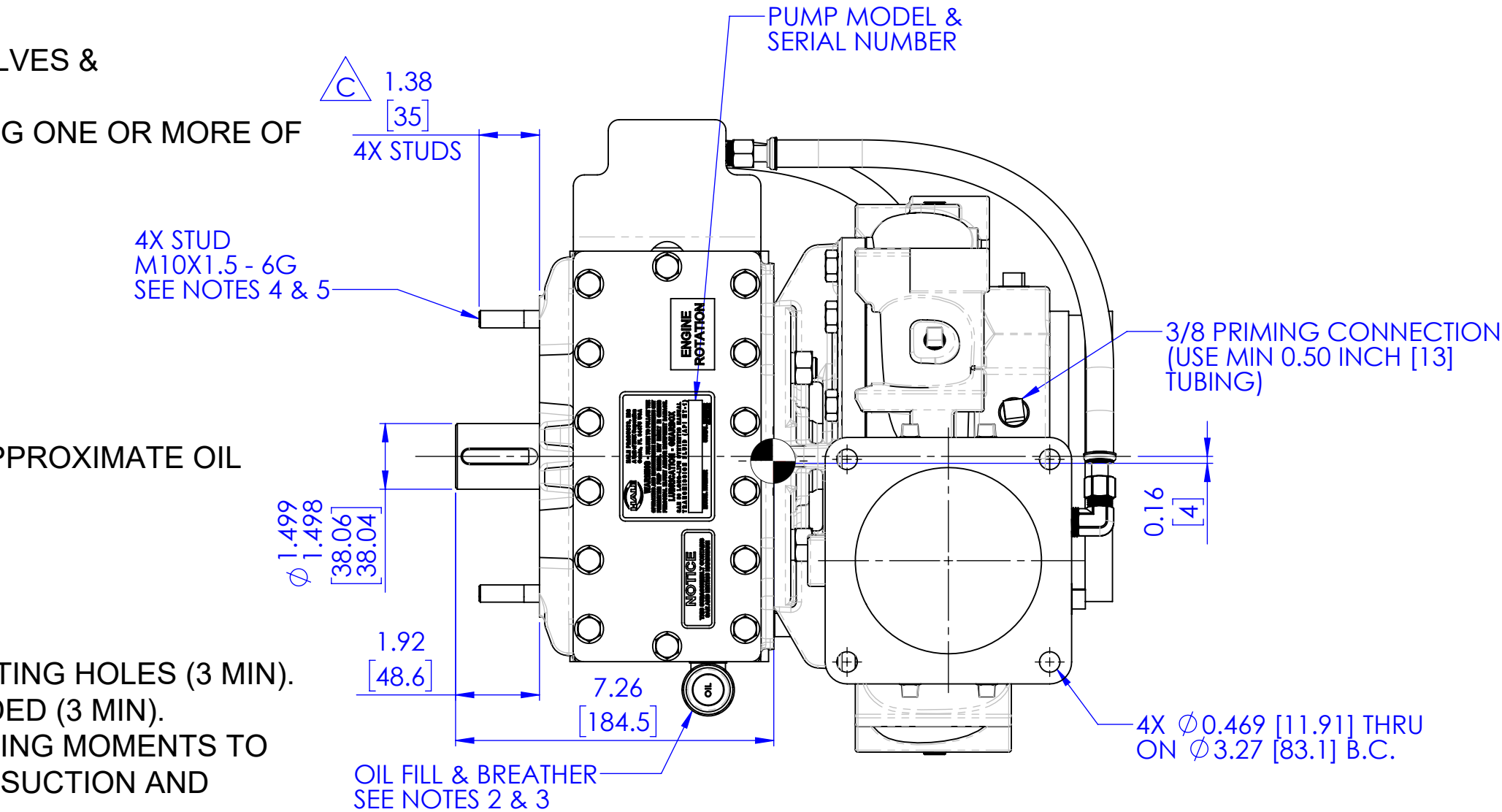
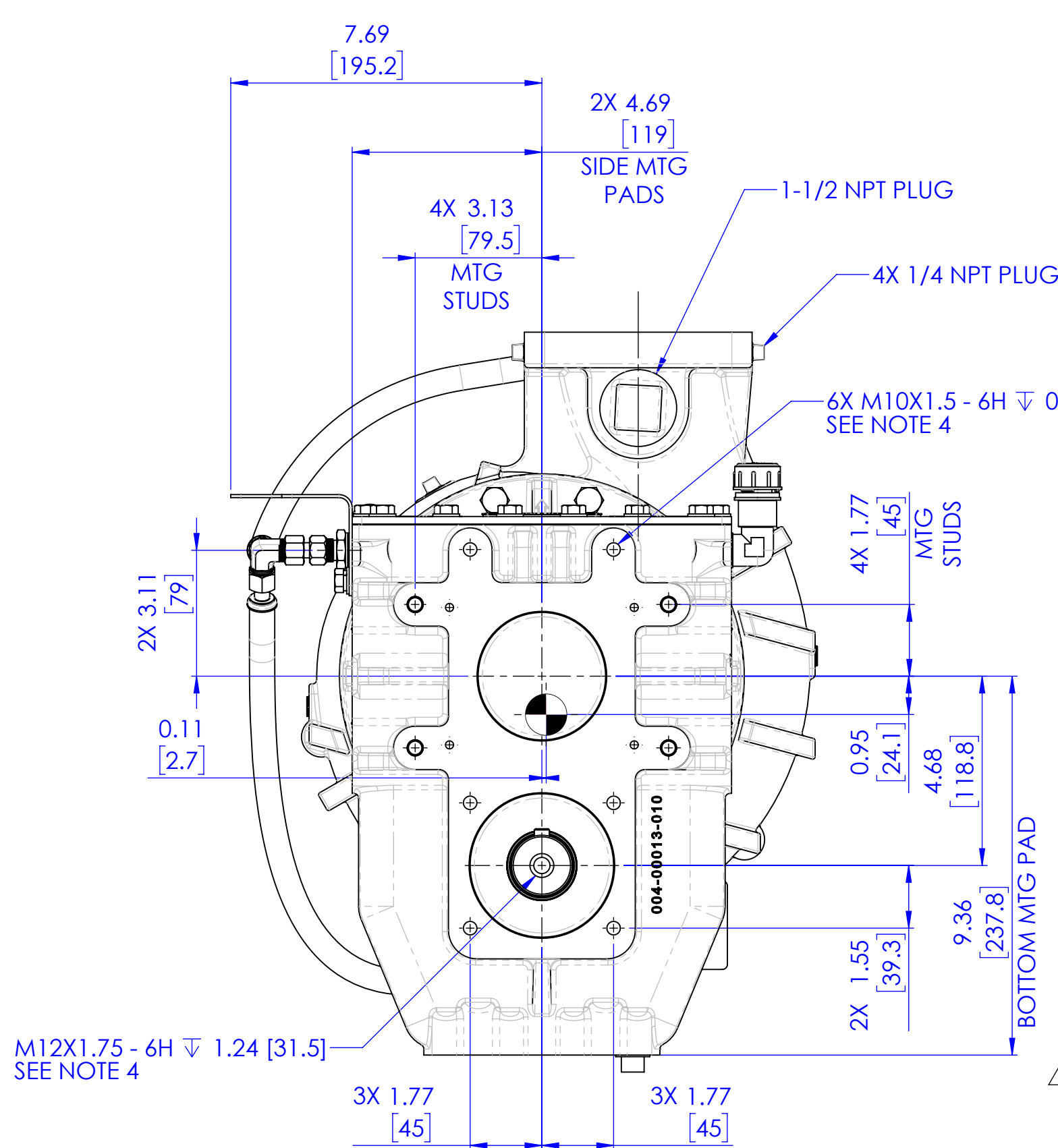


HALE MBP FLEX SERIES PUMP

GEARBOX POSITION - VERTICAL, DISCHARGE POSITION - 1,
ENGINE ROTATION AND OPTIONAL GEARBOX COOLER SHOWN

NOTES:

- PRIMING SYSTEM, DISCHARGE & SUCTION VALVES, PRESSURE RELIEF VALVES & CONTROLLERS AND THERMAL RELIEF VALVES ARE AVAILABLE.
- USE SAE 50 LONG-LIFE SYNTHETIC MANUAL TRANSMISSION FLUID MEETING ONE OR MORE OF THE FOLLOWING SPECIFICATIONS.
 - API MT-1
 - EATON PS-164 Rev. 7
 - MACK TO-A Plus
 - MERITOR 0-81
 - NAVISTAR / INTERNATIONAL TMS 6816
 - ROCKWELL / EATON / FULLER CD-50 (PS-081)
 - ZF FreedomLine
- FILL GEARBOX UNTIL OIL LEVEL INDICATOR WINDOW IS 1/2 TO 3/4 FULL. APPROXIMATE OIL CAPACITY IS 1.5 QUART [1.4 LITER].
- ALL METRIC FASTENERS TO HAVE A MINIMUM PROPERTY CLASS 8.8.
ALL SAE FASTENERS TO HAVE A MINIMUM GRADE 8 SPECIFICATION.
- PUMP ASSEMBLY MOUNTING:
 - MOUNTING SHOULD BE FROM BOTH VOLUTE AND GEARBOX.
 - PUMP MOUNTING SUPPORT SHOULD BE VIA THE PUMP VOLUTE MOUNTING HOLES (3 MIN).
 - GEARBOX MOUNTING SUPPORT SHOULD BE FROM THE STUDS PROVIDED (3 MIN).
 - CONSIDERATION MUST BE TAKEN NOT TO TRANSMIT LOADS OR TWISTING MOMENTS TO OR THROUGH PUMP ASSEMBLY FROM CHASSIS, FRAME, BODY WORK, SUCTION AND DISCHARGE PIPING CONNECTIONS.
- REFER TO "MAXIMUM TORQUE VALUES" AND "THREAD LOCKS & SEALANTS" TABLES WHEN INSTALLING THREADED COMPONENTS.



SUCTION AND DISCHARGE ANODES (OPTIONAL)

CAST ARROW SHOWS DIRECTION OF ROTATION

1/4 NPT PLUG

OIL LEVEL INDICATOR SEE NOTES 2 & 3

OPTIONAL GEARBOX COOLER

1/2 NPT MAGNETIC DRAIN PLUG

GEAR RATIOS & PUMP MODELS	
PUMP MODEL	GEAR RATIO
MBP*-37F	3.74
MBP*-29F	2.91
MBP*-26F	2.60
MBP*-23F	2.33
MBP*-19F	1.90
MBP*-16F	1.64
MBP*-13F	1.31
MBP*-11F	1.14

PROJECTION:
COMPLIANCE NOTES: 15 CFR 78.6 These items are controlled by the U.S. Government and authorized for export only for the purpose of ultimate disposition for security (intelligence or espionage) items identified. They may not be re-exported, transferred, or otherwise disposed of to any other country or to any person other than the authorized ultimate consignee or end-user(s) without the express prior written approval of the U.S. Government and without obtaining approval from the U.S. government or otherwise authorized by U.S. laws and regulations. This item, technical data, drawings, and/or information are controlled under the Export Administration Regulations (EAR) and are subject to the EAR. These drawings are unclassified and copy without restriction property of GSG and its subsidiaries, and may not be reproduced or republished without the express written consent of GSG only.
PUMP WEIGHT (DRY): IRON VERSION: 156 LBS [71 KG] BRONZE VERSION: 165 LBS [75 KG]
REPRESENTS CENTER OF GRAVITY

MAXIMUM INPUT RPM

WARNING
EXCEEDING THESE LIMITS OR FAILURE TO FOLLOW THE RECOMMENDATIONS OUTLINED ON THIS DRAWING COULD DAMAGE THE PUMP AND RESULT IN PERSONAL INJURY.

PUMP MODEL	MAX GEARBOX INPUT RPM	PUMP MODEL	MAX GEARBOX INPUT RPM
MBP-37F	2210	MBP-19F	4340
MBP-29F	2840	MBP-16F	5020
MBP-26F	3180	MBP-13F	6320
MBP-23F	3540	MBP-11F	6720**

SEE HALE TORQUE LIMIT CHART F-72 FOR ADDITIONAL DATA.
MAXIMUM ALLOWABLE HYDRODYNAMIC PRESSURE: 400 PSIG; **340 PSIG
MAXIMUM ALLOWABLE HYDROSTATIC PRESSURE: 500 PSIG

HALE TYPE MBP/MBP-GB PUMP MODEL IDENTIFICATION

THE HALE TYPE MBP/MBP-GB PUMP IS AVAILABLE WITH MULTIPLE DRIVE RATIOS TO ADAPT TO A WIDE VARIETY OF APPLICATIONS. THE RATING, RATIO AND DRIVE UNIT TYPE DETERMINE THE MODEL NUMBER. FOR EXAMPLE:

AP IDENTIFICATION (GPM)		AP IDENTIFICATION (L/S)	
THE MODEL NUMBER FOR AN MBP RATED AT 750 GPM WITH A DRIVE RATIO OF 2.33 AND HALE DRIVE UNIT WOULD BE: MBP(M) 75 -23 E		THE MODEL NUMBER FOR AN MBP RATED AT 50 (L/S) WITH A DRIVE RATIO OF 2.33 AND HALE DRIVE UNIT WOULD BE: MBP(M) 50 GB -23 E	
PUMP TYPE (M=ENGINE MOUNT)	RATED CAPACITY GPM	GEARBOX TYPE DRIVE RATIO (2.33 = 23)	PUMP TYPE (M=ENGINE MOUNT)
		GB FOR 31 LPS LS FOR 32 LPS	GEARBOX TYPE

BE SURE TO INCLUDE THE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS OR REQUESTING INFORMATION. THE MODEL / SERIAL NUMBER PLATE IS LOCATED ON TOP OF GEAR DRIVE AS SHOWN IN DRAWING.

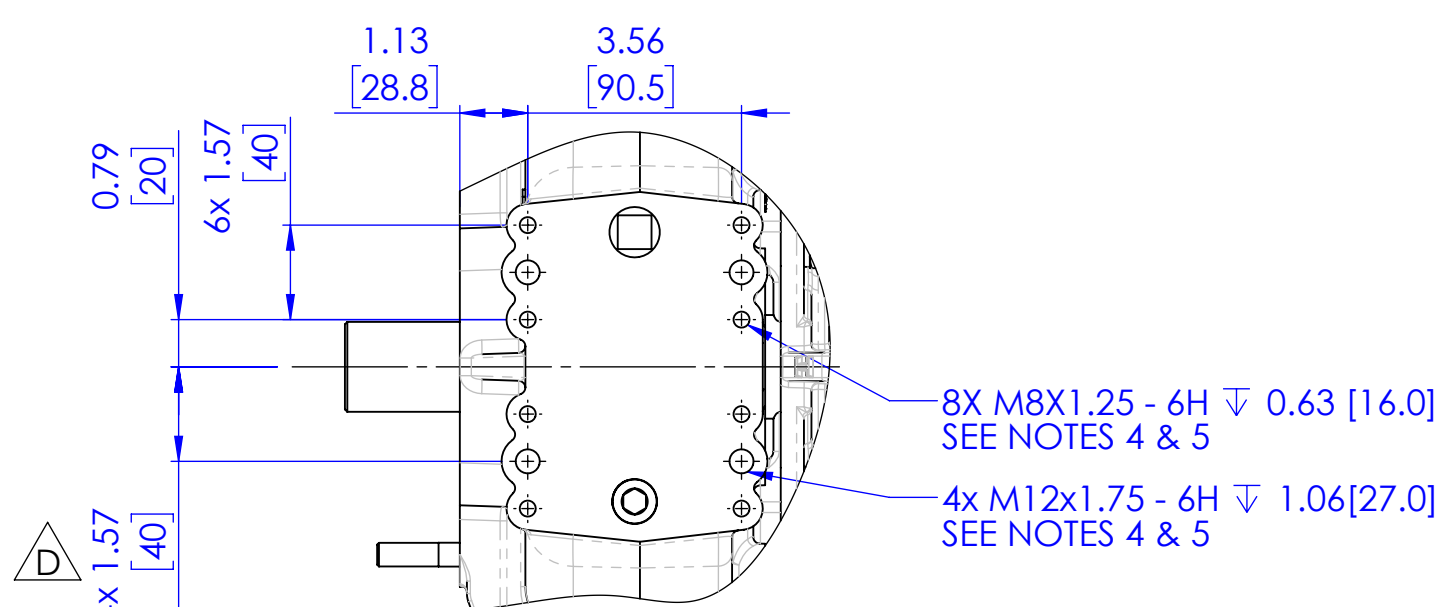
THREAD LOCKS & SEALANTS	
COMPONENT	LOCTITE # (OR EQUIVALENT)
STUDS IN ALUMINUM, OIL SEALS, END CAPS, & CLEARANCE RINGS	680
NUTS & BOLTS WITHOUT LOCKWASHERS	243
NPT / BSP FITTINGS & PLUGS	580

MAXIMUM TORQUE VALUES		
SIZE	STUDS & THREADS IN ALUMINUM	NUTS ON STUDS & THREADS IN ALUMINUM
M8 x 1.25	12 LB-FT [16 Nm]	9 LB-FT [12 Nm]
M10 x 1.50	24 LB-FT [32 Nm]	17 LB-FT [23 Nm]
M12 x 1.75	40 LB-FT [54 Nm]	29 LB-FT [39 Nm]

OTHERWISE, FOLLOW STANDARD TORQUE VALUES PER MATERIAL & GRADE / CLASS OF FASTENER.

INSTALLATION

REVISIONS					
ECN	REV.	ZONE	CHANGED FROM	BY	DATE
4704	B	1-F114-L11, 6-F11	CHANGED THE ORIENTATION OF POSITION 10 ON SHEET 2 TO 90° TO THE RIGHT. REMOVED M8X9/32 STUD FROM BOM ON SHEET 4 FOR CONSISTENCY ON ALL FLEX SERIES PUMPS. ADDED SOCKET HEAD SCREWS TO BOTH SIDES OF THE PUMP	MB	25JAN2019
5177	C	1-B6, 1-G15, 1-K14	INCREASED 4X M10 INPUT SIDE MOUNTING STUD LENGTH TO 35MM, ADDED TORQUE AND THREAD LOCK TABLES	AJG	11AUG2020
5426	D	1-J6, 1-K5, 1-M6, 1-M9, 6-J4	ADDED M12 X 1.75 - 6H MOUNTING HOLE DETAILS & NOTES	KTN	15APR2021



DETAIL - BOTTOM MOUNTING PAD

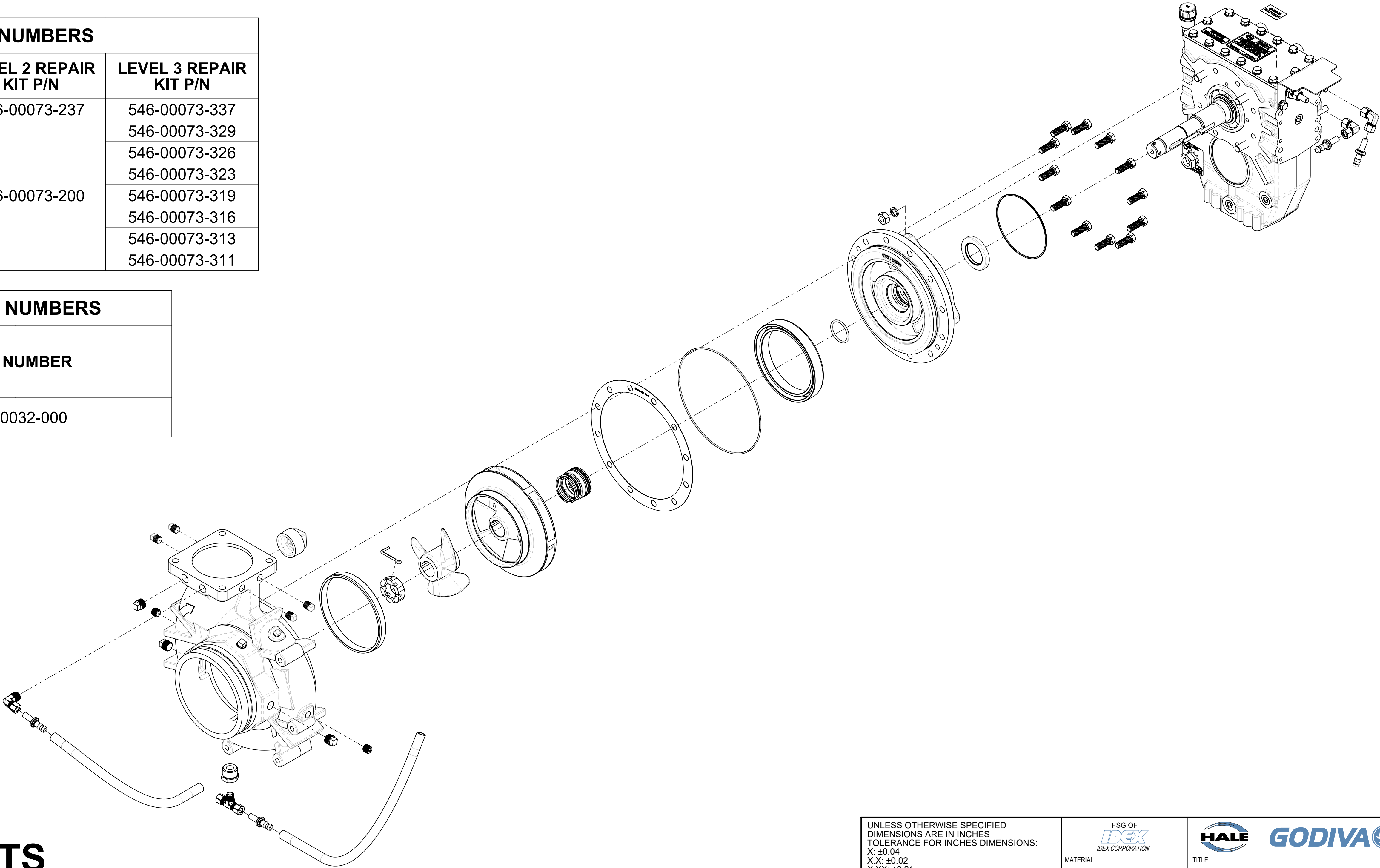
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE FOR INCHES DIMENSIONS: X: \pm 0.04 X.X: \pm 0.02 X.XX: \pm 0.01 X.XXX: \pm 0.005 ANGLES: \pm 0.25° SURFACE TEXTURE IN μ m Ra REMOVE ALL BURRS AND SHARP EDGES, 0.01MAX	
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FSG OF IDEX CORPORATION		TITLE	
MATERIAL		PUMP ASSEMBLY, MBP FLEX SERIES	
MADE FROM		DRAWN	TAM
FINISH		APPROVED	DLM
PROJECT		DATE	19MAR2018
SIZE D		DRAWING NUMBER FSG-PL-01486	
SCALE 5:16		REV D	
		SHEET 1 OF 6	

- NOTES:
1. LEVEL 1 REPAIR KIT PROVIDES EVERYTHING NEEDED TO CHANGE SEALS.
 2. LEVEL 2 REPAIR KIT PROVIDES LEVEL 1 AND ITEMS NEEDED FOR BEARINGS.
 3. LEVEL 3 REPAIR KIT PROVIDES LEVEL 1 & 2 AND ITEMS TO REPLACE GEARS.
 4. IMPELLER RENEW KIT PROVIDES LEVEL 1 REPAIR KIT AND ITEMS TO REPLACE IMPELLER.
 5. REFER TO TECHNICAL MANUAL (FSG-MNL-00184) AND "MAXIMUM TORQUE VALUES" AND "THREAD LOCKS & SEALANTS" TABLES ON SHEET 1 WHEN INSTALLING THREADED COMPONENTS, OIL SEALS/CAPS, OR CLEARANCE RINGS.

REPAIR KIT PART NUMBERS				
RATIO NAME	GEAR RATIO	LEVEL 1 REPAIR KIT P/N	LEVEL 2 REPAIR KIT P/N	LEVEL 3 REPAIR KIT P/N
-37F	3.74	546-00073-100	546-00073-237	546-00073-337
-29F	2.91		546-00073-200	546-00073-329
-26F	2.60			546-00073-326
-23F	2.33			546-00073-323
-19F	1.90			546-00073-319
-16F	1.64			546-00073-316
-13F	1.31			546-00073-313
-11F	1.14			546-00073-311

IMPELLER RENEW KIT PART NUMBERS	
DESCRIPTION	PART NUMBER
IMPELLER RENEW KIT	516-00032-000



REPAIR PART KITS IDENTIFICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE FOR INCHES DIMENSIONS:
X: ±0.04
X.X: ±0.02
X.XX: ±0.01
X.XXX: ±0.005
ANGLES: ±0.25°
SURFACE TEXTURE IN µm Ra
REMOVE ALL BURRS AND SHARP
EDGES, 0.01MAX

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IDEX
IDEX CORPORATION




MATERIAL

MADE FROM

FINISH

PROJECT

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TITLE

PUMP ASSEMBLY, MBP FLEX SERIES

DRAWN

TAM

DATE

19MAR2018

APPROVED

DLM

SIZE
D
SCALE
1:4

DRAWING NUMBER
FSG-PL-01486

REV
D
SHEET
3 OF 6

REV

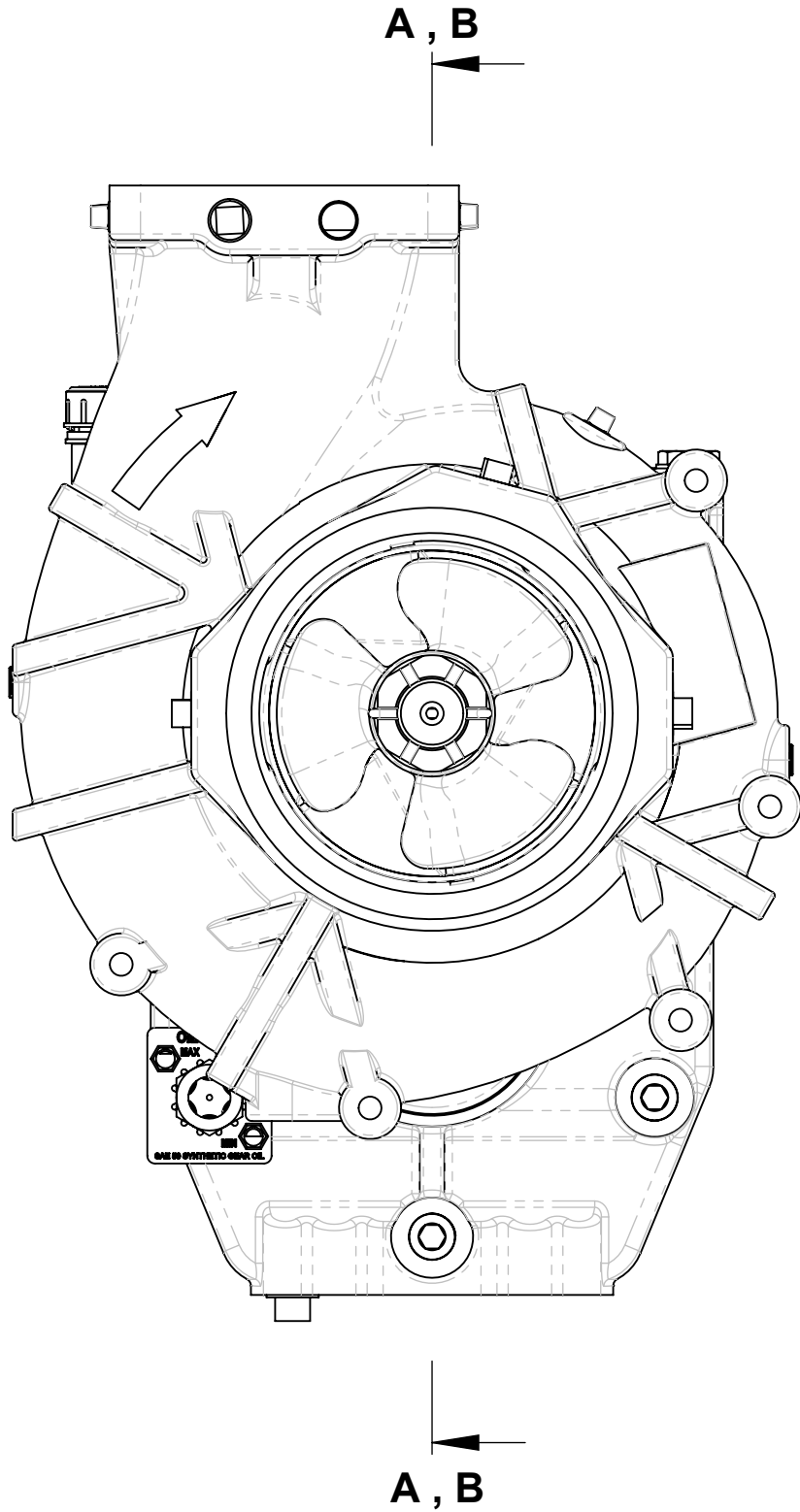
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	001-0601-00-0	VOLUTE BODY	1
	001-0601-03-0	VOLUTE BODY, BRONZE	
2	217-0801-00-0	PLUG, 1-1/2 NPT M.I.	1
	217-0801-01-0	PLUG, 1-1/2 NPT, BRZ PUMP	
3	321-0361-00-0	CLEARANCE RING	1
4	110-7040-00-0	NUT, IMPELLER	1
5	064-5070-01-0	PIN-5/32X2L SST COTTER	1
6	016-1080-00-0	INDUCER	1
7	016-0761-00-0	IMPELLER	1
8	296-5023-00-0	MECHANICAL SEAL	1
9	046-0440-00-0	GASKET HP-W323	1
10	040-1700-00-0	O-RING	1
11	321-00015-000	RING, REAR, WRAP AROUND, MBP-F	1
12	040-2220-10-0	O-Ring, TBP Mechanical Seal PTFE	1
13	002-00019-001	HEAD, PUMP, AP/MBP-F	1
	002-00019-003	HEAD, PUMP, AP/MBP-F, BRONZE	
14	MS35/10	NUT, FULL M12	4
15	MS29/8	WASHER, SPRING SQ M12	4
16	296-00019-000	SEAL, OIL, VITON	1
17	040-1580-00-0	O-RING, AS568-158, NITRILE	1
18	018-1812-25-0	SCREW, 7/16-14 X 1.25, GR8	12
	018-1812-05-0	SCREW, 7/16-14 X 1.25, SILICON BRONZE	
19	FSG-PL-01481	HALE FLEX SERIES GEARBOX	1
20	101-0900-00-0	ENGINE ROTATION DECAL	1
21	082-0318-02-0	ELBOW, 3/8 COMP X 3/8 COMP, 90 DEG	2
22	082-3028-00-0	FITTING 3/8 HOSE BARB x 3/8 TUBE	4
23	340-0490-00-0	HOSE, COOLER 3/8 ID, QTY. 3.5 FT	1
24	082-0333-02-0	TEE, 3/8 COMP X 1/4 MNPT	1
25	082-0513-00-0	BUSHING, 3/4 MNPT X 1/4 FNPT	1
	082-0513-02-0	BUSHING, 3/4 MNPT X 1/4 FNPT, BRZ PUMP	
26	082-0303-02-0	ELBOW, 3/8" COMP X 3/8 MNPT	1
27	217-0301-00-0	PLUG-3/8 NPT SQUARE HEAD	5
	217-0301-01-0	PLUG, 3/8 NPT SQUARE HEAD, BRZ PUMP	
	029-0110-00-0	ANODE (OPTIONAL)	4
28	217-0201-00-0	1/4 NPT SQUARE HEAD STEEL PLUG	5
	217-0201-01-0	PLUG, 1/4 NPT SQUARE HEAD, BRZ PUMP	
29	082-00211-600	PLUG, 1/4 NPT SOCKET HD STEEL	2
	217-0201-04-0	PLUG, PIPE 1/4 MNPT SOC HD BRS	

NOTES:
1. REFER TO TECHNICAL MANUAL (FSG-MNL-00184) AND "MAXIMUM TORQUE VALUES" AND "THREAD LOCKS & SEALANTS" TABLES ON SHEET 1 WHEN INSTALLING THREADED COMPONENTS, OIL SEALS, OR CLEARANCE RINGS.

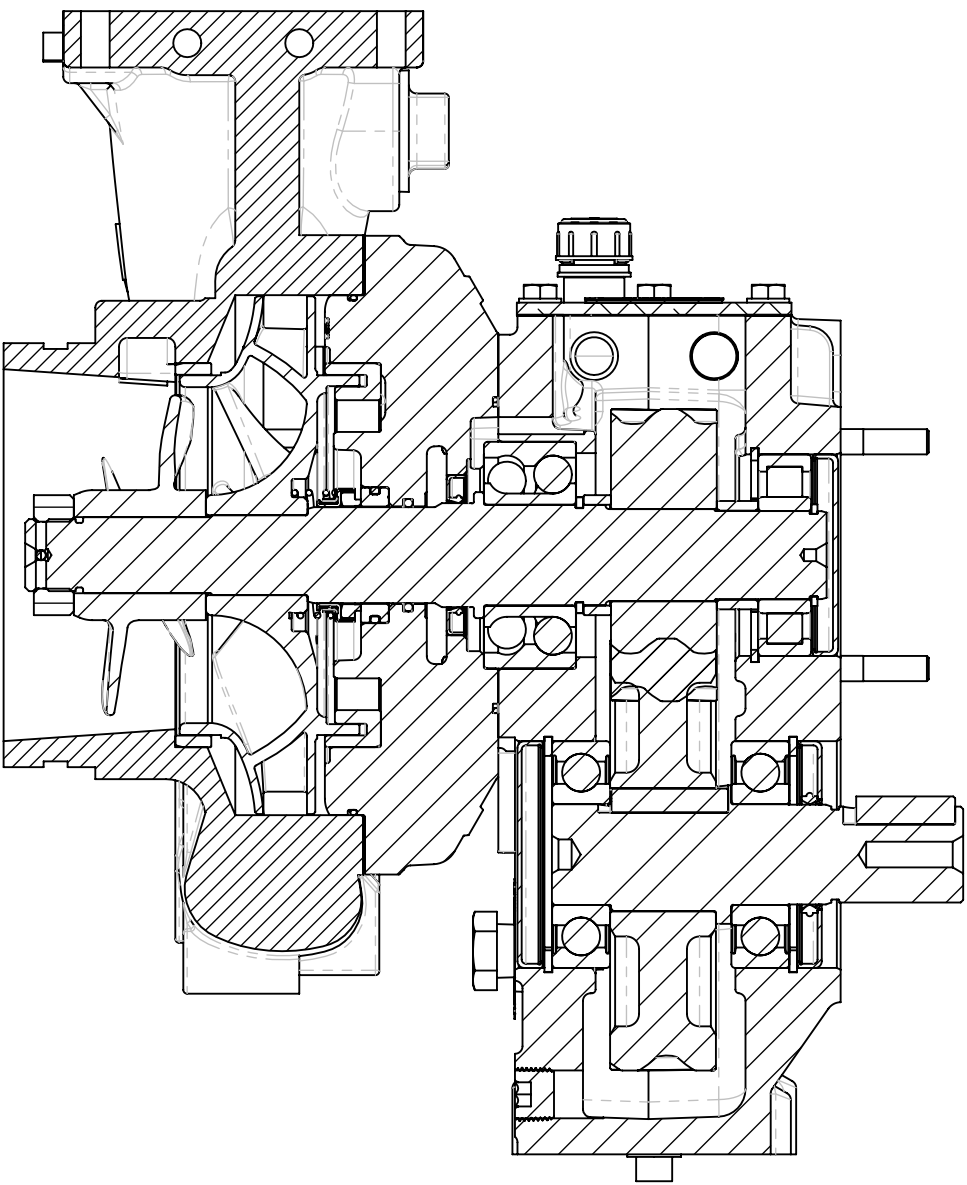
PARTS IDENTIFICATION PUMP HEAD GROUP

IF IN DOUBT ASK

PROJECTION: 

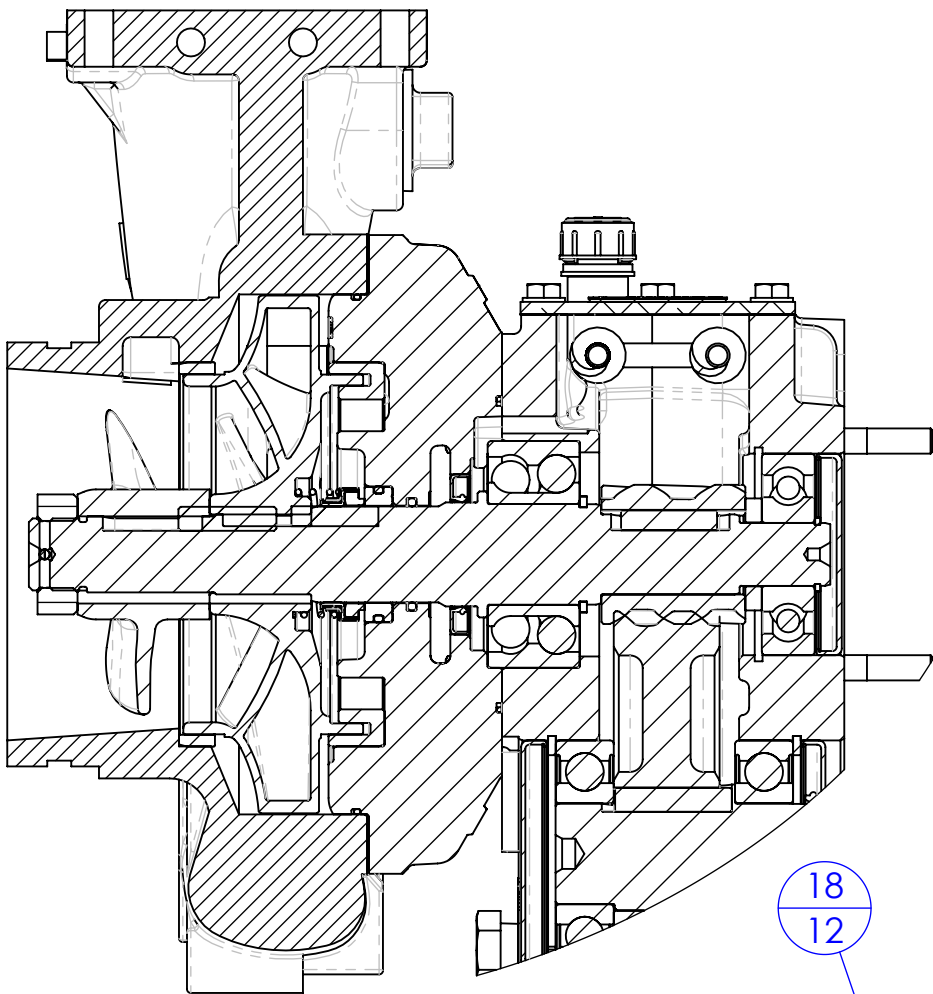


PUMP ASSEMBLY ALL RATIOS EXCEPT 3.74

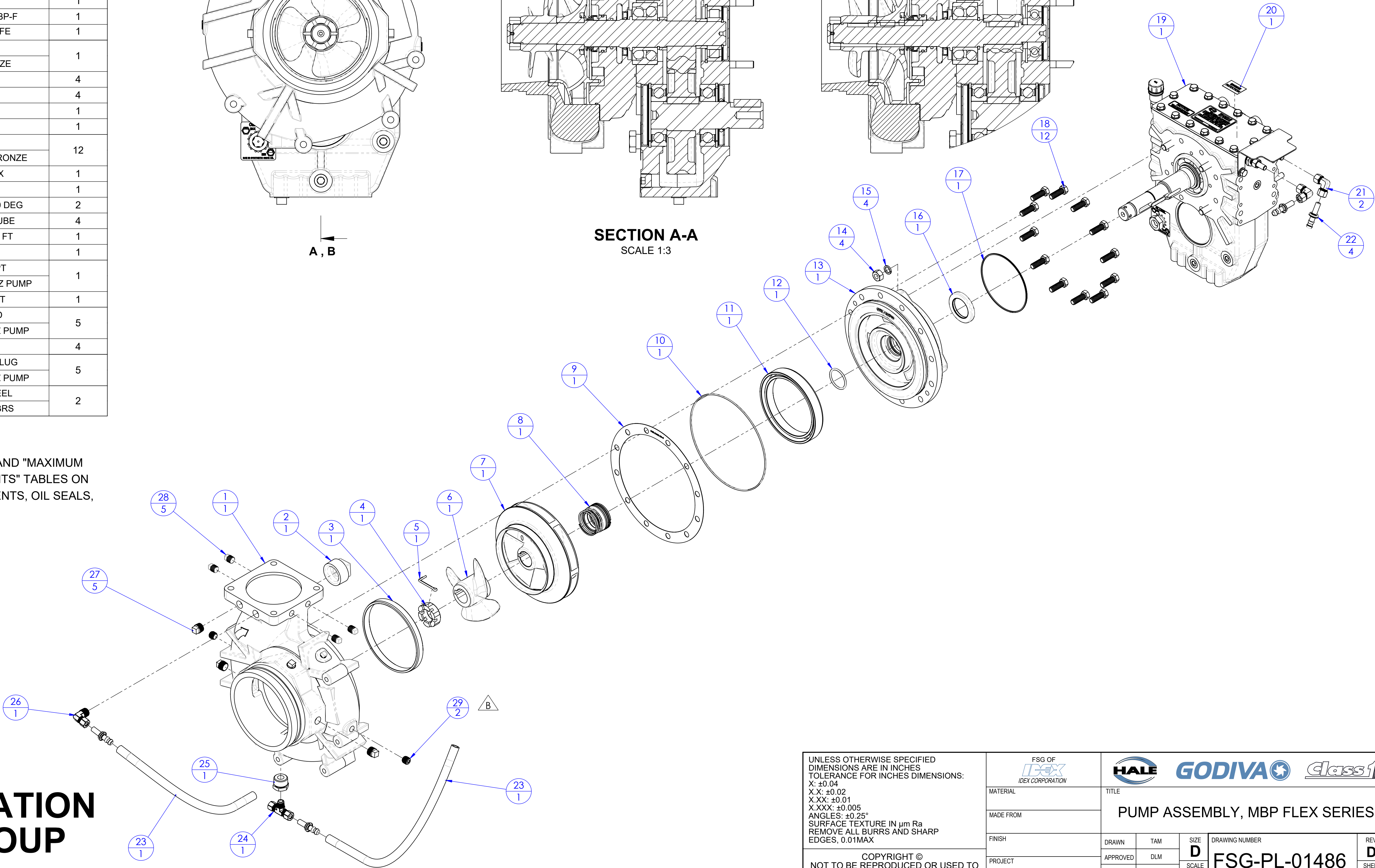


SECTION A-A
SCALE 1:3

PUMP ASSEMBLY 3.74 RATIO



SECTION B-B
SCALE 1 : 3



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE FOR INCHES DIMENSIONS:
X: ±0.04
X.X: ±0.02
X.XX: ±0.01
X.XXX: ±0.005
ANGLES: ±0.25°
SURFACE TEXTURE IN µm Ra
REMOVE ALL BURRS AND SHARP
EDGES, 0.01MAX

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FINISH			
PROJECT			

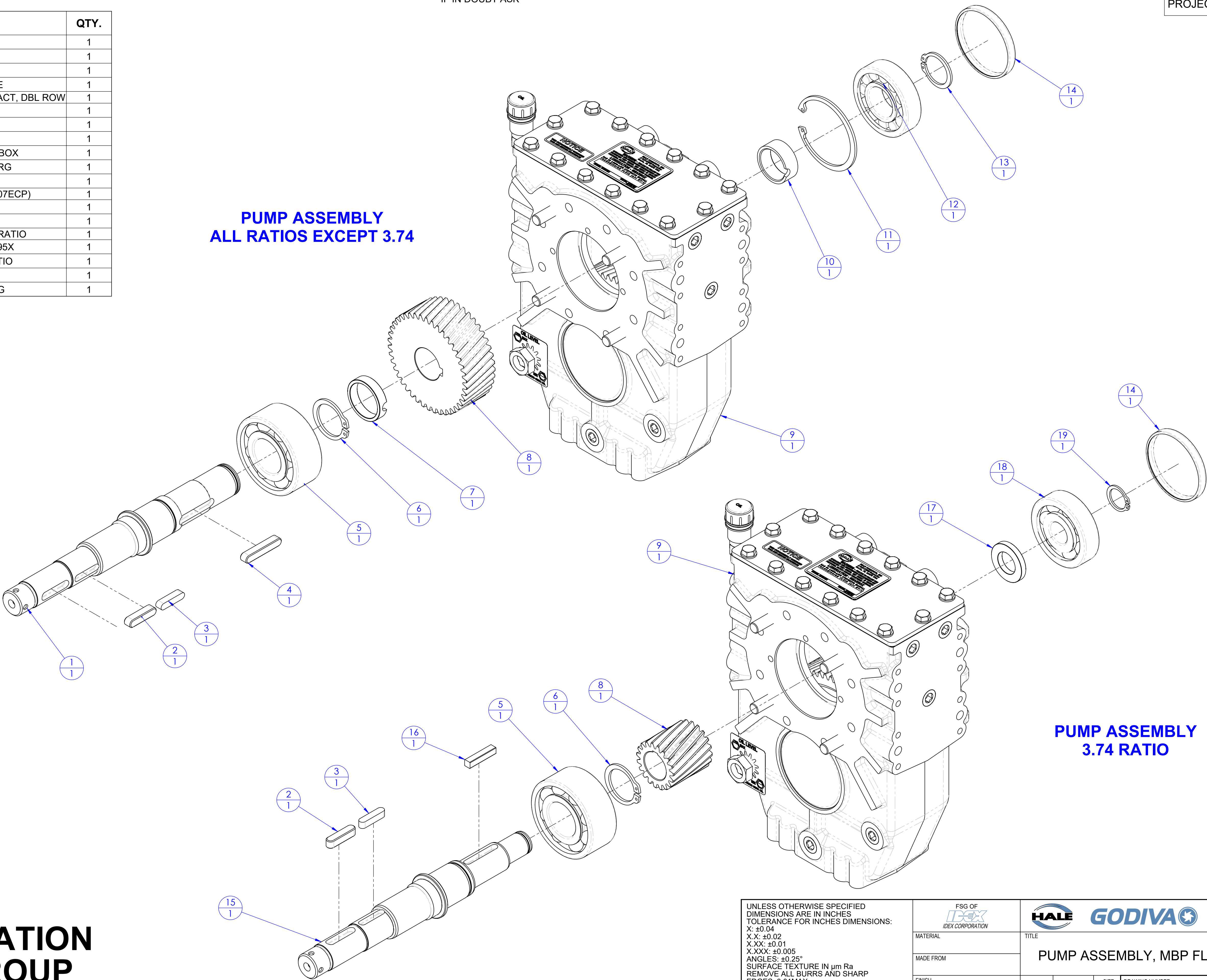
HALE		GODIVA		Class 1	
TITLE PUMP ASSEMBLY, MBP FLEX SERIES					
DRAWN	TAM	SIZE D	DRAWING NUMBER FSG-PL-01486		REV D
APPROVED	DLM	SCALE 1:4			SHEET 4 OF 6
DATE	19MAR2018				

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	037-00029-000	SHAFT, PUMP, MBP-F	1
2	017-0110-00-0	INDUCER KEY	1
3	017-0581-00-0	IMPELLER KEY	1
4	017-00015-000	KEY, 3/8 x 3/8 x 2.07, RE	1
5	250-00010	BEARING, 5308CS, ANGULAR CONTACT, DBL ROW	1
6	077-1560-05-0	RETAINING RING	1
7	159-00059-000	SPACER, GEAR	1
8	SEE TABLE	PUMP GEAR	1
9	FSG-PL-01481	HALE FLEX SERIES GEARBOX	1
10	159-2250-00-0	SPACER, GEARBOX, BORG	1
11	077-3150-00-0	RETAINING RING	1
12	250-8307-00-0	ROLLER BEARING (SKF RN307ECP)	1
13	077-1370-05-0	RETAINING RING	1
14	217-1300-00-0	ENDCAP, 80X10EC	1
15	037-00029-001	SHAFT, PUMP, MBP-F, 3.74 RATIO	1
16	017-0210-00-0	KEY, DRIVE SHAFT, P75-95X	1
17	159-00053-000	SPACER, GEAR, 3.74 RATIO	1
18	250-00013-000	BEARING, BALL, 405S	1
19	077-0980-05-0	78S98, RETAINING RING	1

ITEM 8 TABLE PUMP GEAR PART NUMBER			
RATIO NAME	GEAR RATIO	PUMP GEAR P/N (GEAR TEETH)	MATING GEAR P/N (GEAR TEETH)
-37F	3.74	031-1880-00-0 (19T)	031-00012-000 (71T)
-29F	2.91	031-2190-00-0 (23T)	031-2260-00-0 (67T)
-26F	2.60	031-2200-00-0 (25T)	031-2270-00-0 (65T)
-23F	2.33	031-2210-00-0 (27T)	031-2280-00-0 (63T)
-19F	1.90	031-2220-00-0 (31T)	031-2290-00-0 (59T)
-16F	1.64	031-2230-00-0 (34T)	031-2300-00-0 (56T)
-13F	1.31	031-2240-00-0 (39T)	031-2310-00-0 (51T)
-11F	1.14	031-2250-00-0 (42T)	031-2320-00-0 (48T)

NOTES:
1. REFER TO TECHNICAL MANUAL (FSG-MNL-00184) AND "MAXIMUM TORQUE VALUES" AND "THREAD LOCKS & SEALANTS" TABLES ON SHEET 1 WHEN INSTALLING THREADED COMPONENTS OR OIL SEALS/CAPS.

PARTS IDENTIFICATION
PUMP SHAFT GROUP

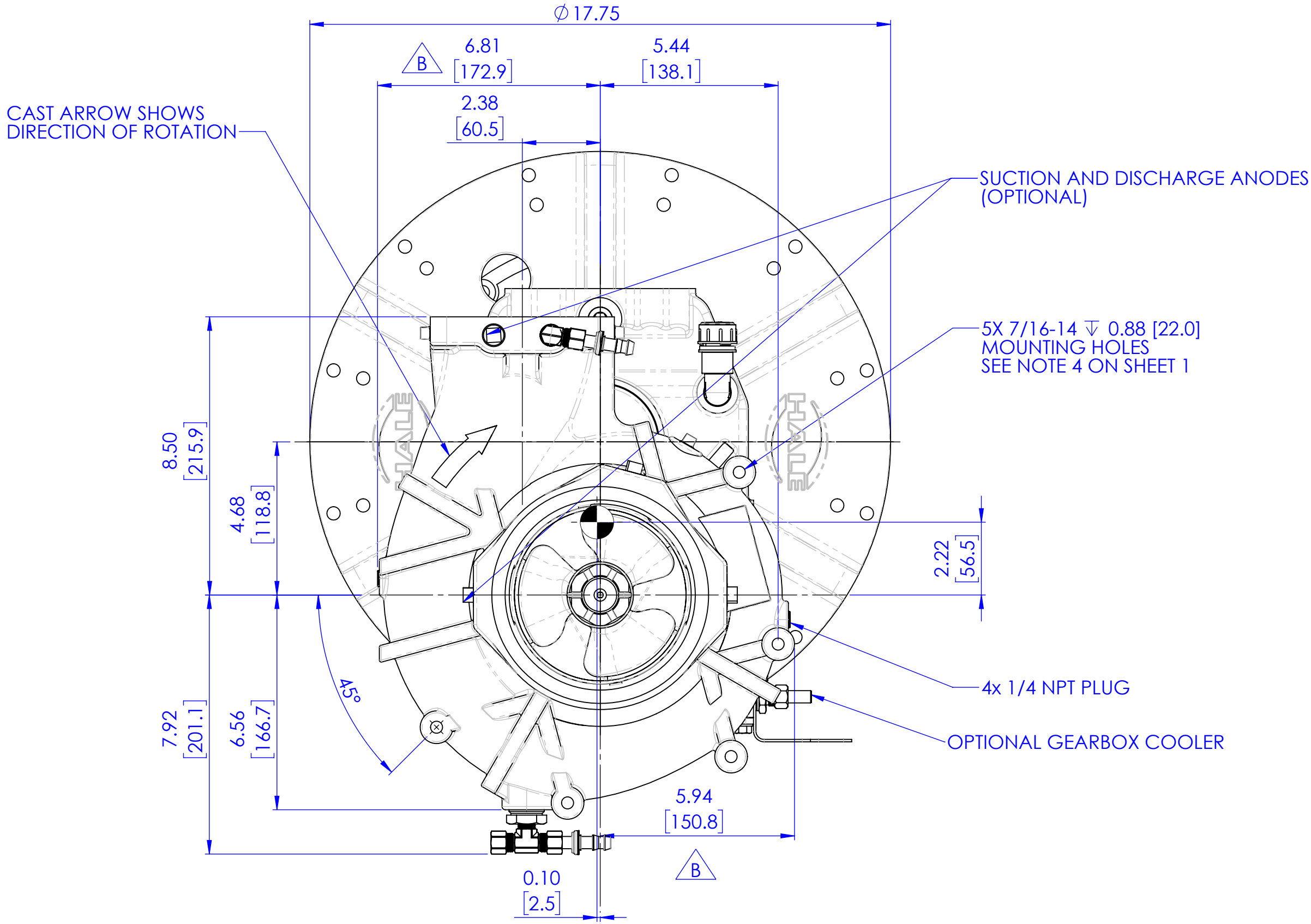
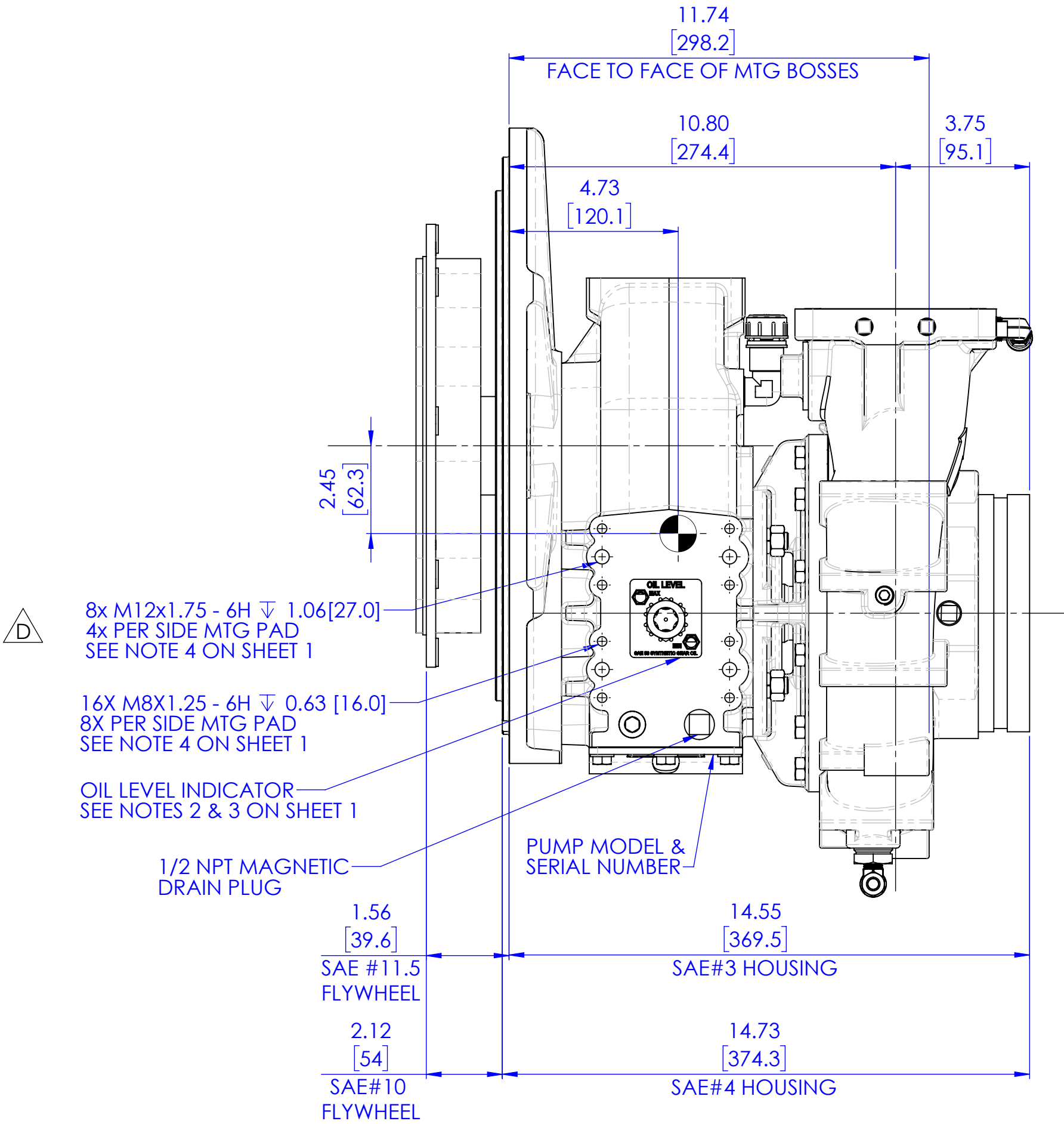
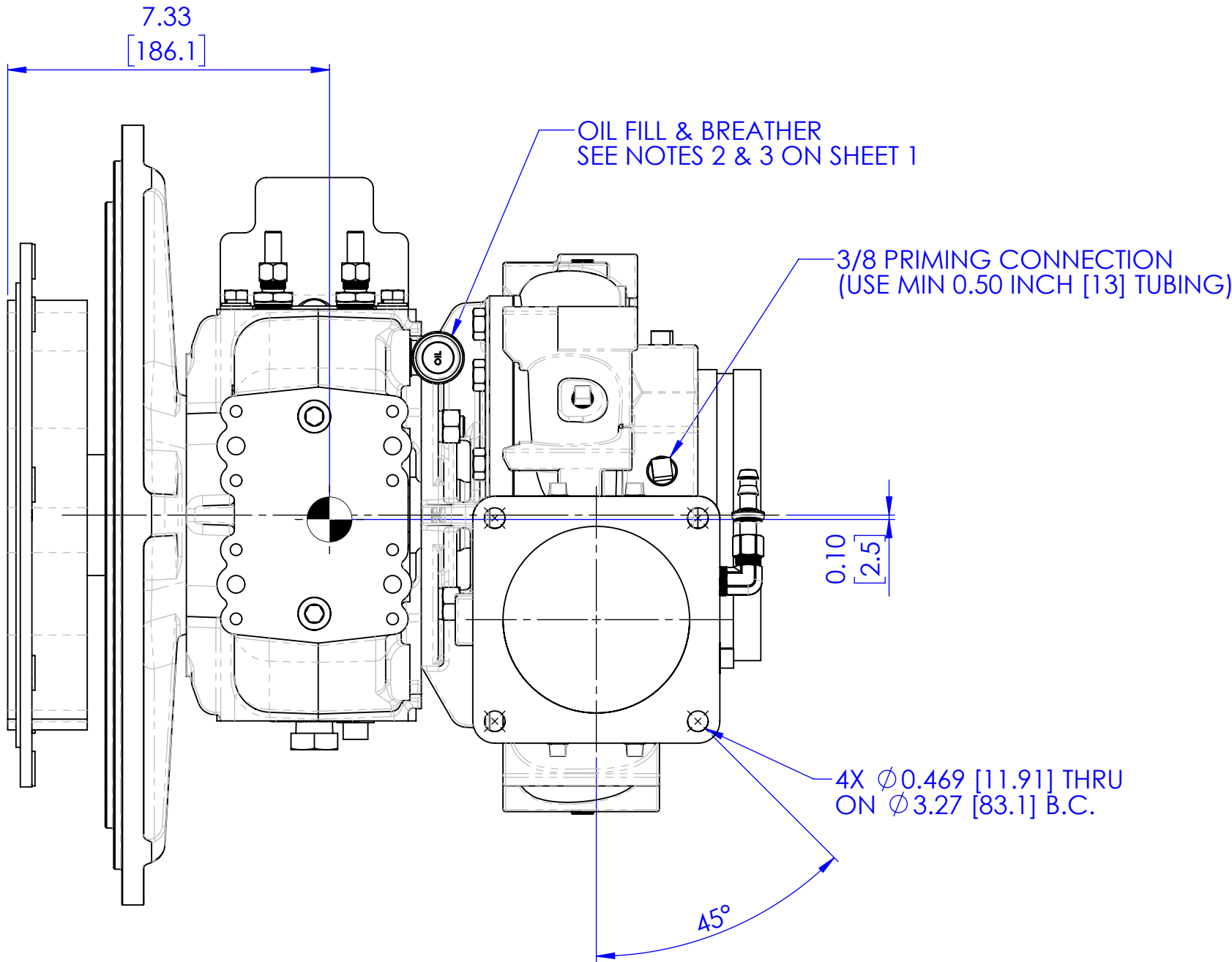


UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE FOR INCHES DIMENSIONS: X: ±0.04 X.X: ±0.02 X.XX: ±0.01 X.XXX: ±0.005 ANGLES: ±0.25° SURFACE TEXTURE IN µm Ra REMOVE ALL BURRS AND SHARP EDGES, 0.01MAX		FSG OF IDEX CORPORATION		HALE GODIVA Class 1	
MATERIAL		MADE FROM		TITLE PUMP ASSEMBLY, MBP FLEX SERIES	
FINISH		PROJECT		DRAWN TAM	REV D
DATE 19MAR2018		APPROVED DLM		SIZE D SCALE 1:3	DRAWING NUMBER FSG-PL-01486 SHEET 5 OF 6

HALE MBP FLEX SERIES PUMP

GEARBOX POSITION - INVERTED, DISCHARGE POSITION - 1,
ENGINE ROTATION AND OPTIONAL GEARBOX COOLER SHOWN

- NOTES:
- REFER TO "MAXIMUM TORQUE VALUES" AND "THREAD LOCKS & SEALANTS" TABLES ON SHEET 1 WHEN INSTALLING THREADED COMPONENTS.



ENGINE MOUNT (M) INSTALLATION

REVISIONS					
ECN	REV.	ZONE	CHANGED FROM	BY	DATE
1					

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE FOR INCHES DIMENSIONS: X: \pm 0.04 X.X: \pm 0.02 X.XX: \pm 0.01 X.XXX: \pm 0.005 ANGLES: \pm 0.25° SURFACE TEXTURE IN μ m Ra REMOVE ALL BURRS AND SHARP EDGES, 0.01MAX		FSG OF IDEX CORPORATION		HALE GODIVA Class1	
MATERIAL		MADE FROM		FINISH	
PROJECT		APPROVED		DATE	
COPYRIGHT © NOT TO BE REPRODUCED OR USED TO MAKE OTHER DRAWINGS OR MACHINERY		DRAWN		TAM	
		APPROVED		DLM	
		DATE		19MAR2018	
		SIZE		SCALE	
		D		5:16	
		DRAWING NUMBER		REV	
		FSG-PL-01486		D	
		SHEET		6 OF 6	