C – 35°C. Automatically reduced charging power below 5°C and above 40°C



5.2 Dimensions & Interface

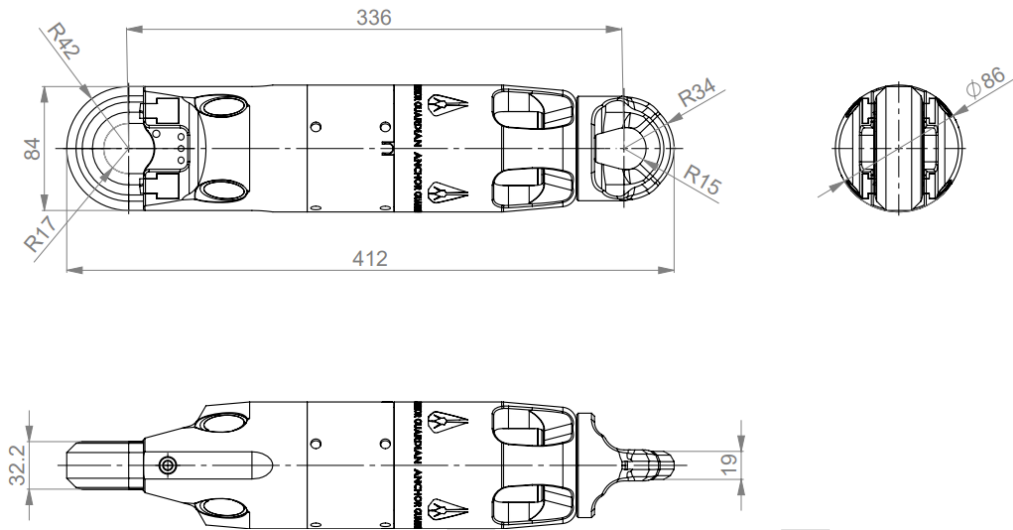


Figure 2: Anchor Module SYA-D16-107kN Dimensions

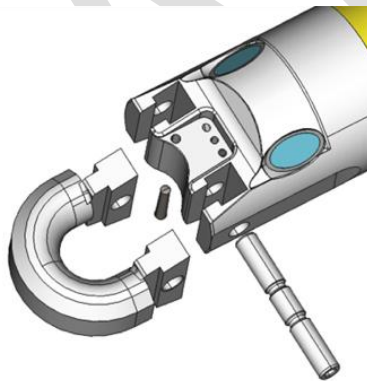


Figure 3: Sliding shackle for easy attachment to the crown shackle.
The crown shackle does not need to be opened

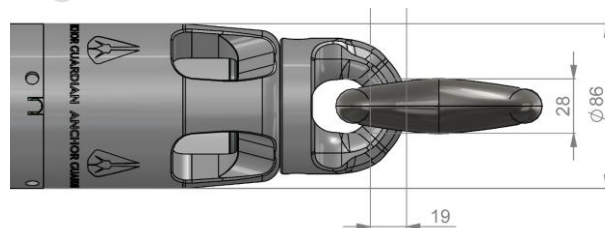


Figure 4: The swivel eye fits to 17.5 mm or 19 mm Kenter Shackle for attachment to the chain

6 Boat Transducer SYA-X90

The boot transducer is installed in the hull of the ship and is responsible for transmitting and receiving sound waves for underwater communication between the Anchor Module and the ship.

To meet the requirements of different hull materials, the transducer housing is manufactured in three different housing versions.

- Version SYA-S90 is suitable for Steel Hulls and is mounted in a Stainless-Steel Welding Cofferdam
- Version SYA-A90 is suitable for Alu Hulls and is mounted in an Aluminum Welding Cofferdam
- Version SYA-G90 is suitable for GRP Hulls and is mounted in a Stainless-Steel Feedthrough Body



6.1 Boat Transducer SYA-S90 & A90 (Welding)

#	Parameter	Symbol	Value	Remarks
6.1.1	Hull Type	-	Steel Aluminum	SYA-90-A for Steel Hulls SYA-90-S for Alu Hulls
6.1.2	Hull Thickness	H	4 mm – 20 mm	
6.1.3	Cofferdam Material	-	Stainless Steel (316L) Aluminum (AL 5083)	
6.1.4	Mounting Procedure	-	Welding	
6.1.5	Ingress Protection	IP	Permanent immersion in water	Proof Pressure 20 bar
6.1.6	Transducer Diameter	D1	60 mm	
6.1.7	Cofferdam Diameter	D2	90 mm	
6.1.8	Transducer Protrusion	L1	30 mm	
6.1.9	Cofferdam Height	L2	72 mm / 92 mm*	Standard version 72 mm *Long version 92 mm
6.1.10	Cable Gland Height	L3	25 mm	
6.1.11	Cofferdam Feed Through	L4	45 mm / 65 mm*	Standard version 45 mm *Long version 65 mm



6.2 Boat Transducer SYA-G90 (GRP Hull)

#	Parameter	Symbol	Value	Remarks
6.2.1	Hull Material	-	GRP / Composite	
6.2.2	Max Clamping Distance	C	35 mm, 55 mm, 75 mm	Three options available
6.2.3	Body Material	-	Stainless Steel (316L)	
6.2.4	Mounting Procedure	-	Thread RD 78 x 1/6"	Sealing with 3M 4200FC or Sikaflex 291 sealant
6.2.5	Ingress Protection	IP	Permanent immersion	Proof pressure 20 bar
6.2.6	Transducer Diameter	D1	60 mm	
6.2.7	Body Diameter	D2	80 mm	
6.2.8	Flange Diameter	D3	106 mm	
6.2.9	Flange Thickness	F	5 mm	
6.2.10	Transducer Protrusion	L1	30 mm	
6.2.11	Body Height	L2	72 mm 92 mm 112 mm	Three options, depending on the required clamping distance (C)
6.2.12	Cable Gland Height	L3	25 mm	

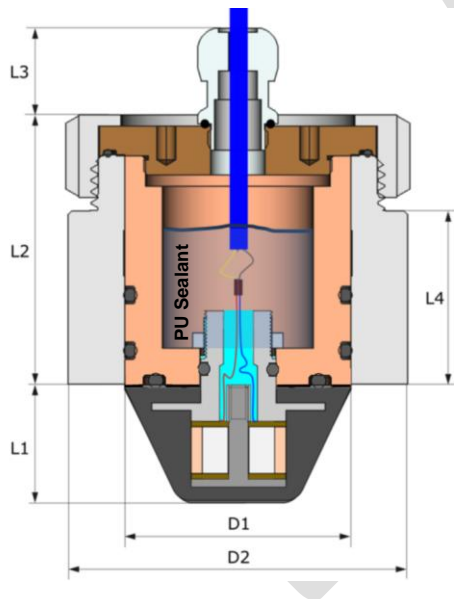


Figure 5: Boat Transducer S90 and A90

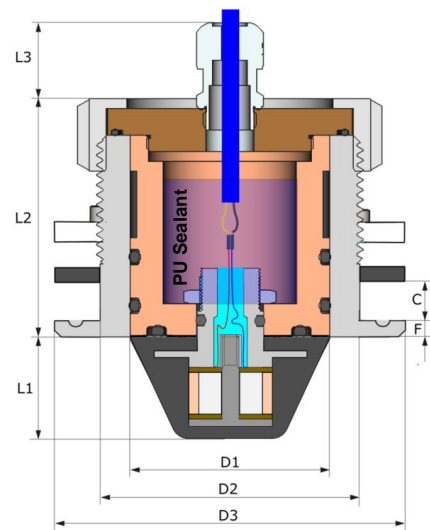


Figure 6: Boat Transducer G90



7 Acoustic Modem SYA-G1

The AnchorGuardian SYA-G1 underwater acoustic modem enables half-duplex digital communication through advanced spread spectrum ultrasound technology and DSP algorithms. Designed for reliable underwater connectivity, it facilitates secure data exchange between the Anchor Module and the Data Hub installed in the vessel.



Key Features:

- Acoustic Communication to Anchor Module
- Direct Sequence Spread Spectrum (DSSS)
- Carrier Frequency 40 kHz
- Adaptive Output Power Control
- Max Output Power 2.5 W
- Wall Mount Flange

7.1 Specification

#	Parameter	Value	Remarks
7.1.1	Power Supply	24VDC / 1 A	Range 16 – 32 V, supplied via Data Hub Cable
7.1.2	Acoustic Signal Type	Chirp, QPSK	
7.1.3	Carrier Frequency	40 kHz	
7.1.4	Modulation Frequency	20 kHz	
7.1.5	Tx Output Voltage Range	25 Vpp – 200 Vpp /18 dB	
7.1.6	Tx Output Power Range	0.02 – 2.5 W	Dynamic adaptation to environment
7.1.7	Dimension	200 x 110 x 60 mm	L x W x H
7.1.8	Housing Material	ASA+PC	flame-retardant thermoplastic
7.1.9	Ingress Protection	IP 65	
7.1.10	Ambient temperature	5°C – 55 °C	
7.1.11	Rel. Humidity	10% - 95% RH	

7.2 Interface

#	Connector	Type	Description
7.2.1	Data	RS422 & 24VDC Power	Connector type: Attend 227B-08M03 Connects to the Data Hub
7.2.2	TRX	Transducer	Connector type: Amphenol BD-05BFMA-LL7001 Connects to the Boat Transducer SYA-X90



8 Data Hub SYA-G1

The AnchorGuardian SYA-G1 Data Hub is designed for seamless integration into marine electronics systems. It serves as a central communication and power distribution point between all AnchorGuardian Modules and the onboard ethernet and NMEA 2000 system. For optimal performance an external GPS and Heading Sensor can be attached to the NMEA 2000 interface of the Data Hub.



Key Features:

- Display Interface
- NMEA2000 Interface
- LAN and WLAN Interface
- Acoustic Modem Interface
- Remote Service & Maintenance
- SW Up-dates Over the Air (OTA)
- Wall Mount Flange

8.1 Specification

#	Parameter	Value	Remarks
8.1.1	Supply Voltage	24VDC	Range 16 – 32 V
8.1.2	Supply Current	Max. 3 A	
8.1.3	Dimension	200 x 110 x 60 mm	L x W x H
8.1.4	Housing Material	ASA+PC	flame-retardant thermoplastic
8.1.5	Ingress Protection	Indoor use (IP40)	Installed in enclosed space, bridge or in protected room
8.1.6	Ambient Temperature	5°C – 55° C	
8.1.7	Rel. Humidity	10% - 95% RH	Noncondensing

8.2 Interface

#	Connector	Type	Description
8.2.1	24VDC	Power Supply Cable	Connector type: Switch Craft L712ASH Provides power to the Data Hub. 24VDC / 3A.
8.2.2	N2K	NMEA 2000 Interface	Connector type: Amphenol HMC-05PMMS-SF8001 Connects to the NMEA 2000 backbone for integration with onboard navigation systems (i.e. GPS and Compass).
8.2.3	Data	RS422	Connector type: Attend 227B-08M03 Connects to the Acoustic Modem
8.2.4	CHARG	RS422	Connector type: Attend 227B-08M03 Connects to the AnchorGuardian Charger
8.2.5	DISP	USB	Connector: USB – mini B / USB 2.0 Connects to the onboard display for data transmission
8.2.6	LAN	LAN	Connector: M12D-04PFFS-SF8001 Internet access via onboard server for OTA software updates and remote service & maintenance.

9 Display

The Anchor Guardian graphical user interface is a 7-inch full-color configurable display designed for marine applications and integrates all AnchorGuardian user information into an easy-to-read operator interface.

It features an LCD within an IP65-rated case and a glove-friendly, glass-front touchscreen which enhances usability in various weather conditions.



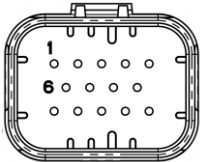
Key Features:

- Capacitive Touch Panel
- 1024 x 600 RGB IPS LCD / LED Backlight
- 24-bit Color Depth for Vibrant Visuals
- High Brightness (720 nits) For Sunlight Readability
- A7 Dual-Core 650 MHz Processor (32-bit)
- SW Up-Dates Over the Air (OTA)
- Alarm Buzzer 80 dB Adjustable

9.1 Specification

#	Parameter	Value	Remarks
9.1.1	Supply Voltage	24VDC	Range 6 – 36 V, reverse polarity protected
9.1.2	Supply Current	300 mA	@ 24V
9.1.3	Dimension	200 x 110 x 60 mm	L x W x H
9.1.4	Ambient Temperature	-10°C - 55° C	
9.1.5	Humidity	10% – 95% RH	Non-condensing
9.1.6	Ingress Protection	IP 65	If mounted and sealed to a panel

9.2 Interface

#	Connector	Type	Description															
9.2.1	Display Data	USB-C	Connector type: USB-C Interface to Data Hub USB (DISP)															
9.2.2	Power In	24V DC	Display power: Connector type: Ampseal 776273-1  <table border="0" style="margin-left: 20px;"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>Ground</td> </tr> <tr> <td>6</td> <td>VDC</td> <td>Power</td> </tr> <tr> <td>7</td> <td>Ignition</td> <td>On / Off</td> </tr> <tr> <td>others</td> <td>Not used</td> <td></td> </tr> </tbody> </table>	Pin	Signal		1	GND	Ground	6	VDC	Power	7	Ignition	On / Off	others	Not used	
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1	GND	Ground																
6	VDC	Power																
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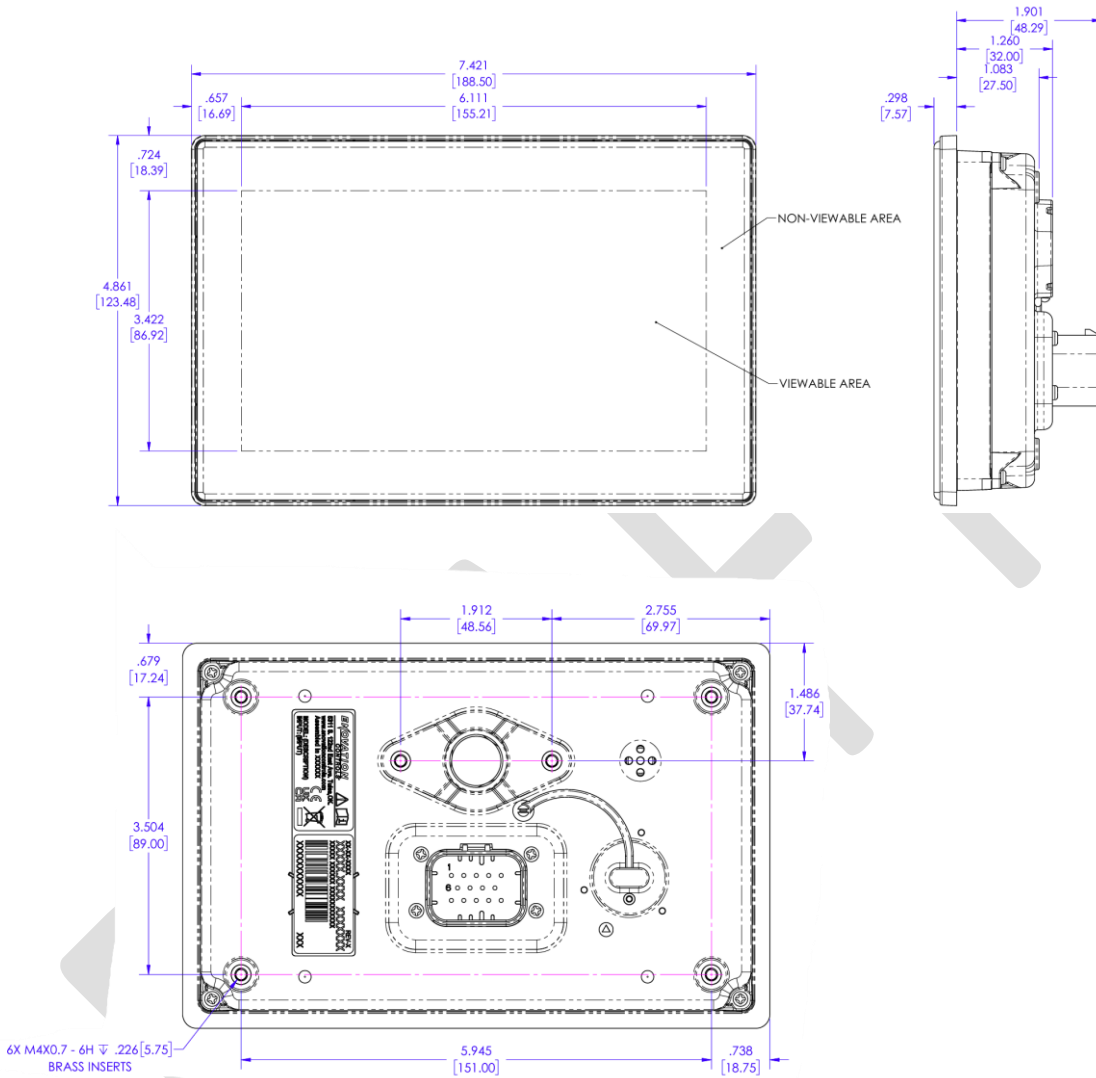


Figure 7: Display Dimensions



10 Wireless Charger

The wireless battery charger is a mains-powered inductive charging unit designed to deliver efficient and controlled wireless power transfer to the Anchor Module. It utilizes resonant inductive coupling at a frequency of 70 – 150 Hz and supports wireless power transfer through the metal housing of the Anchor Module and through the metal walls of stainless steel hawse pipes.

The wireless data interface between the Charger and the Anchor Module, enables precise control of the charging current and real-time battery temperature monitoring. It automatically detects the presence of the Anchor Module and initiates and manages battery charging when the module is in its resting position within the charging coil.



Key Features:

- Input Voltage: 230 VAC
- Output Power: Up to 300 W
- Resonant Mode at 75 – 150 Hz
- Wireless Power Transfer up to 30 Watt
- Penetrates up to 6 mm stainless steel
- Overtemperature protection
- Built-in active PFC function
- Anchor module detection
- Fully autonomous charging

10.1 Specification

#	Parameter	Value	Remarks
10.1.1	Supply Voltage	230 VDC	90 ~ 264 VAC
10.1.2	Supply Power	max. 500 W	
10.1.3	Input Frequency	47 ~ 63 Hz	
10.1.4	Max Output Power	300 W	
10.1.5	Charging Efficiency	10% ~ 50%	Depending on airgap and steel environment
10.1.6	Ambient Temperature	-10°C - 55° C	Derated output power above 55°C
10.1.7	Humidity	10% – 95% RH	Non-condensing
10.1.8	Ingress Protection	IP 65	
10.1.9	Dimension	300 x 120 x 90 mm	L x W x H

10.2 Interface

#	Connector	Type	Description
10.2.1	Power	230 VAC / 3A	Mains Power
10.2.2	Coil	Power Out	ABD-05PMFS-LC7001 /Connects to Charging Coil
10.2.3	DATA	RS422	Connects to Data Hub
10.2.4	BT Aux	RS422 + Power	Connects to an optional Bluetooth module
10.2.5	ANT	BT Antenna	SMA Connector

11 Charging Coil

The wireless power transfer (WPT) charging coil is designed for non-contact energy transmission to charge the Anchor Module battery. Two coil configurations are available, each optimized for different installation conditions. The first version is a cylindrical coil design for in-pipe charging (the coil is installed inside the hawse pipe). The second version is a plate coil design for lateral installation for through-pipe charging (the coil is attached outside the hawse pipe). Both the cylindrical coil and the plate coil configurations can also be used with anchor equipment featuring a bow roll.

11.1 In-pipe Charging Coil

The in-pipe charging coil is mounted inside the hawsepipe, centrally aligned with the receiving coil in the Anchor Module. The coil is packaged in a stainless-steel housing and ensures durability against mechanical impacts such as chain hits during free anchor drops. The coils are available in different outer diameters to fit to hawse pipe diameters from 160 to 200 mm. With the addition of mounting brackets the cylindrical coil configuration is also suitable for anchor equipment featuring a bow roll.

Depending on the installation situation, two different mounting procedures are used:

Option 1: This method involves directly fastening the Charging Coil to the Hawse Pipe using screws. To accomplish this, it is necessary to drill appropriate mounting holes into the Hawse Pipe to securely attach the coil with screws.

Option 2: This method employs pressure-fit mounting technology, using expansion pads strategically placed around the Charging Coil's circumference. When screws are tightened, they press the pads against the inner wall of the hawse pipe, establishing a secure pressure fit that holds the coil firmly in place—eliminating the need for drilling holes.



Specification In-Pipe Charging Coil

	Parameter	Value	Remarks
11.1.1	Outer Diameter (OD)	158, 168, 178, 188 or 198 mm	Please contact Swiss Ocean Tech to determine the ideal charging coil for your setup. Customized dimensions are available on request.
11.1.2	Inner Diameter (ID)	118, 128, 138, 148 or 158 mm	40 mm smaller than OD
11.1.3	Height	120 mm	
11.1.4	Housing Material	316L	
11.1.5	Fixation	M12 screws, or Pressure fit pads	

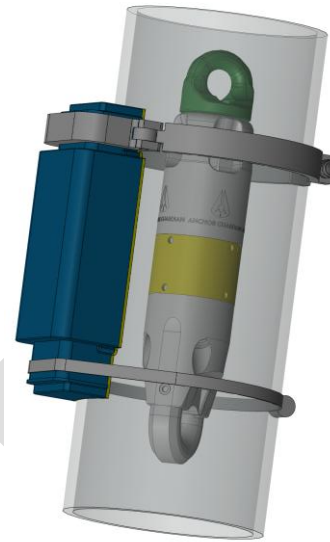


11.2 Charging Plate

The charging plate is installed outside the hawsepipes, eliminating the need for direct coil exposure to mechanical impacts.

Power is transferred through the hawsepipes wall via magnetic induction. However, the system's efficiency is dependent on the material properties of the hawsepipes. If the pipe wall is thicker than 6 mm or if it is magnetic (i.e. a permanent magnet sticks to it), efficiency can drop below 10%. To mitigate excessive heating and efficiency loss, small structural modifications such as slits or removal of pipe material below the magnetic poles of the charging coil are recommended in this case.

The plate coil configuration is also suitable for anchor equipment featuring a bow roll.



Specification Through-Pipe Charging Coil

	Parameter	Value	Remarks
11.2.1	Dimension	300 x 110 x 72 mm 250 x 100 x 50 mm 170 x 86 x 35 mm	Three standard sizes. Please contact Swiss Ocean Tech to determine the ideal charging coil for your setup. Customized dimensions are available on request.
11.2.2	Housing Material	Polyamide	
11.2.3	Fixation	Coil clamps	



12 Cables and Connectors

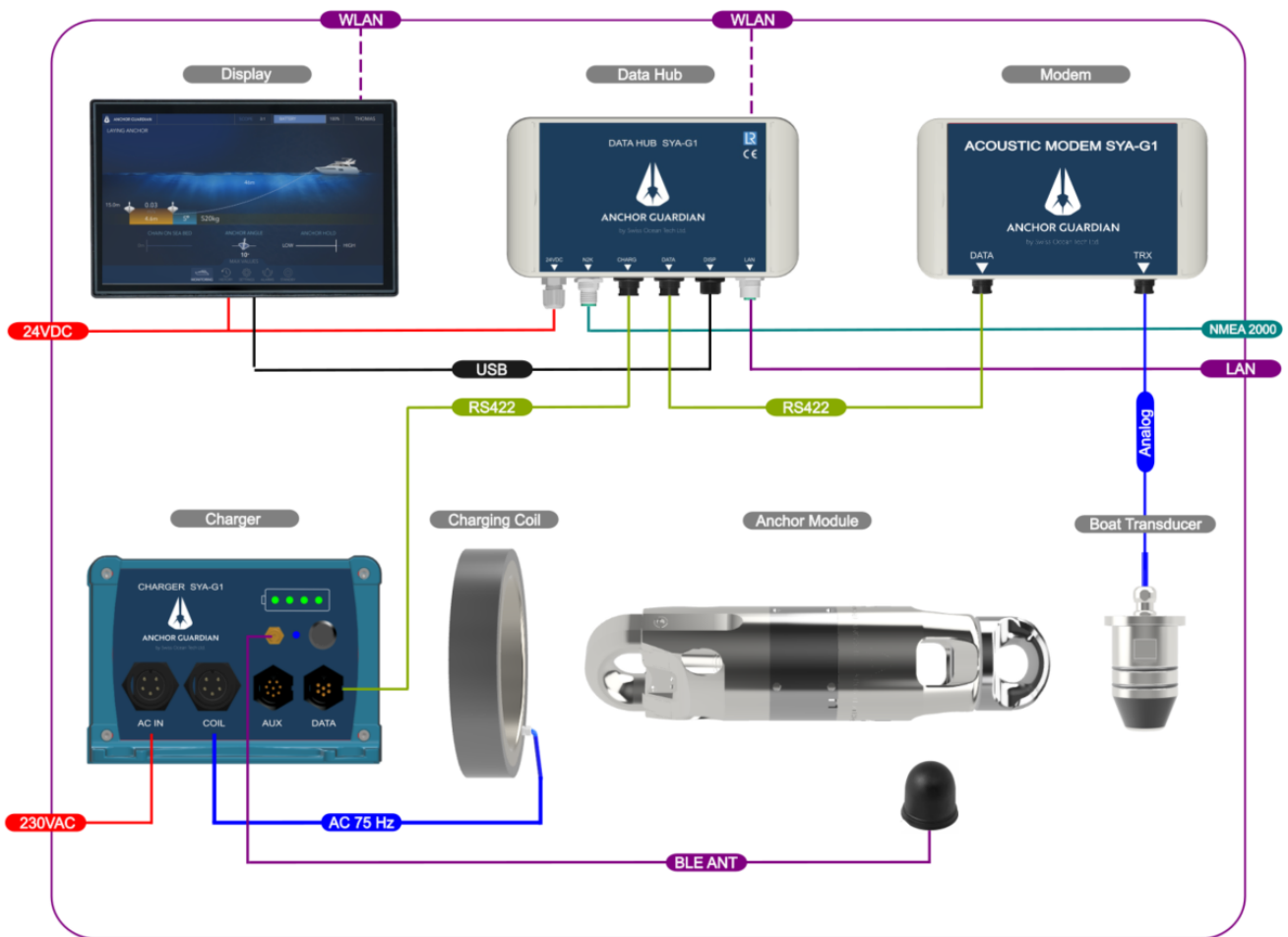
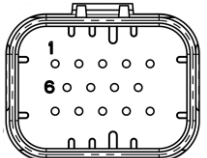
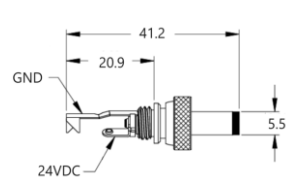


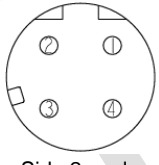
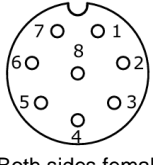



Figure 8, AnchorGuardian cable and connectors

#	Interface	Cable	Connector (front view)															
1	24VDC Display Power 24V / 0.5 A	AWG 22 - 24	<p>Side 1: open leads Side 2: Ampseal 776273-1 / Crimp Contact 770854-1</p>  <p>male</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>Ground</td> </tr> <tr> <td>6</td> <td>VDC</td> <td>24 VDC</td> </tr> <tr> <td>7</td> <td>Ignition</td> <td>On / Off</td> </tr> <tr> <td>others</td> <td>Not used</td> <td></td> </tr> </tbody> </table>	Pin	Signal		1	GND	Ground	6	VDC	24 VDC	7	Ignition	On / Off	others	Not used	
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others	Not used																	
2	24VDC Data Hub Power 24V / 3A	AWG 22 - 24	<p>Side 1: open leads Side 2: Switch Craft 761KS12 / SEALED POWER PLUG</p> 															



ANCHOR GUARDIAN

3	USB Display	USB Max length 5m	Side 1: USB-C Side 2: USB-Mini																											
4	NMEA2000	NMEA2000 - Shielded Twisted pairs	<p>Side 1: Backbone Micro-C Side 2: Female Micro-C,</p>  <p>Side 2: female</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Shield</td> <td></td> </tr> <tr> <td>2</td> <td>GND</td> <td></td> </tr> <tr> <td>3</td> <td>Vin</td> <td>12V / 50 mA</td> </tr> <tr> <td>4</td> <td>Net H</td> <td>Can High</td> </tr> <tr> <td>5</td> <td>Net L</td> <td>Can Low</td> </tr> </tbody> </table>	Pin	Signal		1	Shield		2	GND		3	Vin	12V / 50 mA	4	Net H	Can High	5	Net L	Can Low									
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5	AC75Hz	Charging Coil Cable: (fix attached to coil) AWG20 Sheath 6 mm Max Length 5 m	<p>Side 1: fix in coil Side 2: Amphenol LTW ABD-05PMFS-LC7001</p>  <p>Side 2: female</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Coil 1</td> </tr> <tr> <td>2</td> <td>Coil 2</td> </tr> <tr> <td>3</td> <td>Temp1</td> </tr> <tr> <td>4</td> <td>Temp2</td> </tr> <tr> <td>5</td> <td>Shield</td> </tr> </tbody> </table>	Pin	Signal	1	Coil 1	2	Coil 2	3	Temp1	4	Temp2	5	Shield															
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6	LAN	LAN Cat5e Max Length 5 m	<p>Side 1: User defined (normally RJ45) Side 2: M12D-04BMMA-SL8001</p>  <p>Side 2: male</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TX+</td> <td>Twisted pair 1</td> </tr> <tr> <td>2</td> <td>Rx+</td> <td>Twisted pair 2</td> </tr> <tr> <td>2</td> <td>TX-</td> <td>Twisted pair 1</td> </tr> <tr> <td>4</td> <td>RX-</td> <td>Twisted pair 2</td> </tr> </tbody> </table>	Pin	Signal		1	TX+	Twisted pair 1	2	Rx+	Twisted pair 2	2	TX-	Twisted pair 1	4	RX-	Twisted pair 2												
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7	RS422 Data Hub - Modem Data Hub - Charger	2x Pairs, 28 AWG 2x Power, 22AWG Shielded e.g. Tensile International Corp 30-02484 Max length 100 m	<p>Side 1: Attend 227B-08F01 Side 2: Attend 227B-08F01</p>  <p>Both sides female</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Shield</td> <td></td> </tr> <tr> <td>2</td> <td>TX+</td> <td>Twisted pair 1</td> </tr> <tr> <td>3</td> <td>TX-</td> <td>Twisted pair 1</td> </tr> <tr> <td>4</td> <td>RX+</td> <td>Twisted pair 2</td> </tr> <tr> <td>5</td> <td>RX-</td> <td>Twisted pair 2</td> </tr> <tr> <td>6</td> <td>GND</td> <td></td> </tr> <tr> <td>7</td> <td>Power</td> <td></td> </tr> <tr> <td>8</td> <td>Not used</td> <td></td> </tr> </tbody> </table>	Pin	Signal		1	Shield		2	TX+	Twisted pair 1	3	TX-	Twisted pair 1	4	RX+	Twisted pair 2	5	RX-	Twisted pair 2	6	GND		7	Power		8	Not used	
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8	Analog (Transducer)	Transducer cable Permanently attached and sealed to the transducer Sheath diameter 6 mm Max length 3 m	<p>Side 1: fix in transducer Side 2: Amphenol LTW ABD-05PMFS-LC7001</p>  <p>Side 2: female</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Sig+</td> </tr> <tr> <td>2</td> <td>Not used</td> </tr> <tr> <td>3</td> <td>Shield</td> </tr> <tr> <td>4</td> <td>Not used</td> </tr> <tr> <td>5</td> <td>Sig-</td> </tr> </tbody> </table>	Pin	Signal	1	Sig+	2	Not used	3	Shield	4	Not used	5	Sig-															
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13 Certificates



Page 1 of 2
Certificate No: LR2480160ANS
Issue Date: 01/07/2024
Expiry Date: 30/06/2029



Certificate of general approval of an anchor swivel shackle

The certificate is issued to the company named below to certify that the undernoted anchor swivel design has been examined in accordance with the relevant classification rules and has been granted General Approval.

Manufacturer	Swiss Ocean Tech Ltd.
Address	Industriestrasse 163, Spreitenbach, 8957, Switzerland
Anchor Swivel Name	Anchor Guardian Anchor Swivel Shackle TYPE-SYA-D16-107KN Version V1A & TYPE-SYA-D16-107KN Version V1B
Description	These anchor swivel shackles are designed for connecting anchors to chain cables in compliance with the requirements of the relevant Classification Rules.
Chain Size Grade	22.0mm (U1) & 19.0mm (U2)
Approval Documentation	See Design Appraisal Document for drawing list and prototype test reports with Doc.No. AGU-RP-002, Proofload & Breakload Test report dated 18.04.2024 and Torque Load Test report dated 25.04.2024, both for information
Design Appraisal Document No:	HTS/SST 38913-24
Application	Individual anchor swivel shackles constructed in accordance with approval will be accepted as a connecting link between anchors and corresponding anchor chains, with a suitable shackle interface (common/ end link), with sizes and grades shown above for use on vessels classed with Lloyd's Register subject to the relevant requirements of the Rules. Anchor swivel shackles are to be proof tested in accordance with the requirements stated in the Design Appraisal Document and all materials are to be in accordance with the 'Rules for Manufacture, Testing and Certification of Materials' in force at the time of manufacture.

Garry Evans
Ship Structure - Senior Specialist to Lloyd's Register EMEA
A member of the Lloyd's Register group

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

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