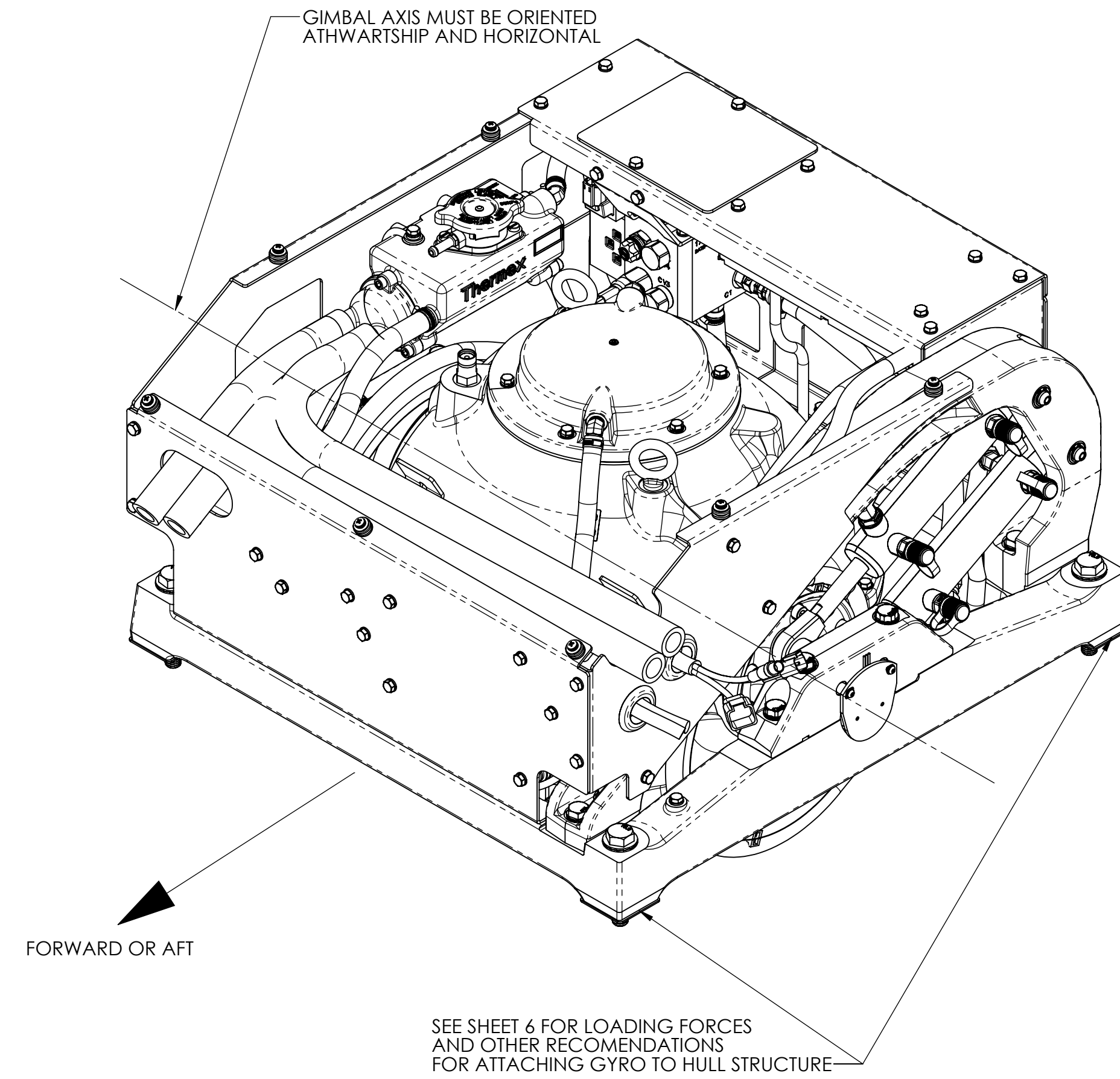
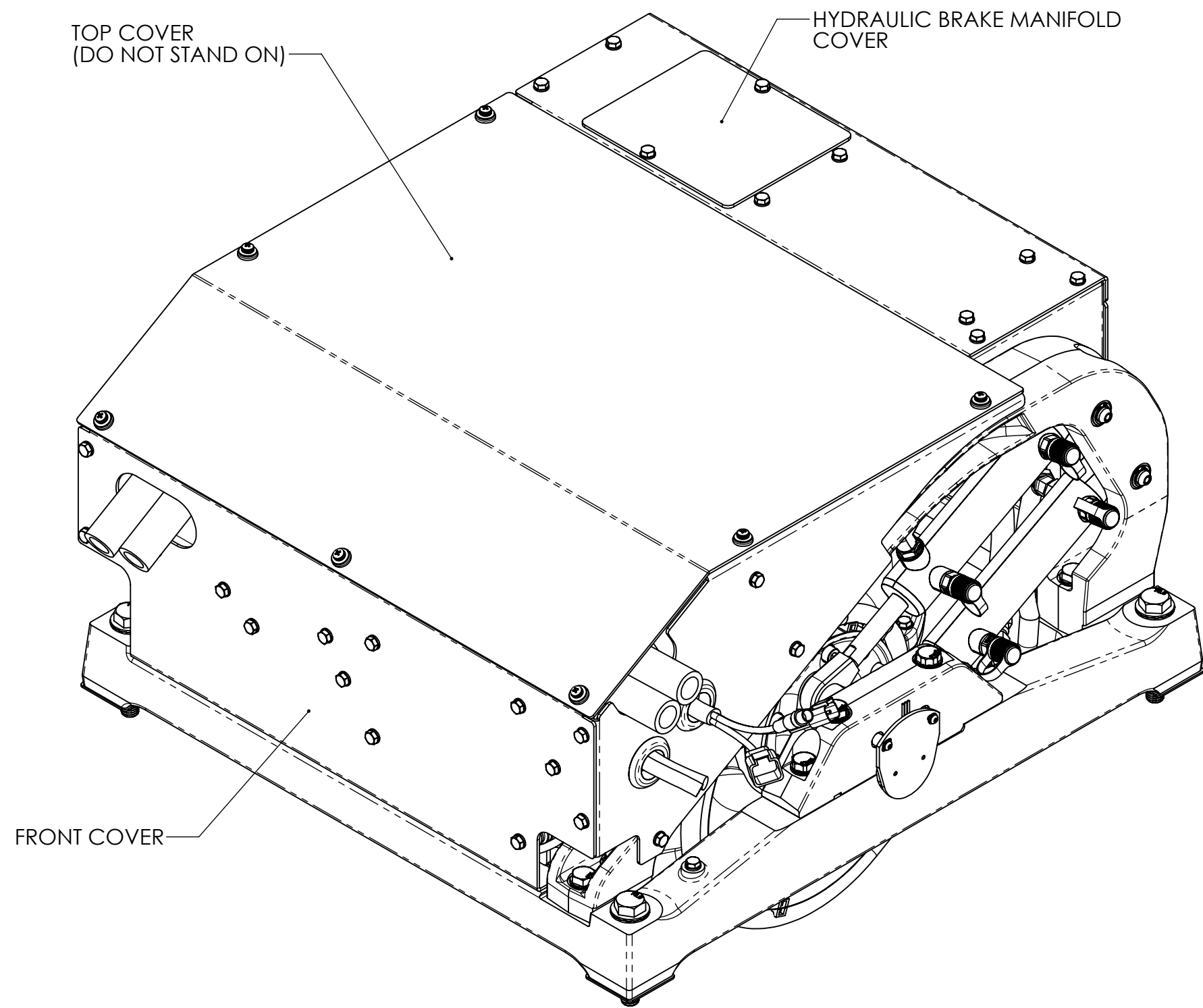


- NOTES:**
- SEE REFERENCES 1 THROUGH 5 FOR RELATED INSTALLATION AND ELECTRICAL/ELECTRONIC AND COOLING CIRCUIT DRAWINGS.
 - SEAKEEPER 2 ASSEMBLY WEIGHT = 414 LBS (188 KG).
 - RAW WATER COOLING REQUIREMENT IS 8 LPM (2 GPM) MINIMUM AND 23 LPM (6 GPM) MAXIMUM CONTINUOUS FLOW. PROVIDED CONNECTIONS ARE 19mm(3/4") HOSE BARB. USE OF RAW WATER STRAINER IS REQUIRED.
 - TWO LIFTING EYES ARE PROVIDED ON THE TOP OF THE GYRO SPHERE FOR USE WITH A CHAIN/SPREADER BAR; TOP COVER MUST BE REMOVED TO ACCESS LIFTING EYES.
 - THE GYRO MUST BE INSTALLED AFT OF AMIDSHIP TO MINIMIZE HIGH ACCELERATION LOADING DUE TO HULL/WAVE IMPACTS DURING OPERATION AT HIGH SPEED OR IN LARGE WAVES. GYRO DOES NOT NEED TO BE MOUNTED TO CENTERLINE OF KEEL. GYRO SUPPORT STRUCTURE MUST BE PARALLEL TO VESSEL WATERLINE.
 - GYRO MAY BE INSTALLED FACING FORWARD OR AFT AS SHOWN. GYRO ORIENTATION SHOULD BE SELECTED TO PROVIDE THE MOST ACCESSABILITY FOR FUTURE SERVICE AND MAINTENANCE. INSTALLATION, START-UP, AND OPERATION IS THE SAME REGARDLESS OF GYRO ORIENTATION.
 - WHEN INSTALLING, SEAKEEPER RECOMMENDS USING A BOLT HOLE LOCATION FIXTURE AVAILABLE FROM DEAKEEPER. THIS FIXTURE WILL PROPERLY SPACE AND LOCATE HOLES TO BE DRILLED IN HULL STRUCTURE FOR BOLT-IN OF SEAKEEPER FOUNDATION.

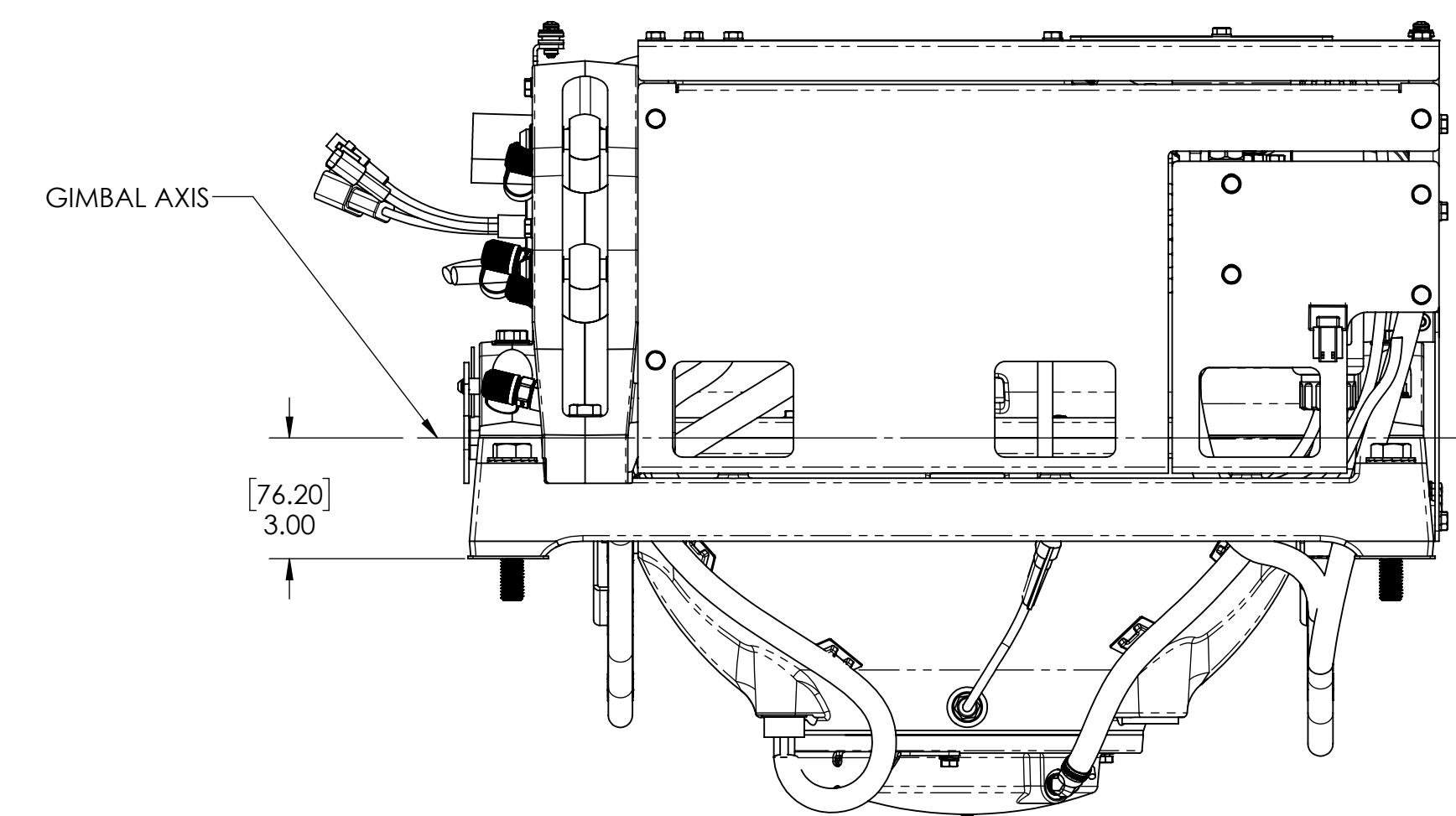
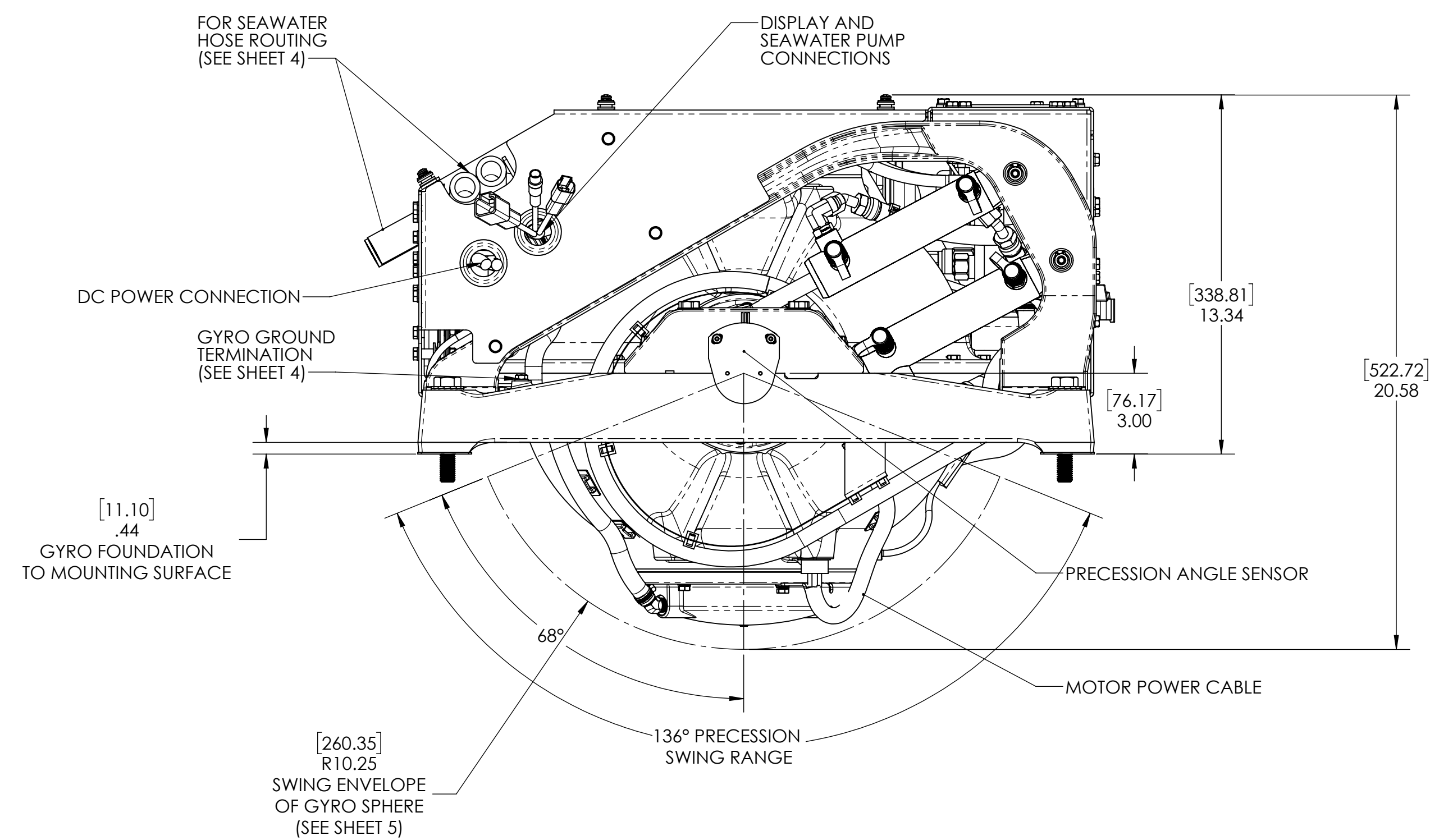
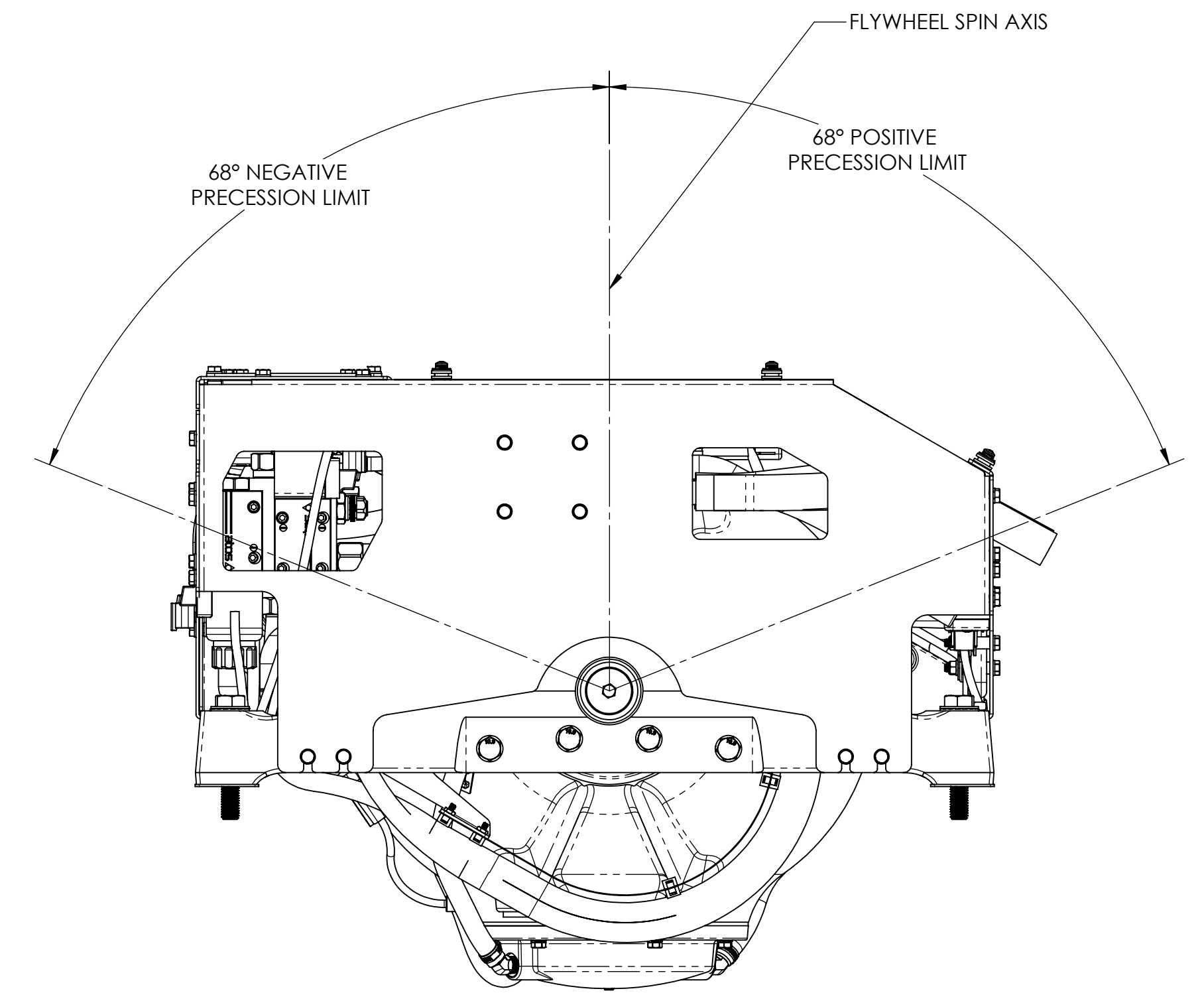
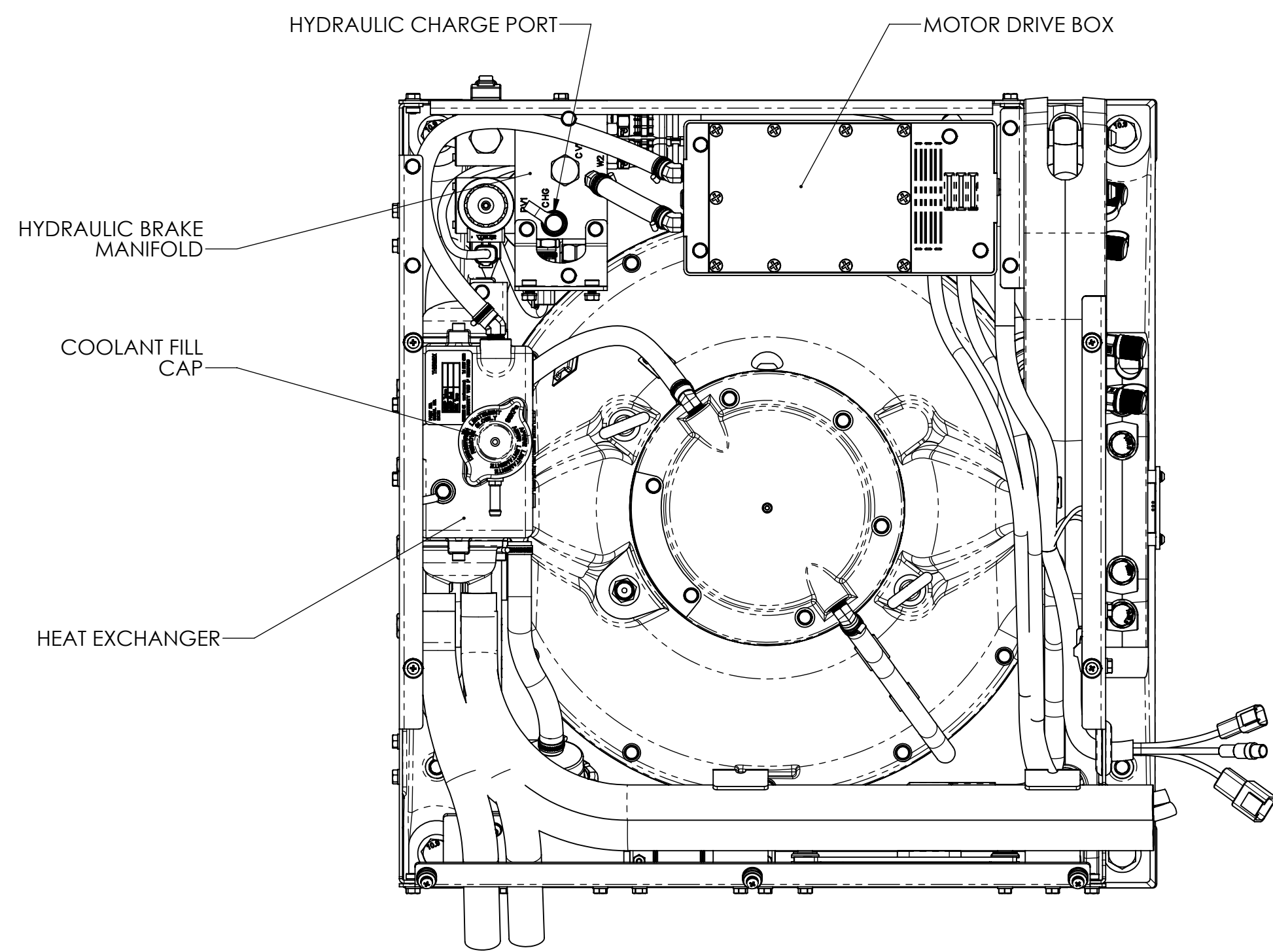


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REF. DWG. NO.	DWG. TITLE
1	90490 SEAKEEPER 2 COOLING WATER SCHEMATIC
2	90470 SEAKEEPER 2 CABLE BLOCK DIAGRAM
3	90438 ENVELOPE AND MOUNTING DETAIL, 5 INCH OPERASTOR DISPLAY
4	90474 SEAKEEPER 2 GYRO INSTALLATION KIT
5	90488 SEAKEEPER 2 GYRO INSTALLATION MANUAL

SHEET 2: GYRO ENVELOPE
SHEET 3: LIFTING DETAILS, SERVICE CLEARANCES, AND BOLT PATTERN
SHEET 4: SEAWATER HOSE CONNECTIONS
SHEET 5: RECOMMENDED HULL STRUCTURES/MOUNTING
SHEET 6: GYROSCOPIC LOADS FOR HULL STRUCTURE DESIGN

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WEIGHT - LBS: ---	DRAWN: BEN	DATE: 10JAN2018	NAME: SEAKEEPER 2 ENCLOSURE AND GIMBAL SHAFT SUB-SYSTEM
MATERIAL: ---	ENG APPR: ---	DATE: ---	DWG NUMBER: 11860
PROD APPR: ---			REV. NO. SHEET NO. 1 OF 6



SEAKEEPER
Seakeeper Inc. 4425 Pecan Court, Suite 151 California, MD 20619

NAME: SEAKEEPER 2 ENCLOSURE AND GIMBAL SHAFT SUB-SYSTEM

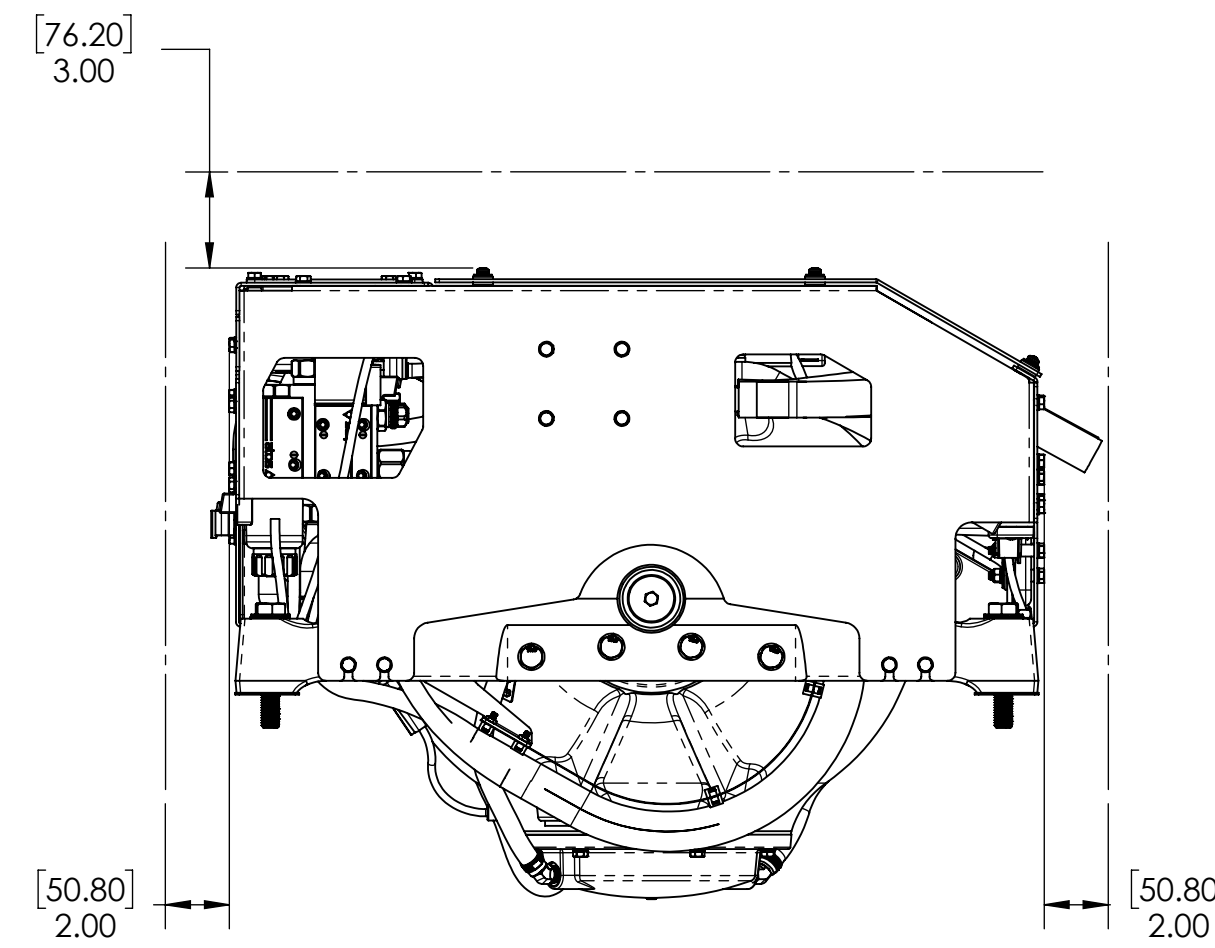
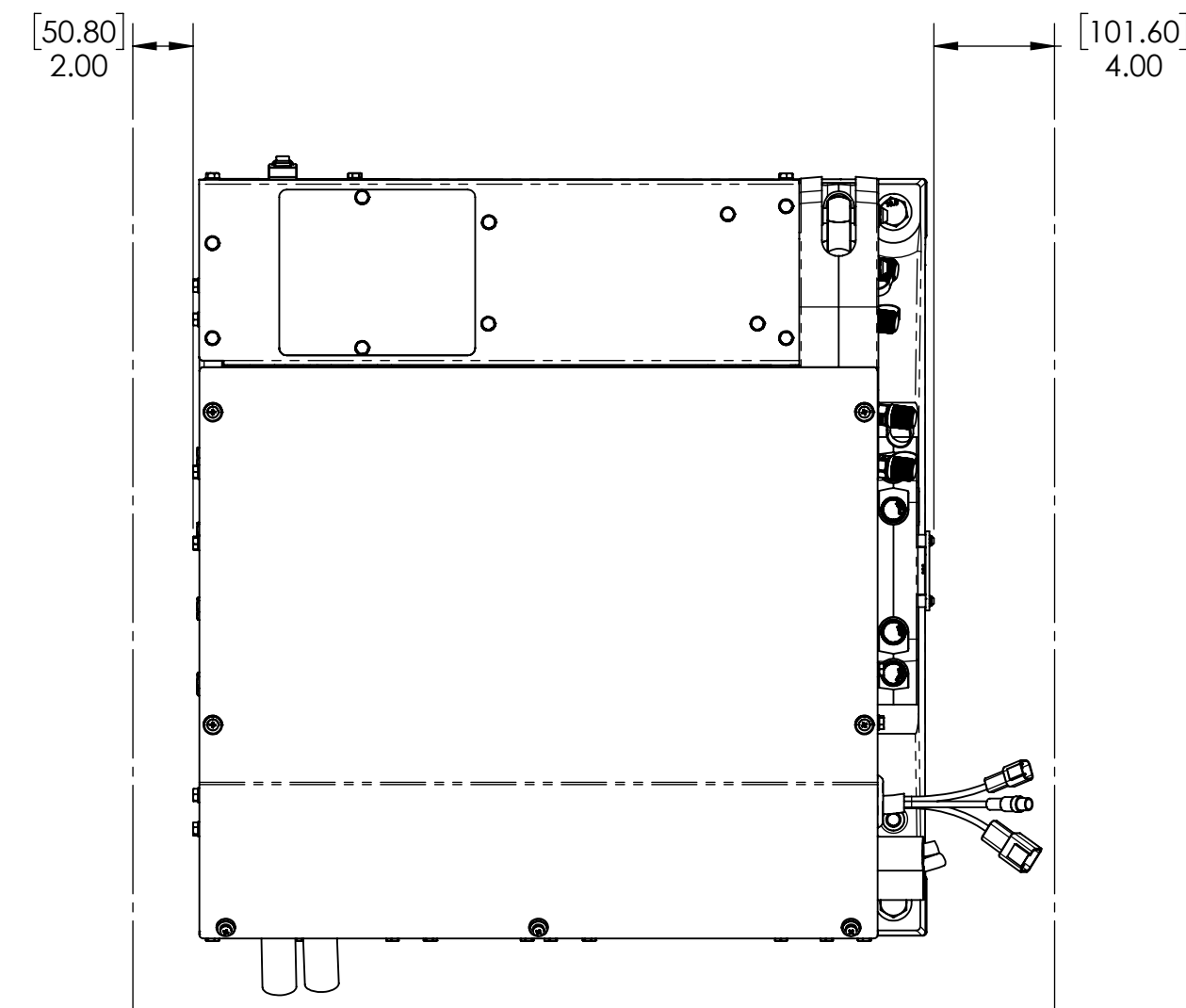
REV. NO. SHEET NO. 1 2 OF 6

DWG NUMBER 11860

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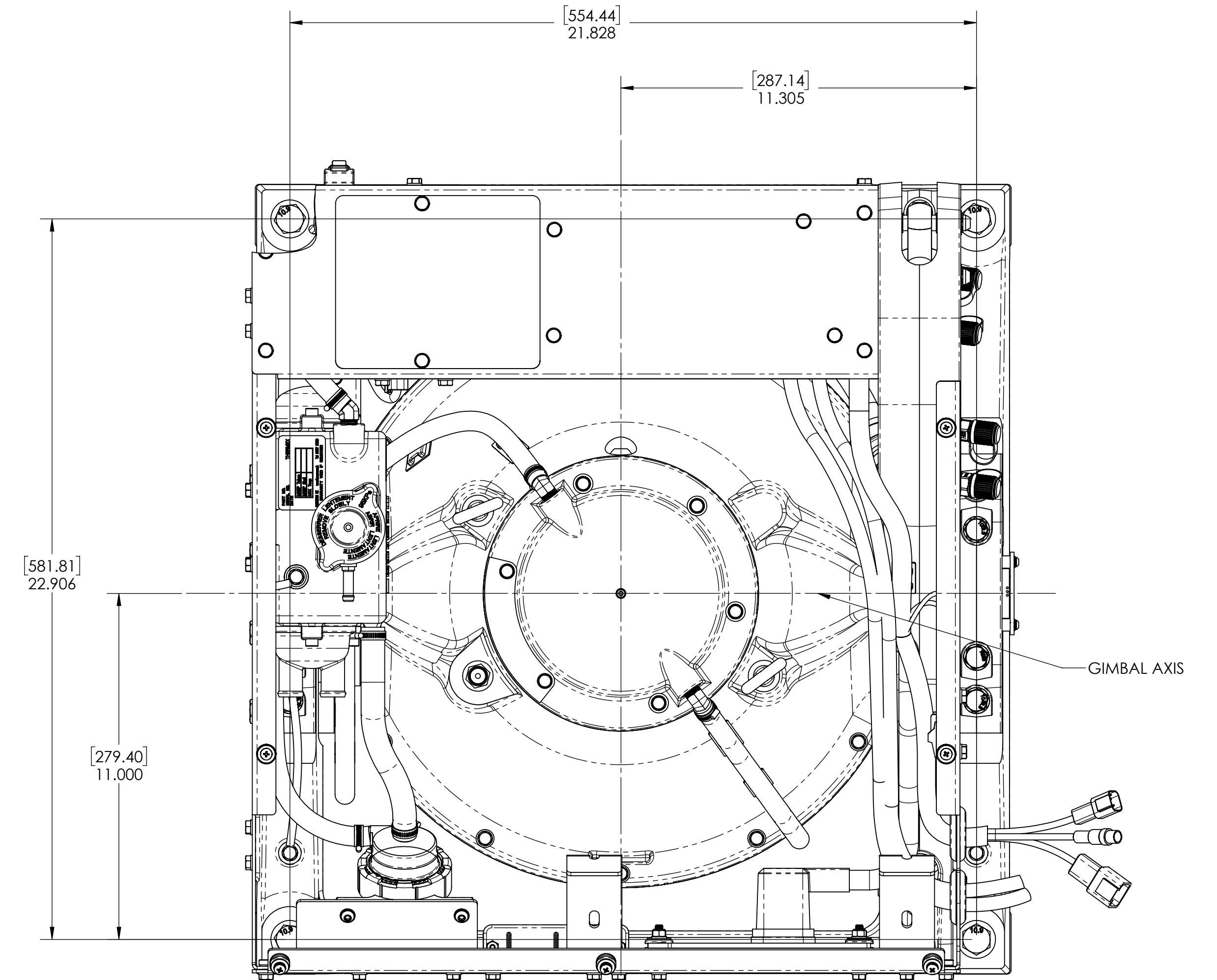
VIEWS SHOWING REQUIRED CLEARANCES AROUND GYRO FOR USE OF HAND TOOLS, EASE OF MAINTENANCE, INSTALLATION AND PROPER OPERATION



MOUNTING BOLT PATTERN/DETAILS

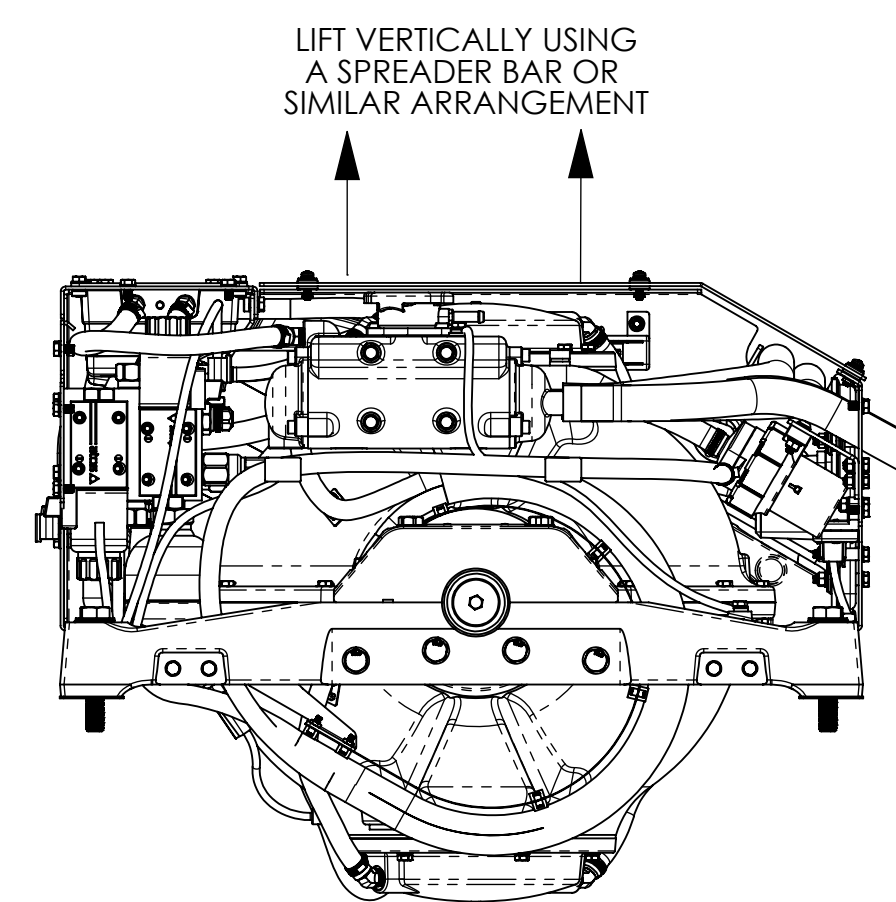
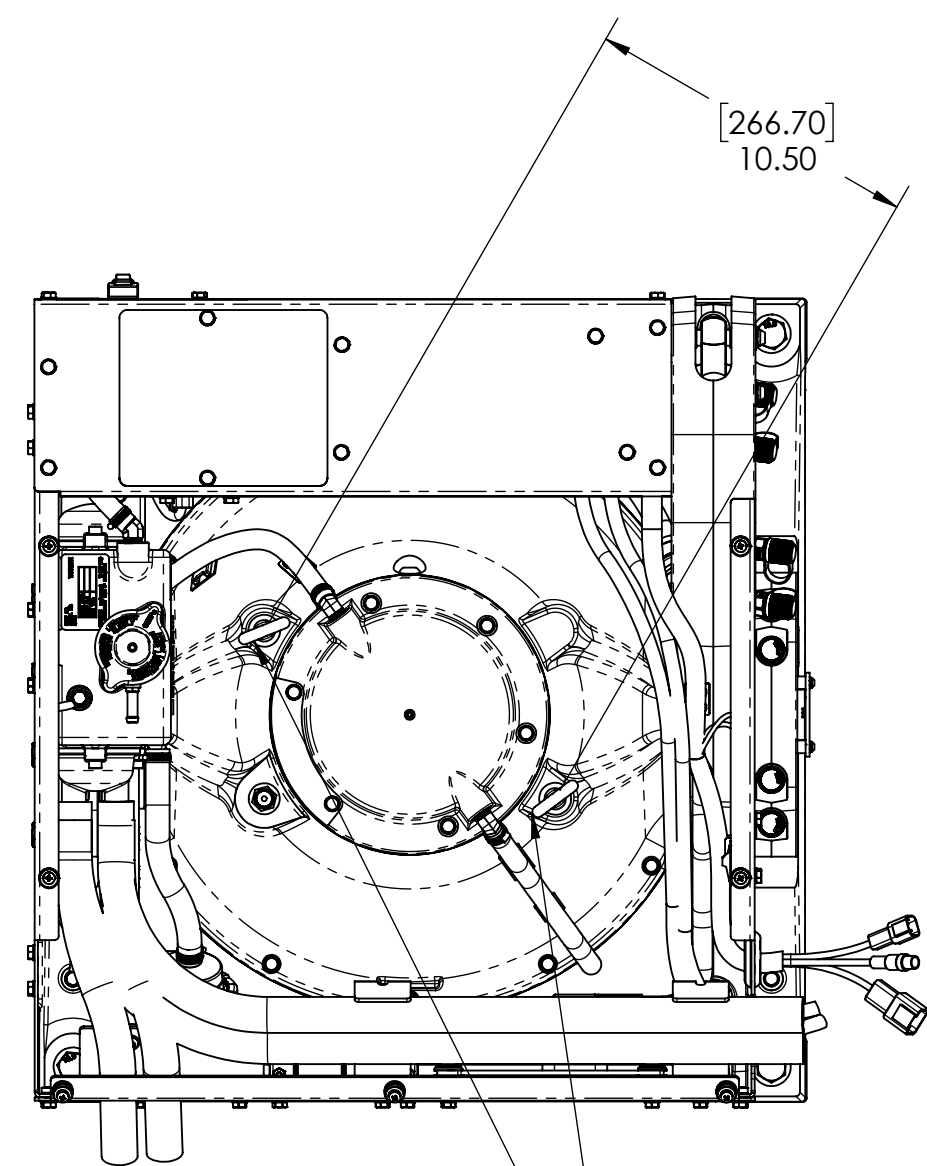
IF SIDE ACCESS IS NOT AVAILABLE TO THE MOUNTING BOLTS; THE MANIFOLD, TOP, AND FACE COVER PANELS MAY BE REMOVED. AN INSTALLATION FIXTURE IS AVAILABLE TO TRANSFER THE SEAKEEPER 2 BOLT PATTERN ON TO THE HULL STRUCTURE. (SEAKEEPER 2 INSTALLATION FIXTURE KIT P/N: 90488)

SEE SHEET 5 FOR HULL STRUCTURE CLEARANCE REQUIREMENTS



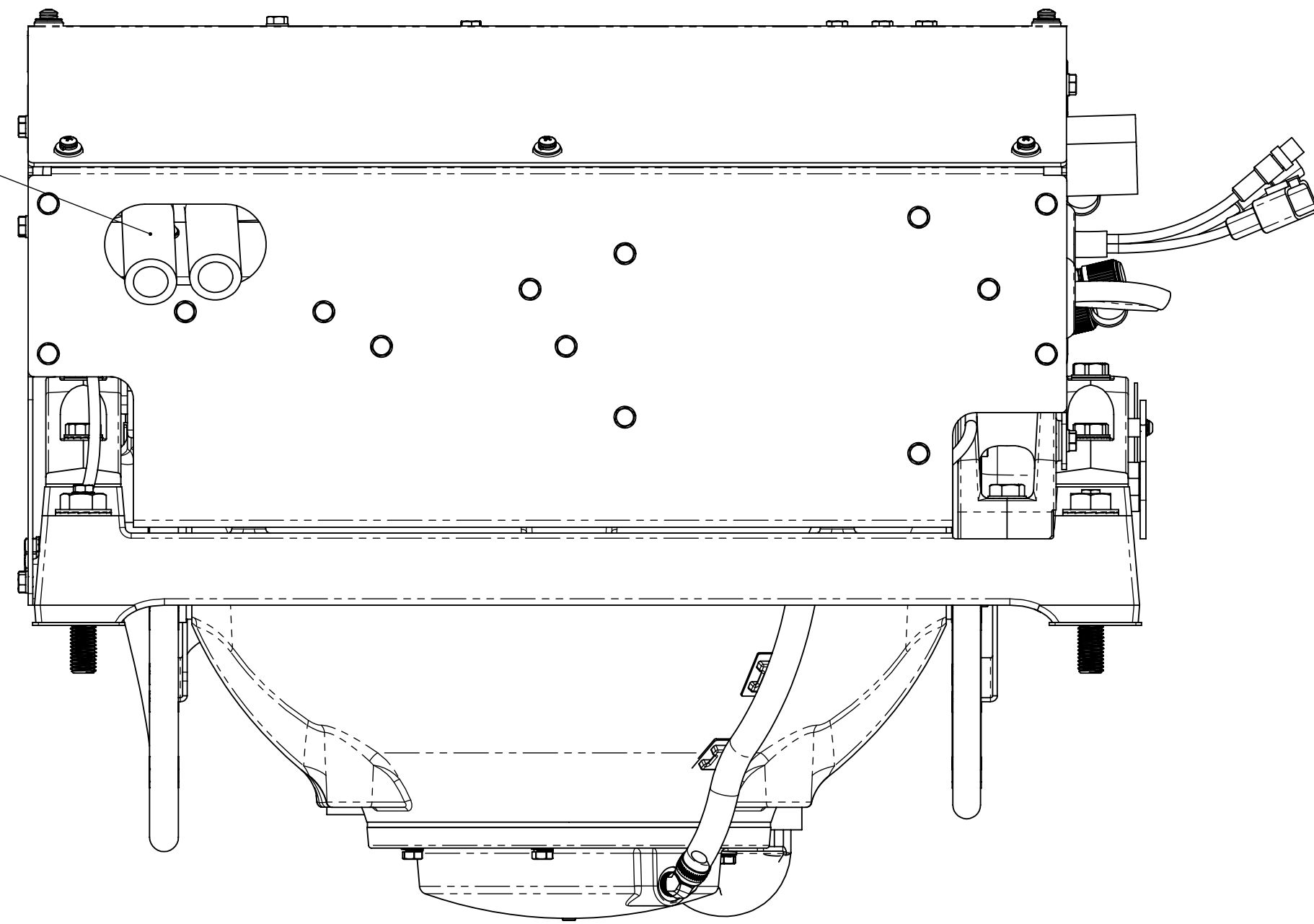
LIFTING DETAILS AND DIMENSIONS

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

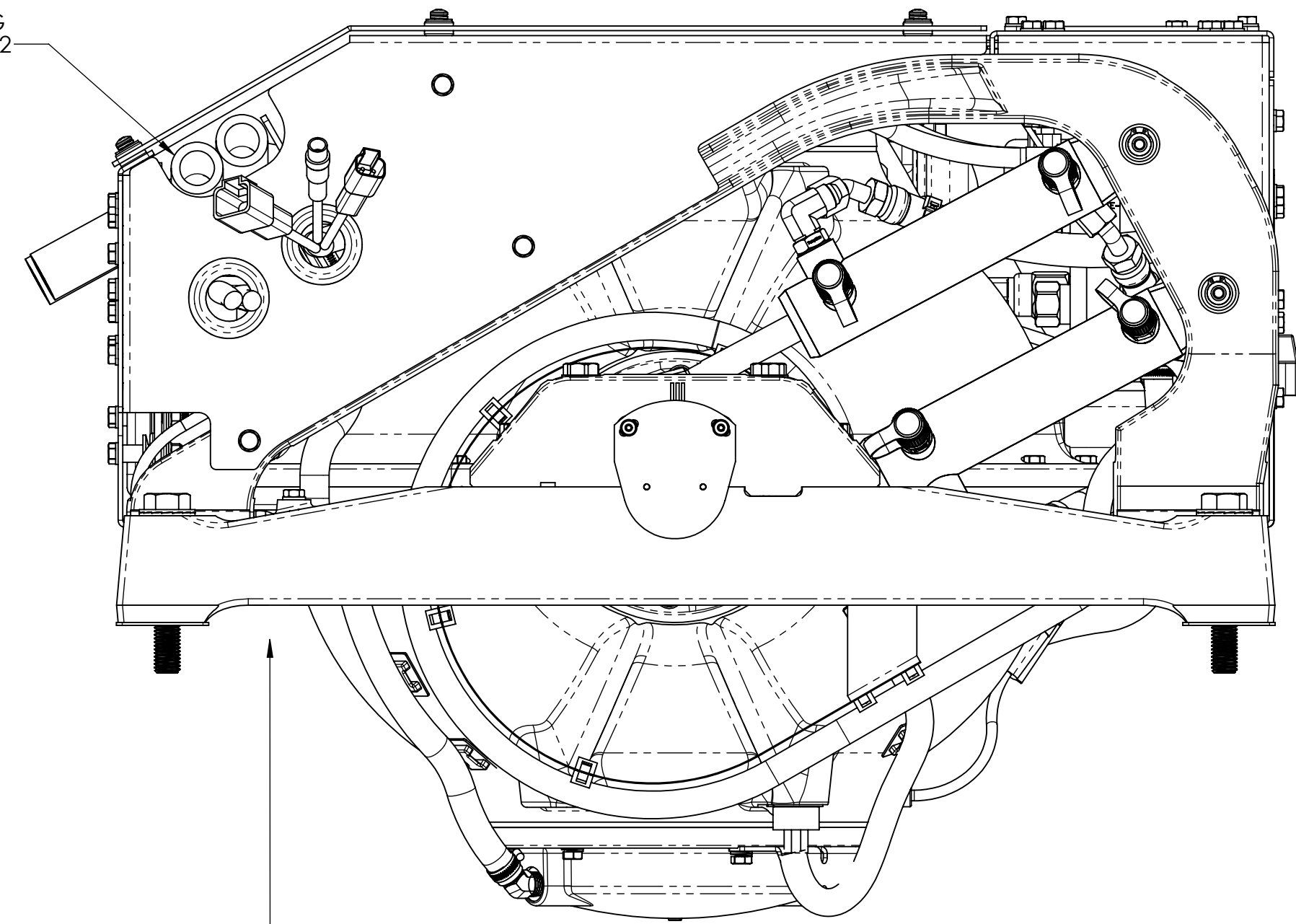


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WEIGHT - LBS: ---	DRAWN: BEN	DATE: 10JAN2018	NAME: SEAKEEPER 2 ENCLOSURE AND GIMBAL SHAFT SUB-SYSTEM
MATERIAL: ---	ENG APPR: ---	DATE: ---	DWG NUMBER: 11860
PROD APPR: ---	DATE: ---	REV. NO: 1	SHEET NO: 3 OF 6

SEAWATER ROUTING
OPTION 1



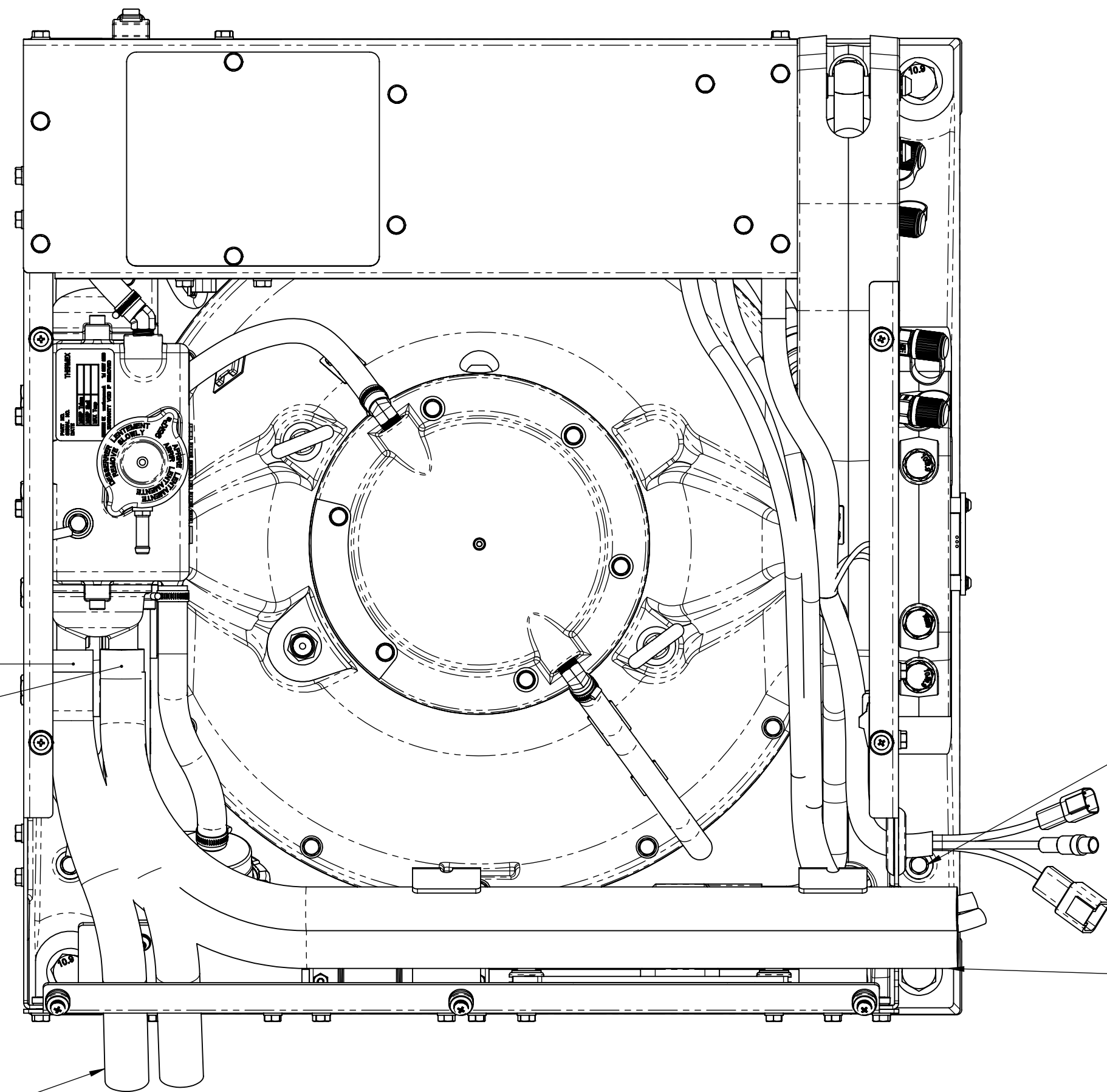
SEAWATER ROUTING
OPTION 2



X
DO NOT
ROUTE SEAWATER HOSES
FROM BOTTOM

SEAWATER IN

SEAWATER OUT



NOTE
M6-1.0 GROUND TERMINATION POINT.
INSTALLER IS RESPONSIBLE FOR PROPERLY
GROUNDING GYRO TO VESSEL.

SEAWATER ROUTING
OPTION 2

- NOTES:
- 1) SEAWATER HOSE CONNECTIONS ARE 3/4 INCH HOSE BARB FITTINGS.
 - 2) THERE ARE 2 HOSE ROUTING OPTIONS RECOMMENDED. USE THE ROUTING THAT WORKS BEST FOR EACH INSTALLATION.
 - 3) DO NOT ROUTE HOSES UP FROM BOTTOM, FROM UNDERNEATH GYRO FOUNDATION.

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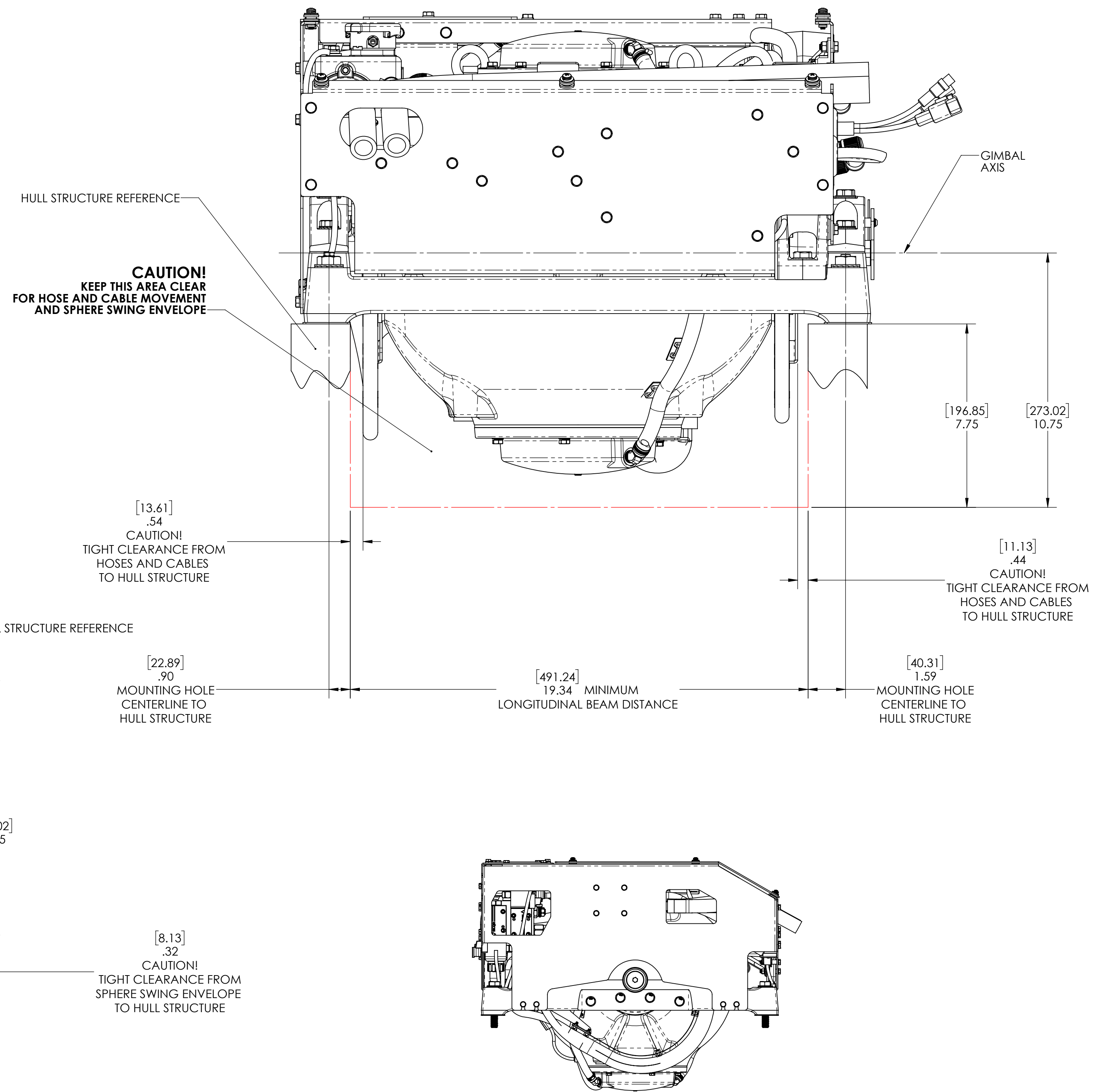
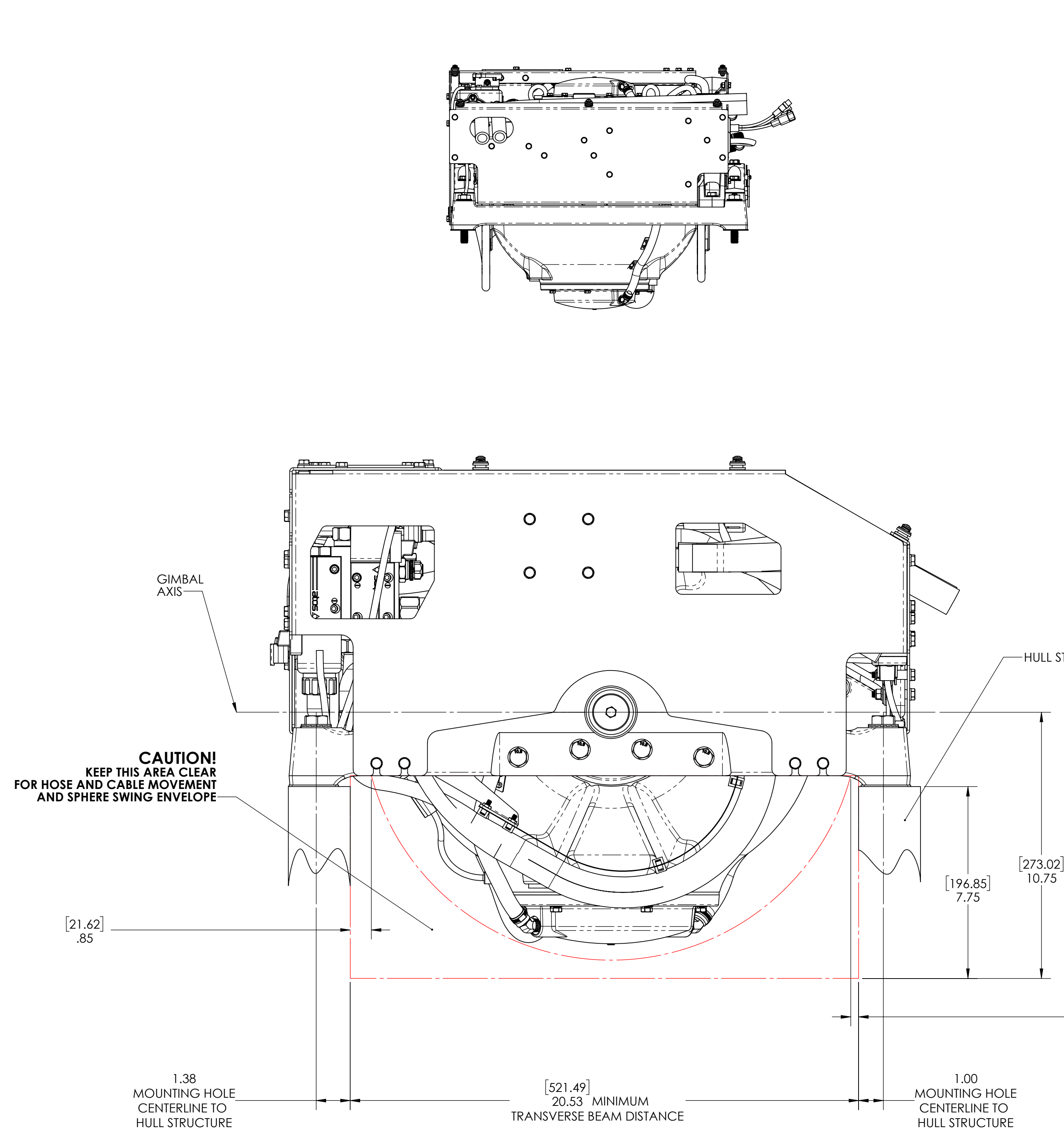


WEIGHT - LBS: ---
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DRAWN: BEN DATE: 10JAN2018
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NAME: SEAKEEPER 2 ENCLOSURE AND
GIMBAL SHAFT SUB-SYSTEM
DWG NUMBER: 11860
REV. NO. SHEET NO.: 1 4 OF 6

OPTION 1: TRANSVERSE BEAM INSTALLION

OPTION 2: LONGITUDINAL BEAM INSTALLION



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SEAKEEPER LOADS FOR HULL STRUCTURE DESIGN :

IF THE SEAKEEPER FOUNDATION IS BOLTED TO A NON-ALUMINUM, METAL HULL STRUCTURE AN ISOLATION GASKET MUST BE USED BETWEEN THE ALUMINUM FRAME AND THE HULL STRUCTURE SURFACE. SEAKEEPER ISOLATION GASKETS ARE INCLUDED IN THE SEAKEEPER 2 BOLT-IN KIT. THE BOLTING SURFACE OF THE HULL STRUCTURE MUST BE FLAT SO THAT THE 4 CONTACT POINTS OF THE GYRO FRAME ARE TOUCHING THE HULL STRUCTURE SIMULTANEOUSLY WITH NO NOTICEABLE ROCKING. THE BOAT BUILDER OR GYRO INSTALLER IS RESPONSIBLE TO DESIGN AND BUILD A HULL STRUCTURE THAT WILL ENSURE A FLAT BOLT SURFACE AS TO AVOID ANY INDUCED STRESSES INTO THE FRAME CASTING ONCE BOLTED DOWN. SEAKEEPER RECOMMENDS A SURFACE FLATNESS WITHIN 1.5 MILLIMETERS.

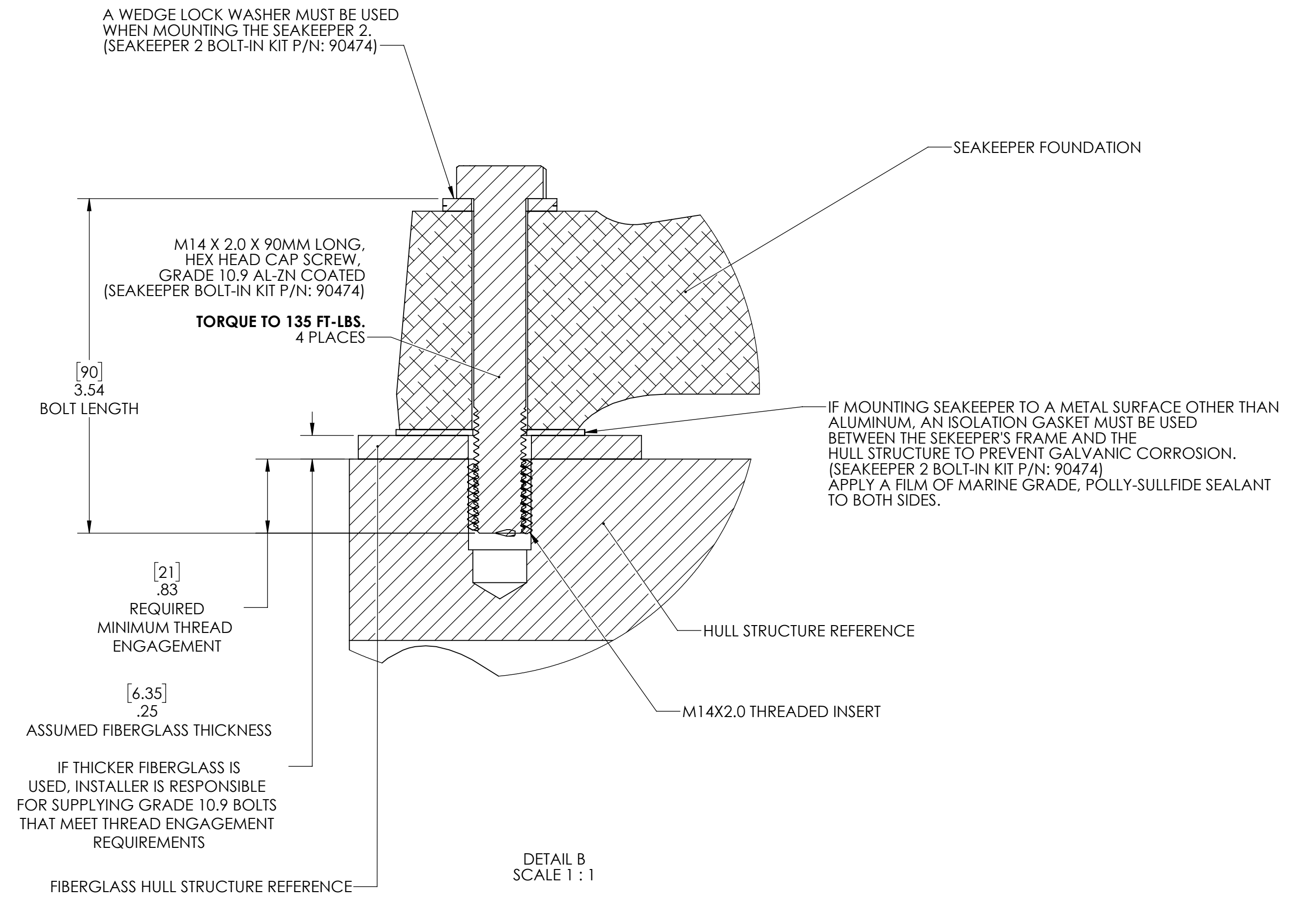
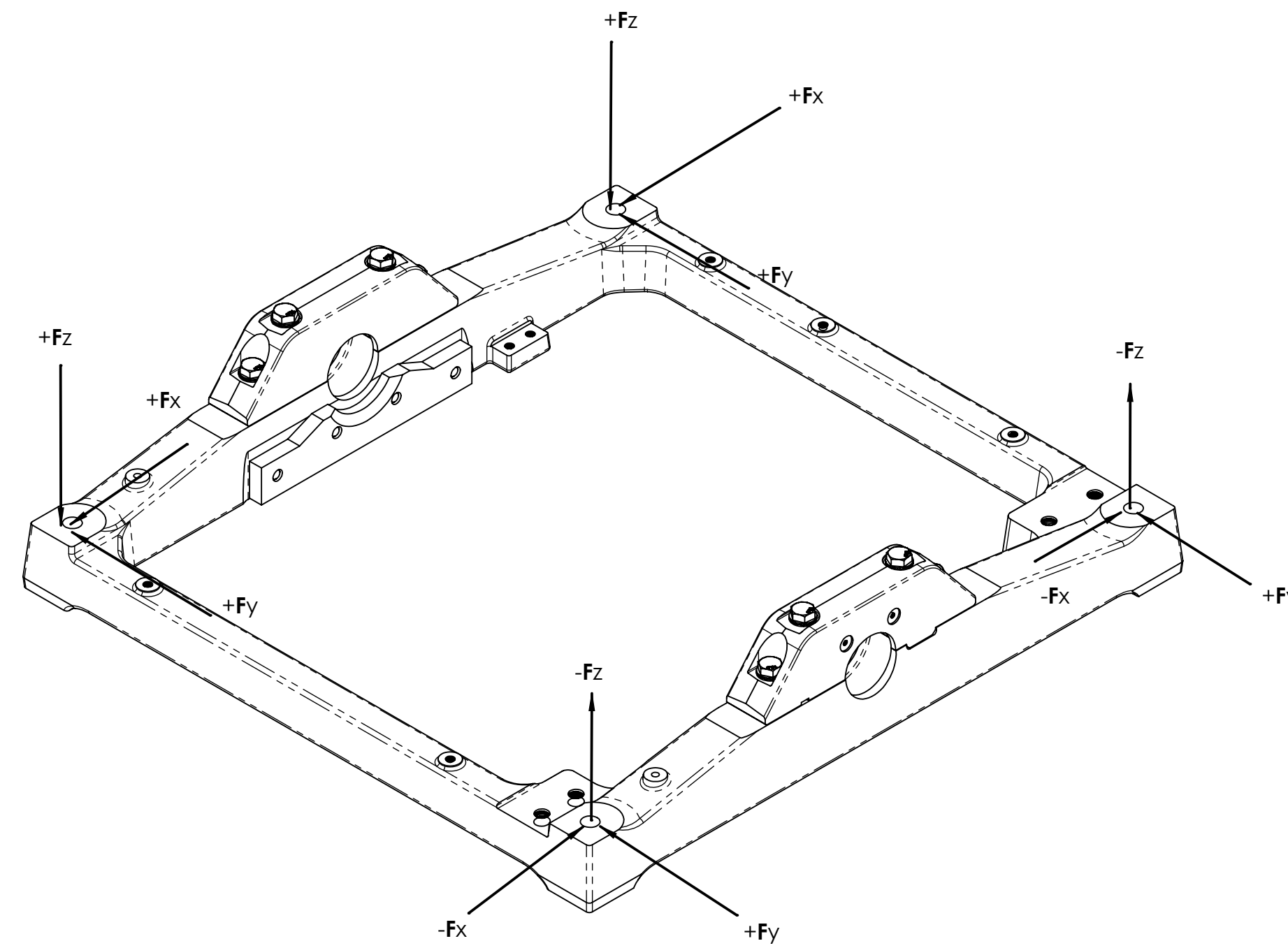
THE SEAKEEPER GENERATES PITCH MOMENTS, ROLL MOMENTS, YAW MOMENTS, AND VERTICAL AND HORIZONTAL FORCES - THE MAGNITUDE OF WHICH IS CONTROLLED BY THE GYRO'S ACTIVE BRAKE SYSTEM. THESE GYRO GENERATED FORCES AND MOMENTS RESULT IN LOADS BEING APPLIED AT THE FOUR POINTS WHERE THE GYRO FRAME BOLTS TO THE TOP FACE OF THE HULL STRUCTURE. THE RESULTANT FORCES AT THESE POINTS ARE ILLUSTRATED ON THE ADJACENT FIGURE AND THE VALUES TO BE USED FOR HULL STRUCTURE DESIGN ARE SUMMARIZED BELOW:

VERTICAL FORCE (Fz) = 1459 lbs (6.49 kN)
 LONGITUDINAL FORCE (Fx) = 963 lbs (4.3 kN)
 LATERAL FORCE (Fy) = 100 lbs (0.45 kN)

THESE FORCES SHOULD BE CONSIDERED TO BE ACTING SIMULTANEOUSLY, FULLY REVERSING IN BOTH DIRECTIONS, AND WILL REPEAT AN INFINITE NUMBER OF TIMES. THESE FORCES DO NOT INCLUDE VESSEL MOTION ACCELERATIONS INCLUDING VERTICAL SLAM LOADS WHICH CAN BE HIGH FOR HIGHER SPEED VESSELS.

THE BOAT BUILDER OR THE GYRO INSTALLER IS RESPONSIBLE FOR DESIGNING THE HULL STRUCTURE TO WHICH THE GYRO IS ATTACHED TO ACCOMMODATE THE ABOVE FORCES AND MOMENTS PLUS A REASONABLE FACTOR OF SAFETY. SEAKEEPER SUGGESTS A SAFETY FACTOR OF 3.0 (YIELDING A SAFETY MARGIN OF 2.0). THIS FACTOR OF SAFETY MAY NEED TO BE INCREASED DEPENDING ON THE OPERATIONAL PROFILE OF THE VESSEL IN WHICH THE GYRO IS TO BE INSTALLED.

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