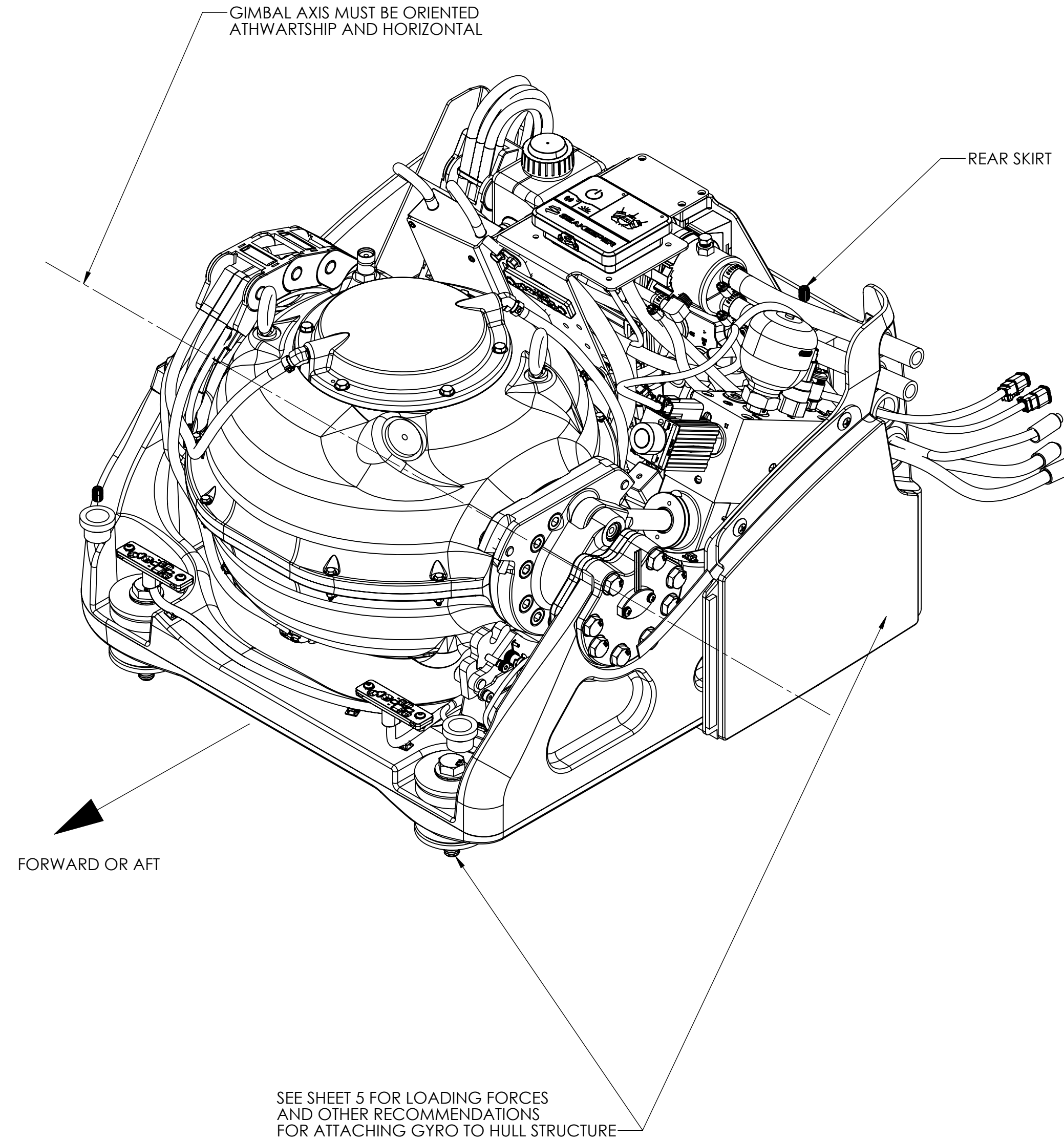
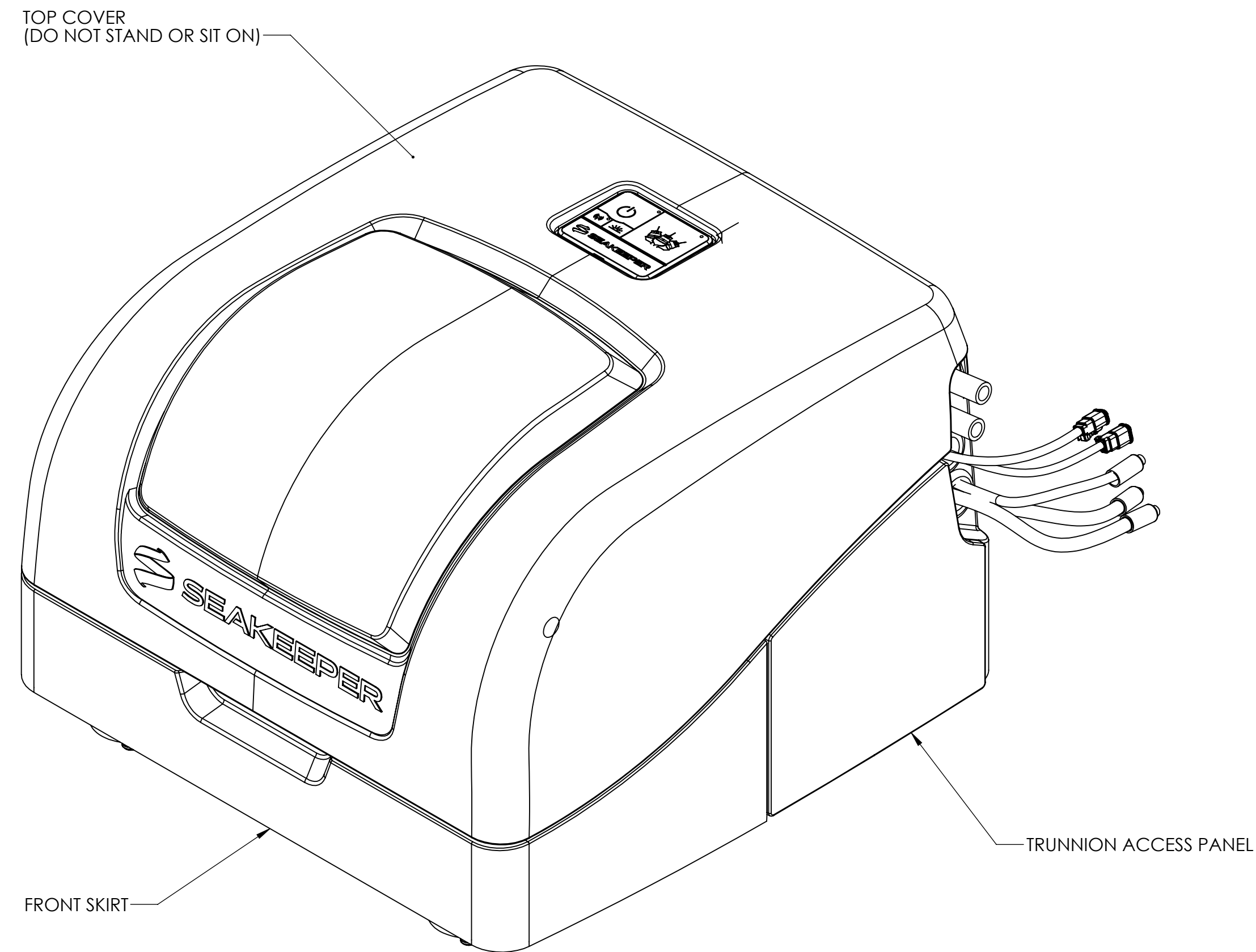


REV NO.	ECN NO.	ZONE	DESCRIPTION	DATE	APPRVD.
2	---	---	INITIAL RELEASE	5/21/2020	

- NOTES:**
- SEE REFERENCES 1 THROUGH 5 FOR RELATED INSTALLATION AND ELECTRICAL/ELECTRONIC AND COOLING CIRCUIT DRAWINGS.
 - SEAKEEPER 1 ASSEMBLY WEIGHT = 365 LBS (166 KG).
 - RAW WATER COOLING REQUIREMENT IS 8 LPM(2 GPM) MINIMUM AND 15 LPM (4 GPM) MAXIMUM CONTINUOUS FLOW, WHEN SEAKEEPER IS IN OPERATION. PROVIDED CONNECTIONS ARE 12.7mm(1/2") HOSE BARB. USE OF RAW WATER STRAINER IS REQUIRED.
 - TWO LIFTING EYES ARE PROVIDED ON THE TOP OF THE SEAKEEPER SPHERE FOR USE WITH A CHAIN OR SPREADER BAR; TOP COVER MUST BE REMOVED TO ACCESS LIFTING EYES.
 - THE SEAKEEPER IS RECOMMENDED TO BE INSTALLED AFT OF AMIDSHIP TO MINIMIZE HIGH ACCELERATION LOADING DUE TO HULL/WAVE IMPACTS DURING OPERATION AT HIGH SPEED OR IN LARGE WAVES. SEAKEEPER DOES NOT NEED TO BE MOUNTED TO CENTERLINE OF VESSEL. SEAKEEPER SUPPORT STRUCTURE MUST BE PARALLEL TO VESSEL WATERLINE.
 - SEAKEEPER MAY BE INSTALLED FACING FORWARD OR AFT AS SHOWN. SEAKEEPER ORIENTATION SHOULD BE SELECTED TO PROVIDE THE MOST ACCESSIBILITY FOR FUTURE SERVICE AND MAINTENANCE. THE BRAKE-SIDE OF THE SEAKEEPER 1 IS INTENDED TO BE SERVICE ACCESSIBLE. THE SEAKEEPER 1 SHOULD BE MOUNTED IN A LOCATION THAT ALLOWS REMOVAL OF THE TOP COVER. INSTALLATION, START-UP, AND OPERATION IS THE SAME REGARDLESS OF SEAKEEPER ORIENTATION.
 - WHEN INSTALLING, SEAKEEPER RECOMMENDS USING A BOLT HOLE LOCATION FIXTURE AVAILABLE FROM SEAKEEPER (P/N 90517). THIS FIXTURE WILL PROPERLY SPACE AND LOCATE HOLES TO BE DRILLED IN HULL STRUTURE FOR BOLT-IN OF SEAKEEPER FOUNDATION.



REF.	DWG. NO.	DWG. TITLE
1	90512	SEAKEEPER 1 COOLING WATER SCHEMATIC
2	90511	SEAKEEPER 1 CABLE BLOCK DIAGRAM
3	90518	SEAKEEPER 1 METAL STRUCTURE BOLT-IN KIT
4	90519	SEAKEEPER 1 GYRO INSTALLATION MANUAL
5	90562	SEAKEEPER 1 FIBERGLASS STRUCTURE BOLT-IN KIT

SHEET 2: ENVELOPE
SHEET 3: LIFTING DETAILS, SERVICE CLEARANCES, AND BOLT PATTERN
SHEET 4: SEAWATER HOSE CONNECTIONS
SHEET 5: LOADS AND RECOMMENDED HULL STRUCTURES/MOUNTING

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SEAKEEPER
 Seakeeper Inc. 44425 Pecan Court, Suite 151 California, MD 20619

NAME: SEAKEEPER 1 BOLT-IN INSTALLATION DETAILS

DWG NUMBER: **90516**

REV. NO. SHEET NO.: **2** OF 5

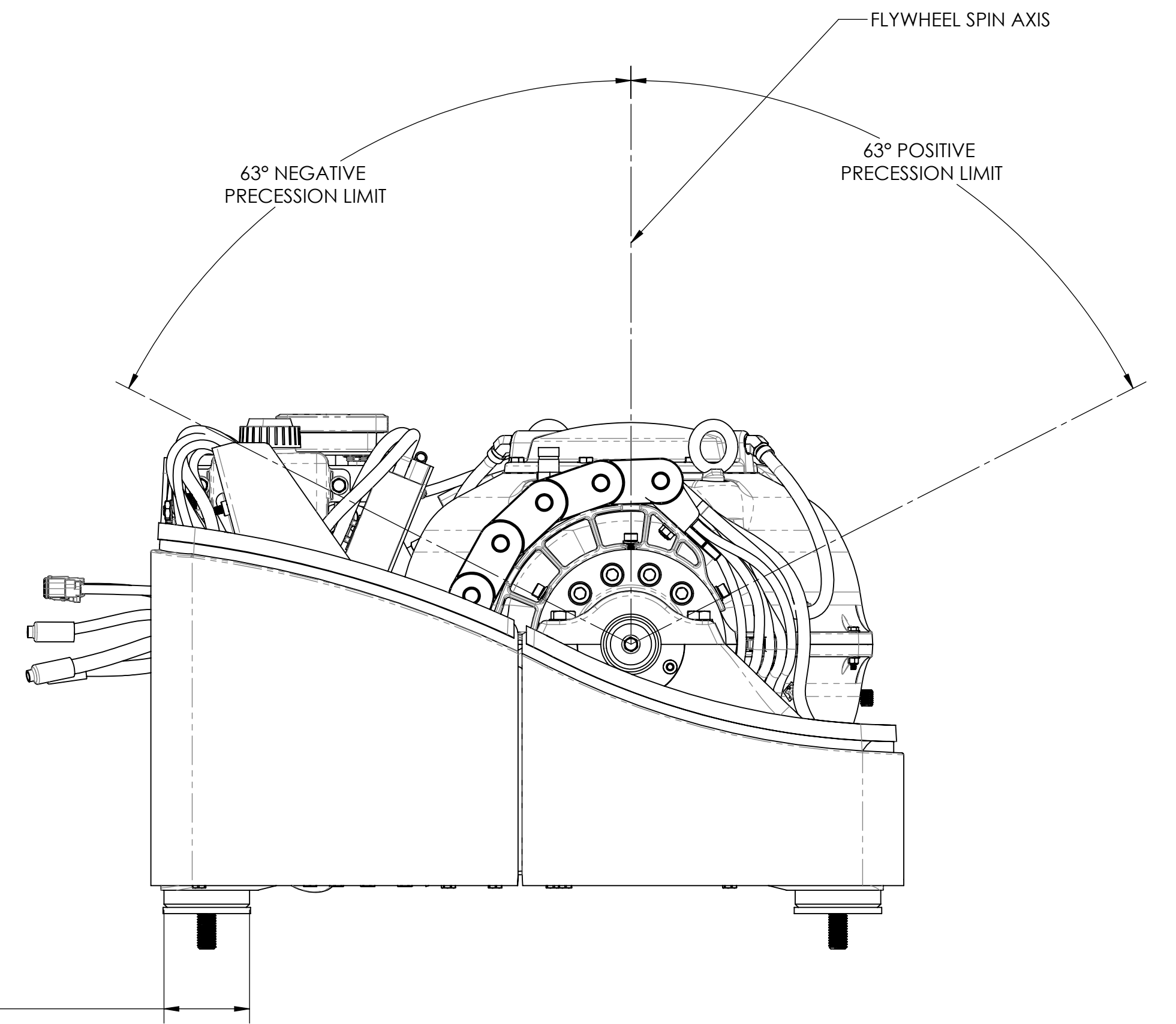
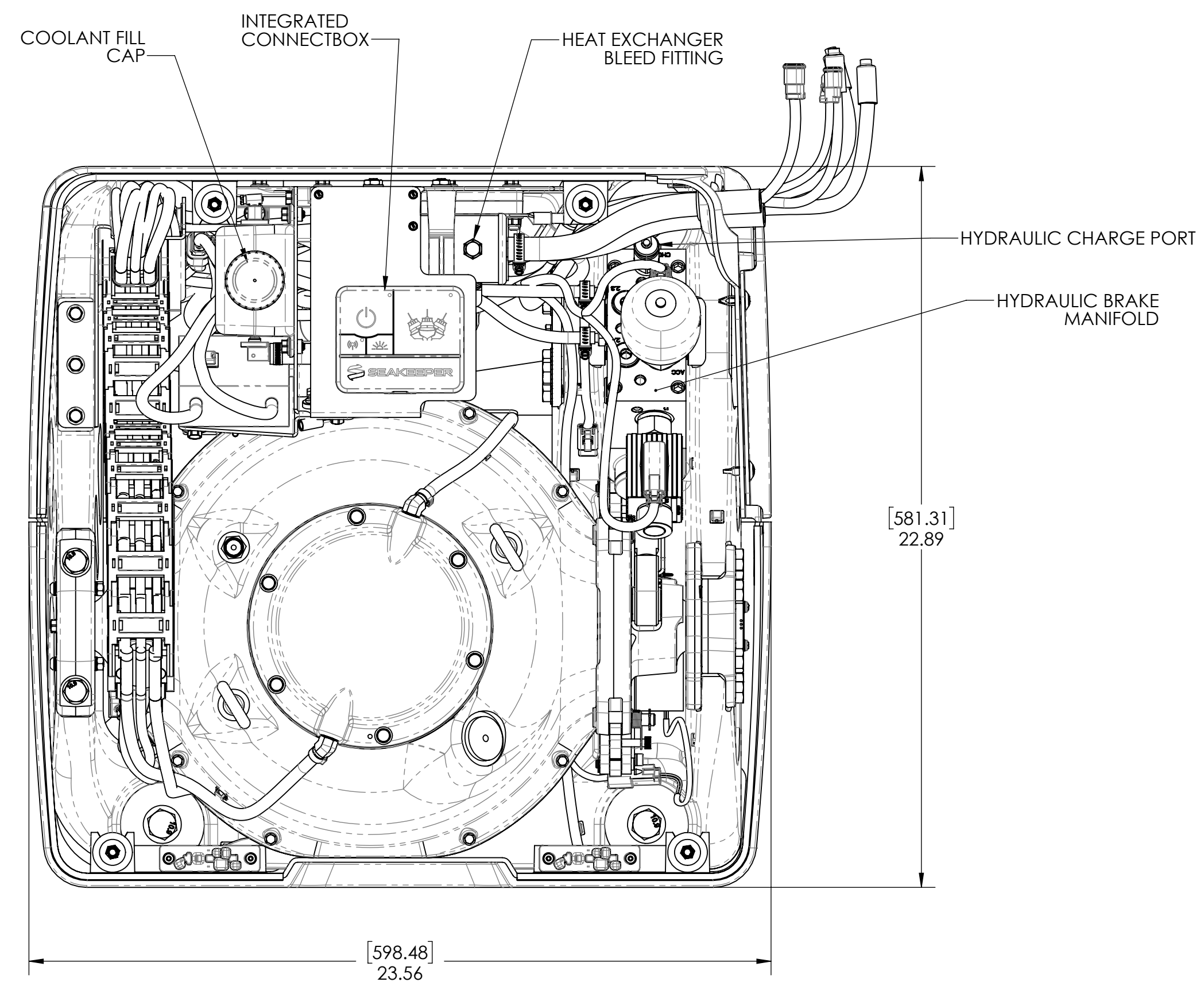
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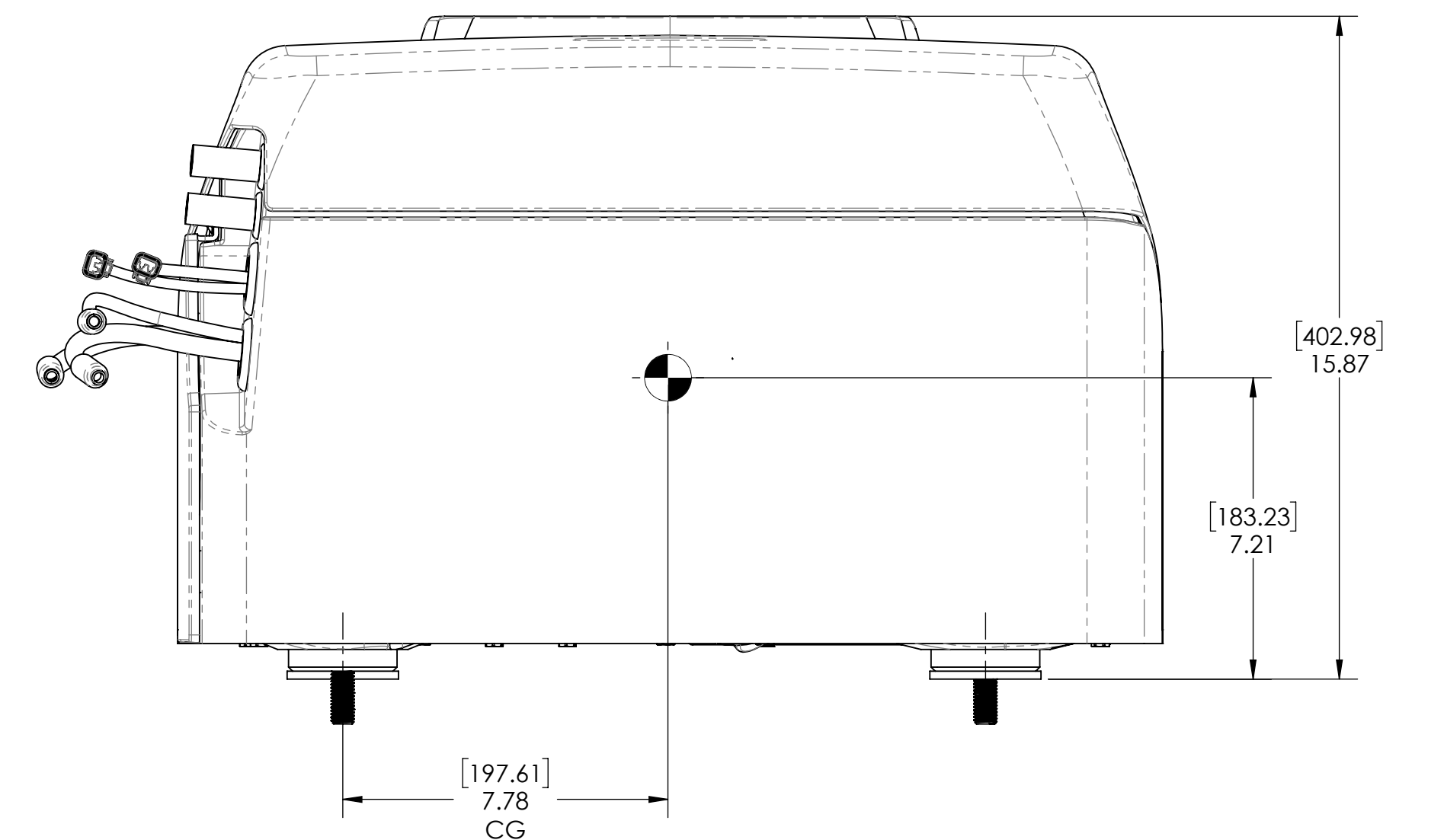
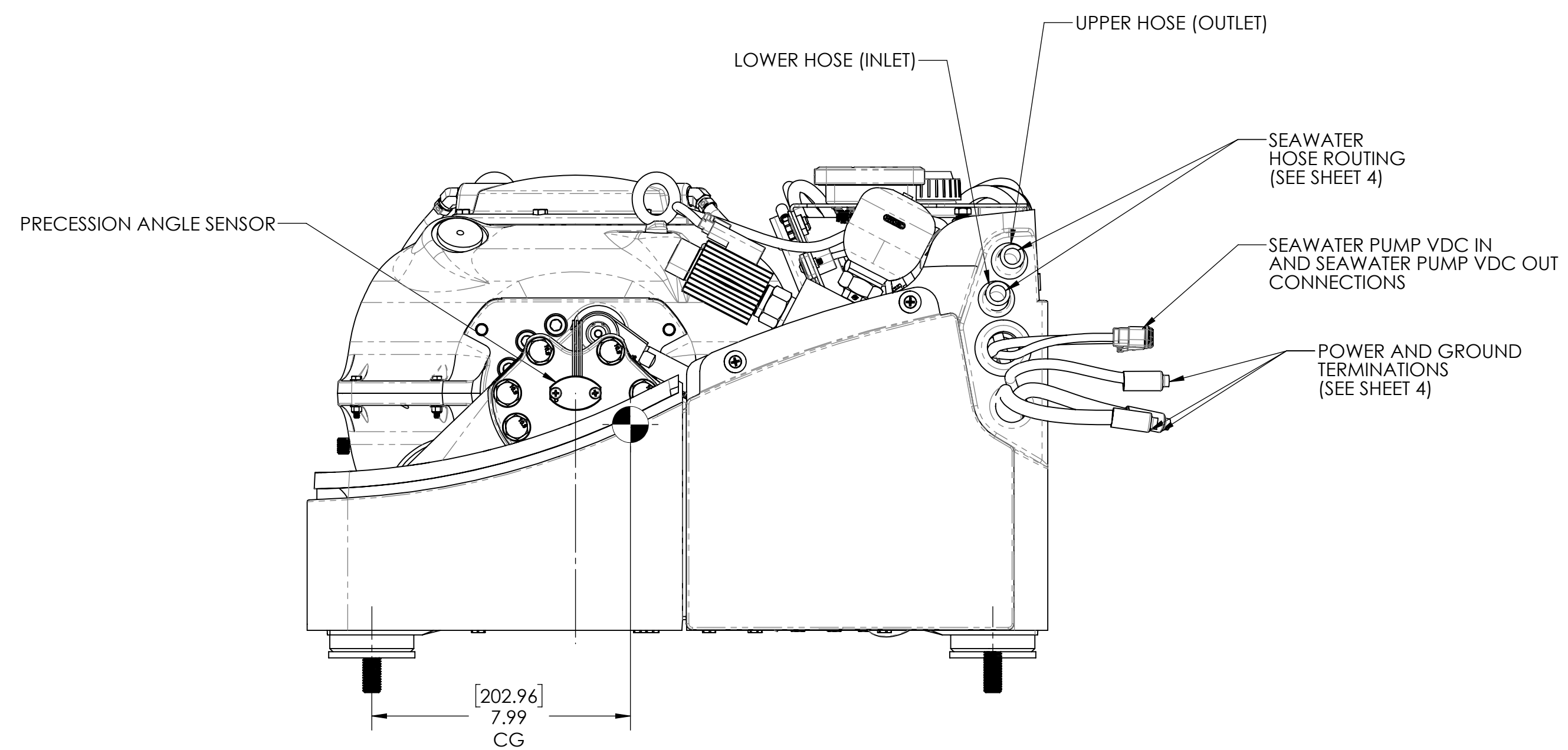
DRAWN: DDG DATE: 31 OCT 2019

ENG APPR: DMF DATE: 21 APR 2020

PROD APPR: --- DATE: ---

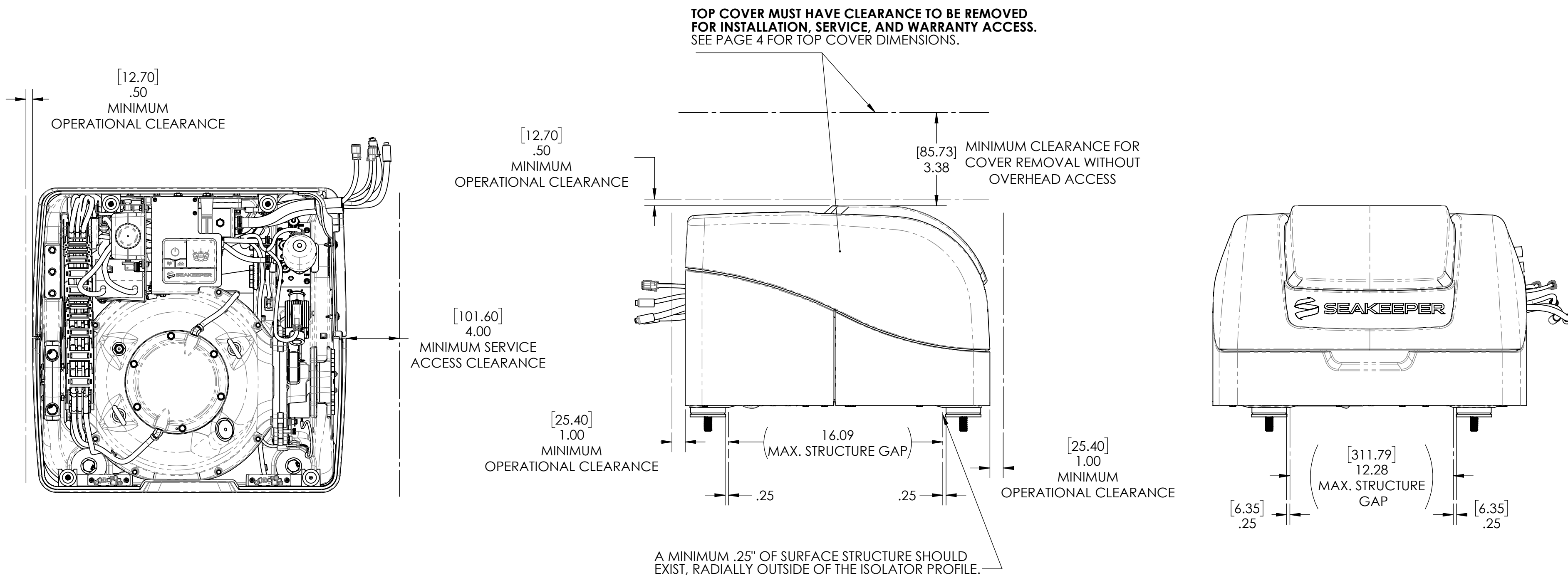


[66.04]
4X Ø2.60
ISOLATOR DIAMETER
ENTIRE SURFACE MUST BE SUPPORTED



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MATERIAL: ---	ENG APPR: DMF	DATE: 21 APR 2020	
---	PROD APPR: ---	---	

VIEWS SHOWING REQUIRED CLEARANCES AROUND GYRO FOR USE OF HAND TOOLS, EASE OF MAINTENANCE, INSTALLATION AND PROPER OPERATION

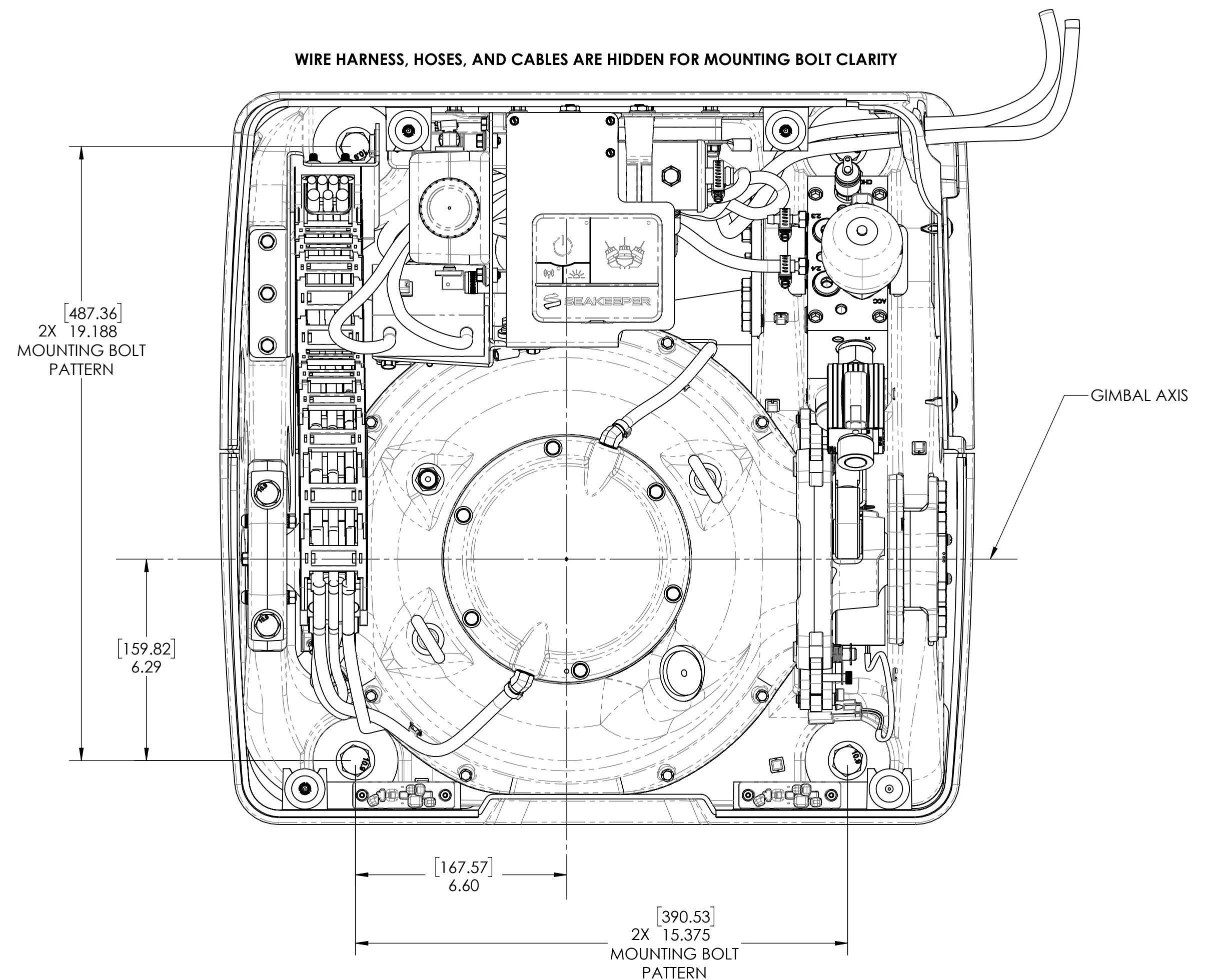


MOUNTING BOLT PATTERN/DETAILS

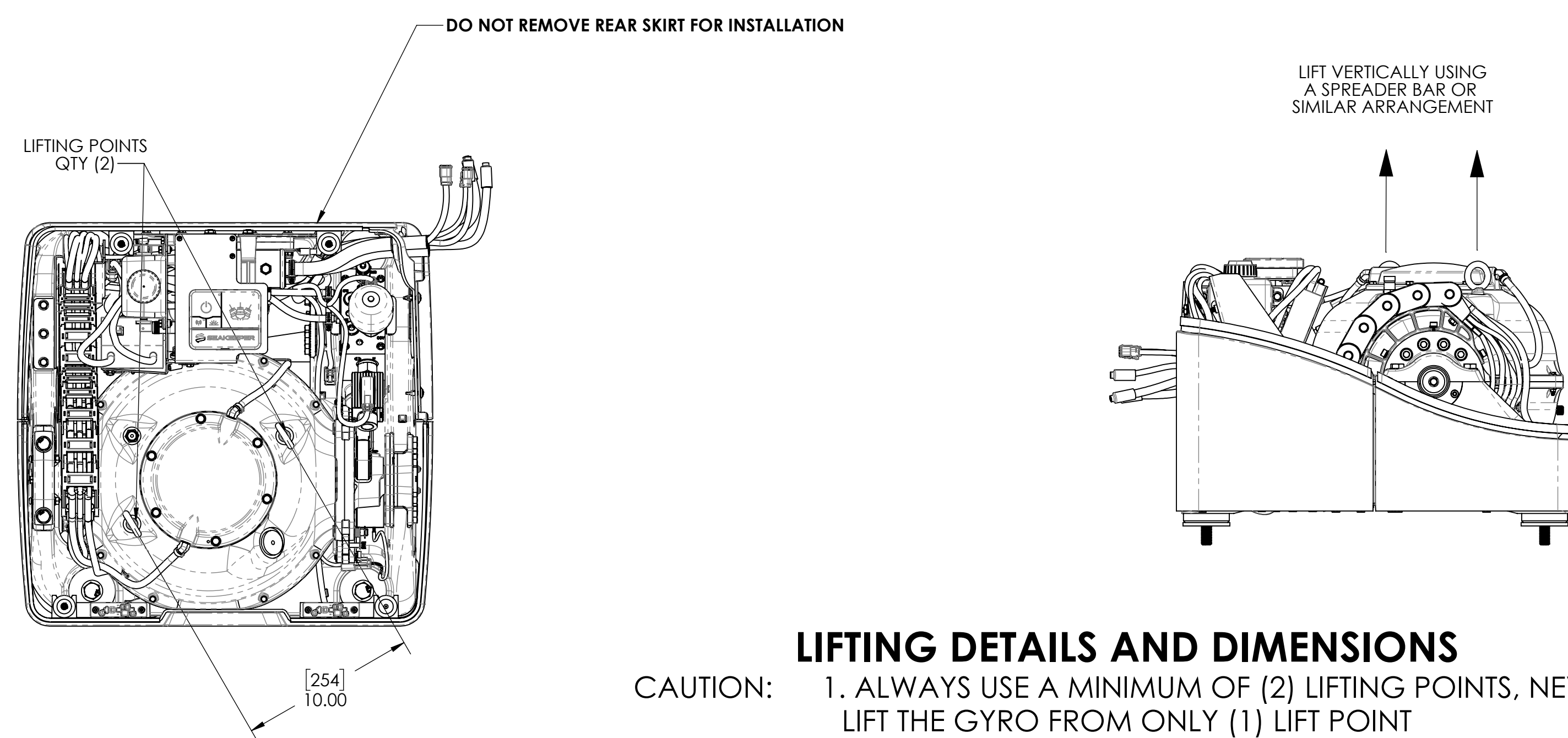
TOP-DOWN ACCESS MUST BE AVAILABLE TO ACCESS MOUNTING BOLT INSTALLATION LOCATIONS. IF TOP-DOWN ACCESS IS NOT AVAILABLE, THE MINIMUM OVERHEAD CLEARANCE OF 3.38" [85.73MM] MUST BE MET AND ADDITIONAL ACCESS MUST BE PROVIDED TO SERVICE THE UNIT.

AN INSTALLATION DRILL FIXTURE IS AVAILABLE TO TRANSFER THE SEAKEEPER 1 BOLT PATTERN ON TO THE HULL STRUCTURE AND PROVIDES DRILL BUSHINGS FOR DRILLING MINOR Ø FOR HELICOIL TAPPED HOLES. (SEAKEEPER 1 INSTALLATION FIXTURE KIT P/N: 90517)

SEE SHEET 5 FOR HULL STRUCTURE CLEARANCE REQUIREMENTS



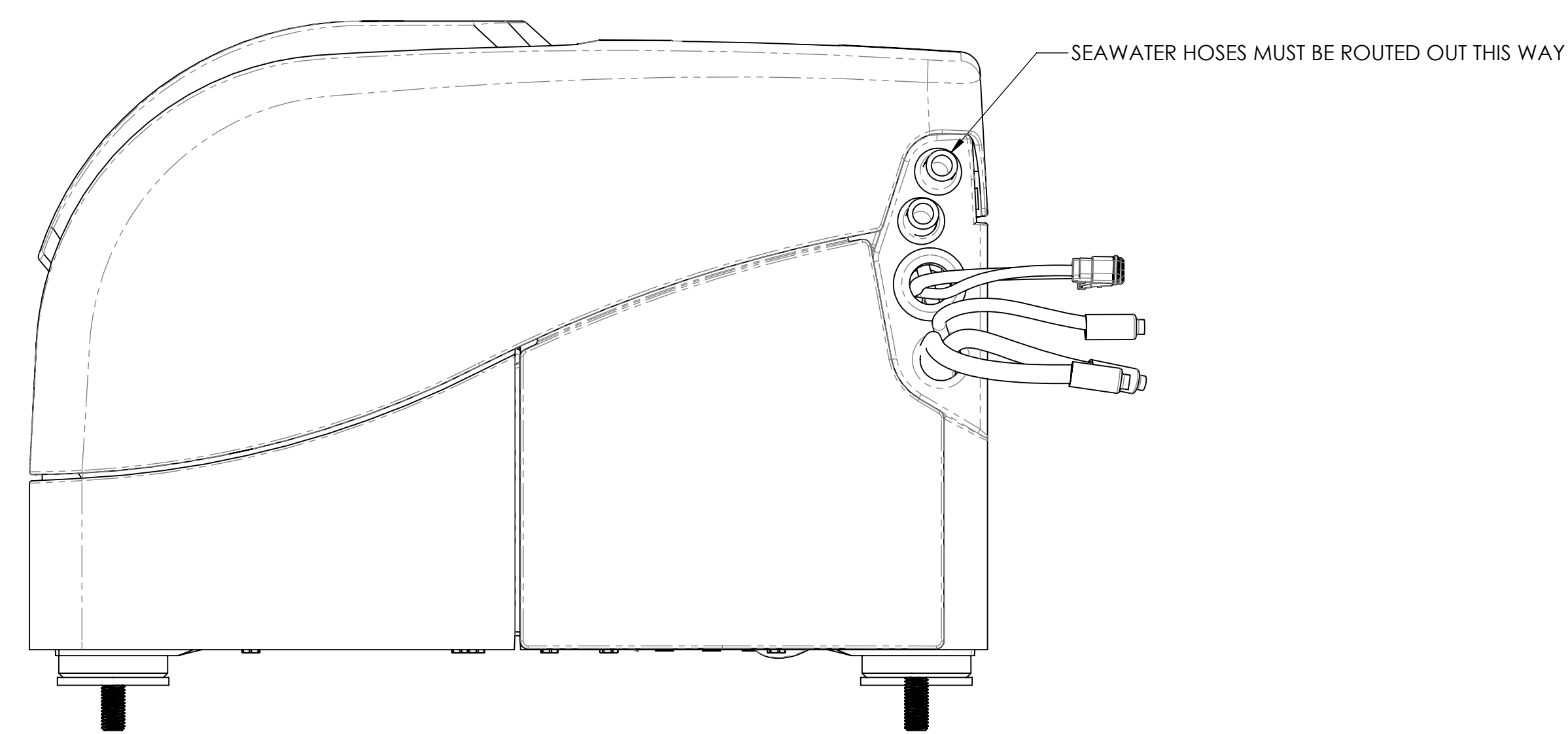
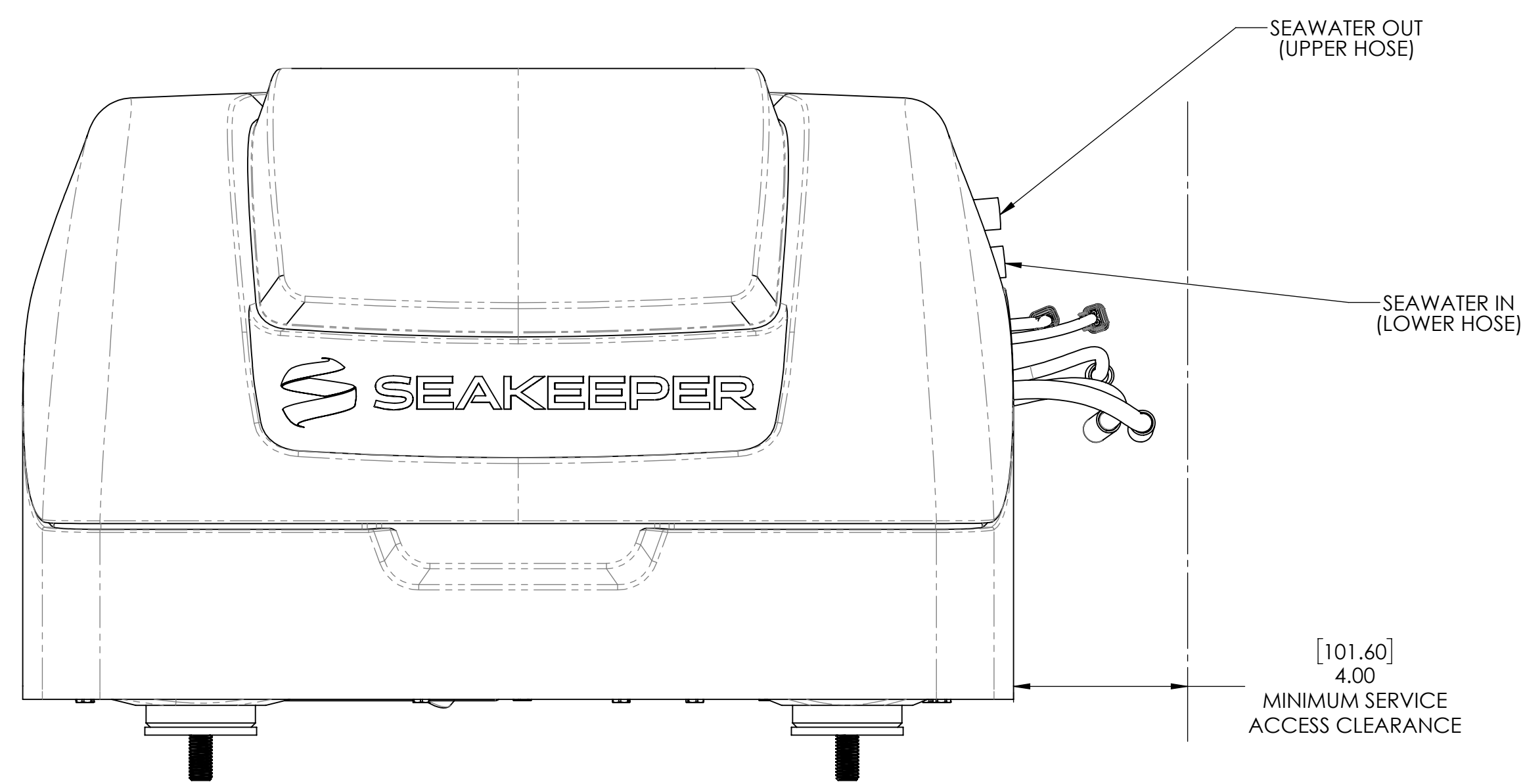
TOP DOWN ACCESS MUST BE INCORPORATED INTO THE INSTALLATION DESIGN TO ALLOW FOR ADEQUATE REGULAR MAINTENANCE, SERVICE, REPAIR OF COMPONENTS, AND REMOVAL OF TOP COVER.



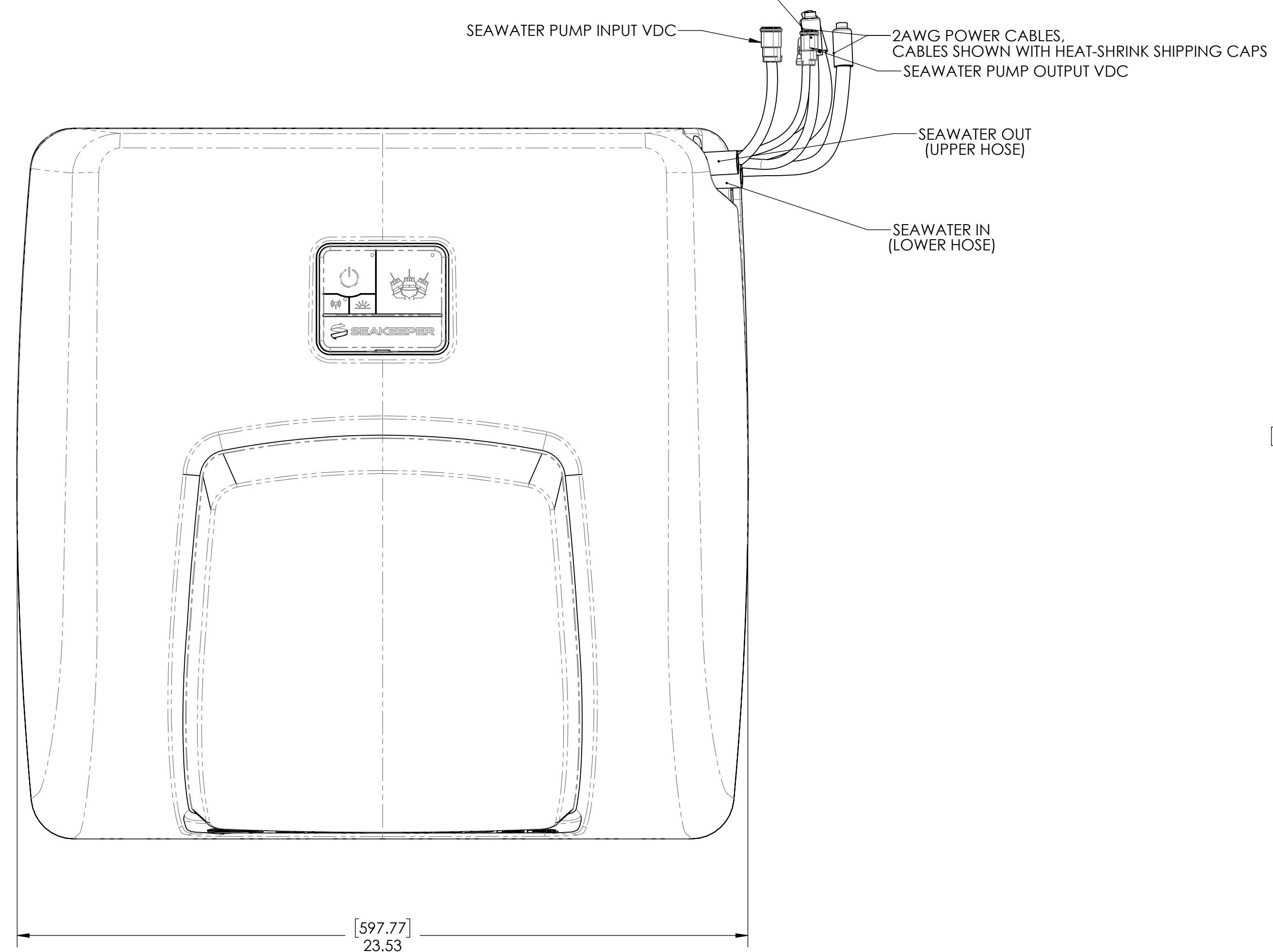
LIFTING DETAILS AND DIMENSIONS

CAUTION: 1. ALWAYS USE A MINIMUM OF (2) LIFTING POINTS, NEVER LIFT THE GYRO FROM ONLY (1) LIFT POINT
2. ALWAYS REMOVE THE TOP COVER BEFORE LIFTING GYRO

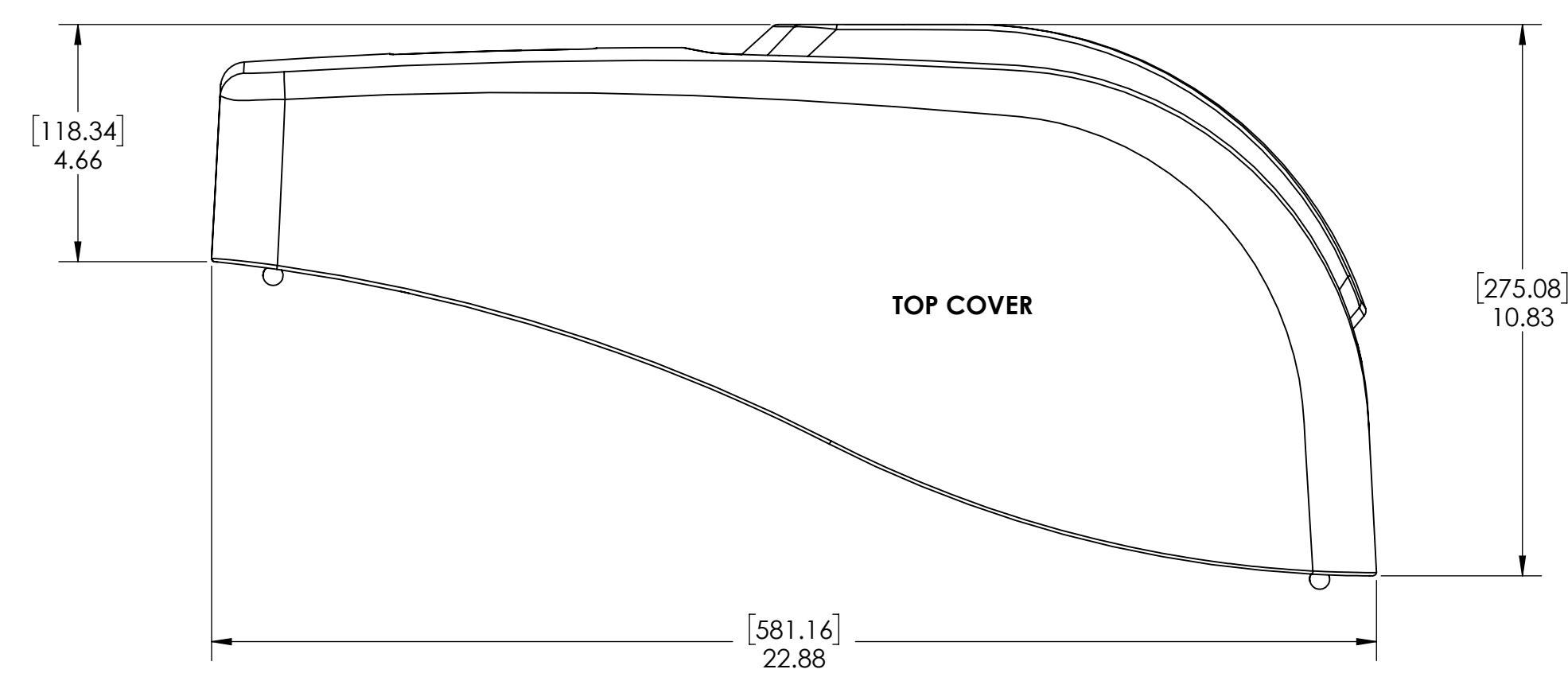
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MATERIAL: ---	ENG APPR: DMF	DATE: 21 APR 2020	DWG NUMBER: 90516
	PROD APPR: ---	DATE: ---	REV. NO. SHEET NO. 2 3 OF 5



NOTE
4AWG GROUND CONNECTION POINT.
INSTALLER IS RESPONSIBLE FOR PROPERLY
GROUNDING GYRO TO VESSEL.



NOTES: 1) SEAWATER HOSE CONNECTIONS ARE 1/2 INCH HOSE BARB FITTINGS.
2) SEAWATER INLET HOSE MUST BE ROUTED TO THE LOWER HEAT EXCHANGER BARB
AND OUTLET HOSE CONNECTED TO THE UPPER HEAT EXCHANGER BARB.



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DATE:	31 OCT 2019
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PROD APPR:	---

SEAKEEPER 1 BOLT-IN INSTALLATION DETAILS	
DWG NUMBER	90516
REV. NO. / SHEET NO.	2 / 4 OF 5

SEAKEEPER LOADS FOR HULL STRUCTURE DESIGN:

THE SEAKEEPER 1 IS BOLTED USING (4X) M14-2.0 ZINC-NICKEL COATED, STEEL, HEX HEAD CAP SCREWS, GRADE 10.9. THIS HARDWARE IS PROVIDED AT A CUSTOM LENGTH OF 94mm WITH THE SEAKEEPER BOLT-IN INSTALLATION KIT, #90599.

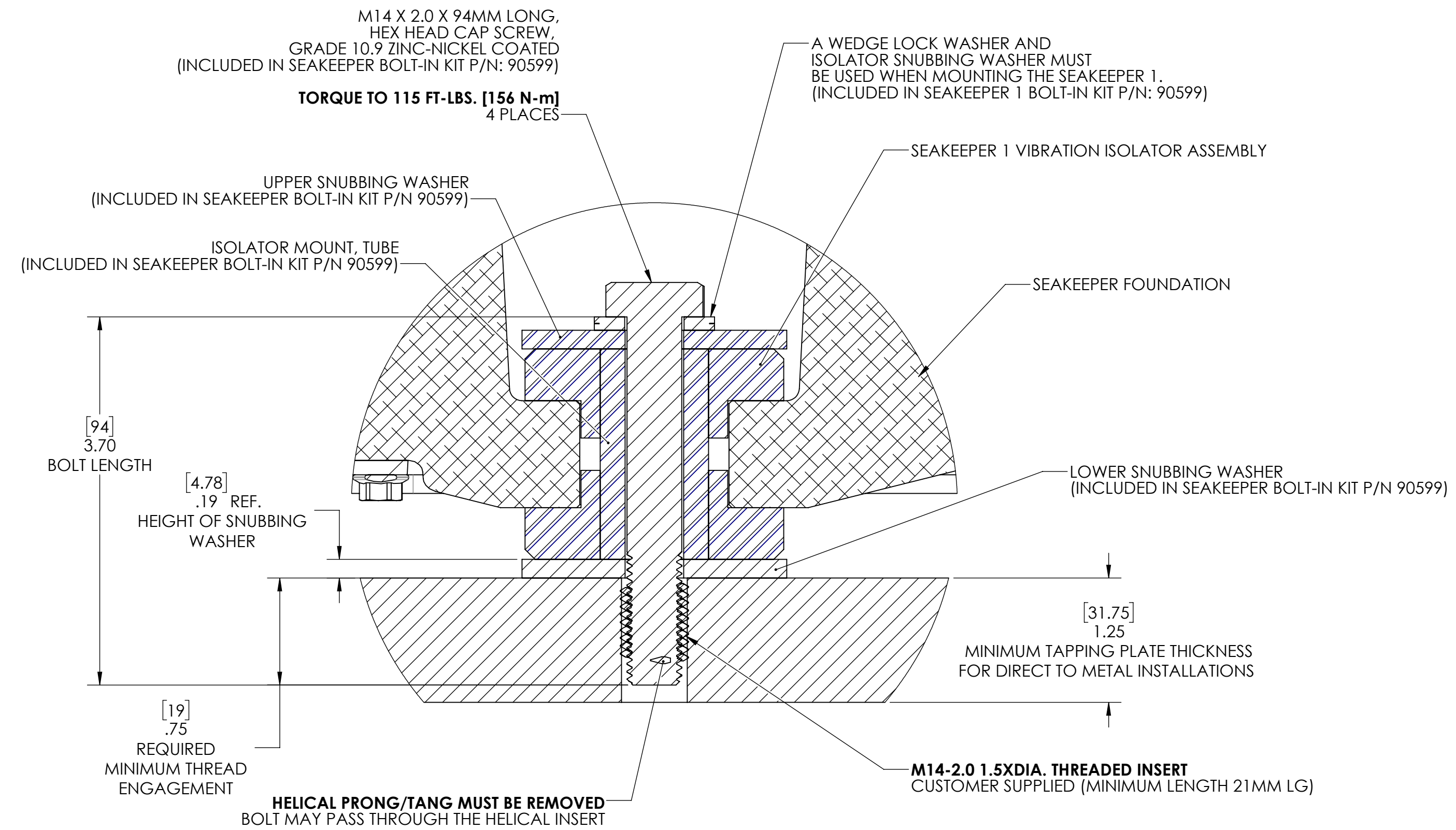
THE HULL STRUCTURE MUST BE FLAT AMONG THE 4 CONTACT POINTS AND COVER THE ENTIRE SURFACE OF THE ISOLATOR. SEAKEEPER RECOMMENDS A SURFACE FLATNESS WITHIN 2 MILLIMETERS (.079").

THE SEAKEEPER GENERATES PITCH MOMENTS, ROLL MOMENTS, YAW MOMENTS, AND VERTICAL AND HORIZONTAL FORCES. THE RESULTING FORCES AT THE MOUNTING POINTS ARE ILLUSTRATED ON THE FIGURE, AND THE VALUES TO BE USED ARE SUMMARIZED BELOW. THESE FORCES ARE WORST CASE LOADING IN EACH DIRECTION (X, Y OR Z) AND INCLUDE A 6G ACCELERATION APPLIED IN ONE DIRECTION ONLY, THROUGH SIX DIFFERENT CASES (+/- VERTICAL, +/- LONGITUDINAL, +/- LATERAL). THESE FORCES COULD BE ACTING SIMULTANEOUSLY AND FULLY REVERSING IN BOTH DIRECTIONS.

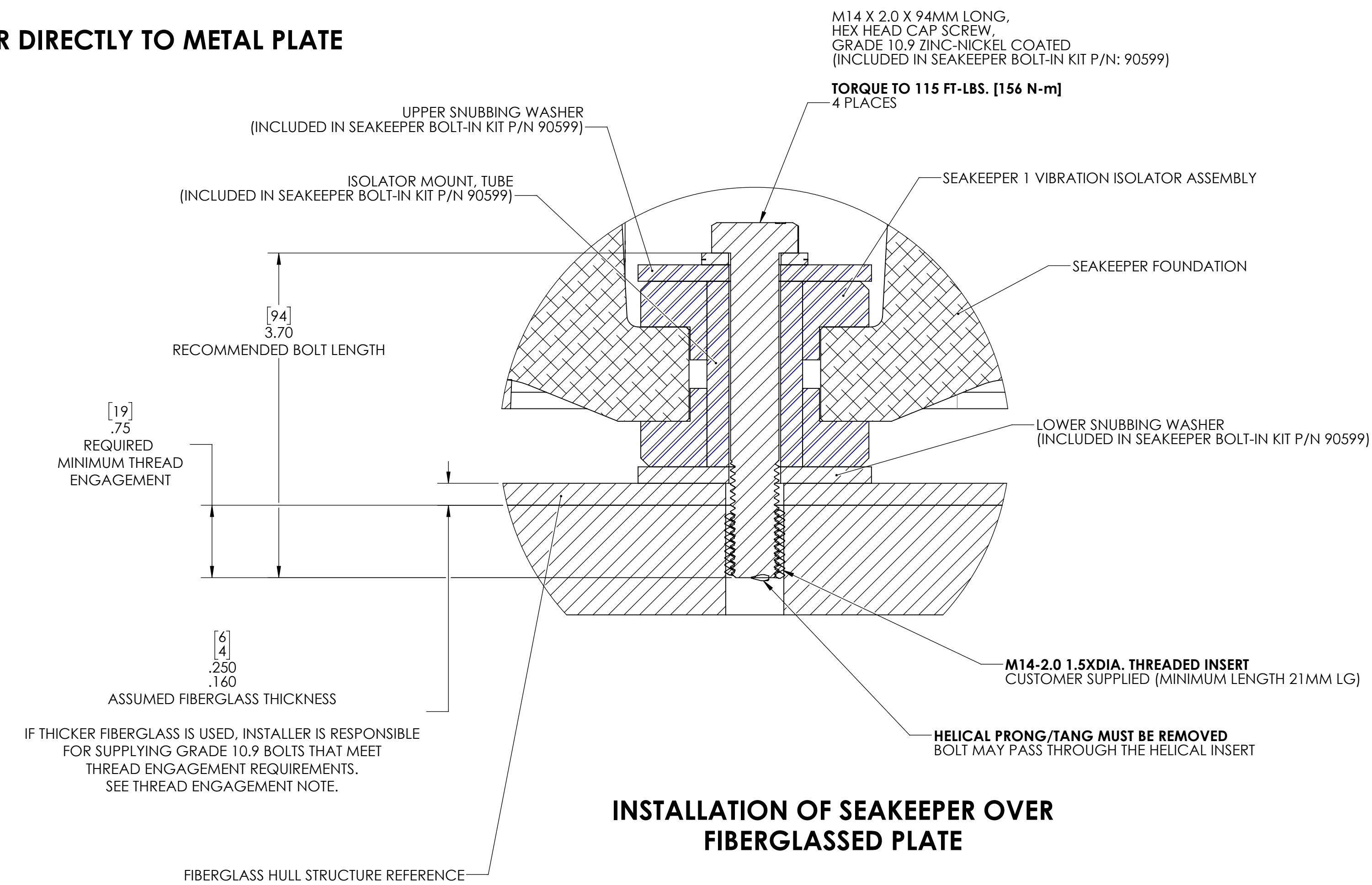
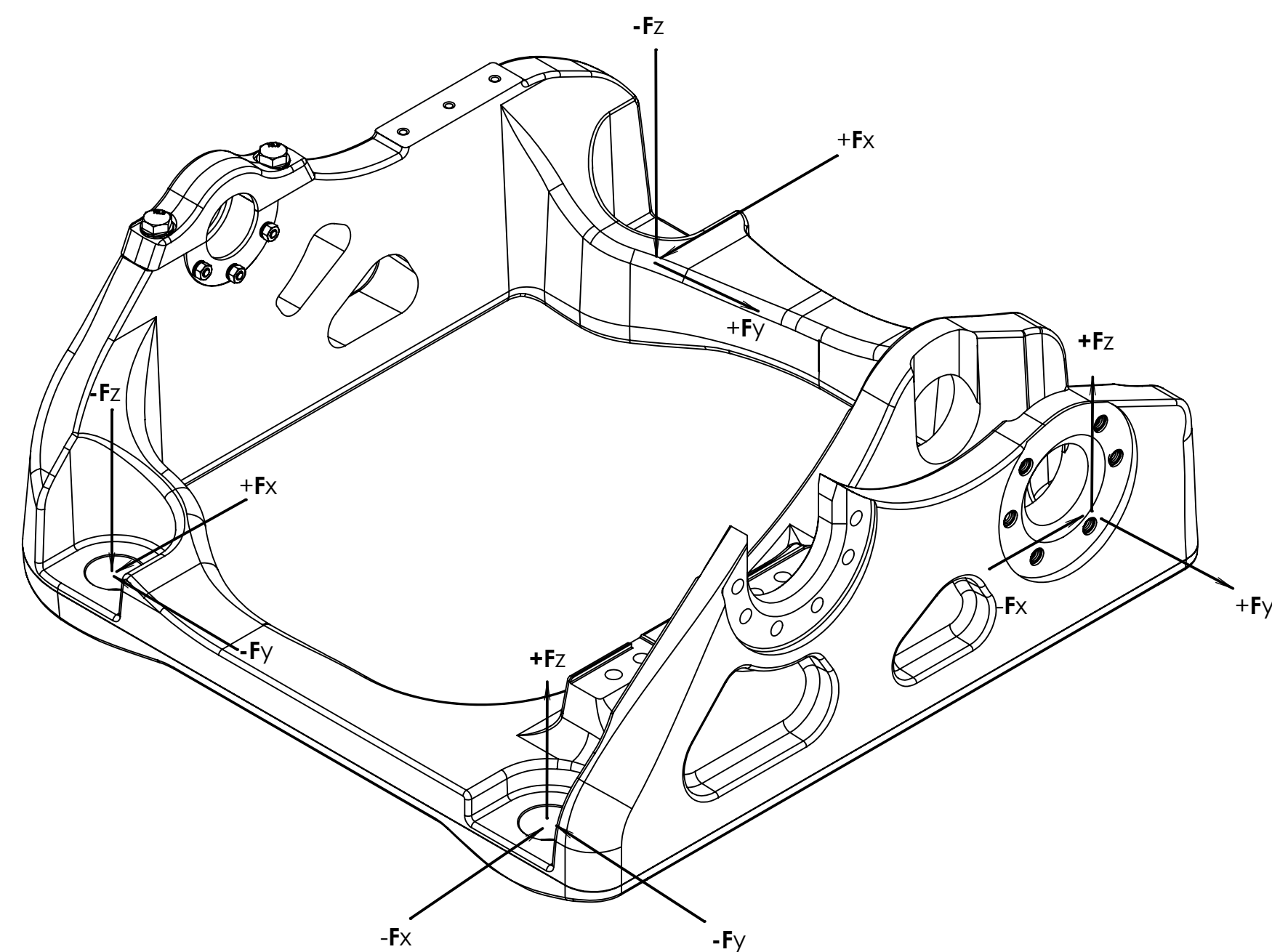
VERTICAL FORCE (Fz) = 1,515 lbs (6.74 KN)
LONGITUDINAL FORCE (Fx) = 2,248 lbs (10.0 KN)
LATERAL FORCE (Fy) = 1,697 lbs (7.55 KN)

THE RESPONSIBLE PARTY FOR DESIGNING THE SUPPORTING STRUCTURE (BOAT BUILDER OR HIRED SUB-CONTRACTOR) MUST ACCOMMODATE THE ABOVE FORCES PLUS A REASONABLE FACTOR OF SAFETY. SEAKEEPER RECOMMENDS A MINIMUM SAFETY FACTOR OF 2.0 (YIELDING A SAFETY MARGIN OF 2.0).

THE SEAKEEPER IS RATED TO +/- 6G ACCELERATION IN ALL DIRECTIONS. IF THE UNIT DETECTS HIGHER ACCELERATIONS, THE BRAKE SYSTEM WILL LOCK AND THE FLYWHEEL WILL START TO SPOOL DOWN. THIS IS A WARNING TO THE USER, ALTHOUGH THE WARNING CAN BE CLEARED AND THE SEAKEEPER CAN BE RESTARTED AT SPEED. THE SEAKEEPER WILL RECORD ACCELERATION DATA AND VESSEL MOTIONS FROM ITS CONTROLLER. DO **NOT** INSTALL THE GYRO AT A BOAT LOCATION OR OPERATE THE BOAT IN A MANNER THAT WILL EXCEED THESE ACCELERATION LEVELS WITHOUT FIRST CONTACTING SEAKEEPER.



INSTALLATION OF SEAKEEPER DIRECTLY TO METAL PLATE



INSTALLATION OF SEAKEEPER OVER FIBERGLASSED PLATE

SOCKET EXTENSIONS WILL BE REQUIRED ON ALL FOUR (4) MOUNTING BOLTS. A FASTENER-HOLDING SOCKET (MAGNETIC OR OTHER) IS HIGHLY RECCOMENDED FOR INSTALLING THE TWO (2) REAR MOUNTING BOLTS. DO NOT REMOVE REAR SKIRT FOR INSTALLATION.

THREAD ENGAGEMENT NOTE

- 1) THE MINIMUM TAPPING PLATE THICKNESS FOR DIRECT TO METAL INSTALLATIONS OF THE SEAKEEPER 1 IS 1.25" (31.75 mm).
- 2) THE MINIMUM TAPPING PLATE THICKNESS REQUIRED FOR FIBRE-REINFORCED (FRP) INSTALLATIONS IS 1.0" (25.4mm). IF THE LAMINATE THICKNESS IS LESS THAN 0.16" (4.1 mm) THE TAPPING PLATE THICKNESS MUST BE INCREASED.

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