



08/13/2014  
Patriot Biofuels  
101 Patriot Way  
ANNAWAN, IL 61234  
USA

Purchase Order #: 008731  
Sales Order #: 0001876901  
Line Item: 000020

Please note this documentation is being submitted for your review and approval. Procurement & Fabrication can not proceed until approval of these drawings are received by LIGHTNIN. Please return one copy of each drawing marked "APPROVED", "APPROVED AS NOTED" or "NOT APPROVED - RESUBMIT". Drawings marked "APPROVED" or "APPROVED AS NOTED" will be released for material procurement and fabrication.

Please also note that price and delivery are contingent upon return and approved with 30 days of the date noted above. Drawings not received by this date may result in delayed delivery based on manufacturing capacity.

Submitted Date: 08/13/2014  
Print Quantity: 01

Document Name	Document Number	Document Revision
General Arrangement Drawing	1876901000020-A	
Seal Assembly	1876901020-B	
Impeller Welded A510 / A510E	IT-4056	
Gear Drive Assembly Drawing	L-17634	

Thank You.

For Questions please call: John Hogan  
Surkamp & Rowe, Inc.  
Phone #: 513-489-2850  
Email: sally.elkins@surkamp-rowe.com

Please return drawings via e-mail, fax or hard copy to:  
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ROCHESTER, NY 14611  
USA  
Fax: 585-527-1744  
E-Mail: cathy.stowe@spx.com

>Lightnin®

# Lightnin Mixer Model 14S1

Ship To: Patriot Fuels Biodiesel LLC  
Customer: Patriot Fuels Biodiesel LLC  
PO Number: 008731

Order: 0001876901 Line: 000020

READ AND UNDERSTAND THIS DOCUMENT PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



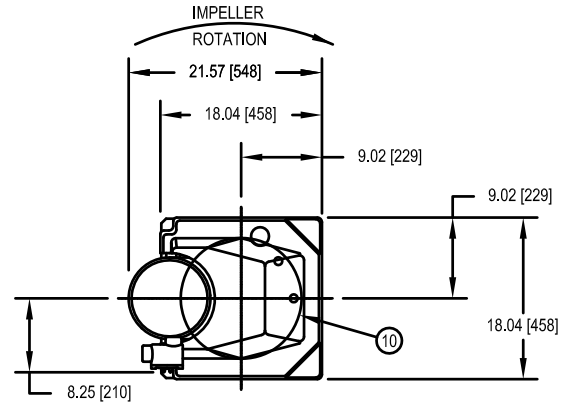
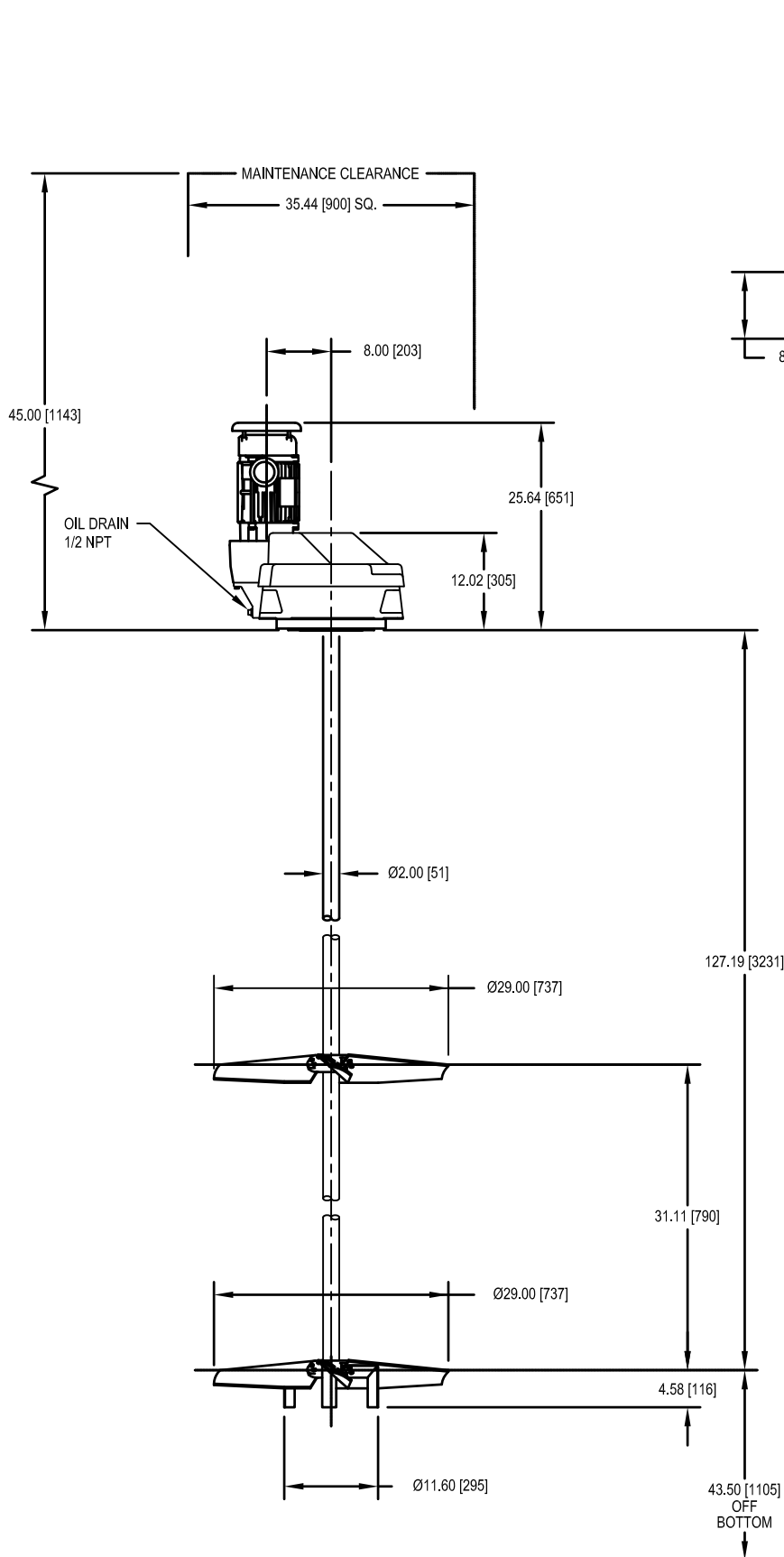
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Seal Assembly  
Impeller Welded A510 / A510E  
Gear Drive Assembly Drawing

### DOCUMENT NO.

1876901000020-A  
1876901020-B  
IT-4056  
L-17634



## NOTES:

- ① MATERIAL OF IN-TANK MIXER PARTS IS 316
- ② ALL DIMENSIONS ARE IN INCHES [mm].
- ③ MOTOR DATA:  
H.P.: 1.00 R.P.M.: 1200 DUTY: SEVERE DUTY  
VOLTS: 230/460 PHASE: 3 HZ: 60  
ENCLOSURE: XPFC FRAME: 145TC
- ④ IMPELLER DATA:  
TYPE: A510E / A510E QUANTITY OF BLADES: 3 / 3  
R.P.M.: 84  
IMPELLER HUBS NOT ADJUSTABLE OR REMOVABLE  
FROM POSITION SHOWN.  
BLADES/FINS ARE REMOVABLE.
- ⑤ TOTAL MIXER WEIGHT IS 539.8 lbs [245 kg]
- ⑥ MIXER MOUNTING DESIGN DATA:  
VERTICAL DOWNWARD LOAD: 1002 LBS. [4457 N]  
TORQUE: 1136 IN.-LBS. [128 N•m]  
BENDING MOMENT: 9197 IN.-LBS. [1039 N•m]  
DESIGN LOADS ARE GREATER THAN ACTUAL LOADS  
BY A SUITABLE FACTOR, CONSISTENT WITH  
CONSTRUCTION CODES AND **LIGHTNIN** EXPERIENCE.  
**LIGHTNIN** WARRANTIES AND GUARANTEES EXTEND  
FOR THOSE ITEMS FURNISHED BY IT. ALL OTHER  
EQUIPMENT AND DESIGNS ARE THE RESPONSIBILITY  
OF OTHERS.
- ⑦ MINIMUM OPENING REQUIRED TO PASS DISASSEMBLED  
MIXER PARTS IS 7.78 [198]
- ⑧ REFER TO INSTRUCTIONS FOR PROPER LIFTING  
PROCEDURE.
- ⑨ UNIT IS FURNISHED WITH A STYLE S10L  
MECHANICAL SEAL.
- ⑩ MOUNTING FLANGE DATA:  
150 LB. ANSI SERIES DRILLING  
SIZE: 8" O.D.: 13.50 BOLT CIRCLE: 11.75  
NO. OF HOLES: 8 BOLT DIA: .75  
FLANGE BOLT HOLES ARE TAPPED THRU, BOLT  
HOLES ARE LOCATED ON MIXER CENTERLINE.

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**SPX. >Lightnin**

## GENERAL ARRANGEMENT

FOR: **Patriot Fuels Biodiesel LLC**  
S.O. NO.: 1876901 LINE NO.: 20  
CUST. P.O. NO.: 008731 QUANTITY: 1  
TAG NO.: RATIO: 14.06:1  
MIXER MODEL: 14S1  
SERIAL NO.: 1000002948658

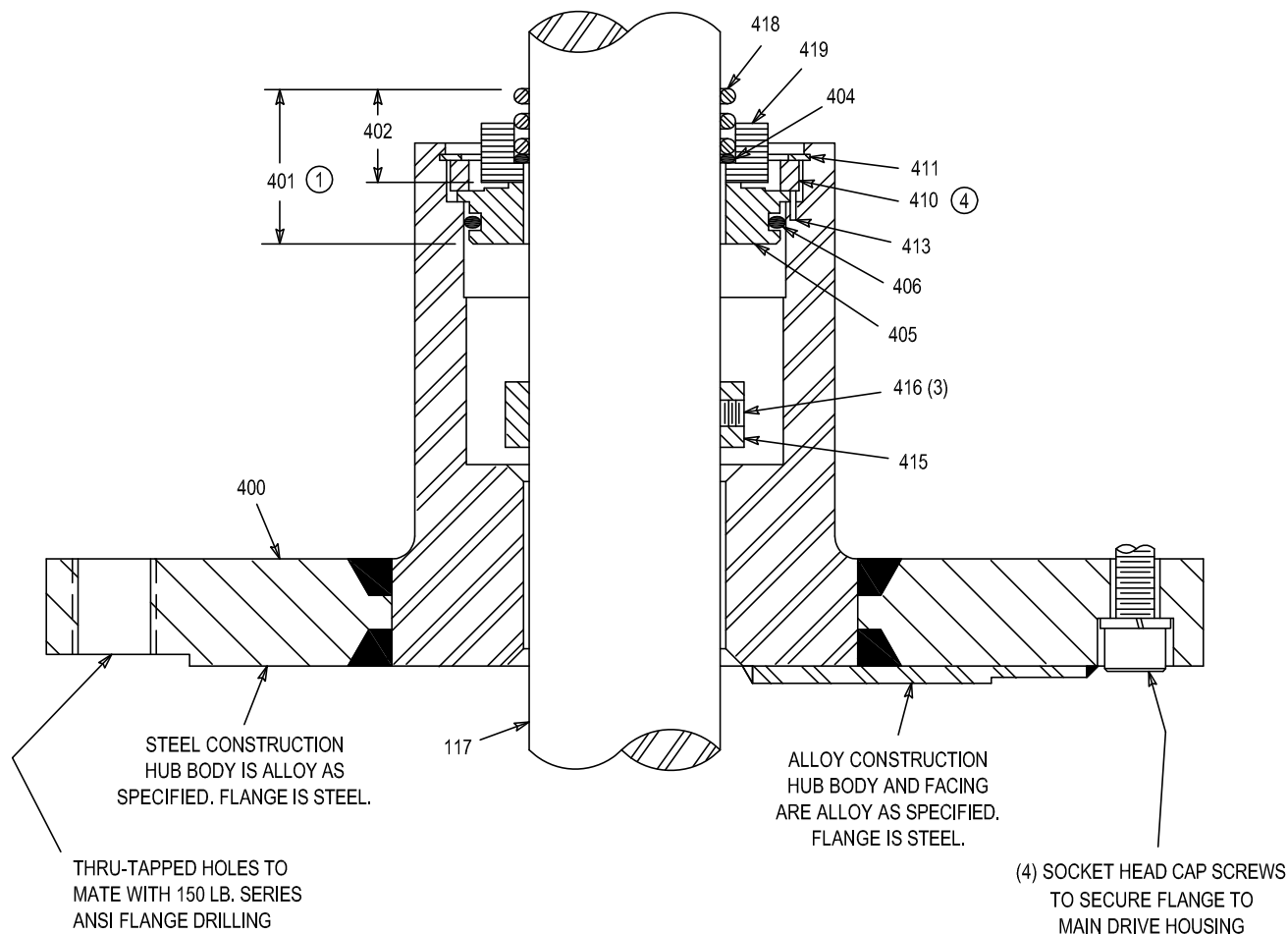


CERTIFIED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

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2014

DRAWING NO. 1876901000020-A



NOTES:

- ① THE "LIGHTNIN" SEAL ASSEMBLY (401) IS AVAILABLE AS AN ASSEMBLY ONLY. INTERNAL COMPONENTS ARE NOT AVAILABLE AS INDIVIDUAL ITEMS.
- ② MECHANICAL SEAL LIMITS:  
VESSEL TEMPERATURE = 250° F. MAX.  
VESSEL PRESSURE = VACUUM TO 25 PSIG MAX.

- ③ STANDARD SEAL ASSEMBLY MATERIALS:  
METAL COMPONENTS - STAINLESS STEEL  
STATIONARY SEAL FACE - CARBON  
ROTARY SEAL FACE - PERAMIC  
SEAL RINGS - KALREZ 6375
- ④ NOT FURNISHED ON 17 SIZE MIXERS.

WHEN ORDERING PARTS, SPECIFY:  
DRAWING NUMBER, PART NAME, ITEM NUMBER,  
AND UNIT MODEL & SERIAL NUMBER.

419	ROTARY SEAL FACE
418	SPRING
416	SOCKET HEAD SET SCREW (3)
415	SHAFT SUPPORT COLLAR
413	ANTI-ROTATION PIN
411	RETAINING RING
410	SPACER - SEE NOTE 4
406	SEAL RING
405	STATIONARY SEAL FACE
404	SEAL RING
402	ROTARY SEAL HEAD
401	"LIGHTNIN" SEAL ASSEMBLY - SEE NOTE 1
400	HUB & FLANGE
117	IMPELLER SHAFT

ITEM	PART NAME
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**LIGHTNIN®**  
MIXERS AND AERATORS

ASSEMBLY DRAWING

**SERIES 10™**  
**LOW PRESSURE MECHANICAL**  
**SEAL ASSEMBLY**  
**STYLE S 10 L**



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1876901020-S

# INSTALLATION OF A510 AND A510E AXIAL FLOW IMPELLER ONE PIECE HUB WELDED TO IMPELLER SHAFT BOLTED ON BLADES

## SECTION 1 – GENERAL

- 1.1 Refer to the appropriate table for the minimum diameter opening that the impeller will pass through. Opening shown is based on disassembled impellers with the hub on the shaft.
- 1.2 A510 type impellers are shipped disassembled for ease of shipment and handling at the job site. Refer to Section 2 for impeller assembly guides.

## SECTION 2 – IMPELLER ASSEMBLY

- 2.1 Mate the three blades (convex side up) on the hub ears. If fins (168) are furnished, mount them before installing hex nuts (167).

**WARNING:** Before securing the hardware, apply pressure to the blade so that its edge is firmly seated against the raised shoulder on each hub ear. After tightening hardware, check to make sure that the blade has not shifted away from the hub ear shoulder. PROPER BLADE POSITIONING IS IMPORTANT TO IMPELLER FUNCTION.

- 2.2 **IT IS ESSENTIAL** that the hardware securing the blades to the hub is tightened to the specific torques in Table 1. It is important that tight connections are maintained as impellers are usually subjected to a wide range of adverse loading conditions imposed by fluid force reactions.
- 2.3 It is good practice to **RETIGHTEN** all bolted connections after the equipment has been in operation. It is recommended that all hardware be checked for tightness 12 hours after assembly, and at each scheduled shut down thereafter.

**TABLE 1 – IMPELLER TIGHTENING TORQUES**

BOLT THREAD SIZE	TORQUE (FT-LBS)	
	GRADE 2, 3 OR 304 / 316 SS BOLTS	GRADE 5 BOLTS
3/8-16	17	26
1/2-13	41	64
5/8-11	83	128
3/4-10	120	226
7/8-9 (1)	142	365
1-8	212	547
1-1/8-7	301	675
1-1/4-7	425	952

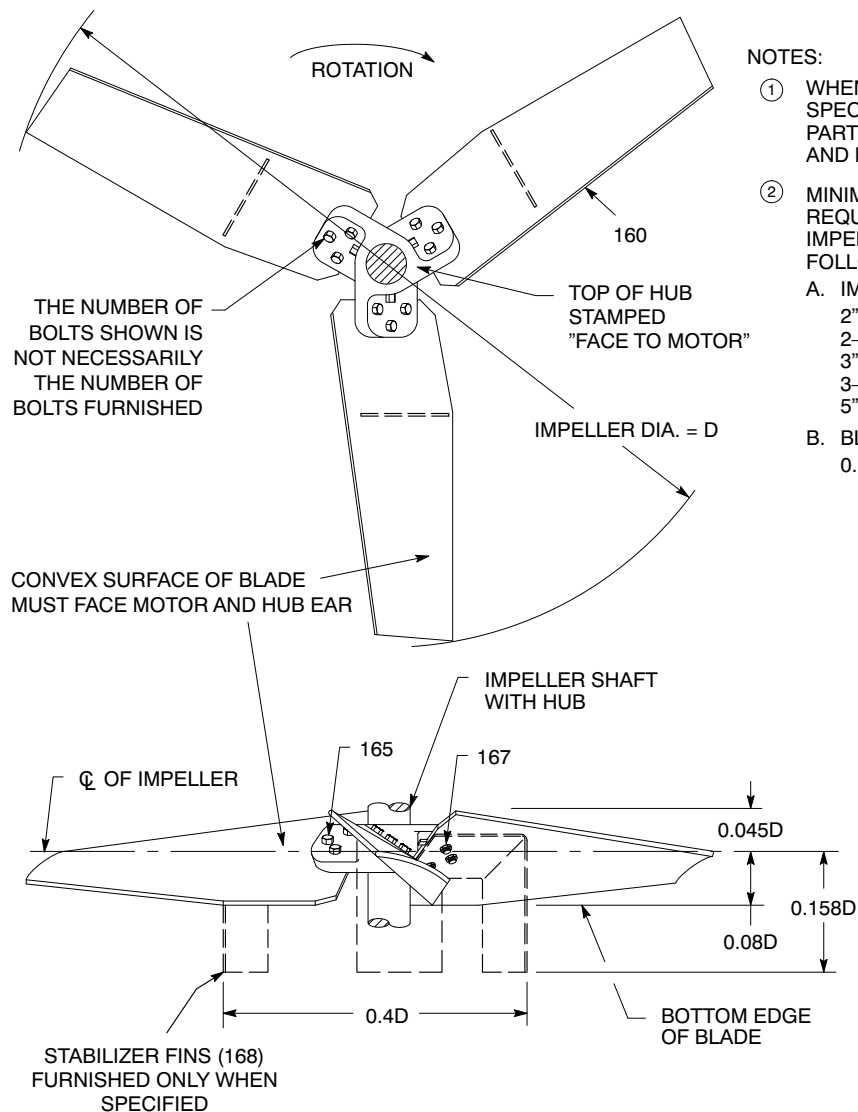
Torque must be applied to the hex nuts. Restrain the bolt heads and tighten the hex nuts.

Torque values are based on hardware, threads and bearing surfaces lubricated with a light oil.

**LIGHTNIN** standard steel material is SAE Grade 5.

(1) Allowable bolt stress values change at these locations and this is reflected in the torque values.

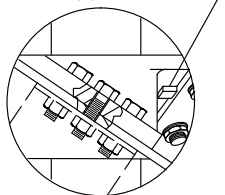
**FIGURE 1 – A510 AND A510E AXIAL FLOW IMPELLER**  
**ONE PIECE HUB WELDED TO IMPELLER SHAFT**  
**BOLTED ON BLADES**



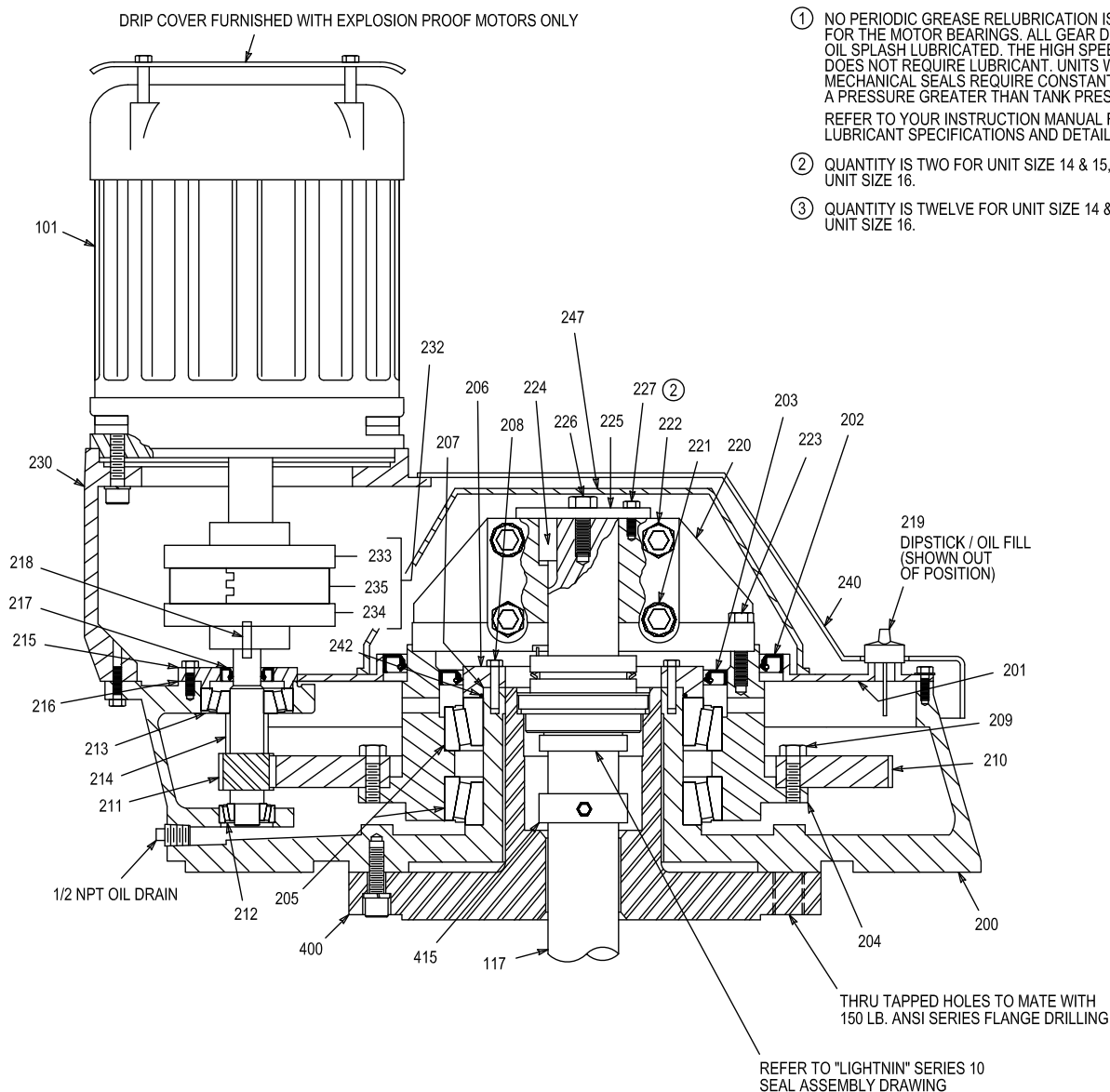
**NOTES:**

- ① WHEN ORDERING PARTS, SPECIFY DRAWING NUMBER, PART NAME, ITEM NUMBER, AND MACHINE SERIAL NUMBER
- ② MINIMUM DIAMETER OPENING REQUIRED TO PASS DISASSEMBLED IMPELLER IS THE LARGER OF THE FOLLOWING:
  - A. IMPELLER SHAFT WITH HUB:
    - 2" SHAFT – 9" DIA.
    - 2-1/2" SHAFT – 13" DIA.
    - 3" SHAFT – 15" DIA.
    - 3-1/2" THRU 4-1/2" SHAFT – 17" DIA.
    - 5" & 5-1/2" SHAFT – 20" DIA.
  - B. BLADE (160) OFF HUB:
    - 0.165D

CAST LOCATING LUGS FOR  
 BLADE SEATING. (2) PER EAR



168	STABILIZER FIN
167	HEX NUT
165	HEX HD. CAP SCREW
160	BLADE
ITEM	PART NAME



NOTES:

- ① NO PERIODIC GREASE RELUBRICATION IS REQUIRED EXCEPT FOR THE MOTOR BEARINGS. ALL GEAR DRIVE BEARINGS ARE OIL SPLASH LUBRICATED. THE HIGH SPEED COUPLING DOES NOT REQUIRE LUBRICANT. UNITS WITH DOUBLE MECHANICAL SEALS REQUIRE CONSTANT LUBRICATION AT A PRESSURE GREATER THAN TANK PRESSURE. REFER TO YOUR INSTRUCTION MANUAL FOR COMPLETE LUBRICANT SPECIFICATIONS AND DETAILS.
- ② QUANTITY IS TWO FOR UNIT SIZE 14 & 15, AND THREE FOR UNIT SIZE 16.
- ③ QUANTITY IS TWELVE FOR UNIT SIZE 14 & 15, AND SEVEN FOR UNIT SIZE 16.

WHEN ORDERING PARTS, SPECIFY:  
MODEL & SERIAL NUMBER, ITEM  
NUMBER AND DRAWING NUMBER

216	SHIM SET - HIGH SPEED BEARING ADJUSTMENT - SEE NOTE 3	415	SHAFT SUPPORT COLLAR
215	HIGH SPEED BEARING RETAINER	400	MECH. SEAL HUB & FLANGE
214	SPACER - UNIT SIZE 16 ONLY	247	COUPLING SHIELD
213	HIGH SPEED BEARING - UPPER	242	O-RING
212	HIGH SPEED BEARING - LOWER	240	SAFETY GUARD
211	HIGH SPEED PINION & SHAFT	235	FLEXIBLE ELEMENT - SPLIT
210	LOW SPEED GEAR	234	DRIVEN HUB - PINION SHAFT
209	HEX HEAD CAP SCREW - NYLOK	233	DRIVE HUB - MOTOR SHAFT
208	HEX HEAD CAP SCREW - NYLOK	232	H.S. FLEXIBLE COUPLING ASSEMBLY
207	SHIM SET - LOW SPEED BEARING ADJUSTMENT (10 PER SET)	230	MOTOR PEDESTAL
206	LOW SPEED BEARING RETAINER	227	HEX HEAD CAP SCREW - SEE NOTE 2
205	LOW SPEED BEARING (2)	226	HEX HEAD CAP SCREW (1)
204	LOW SPEED GEAR HUB	225	THRUST PLATE
203	OIL SEAL - INNER	224	KEY - IMPELLER SHAFT
202	OIL SEAL - OUTER	223	HEX HEAD CAP SCREW - NYLOK (8)
201	DRIVE COVER	222	HEX NUT (4)
200	GEAR DRIVE HOUSING	221	SOCKET HEAD CAP SCREW (4)
117	IMPELLER SHAFT	220	LOW SPEED COUPLING - SPLIT
101	MOTOR	218	KEY - PINION SHAFT
ITEM	PART NAME	ITEM	PART NAME

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**LIGHTNIN**<sup>®</sup>  
MIXERS AND AERATORS

ASSEMBLY DRAWING

**SERIES 10**<sup>™</sup>  
**UNIT SIZE 14, 15 & 16**  
**CLOSED TANK MIXER**  
**WITH MECHANICAL SEAL**



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# Notes

## LIMITED WARRANTY

Unless otherwise noted on the face hereof, SPX goods, auxiliaries and parts thereof are warranted to the original purchaser against defective workmanship and material for a period of twelve (12) months from date of installation or (18) months from date of shipment from factory, whichever expires first. If the goods or services do not conform to the warranty stated above, then as Buyer's sole remedy, SPX shall, at SPX's option, either repair or replace the defective goods or re-perform defective services. Third party goods furnished by SPX will be repaired or replaced as Buyer's sole remedy, but only to the extent provided in and honored by the original manufacturer's warranty. Unless otherwise agreed to in writing, SPX shall not be liable for breach of warranty or otherwise in any manner whatsoever for: (i) normal wear and tear; (ii) corrosion, abrasion or erosion; (iii) any good or services which, following delivery or performance by SPX, has been subjected to accident, abuse, misapplication, improper repair, alteration, improper installation or maintenance, neglect, or excessive operating conditions; (iv) defects resulting from Buyer's specifications or designs or those of Buyer's contractors or subcontractors other than SPX; or (v) defects resulting from the manufacture, distribution, promotion or sale of Buyer's products.

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## TECHNICAL SERVICES

The Lightnin brand dedicated after sales support teams are on hand to offer advice and support. With more than 85 years' experience in the manufacture and supply of agitation equipment, we know what parts need to be on hand to support our customer base so that your downtime is minimized. Our team of highly experienced field service technicians is on call to support the on-site servicing of equipment, or supervise and train your maintenance staff in best practice care of equipment.

## INSTALLATION AND COMMISSIONING

Proper installation of your Lightnin mixer is critical to its long term performance and reliability. To ensure that installation

procedures are followed, a certified technician will:

- Audit the equipment
- Supervise job-site contractors
- Perform a final inspection

## SERVICE SUPPORT & REFURBISHMENT

The equipment audit is specifically designed to identify potential mechanical problems before they occur. Using many forms of modern technology and drawing on our mixer manufacturing experience, our technicians can identify the onset of bearing and gear failures, misalignment and system problems without the need to interrupt production. Factory gearbox exchange and refurbishment programs offer a fast and cost-effective route to extending equipment life.

### SPX FLOW TECHNOLOGY

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