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, REMOVED HD	6/26/2019	AVM

NOTES:

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

2) GYRO ASSEMBLY WEIGHT = 890 LBS (404KG)

3) RAW WATER COOLING REQUIREMENT IS 15 LPM (4 GPM) MINIMUM AND 30 LPM (8 GPM) MAXIMUM CONTINUOUS FLOW. PROVIDED CONNECTIONS ARE 19mm (3/4" INCH) HOSE BARB. USE OF RAW WATER STRAINER IS REQUIRED.

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.

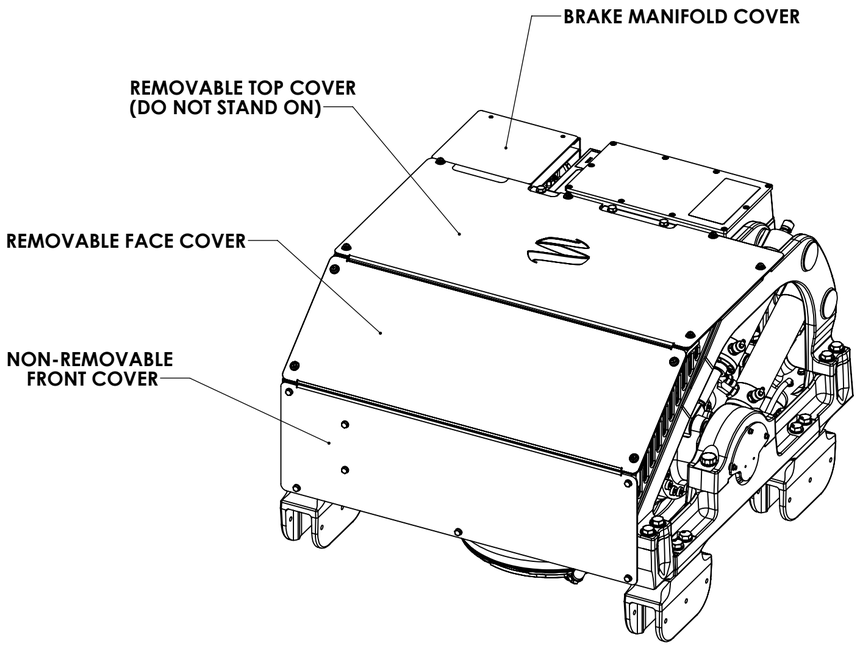
5) COVERS ARE PROVIDED TO PREVENT PERSONNEL OR EQUIPMENT ENTANGLEMENT WHILE GYRO IS IN OPERATION. THESE COVERS ARE NOT TO BE STOOD ON OR TO HAVE ANYTHING STORED ON TOP OF. SEAKEEPER RECOMMENDS THE COVERS TO ALWAYS BE IN PLACE DURING OPERATION.

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.

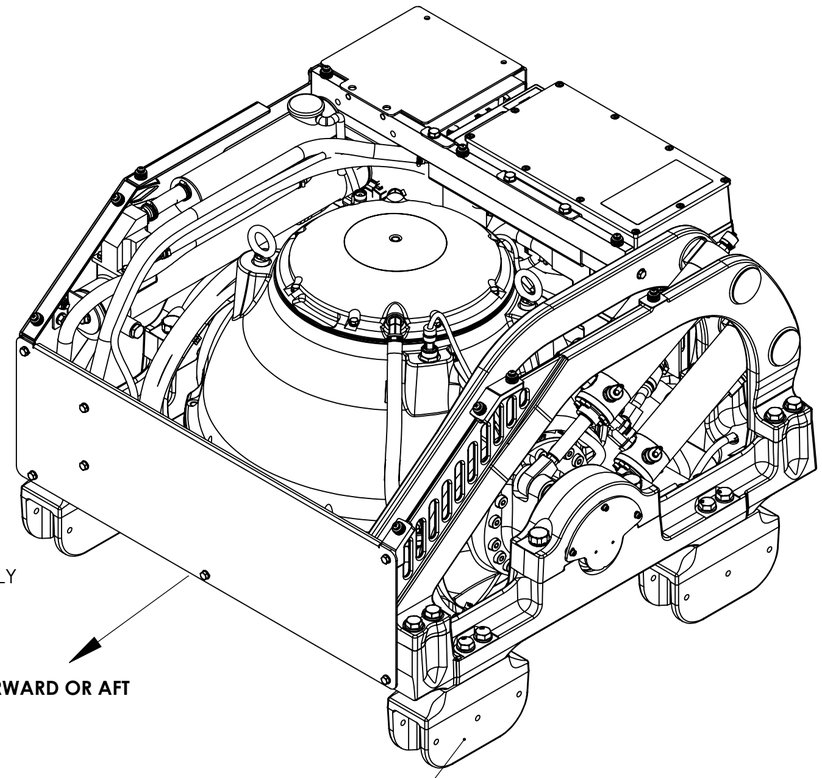
7) ADHESIVE INJECTION HOLES ARE PROVIDED AS A SECONDARY MEANS TO ADD ADHESIVE IN AREAS THAT ARE LACKING ADHESIVE BETWEEN THE SADDLE SIDES AND HULL STRUCTURE. THE INJECTION PROCESS IS ONLY USED TO RECOVER FROM INADEQUATE OR UN-EVEN ADHESIVE APPLICATION. REFER TO INSTALLATION MANUAL FOR ADHESIVE INSTALLATION PROCEDURE. NO FASTENERS ARE TO BE USED IN THE INJECTION HOLES.

8) 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.

9) WHEN INSTALLING GYRO SEAKEEPER RECOMMENDS USING A SADDLE LOCATION FIXTURE #90392 AVAILABLE FROM SEAKEEPER. THIS FIXTURE WILL PROPERLY SPACE AND ALIGN SADDLES FOR THE BONDING PROCESS. SEE INSTALLATION MANUAL FOR DETAILS OF INSTALLATION PROCESS.



SHOWN WITH FRONT COVER ONLY



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

REF.	DWG NO.	DWG. TITLE
1	90397	SEAKEEPER 6 COOLING WATER SCHEMATIC
2	90396	SEAKEEPER 6 CABLE BLOCK DIAGRAM
3	90392	SEAKEEPER 6/5 INSTALLATION FIXTURE KIT
4	90402	SEAKEEPER 6/5 INSTALLATION MANUAL
5	90401	SEAKEEPER 6 BOND-IN SADDLE KIT
6	90438	TOUCH DISPLAY AND MOUNTING DETAILS

WEIGHT - LBS : ---

MATERIAL: ---

DRAWN: WHK DATE: 1JUL2016

ENG APPR: DATE:

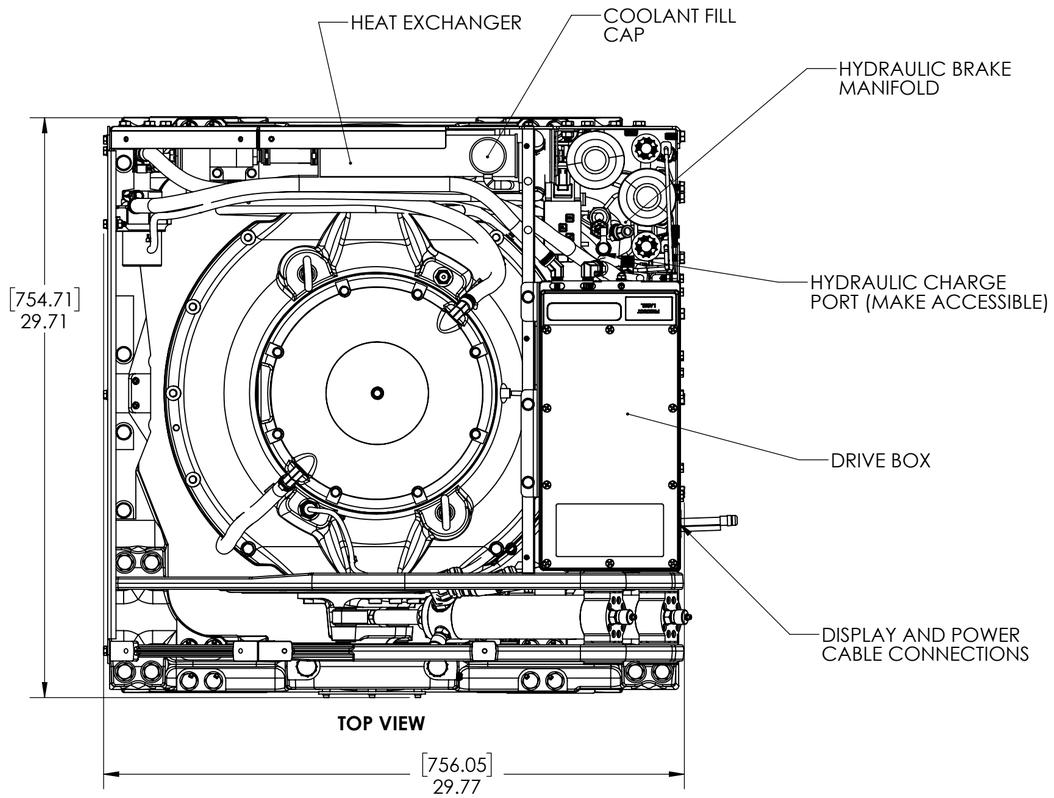
PROD APPR: DATE:

SEAKEEPER

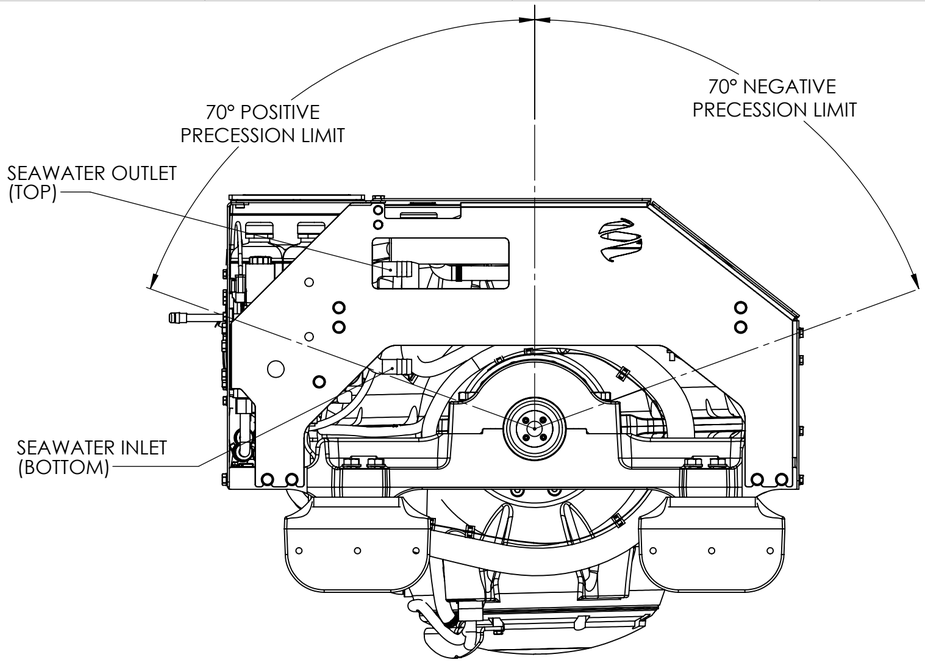
Seakeeper Inc. 44425 Pecan Court, Suite 151 California, MD 20619

NAME: SEAKEEPER 6/5 INSTALLATION DETAILS - BOND-IN METHOD

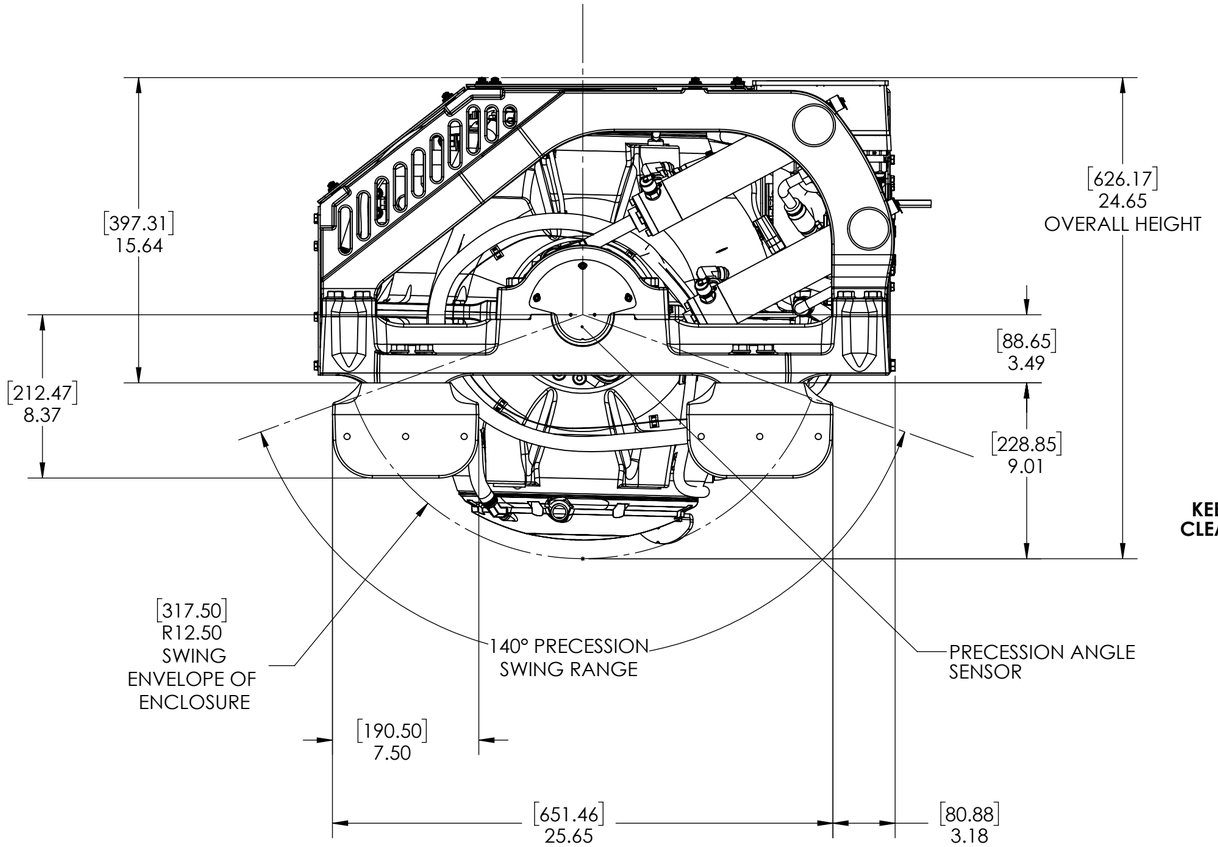
DWG NUMBER **90399** REV. NO. **4** SHEET NO. 1 OF 5

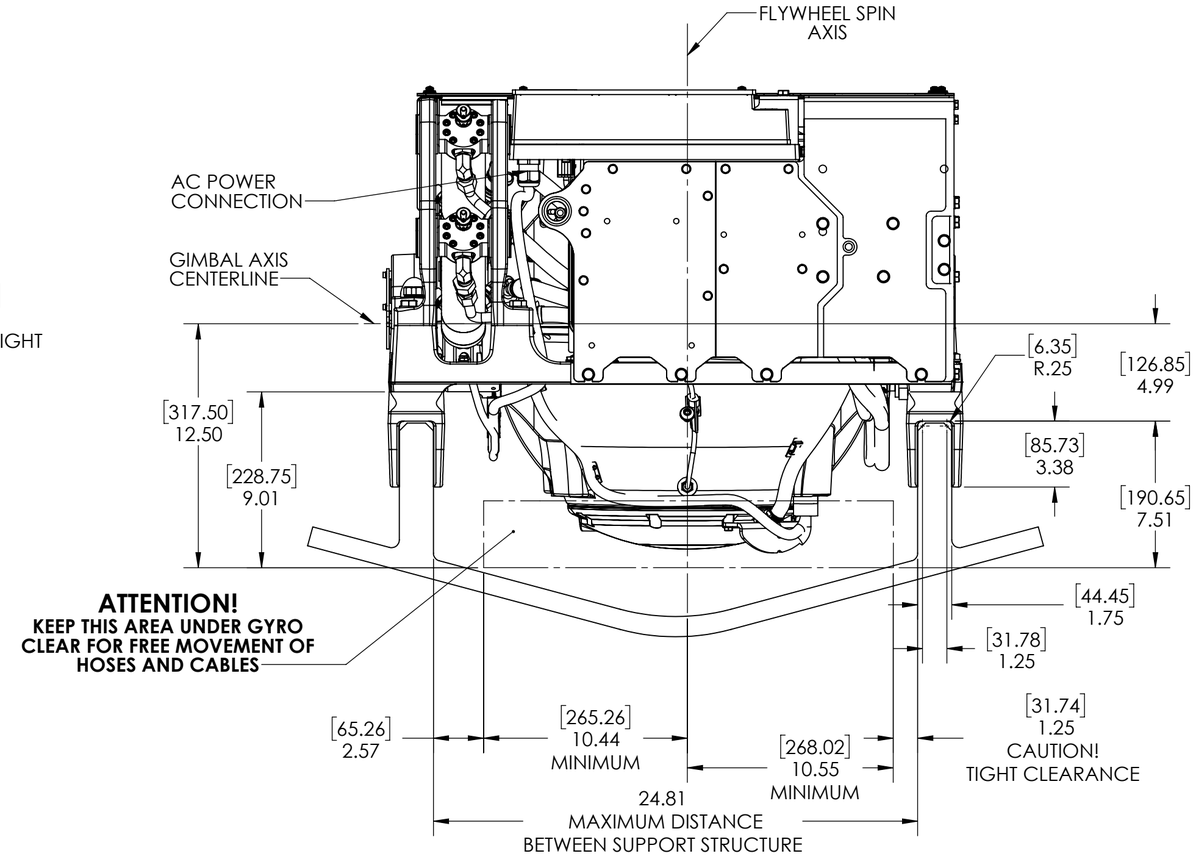


TOP VIEW



NON-BRAKE SIDE VIEW



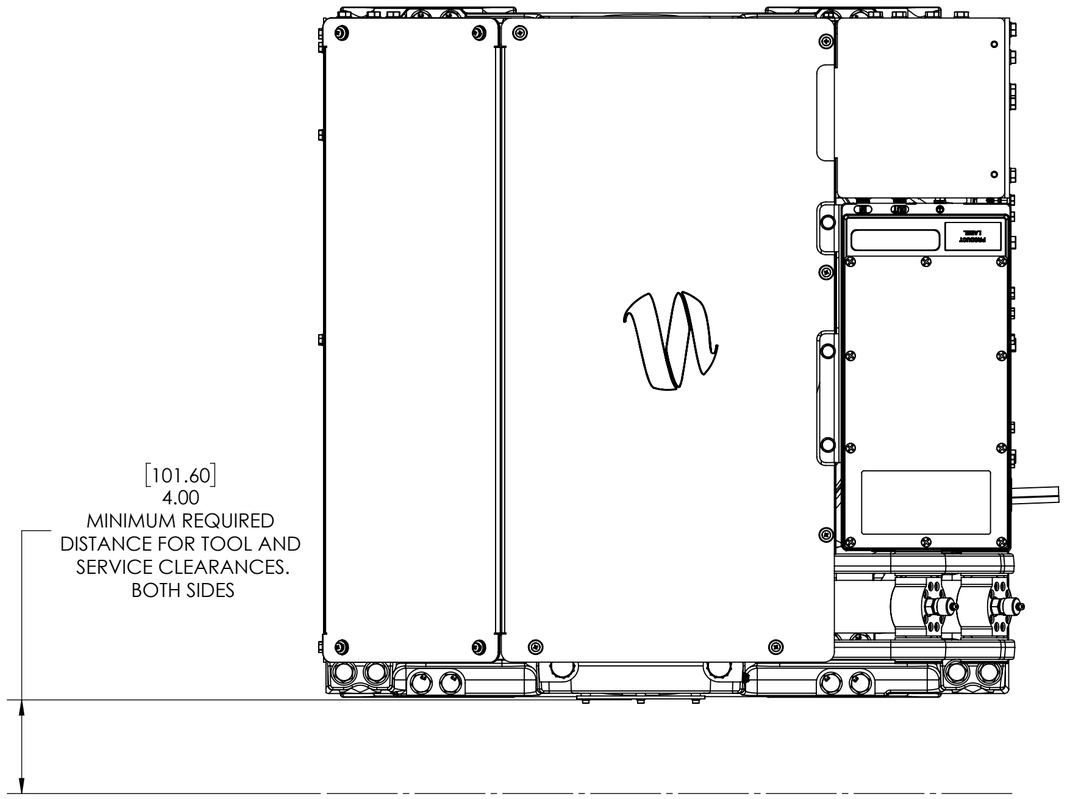


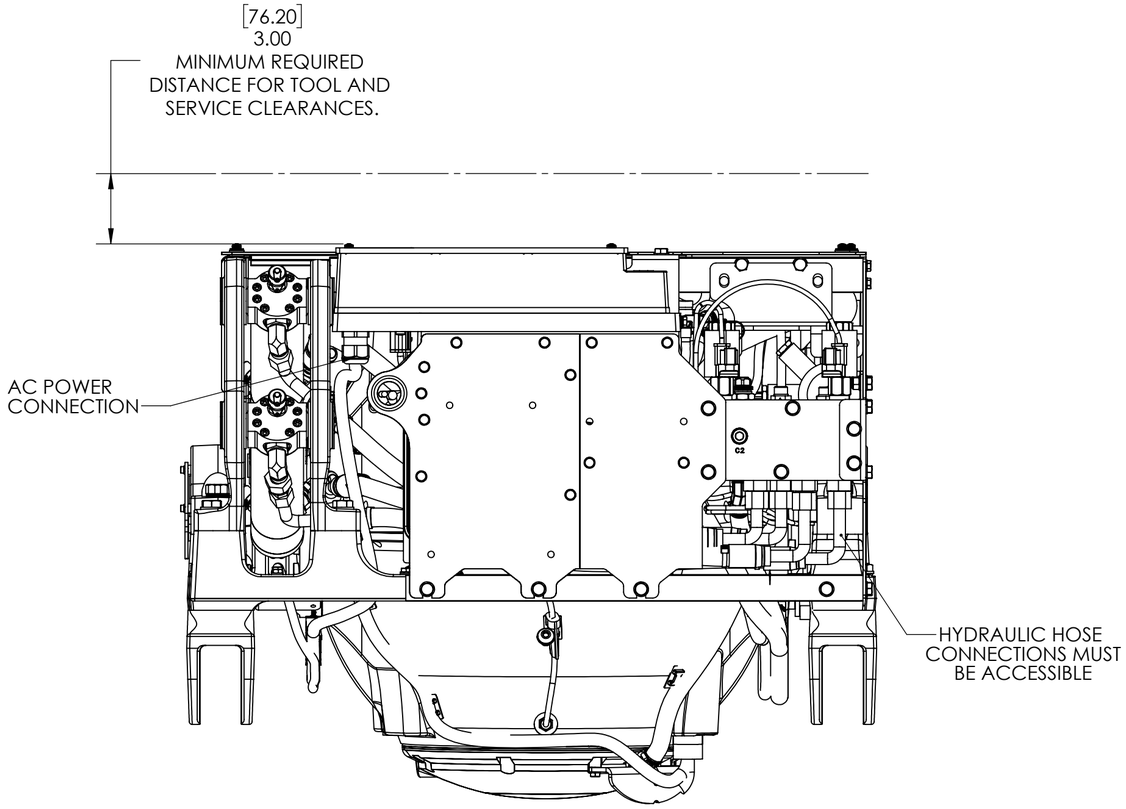
ATTENTION!
KEEP THIS AREA UNDER GYRO CLEAR FOR FREE MOVEMENT OF HOSES AND CABLES

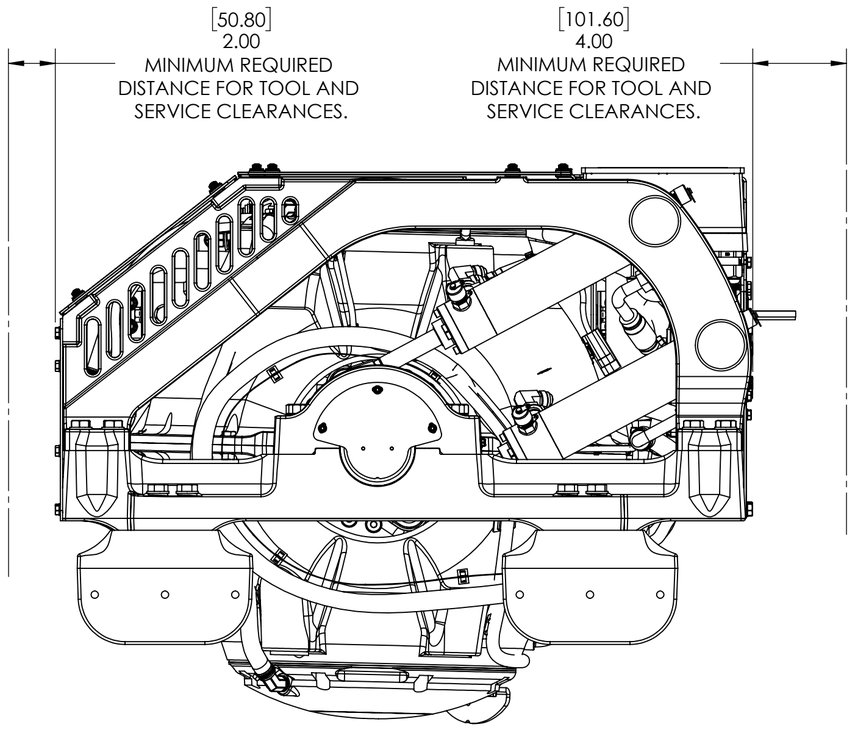
SEAKEEPER
Seakeeper Inc. 44425 Pecan Court, Suite 151 California, MD 20619

WEIGHT - LBS : ---	NAME: SEAKEEPER 6/5 INSTALLATION DETAILS - BOIND-IN METHOD		
MATERIAL: ---	DRAWN: WHK	DATE: 1JUL2016	
	ENG APPR:	DATE:	
	PROD APPR:	DATE:	
	DWG NUMBER: 90399	REV. NO.: 4	SHEET NO.: 2 OF 5

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

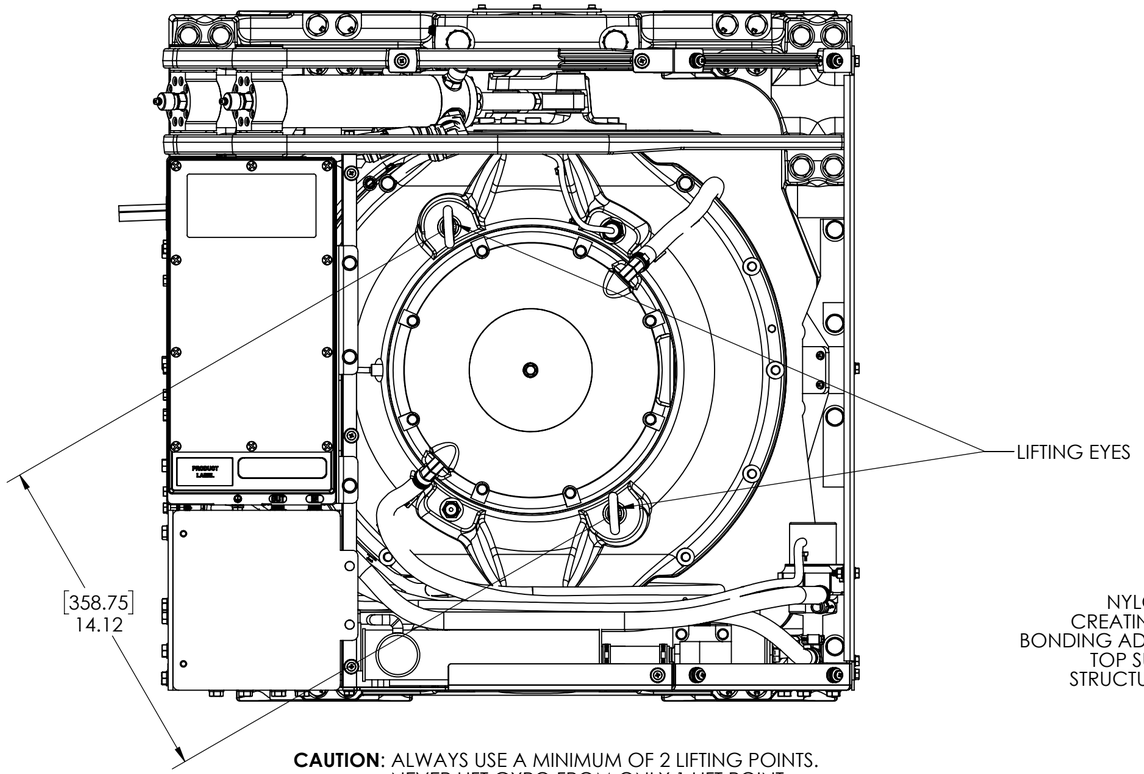




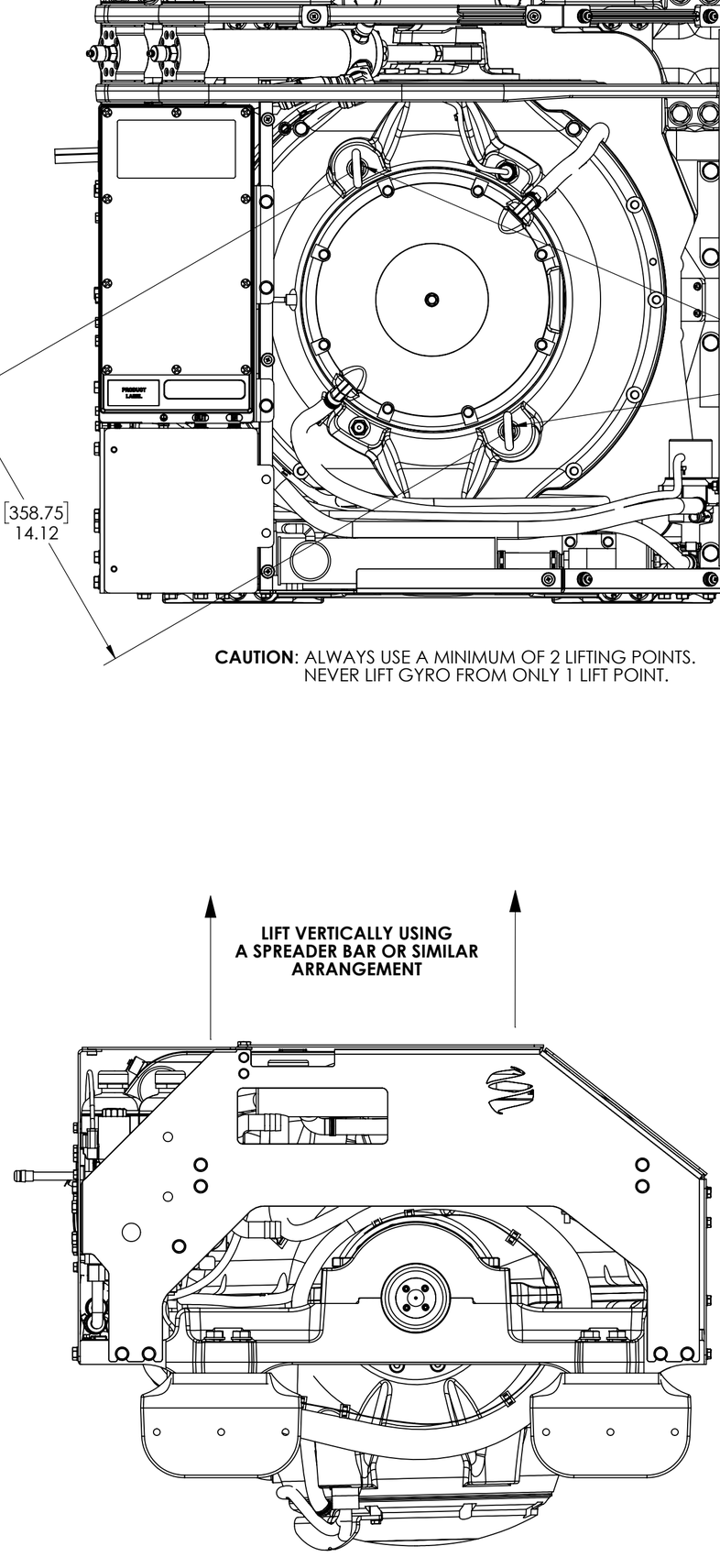


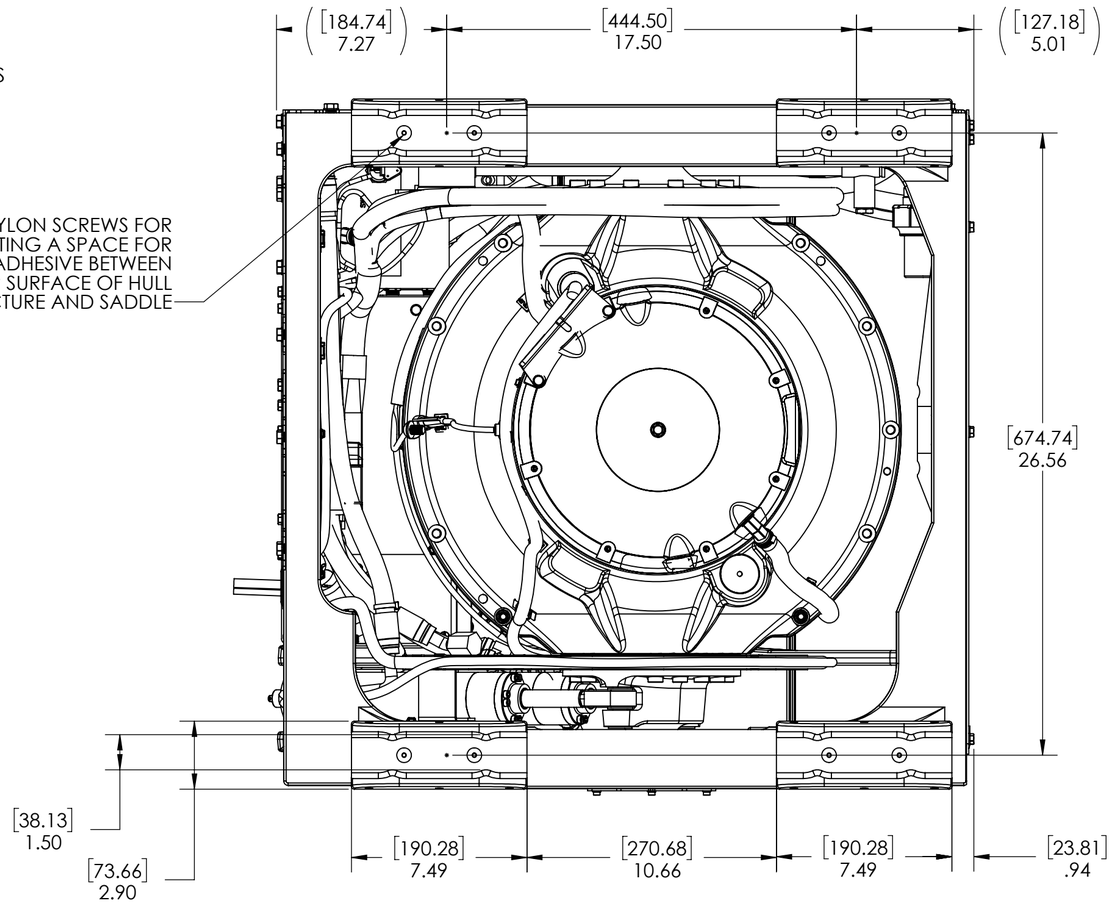
SEAKEEPER
Seakeeper Inc. 44425 Pecan Court, Suite 151 California, MD 20619

WEIGHT - LBS : ---	NAME: SEAKEEPER 6/5 INSTALLATION DETAILS - BOND-IN METHOD		
MATERIAL: ---	DRAWN: WHK	DATE: 1JUL2016	
	ENG APPR:	DATE:	
	PROD APPR:	DATE:	
	DWG NUMBER: 90399	REV. NO.: 4	SHEET NO.: 3 OF 5



CAUTION: ALWAYS USE A MINIMUM OF 2 LIFTING POINTS.
NEVER LIFT GYRO FROM ONLY 1 LIFT POINT.





**SEAKEEPER RECOMMENDS BUILDER/INSTALLER USING
INSTALLATION FIXTURE #90392 AVAILABLE FROM
SEAKEEPER TO LOCATE SADDLE POSITION ON HULL STRUCTURE.**

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

WEIGHT - LBS : ---	NAME: SEAKEEPER 6/5 INSTALLATION DETAILS - BOND-IN METHOD		
MATERIAL: ---	DRAWN: WHK	DATE: 1JUL2016	
	ENG APPR:	DATE:	
	PROD APPR:	DATE:	
	DWG NUMBER: 90399	REV. NO.: 4	SHEET NO.: 4 OF 5

GYRO LOADS FOR HULL STRUCTURE DESIGN :

GYRO IS MOUNTED IN A FOUNDATION FRAME WHICH IS BOLTED TO FOUR SADDLE FITTINGS MADE OF A356-T6 CAST ALUMINUM. THE GYRO FRAME INCORPORATES SEMI-ELASTIC ANTI-VIBRATION ISOLATORS ENCASING THE GIMBAL BEARINGS THAT DAMPEN VIBRATIONS THAT COULD TRANSMIT INTO THE HULL STRUCTURE.

THE SADDLES ARE DESIGNED TO BE PERMANENTLY ATTACHED TO LONGITUDINAL GRP HULL BEAMS WITH A STRUCTURAL ADHESIVE. THIS MOUNTING ARRANGEMENT DISTRIBUTES THE CYCLIC, FULLY REVERSING FORCES AND MOMENTS GENERATED BY THE GYRO OVER A LARGE SURFACE AREA. THE BONDED IN SADDLES ARE **NOT** DESIGNED TO BE BOLTED TO THE HULL STRUCTURE AND THIS METHOD OF ATTACHMENT SHOULD NEVER BE ATTEMPTED WITHOUT CONSULTATION WITH SEAKEEPER INC.

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 SADDLE FITTINGS. 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:

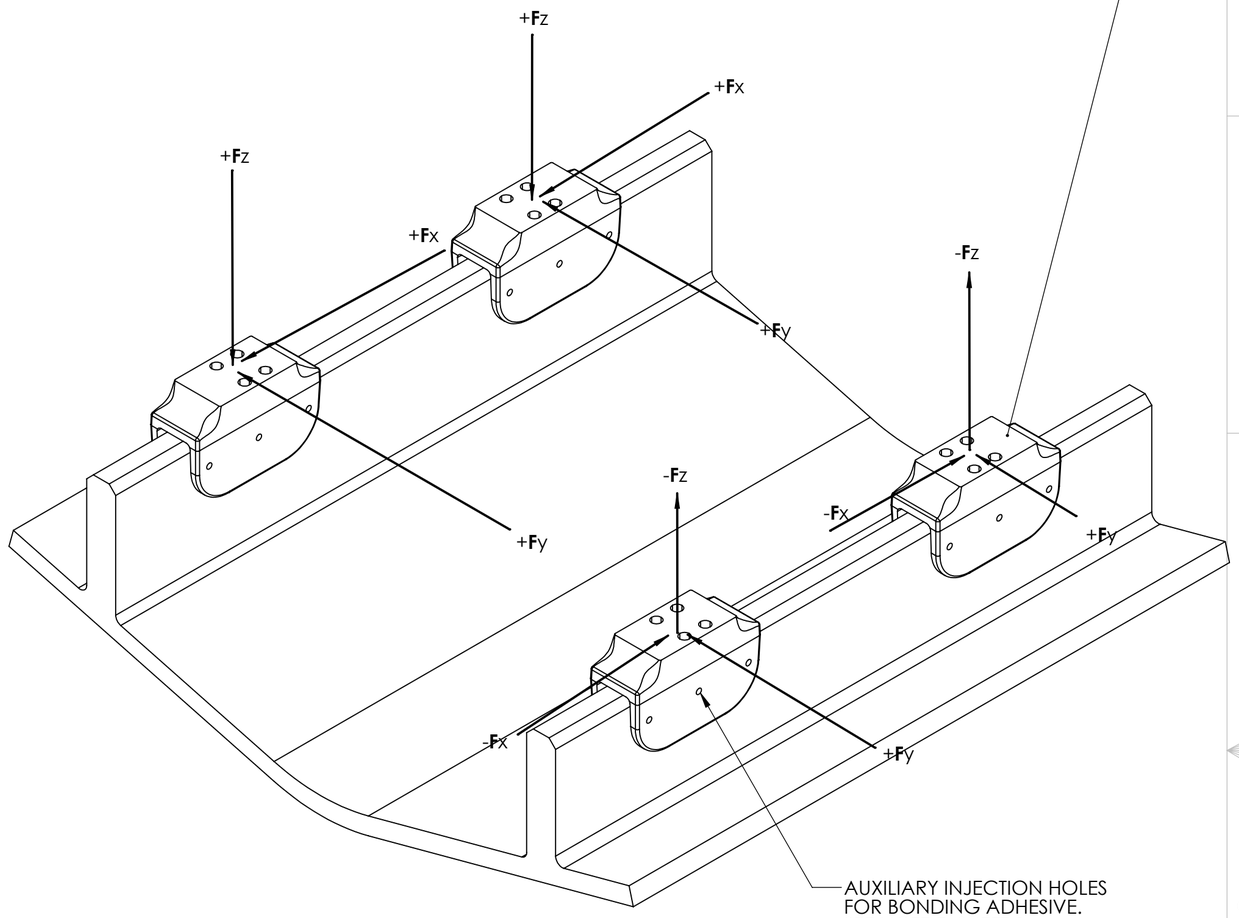
VERTICAL FORCE (Fz) = 3820 lbs (17.0 kN)
LONGITUDINAL FORCE (Fx) = 2335 lbs (10.4 kN)
LATERAL FORCE (Fy) = 209 lbs (0.93 kN)

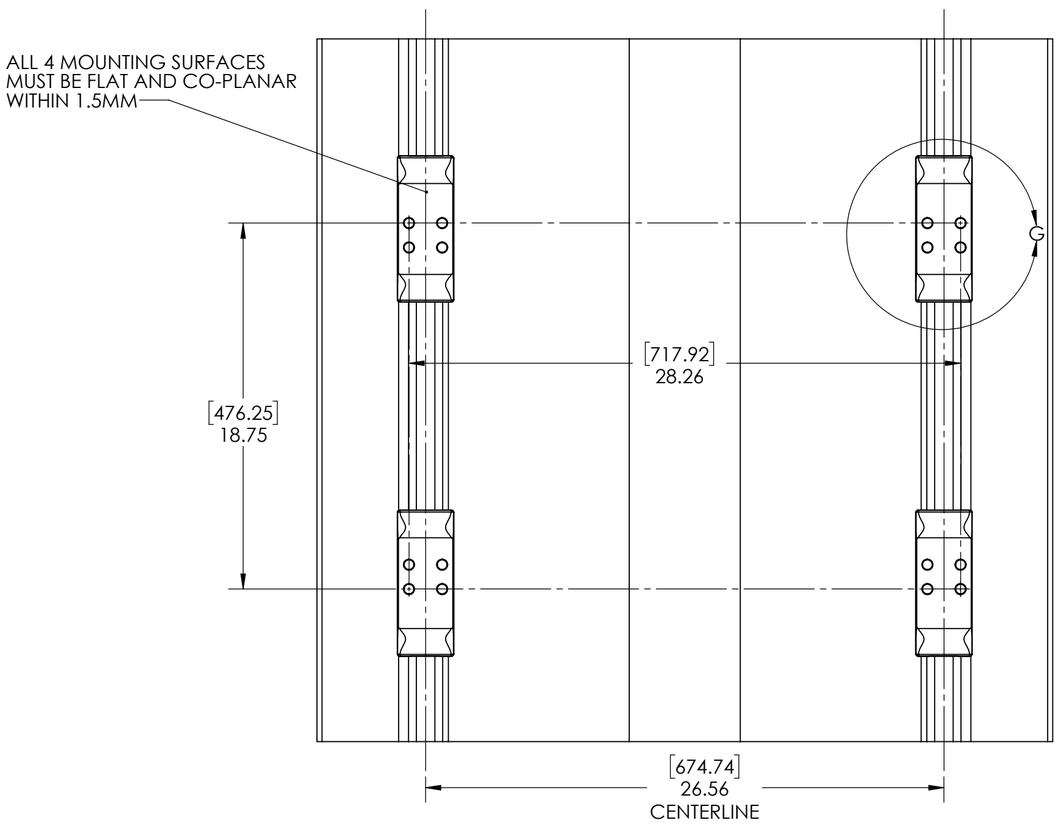
THESE FORCES SHOULD BE CONSIDERED TO BE ACTING SIMULTANEOUSLY, FULLY REVERSING IN BOTH DIRECTIONS, AND WILL REPEAT AN INFINITE NUMBER OF TIMES. THESE FORCES DO NOT INCLUDE VESSEL MOTION ACCELERATIONS INCLUDING VERTICAL SLAM LOADS WHICH CAN BE HIGH FOR HIGHER SPEED VESSELS.

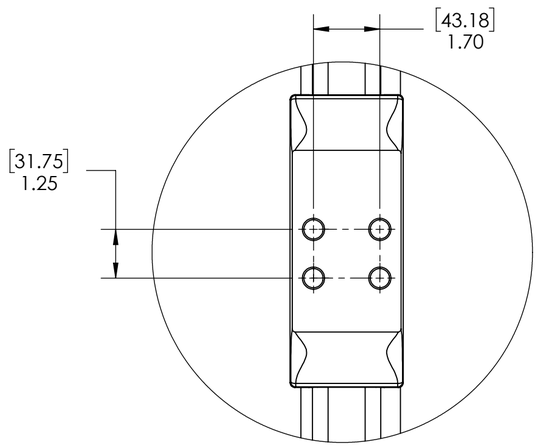
THE BOAT BUILDER OR THE GYRO INSTALLER IS RESPONSIBLE FOR DESIGNING THE HULL STRUCTURE TO WHICH THE GYRO IS ATTACHED TO ACCOMMODATE THE ABOVE FORCES AND MOMENTS PLUS A REASONABLE FACTOR OF SAFETY. SEAKEEPER SUGGESTS A SAFETY FACTOR OF 3.0 (YIELDING A SAFETY MARGIN OF 2.0). THIS FACTOR OF SAFETY MAY NEED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

THE BOAT BUILDER OR GYRO INSTALLER IS ALSO FULLY RESPONSIBLE FOR SELECTING THE STRUCTURAL ADHESIVE TO SECURE THE ALUMINUM SADDLE FITTINGS TO THE GRP HULL BEAMS.
SEAKEEPER RECOMMENDS THAT THE BUILDER OR INSTALLER USE A STRUCTURAL ADHESIVE WITH A MINIMUM SHEAR STRENGTH OF 13.8 MPa (2000 psi). ADDITIONALLY IT IS STRONGLY SUGGESTED THAT THE BUILDER OR INSTALLER TEST THE COMPATIBILITY OF THE SELECTED ADHESIVE WITH CAST A356 T6 ALUMINUM AND PLANNED HULL MATERIALS BY PERFORMING MECHANICAL PROPERTY TESTS. TO AID IN DETERMINING THE QUANTITY OF ADHESIVE REQUIRED, THE INTERIOR SURFACE AREA (BONDING SURFACES) OF EACH SADDLE FITTING IS 375.03 SQ. CM. (58.13 SQ. IN.)
TOTAL BONDED SURFACE AREA FOR ALL 4 SADDLES = 1500.01 SQ. CM. (232.52 SQ. IN.)

BUILDER/INSTALLER IS TO INSTALL 4 SADDLE FITTINGS USING STRUCTURAL ADHESIVE. SEAKEEPER RECOMMENDS USING AN INSTALLATION FIXTURE #90392 AVAILABLE FROM SEAKEEPER, TO MAINTAIN ALIGNMENT AND LOCATION OF SADDLES DURING BONDING PROCESS.
AFTER ADHESIVE IS FULLY CURED, THE GYRO FRAME IS THEN FASTENED TO THE SADDLES USING THE HARDWARE INCLUDED WITH GYRO- M12-1.75 X 65mm LONG, ALLOY STEEL HEX HEAD CAP SCREWS.
TORQUE VALUE FOR BOLTS = 65 FT/LBS (88.1 Nm) USING REMOVABLE THREADLOCKER COMPOUND ON BOLT THREADS AND MARINE SEALANT UNDER FLAT WASHERS.
SEE INSTALLATION MANUAL #90402 FOR DETAILS OF INSTALLATION PROCEDURE.







DETAIL G

WEIGHT - LBS : ---	***PROPRIETARY AND CONFIDENTIAL*** THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SEAKEEPER INCORPORATED. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SEAKEEPER IS PROHIBITED.	SEAKEEPER® Seakeeper Inc. 44425 Pecan Court, Suite 151 California, MD 20619	
MATERIAL: ---	DRAWN: WHK DATE: 12JUL2016	NAME: SEAKEEPER 6/5 INSTALLATION DETAILS - BOND-IN METHOD	
	ENG APPR: DATE:	DWG NUMBER 90399	REV. NO. 4
	PROD APPR: DATE:		SHEET NO. 5 OF 5