NOTES:
1) SEE REFERENCES 1 THROUGH 6 FOR RELATED INSTALLATION MANUAL AND ELECTRICAL / ELECTRONIC AND COOLING CIRCUIT DRAWINGS.

2) GYRO ASSEMBLY WEIGHT = 870 LBS (395KG)

3) REFERENCE 90397 SEAKEEPER COOLING WATER SCHEMATIC FOR COOLING SYSTEM REQUIREMENTS.

4) TWO LIFTING EYES ARE PROVIDED ON THE TOP OF THE GYRO SPHERE FOR USE WITH A CHAIN/SPREADER BAR (SEE SHEET 4) TOP COVER MUST BE REMOVED TO ACCESS LIFTING EYES.

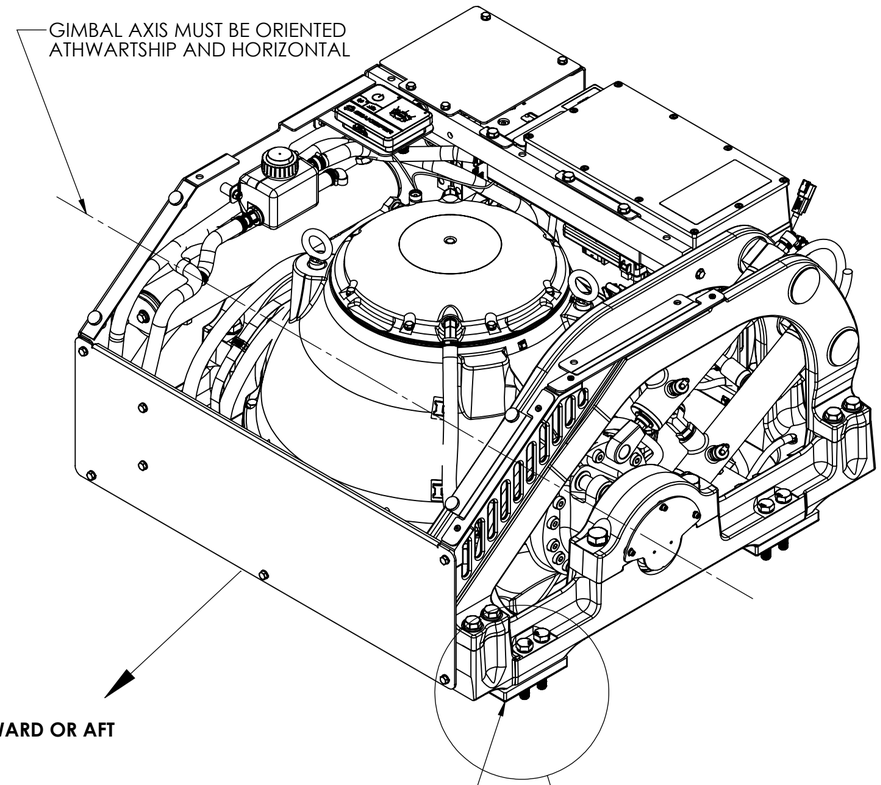
5) COVERS ARE PROVIDED TO PREVENT PERSONNEL OR EQUIPMENT ENTANGLEMENT WHILE GYRO IS IN OPERATION. THESE COVERS ARE NOT TO BE STOOD ON OR TO HAVE ANYTHING STORED ON TOP OF. SEAKEEPER RECOMMENDS THE COVERS TO ALWAYS BE IN PLACE DURING OPERATION.

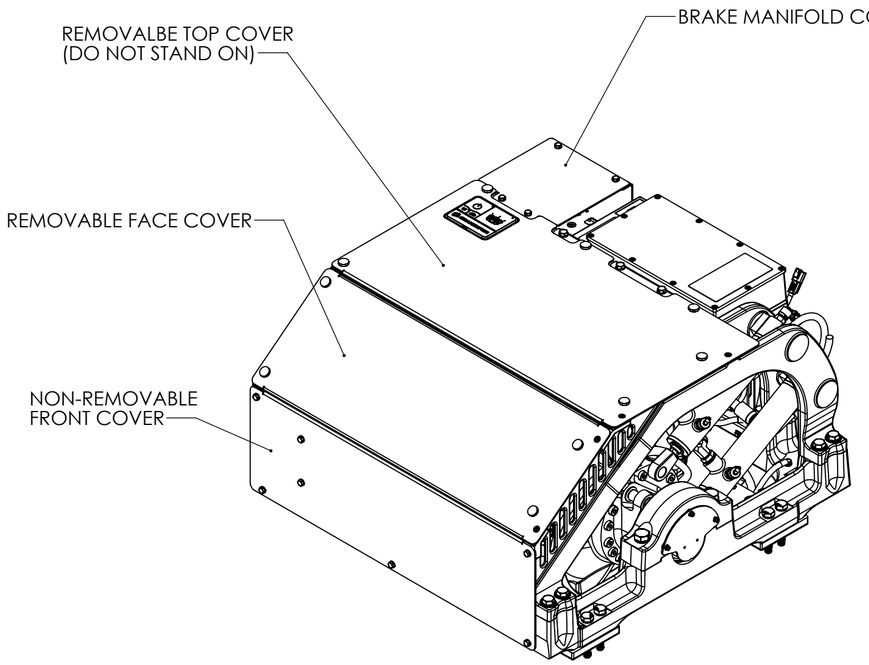
6) THE GYRO MUST BE INSTALLED AFT OF AMIDSHIP TO MINIMIZE HIGH ACCELERATION LOADING DUE TO HULL/WAVE IMPACTS DURING OPERATION AT HIGH SPEED OR IN LARGE WAVES. GYRO DOES NOT NEED TO BE MOUNTED ON CENTERLINE OF KEEL. GYRO SUPPORT STRUCTURE MUST BE PARALLEL TO VESSEL WATERLINE.

7) GYRO MAY BE INSTALLED FACING FORWARD OR AFT AS SHOWN. GYRO ORIENTATION SHOULD BE SELECTED TO PROVIDE THE MOST ACCESSIBILITY FOR FUTURE SERVICE AND MAINTENANCE. INSTALLATION, START-UP, AND OPERATION IS THE SAME REGARDLESS OF GYRO ORIENTATION.

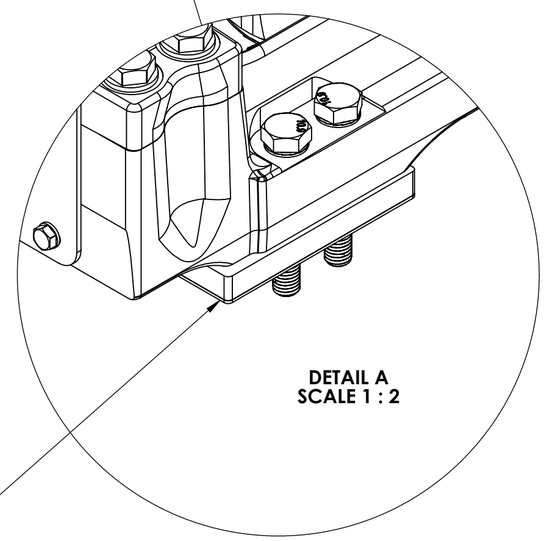
8) WHEN INSTALLING GYRO SEAKEEPER RECOMMENDS USING A BOLT HOLE LOCATION FIXTURE #90392 AVAILABLE FROM SEAKEEPER. THIS FIXTURE WILL PROPERLY SPACE AND LOCATE HOLES TO BE DRILLED IN HULL STRUCTURE FOR BOLT-IN OF GYRO FOUNDATION. SEE INSTALLATION MANUAL FOR DETAILS OF INSTALLATION PROCESS.

REV NO.	ECN NO.	ZONE	DESCRIPTION	DATE	APPRVD.
2			DRAWING VIEWS ROTATED	8/10/2017	WHK
3	612		ADDED 5HD TO DESCRIPTION	7/26/2018	BRD
4	765		SK5 RELAUNCH TITLE BLOCKS	6/25/2019	AVM
5	908	ALL SHT 1 SHT 1 SHT 5	SK 5/6 CBRO UPDATES DEL REF 6 90438 ADDED ITEM 6: 90488 ADDED THRU BOLT VIEW	12/2/2021	ZGY





SEE SHEET 5 FOR LOADING FORCES AND OTHER RECOMMENDATIONS FOR ATTACHING GYRO TO HULL STRUCTURE

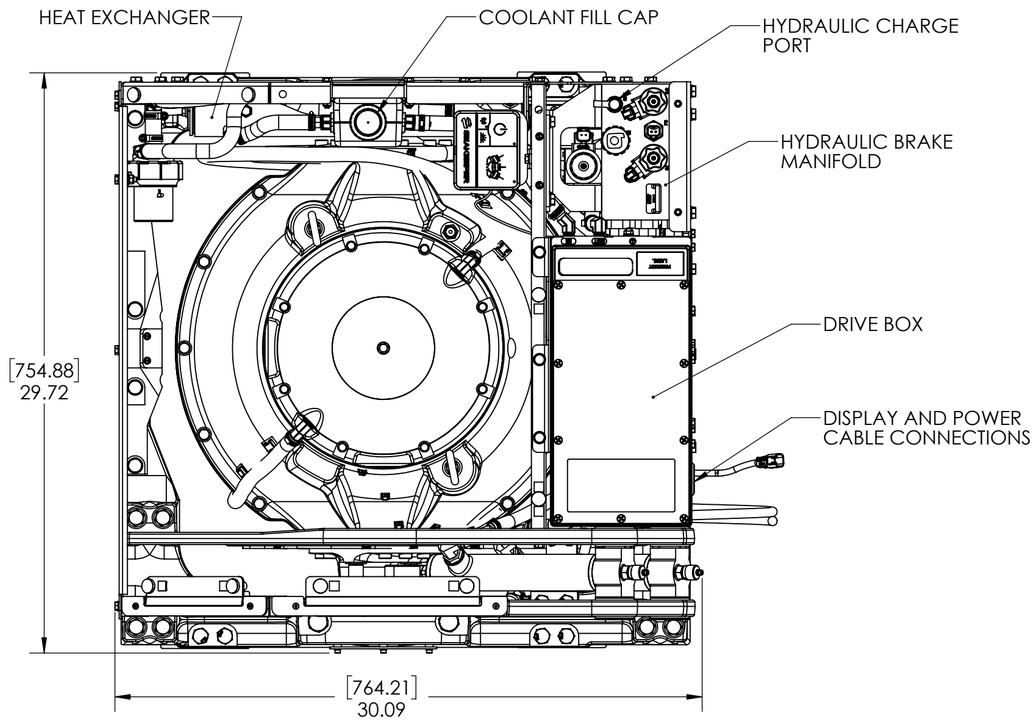


WHEN ATTACHING GYRO DIRECTLY TO ANY STRUCTURE,
(4) FOUNDATION SPACERS (#11241) ARE PROVIDED TO GO BETWEEN GYRO FRAME AND HULL STRUCTURE. THESE WILL PROVIDE CLEARANCE FOR THE MOVING PARTS OF THE GYRO.
WHEN MOUNTING TO A NON-ALUMINUM, METAL STRUCTURE
(4) ISOLATION GASKETS (#11145) MUST BE USED BETWEEN THE FOUNDATION SPACER AND THE HULL STRUCTURE TO PREVENT DISSIMILAR METAL TO METAL CORROSION.
APPLY THIN FILM OF MARINE GRADE POLY-SULFIDE SEALANT TO ALL MATING SURFACES OF GASKET AND SPACER TO SEAL OUT SEAWATER.

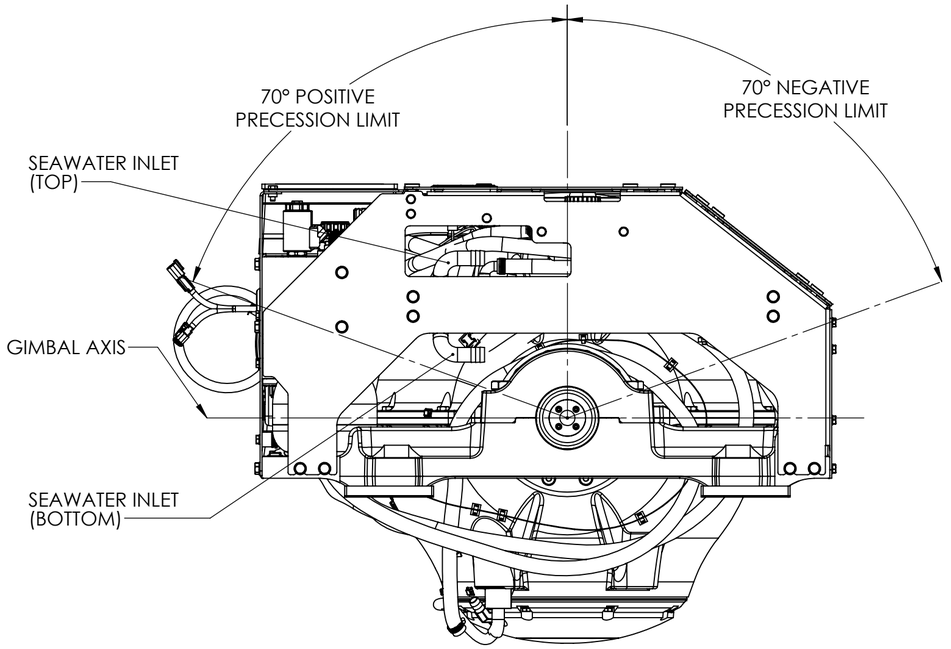
REF.	DWG NO.	DWG. TITLE
1	90397	SEAKEEPER 6 COOLING WATER SCHEMATIC
2	90396	SEAKEEPER 6 CABLE BLOCK DIAGRAM
3	90392	SEAKEEPER 6 INSTALLATION FIXTURE KIT
4	90402	SEAKEEPER 6 INSTALLATION MANUAL
5	90400	SEAKEEPER 6 BOLT-IN KIT
6	90488	SEAKEEPER 6 GENERIC INSTALLATION GUIDE

SEAKEEPER®
Seakeeper Inc. 45310 Abell House Lane, Suite 350 California, MD 20619

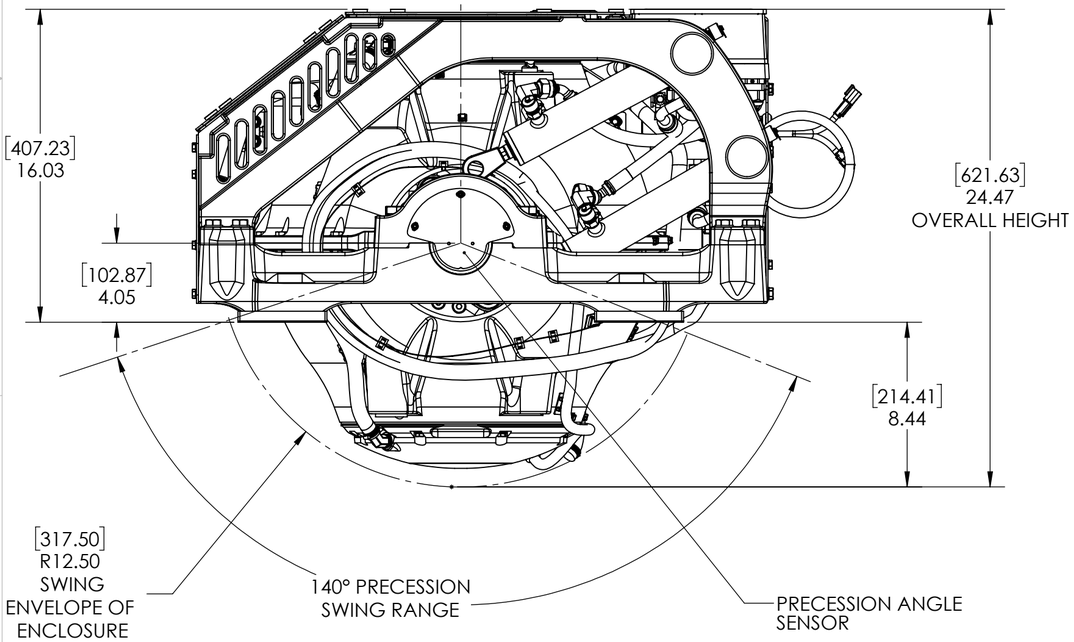
WEIGHT - LBS : ---
MATERIAL: ---
DRAWN: WHK DATE: 01JUL2016
ENG APPR: ZGY DATE: 12DEC2021
PROD APPR: DATE:
NAME: SEAKEEPER 5/6 BOLT IN INSTALLATION
DWG NUMBER: 90398
REV. NO.: 5
SHEET NO.: 1 OF 5

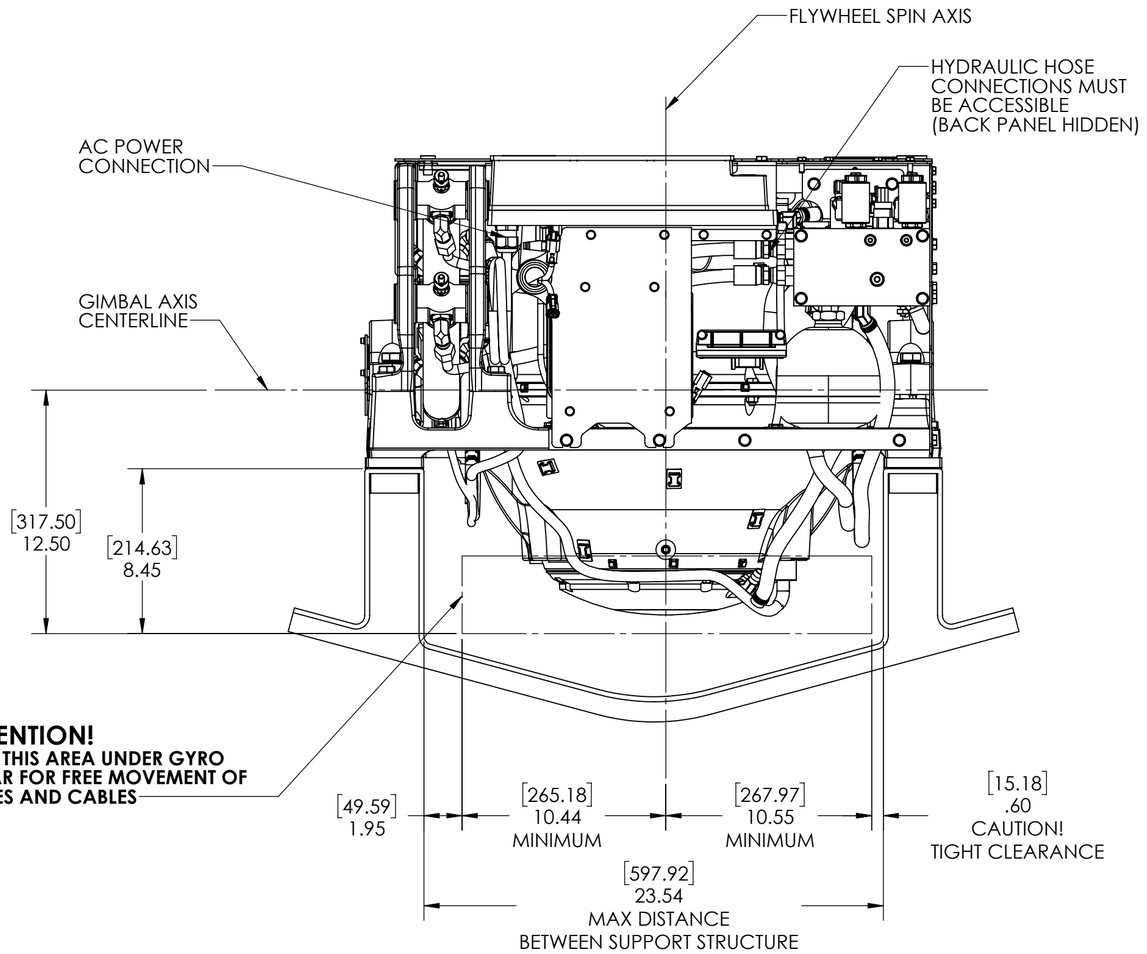


TOP VIEW



NON-BRAKE SIDE VIEW



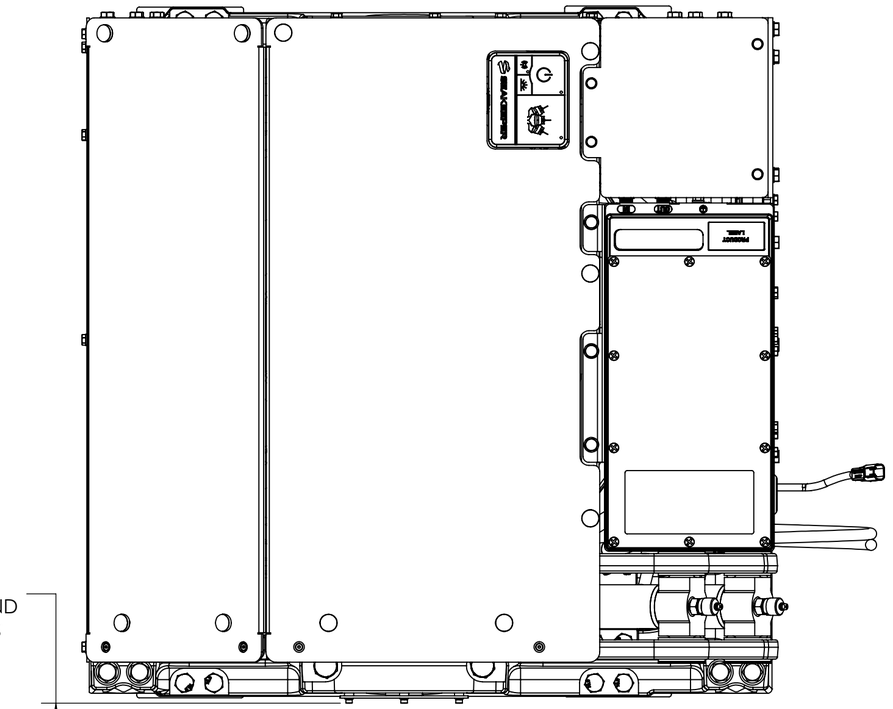


ATTENTION!
KEEP THIS AREA UNDER GYRO CLEAR FOR FREE MOVEMENT OF HOSES AND CABLES

SEAKEEPER
Seakeeper Inc. 45310 Abell House Lane, Suite 350 California, MD 20619

WEIGHT - LBS : ---	NAME: SEAKEEPER 5/6 BOLT IN INSTALLATION		
MATERIAL: ---	DRAWN: WHK	DATE: 01JUL2016	
	ENG APPR: ZGY	DATE: 12DEC2021	
	PROD APPR:	DATE:	
	DWG NUMBER: **90398**	REV. NO.: **5**	SHEET NO.: 2 OF 5

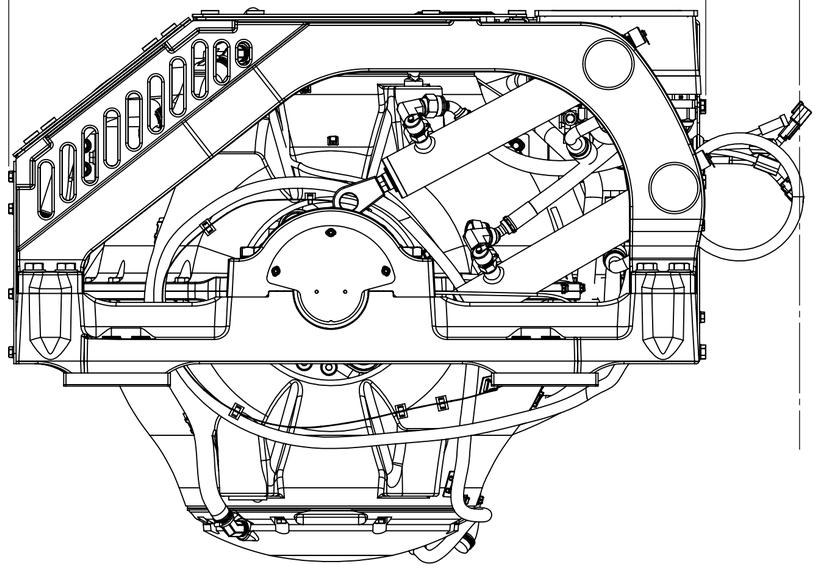
VIEWS SHOWING REQUIRED CLEARANCES AROUND GYRO FOR USE OF HAND TOOLS, EASE OF MAINTENANCE, AND INSTALLATION.



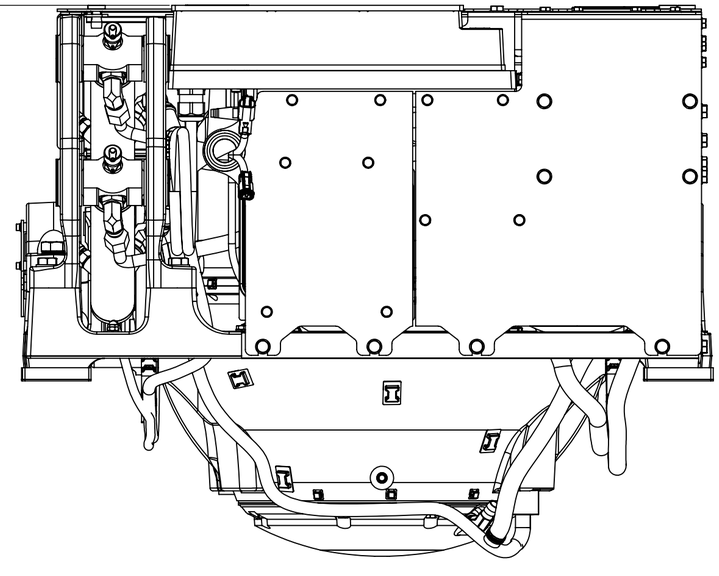
[101.60]
4.00
MINIMUM REQUIRED
DISTANCE FOR TOOL AND
SERVICE CLEARANCES
BOTH SIDES

[50.80]
2.00
MINIMUM REQUIRED
DISTANCE FOR TOOL AND
SERVICE CLEARANCES.

[101.60]
4.00
MINIMUM REQUIRED
DISTANCE FOR TOOL AND
SERVICE CLEARANCES.



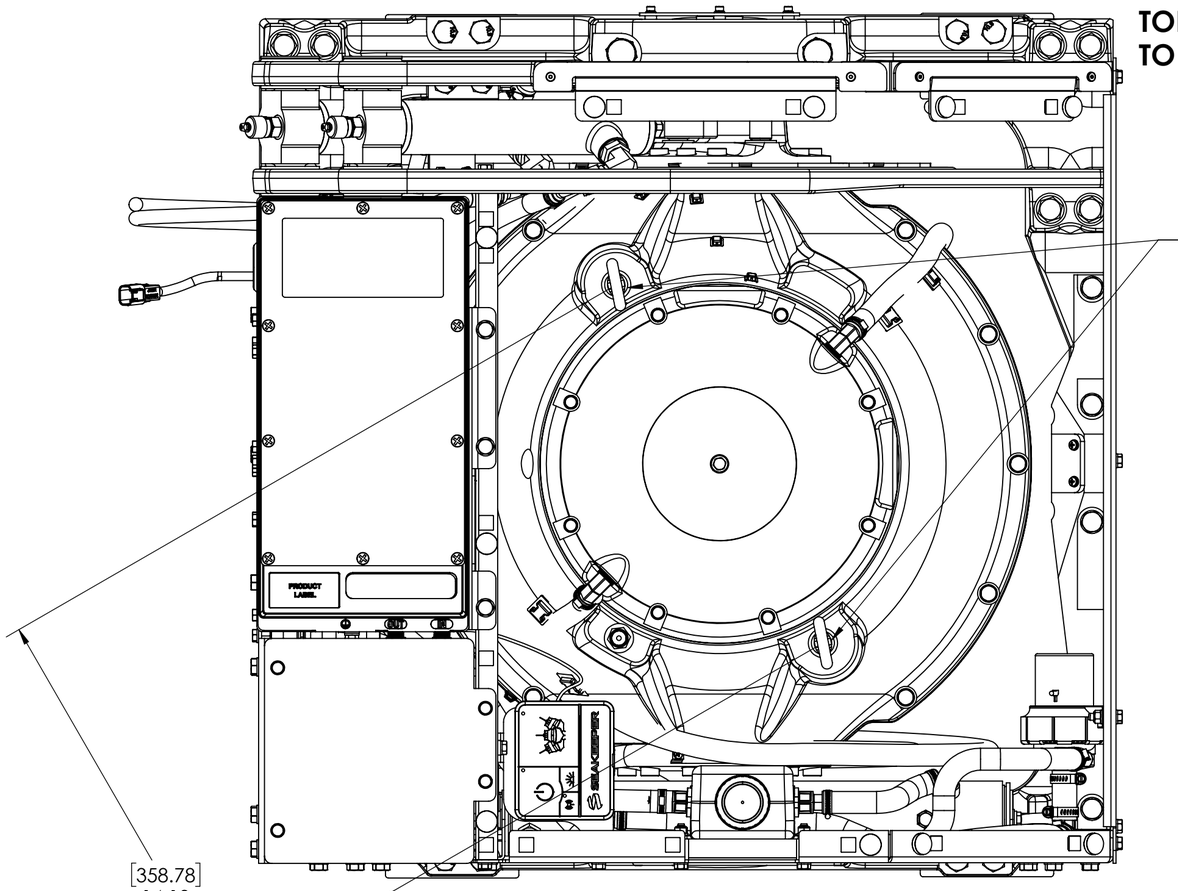
[76.20]
3.00
MINIMUM REQUIRED
DISTANCE FOR TOOL AND
SERVICE CLEARANCES.



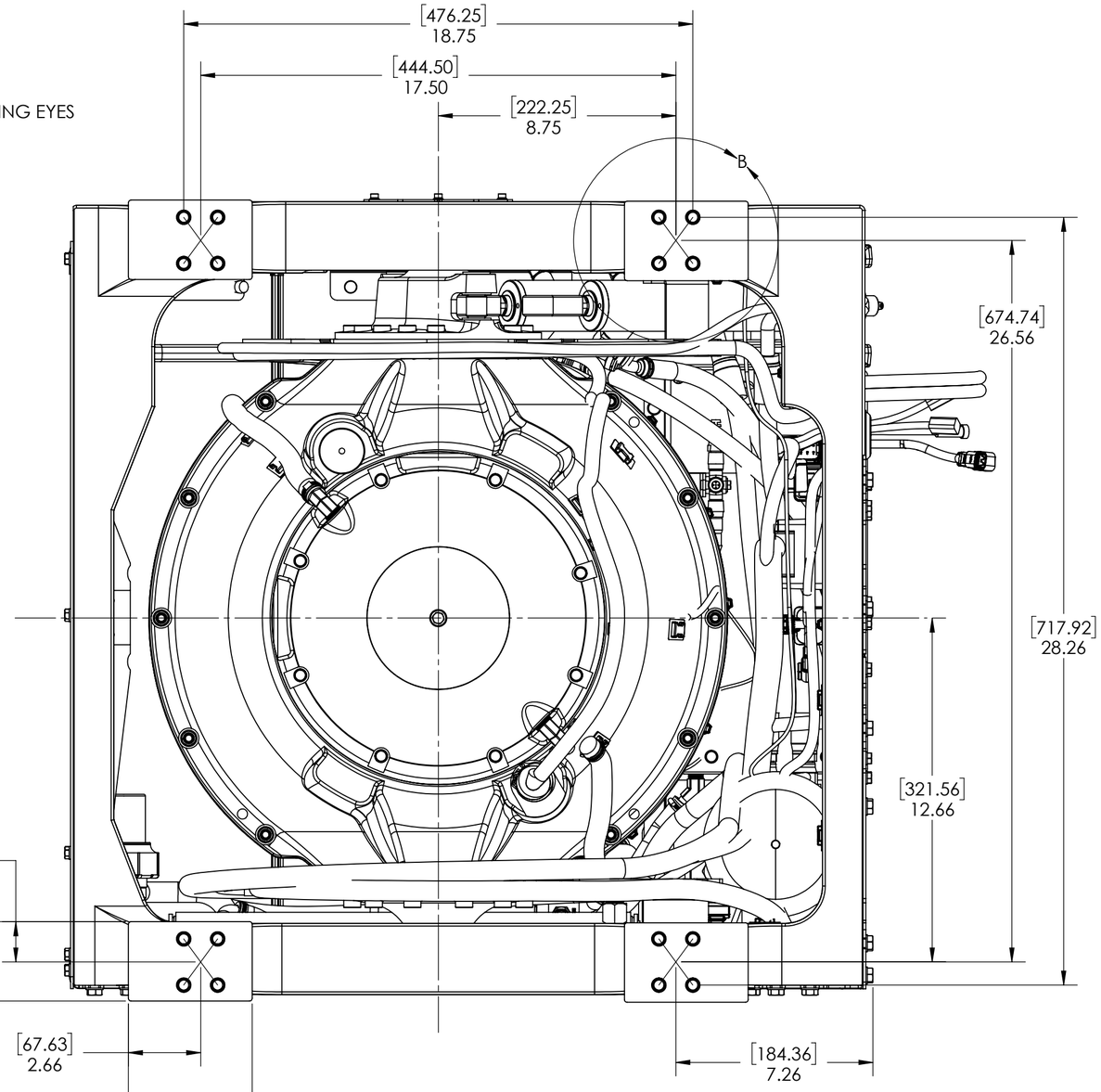
SEAKEEPER
Seakeeper Inc. 45310 Abell House Lane, Suite 350 California, MD 20619

WEIGHT - LBS : ---	NAME: SEAKEEPER 5/6 BOLT IN INSTALLATION		
MATERIAL: ---	DRAWN: WHK	DATE: 01JUL2016	
	ENG APPR: ZGY	DATE: 12DEC2021	
	PROD APPR:	DATE:	
	DWG NUMBER: 90398	REV. NO: 5	SHEET NO.: 3 OF 5

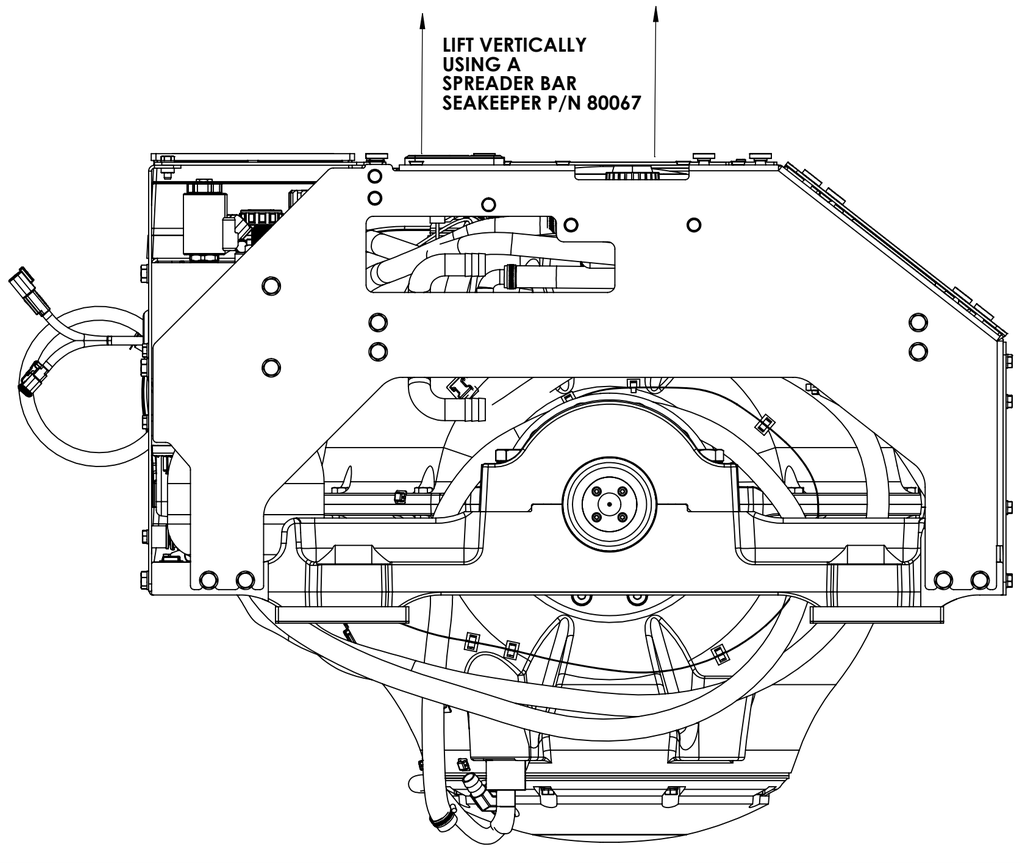
TOP DOWN ACCESS MUST BE INCORPORATED INTO THE INSTALLATION DESIGN TO ALLOW FOR ADEQUATE REGULAR MAINTENANCE, SERVICE, AND REPAIR OF COMPONENTS



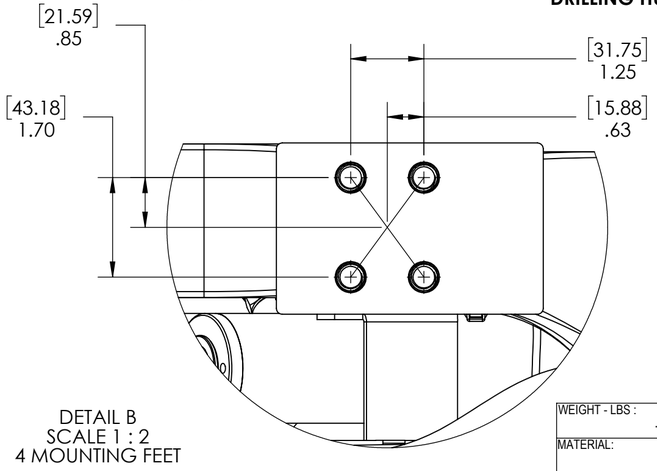
CAUTION: ALWAYS USE A MINIMUM OF 2 LIFTING POINTS.
NEVER LIFT A GYRO FROM ONLY ONE LIFT POINT.



LIFT VERTICALLY USING A SPREADER BAR SEAKEEPER P/N 80067



SEAKEEPER RECOMMENDS BUILDER/INSTALLER USING INSTALLATION FIXTURE #90392 AVAILABLE FROM SEAKEEPER TO LOCATE BOLT HOLE POSITIONS WHEN DRILLING HULL STRUCTURE.



DETAIL B
SCALE 1 : 2
4 MOUNTING FEET

WEIGHT - LBS : ---		
MATERIAL: ---	DRAWN: WHK	DATE: 01JUL2016
	ENG APPR: ZGY	DATE: 12DEC2021
	PROD APPR:	DATE:

SEAKEEPER

Seakeeper Inc. 45310 Abell House Lane, Suite 350 California, MD 20619

NAME: SEAKEEPER 5/6 BOLT IN INSTALLATION

DWG NUMBER	REV. NO.	SHEET NO.
90398	5	4 OF 5

GYRO LOADS FOR HULL STRUCTURE DESIGN :

THE GYRO IS MOUNTED IN A RIGID FOUNDATION FRAME WHICH INCORPORATES SEMI-ELASTIC ANTI-VIBRATION ISOLATORS ENCASING THE GIMBAL BEARINGS THAT DAMPEN VIBRATIONS THAT COULD TRANSMIT INTO THE HULL STRUCTURE.

IF THE GYRO 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 5-6 BOLT-IN KIT P/N: 90400 AND THE SEAKEEPER 5-6 THRU-BOLT KIT P/N: 90660.
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.

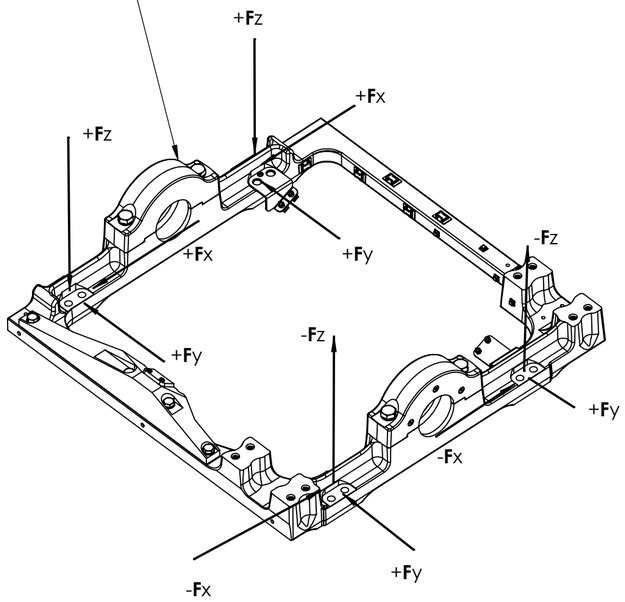
THE GYRO GENERATES PITCH MOMENTS, ROLL MOMENTS, YAW MOMENTS, AND VERTICAL AND HORIZONTAL FORCES - THE MAGNITUDE OF WHICH IS CONTROLLED BY THE GYRO'S ACTIVE BRAKE SYSTEM. THESE GYRO GENERATED FORCES AND MOMENTS RESULT IN LOADS BEING APPLIED AT THE FOUR POINTS WHERE THE GYRO FRAME BOLTS TO THE TOP FACE 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) =3820 lbs (17.0 kN)
LONGITUDINAL FORCE (Fx) = 2335 lbs (10.4 kN)
LATERAL FORCE (Fy) = 209 lbs (0.93 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.

5 THE GYRO FRAME IS BOLTED TO HULL STRUCTURE USING M12X1.75 ZI-NI PLTD STEEL, HEX HEAD CAP SCREWS, GRADE 10.9, 16 PLACES.
RECOMMENDED TORQUE VALUE = 95 FT/LBS (129 Nm) USING REMOVABLE THREAD LOCKER ON BOLT THREADS AND MARINE SEALANT UNDER FLAT WASHERS.

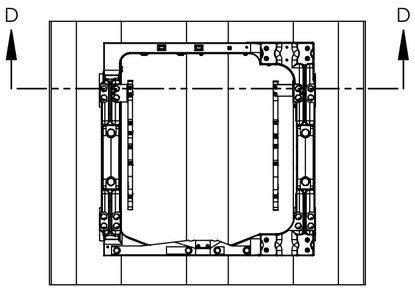


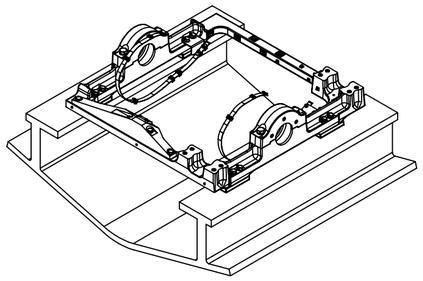
NOTIONAL METAL STRUCTURE, THROUGH-BOLT INSTALLATION

5

STRUCTURE SHOWN BELOW IS FOR REFERENCE PURPOSE ONLY
APPLY MARINE GRADE SEALANT UNDER BOLT HEADS AND WASHERS.
APPLY NICKEL-BASE ANTI-SEIZE TO THREADS, TORQUE TO 95 FT-LBS (129 N-M).

USE P/N 90660, SEAKEEPER 5-6 THRU-BOLT KIT





P/N 60845, M12-1.75 X 100MM LONG
HEX HEAD CAP SCREW, GRADE 10.9 Zn-Ni PLATED
TORQUE TO 95 FT-LBS.
4 PLACES

P/N 11241. FOUNDATION SPACER
APPLY THIN FILM OF MARINE GRADE, POLY-SULFIDE SEALANT TO BOTH SIDES

IF MOUNTING SEAKEEPER TO A METAL SURFACE OTHER THAN ALUMINUM, P/N 11145, ISOLATION GASKET MUST BE USED BETWEEN THE SEAKEEPER'S FRAME AND THE HULL STRUCTION TO PREVENT GALVANIC CORROSION. APPLY A FILM OF MARINE GRADE, POLLY-SULFIDE SEALANT TO BOTH SIDES.

P/N 60844
WEDGELOCK WASHER M12
MUST BE USED WHEN MOUNTING

[37.15]
1.46
SEAKEEPER
FOUNDATION

[12.70]
.50
FOUNDATION
SPACER

[100]
3.94
BOLT LENGTH

1.15
MAX FLANGE THICKNESS

HULL STRUCTURE REFERENCE. IF THICKER FLANGE IS USED, INSTALLER IS RESPONSIBLE FOR SUPPLYING GRADE 10.9 BOLTS THAT MEET THREAD ENGAGEMENT REQUIREMENTS. MUST BE A MINIMUM OF 2 THREADS PROTRUDING PAST NUT.

P/N 60847, M12-1.75 HEX NUT

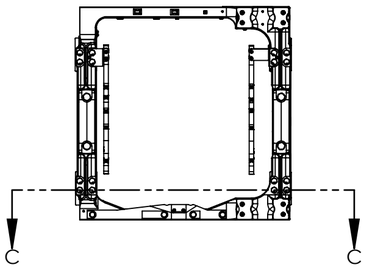
SECTION D-D
SCALE 1 : 2

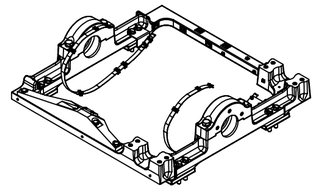
NOTIONAL GRP HULL, BLIND-HOLE INSTALLATION

5

STRUCTURE SHOWN BELOW IS FOR REFERENCE PURPOSE ONLY
APPLY MARINE GRADE SEALANT UNDER BOLT HEADS AND WASHERS.
APPLY NICKEL-BASE ANTI-SEIZE TO THREADS, TORQUE TO 95 FT-LBS (129 N-M).

USE P/N 90400, SEAKEEPER 5-6 BOLT-IN KIT





P/N 60846, M12-1.75 X 80MM LONG
HEX HEAD CAP SCREW, GRADE 10.9 Zn-Ni PLATED
TORQUE TO 95 FT-LBS.
4 PLACES

P/N 11241 FOUNDATION SPACER
APPLY THIN FILM OF MARINE GRADE, POLY-SULFIDE SEALANT TO BOTH SIDES

IF MOUNTING SEAKEEPER TO A METAL SURFACE OTHER THAN ALUMINUM, P/N 11145, ISOLATION GASKET MUST BE USED BETWEEN THE SEAKEEPER'S FRAME AND THE HULL STRUCTION TO PREVENT GALVANIC CORROSION. APPLY A FILM OF MARINE GRADE, POLLY-SULFIDE SEALANT TO BOTH SIDES.

[37.15]
1.46
SEAKEEPER
FOUNDATION

[80]
3.15
BOLT LENGTH

.50
FOUNDATION
SPACER

[6.35]
.25
ASSUMED FIBERGLASS THICKNESS
IF THICKER FIBERGLASSIS USED, INSTALLER IS RESPONSIBLE FOR SUPPLYING GRADE 10.9 BOLTS THAT MEET THE MINIMUM THREAD ENGAGEMENT.

M12-1.75 THREADED INSERT

[18]
.71
MINIMUM THREAD
ENGAGEMENT

[76.96]
3.03

[16.82]
.66

SECTION C-C
SCALE 1 : 2

SEAKEEPER
Seakeeper Inc. 45310 Abell House Lane, Suite 350 California, MD 20619

WEIGHT - LBS : ---	NAME: SEAKEEPER 5/6 BOLT IN INSTALLATION		
MATERIAL: ---	DRAWN: WHK	DATE: 01JUL2016	
	ENG APPR: ZGY	DATE: 12DEC2021	
	PROD APPR:	DATE:	
	DWG NUMBER: 90398	REV. NO.: 5	SHEET NO.: 5 OF 5