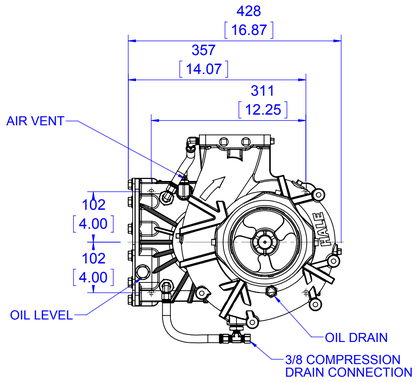
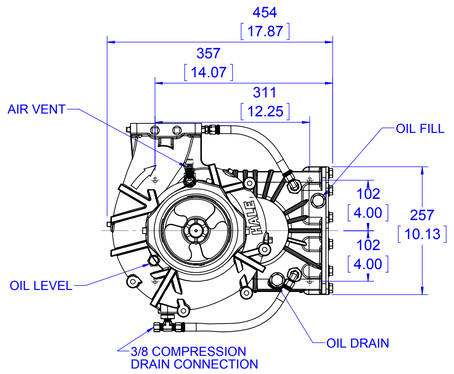
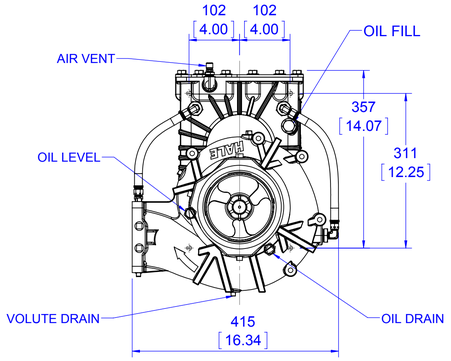
HALE TYPE MBP SILENCER SERIES PUMP INSTALLATION



HORIZONTAL LEFT DRIVE UNIT

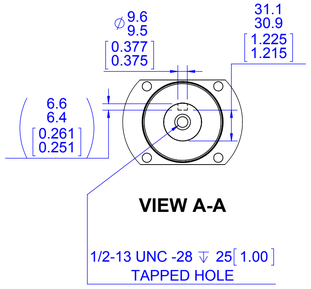


HORIZONTAL RIGHT DRIVE UNIT



INVERTED DRIVE UNIT

NOTES:
1. TO CONFORM TO NFPA 1901, APPARATUS MANUFACTURER MUST INSTALL SHIFT AND THROTTLE CONTROL INDICATOR LIGHTS ON THE DRIVING COMPARTMENT AND OPERATOR'S PANEL AS PER INDIVIDUAL NFPA REQUIREMENTS. CONSULT LATEST VERSION OF NFPA STANDARD FOR DETAILS.
2. ALL MOUNTING SCREWS TO BE MINIMUM GRADE 5, UNLESS OTHERWISE NOTED.
3. ALL FASTENERS SHALL BE INSTALLED WITH A THREAD LOCKING ANAEROBIC ADHESIVE/SEALANT: LOCTITE #243 HIGH TEMPERATURE THREAD LOCKER OR EQUIVALENT.
4. PUMP VOLUTE IS FURNISHED IN VERTICAL POSITION STANDARD. VOLUTE CAN ALSO BE FACTORY CONFIGURED FOR LEFT, RIGHT, AND INVERTED DISCHARGE. CUSTOMER CAN ROTATE VOLUTE IN 30° INCREMENTS.THIS MAY REQUIRE RELOCATING COOLING LINES, DRAINS, PRIMING TAP, AND REPLACING VOLUTE GASKET. SEE SHEET 2 FOR VOLUTE ORIENTATIONS.
5. APPROXIMATE OIL CAPACITY:
   VERTICAL: 2 QUARTS (1.90L)
   HORIZONTAL: 1-1/2 QUARTS (1.42L)
   INVERTED: 1-3/4 QUARTS (1.66L)
   CAPACITY IS FOR REFERENCE ONLY; ALWAYS FILL TO BOTTOM OF OIL LEVEL PLUG WITH SAE EP90 OR 80W-90 API GL-5 OIL.
6. REFER TO PL1026 FOR PUMP CROSS-SECTION.
7. ⊕ REPRESENTS CENTER OF GRAVITY (COG).
8. 6" VICTAULIC CONNECTION. IT IS RECOMMENDED THAT THE APPARATUS BUILDER USE 6" MANIFOLDING FROM THE PUMP SUCTION TO THE HOSE ADAPTER AT THE OPERATOR'S PANEL. (FOR USE WITH VICTAULIC STYLE 77 CLAMP - HALE P/N 088-5050-00-0).
9. TO REDUCE PRE-ROTATION AT LOW FLOW, IT IS RECOMMENDED THAT A STRAIGHT SUCTION VANE BE ADDED TO THE PUMP SUCTION MANIFOLD LEADING UP TO THE VICTAULIC PUMP SUCTION CONNECTION.



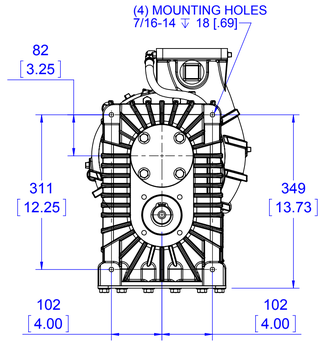


TABLE "B" - HALE TYPE MBP/MBP-GB PUMP MODEL IDENTIFICATION

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

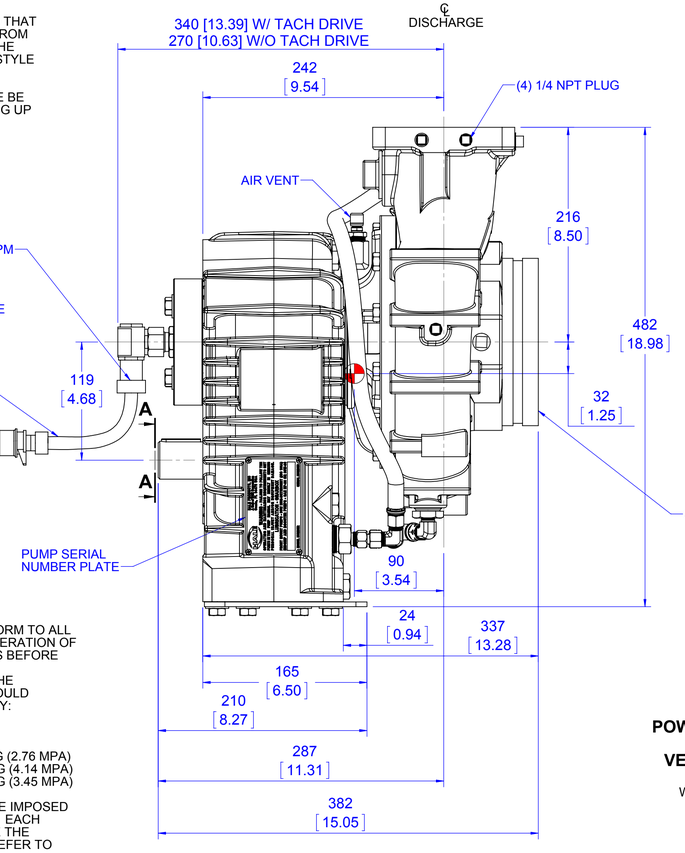
MBP IDENTIFICATION (GPM)	MBP-GB IDENTIFICATION (L/S)
THE MODEL NUMBER FOR AN MBP RATED AT 750 GPM WITH A DRIVE RATIO OF 2.60 AND HALE DRIVE UNIT WOULD BE: MBP 75 -26 PUMP TYPE — RATED CAPACITY - GPM — DRIVE RATIO (2.60 = 26)	THE MODEL NUMBER FOR AN RSD RATED AT 50 (L/S) WITH A DRIVE RATIO OF 2.60 AND HALE DRIVE UNIT WOULD BE: MBP 50 GB -26 PUMP TYPE — RATED CAPACITY - L/S — PUMP MEETS GB6245-2006 STANDARD — DRIVE RATIO (2.60 = 26)

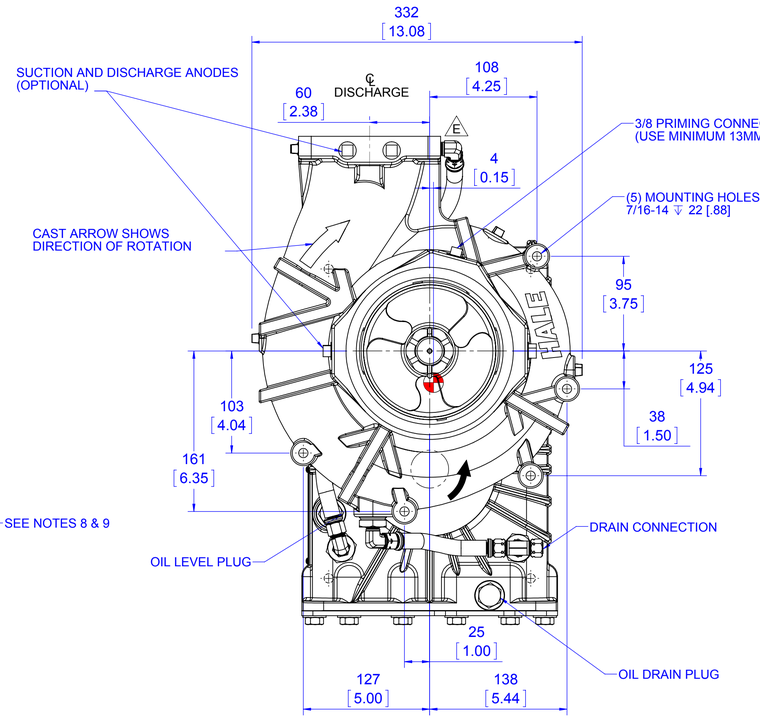
BE SURE TO INCLUDE THE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS OR REQUESTING INFORMATION. THE MODEL / SERIAL NUMBER PLATE IS LOCATED ON BOTTOM OF GEAR DRIVE AS SHOWN IN DRAWING.

TABLE "A" - PUMP RATIO

PUMP RATIO		DRIVE TYPE	MAXIMUM INPUT RPM
MBP * -16	1.64	PTO	3800
MBP * -23	2.33		2740
MBP * -26	2.60		2400
MBP * -29	2.91		2150
MBP * -37	3.74		1650
MBPH * -16	1.64	HYDRAULIC	3800
MBPH * -23	2.33		2740
MBPH * -26	2.60		2400
MBPH * -29	2.91		2150
MBPM * -16	1.64	DIRECT ENGINE MOUNT	3800
MBPM * -23	2.33		2740
MBPM * -26	2.60		2400
MBPM * -29	2.91		2150
MBPM * -37	3.74		1650

*** RATED CAPACITY - GPM OR L/S**
MBP PUMP RATED CAPACITY:
750 & 1000 GPM @ 150 PSI NFPA 1901 RATED
MBP-GB PUMP RATED CAPACITY:
40 & 50 L/S @ 1.3 MPA GB6245 RATED





POWER TAKE OFF DRIVE

VERTICAL DRIVE UNIT

WEIGHT: 145 LBS. (66 Kg)

WARNING

ALL WIRING AND INSTALLATION DETAILS MUST CONFORM TO ALL APPLICABLE NFPA AND SAW STANDARDS. VERIFY OPERATION OF PUMP ENGAGED INDICATOR LIGHTS AND INTERLOCKS BEFORE PLACING APPARATUS IN SERVICE.
EXCEEDING THESE LIMITS OR FAILURE TO FOLLOW THE RECOMMENDATIONS OUTLINED ON THIS DRAWING COULD DAMAGE THE PUMP AND RESULT IN PERSONAL INJURY:

MAX POWER INPUT FOR PUMPING = 200 HP (150KW)

MAX HYDRODYNAMIC PRESSURE = 400 PSIG (2.76 MPA)
MAX HYDROSTATIC PRESSURE (IRON) = 600 PSIG (4.14 MPA)
MAX HYDROSTATIC PRESSURE (BRONZE) = 500 PSIG (3.45 MPA)

IN PUMP OPERATION, THERE IS SUBSTANTIAL TORQUE IMPOSED ON THE PTO AND OTHER PUMP DRIVE COMPONENTS. EACH DRIVE COMPONENT MANUFACTURER MUST APPROVE THE TORQUE LOADS FOR ALL PUMPING APPLICATIONS. REFER TO LIMIT CHART NO. F-72 AND I-91 FOR ADDITIONAL DATA.

DRIVE LINE RECOMMENDATIONS

APPARATUS BUILDER SUPPLIED DRIVELINES SHALL BE OF APPROPRIATE SIZE TO MATCH THE CHASSIS AND PUMP REQUIREMENTS WITH INDIVIDUAL JOINT CANCELLATION AND PHASING BEFORE AND AFTER THE PUMP. DRIVESHAFT BALANCE (INCLUDING YOKES) SHALL NOT EXCEED THE RECOMMENDED LIMIT OF EITHER THE DRIVESHAFT OR CHASSIS TRANSMISSION MANUFACTURER'S SPECIFICATIONS. DRIVESHAFT FULL RANGE OPERATING SPEEDS SHALL NOT EXCEED 42% OF ITS CRITICAL SPEED. DRIVELINE SHALL BE INSTALLED PER SAE UNIVERSAL JOINT AND DRIVESHAFT DESIGN MANUAL, PUBLICATION # AE-7. ALL DRIVELINES MUST CONFORM TO HALE BULLETIN SB90. U-JOINT ANGLES SHOULD BE NO LESS THAN 1°; THE MAXIMUM ALLOWABLE ANGLE AND TUBE DIAMETER SHOULD BE CONFIRMED WITH THE MANUFACTURER OF THE DRIVELINE FOR THE PARTICULAR APPLICATION.

REVISIONS

ECN	REV.	ZONE	CHANGED FROM	BY	DATE	APVD
CFL3270	D	--	REDRAWN IN SOLIDWORKS; REDRAWN ON FSG BORDER; ADDED INDUCER TO ALL RATINGS	JRH	24JUL2014	JRP
CFL3330	E	E13	MOVED COOLING HOSE	JRH	25NOV2014	AJG

PROJECTION:

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

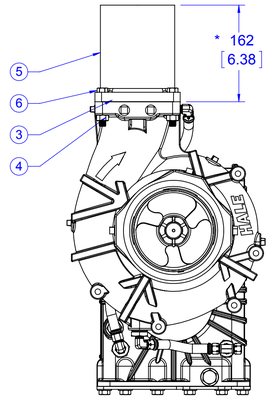
FSG OF IDEX CORPORATION

HALE GODIVA Class 1

MATERIAL	
MADE FROM	
FINISH	
PROJECT	
TITLE	HALE TYPE MBP SILENT SERIES PUMP
DRAWN	JRP
APPROVED	JRH
DATE	09MAR2009
SIZE	D
SCALE	1:3
DRAWING NUMBER	PL1116
REV	E
SHEET	1 OF 2

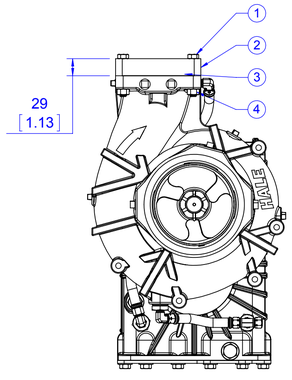
TABLE "C" - DISCHARGE OPTIONS				
ITEM	PART	DESCRIPTION	QTY.	BRONZE P/N
1	018-1824-25-0	SCREW, 7/16-14 X 2.5, GR8	4	
2	115-0210-00-0	4" NPT FLANGE (IRON)	1	115-0210-05-0
3	040-2480-00-0	O-RING	1	
4	110-1800-25-0	NUT, HEX, 7/16-14, GR8, ZINC PL	4	
5	112553	FLANGE ADAPTER 4" S/S AP50	1	
6	018-1822-25-0	SCRW,7/16-14x2.25,GR8,ZINC PL	4	

DISCHARGE CONNECTION OPTIONS

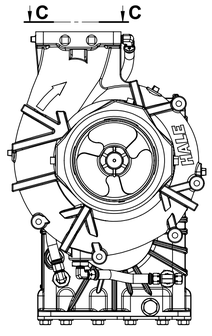


* CAN BE CUT TO DESIRED LENGTH

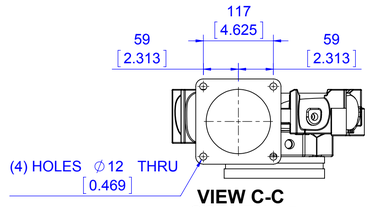
4 INCH STAINLESS SLIP WELD FLANGE



4 INCH NPT CAST IRON FLANGE

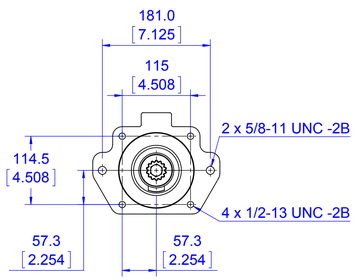


OPEN FLANGE (STANDARD)

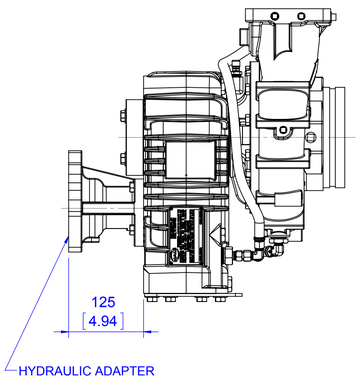


VIEW C-C
SCALE 1 : 5

INPUT DRIVE OPTIONS



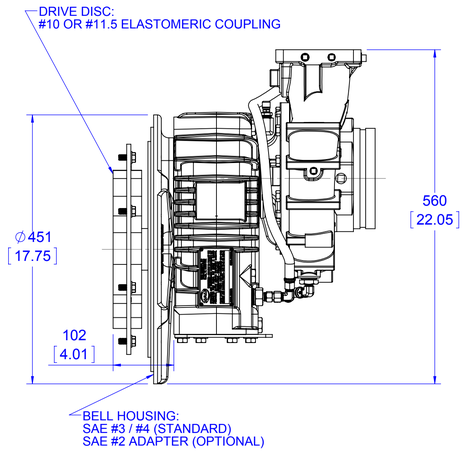
INTERNAL SPLINE DATA:
NO. OF TEETH: 14
SPLINE PITCH: 12/24



SAE "C" 2 OR 4 BOLT ADAPTER WITH 14T SPLINE DRIVE

HYDRAULIC PUMP DRIVE

WEIGHT: 160 LBS. (72 Kg)



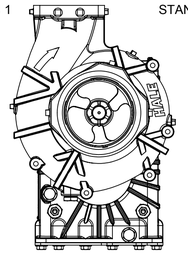
DIRECT ENGINE DRIVE
(FLYWHEEL HOUSING MOUNT)

WEIGHT: 180 LBS. (83 Kg)

VOLUTE AND DRIVE UNIT ORIENTATION (SEE SHEET 1, NOTES 2 & 4)

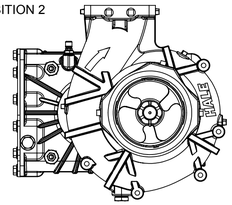
PROJECTION:

POSITION 1 STANDARD



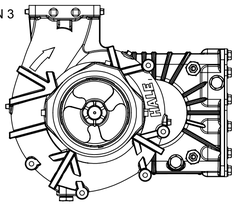
VERTICAL DISCHARGE VOLUTE
VERTICAL GEARBOX

POSITION 2



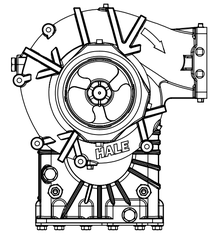
VERTICAL DISCHARGE VOLUTE
HORIZONTAL LEFT GEARBOX

POSITION 3



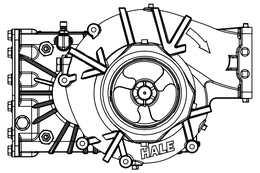
VERTICAL DISCHARGE VOLUTE
HORIZONTAL RIGHT GEARBOX

POSITION 4



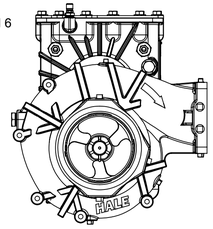
RIGHT DISCHARGE VOLUTE
VERTICAL GEARBOX

POSITION 5



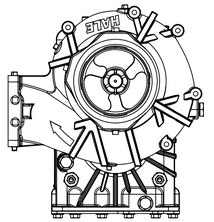
RIGHT DISCHARGE VOLUTE
HORIZONTAL LEFT GEARBOX

POSITION 6



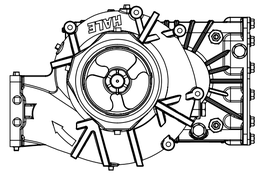
RIGHT DISCHARGE VOLUTE
INVERTED GEARBOX

POSITION 7



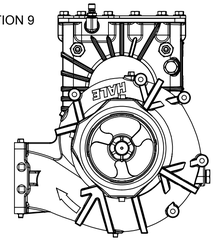
LEFT DISCHARGE VOLUTE
VERTICAL GEARBOX

POSITION 8



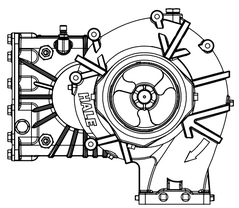
LEFT DISCHARGE VOLUTE
HORIZONTAL RIGHT GEARBOX

POSITION 9



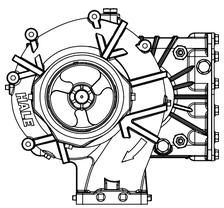
LEFT DISCHARGE VOLUTE
INVERTED GEARBOX

POSITION 10



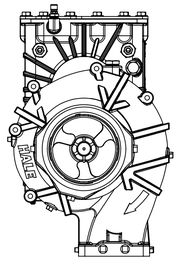
INVERTED DISCHARGE VOLUTE
HORIZONTAL LEFT GEARBOX

POSITION 11



INVERTED DISCHARGE VOLUTE
HORIZONTAL RIGHT GEARBOX

POSITION 12



INVERTED DISCHARGE VOLUTE
INVERTED GEARBOX

REVISIONS						
ECN	REV.	ZONE	CHANGED FROM	BY	DATE	APVD
CFL3270	D	--	REDRAWN IN SOLIDWORKS; REDRAWN ON FSG BORDER; ADDED INDUCER TO ALL RATINGS	JRH	24JUL2014	JRP

UNLESS OTHERWISE SPECIFIED
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[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

FSG OF IDEX CORPORATION

MATERIAL

MADE FROM

FINISH

PROJECT

HALE GODIVA Class 1

TITLE
HALE TYPE MBP SILENT SERIES PUMP

DRAWN	JRP	SIZE	DRAWING NUMBER
APPROVED	JRH	D	PL1116
DATE	09MAR2009	SCALE 1:6	REV E
			SHEET 2 OF 2