

NOTES:

- GRIND VOLUTE RIB WHERE NECESSARY TO AVOID INTERFERENCE (2) PLACES.
- SEE LIMIT CHART, HALE DOCUMENT F-72 FOR MAXIMUM ALLOWABLE PUMP PRESSURE, ENGINE HORSEPOWER AND TORQUE LIMITS FOR CENTRIFUGAL PUMPS.
- APPLY LOCTITE #246 HIGH TEMPERATURE THREAD LOCKER OR EQUIVALENT TO SCREW THREADS AND TORQUE SCREWS PER HALE ENGINEERING STANDARD ES018-002.
- UNLESS OTHERWISE INDICATED FASTENERS ARE GRADE 5 ZINC PLATED STEEL.

DRIVE LINE RECOMMENDATIONS

APPARATUS BUILDER SUPPLIED DRIVE LINES SHALL BE OF APPROPRIATE SIZE TO MATCH THE CHASSIS AND PUMP REQUIREMENTS WITH INDIVIDUAL JOINT CANCELLATION AND PHASING BEFORE AND AFTER THE PUMP. DRIVE SHAFT BALANCE (INCLUDING YOKES) SHALL NOT EXCEED THE RECOMMENDED LIMIT OF EITHER THE DRIVE SHAFT OR CHASSIS TRANSMISSION MANUFACTURER'S SPECIFICATIONS. DRIVE SHAFT FULL RANGE OPERATING SPEEDS SHALL NOT EXCEED 42% OF ITS CRITICAL SPEED.

WARNING

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

8FGF MAXIMUM PUMP PRESSURE:
HYDROSTATIC = 500 PSI
HYDRODYNAMIC = 400 PSI

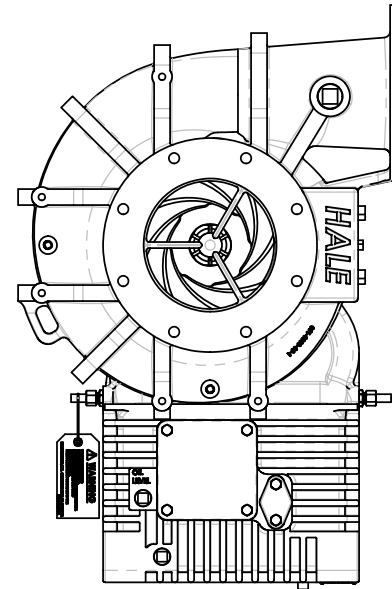
MAXIMUM POWER INPUT FOR PUMPING = 450 HP
MAXIMUM TORQUE ON PUMP SHAFT = 2300 LB-FT

PROJECTION:

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. | COMMENTS |
|----------|-------------------|-------------------------------|------|-------------|
| 1 | 504-0020-000 | RG GEARBOX, MARINE 8FGF PTO | 1 | SEE SHEET 2 |
| 2 | IMPELLER ASSEMBLY | 8FGF BRONZE IMPELLER ASSEMBLY | 1 | SEE SHEET 2 |
| 3 | 001-0830-05-0 | VOLUTE BODY | 1 | |
| 4 | 321-0101-00-0 | CLEARANCE RING | 1 | |
| 5 | 018-1812-05-0 | SCREW, 7/16-14 X 1.25, BRNZ | 16 | |
| 6 | 018-1812-25-0 | SCREW, 7/16-14 X 1.25, GR8 | 8 | |
| 7 | 217-0501-01-0 | PLUG-3/4 NPT BRASS | 2 | |
| 8 | 217-0301-01-0 | PLUG-3/8 NPT BRASS | 1 | |
| 9 | 217-0401-01-0 | PLUG-1/2 NPT BRASS | 1 | |
| 10 | 217-0201-01-0 | PLUG-1/4 NPT BRASS | 3 | |
| 11 | 217-0701-01-0 | PLUG-1 1/4 NPT BRASS | 1 | |

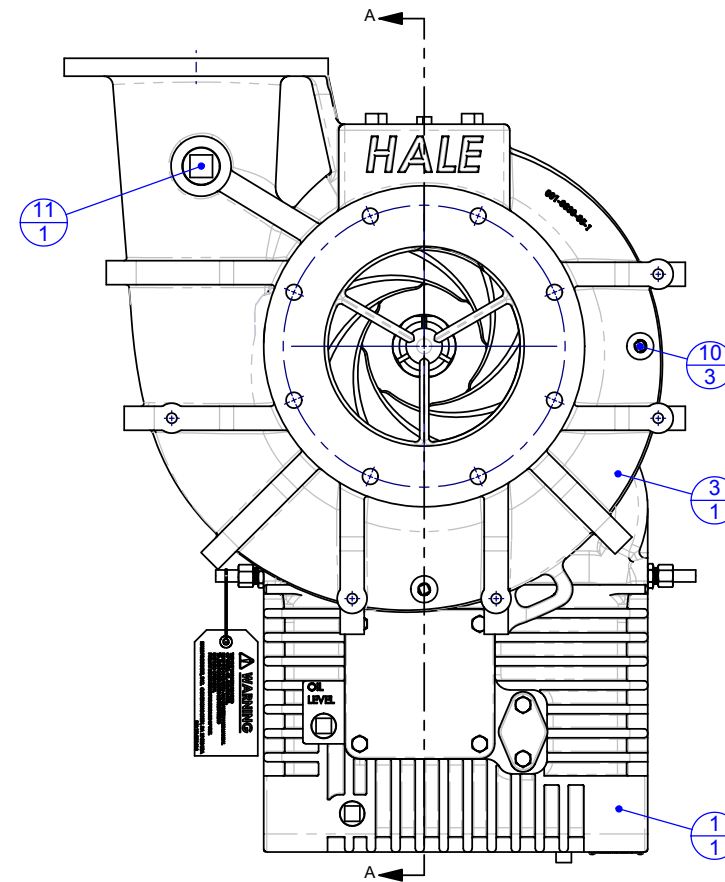
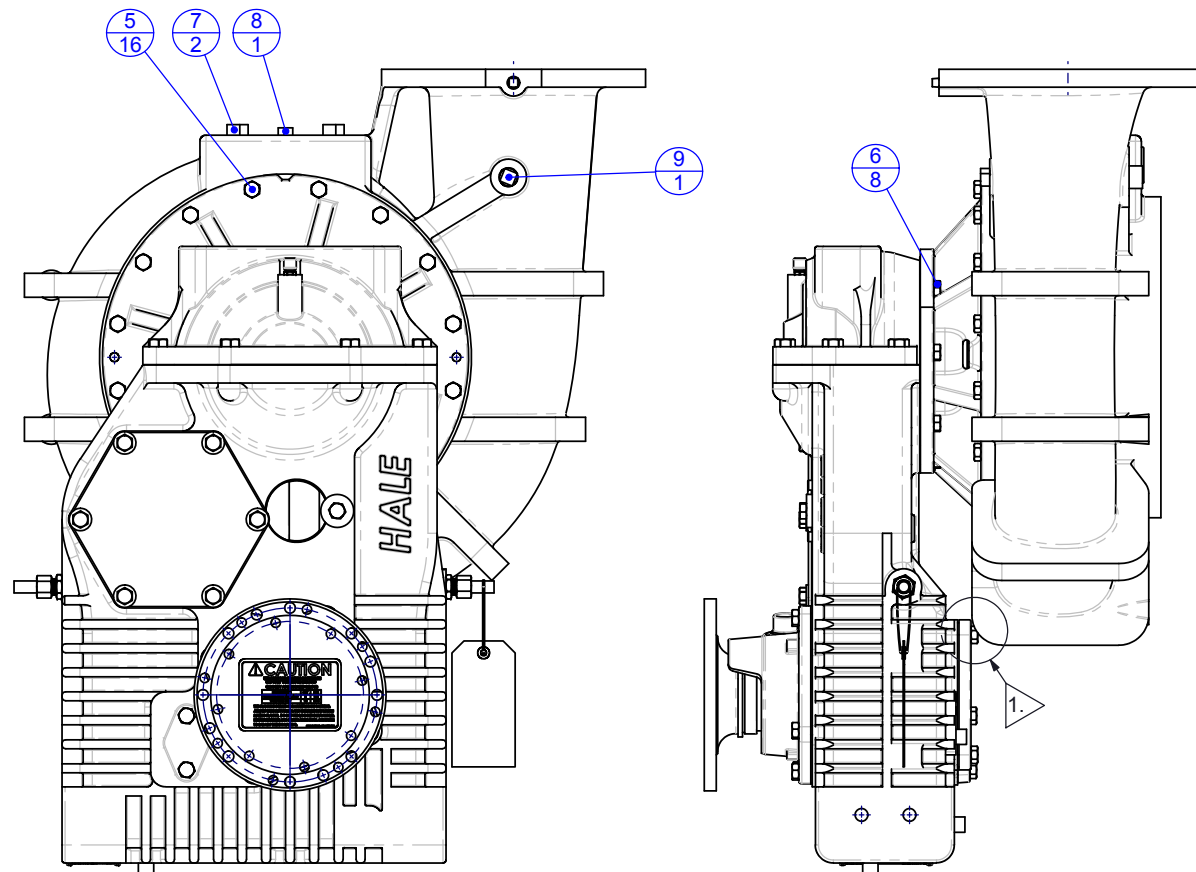
| PUMP ASSEMBLY PART NUMBERS | |
|----------------------------|--------------------------------|
| PART NUMBER | DESCRIPTION |
| 501-00019-000 | 8FGF-15RG PTO, VERT GRBX, P#21 |
| 501-00019-001 | 8FGF-17RG PTO, VERT GRBX, P#21 |
| 501-00019-002 | 8FGF-19RG PTO, VERT GRBX, P#21 |
| 501-00019-003 | 8FGF-21RG PTO, VERT GRBX, P#21 |
| 501-00019-004 | 8FGF-23RG PTO, VERT GRBX, P#21 |

| PUMP ASSEMBLY PART NUMBERS | |
|----------------------------|--------------------------------|
| PART NUMBER | DESCRIPTION |
| 501-00019-010 | 8FGF-15RG PTO, VERT GRBX, P#25 |
| 501-00019-011 | 8FGF-17RG PTO, VERT GRBX, P#25 |
| 501-00019-012 | 8FGF-19RG PTO, VERT GRBX, P#25 |
| 501-00019-013 | 8FGF-21RG PTO, VERT GRBX, P#25 |
| 501-00019-014 | 8FGF-23RG PTO, VERT GRBX, P#25 |

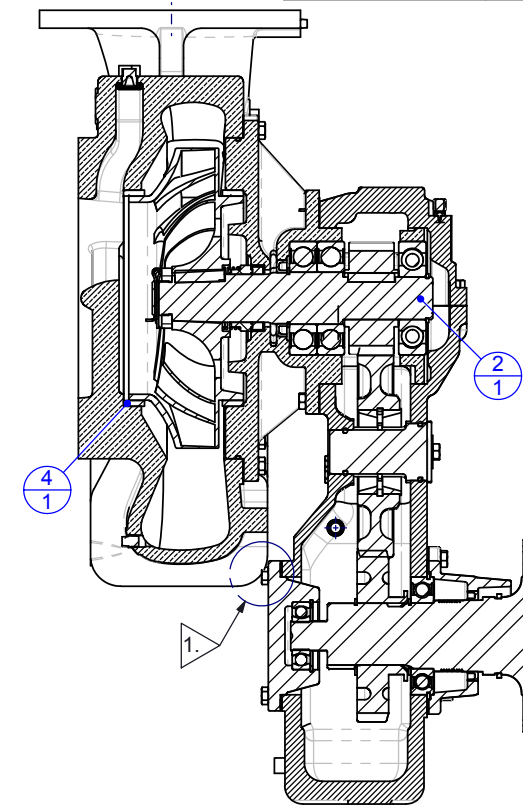


SCALE 1:6

HORIZONTAL VOLUTE - POSITION #25 - CW ROTATION



VERTICAL VOLUTE - POSITION #21 - CW ROTATION



SECTION A-A

MARINE 8FGF-RG PTO PUMP WITH VERTICAL GEARBOX

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS (INCHES ARE FOR REFERENCE, ONLY) TOLERANCE FOR MILLIMETER DIMENSIONS:
X: ±1
X.X: ±0.5
X.XX: ±0.25
X.XXX: ±0.125
ANGLES: ±0.25°
SURFACE TEXTURE IN µm Ra REMOVE ALL SHARP EDGES, 0.25MAX

COPYRIGHT © NOT TO BE REPRODUCED OR USED TO MAKE OTHER DRAWINGS OR MACHINERY

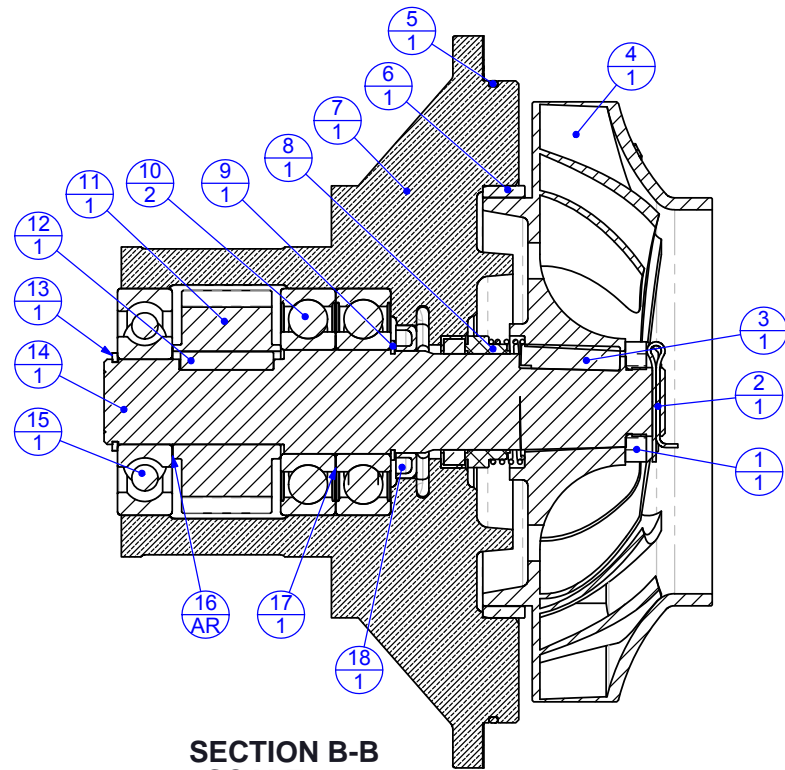
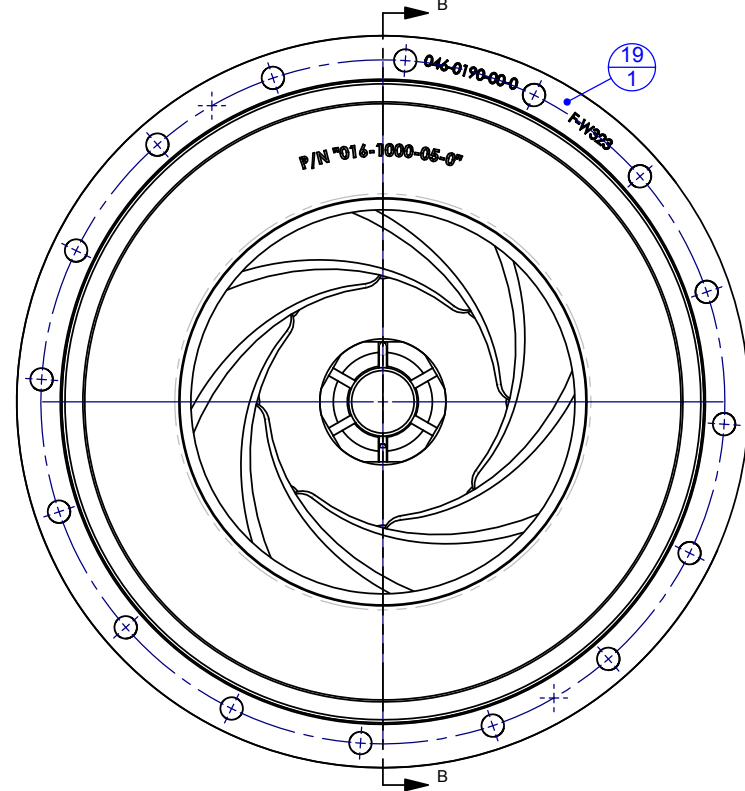
| | | | |
|----------------|-------------------------------|-----------|--------|
| | | | |
| MATERIAL | TITLE | | |
| MADE FROM | 8FGF-RG PTO, VERTICAL GEARBOX | | |
| FINISH | DRAWN | JRP | SIZE |
| PROJECT | APPROVED | JRP | D |
| | DATE | 06NOV2013 | SCALE |
| | | | 1:4 |
| DRAWING NUMBER | | | REV |
| FSG-PL-01351 | | | A |
| | | | SHEET |
| | | | 1 OF 3 |

| REVISIONS | | | | | | |
|-----------|------|------|---------------------------|-----|-----------|------|
| ECN | REV. | ZONE | CHANGED FROM | BY | DATE | APVD |
| CFL3140 | A | - | RELEASE FOR DOCUMENTATION | JRP | 06NOV2013 | JRP |

IMPELLER ASSEMBLY

PROJECTION:

- SHIM NOTE:**
 USING 0.005" FEELER GAUGE, CHECK PUMP SHAFT FLOAT BETWEEN 409 BEARING AND GEARBOX HOUSING. IF FLOAT IS LESS THAN 0.005" SHIMS MUST BE REMOVED AS FOLLOWS:
- REMOVE 7/16-14 X 1-1/4 CAP SCREWS THAT HOLD IMPELLER ASSEMBLY TO GEARBOX.
 - REMOVE RETAINING RING SECURING 409 BEARING TO PUMP SHAFT.
 - REMOVE 409 BEARING AND SHIM.
 - RE-INSTALL 409 BEARING ONTO SHAFT AND SECURE IN PLACE USING RETAINING RING.
 - RE INSTALL 7/16-14 X 1-1/4 CAP SCREWS.



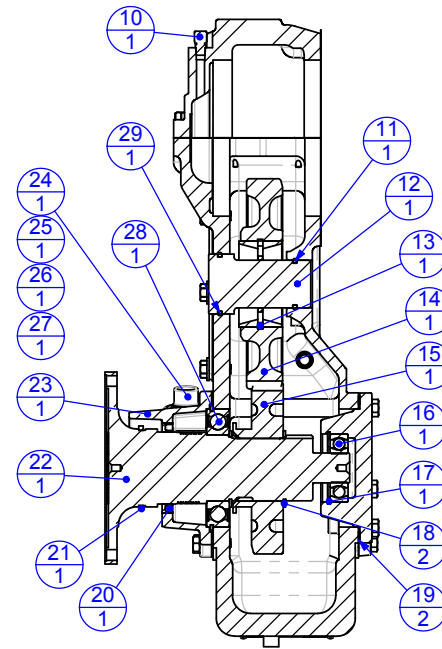
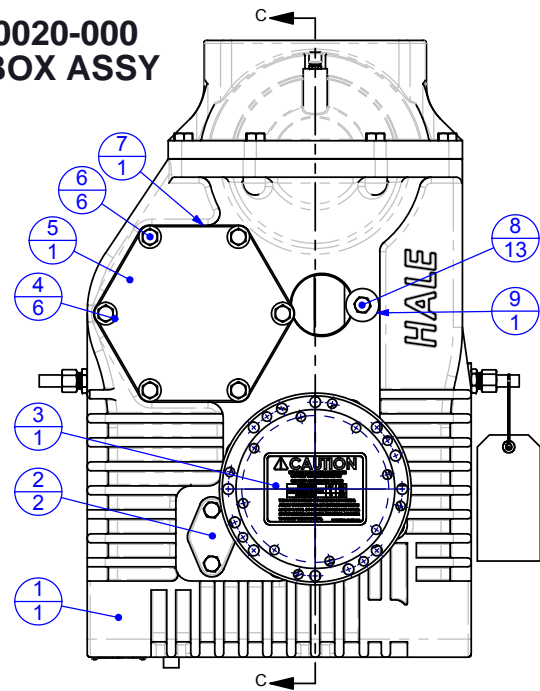
SECTION B-B
SCALE 1 : 2

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|------------------|------------------------------------|------|
| 1 | 110-7060-00-0 | ZM-274 IMPELLER NUT | 1 |
| 2 | 064-5080-01-0 | PIN-5/32X2.5L SST COTTER | 1 |
| 3 | 017-0650-00-0 | 60FCG IMPELLER KEY | 1 |
| 4 | 016-1000-00-0 | 8FG IMPELLER | 1 |
| 5 | 040-2790-00-0 | SEAL RING | 1 |
| 6 | 321-0101-00-0 | CLEARANCE RING | 1 |
| 7 | REAR BEARING HSG | SEE GEAR AND BEARING HOUSING TABLE | 1 |
| 8 | 296-5210-09-0 | MECHANICAL SEAL | 1 |
| 9 | 077-2120-01-0 | RETAINING RING | 1 |
| 10 | 250-0311-20-0 | BEARING, 311M | 2 |
| 11 | PUMP SHAFT GEAR | SEE GEAR AND BEARING HOUSING TABLE | 1 |
| 12 | 017-0300-00-0 | DRIVEN SHAFT KEY | 1 |
| 13 | 077-1750-05-0 | 78S175 (5F-77) RETAINING RING | 1 |
| 14 | 037-1860-00-0 | 8FG PUMP SHAFT | 1 |
| 15 | 250-0409-00-0 | BEARING, 409K, 409S, 6409 | 1 |
| 16 | 048-0170-00-0 | 344-09 (C-344) SHIM | AR |
| 17 | 048-0150-00-0 | 344-11 (T-344) SHIM | 1 |
| 18 | 296-2090-01-0 | OIL SEAL | 1 |
| 19 | 046-0190-00-0 | F-W323 GASKET | 1 |

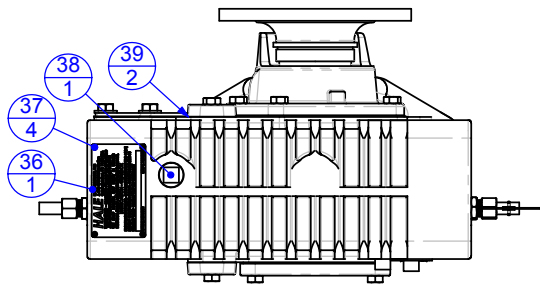
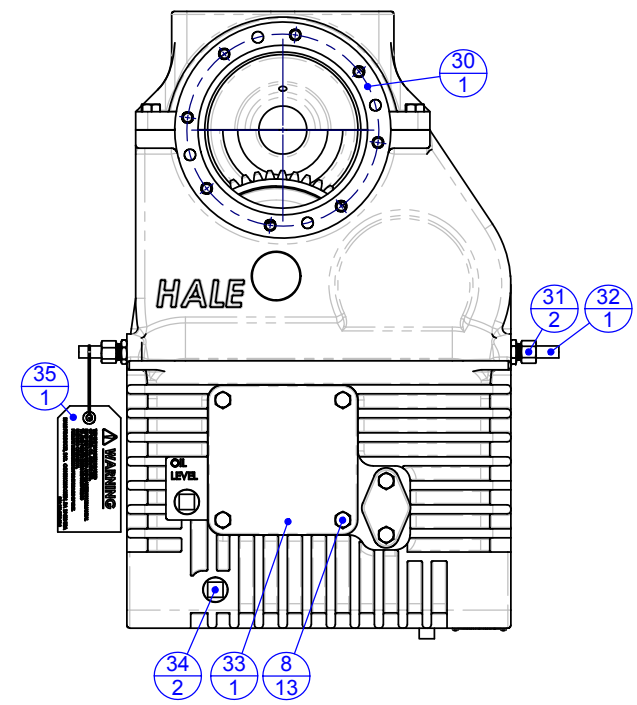
| GEAR AND BEARING HOUSING TABLE | | | | |
|--------------------------------|------------|---------------|-----------------------|------------------------|
| GEAR RATIO | GEAR TEETH | GEAR PART NO. | REAR HOUSING PART NO. | IMPELLER ASSY PART NO. |
| 1.58 | 26 | 031-0960-00-0 | 062-0661-03-0 | 516-0660-26-0 |
| 1.71 | 24 | 031-0950-00-0 | 062-0661-04-0 | 516-0660-28-0 |
| 1.86 | 22 | 031-0940-00-0 | 062-0661-05-0 | 516-0660-30-0 |
| 2.05 | 20 | 031-0930-00-0 | 062-0661-04-0 | 516-0660-35-0 |
| 2.28 | 18 | 031-0920-00-0 | 062-0661-03-0 | 516-0660-45-0 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|---------------|--------------------------------------|------|
| 1 | 504-0440-01-0 | GEARBOX | 1 |
| 2 | 115-0091-01-0 | GEARSHIFT SHAFT FLANGE | 2 |
| 3 | 101-1730-00-0 | DRIVELINE FLANGE CAUTION STICKER | 1 |
| 4 | 097-0250-00-0 | ZEYC-396 WASHER | 6 |
| 5 | 044-0190-00-0 | BLANK OFF PLATE | 1 |
| 6 | 018-1810-02-0 | SCREW, 7/16-14 X 1, GR8 | 6 |
| 7 | 046-0090-00-0 | GASKET, VHQ-295V | 1 |
| 8 | 018-1812-25-0 | SCREW, 7/16-14 X 1.25, GR8 | 13 |
| 9 | 097-1330-00-0 | WASHER, G GEARBOX INTERMEDIATE SHAFT | 1 |
| 10 | 044-0260-00-0 | VENT, AIR 1/8 MPT | 1 |
| 11 | 040-2240-00-0 | SEAL RING | 1 |
| 12 | 037-1530-00-0 | G INTERMEDIATE SHAFT | 1 |
| 13 | 250-8040-00-0 | BEARING, G INTERMEDIATE TAPER | 1 |
| 14 | 031-0980-00-0 | INTERMEDIATE GEAR | 1 |
| 15 | 031-0970-00-0 | SLIDING GEAR | 1 |
| 16 | 250-0306-20-0 | 306W BEARING | 1 |
| 17 | 077-2810-00-0 | RETAINING RING | 1 |
| 18 | 077-2750-01-0 | RETAINING RING | 2 |
| 19 | 046-5130-01-0 | GEARBOX BEARING COVER GASKET | 2 |
| 20 | 296-2540-00-0 | QHD OIL SEAL | 1 |
| 21 | 142-0160-00-0 | SLINGER | 1 |
| 22 | 537-1740-01-0 | SLIDING GEAR SHAFT | 1 |
| 23 | 008-0571-00-0 | FRONT BEARING CAP | 1 |
| 24 | 008-0070-00-0 | SPEEDOMETER DUST CAP | 1 |
| 25 | 007-0040-00-0 | ZSF-425 SPEEDCOUNTER ADAPTER | 1 |
| 26 | 040-0180-00-0 | O-RING | 1 |
| 27 | 031-0170-00-0 | ZSF-204 S'COUNTER DRIVE GEAR | 1 |
| 28 | 250-0214-06-0 | 214KG BEARING | 1 |
| 29 | 040-2280-00-0 | SHAFT SEAL RING | 1 |
| 30 | 046-6020-00-0 | GASKET, CIR-W263 | 1 |
| 31 | 088-0040-00-0 | 1/2 NPT TO 1/2 TUBE CONNECTOR BRASS | 2 |
| 32 | 007-0100-00-0 | DRIVE UNIT COOLING TUBE | 1 |
| 33 | 044-1120-00-0 | BEARING COVER | 1 |
| 34 | 217-0501-00-0 | PLUG-3/4 NPT M.I. | 2 |
| 35 | 101-0310-00-0 | TAG WATER/OIL/FUEL DRAINED | 1 |
| 36 | 101-0082-00-0 | SERIAL NUMBER PLATE | 1 |
| 37 | 018-5002-00-0 | #4-40 x 1/4LG SCREW | 4 |
| 38 | 217-0501-08-0 | 3/4 NPT MAGNETIC DRAIN PLUG | 1 |
| 39 | 046-5060-00-0 | GASKET QL-W429 | 2 |

504-00020-000 GEARBOX ASSY



SECTION C-C



MARINE 8FGF-RG PTO PUMP WITH VERTICAL GEARBOX

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS (INCHES ARE FOR REFERENCE, ONLY) TOLERANCE FOR MILLIMETER DIMENSIONS:
 X: ±1
 X.X: ±0.5
 X.XX: ±0.25
 X.XXX: ±0.125
 ANGLES: ±0.25°
 SURFACE TEXTURE IN µm Ra REMOVE ALL SHARP EDGES, 0.25MAX

COPYRIGHT © NOT TO BE REPRODUCED OR USED TO MAKE OTHER DRAWINGS OR MACHINERY

| | | | |
|-------------------------|-------------------------------|--------------------|-------|
| FSG OF IDEX CORPORATION | | HALE GODIVA Class1 | |
| MATERIAL | TITLE | | |
| MADE FROM | 8FGF-RG PTO, VERTICAL GEARBOX | | |
| FINISH | DRAWN | JRP | SIZE |
| PROJECT | APPROVED | JRP | D |
| | DATE | 06NOV2013 | SCALE |
| | | | 1:4 |
| DRAWING NUMBER | | REV | |
| FSG-PL-01351 | | A | |
| | | SHEET 2 OF 3 | |

| REVISIONS | | | | | |
|-----------|------|------|---------------------------|-----|-----------|
| ECN | REV. | ZONE | CHANGED FROM | BY | DATE |
| CFL3140 | A | - | RELEASE FOR DOCUMENTATION | JRP | 06NOV2013 |

PUMP RATING OPTIONS (SELECT ONE):

- 2500 GPM @ 150 PSI
- 3000 GPM @ 150 PSI
- 3000 GPM @ 100 PSI

PUMP LIGHT KIT OPTION (SELECT ONE):

- NFPA MIDSHIP LIGHT KIT
- NO LIGHT KIT

PUMP MANUAL OPTION (SELECT ONE):

- PAPER MANUAL
- CD VERSION (2)

PANEL PLACARD OPTION (SELECT ONE):

- STAMPED SERIAL NUMBER PLACARD
- NO PANEL PLACARD

PAINT OPTION (SELECT ONE):

- BLACK PRIMER
- GRAY PRIMER
- HALE BLACK FINISH COAT
- HALE RED FINISH COAT

TACHOMETER OPTION (SELECT ONE):

- NO CABLE OR PANEL ADAPTER
- PANEL ADAPTER ONLY
- CABLE AND PANEL ADAPTER

AUX. DISCH. PORT OPTIONS (SELECT ONE):

- TRV-120
- TRV-120L
- MAGNESIUM ANODE
- ALLOY ANODE
- 1-1/4 NPT PLUG (STANDARD)

DISCHARGE FLANGE OPTIONS (SELECT ONE):

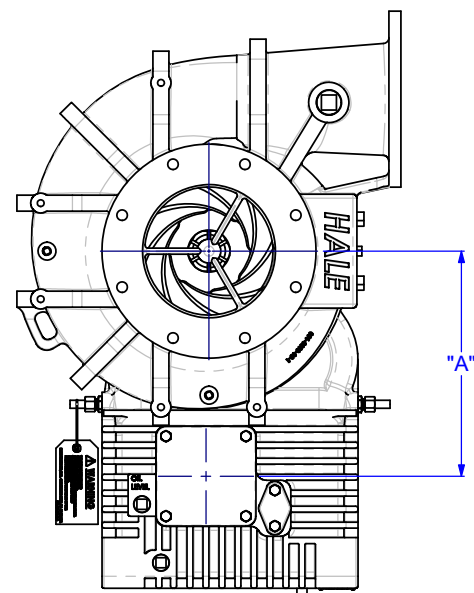
- NONE (6 X 11 ASA 150# OPEN PUMP FLANGE)
- DISCHARGE FLANGE 6.0 INCH NPT (CAST IRON)
- DISCHARGE FLANGE 6.0 INCH NPT (STAINLESS)

SUCTION FLANGE OPTIONS (SELECT ONE):

- NONE (8 X 13 ASA 150# OPEN PUMP FLANGE)
- SUCTION FLANGE 8.0 INCH NPT (CAST IRON)
- SUCTION FLANGE 8.0 INCH NPT (STAINLESS)

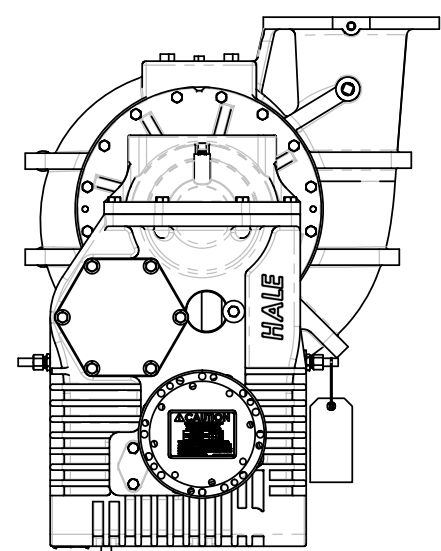
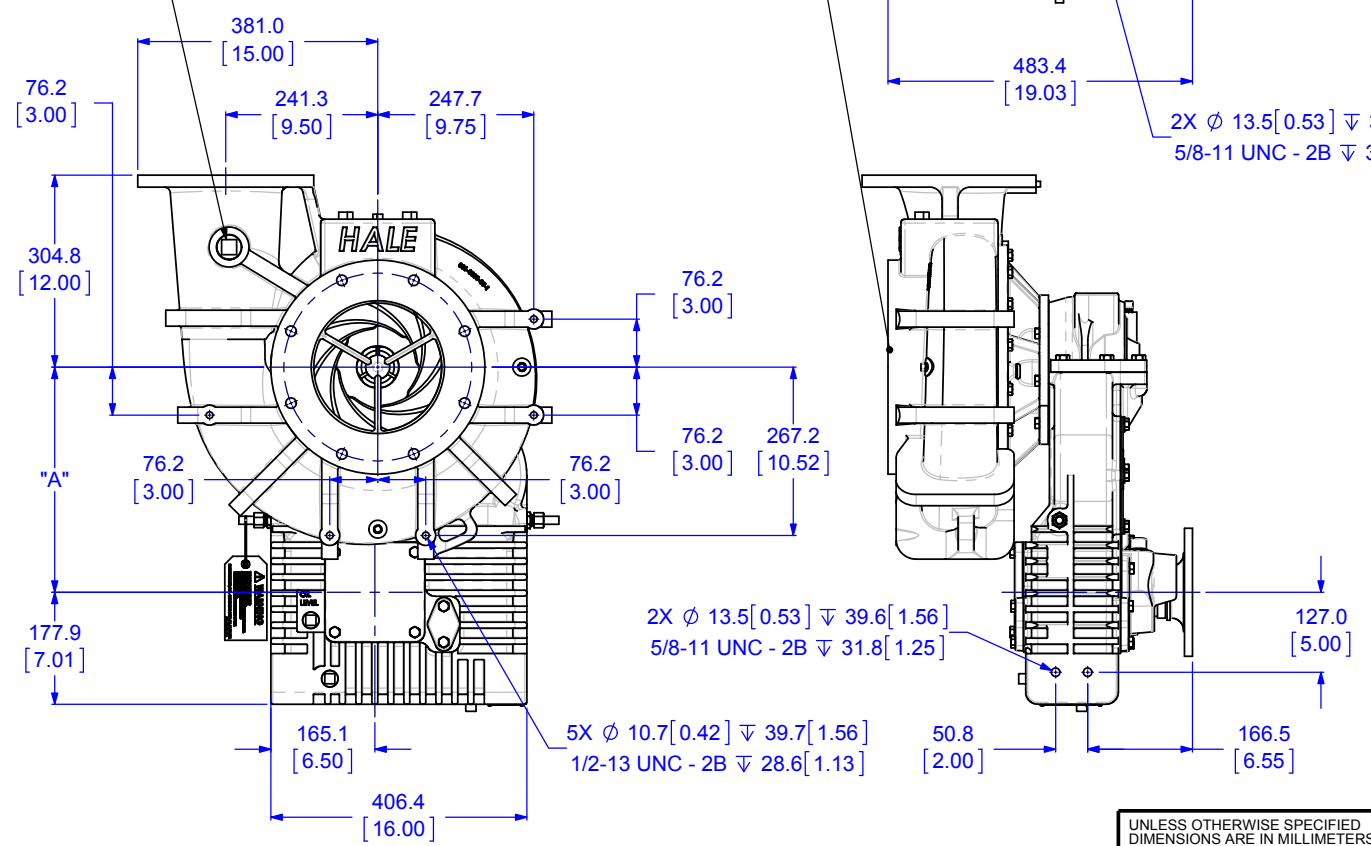
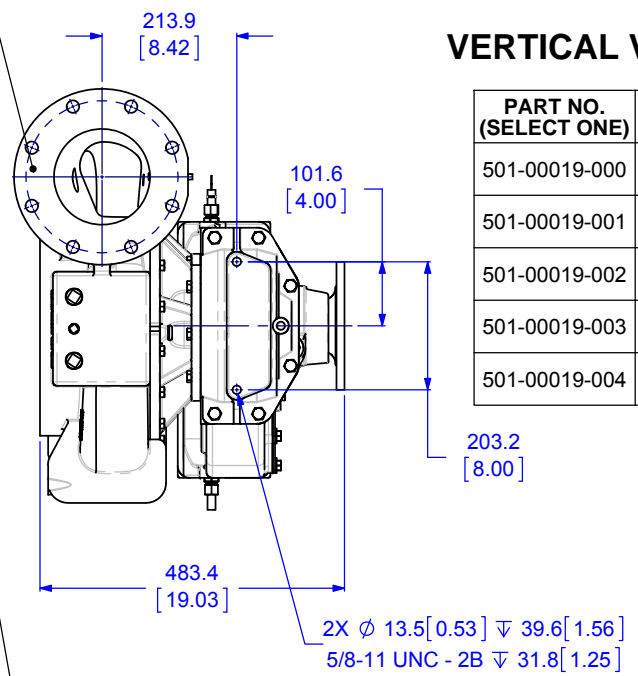
HORIZONTAL VOLUTE - POSITION #25 - CW ROTATION

| PART NO. (SELECT ONE) | DESCRIPTION | GEAR RATIO | DIMENSION "A" |
|-----------------------|--------------------------------|------------|---------------|
| 501-00019-010 | 8FGF-15RG PTO, VERT GRBX, P#25 | 1.58 | 358.8 [14.13] |
| 501-00019-011 | 8FGF-17RG PTO, VERT GRBX, P#25 | 1.71 | 354.0 [13.94] |
| 501-00019-012 | 8FGF-19RG PTO, VERT GRBX, P#25 | 1.86 | 349.3 [13.75] |
| 501-00019-013 | 8FGF-21RG PTO, VERT GRBX, P#25 | 2.05 | 344.5 [13.56] |
| 501-00019-014 | 8FGF-23RG PTO, VERT GRBX, P#25 | 2.28 | 339.7 [13.38] |



VERTICAL VOLUTE - POSITION #21 - CW ROTATION

| PART NO. (SELECT ONE) | DESCRIPTION | GEAR RATIO | DIMENSION "A" |
|-----------------------|--------------------------------|------------|---------------|
| 501-00019-000 | 8FGF-15RG PTO, VERT GRBX, P#21 | 1.58 | 358.8 [14.13] |
| 501-00019-001 | 8FGF-17RG PTO, VERT GRBX, P#21 | 1.71 | 354.0 [13.94] |
| 501-00019-002 | 8FGF-19RG PTO, VERT GRBX, P#21 | 1.86 | 349.3 [13.75] |
| 501-00019-003 | 8FGF-21RG PTO, VERT GRBX, P#21 | 2.05 | 344.5 [13.56] |
| 501-00019-004 | 8FGF-23RG PTO, VERT GRBX, P#21 | 2.28 | 339.7 [13.38] |





SALES/OPTION ORDER ENTRY DRAWING

MARINE 8FGF-RG PTO PUMP WITH VERTICAL GEARBOX

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS [INCHES ARE FOR REFERENCE, ONLY] TOLERANCE FOR MILLIMETER DIMENSIONS:
 X: ±1
 X.X: ±0.5
 X.XX: ±0.25
 X.XXX: ±0.125
 ANGLES: ±0.25°
 SURFACE TEXTURE IN µm Ra REMOVE ALL SHARP EDGES, 0.25MAX

COPYRIGHT © NOT TO BE REPRODUCED OR USED TO MAKE OTHER DRAWINGS OR MACHINERY

| | | | |
|---|-------------------------------|---|------|
|  | |  | |
| MATERIAL | TITLE | | |
| MADE FROM | 8FGF-RG PTO, VERTICAL GEARBOX | | |
| FINISH | DRAWN | JRP | SIZE |
| PROJECT | APPROVED | JRP | D |
| DATE | 06NOV2013 | SCALE | 1:6 |
| DRAWING NUMBER | | REV | |
| FSG-PL-01351 | | A | |
| | | SHEET 3 OF 3 | |

| REVISIONS | | | | | | |
|-----------|------|------|---------------------------|-----|-----------|------|
| ECN | REV. | ZONE | CHANGED FROM | BY | DATE | APVD |
| CFL3140 | A | - | RELEASE FOR DOCUMENTATION | JRP | 06NOV2013 | JRP |