



CERTIFICATE No.	QC-012
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

CHECK CERTIFICATE

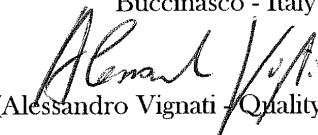
This is to certify that mixers above have been positively tested on

28 / 09 / 2012

as follows:

**FINAL VISUAL AND DIMENSIONAL CHECK ACCORDING TO DRAWING:
Nº 552954A Rev. 0**

DATE: 28 / 09 / 2012

AxFlow S.p.A.
Buccinasco - Italy

(Alessandro Vignati - Quality Manager)

AxFlow S.p.A.

Via Del Commercio, 15-15/A
20090 Buccinasco (MI) – Italy
Capitale sociale 120.000,00 € (interamente versato)
P.I. 02161000126 – C.F. 01265950129 – R.E.A. 1684945
Socio unico : AxFlow Holding AB – P.O. Box 5174 Villagatan 6 102 44 Stockholm (Sweden)

TELEPHONE: +39 02 484801
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CERTIFICATE No.	QC-009
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

PAINTING CHECK CERTIFICATE

We certify that mixer above was painted according to following procedure:

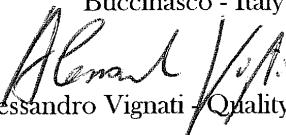
LIGHTNIN Standard procedure no. QP0321

Final color: RAL 6028

DATE: 28 / 09 / 2012

AxFlow S.p.A.

Buccinasco - Italy



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P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

MATERIAL CERTIFICATES LIST

MIXER PART	RAW MATERIAL	CERTIFICATE N.	SUPPLIER
FLANGE	Plate thickness 40 mm.	310040048-1	ACRONI
SHAFT	Round bar 50 mm.	06001537	MARCEGAGLIA
A510-32 IMPELLERS	BLADES	Plate thickness 6 mm.	APERAM
	HUB	Hub casting	AxFlow S.p.a.
STEADY BEARING	BUSHING HOLDER	Plate thickness 8 mm.	APERAM
		Round bar dia. 75 mm.	EURE INOX
	SHAFT SLEEVE	Round bar dia. 40 mm.	MARCEGAGLIA

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ACRONI

TEHNIČNA KONTROLA
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Telefax: +386 4 584 10 66
<http://www.acroni.si>
E-mail: anton.papler@acroni.si

Potrdilo o prevzemu 3.1 / Abnahmeprüfzeugnis 3.1 / Inspection certificate 3.1

Stran/Selje/Page 1 / 2
St. / Nr. / No.

EN 10 204 3.1
Datum / Datum / Date

310040048-1 09.03.2012

Narocilo / Bestellung Nr. / Order No.
22/0065 disp.34728

Dobavni list / Lieferschein / Despatch note
310040048 z/vom/from 09.03.2012

Izdelek / Erzeugnis / Product BLECH	Vrsta pecl / Erschmelzungsart / Melting furnace E+VOD	Znak izvedenca TK Zeichen des sachverständigen Inspectors' stamp	Znak proizvajalca Zeichen des Herstellerewks Mark of the Manufacturer
Specifikacije / Vorschriften / Specifications ASTM A240/A 240 M/ED.10 A/480 ASME SA 240 SECT.II PART A/ED07 A 10 NACE MR 0175-2003 EN 10088-2/ED.05 EN 10028-7/ED.2000	Tip / W.nr. / Type 316L/316 316L/316	Pov. / Flache / Finish No.1 No.1	Koroz. test / Int.krist.korr. / Corrosion test ASTM A262 PRACTICE E:OK
X2CrNiMo17/12/2 W.Nr.1.4404/1.4401	C2-IIa, 1D		EN ISO 3651-2: OK

PED/97/23/EC

Obseg dobave / Umfang der Lieferung / Extent of material delivery

Poz. Pos. item	St. sarze Schmelzen Nr. Heat No.	St. plosce Waltztafel Plate No.	Teza neto Gewicht Weight kg	Dimenzije Abmessungen Dimensions mm	St. kom. Stückzahl Quantity	St. vzorca Probe Nr. Sample No.
2	279271	85304	3878	40.00 / 2000 / 6000	1	85304 T

Mehanske lastnosti / Mechanische Eigenschaften / Mechanical properties

St.vzorca Probe Nr. Sample No.	Smer vzorca Proben lage Position	Nap.tecenja Dehn grenze Yield 0,2% MPa	Nap.tecenja Dehn grenze Yield 15 MPa	Nat.trdnost Zugfestigkeit Tensile str.-MPa	Raztezek / Bruchdehnung / Elongation Elongation AS % ASO %	Kontrakc. Einschurung Red. of area %	Trdota Harte Hardness HB	Zlavost / Kerbschlag / Impact pri/smer bei /age at/posit.
Zahiteva Anforderung. Requirem.	MIN	220	260	520	45			60 20
	MAX			670			217	
85304 T P	287	353	580	50.7	69.6		163 328 339 331	20
G - Glava / Kopf / Top	N - Noga / Fuss / Bottom	V - Vzdolzno / Langs / Longitudinal	P - Prečno / Quer / Transverse	Upogib / Biega / Bend:	0.5a			

Zig in podpis
Firmenstempel und Unterschrift
Stamp and signature

ACRONI d.o.o.
Cesta vodnikov 10
1470 Šentrupert
Slovenija
19/72

C4603 P 6582

Potrdilo o prevzemu 3.1/ Abnahmeprüfzeugnis 3.1/ Inspection certificate 3.1

St./Nr./No. 310040048-1

Stran/Selje/Page 2 / 2

Kemična analiza / Chemische Zusammensetzung / Chemical Composition

Sarza/Schmelze Nr./ Heat No.	%C	%Si	%Mn	%P	%S	%Cr	%Ni	%Mo	%N	Ferrite
279271	0.019	0.34	1.63	0.040	0.001	17.21	10.12	2.10	0.0590	

Opombe / Bemerkungen / Remarks

HEAT TREATMENT : SOLUTION ANNEALED AT 1050° C, WATER QUENCHED

- VISUAL AND DIMENSIONAL CHECK: OK!
- SPECTROMETER SORTING TEST : OK!
- INTERGRANULAR CORROSION TEST ACCORDING TO
ASTM A 262 PRACTICE E : OK!

WARMBEHANDLUNG : LOSUNGSGLUHEN BEI 1050°C, WASSER ABGESCHRECKT !

- OBERFLÄCHEN UND MASSPRÜFUNG : OHNE BEANSTANDUNG NACH EN 10029 DICKE CLASS B UND
EN 10163-2 B3
- PRÜFUNG AUF WERKSTOFFVERWECHSLUNG : OHNE BEANSTANDUNG
- PRÜFUNG AUF BESTÄNDIGKEIT GEGEN IMERKRISTALLINE KORROSION
NACH EN ISO 3651-2 : OHNE BEANSTANDUNG

Certified acc. Pressure Equipment Directive (97/23/EC)
by TÜV-CERT-Certification body for pressure equipment of the
TÜV Industrie Service G.m.b.H TÜV Süd Gruppe.

Es wird bestätigt, daß die Lieferung den Bestellanforderungen entspricht.

We confirm herewith that the delivered material complies with the terms of the order.

Zig in podpis
Firmenstempel und Unterschrift
Stamp and signature

ACRONI
Anton Papler
Otočna 10
1000 Ljubljana
Slovenia
19.22

Data Bolla 11/01/2006 N.Bolla 150146 Fattura

 Sede legale e amministrativa:
 via Bresciani 16
 46040 Gazzoldo degli Ippoliti
 Mantova - Italy
 Tel. +39 . 0376 685 1
 Fax. +39 . 0376 685 600
www.gruppomarcegaglia.com

 N° CERTIFICATO 06001537
 Data Certificato 12/01/2006

Certificato di collaudo "3.1" UNI EN 10204

Cliente Customer Kunde Client	NS.DEPOSITO C/O GRUPPO INOX SRL VIA SARDEGNA 5/7-FIZZONASCO DI 20090 PIEVE EMANUELE		Ordine Marcegaglia S.p.A. Mill Order Unsere Auftragsbestätigung Notre conf. de commande	Data Date Datum Date				
Norma Norm Norm Norm	UNI EN 10088 / UNI EN 10278		Tondi inox sgrossati di rettifica tolleranza h9 secondo UNI EN 10278 Cold centerless ground drawn bars					
Richieste Part. Special Req. Bes. Anforderungen Requetes Particulieres								
n.	Colata N. Heat No. Schmelze N° Coulée	Qualità Quality Werkstoff Nuance Acier	Dimensioni (mm) Dimensions Abmessungen Dimensions	Quantità (kg) Quantity Anzahl Quantité	Ordine Cliente Customer Order Bestellung Comm. du Client			
1 2 3 4 5 6 7	7PD0	AISI 316 L	SGROSSATO DI RETTINOX LG.6000 50 W.1.4404	1536	127			

Analisi Chimica / Chemical Composition/ Chimische Zusammensetzung/ Composition Chimique

n.	%C	%Si	%Mn	%P	%S	%Cr	%Ni	%Mo	%Ti	%Co	%Al	%Cu	%N	%Te	%Bi	%Pb	%V	Ceq
MN MX	.03	1	2	.045	.03	16.5 18.5	10 13	2 2.5			1	.11						
1 2 3 4 5 6 7	.024 .357	1.376	.033	.025	16.910	10.574	2.182		.075		.325	.0440						

n.	N°Test N°Test N°Test N°Test	Resistenza Tens. strengthl Zugfestigkeit Resistance N/mm²	Sfornamento Yeld str. Streckgrenze Limite El. 0.2% N/mm²	Allun. Elongation Dehnung Allongement 0.2% N/mm²	Durezza Hardness Härte Dureté	Grano Grain size Korngrösse Grain	Resilienza (J) Impact Value Kerbschlagarbeit Resilience	Contr.visivo e dimensionale Visual and dimensional inspec Besichtigung und Ausmess. Controle visuel et dimensionel	Contr.non distruttivo Non destructive test Zerstörungsfreie Prüfung	Z%	Schlacc.	
MN MX	500 700	200		40								
1 2 3 4 5 6 7	5X7049	566	299	48					ESEGUITO			

Note

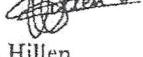


Noi certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordinazione.
 We certify that material supplied complies with the requirements agreed on order
 Es wird bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellannahme entspricht
 Nous certifions que le produit fourni est conforme à la qualité de la commande

Firma e Timbro del Collaudatore

Carlo Faccioli



A04 aperam		MILI, CERTIFICATE BS EN 10204/3.1 CERTIFICAT DE RECEPTION NF EN 10204/3.1 ABNAHMEPWERZEUGNIS DIN EN 10204/3.1								N-Nr-N 11K0032539-01 V01							
Correspondentieadres: Aperam Genk Swinnenwijerweg 5, 3600 Genk, Belgium Tel. +32 (0)89 30 21 11		Company Certificate: Certified acc. PED 97/23/EC Annex I § 4.3 by Certification Body 0036 of TÜV SÜD Industrie Service GmbH with certificate No.: 314/2007/MUC. Renounced of counter signature agreed by TÜV SÜD (9/5/2007). Approved acc. AD 2000-Merkblatt W0/TRD 100 by TÜV SÜD Industrie Service GmbH. Confirmation letter from TÜV SÜD Industrie Service GmbH of 07/05/2010 about the uniformity of coils acc. AD2000 W2 §4.1.								A02							
A01 Manufacturer's works order number N° de la commande usine productrice Werksauftragsnummer 80044148/01-07964/809/05		Surveyor's mark Cachet de l'expert Stempel des Werkssachverständigen GNKI Z03								Tech.Reg.:AD 2000 W2/2008 -- AD 2000 W10/2007 -- EN 13445-2/2009 (cor.2010)		Z05					
Product - Produit - Erzeugnis COILS, HOT ROLLED, ANNEALED AND PICKLED COILS, LAMINE A CHAUD, REBOUILLES + DECAPE COILS, WARMGEWALZT, GEGLÜHBT UND GEBEIZT		Purchaser and/or consignee Client et/ou destinataire Besteller und/oder Empfänger								Purchaser's order number N° de commande client Kundenbestellnummer Ordine ULU102 LUGLIO		A07					
Steel designation Designation de l'acier Stahlbezeichnung EN 10028-7:2008 1.4404 / 1.4401 EN 10088-2:2005 1.4404 / 1.4401 ASTM A 240-2010 TYPE 316L / 316 ASME SA 240-2010 TYPE 316L / 316		Finish Présentation Ausführung ID ID NO 1 NO 1								Customer article number N'article client Artikelnummer des Kunden		A08					
Steelmaking process Mode d'élaboration de l'acier - Stahlherstellungverfahren Prod.proc: Electric arc furnace - VOD/AOD - Continuous casting Proc.fabri: Four à arc - VOD/AOD - Coulée continue Fertigungsablauf: Elektro-Ofen - VOD/AOD - Stranggussanlage		B01								Product delivery condition Etat de livraison du produit - Lieferzustand		A09					
Any supplementary requirements Prescriptions supplémentaires - Zusätzliche Anforderungen		B03								Solution treated: Hypertermic: 1050 C Loesungsgegl.+abgeschreckt:		A06					
ASTM A480 / A480M -10 -- ASME SA480 / SA480M -10 // CORROSION TEST: ASTM A262-E :OK // ATTESTATION PED 97/23/EC PAR TÜV SUD										Forced air - Air force Gebäuse Luft		B04					
Identification of the product Identification du produit - Identifizierung des Erzeugnisses MELTED IN BELGIUM, MADE IN BELGIUM		Dimensions Dimensions - Abmessungen Thickness Epaisseur - Dicke 6.00 mm								Number of pieces Nb de pièces - Stückzahl		B05					
Coll n. N.Bobine - Band Nr. 12304061		Width Largeur - Breite 1250.00 mm								Net weight Poids net - netto Gewicht		B06					
Heat n. N.Coulée - Schmelz Nr. 123040		Length Longueur - Laenge										2					
CHEMICAL ANALYSIS - ANALYSE CHIMIQUE - CHEMISCHE ZUSAMMENSETZUNG																	
		C	Si	Mn	Ni	Cr	Mo	Ti	N	S	P						
Required - Exigé %mini Anforderung. %maxi		0.030	0.75	2.00	10.00 13.00	16.50 18.00	2.00 2.50		0.100	0.015	0.045						
Cast Analysis Analyse coulée Analyse Schmelze		0.021	0.34	1.26	10.01	16.69	2.03		0.045	0.003	0.034						
C71 C72 C73 C74 C75 C76 C77 C78 C79 C80 C81 C82 C83 C84 C85		Alfa Ferrite Delta Ferrite								C04 C93		C86					
Tests to verify batch and quality have been carried out : OK Tests de vérification de la conformité de la nuance fournie : OK Verwechslungsprüfung wurde durchgeführt : OK														D52			
Location (1)		MECHANICAL PROPERTIES - PROPRIÉTÉS MÉCANIQUES - MECHANISCHE WERTE										EN ISO 6892-1					
Direction (2)		Room temperature - Température ambiante - Raumtemperatur										Test temperature (°C):					
Required Exigé Anforderung		Yield or proof strength Limite d'élasticité Dehngrenze		Tensile Strength Résistance à la traction Zugfestigkeit		Elongation after fracture Allongement après rupt. Bruchdehnung		Hardness Duréte Härte		Yield or proof strength Limite d'élasticité Dehngrenze		Tensile str. Résist. Zugfestigkeit		Elongation % Allongement. Bruchdehnung			
1	T	Rp0.2% mini maxi		Rp1% Rm		A5 40		50mm 40		HRB C30		Rp0.2% Rp1% Rm		A5			
		Obtained Obtenu Ergebnisse		288 C11		319 C14		588 C12		59 C13		83 86 C31		C16 C17 C18		C19	
Impact strength test Essai de résilience Kerbschlagzähigkeits test		Corrosion test Test de corrosion Korrosionstest								E0.2(T)/R(T) %						Sample Thickness	
C40 If°C) C44		EN ISO 3651/2:OK								49 C50		C51		C52 C53 C54		6.02 mm C55	
C42		D51 Internal cleanliness:								A: B: C: D:		C57					
Location of the sample (1) Emplacement de l'échantillon Lage des Probenabschnitten 1. Front - Début - Anfang 2. Back - Fin - Ende 3. Middle - Milieu - Mitte		The delivery is in accordance with the order La fourniture est conforme aux exigences de la commande Die lieferung entspricht den Bestellbedingungen								Z01		Organisation inspection Organisme et/ou service contrôle Überwachungsabteilung		A05			
Direction of the test pieces (2) Orientation des éprouvettes Probenrichtung T. Transverse - Travers - Quer L. Longitudinal - Long - Laengs		Packing list Avis d'expédition LiefercheinNummer 2011039347-7964								A10		Quality Department		A06			
C01		Marking, inspection and measurement : without objection Contrôle de marquage, d'aspect et de dimensions : satisfaçants Prüfung der Stempelung, des Oberflächenaspekts und der Abmessungen : ohne Beanstandung								D01		7/7/2011 The inspector Le responsable Der Werkssachverständige  S. Hillen		Z02			
C02																	



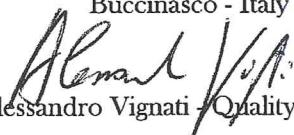
CERTIFICATE No.	QC-005B
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

IMPELLER HUB CONFORMANCE CERTIFICATE

We certify that impeller hub fitted on shaft of the mixer above has been manufactured in conformity to LIGHTNIN technical specifications.

Material AISI 316L

DATE : 28 / 09 / 2012

AxFlow S.p.A.
Buccinasco - Italy

(Alessandro Vignati - Quality Manager)

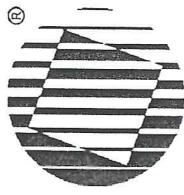
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Socio unico : AxFlow Holding AB – Wenner-Gren Center – Sveavägen 166, floor 14 – SE-113 46
Stockholm (Sweden)

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E-MAIL: info@axflow.it
WEB SITE: www.axflow.it

operam		MILL CERTIFICATE BS EN 10204/3.1 CERTIFICAT DE RECEPTION NF EN 10204/3.1 ABNAHMEPRUEFZEUGNIS DIN EN 10204/3.1										N-Nr-N 11K0821204-01 V01					
												A03					
Correspondentieadres: Aperam Stainless Belgium NV/SA Aperam Genk Swinnenwijerweg 5, 3600 Genk, Belgium Tel. +32 (0)89 30 21 11		Company Certificate: Certified acc. PED 97/23/EC Annex I § 4.3 by Certification Body 0036 of TÜV SÜD Industrie Service GmbH with certificate No.: 314/2007/MUC. Renounced of counter signature agreed by TÜV SÜD (9/5/2007). Approved acc. AD 2000-Merkblatt W0/TRD 100 by TÜV SÜD Industrie Service GmbH. Confirmation letter from TÜV SÜD Industrie Service GmbH of 07/05/2010 about the uniformity of coils acc. AD2000 W2 §4.1.1										A02					
Manufacturer's works order number N° de la commande usine productrice Werksauftragsnummer 80035481/08-07964/794/05		Surveyor's mark Cachet de l'expert Stempel des Werkssachverständigen		GNKI		Purchaser and/or consignee Client et/ou destinataire Besteller und/oder Empfänger						Tech.Req.:AD 2000 W2/2008 -- AD 2000 W1/2007 -- EN 13445-2/2009 (cor.2010)		205			
Product - Produit - Erzeugnis COILS, HOT ROLLED, ANNEALED AND PICKLED COILS, LAMINE A CHAUD, RECUTS + DECAPE COILS, WARMGEWALZT, GEGLUELT UND GEBEIZT														A06			
Steel designation Désignation de l'acier Stahlbezeichnung EN 10028-7:2008 1.4404 / 1.4401 EN 10088-2:2005 1.4404 / 1.4401 ASTM A 240-2010 type 316L / 316 ASME SA 240-2010 type 316L / 316		Finish Présentation Ausführung		Steelmaking process Mode d'élaboration de l'acier - Stahlherstellungverfahren Prod.proc: Electric arc furnace - VOD/AOD - Continuous casting Prod.fabric.: Four à arc - VOD/AOD - Coulée continue Fertigungsablauf: Elektro-Ofen - VOD/AOD - Stranggussanlage										A09			
		JD ID NO 1 NO 1				Any supplementary requirements Prescriptions supplémentaires - Zusätzliche Anforderungen								B03			
ASTM A480 / A480M -10 -- ASME SA480 / SA480M -10 // CORROSION TEST: ASTM A262-E :OK // ATTESTATION PED 97/23/EC PAR TUV SUD														B04			
Identification of the product Identification du produit - Identifizierung des Erzeugnisses MELTED IN BELGIUM, MADE IN BELGIUM		Heat n. N.Coulée - Schmelz Nr. 11305911		Dimensions Dimensions - Abmessungen				Number of pieces Nb de pièces - Stückzahl						B08			
Coll n. N.Bobine - Band Nr. 11305911		Thickness Epaisseur - Dicke 8.00 mm		Width Largeur - Breite 2000.00 mm		Length Longueur - Laenge								B09			
								Net weight Poids net - netto Gewicht						B11			
														B13			
CHEMICAL ANALYSIS - ANALYSE CHIMIQUE - CHEMISCHE ZUSAMMENSETZUNG														B06			
Required - Exigé %mini Anforderung %maxi		C	Si	Mn	Ni	Cr	Mo	Ti	N	S	P						
Cast Analysis Analyse coulée Analyse Schmelze		0.022	0.39	1.28	10.08	16.64	2.05		0.045	0.002	0.038						
		C71	C72	C73	C74	C75	C76	C77	C78	C79	C80	C81	C82	C83	C84	C85	C86
Tests to verify batch and quality have been carried out : OK Tests de vérification de la conformité de la nuance fournie : OK Verwechslungsprüfung wurde durchgeführt : OK		Alfa Ferrite		Delta Ferrite												D52	
		C04														C93	
Location (1)		MECHANICAL PROPERTIES - PROPRIETES MECANIQUES - MECHANISCHE WERTE EN 10002-1												C20			
		Room temperature - Température ambiante - Raumtemperatur												C03			
Direction (2)		Yield or proof strength Limite d'élasticité Dehrgrenze MPa		Tensile Strength Résistance à la traction Zugfestigkeit MPa		Elongation after fracture Allongement après rupt. Bruchdehnung %		Hardness Duréte Härte		Yield or proof strength Limite d'élasticité Dehrgrenze MPa		Tensile str. Résist. MPa Zugfestigkeit		Elongation % Allongement Bruchdehnung			
1	T	Rp0.2% mini maxi		Rp1% Rm		A5	50mm	HRB	C30	Rp0.2%	Rp1%	Rm	A5				
				220	260	530 680	40	40									
2	T	Obtained Obtenu Ergebnisse		306 C11		338 C14	597 G12	54 G13	56 G15	85 C31	86 C31	C16	C17	C18	C19		
Impact strength test Essai de résilience Kerbshlagszähigkeitstest				Corrosion test Test de corrosion Korrosionstest		E0.2(T)/R(T) %									Sample Thickness		
C40 (°C)		C44		EN ISO 3651/2:OK		S1 C50	C51	C52	C53	C54	C55				7.93 mm	C05	
		C47		D51		Internal cleanliness: A: B: C: D: C57											
Location of the sample (1)		The delivery is in accordance with the order La fourniture est conforme aux exigences de la commande Die lieferung entspricht den Bestellbedingungen										Organisation inspection Organisme et/ou service contrôlé Überwachungsabteilung		A05			
Enplacement de l'échantillon Lage des Probenabschnitten 1. Front - Début - Anfang 2. Back - Fin - Ende 3. Middle - Milieu - Mitte		Packing list Avis d'expédition LiefercheinNummer 2011034492-7964										Quality Department 4/5/2011		A10			
C01												The inspector Le responsable Der Werkssachverständige		S. Hillen			
Direction of the test pieces (2)		Marking, inspection and measurement : without objection Contrôle de marquage, d'aspect et de dimensions : satisfaisants Prüfung der Stempelung, des Oberflächenaspekts und der Abmessungen : ohne Beanstandung										D01		Z02			
Orientation des éprouvettes Probenrichtung T. Transverse - Travers - Quer L. Longitudinal - Long - Laengs																	
C02																	

C3434 P5382



Eure Inox

Eure Inox s.r.l.
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tel. +39 02.55305606 r.a. • fax +39.02.55305240
info@eureinox.it • www.eureinox.it
c.f./p.iva IT12193360158 • cciaa 1539337
trib. Milano 268339/1997 • cap. sociale € 1.000.000,00

N.ro Certificato Inspection Certificate Number	Data Date
2010/06063	22.06.2010
Ddt N.ro Delivery Note	Data Date
2010/02881	22.06.2010

Material Material	N.ro Ordine Order Number	Vs Riferimento Customer Reference
X 2 CrNiMo 17 12 ACCIATO INOX 4404 AISI 316L Lavorabilità migliorata Eure+	2010/03442	715182
Prodotto Product	Dimensions Dimensions	Tolleranza Tolerance
trafilato solubilizzato in barre da mm. 6000 Tondo 075.00	Tondo 075.00	H9

Osservazioni Observation
1.092

Composizione Chimica % / Chemical Composition						
Colata Cast N°	C	P	S	Mn	Cr	Ni
926023	0,0190	0,0280	0,0240	0,5800	1,3100	16,8100
Valori Richiesti Required Values	0,0300	0,0450	0,0300	1,0000	2,0000	10,0000
Caratteristiche Meccaniche / Mechanical Properties	Rm N/mm ²	Rp 0,2 N/mm ²	Rp 1,0 N/mm ²	Z	A5%	HB
Colata Cast N°	575	295			50	

Data Bolla 16/09/2009 N.Bolla 153591 Fattura

 Sede legale e amministrativa:
 via Bresciani 16
 46040 Gazoldo degli Ippoliti
 Mantova - Italy
 Tel. +39 . 0376 685 1
 Fax. +39 . 0376 685 600
www.gruppomarcegaglia.com

 N° CERTIFICATO 09036803
 Data Certificato 17/09/2009

Certificato di collaudo "3.1" UNI EN 10204

Cliente Customer Kunde Client	ND C/O GRUPPO INOX SPA VIA SARDEGNA 5/7-FIZZONASCO DI 20090 PIEVE EMANUELE		Ordine Marcegaglia S.p.A. Mill Order Unsere Auftragsbestätigung Notre conf. de commande		Data Date Datum Date													
Norma Norm Norm Norm	UNI EN 10088 / UNI EN 10278		Tondi inox sgrossati di rettifica tolleranza h9 secondo UNI EN 10278 Cold centerless ground drawn bars															
Richieste Part. Special Req. Bes. Anforderungen Requetes Particulieres																		
n.	Colata N. Heat No. Schmelze N° Coulée	Qualità Quality Werkstoff Nuance Acier	Dimensioni (mm) Dimensions Abmessungen Dimensions	Quantità (kg) Quantity Anzahl Quantité	Ordine Cliente Customer Order Bestellung Comm. du Client													
1 2 3 4 5 6 7	972215	AISI 316 L	SROSSATO DI RETTINOX LG.6000 40 W.1.4404	497	141													
Analisi Chimica / Chemical Composition/ Chimische Zusammensetzung/ Composition Chimique																		
n.	%C	%Si	%Mn	%P	%S	%Cr	%Ni	%Mo	%Ti	%Co	%Al	%Cu	%N	%Te	%Bi	%Pb	%V	Ceq
MN MX	.03	1	2	.045	.03	16.5 18.5	10 13	2 2.5			1	.11						
1 2 3 4 5 6 7	.018	.360	1.770	.028	.030	16.700	10.130	2.000		.060	.380	.0800						
n.	N°Test N°Test N°Test	Resistenza Tens. strength Zugfestigkeit Resistance N/mm²	Snergamento Yeld str. Streckgrenze Limite El. 0.2% N/mm²	Allun. Elongation Dehnung Allongement A5%	Durezza Hardness Härte Dureté	Grano Grain size Korngrösse Grain	Resilienza (J) Impact Value Kerbschlagarbeit Resilience	Contr.visivo e dimensionale Visual and dimensional inspec. Besichtigung und Ausmess. Controle visuel et dimensionel	Contr.non distruttivo Non destructive test Zerstörungsfreie Prüfung	Z%	Schiacc.							
MN MX	500 700	200		40				ESEGUITO										
1 2 3 4 5 6 7	9X3221	581	275	61.7														
Note																		
Noi certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordinazione. We certify that material supplied complies with the requirements agreed on order Es wird bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellannahme entspricht Nous certifions que le produit fourni est conforme à la qualité de la commande						Firma e Timbro del Collaudatore Carlo Faccioli												



AxFLOW

LUBRICANTS LIST

A - MACHINERY

Machinery type and Model	MIXER MODEL 15
AXFLOW Job	110635
ITEM n°	62A3
Service	---
Parts to be lubricated	GEAR DRIVE
Filling quantities (LITRES or Kg.)	8 LITRES

B - LUBRICANT

Type	SYNTHETIC OIL EP (EXTREME PRESSURE)
Grade	AGMA 3S - ISO 100

MAIN CHARACTERISTICS :

• Viscosity 40°C	99.1	• Viscosity 100°C	13.9
• Viscosity Index	143	• Flash Point	248
• Pour point	-42	• Density 15°C	0.86

MINERAL OIL LISTED IN TABLE MAY BE USED AS A SUBSTITUTE

Trade marks:	SYNTHETIC	MINERAL	Trade marks:	SYNTHETIC	MINERAL
-AGIP	BLASIA S	BLASIA EP150	-MOBIL	SHC	600XP EP150
-EXXON	No Product	SPARTAN EP150	-SHELL	TIVELA S	Omala EP 150
-TEXACO	No Product	Meropa 150	-CHEVRON	No Product	GEAR COMPOUND EP 150

C - MAINTENANCE

Recommended change frequency:

- 1 st filling (months or hours)	(ALWAYS) 6 months or 2500 hours
• for intermittent service	12 MONTHS OR 5000 HOURS (SYNTHETIC OIL EP) 6 MONTHS OR 2500 HOURS (MINERAL OIL EP)
• for continuous service	12 MONTHS OR 8800 HOURS (SYNTHETIC OIL EP) 6 MONTHS OR 4400 HOURS (MINERAL OIL EP)

Other recommendations :

- USE ONLY ONE TYPE OF OIL IN ANY SINGLE UNIT.
- DO NOT MIX OIL TYPES, GRADES OR BRANDS IN ANY UNIT
- SEE ALSO THE MAINTENANCE MANUAL SECTION 5 – GEAR DRIVE LUBRICATION

AxFlow S.p.A.

Via Del Commercio, 15-15/A

20090 Buccinasco (MI) – Italy

Capitale sociale 120.000,00 € (interamente versato)

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Socio unico : AxFlow Holding AB – P.O. Box 5174 Villagatan 6 102 44 Stockholm (Sweden)

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WEB SITE: www.axflow.it



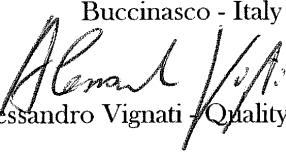
CERTIFICATE No.	QC-006
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

NOISE CERTIFICATE

We certify that the overall Sound Pressure Level generated by the agitator does not exceed
75 dBA at 1 meter

when tested under no load in free-field conditions.

DATE: 28 / 09 / 2012

AxFlow S.p.A.
Buccinasco - Italy

(Alessandro Vignati - Quality Manager)

AxFlow S.p.A.

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CERTIFICATE No.	QC-004
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

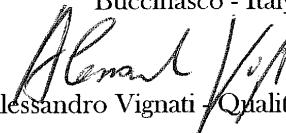
STATIC BALANCING CERTIFICATE

We certify that impeller fitted on shaft of mixer above has been statically balanced according to LIGHTNIN Static Balance Procedure (Quality grade G40 of the International Standard ISO 1940 for single plane balancing).

DATE: 28 / 09 / 2012

AxFlow S.p.A.

Buccinasco - Italy


(Alessandro Vignati - Quality Manager)

AxFlow S.p.A.

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CERTIFICATE No.	QC-016
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

MACHINERY DIRECTIVE

(2006/42/CE formerly 89/392/EEC Amended by 91/368/EEC, 93/44/EEC and 93/68/EEC)

CONFORMITY CERTIFICATE

(In Accordance with Article 4(2) and Annex II A of the above Directive)

This mixer has been designed and manufactured in accordance with the following standards and in conformity with the above Machinery Directive.

EN292 PART 1 & 2 : 1991 Safety of Machinery

DATE: 28 / 09 / 2012

**AxFlow S.p.A.
Lightnin Division
(Buccinasco)**

A handwritten signature in black ink, appearing to read "Giacomo Merello".

AxFlow S.p.A.

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INSTRUCTION MANUAL

CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	62A3
MIXER MODEL	15C-4
AXFLOW JOB:	110635
SERIAL NUMBER:	552954
QUANTITY	1

AxFlow S.p.A.

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TITLE	SECTION
GENERAL SAFETY RECOMMENDATIONS	
STORAGE INSTRUCTIONS	
OUTLINE DRAWING	
ASSEMBLY DRAWING	
IMPELLER ASSEMBLY DRAWING	
STUFFING BOX ASSEMBLY DRAWING	
STEADY BEARING ASSEMBLY DRAWING	
 INSTRUCTION MANUAL	
Initial Inspection	Section 1
Installation	Section 2
Recommended lifting procedures	Section 3
Start-up	Section 4
Gear drive lubrication	Section 5
Storage procedures	Section 6
Bolt tightening torque recommendations	Section 7
 FLEXIBLE COUPLING	
 GEAR DRIVE MAINTENANCE INSTRUCTIONS	
General	Section 1
Parts removal	Section 2
Gear drive assembly	Section 3
 SHAFT INSTALLATION	
Installation	Section 1
Removal	Section 2
 STUFFING BOX INSTRUCTIONS	
 INSTALLATION AXIAL FLOW IMPELLERS	
 TRIPOD STEADY BEARING INSTRUCTIONS	
 SPARE PARTS LIST	

GENERAL SAFETY RECOMMENDATION

NOTE: READ THIS SECTION CAREFULLY before operating or servicing
IF YOU DON'T UNDERSTAND SOME PARTS OF THIS INSTRUCTIONS, DO NOT TRY TO INSTALL OR
OPERATE THIS MIXER. PLEASE REPORT ANY PROBLEM IMMEDIATELY TO LIGHTNIN ITALIA S.R.L.

In general all site rules must be followed in operation and maintenance of your equipment

MIXER INSTALLATION, HANDLING AND LIFTING

Use only adequate lifting equipment. DO NOT try to lift the mixer by hand.

POWER SUPPLY CONNECTION

Don't connect motor leads until all components are assembled, the mixer installed and all bolts properly tightened as shown in the manual.

To prevent electrical shock, don't touch the mixer or the power supply cable when you have wet hands or feet, but also when you are in contact with a wet or humid surface.

Disconnect motor leads or otherwise lock-out power supply before servicing the mixer. Precautionary measures to prevent the possibility of applying power to the equipment when maintenance is being carried out MUST BE OBSERVED.

MIXER OPERATION

Protective guards must be fitted when the equipment is operating.

Don't touch with hands, or any other part of your body, mixer components (shaft, motor, impellers, seal, coupling, etc.). Don't try to handle the mixer if is running.

Don't use the mixer with purposes that differ from the original. Don't operate the seal device where temperature and pressure are higher than scheduled values.

It is very important to consider the following check-list before operating the mixer:

Make sure to have hearted the mixer

Make sure to have installed all the safety guards.

Make sure to have firmly secured all the detachable parts.

Read the instruction manual carefully.

Check for free movement of all rotating components.

Make sure to have made all external connections (electrical, hydraulic, etc.) in compliance with regulations.

DO NOT GET into the tank when the motor is connected and the shaft is not yet firmly fixed to the mixer.

MAINTENANCE

Do not modify the mixer (power rating, rotation speed, shaft length, impellers, etc.) without consulting Lightnin Italia S.r.l.

Disconnect motor leads or otherwise lock-out power supply before servicing the mixer.

When the mixer needs a repair, or when some parts need to be replaced, use only procedures and spare parts approved by LIGHTNIN.

Do not touch mixer motor and the upper part of the shaft , until they have been cooling for one hour.

Make sure the gear chamber has been filled with the correct amount of lubricant (grease or oil) before start up.

STORAGE INSTRUCTIONS

Please REVIEW and FOLLOW all instructions in this section.

FAILURE TO PROPERLY STORE AND PROTECT EQUIPMENT AS OUTLINED MAY VOID ANY WARRANTY, EXPRESSED OR IMPLIED

GENERAL RECCOMENDATIONS

- As soon as you have uncrated your mixer, check it for shipping damage and report any damage immediately to the carrier and to our factory.
- The mixer is shipped as complete unit ready to install after unbolting from the shipping skid. All unpainted steel surfaces are coated with a rust preventative is easily removed with kerosene or similar solvents.
- Do not remove wrappings or protective coating in the mixer is to be stored before it is placed in operation. Store the mixer in a clean dry location, with circulating air free from wide or rapid variations in temperature.
- If it is stored for more than a year, the condition of the grease gear lubricant should be checked before the mixer is installed.

EXTENDED STORAGE RECOMMENDATIONS

SECTION 1 - STORAGE CONSIDERATIONS

LIGHTNIN Mixers and Aerators, like all precision equipment, must be protected against corrosion during prolonged periods of inactivity. The primary cause of corrosion is condensation due to fluctuating temperatures, high humidity, or both. Properly treated and located in clean and dry surrounding, inactive equipment can be successfully stored for up to one year without damage from corrosive attack.

Electric motors or other prime movers are not prepared for indoor storage beyond the period shown below by LIGHTNIN. Outdoor storage of electric motors is not recommended by any motor manufacturer. For storage periods beyond those shown below, refer to motor maintenance instructions furnished with this manual for further details.

SECTION 2 - STORAGE OF NEW UNITS

Lightnin Mixers are factory treated with high quality corrosion inhibitors and rust preventatives. With reasonable care at the site, the products will effectively protect new, uninstalled units from corrosion due to water and water vapour, for up to one year, depending on how the unit is stored. Outdoor, unprotected storage is not permitted under any circumstances unless unit has been specifically prepared for such storage at the factory prior to shipment.

2.1 UNINSTALLED, PROTECTED STORAGE

Depending on the conditions under which a new unit which has not been installed is stored, the initial factory applied corrosion protection treatment will last up to one year. Actual preservation periods, as a function of storage conditions are defined in Table 12. This Table also defines the required intervals at which the corrosion protection must be renewed.

Table 1 - Corrosion Protection Periods

STORAGE CONDITIONS	PROTECTION PERIODS (MONTHS)	
	INITIAL	RE-PRESERVATION
Indoor in a dry ambient atmosphere with controlled temperatures	12	12
Indoor in a dry ambient atmosphere without temperature control	6	6
Outdoors as crated with suitable protection from the elements. Coverings must be waterproof, but have provisions for free circulation of air to avoid build-ups of condensation. Equipment must be elevated at least 300 mm above ground level to reduce moisture pickup.	4	4

2.2 INSTALLED, INOPERATIVE UNITS

Units that have been installed, but not serviced for operation and which will be inactive for more than three months must be prepared for storage per Paragraph 3 below.

2.3 INSTALLED, OPERATIVE UNITS

Units that have been installed, serviced for operation and run, but which will be inactive for more than three months must be prepared for storage per Paragraph 4 below.

2.4 PERIODIC INSPECTION

All protective coatings and wrapping must be maintained in good condition. Stored units should be visually inspected periodically to insure that the factory wrappings and coating are intact. If factory wrappings and coatings are accidentally removed or damaged, reapply them over the exposed areas.

SECTION 3 - CORROSION PROTECTION RENEWAL

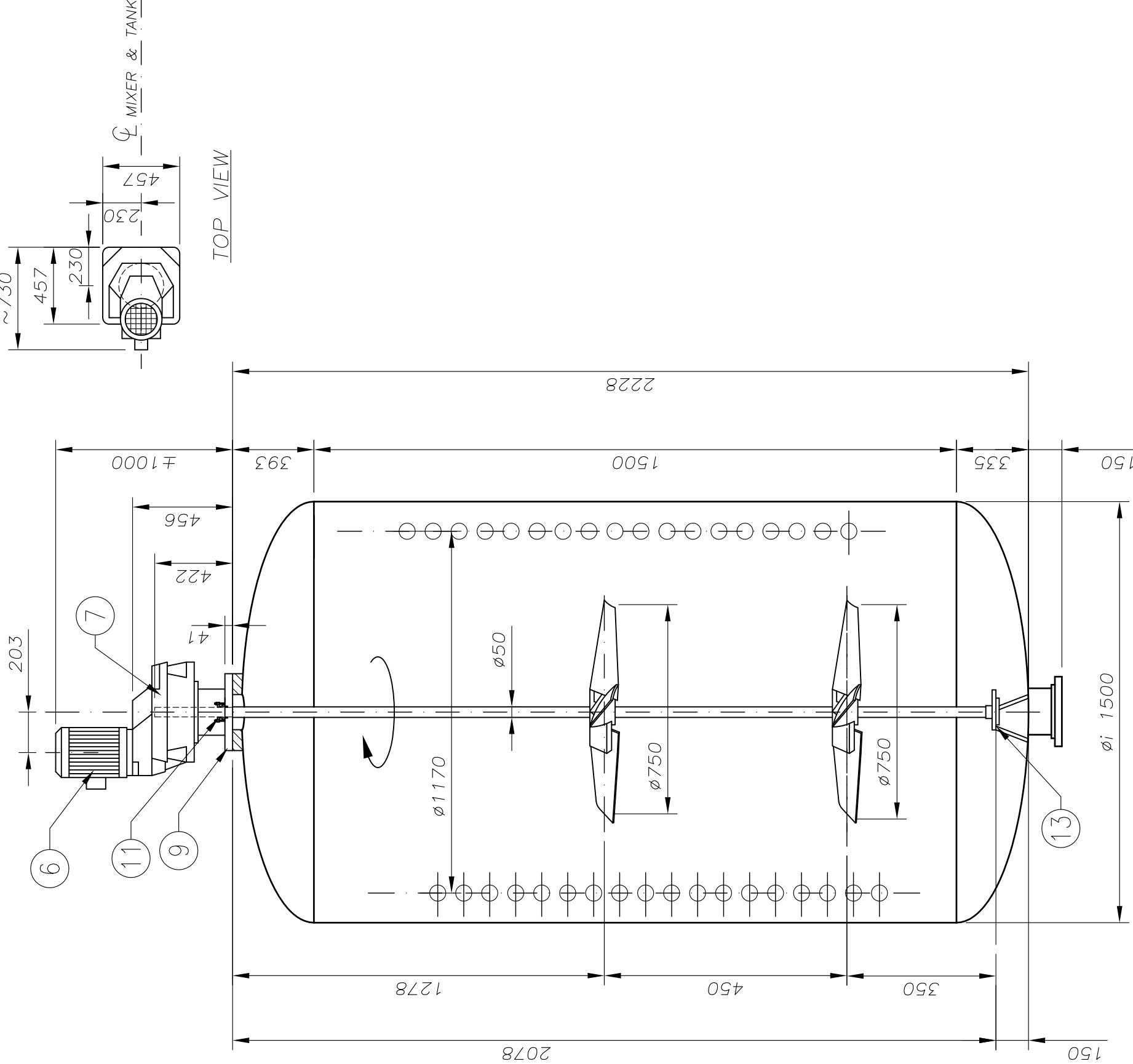
Table 1 defines the length of time which units, originally preserved at the factory, may be stored under various conditions.

This Table also defines the time period after which a stored unit must be re-preserved. Careful adherence to the protection renewal procedures defined herein will afford adequate protection for the same period covered by a factory prepared unit when stored under conditions defined in Table 1.

In order to re-preserve a stored unit, the following steps must be taken:

- 3.1 Remove all covers and protective wrappings.
- 3.2 Remove the oil filler plug or inspection cover, dipstick and breather plug(s) in the gear drive.
- 3.3 The interior of the unit must be treated with Vapor Phase Inhibitor (VPI) product to retard corrosion. Approved products are listed in Table 2. Use only approved VPI products. Distribute the required quantity of the VPI product through one or more the openings, directing the product to all corners for maximum coverage. With an assembly unit, the liquid product is generally easiest to apply, through the use of a fine mist sprayer and it is strongly recommended.
- 3.4 Replace the oil filler plug and inspection cover, dipstick and breather plug(s) which were removed to permit application of the VPI.
- 3.5 Seal off breathing passages by wrapping with VPI treated paper and waterproof tape. Add a tablespoon of one of the VPI products defined in Table 2 to the exposed cavities before sealing up with VPI paper and tape.

① Questo disegno non è in scala	① This drawing is not to scale
② Le dimensioni sono in mm	② Dimensions are in mm
③ Materiale parti a contatto con il prodotto	③ Materials of intank mixer parts
④ Frangiflotti (forniti dal cliente)	AISI 316L
⑤ Giranti	NONE
- tipo	A510-32
- n° di pale	3
- velocità di rotazione	102 rpm
Spostamento girante lungo l'albero	Impeller adjustment on shaft
- superiore	±225
- inferiore	±225
Con incrementi di	In increments of
Apertura min. per introd. giranti	Min. opening required
⑥ Motore	BY BALLESTRA
- potenza	4 kW
- giri / minuto	1430
- volt / fasi / cicli	415/3/50
- protezione	TEFC / IP55
- grandezza / forma	V1
⑦ Riduttore	LIGHTNING
- modello	15
- rapporto di riduzione	14 : 1
⑧ Carichi progetto sul bocchello del serbatoio	⑧ Tank nozzle design data
- carico verticale	5800 N
- momento torcente	1700 Nm
- momento flettente	660 Nm
⑨ Flangia di montaggio	8" ANSI 150
- diametro esterno	343
- diametro centro fori	298,4
- numero fori / bulloni	8 / 3/4
⑩ Peso agitatore	⑩ Mixer weight
- gruppo di azionamento	230 kg.
- motore	45 kg.
- albero	40 kg.
- giranti	30 kg.
⑪ Tenuta baderma	⑪ Stuffing box
- dis. n°	---
- n° baderme	2
- Materiali - baderme	PTFE
- premirtreccia	BRONZO
- separatore	---
⑫ Rumorosità attesa a 1 mt	≤ 75 dB(A)
⑬ Guida di fondo	⑬ Steady bearing
- dis. n°	ASu11
	- drawing No.



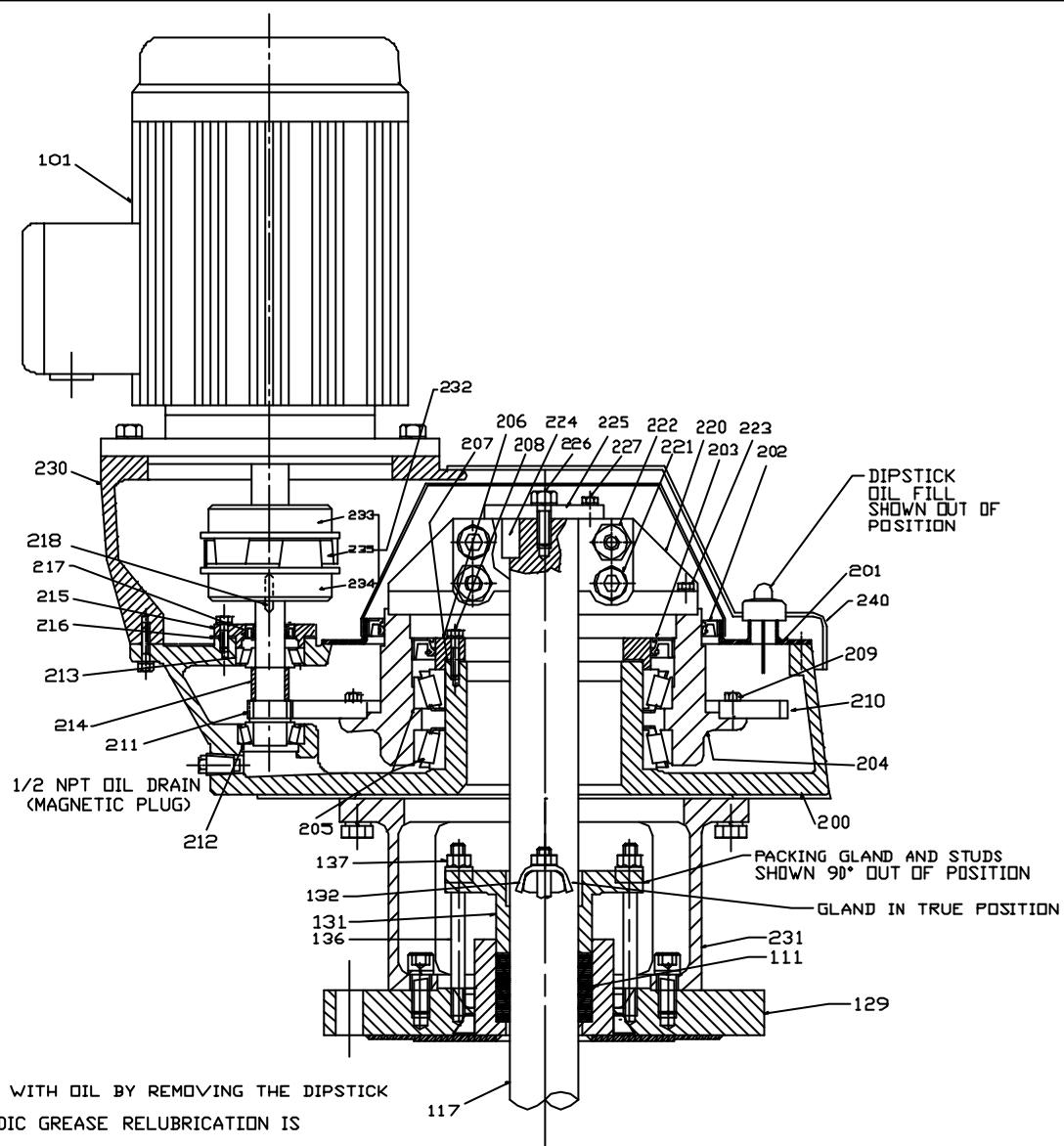
MODELLO AGITATORE / MIXER MODEL: 15C-4
CLIENTE / CLIENT: DESMET

ITEM: 62A3
ORDINE N° / P. O. N°: 121319

AxFlow LIGHTNING
AGITATORI LIGHTNING COSTRUITI SU LICENZA LIGHTNING MIXER MANUFACTURED UNDER LICENCE BY AXFLOW S.P.A. BUCCINASCO (MI) ITALY

DIS./DWG	DATA/DATE	DIS. N°	552954A	REV.
AR	18/06/12	DWG. No.		
CON./CHKD	DATA/DATE	COMM. N°	110635	O

TUTTI I DATI RELATIVI ALL'APPARECCHIATURA ED APLICAZIONE QUI RIPORTATI SONO DA CONSIDERARSI CONFIDENZIALI E DI PROPRIETÀ DELLA AxFlow S.P.A. USO O RIVELAZIONE A TERZI NON SONO CONSENTITI SENZA LA NOstra APPROVAZIONE SCRITTA. ALL EQUIPMENT DESIGN AND APPLICATION DATA SHOWN HEREIN AND RELATED KNOW-HOW ARE CONFIDENTIAL AND THE PROPERTY OF AxFlow S.P.A. NO USE OR DISCLOSURE THEREOF MAY BE MADE WITHOUT OUR WRITTEN PERMISSION.



NOTES:

1. FILL UNIT WITH OIL BY REMOVING THE DIPSTICK
2. NO PERIODIC GREASE RELUBRICATION IS REQUIRED
GEAR DRIVE BEARINGS ARE OIL SPLASH LUBRICATED. THE HIGH SPEED COUPLING DOES NOT REQUIRE LUBRICANT.
REFER TO YOUR INSTRUCTION MANUAL FOR COMPLETE LUBRICANT SPECIFICATIONS & DETAILS.

213	HIGH SPEED BEARING-UPPER	322	COVER PLATE (NOT SHOWN)
212	HIGH SPEED BEARING-LOWER	240	COUPLING GUARD
211	HIGH SPEED PINION & SHAFT	235	FLEXIBLE ELEMENT
210	LOW SPEED GEAR	234	DRIVEN HUB-PINION SHAFT
209	HEX HD CAP SCREW(NYLOK)	233	DRIVEN HUB-MOTOR SHAFT
208	HEX HD CAP SCREW(NYLOK)(4)	232	H.S. FLEXIBLE COUPLING ASSY
207	SHIM SET-L.S.BEARING ADJUSTMENT-7 PER SET	231	PEDESTAL
206	LOW SPEED BEARING RETAINER	230	MOTOR PEDESTAL
205	LOW SPEED BEARING(2)	227	HEX HEAD CAP SCREW(2)
204	LOW SPEED GEAR HUB	226	HEX HEAD CAP SCREW(1)
203	OIL SEAL-INNER	225	THRUST PLATE
202	OIL SEAL-OUTER	224	KEY - IMPELLER SHAFT
201	HOUSING COVER	223	HEX HD CAP SCREW(NYLOK)(8)
200	GEAR DRIVE HOUSING	222	HEX NUT(4)
137	HEX NUT	221	SOC. HEAD CAP SCREW(4)
136	STUD	220	LOW SPEED COUPLING-SPLIT
132	GLAND CLAMP	218	KEY PINION SHAFT
131	PACKING GLAND	217	OIL SEAL-HIGH SPEED
129	FLANGE ASSEMBLY	216	SHIM SET H.S.BEARING
117	IMPELLER SHAFT	215	ADJUSTMENT-6 PER SET
111	PACKING RINGS (5)	214	HIGH SPEED BEARING RETAINER
101	MOTOR	-	SPACER (UNIT SIZE 16 ONLY)

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A UNIT OF GENERAL SIGNAL

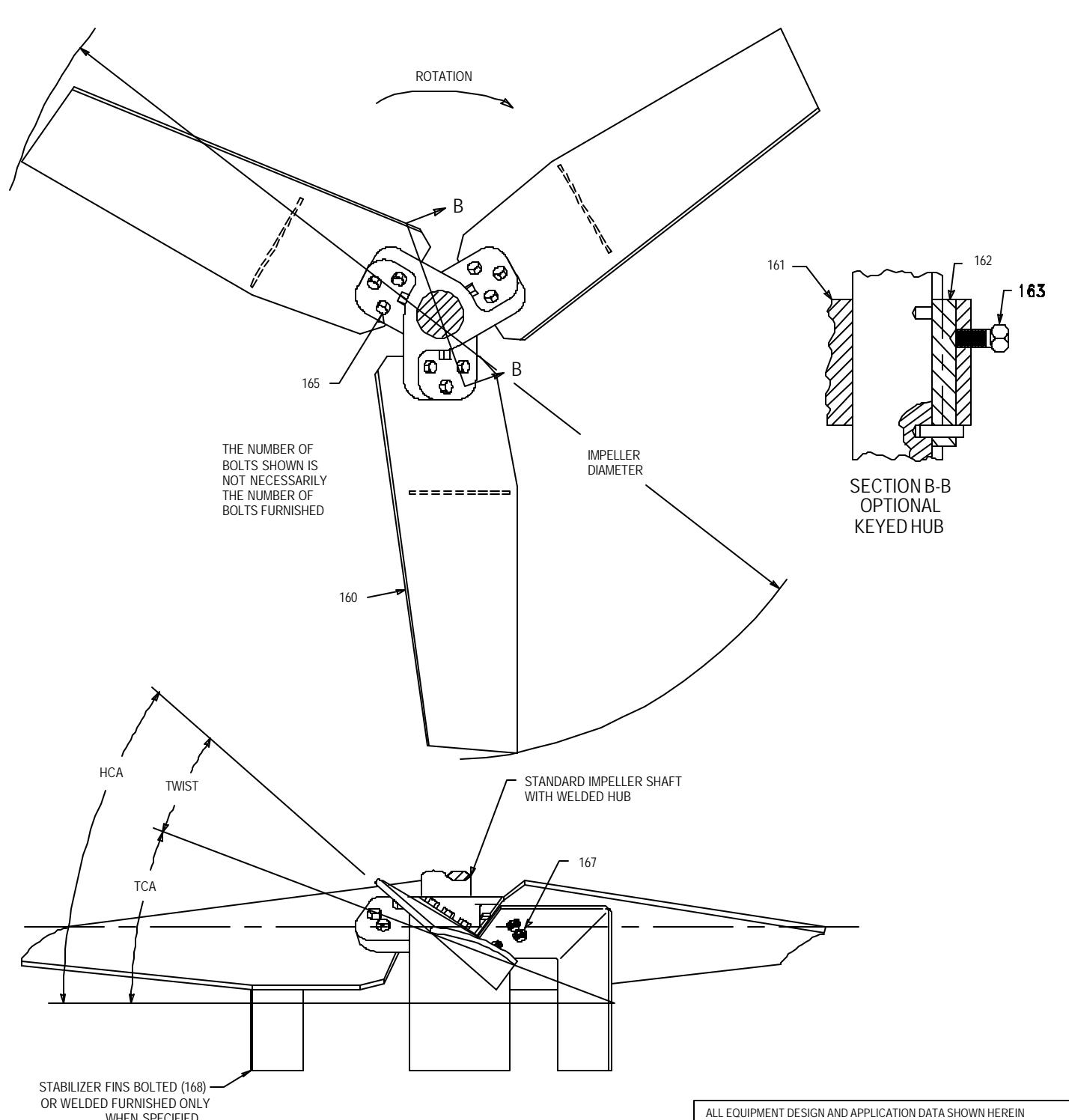
LIGHTNIN

MIXERS AND AERATORS

SERIES 10 UNIT SIZE 14-16
PEDESTAL MOUNTED MIXER
WITH STUFFING BOX

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1996

DRAWING No. S921088 RevA



WHEN ORDERING PARTS, SPECIFY:
IMPELLER DIAMETER, ITEM NO., PART NAME,
DRAWING NO. AND MIXER SERIAL NO.

168	STABILIZER FIN
167	HEX NUT
165	HEX HEAD CAP SCREW
163	SET SCREW
162	HOOK KEY
161	HUB
160	BLADE
ITEM	PART NAME

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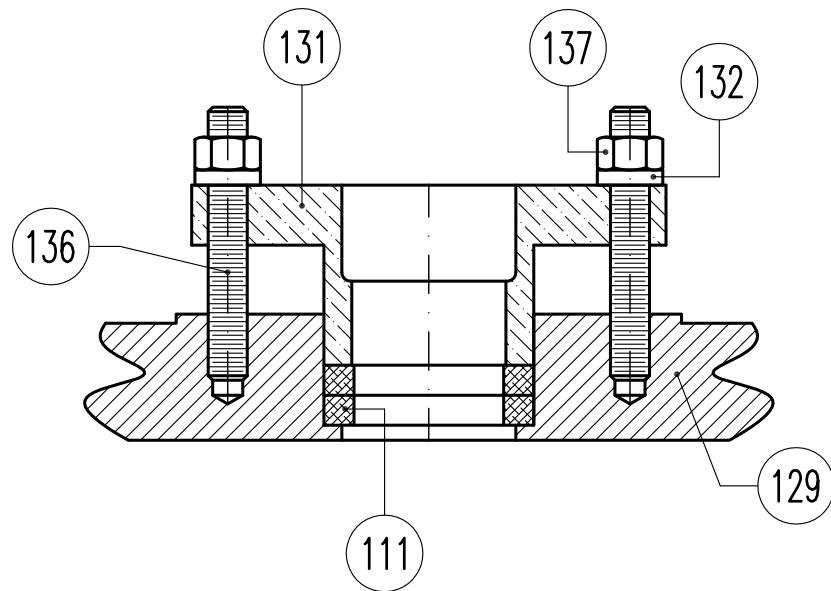


LIGHTNING®
MIXERS AND AERATORS

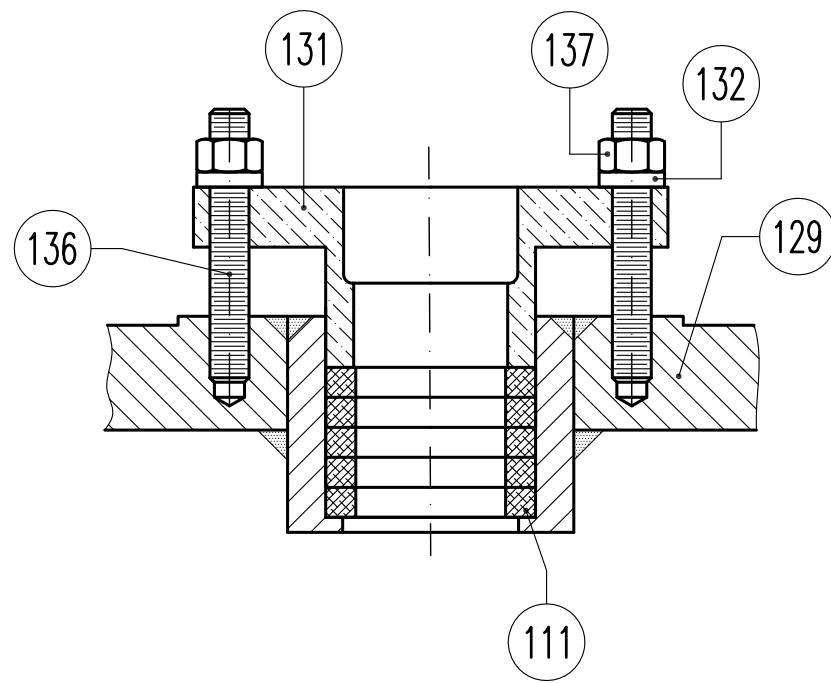
ASSEMBLY DRAWING

A510 AND A510E
AXIAL FLOW IMPELLER
ONE PIECE HUB w/
BOLTED BLADES

BASSE PRESSIONI
LOW PRESSURE



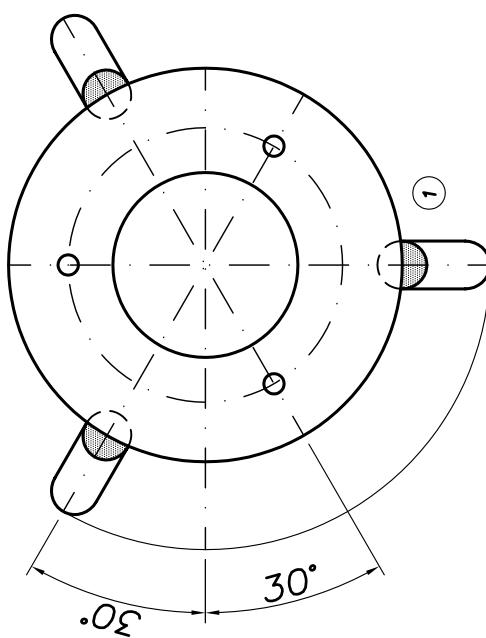
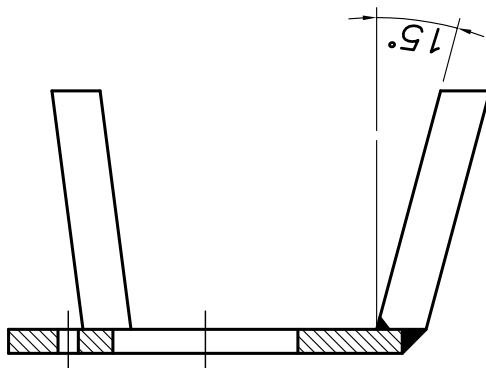
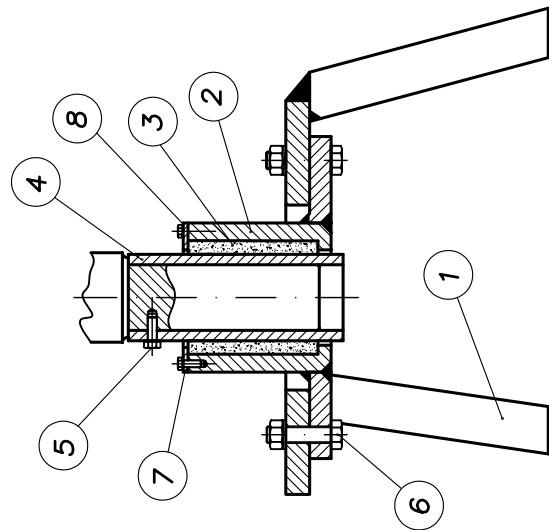
ALTE PRESSIONI
HIGH PRESSURE



AxFLOW S.p.A.	LIGHTNING
AGITATORI LIGHTNING COSTRUITI SU LICENZA DA: / LIGHTNING MIXER MANUFACTURED UNDER LICENCE BY: AXFLOW S.P.A. BUCCINASCO (MI) ITALY	
<u>TITOLO: Particolare assieme zona tenuta Baderna tipologia std.</u>	
<u>basse pressioni 2 anelli alte pressioni 5+7 anelli</u>	
<u>TITLE: Assembly std stuffing box view for low 2 ring and high 5+7 ring pressure.</u>	
DIS. N° / DRW. N°	REV.
10/C/AS	0
DIS./DRN. MF 03/01/05	
CNTR./CKD.	
APP./APP.	

Pos.	DESCRIPTION DESCRIZIONE
8	Cover Coperchio
7	Cover screws (3) Viti coperchio (3)
6	Mounting screws (3) Viti di montaggio (3)
5	Screws (2) Viti di fermo (2)
4	Shaft sleeve Carnicia albero
3	Bushing Bussola
2	Bushing holder Portabussola
1	Support Supporto

SUPPORT: FURNISHED BY CLIENT
SUPPORTO: FORNITO DAL CLIENTE



A Division of SPX

LIGHTNIN

Steady bearing
Assembly drawing

Disegno d'assieme
Guida di fondo

ASJ 1 1

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Dis. n°/Dwg. n°:

GENERAL INSTRUCTIONS FOR LIGHTNIN® SERIES 10 – MODELS 14, 15, 16, 17

SECTION 1 - INITIAL INSPECTION, SHIPPING ARRANGEMENTS

- 1.1 Check shipping crates and your **LIGHTNIN** equipment for possible shipping damage. Report any damage immediately to the carrier and our factory.
- 1.2 All Series 10 mixers are shipped completely assembled except for the lower shaft, impeller assembly, and mechanical seal, if supplied. The in-tank shaft and impeller blades will be crated separately or secured to the main shipping skid.
- 1.3 All mixers are treated with corrosion inhibitors for protection during shipment and possible storage.
 - a. All steel surfaces not protected with permanent coatings are covered with a rust preventative that is easily removed with kerosene or similar solvents.
 - b. All internal surfaces are protected against corrosion due to water or water vapor in case the mixer will not be put into service right away.
- 1.4 The dipstick/oil fill plug is packaged separately and should be identified. A plastic plug is installed in the opening to ensure that the mixer remains sealed and properly preserved during shipment. DO NOT remove this plug until the mixer is put into service.
- 1.5 Factory applied inhibitors will protect mixers from internal corrosion for periods up to (1) year if stored indoors in clean, dry surroundings. OUTDOOR STORAGE IS NOT RECOMMENDED. Review the section on storage carefully if the mixer is to be stored or inactive for an extended period.

SECTION 2 - INSTALLATION

- 2.1 Recommended lifting procedures are covered in Section 3 of these instructions. Important mounting and operating information is shown on the installation drawings.
 - a. Mixer weight and design loads imposed by the mixer for mounting structure design.
 - b. Location and mounting dimensions.
 - c. Baffle information (when required).
- 2.2 Install the dipstick/oil fill plug.
- 2.3 Lower the shaft and impeller hub assembly into the vessel and support in an upright position.
- 2.4 Angle Mount Mixers: Lower shaft must be installed vertically with the mixer in a level horizontal position.
To avoid insufficient gear drive lubrication, install the mixer as shown on the Installation Drawing.
- 2.5 Place the mixer on the mounting structure or tank nozzle. Refer to Section 3 for proper lifting procedures.
- 2.6 Refer to the shaft installation instructions before inserting impeller shaft into gear drive for important assembly procedures and tightening torques.
- 2.7 IMPELLER ASSEMBLY
 - a. When installing the impeller/s on a shaft, refer to the impeller drawing and instructions. Make sure the impellers are installed for the shaft rotation indicated and that impeller hardware is tightened to the specific torques listed in the impeller instructions.
 - b. For angle mount mixers supplied with a **LIGHTNIN** mechanical seal, it may be necessary to install the impeller/s from inside the tank.
- 2.8 Tighten all in-tank hardware to the specific torques listed in either Section 7 or special torques that will be listed on individual instruction sheets where applicable.
- 2.9 It is the customer's responsibility to touch up any paint damage incurred during installation and/or shipping.

SECTION 3 - RECOMMENDED LIFTING PROCEDURES

CAUTION: FAILURE TO LIFT THE MIXER AS DESCRIBED IN THESE INSTRUCTIONS MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

3.1 GENERAL LIFTING INSTRUCTIONS

- a. WE DO NOT RECOMMEND that you include the lower shaft and impeller assembly as part of the mixer being lifted.
- b. When taking up slack on the lifting sling or strap, avoid sudden impact loading of the lifting devices.
- c. The mixer must be supported until it is securely bolted to the mounting structure.
- d. If removed, re-install the coupling shield and the safety guard prior to start-up.

3.2 LIFTING PROCEDURE

- a. Refer to Figure 1 for proper lifting scheme.
- b. Place a "choker" sling or strap around the motor pedestal (230). Ensure the strap is BELOW the strap retention flange.
- c. DO NOT lift by wrapping a sling or strap around the motor. The motor connection is not designed to support the weight of the entire mixer.

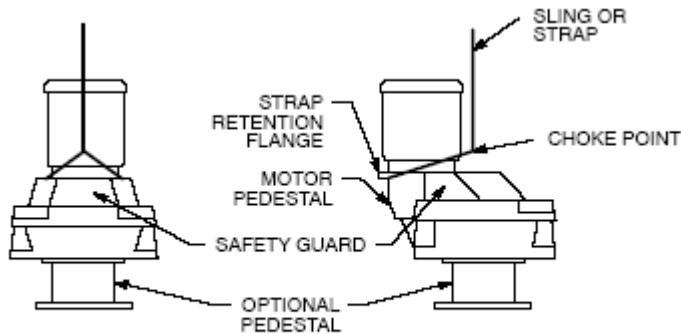


FIGURE 1

SECTION 4 - START-UP

4.1 Dipstick / Breather

- a. For mixers without angle risers, the gear drive dipstick/oil fill plug is removed prior to shipment and replaced with a solid plug to provide an airtight housing.
- b. For mixers with angle risers, the breather is removed prior to shipment and replaced with a solid plug to provide an airtight housing.

4.2 FILL THE GEAR DRIVE WITH OIL TO THE PROPER LEVEL. Refer to Section 5 for recommended oil and viscosity recommendations.

4.3 Refer to the motor maintenance instructions before connecting the motor to the power source.

- a. Rotate the motor shaft to check for free rotation.
- b. It is recommended that stator windings be checked for insulation resistance. If resistance is less than one megaohm, windings should be dried thoroughly.
- c. Check the motor nameplate for proper line voltage and correct connections according to the wiring diagram.
- d. Before making permanent motor lead connections, check impeller shaft rotation. Jog the motor to determine if rotation is correct, then make permanent connections. Make sure the mixer is properly grounded in accordance with applicable UL codes.

4.4 If your mixer is equipped with a mechanical seal, refer to the seal instructions for pressure, temperature and lubricant specifications.

- 4.5 Before filling and/or pressurizing vessel:
 - a. Run mixer in air and check for any unusual noises.
 - b. Check output RPM.
 - c. Check all bolts for tightness. After two weeks of operation, recheck hardware for tightness.
- 4.6 After filling and/or pressurizing vessel:
 - a. Jog the motor or rotate the input shaft by hand to ensure impellers are free of obstructions.
 - b. Never start up the mixer with the impeller/s imbedded in solids or set-up liquids.
 - c. Take load reading.
- 4.7 Install and secure the coupling shield (247) and safety guard (240) before operating the mixer.

SECTION 5 - GEAR DRIVE LUBRICATION

WARNING: EYE PROTECTION MUST BE WORN AT ALL TIMES WHILE SERVICING THIS MIXER.

- 5.1 Fill the gear drive with oil to the proper level using only one of the products listed in Table 1 as appropriate for the expected ambient temperature range. If the oils listed in Table 1 are not available, the EP oils listed in Table 2 may be used as a substitute. Use only one type of oil in any single mixer. Do not mix oil types, grades or brands in any mixer. If it becomes necessary to add oil to a mixer prior to the normal drain interval, be sure to use only the same type, brand and grade oil used at the original fill. Do not use any product not listed in Table 1 without prior factory approval (refer to Paragraph 5.8 for additional details).

In selecting an oil from Table 1, use the grade that most closely suits the average ambient temperature range that may be expected before the next oil change. If the expected ambient temperature overlaps two temperature ranges defined in Table 1, use the lower viscosity grade.

- 5.2 Lubrication instruction revisions

Both AGMA Standards and Lubricant Manufacturer's offerings change, over time. The lubricant information in this general instruction may be different than in older versions. In most cases **LIGHTNIN** urges the customer to be consistent with AGMA lubrication standards, but we recognize that they may have had successful field experience based on the older instructions. Immediate conversion is not required, however a gradual transition to the current lubrication standards is recommended.

MANUFACTURER	BRAND	Ambient Temperature °C (°F)		
		-25° to -5° C (-15° to +25°F) (AGMA 2 S, ISO 68)	-10° to +40° C (+15° to +100° F) (AGMA 3 S, ISO 100)	+30° to +55° C (+90° to +130° F) (AGMA 4 S, ISO 150)
EXXONMOBIL	MOBIL	Mobil SHC 68	Mobil SHC 100	Mobil SHC 150
EXXONMOBIL	EXXON	No Product	No Product	MobilGear SHC 150
CHEVRON	CHEVRON	No Product	No Product	Tegra 150
CHEVRON	TEXACO	No Product	No Product	Pinnacle EP 150
SHELL	SHELL	No Product	No Product	Omala HD 150

Table 1 – Approved Synthetic Oils

Temperature Range °C (°F)			-10° to +5° C (+10° to +40° F)	+5° to +20° C (+40° to +70° F)	+20° to +40° C (+70° to +100° F)	+40° to +55° C (+100° to +130° F)
MANUFACTURER	BRAND	PRODUCT	AGMA Viscosity Grade			
			2 EP – 3 EP	3 EP – 4 EP	4 EP – 5 EP	5 EP – 6 EP
EXXONMOBIL	MOBIL	MobilGear 600 XP	68 - 100	100 - 150	150 - 220	220 - 320
EXXONMOBIL	EXXON	Spartan EP	100	100 - 150	150 – 220	220 - 320
CHEVRON	CHEVRON	Gear Compound EP	100	100 - 150	150 – 220	220 - 320
CHEVRON	TEXACO	Meropa	100	100 - 150	150 – 220	220 - 320
SHELL	SHELL	Omala	100	100 - 150	150 – 220	220 - 320

Table 2 – Approved Petroleum Based EP Oils

5.3 Filling mixer with oil:

- a. Mixers mounted vertical on tank centerline can be filled by removing the dipstick/oil fill plug. Add the amount of oil stamped on the mixer nameplate. Replace the dipstick/oil fill plug and recheck oil level. The dipstick full mark should always be used as the most accurate guide to the actual oil level in a specific mixer. Always stop the mixer to check the oil level.
 - b. Mixers with angular offset mounting are furnished with a stand pipe type arrangement for oil measurement. The stand pipe/oil drain assembly must be adjusted to maintain the elevation of the stand pipe in respect to the top face of the gear drive (see Figure 2), using the values in the table. Once this has been accomplished, fill the stand pipe to the top and replace the oil plug. The oil level should be maintained within $1/8$ " of the top of the stand pipe.

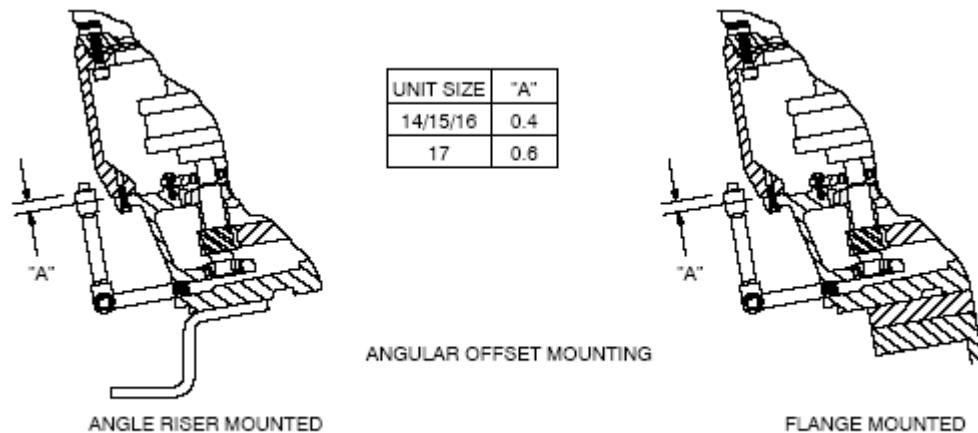


FIGURE 2

CAUTION: DUE TO LUBRICATION CONSIDERATIONS, MAXIMUM ALLOWABLE INPUT SPEED IS 2000 RPM.

Series 10 Mixers are supplied with one of the following dipsticks:

- a. 220021PSP (blade #219646) for use with input speeds of 1800, 1200 or 900 RPM.
 - b. 220022PSP (blade #219649) for use with input speeds at or below 600 RPM.

Mixer size	Input RPM	
	1800, 1200, 900	600 and Below
14 & 15	8 (9)	9 (10)
16	17 (18)	18 (20)
17	21 (23)	23 (25)

Oil Capacity – Liters (Quarts)

If the mixer is to be operated at or below 600 RPM for an extended period of time, and dipstick 220021PSP has been furnished, fill the gear drive housing with oil to a point 11mm (7/16 inch) **OVER** the full mark on the dipstick. When normal operation resumes (input speed above 600 RPM), the excess oil must be removed or oil spillage will occur.

If the mixer is to be operated above 600 RPM for an extended period of time, and dipstick 220022PSP has been furnished, drain the gear drive housing of oil to a point 11mm (7/16 inch) **BELOW** the full mark on the dipstick. When normal operation resumes (input speed below 600 RPM), oil must be added or gear drive damage will occur.

CAUTION: DIPSTICK 220022PSP WAS NOT DESIGNED TO REGISTER THE LOWER OIL LEVEL MENTIONED ABOVE. TO ENSURE PROPER LOW OIL LEVEL READING, DIPSTICK 220021PSP MUST BE USED.

- 5.4 The oil change frequency required for the gear drive is dependant upon the type of oil being used and the overall operating conditions. In general, higher operating or local ambient temperatures or adverse operating conditions will require more frequent oil changes. Table 3 provides specific guidance regarding the oil change interval for these gear drives. These oil change intervals must be adhered to.

Duty Classification	Oil Selected from Table	Oil Change Interval (Whichever occurs first)	
		Operating Hours	Calendar Months
Intermittent	2	2500	6
	1	5000	12
Continuous (24 Hours Per Day)	2	4380	6
	1	8760	12

Table 3 – Recommended Normal Oil Change Intervals

- 5.5 The lubricant change interval may be extended if a comprehensive oil analysis program is established. Such a program must include both spectrographic and ferrographic analyses as well as viscosity, total acid number, total based number, and water content. If such an analysis program is in place, the oil should only be changed when degradation or contamination is indicated by the analysis results. In no case should the oil change interval exceed 36 months.

DO NOT MIX oil types, grades or brands in the same mixer. If, at any oil change interval, it is necessary to change lubricant, it is necessary to flush the mixer as follows:

- a. Drain existing lubricant from gear drive as fully as possible.
- b. Refill mixer as described above with new lubricant.
- c. Operate gears drive long enough to reach normal operating temperature, usually at least two hours.
- d. Drain and discard the lubricant from the gear drive.
- e. Refill mixer with new lubricant and return to service.

- 5.6 More frequent oil change intervals, of one half to two thirds of the periods listed in Table 3, may be necessary if unfavorable operating conditions that tend to degrade the oil or cause excessive condensation exist. Unfavorable conditions are defined as:
- a. Intermittent operation with rapid changes in oil temperature.
 - b. Wide fluctuations in ambient temperatures over short time spans.
 - c. Harmful vapors, chemical fumes, dusty atmospheres or prolonged humid atmospheres.
 - d. If adverse operating conditions are present, reputable lubricant suppliers can test oil and recommend economical oil change schedules.
- 5.7 No periodic grease relubrication is required except for the motor bearings. All gear drive bearings are lubricated by oil splash. Refer to the motor maintenance instructions for motor bearing lubricant specifications and recommended frequency of relubrication.
- 5.8 ALTERNATE OILS
- a. Care must be taken to choose an appropriate alternate lubricant.
 - b. The selection of an alternate oil should be done only after thorough evaluation by a qualified individual. Lubrication is a complex subject with numerous variables.
- NOTE: The gear drive contains elastomers, gear case sealer and other materials that may not be suitable for use with an alternate oil. It is the customer's responsibility to ensure that the oil is compatible.
- c. All lubricants DO NOT perform equally, even though they may be the same AGMA viscosity grade. Each lubricant has different performance levels based on the specific additives and formulations. **It is the Customer's responsibility to understand the performance capability of the alternate lubricant they will be using.**
 - d. **LIGHTNIN DOES NOT APPROVE OR INVESTIGATE ALTERNATE OILS.** We recognize, however, that alternate oils may perform adequately and provide other benefits to the customer. Customers may want an alternate oil due to cost, availability or commonality of use with other equipment. In light of this, **LIGHTNIN provides general guidance for the customer or a third party to evaluate alternate oils.**
 - e. **LIGHTNIN** offers general guidelines for evaluating alternate oils, however, successful field experience is critical to the selection.
 - f. Most lubricant manufacturers can provide, upon request, product specification data sheets for each of their products. These data sheets generally provide all or most of the data required.
 - g. If a lubrication related failure occurs, the Customer's lubricant evaluation and field experience would be considered in the failure analysis.
 - h. **The Warranty may be voided if the customer has not conducted a proper lubricant evaluation, before using the alternate lubricant.**
 - i. For suggestions of a third party to perform an oil evaluation, the Society of Tribologists and Lubrication Engineers may be contacted at www.stle.org.

TABLE 4
MINIMUM PHYSICAL AND PERFORMANCE REQUIREMENTS FOR
EXTREME PRESSURE AND SYNTHETIC GEAR LUBRICANTS

PROPERTY	TEST PROCEDURE	ACCEPTANCE CRITERIA		
Flash Point (°F)	ASTM D 92	400 (Minimum)		
Viscosity	ASTM D 445	Per Table 6		
Viscosity Index	ASTM D 2270	EP: 90 (Minimum), SYN: 120 (Minimum)		
Oxidation Stability	ASTM D 2893 (Increase in Kinematic Visc. of a sample at 250°F)	6% Maximum		
Rust Protection	ASTM D 665 B (24 hrs in synthetic sea water)	No Rust		
Corrosion Protection	ASTM D 130 (Copper strip corrosion after 3 hrs. @ 212°F	1b strip		
Foam Suppression	ASTM D 892 (Must be within the limits shown)	Maximum Volume of Foam (ml) after: Sequence: I II III Temp. °F: 75 200 75 After 5 Min. Blow: 75 75 75 After 10 Min. Rest: 10 10 10		
Demulsibility	ASTM D 2711 MOD (Must be within the limits shown)	AGMA Grades EP Syn. . 2-7 8-13 Max. % H ₂ O in oil 2.0 2.0 1.0 Max. Cuff after centrifuging (ml) 1.0 4.0 2.0 Min. Total free water collected during entire test (start w/ 90 ml of water) (ml) 80.0 50.0 60.0		
Cleanliness	None	Must be free from grit and abrasives.		
Pour Point	ASTM D 97			
Timken OK Load (lbs.)	ASTM D 2782	60 (Minimum)		
FZG Test (No. of stages passed)	DIN 51 354 (A/8.3/90°C parameters)	12 (Minimum)		
Filterability	None	Must be filterable to 25 microns without the loss of additives.		

SECTION 6 - STORAGE PROCEDURES

LIGHTNIN Mixers and Aerators, like all precision equipment, must be protected against corrosion during prolonged periods of inactivity. The primary cause of corrosion is condensation due to fluctuating temperatures and/or high humidity. Properly treated and located in clean, dry surroundings, inactive equipment can be successfully stored without damage from corrosion attack.

REVIEW AND FOLLOW THE PROCEDURES THAT FOLLOW. FAILURE TO PROPERLY STORE AND PROTECT THE EQUIPMENT AS OUTLINED MAY VOID ANY WARRANTY, EXPRESSED OR IMPLIED.

Electric motors or other prime movers are not prepared for indoor storage beyond the periods listed by **LIGHTNIN**. OUTDOOR STORAGE OF MOTORS IS NOT RECOMMENDED BY ANY MOTOR MANUFACTURER. For storage periods beyond those mentioned, refer to motor maintenance instructions furnished with this manual for further details.

The seal cartridge of mechanical seal mixers is not filled with lubricant. Fill the seal cartridge with lubricant as outlined in the seal maintenance instructions of this manual.

6.1 STORAGE OF NEW MIXERS

LIGHTNIN mixers are factory treated with high quality corrosion inhibitors and rust preventatives. The products used will effectively protect mixers from corrosion due to water and water vapor for the following initial periods depending on how the mixers are stored.

a. LENGTH OF CORROSION PROTECTION

1. 12 months, when stored in a dry, ambient atmosphere with controlled temperatures. Corrosion protection to be reapplied at 12 month intervals.
2. 6 months, when stored indoors in a dry, ambient atmosphere without temperature control. Corrosion protection to be reapplied at 6 month intervals.
3. 6 months, when stored outdoors as crated, with suitable protection from the elements. Coverings must be waterproof, but have provisions for free circulation of air to avoid buildups of condensation. Equipment must be elevated at least 300mm (12 inches) above ground level to reduce moisture pickup. CORROSION PROTECTION TO BE REAPPLIED AT 4 MONTH INTERVALS AFTER INITIAL STORAGE.

b. STORAGE OF INSTALLED MIXERS

1. Mixers that have been installed, but not filled with oil and will be inactive for an extended period should be prepared per 6.2
2. Mixers that have been installed, filled with oil and run, but will be inactive for an extended period should be prepared for storage per 6.3.

c. STORAGE OF CRATED MIXERS

For mixers that will be stored for periods longer than 6 months as crated indoors without temperature control or outdoors, remove the dipstick/oil fill plug (located on top of the gear drive) per Section 4.1. Add 0.06 liter (2 ounces) of "MOTORSTOR" and replace the plug.

d. INSPECTION

Inspect factory installed wrappings and coatings. If factory wrappings and coatings are accidentally removed or damaged, reapply them over the exposed areas. Corrosion inhibitors deteriorate rapidly when exposed to air and water vapors.

6.2 CORROSION PROTECTION RENEWAL

Careful adherence to the renewal procedures will afford adequate protection for the same period covered by a factory prepared mixer when stored under conditions as defined in 6.1. These procedures should be repeated at the same intervals as noted in 6.1.

- a. The interior of the gear drive must be treated with a vapor phase inhibitor. Two types of products can be used:

"MOTORSTOR" VCI No. 10 preservative oil, a product of Daubert Chemical Co., Oak Brook, IL. (This is the factory applied product) or

SHELL "VPI 260" crystals (powder form), a product of Shell Oil Co., Syracuse, NY.

- b. Prepare the mixer as follows:

1. Remove cover and protective wrappings.
2. Remove oil fill plug and add 0.06 liter (2 ounces) of "MOTORSTOR" to sump oil.
3. Add fresh grease to the motor bearings. Remove relief plugs and add lubricant until fresh grease appears at the

relief. Replace plugs.

4. Rotate motor shaft by hand to distribute grease and turn over oil in gear sump.
5. Spray "MOTORSTOR" or equal preservative oil to exposed cavities.
6. Seal off breathing passages with VPI paper and wrap with waterproof tape.

6.3 STORAGE OF INACTIVE MIXERS

Mixers that have been in service, but will be idle less than 3 months, should be run at least 15 minutes every week and receive regular maintenance. Mixers inactive more than 3 months should be prepared as follows:

- a. Check the condition of the oil. (Lubricant suppliers can furnish oil checking service).
- b. If the oil condition is good, add 0.06 liter (2 ounces) of "MOTORSTOR" rust preventative oil to the regular oil.
- c. If the oil has deteriorated, or is due to be changed under normal schedules, drain the gear drive completely.
 1. Spray a mist of "MOTORSTOR" in the gear drive, directing the spray to all corners for maximum coverage.
 2. Add 0.06 liter (2 ounces) of "MOTORSTOR" (or 5 grams of SHELL VPI 260 can be used as an alternate).
- d. Remove the dipstick/oil fill plug and store in a safe place. Seal the opening with a solid plug.
- e. Cover mixers stored indoors with a waterproof covering, allowing for free air circulation.
- f. Inspect the drive every 4 months and:
 1. Regrease all motor bearings. Rotate motor shaft.
 2. Add additional "MOTORSTOR" as outlined above.
 3. Rotate shafts to distribute fresh oil and grease.

6.4 START-UP PREPARATION

- a. Remove all wrappings and coverings.
- b. Rotate shafts to check for free movement.
- c. Install the dipstick/oil fill plug.
- d. Check oil fill level, with the mixer stopped, and fill if necessary.

SECTION 7 - BOLT TIGHTENING TORQUE RECOMMENDATIONS

Inadequately or improperly tightened hardware can loosen due to vibration or the load reactions imposed by fluid forces. This can result in reduced equipment service life or damage and failure.

7.1 Recommended torques for tightening metric bolts and screws on **LIGHTNIN** Mixers and Aerators and their mounting structures are listed in Table 5 for your general reference. These average torque values should be considered only as guides and not as absolute values.

The amount of torque required to maintain a tight connection can vary considerably for bolts of the same size under different operating conditions. Variations such as basic joint design, compression factors, type and strength of base and hardware material, surface finish of mating parts and lubrication are only some of the factors that influence the tightness of bolted connections for given bolt torques.

UNLESS SPECIFICALLY LISTED ELSEWHERE IN THE DETAILED INSTRUCTIONS, TIGHTEN THE MIXER AND MOUNTING HARDWARE TO THE RECOMMENDED VALUES SHOWN IN TABLE 5. A torque wrench must be used to ensure compliance with these torque requirements.

Certain assembly connections may require special torques that are not listed in Table 5. These torques can be found in the detailed assembly and disassembly sections of your manual. **REVIEW YOUR MANUAL CAREFULLY TO DETERMINE WHERE SPECIAL TORQUES ARE REQUIRED.**

For severe duty service, torques higher than listed, to tighten a bolt to maximum capacity, can often be used. However, due to the many variables previously mentioned, the only absolute method to determine optimum torque is to deliberately yield a bolt under actual conditions. If a bolt does yield or shear, 75% of the torque applied in yielding the bolt can be used to obtain a tight connection that is satisfactory.

ALL BOLTS SHOULD BE RETIGHTENED 12 HOURS AFTER ASSEMBLY, AND AT EACH SCHEDULED SHUT DOWN THEREAFTER.

TABLE 5
RECOMMENDED TIGHTENING TORQUES FOR COMMERCIAL
GRADE STEEL, GR5, 304 AND 316 STAINLESS STEEL (1) (2)

BOLT THREAD SIZE	TIGHTENING TORQUES (FT-LBS) (3) GRADE 5.6 OR 304/316 SS BOLTS LUBRICATED	TIGHTENING TORQUES (FT-LBS) (3) GRADE 8.8 BOLTS LUBRICATED	ISO MARKING REFERENCE GUIDE (2)
M5	1.7	4.1	HEX HEAD CAP SSREWS
M6	3.0	7.0	
M7	5.0	12	
M8	7.0	17	
M10	14	34	
M12	25	59	
M14	39	93	HEX NUT
M16	62	146	
M18	85	200	
M20	120	284	
M22	178	386	
M24	207	491	
M27	303	718	SOCKET HEAD CAP SSREWS
M30	412	975	
M33	561	1327	
M36	720	1704	
M39	932	2205	
M42	1153	2727	

(1) ALL BOLTS SHOULD BE COATED WITH OIL, GREASE OR AN ANTI-SEIZE COMPOUND WHENEVER POSSIBLE. THE THREADS AND BEARING FACE OF BOLT HEADS AND/OR NUTS SHOULD BE LUBRICATED.

(2) TORQUE VALUES SHOWN SUPERSEDE PREVIOUS TABLES THAT MAY HAVE ALLOWED LOWER VALUES. IT IS RECOMMENDED THAT ONLY FASTENERS BE USED THAT ARE PROPERLY MARKED, INCLUDING MANUFACTURER'S TRADE MARKING. ONLY FASTENERS MARKED AS SHOWN ARE GUARANTEED TO MEET SPECIFICATION AND PERFORMANCE REQUIREMENTS.

(3) CONVERSION FACTORS:

FRiction LOCKING DEVICES MULTIPLY LUBRICATED VALUE BY 1.15. THESE TORQUES PERTAIN TO BOLTS OR NUTS WITH FRiction LOCKING DEVICES SUCH AS NYLON PELLETS OR PATCHES, FIBER INSERTS OR UPSET THREADS.

DRY VALUES MULTIPLY LUBRICATED VALUE BY 1.33.

Metric Values in N·m

1FT-LB = 1.3558 N·m

7.2 Recommended torques for tightening ANSI standard bolts and screws are listed in Table 6 for your general reference. These average torque values should be considered only as guides and not as absolute values.

The amount of torque required to maintain a tight connection can vary considerably for bolts of the same size under different operating conditions. Variations such as basic joint design, compression factors, type and strength of base and hardware material, surface finish of mating parts and lubrication are only some of the factors that influence the tightness of bolted connections for given bolt torques.

UNLESS SPECIFICALLY LISTED ELSEWHERE IN THE DETAILED INSTRUCTIONS, TIGHTEN THE MIXER AND MOUNTING HARDWARE TO THE RECOMMENDED VALUES SHOWN IN TABLE 6. A torque wrench must be used to ensure compliance with these torque requirements.

Certain assembly connections may require special torques that are not listed in Table 6. These torques can be found in the detailed assembly and disassembly sections of your manual. REVIEW YOUR MANUAL CAREFULLY TO DETERMINE WHERE SPECIAL TORQUES ARE REQUIRED.

For severe duty service, torques higher than listed, to tighten a bolt to maximum capacity, can often be used. However, due to the many variables previously mentioned, the only absolute method to determine optimum torque is to deliberately yield a bolt under actual conditions. If a bolt does yield or shear, 75% of the torque applied in yielding the bolt can be used to obtain a tight connection that is satisfactory.

ALL BOLTS SHOULD BE RETIGHTENED 12 HOURS AFTER ASSEMBLY, AND AT EACH SCHEDULED SHUT DOWN THEREAFTER.

**TABLE 6
RECOMMENDED TIGHTENING TORQUES FOR COMMERCIAL
GRADE STEEL, GR5, 304 AND 316 STAINLESS STEEL (1) (2)**

BOLT THREAD SIZE	TIGHTENING TORQUES (FT-LBS) (4) GRADE 2, 3 OR 304/316 SS BOLTS LUBRICATED	TIGHTENING TORQUES (FT-LBS) (4) GRADE 5 BOLTS LUBRICATED	MARKING GRADE	STEEL SAE GRADE MARKING REFERENCE GUIDE (2)
1/4 - 20	4.6	7.2	 NO MARK	SAE GRADES 0, 1 AND 2
5/16 - 18	9.6	15		
3/8 - 16	17	26		
7/16 - 14	27	42	 SAE GRADE 3	SAE GRADE 3
1/2 - 13	41	64		
9/16 - 12	60	92		
5/8 - 11	83	128	 SAE GRADE 5	SAE GRADE 5
3/4 - 10	146	226		
7/8 - 9 (3)	142	365		
1 - 8	212	547	 ALL SOCKET HEAD CAP SCREWS SAE GRADE 5	ALL SOCKET HEAD CAP SCREWS SAE GRADE 5
1 1/8 - 7	301	675		
1 1/4 - 7	425	952		
1 3/8 - 6	557	1249		
1 1/2 - 6	739	1657		
1 3/4 - 5 (3)	754	1600		
2 - 4 1/2	1134	2406		
2 1/4 - 4 1/2	1659	3519		
2 1/2 - 4	2269	4813		

(1) ALL BOLTS SHOULD BE COATED WITH OIL, GREASE OR AN ANTI-SEIZE COMPOUND WHENEVER POSSIBLE. THE THREADS AND BEARING FACE OF BOLT HEADS AND/OR NUTS SHOULD BE LUBRICATED.

(2) TORQUE VALUES SHOWN SUPERSEDE PREVIOUS TABLES THAT MAY HAVE ALLOWED LOWER VALUES. IT IS RECOMMENDED THAT ONLY FASTENERS BE USED THAT ARE PROPERLY MARKED, INCLUDING MANUFACTURER'S TRADE MARKING. ONLY FASTENERS MARKED AS SHOWN ARE GUARANTEED TO MEET SPECIFICATION AND PERFORMANCE REQUIREMENTS.

(3) ALLOWABLE BOLT STRESS VALUES CHANGE AT THESE LOCATIONS AND IS REFLECTED IN THE SUGGESTED TORQUE VALUES.

(4) CONVERSION FACTORS:

FRiction LOCKING DEVICES MULTIPLY LUBRICATED VALUE BY 1.15. THESE TORQUES PERTAIN TO BOLTS OR NUTS WITH FRiction LOCKING DEVICES SUCH AS NYLON PELLETS OR PATCHES, FIBER INSERTS OR UPSET THREADS.

DRY VALUES MULTIPLY LUBRICATED VALUE BY 1.33.

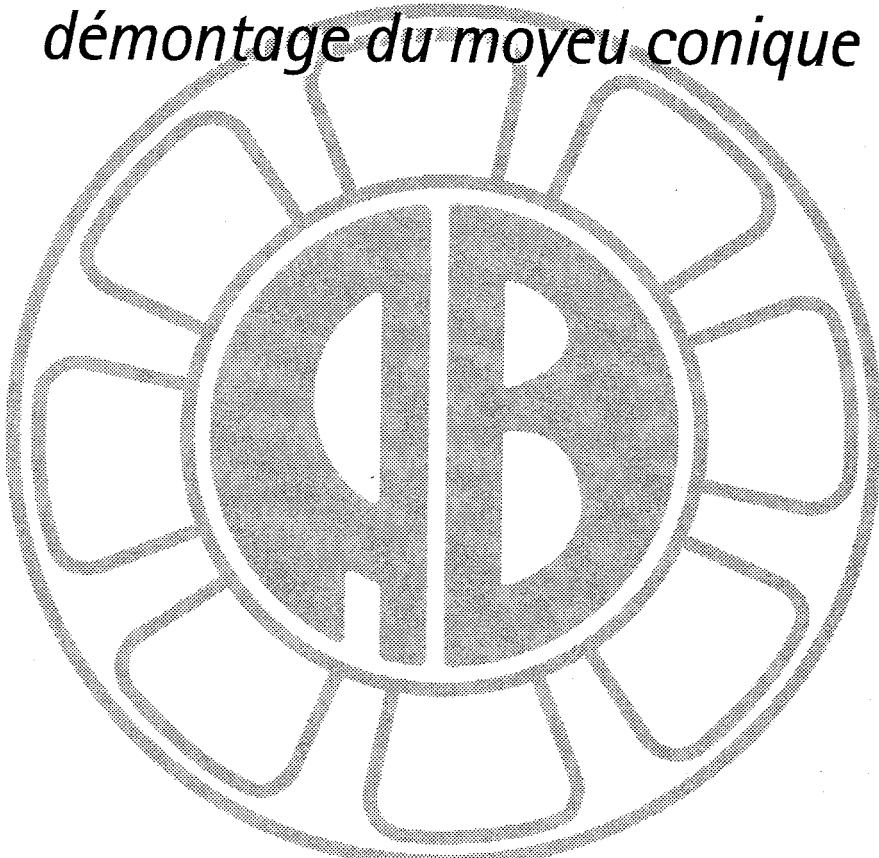
METRIC VALUES IN N-M

1FT-LB = 1.3558 N-M

Istruzioni Montaggio - Smontaggio Bussole Coniche

Taper bush installation and removal Instructions

Instructions pour le montage et démontage du moyeu conique



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TAPER BUSH INSTALLATION AND REMOVAL INSTRUCTIONS

INSTALLATION

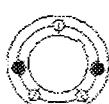
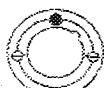
- Clean shaft, bore and outside of bushings, and bore of hubs (taking bushings from hubs is already assembled). Remove any oil, lacquer or dirt.
- Being careful not to damage bore or hubs, slip shaft into pulley.
- Slip bushings onto shaft and into hubs. Oil thread and point of set screws or thread and under head of cap screws. Place screws loosely in holes that are threaded on hub side (shown "0" thus in diagram).
- Locate shaft in position desired and tighten screws in each bushing slightly, so that bushings are snug in hubs.
- Tighten screws alternately and evenly in one bushing only until all are pulled up very tightly. See table for wrench torque. Avoid excessive wrench torque to prevent damage to the threads. Now hammer against large end of bushing using a heavy steel or bronze bar held against bushing.
- Screw can now be tightened a little more using the specified torque. Repeat this alternate hammering and screw re-tightening until the specified wrench torque no longer turns the screws after hammering.
- Check to make sure that the surface on both sides of the split are evened up. Fill the other holes with grease to exclude dirt.

REMOVAL

- Remove all screws. Oil thread and point of set screws or thread and under head of cap screws.
- Insert screws in holes that are threaded on bushing side (shown thus • in diagram).
- In sizes where washers are found under screw heads, be sure to use these washers: Note that one screw in each hub is left over and is not used in this loosening operation.
- Tighten screws alternately until bushings are loosened in hubs. If bushing does not loosen immediately tap on hub.

TORQUE WRENCH SETTING

AB BALBONI TAPER BUSH CODE	TAPER BUSH CODE	SCREW	TORQUE WRENCH SETTING	SOCKET HEAD SCREW
A28B20	1108	GRUB SCREW	1/4"	6 Nm
A30B25	1210	GRUB SCREW	3/8"	20 Nm
A40B25	1610	GRUB SCREW	3/8"	20 Nm
A50B30	2012	GRUB SCREW	7/16"	30 Nm
A65B45	2517	GRUB SCREW	1/2"	50 Nm
A75B50	3020	GRUB SCREW	5/8"	90 Nm
A90B90	3535	VTCEI	1/2"	110 Nm
A100B100	4040	VTCEI	5/8"	190 Nm



GEAR DRIVE MAINTENANCE INSTRUCTIONS FOR SERIES 10 MODELS 14, 15 & 16

SECTION 1 – GENERAL

- 1.1 Series 10 gear drives are precision manufactured and assembled to provide long trouble-free service when properly maintained. If it becomes necessary to disassemble the unit, careful precise re-assembly is necessary.
 - a . Equipment that may be required to service a unit, in addition to standard mechanics tools, are hoist, slings, arbor press, wheel pullers, torque wrench, feeler gauges, dial indicator and micrometers.
 - b . When disassembling a unit, clean external surfaces adjacent to covers to prevent dirt from entering the housing.
 - c . During disassembly, keep old shim-pack sets with their respective cages and retainers for reference when reassembling.
 - d . It is recommended that oil seals, O-rings and gaskets be replaced when units are disassembled.
 - e . Refer to the Mixer Assembly drawing included in this manual for parts identification.
 - f . Refer to the General Instructions for bolt tightening torques.
 - g . HIGH SPEED COUPLINGS as standard are either elastomer flexible element type (standard duty) or TYPE H or T10 tapered grid (variable speed/variable torque applications).
 - h . Determine the type high speed coupling furnished and refer to the appropriate coupling instructions for required alignment and assembly procedures. Coupling identifiers are located on the coupling components.
- 1.2 **Prior to servicing the gear drive**, do the following:
 - a . **Disconnect the motor leads or otherwise lock-out power supply.**
 - b . Drain oil from gear drive by removing the 1/2" NPT oil drain plug.
 - c . Remove safety guard (240) and coupling shield (247).
 - d . If gear drive is to be removed from the vessel, see the Shaft Installation and Removal Instructions included in this manual for shaft and coupling removal procedures.

SECTION 2 – PARTS REMOVAL

WARNING: EYE PROTECTION MUST BE WORN AT ALL TIMES WHILE SERVICING THIS MIXER.

2.1 SEAL REPLACEMENT

- a . We recommend that oil seals and O-rings be replaced when the unit is dismantled. Carefully check for nicks, gouges and deformities if they are not being replaced.
- b . Coat O-rings and the rubber lip of all oil seals with a light grease before installing.
- c . Be sure to install all oil seals in the correct orientation (with the closed side of the metal case facing upward). Refer to mixer assembly drawing.
- d . Install oil seals with the appropriate seal driver, being careful not to damage the metal case. If new oil seals are being used, coat seal cases with Permatex #1 or equivalent and press into bores with the proper seal driver. Apply a coating of grease to the oil seal lip and cavity.
- e . If a bearing has been removed and its condition is suspect, clean the bearing with a solvent and allow to dry. DO NOT SPIN dry bearings. Dip the bearings in a light oil for protection before spinning to check bearing condition.

2.2 GEAR AND PINION REMOVAL

- a . Remove the cap screws connecting the motor pedestal (230) to the gear drive housing (200) and remove the motor (101), motor coupling half (233) and motor pedestal as an assembly.
- b . Remove the drive cover (201) and oil seal (202). Scrape off all gasket material from the cover and the gear drive housing.
- c . Remove all of the hex head cap screws (209) holding the gear (210) to the gear hub (204).

- d . Upon removal of the cap screws (209), you will find that two of the holes in the gear are tapped with the following threads:

Unit Size	Thread Size
14 & 15	M12
16	M16

Install two jacking screws or bolts, 75mm (3 inches) long with at least 40mm ($1\frac{1}{2}$ inches) of thread into the tapped holes. Tighten these screws until the gear is free of the gear hub, then pick up the gear by the jacking screws and lift it out of the gear box. (see Figure 1)

- e . Inspect the gear for damage and replace if necessary. We strongly recommend that the gear (210) and pinion (211) be replaced as a set.
- f . Remove the pinion shaft coupling half (234) and the flexible element (235) from the pinion shaft (211).
- g . Remove the high speed bearing retainer (215) and the shim set (216), being careful not to damage the shim set.
- h . The high speed pinion and shaft (211) and bearings (212 & 213) can now be lifted up and out of the gear box. Inspect the pinion and replace if necessary.
- i . Inspect the high speed bearings (212 & 213) and replace if necessary. If the bearings or the pinion and shaft are replaced, a new shim set (216) will be required. If the bearings must be replaced, the outer race of the lower bearing can be removed from its bore with a small puller.

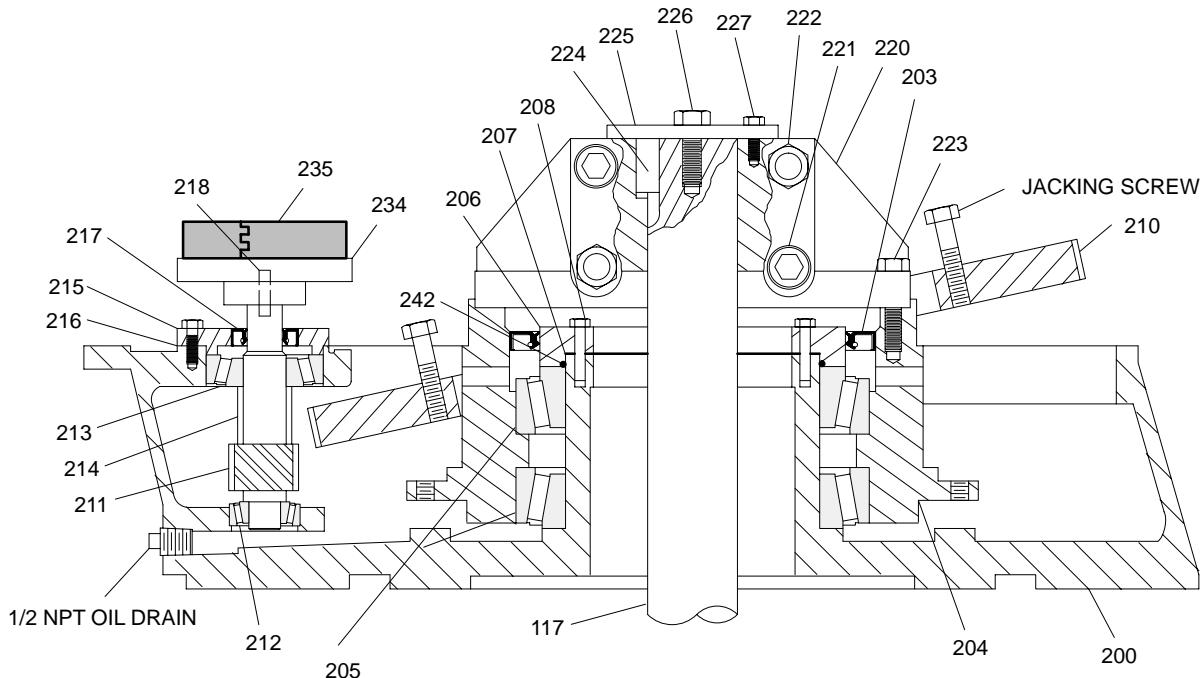


Figure 1

2.3 LOW SPEED BEARING REMOVAL

- a . Remove the low speed coupling (220) and impeller shaft (117) per the Shaft Installation and Removal Instructions included in this manual.
- b . Remove gear (210) per Section 2.2 of these instructions.
- c . Remove the low speed bearing retainer (206), the shim set (207) and O-ring (242).
- d . Place a 25mm (1 inch) thick steel rectangular bar of the length listed in Figure 2 across the top of the bearing pedestal of the gear drive housing. Using a large gear puller, pull the low speed gear hub (204) and the low speed bearings (205) off of the bearing pedestal of the gear drive housing. Refer to Figure 2.

- e . Inspect the bearings and replace if necessary. If the bearings are replaced, a new shim set (207) will be required. Using a drift, drive the outer races from the bearing pedestal. The inner race and rollers of the lower low speed bearing can be removed from the bearing pedestal of the gear drive housing by using a puller on the bearing cage. Only do so if you have determined that the bearing must be replaced, since the puller will damage the bearing.

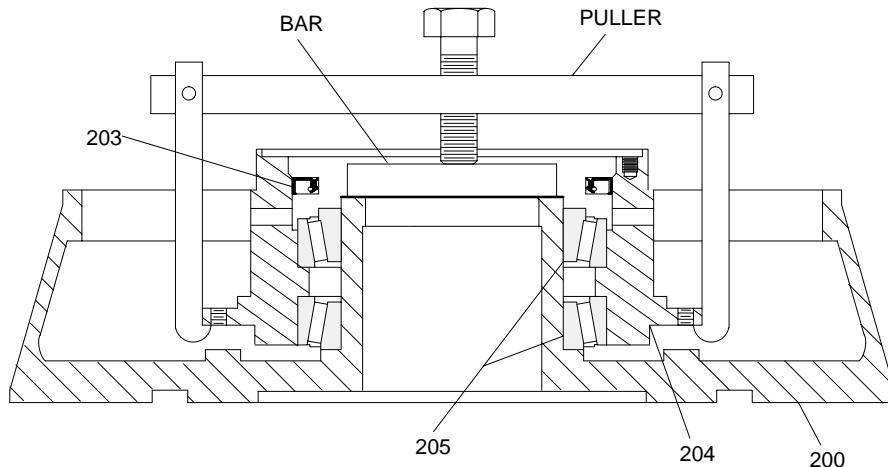


Figure 2

SECTION 3 – GEAR DRIVE ASSEMBLY

3.1 LOW SPEED BEARING INSTALLATION

- a . Coat the bearing bores in the gear hub (204) and the bearing pedestal of the gear drive housing (200) with oil prior to installing new bearings.
- b . Press the outer races of both low speed bearings (205) into the gear hub (204). Refer to assembly drawing for correct bearing orientation. Make sure the races are seated against the shoulder by checking for a gap with feeler gauges.
- c . Preheat the inner races of the low speed bearings in an oil bath or oven with a maximum temperature of 135° C (275° F).
- d . Remove one of the inner races from the oil bath or oven, and slide the race and rollers down the bearing pedestal, seating it against the bottom of the gear drive housing.
- e . Place the gear hub over the bearing pedestal and rest it on the lower bearing.
- f . Slide the second inner race and rollers onto the bearing pedestal, seating it into the upper outer race in the gear hub.

3.2 SETTING THE AXIAL PRELOAD IN THE LOW SPEED ROLLER BEARINGS

NOTE: Hex head cap screws (208) are furnished with Nylok inserts and should only be installed once. To establish proper preload, use hardware that does not contain a locking patch or pellet, then use new hardware for final assembly. **USE ONLY THE QUANTITY OF BOLTS LISTED IN 3.2.a TO INITIALLY SET THE PRELOAD.**

- a . To set the bearings, install the low speed bearing retainer (206) without the shims (207). Install **four** M8 x 30mm long bolts (without locking patch or pellet) in a symmetrical pattern.
- b . Tighten the bolts in a symmetrical pattern to the value listed in Table 1. It is critical that these bolts be tightened only to the torque indicated, and no greater.

NOTE: This is the torque for setting the preload ONLY.

UNIT SIZE	TORQUE (FT-LBS)
14, 15	8
16	12

Table 1

- c . Rotate the gear hub (204) at least five revolutions in one direction, and tighten the bolts again to the value listed in Table 1.
- d . Repeat Step 3.2.c until the bolt load does not change after the gear hub is rotated.
- e . With a feeler gauge, measure the gap between the low speed bearing retainer (206) and the top of the drywell. Do this in four places in close proximity to the bolts in the bearing retainer. These gap measurements should be close in value, but some difference is expected. If more than .005" difference is present, repeat Steps 3.2.a through 3.2.d. If the measurements are close to one another, take the average of the four measurements, and this is the total number of shims (207) that must be added between the low speed bearing retainer (206) and the drywell.
- f . The bolts apply a load capable of deflecting the bearings the desired amount of .003". The gap measured is the desired shim pack thickness.
- g . Remove the bearing retainer (206) and add the required shims (207).
- h . Install O-ring (242) and low speed bearing retainer (206). Insert new hex head cap screws (208) with unused Nylok inserts, and tighten to 20 ft-lbs.

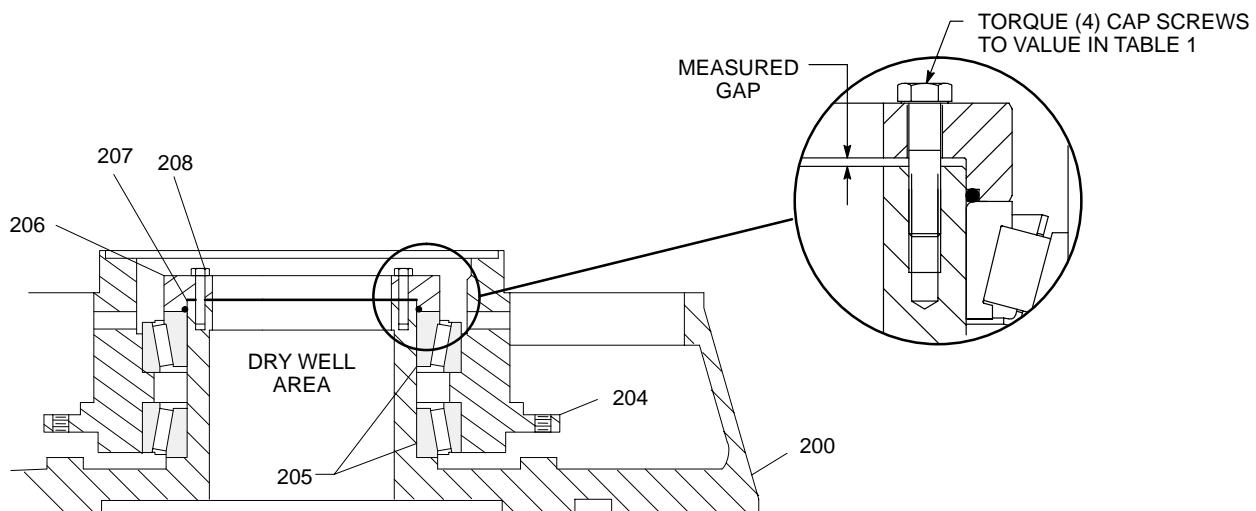


Figure 3

- i . Apply Loctite #515 gasket eliminator to the outer diameter of the oil seal (203) and install the oil seal. Refer to Machine Assembly drawing for the correct orientation. Align the seal to within 0.178mm (.007 inch) TIR using a dial indicator.

3.3 HIGH SPEED BEARING, PINION SHAFT AND GEAR INSTALLATION

- a . Coat the bearing bores in the gear drive housing (200) and the pinion shaft (211) with oil prior to installing the high speed bearings (212 & 213).
- b . Press the outer race of the lower high speed bearing (212) into the bore of the gear drive housing (200) and press the inner race of the lower high speed bearing onto the end of the pinion shaft (211). Check for proper seating with feeler gauges. Refer to assembly drawing for correct orientation of the bearing races.
- c . Set the pinion shaft and high speed bearings (212 & 213) in the gear drive housing.
- d . Install the upper high speed bearing outer race on the pinion shaft (211) and slide it into the bearing bore.
- e . With the use of two jacking screws or bolts, as described in Section 2.2-d, set the low speed gear (210) in place on the gear hub (204). You may have to rotate the pinion shaft to mesh the gear and pinion together. Be sure to line up the holes in the gear with the holes in the gear hub. Remove the jacking screws.
- f . Install the hex head cap screws (209) and secure the gear to the gear hub by drawing the gear down onto the gear hub evenly with the cap screws (209).

3.4 SETTING THE AXIAL FLOAT IN THE HIGH SPEED ROLLER BEARINGS

- a . To seat the bearings, install the high speed bearing retainer (215) without the shim set (216), and tighten the hardware. Remove the bearing retainer and hardware.

- b . Install the high speed bearing retainer with a full new shim set (216) and tighten the hardware. Rotate the pinion shaft (211) to align the bearing rollers.
 - c . Measure the axial float per the following procedure (refer to Figure 4):
 - 1 . Install the coupling hub on the pinion shaft (211) and tighten set screw.
 - 2 . Set up a dial indicator on the end of the pinion shaft (211).
 - 3 . Grasp the coupling hub and move the pinion shaft up and down while measuring the axial float with the dial indicator.
 - d . Remove shims and repeat steps "b" and "c" until an axial FLOAT of 0.01mm to 0.05mm (.0005 to .0020 inch) is attained.
 - e . Rotate high speed shaft by hand and check for smooth operation.
 - f . Loosen the set screw on the coupling hub and move the hub down the shaft as far as possible for easy installation of motor and flexible coupling element.

3.5 FINAL ASSEMBLY

- a . Drive a new outer oil seal (202) into the bore of the drive cover (201).

NOTE: Unit size 14 & 15 furnished before July 1996: Replace the drive cover and outer oil seal with a new assembly (201 & 202).

- b . Apply a bead of non-hardening RTV Silicone caulk around the top surface of the gear drive housing (200).
 - c . Install the housing cover and seal assembly and fasten with the required hardware. Be sure to engage the pin holes in the cover with the two alignment pins in the gear drive housing.
 - d . If a TAPER GRID HIGH SPEED COUPLING is furnished:
 - 1 . Install the motor (101), motor pedestal (230) and motor coupling hub (233).
 - 2 . Install flexible elements, secure hubs, covers and lubricate coupling.
 - e . If an ELASTOMER TYPE HIGH SPEED COUPLING is furnished:

Install the motor (101), motor pedestal (230), motor coupling hub (233) and the coupling flexible element (235) as an assembly. ELASTOMER TYPE couplings do not require lubrication.
 - f . Refer to the appropriate Coupling Instructions for required assembly procedures.
 - g . Re-fill the unit with oil. Refer to the General Instructions for oil specifications and capacity. Check oil level with the dipstick (with the mixer stopped).
 - h . Install the impeller shaft (117) and the low speed coupling (230) per the Shaft Installation and Removal Instructions.
 - i . Install the coupling shield (247) and safety guard (240) before re-connecting power.

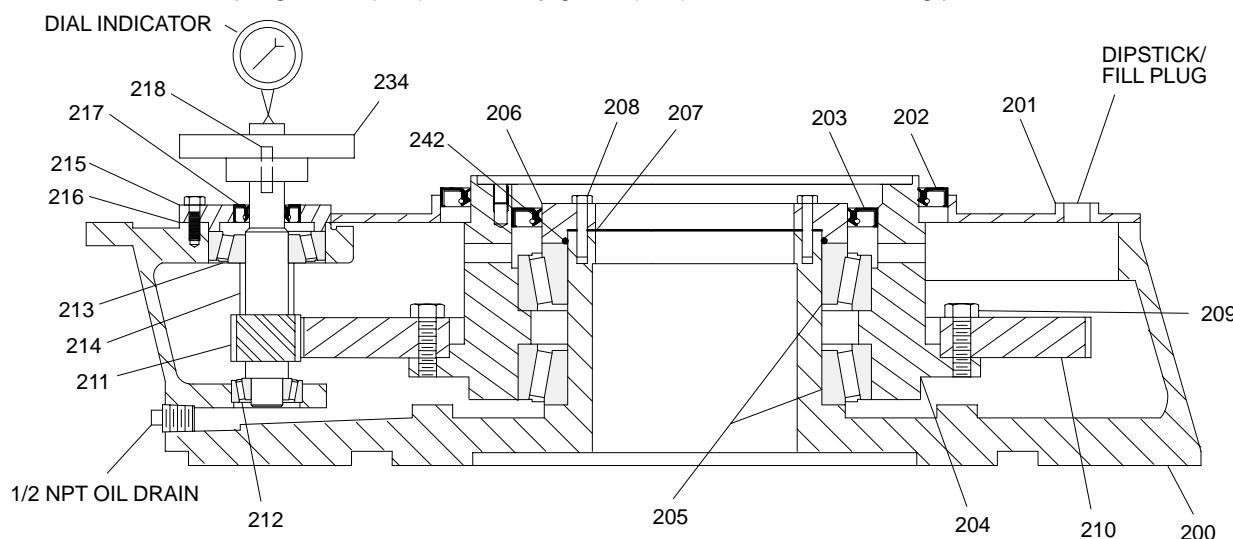


Figure 4

SERIES10 MIXER

SHAFT & SEAL INSTALLATION

Refer to Mixer Assembly drawing

SECTION 1 - INSTALLATION

For the first installation, mount the flange unit on tank nozzle with the right gasket and bolts not furnished by Lightnin.

- 1.1 Disconnect motor leads or otherwise lock-out power supply.
- 1.2 Remove safety guard (240) from unit.
- 1.3 Lower down impeller shaft (117) an sling or chain fall thru stuffing box seal and thru pedestal (231) and flange (129). Supported shaft (117) in up-right positions using two block woods or similar.

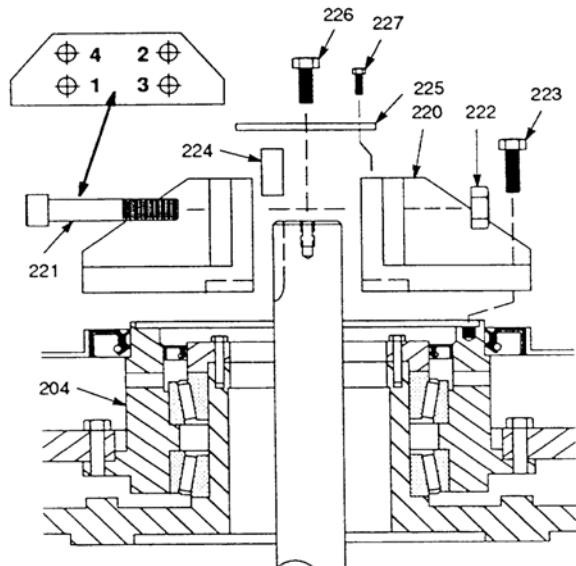
WE STRONGLY RECOMMEND THAT EITHER THE EYEBOLT OR HOIST RING BE OF THE SAFETY SWIVEL TYPE WITH A 360° ROTATIONAL CAPABILITY.

EYEBOLT TABLE

Unit Size	Eyebolt Size	Working load capacity lbs.
15	M12	1400
16	M12	2600
17	M16	6000

- 1.4 Lower down gear drive unit with your pedestal (231) on flange surface.
- 1.5 Connect flange (129) with pedestal (231) and impeller shaft (117) with shaft (117A)
- 1.6 Tighten the hardware to the proper torques in the following sequence:
 - a. Shaft cap screw (226). This draws the shaft up to the thrust plate (225).
 - b. Socket head cap screws (221) and hex nuts (222). Restrain the hex nut, then **TIGHTEN THE CAP SCREWS TO THE TORQUE LISTED IN THE TABLE BELOW**, keeping the gap between the coupling halves approximately equal from side to side.

Item 221 Cap Screw Tightening Torques Table



UNIT SIZE	THREAD SIZE	TORQUE
15	M16	112 Nm
16	M20	257 Nm
17	M20	257 Nm

- c. Cap screws (223) and then (227) cap screws. Use the torque values listed in the General Instruction.

- 1.7 Rotate input shaft by hand to check for free rotation of the shafts.
- 1.8 If not yet installed, set the packing into the mixer flange.
- 1.9 Tighten packing gland screws.
- 1.10 Refer to the appropriate section for stuffing box maintenance.
- 1.11 Install and secure the coupling guard (240) before operating mixer.

SECTION 2 REMOVAL

- 2.1 Jog the motor or rotate the shaft to make sure the impeller/shaft is not embedded in tank contents or otherwise seized.
- 2.2 Disconnect motor leads or otherwise lock-out power supply.
- 2.3 Remove the packing gland and the packing.
- 2.4 Remove coupling guard (240).
- 2.5 Remove two hex screw between shaft (117) to (117A)
- 2.6 Insert two wood supports under shaft coupling (117)
- 2.7 Remove remains screws
- 2.8 Disconnect the gear drive from pedestal (231).
- 2.9 Remove cap screws (227), (226) and (223), and thrust plate (225).
- 2.10 Remove the (4) low speed coupling socket head cap screws (221).
- 2.11 Remove the coupling halves (220).

STUFFING BOX INSTRUCTION

Ref. dwg.n° 10/C/AS

Low Pressure Stuffing Boxes are supplied with two rings of packing and no separators. The packing rings are impregnated with lubricant and no further lubrication is required.

There are two ways of seating the packing. One Way consists of merely pushing each ring of packing in as tight and firm as you can by hand, as you pack the box. This method is common on top entering mixers, where leakage is not critical. Home-made tamping tools are common. They are made out of a piece of a half round of pipe or tubing that will fit in between the box and the shaft. You can push down on each ring of packing by hitting or tamping from outside the box.

After the packing is installed, it can be seated further by "running in".

SEZIONE 1 - PROCEDURE FOR SEATING THE PACKING BY "RUNNING IN"

- 1.1 The stuffing box should be operated with the least possible gland force.
- 1.2 It is most important for good stuffing box performance that the gland should not be cocked in any way, but should have its axis as nearly coincident with the shaft axis as possible.
- 1.3 Check the packing gland adjustment frequently for the first few days of operation, until the best gland setting has been obtained.
- 1.4 Make sure gland nuts (137) are only finger tight then turn on the mixer.
- 1.5 Tighten the gland nuts (137) as evenly as possible, about $\frac{1}{4}$ to $\frac{1}{2}$ turn every 10 minutes or so until the box is hot to the touch. (NOTE: never over tighten the gland nuts (137) while the unit is running because this can cause damage to the shaft, the packing and the lubricant).
- 1.6 Stop the unit . Immediately while the packing is still hot and soft, seat the packing down in the box by tightening the gland nuts (137).
- 1.7 Let it all stand for at least 10 to 15 minutes. This gives the packing a chance to adjust and conform under heat and pressure.
- 1.8 Loosen the gland nuts (137) until they are only finger tight. The packing has now been "run in" and seated once. This is enough for most applications.

SEZIONE 2 - KEEPING THE PACKING SEATED

- 2.1 Tightening the gland nuts by the right amount , every other minute would completely nullify the renout of the shafts, and keep the stuffing box on tip-top shape. However, "every other minutes" is not practical or necessary. The problem, of course, is to know just how much to tighten the nuts and how often.
- 2.2 If you have no past experience to go by , we would suggest a $\frac{1}{4}$ to $\frac{1}{2}$ turn on the gland nuts every 24 hours.
- 2.3 For the first week, stop by at more frequent intervals to see how the box is doing and revise the amount of turns and/or the scheduled frequency as required.

SEZIONE 3 - WHAT IF IT LEAKS?

- 3.1 If sometimes you find the box leaking unacceptably and it must be corrected in a short amount of time, the natural impulse is to quickly overtighten the gland nuts.
- 3.2 While this might temporarily seal off the leak, **IT CAN CAUSE PERMANENT DAMAGE** to the shaft and packing and it is not recommended, we recommended stopping the mixer and resealing the packing by tightening down hard on the gland nuts.
- 3.3 **BE SURE AND LOOSEN THE NUTS TO FINGER TIGHT BEFORE TURNING THE MIXER ON AGAIN.**

- 3.4 However, if the mixer cannot be stopped, or if the packing is not hot enough to seat, we recommended taking a $\frac{1}{4}$ to $\frac{1}{2}$ turn every 10 minutes or so until the leak is reduced to an acceptable level.

SEZIONE 4 - PACKING SPECIFICATION

A LIGHTNIN standard packing and separator and combination is furnished unless otherwise specified.

PACKING TYPE	MAX TEMPERATURE (°C)
Interlace braid bleached multifilament Teflon yarn impregnated with Teflon dispersion.	260

If the packing and separators are not installed at our factory, a separate package containing the stuffing box components will be attached to the unit.

SEZIONE 5 - REPACKING STUFFING BOX

- 5.1 Remove the split packing gland (131). Remove the rings (111) of packing by poking them out carefully with a thin tool.
- 5.2 Thoroughly clean the shaft and stuffing box. Flush out any old lubricant.
- 5.3 Check the shaft surface for damage. If the shaft is damaged, do not repack the stuffing box until the shaft surface is repaired. Be sure the shaft and stuffing box are in alignment.
- 5.4 Cut coil packing to exact length so that the ends meet with no gap or overlap.
- 5.5 Thoroughly coat each packing ring and separator with a suitable lubricant.
- 5.6 Replace rings of packing, one at a time, in the exact order as shown.

NOTE: Install each packing ring and separator with their joints staggered 90 degrees and carefully seat each packing ring by firm, even tamping on the separator above each packing ring with a piece of split pipe.

- 5.7 Replace split packing gland (131), packing gland clamps and gland adjusting hex nuts (137)
- 5.8 Seat the packing in accordance with previous sections

INSTALLATION AXIAL FLOW IMPELLERS

(One piece keyed hub - bolted on blades)

Refer to Impeller Assembly drawing

SECTION 1 - GENERAL

- 1.1 Refer to installation drawing to check the minimum opening required to pass the impeller inside the vessel.
- 1.2 Impellers are shipped disassembled for ease of shipment and handling at the job site.

2 – IMPELLER ASSEMBLY

- 2.1 Mate the three blades with the hub ears and install the hardware with the hex nuts (167).

IMPORTANT: BEFORE SECURING THE HARDWARE APPLY PRESSURE TO THE BLADES 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.

- 2.2 It is essential that hardware securing blades to the hub is tightened to specific torque. It is also important that tight connections are maintained as impellers are usually subjected to a wide range of adverse loading conditions imposed by fluid force reactions. Recommended torques are given on Table 1 in this manual.

3 – IMPELLER ASSEMBLY TO SHAFT

- 3.1 Coat the shaft with a lubricant to facilitate movement and slide the impeller up the shaft slightly above the desired location.
- 3.2 Insert the hook key pin (162) into the shaft keyway pin hole.
- 3.3 Lower the impeller gently over the hook key (162) until the hub is resting on the protruding pin. Do not allow the impeller to drop on the pin. The pin is a safety device designed to support the weight of the impeller but not to withstand impacts.
- 3.4 Install the set screw (163). After the set screw (163) is properly seated in the countersunk hole in the hook key, then tighten the set screw against key (162).

4 - REPOSITIONING

When you need to change the impeller position on the shaft, read the following instructions.

- 4.1 Remove the set screw (163).
- 4.2 Raise the impeller until the hook key (162) is exposed.
- 4.3 Relocate the hook key (162) in the desired position.
- 4.4 Retighten all hardware as noted in steps 3.2 e 3.3.
- 4.5 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 after one week, but within 3 months of operation.

TRIPOD STEADY BEARING INSTRUCTIONS

Refer to steady bearing Assembly drawing

SECTION 1 – GENERAL INSTRUCTIONS

THE UNIT SHOULD NOT BE OPERATED WHILE THE STEADY BEARING IS DRY. THE STEADY BEARING MUST BE LUBRICATED BY THE TANK CONTENTS OR BY SOME OTHER TYPE OF LUBRICANT.

- 1.1 The steady bearings are designed to provide excellent service under all normal conditions.
- 1.2 The rate of wear of steady bearing bushing can vary considerably depending on the severity of the operating conditions. It is important that periodic examinations of the bushing be made to establish, in advance, some indications of the rate of wear.
- 1.3 If the bushing becomes too badly worn, serious damage to other steady bearing components can result. Therefore, it is recommended that the bushing be examined after 500 hours of operation.
- 1.4 On the basis of this examination, determine the intervals of time between subsequent inspection and/or replacements.

SECTION 2 – INSTALLATION

- 2.1 Place the tripod (1) without welding it to the bottom of the tank. After the impeller(s) are mounted on the shaft and the lower shaft is coupled to the upper shaft, slide the shaft sleeve in position (4) and install retaining screws (5).
- 2.2 Place the bushing holder (2) including the bushing (3) on shaft and attach it to the tripod with the three bolts furnished with all steady bearing components, aligning as much as possible the bushing holder holes and the tripod ones.
- 2.3 With the unit in position, plumb the lower shaft and check its perpendicularity with the steady bearing mounting surface. If not within $\pm \frac{1}{4}^\circ$ correct with tapered gasket, a dutchman or shims.
- 2.4 Check the clearance between the shaft sleeve (4) and the tripod (1).
- 2.5 Turn the shaft by hand and align the steady bearing tripod as closely as possible.
- 2.6 Weld the tripod in this position. Loosen the screws connecting the tripod and the bushing holder. Make the shaft turning by hand again and obtain final steady bearing alignment by adjusting the bushing holder position. tighten all screws
- 2.7 The steady bearing is now ready for use.

SECTION 3 - REPLACING THE BUSHING

- 3.1 Loosen bolts connecting the bushing holder (2) and the tripod (1).
- 3.2 Slide down the bushing holder (2) with the bushing (3) and remove it from the tripod (1).
- 3.3 The bushing (3) is fitted in its holder (2) with interference, use an extractor or tap with a piece of tube on its bottom to remove it. To insert a new bushing, preheat the bushing to 100 - 120 °C.

SECTION 4 - REPLACING THE SLEEVE

- 4.1 Once the bushing holder (2) and the bushing (3) have been removed, loosen and remove the two locking screws (5) and slide down the sleeve (4) and remove it from the tripod (1).
- 4.2 Before installing the new sleeve (4) clean and lubricate the shaft edge.



**SCHEMA PARTI DI RICAMBIO
(SPARE PARTS)**
per (for)

AGITATORE LIGHTNIN MODELLO (LIGHTNIN MIXER MODEL)	15C-4
RIDUTTORE TIPO (REDUCER TYPE)	15
RAPPORTO (RATIO)	14 : 1

Q.TA' (Q.TY)	DESCRIZIONE (DESCRIPTION)	POS. (P/N)	CODICE (da citare) (CODE)
1	PARAOILIO(OUTER OIL SEAL)	202	115506
1	PARAOILIO(INNER OIL SEAL)	203	115513
2	CUSCINETTI (L.S. BEARING)	205	117110
1	CUSCINETTO (LOWER H.S. BEARING)	212	117136
1	CUSCINETTO (UPPER H.S. BEARING)	213	117126
1	PARAOILIO (H.S. OIL SEAL)	217	115512
1	RASAMENTO (SHIM SET)	207	217181
1	RASAMENTO (SHIM SET)	216	125982
1set	(5 pz)ELEMENTI FLESSIBILI GIUNTO(FLEXIBLE ELEMENT) per giunto tipo GIUELGB20	235	
2	ANELLI QUADRO 16X16 (Packing ring)	111	N.C.

*Riferimento disegno N. S921088 (RIDUTTORE)
(Ref. drawing n.) (REDUCER)*



CERTIFICATE No.	QC-012
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	63A1A/B
MIXER MODEL	17C-15
AXFLOW JOB:	110635
SERIAL NUMBER:	552955
QUANTITY	2

CHECK CERTIFICATE

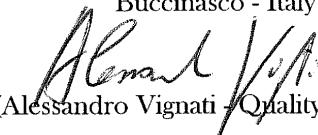
This is to certify that mixers above have been positively tested on

28 / 09 / 2012

as follows:

**FINAL VISUAL AND DIMENSIONAL CHECK ACCORDING TO DRAWING:
Nº 552955A Rev. 0**

DATE: 28 / 09 / 2012

AxFlow S.p.A.
Buccinasco - Italy

(Alessandro Vignati - Quality Manager)

AxFlow S.p.A.

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WEB SITE: www.axflow.it



CERTIFICATE No.	QC-009
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	63A1A/B
MIXER MODEL	17C-15
AXFLOW JOB:	110635
SERIAL NUMBER:	552955
QUANTITY	2

PAINTING CHECK CERTIFICATE

We certify that mixer above was painted according to following procedure:

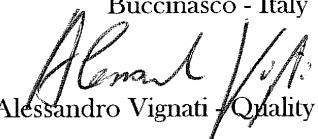
LIGHTNIN Standard procedure no. QP0321

Final color: RAL 6028

DATE: 28 / 09 / 2012

AxFlow S.p.A.

Buccinasco - Italy



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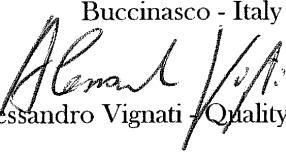
CERTIFICATE No.	QC-006
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	63A1A/B
MIXER MODEL	17C-15
AXFLOW JOB:	110635
SERIAL NUMBER:	552955
QUANTITY	2

NOISE CERTIFICATE

We certify that the overall Sound Pressure Level generated by the agitator does not exceed
80 dBA at 1 meter

when tested under no load in free-field conditions.

DATE: 28 / 09 / 2012

AxFlow S.p.A.
Buccinasco - Italy

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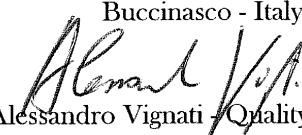


CERTIFICATE No.	QC-004
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	63A1A/B
MIXER MODEL	17C-15
AXFLOW JOB:	110635
SERIAL NUMBER:	552955
QUANTITY	2

STATIC BALANCING CERTIFICATE

We certify that impeller fitted on shaft of mixer above has been statically balanced according to LIGHTNIN Static Balance Procedure (Quality grade G40 of the International Standard ISO 1940 for single plane balancing).

DATE: 28 / 09 / 2012

AxFlow S.p.A.
Buccinasco - Italy

(Alessandro Vignati - Quality Manager)

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AxFLOW

LUBRICANTS LIST

A - MACHINERY

Machinery type and Model	MIXER MODEL 10
AXFLOW Job	110635
ITEM n°	63A1A/B
Service	---
Parts to be lubricated	GEAR DRIVE
Filling quantities (LITRES or Kg.)	8 LITRES

B - LUBRICANT

Type	SYNTHETIC OIL EP (EXTREME PRESSURE)
Grade	AGMA 3S - ISO 100

MAIN CHARACTERISTICS :

• Viscosity 40°C	99.1	• Viscosity 100°C	13.9
• Viscosity Index	143	• Flash Point	248
• Pour point	-42	• Density 15°C	0.86

MINERAL OIL LISTED IN TABLE MAY BE USED AS A SUBSTITUTE

Trade marks:	SYNTHETIC	MINERAL	Trade marks:	SYNTHETIC	MINERAL
-AGIP	BLASIA S	BLASIA EP150	-MOBIL	SHC	600XP EP150
-EXXON	No Product	SPARTAN EP150	-SHELL	TIVELA S	Omala EP 150
-TEXACO	No Product	Meropa 150	-CHEVRON	No Product	GEAR COMPOUND EP 150

C - MAINTENANCE

Recommended change frequency:

- 1 st filling (months or hours)	(ALWAYS) 6 months or 2500 hours
• for intermittent service	12 MONTHS OR 5000 HOURS (SYNTHETIC OIL EP) 6 MONTHS OR 2500 HOURS (MINERAL OIL EP)
• for continuous service	12 MONTHS OR 8800 HOURS (SYNTHETIC OIL EP) 6 MONTHS OR 4400 HOURS (MINERAL OIL EP)

Other recommendations :

- USE ONLY ONE TYPE OF OIL IN ANY SINGLE UNIT.
- DO NOT MIX OIL TYPES, GRADES OR BRANDS IN ANY UNIT
- SEE ALSO THE MAINTENANCE MANUAL SECTION 5 – GEAR DRIVE LUBRICATION

AxFlow S.p.A.

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CERTIFICATE No.	QC-016
CLIENT	DESMET BALLESTRA
P.O. N°:	121319
MIXER ITEM	63A1A/B
MIXER MODEL	17C-15
AXFLOW JOB:	110635
SERIAL NUMBER:	552955
QUANTITY	2

MACHINERY DIRECTIVE

(2006/42/CE formerly 89/392/EEC Amended by 91/368/EEC, 93/44/EEC and 93/68/EEC)

CONFORMITY CERTIFICATE

(In Accordance with Article 4(2) and Annex II A of the above Directive)

This mixer has been designed and manufactured in accordance with the following standards and in conformity with the above Machinery Directive.

EN292 PART 1 & 2 : 1991 Safety of Machinery

DATE: 28 / 09 / 2012

**AxFlow S.p.A.
Lightnin Division
(Buccinasco)**

A handwritten signature in black ink, appearing to read "Giacomo Merello".

AxFlow S.p.A.

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INSTRUCTION MANUAL

JOB	110635
SERIAL NUMBER	552955
MODEL	17C-15
CLIENT	DESMET BALLESTRA
P.O. ORDER	121319
ITEM	63A1A/B

AxFlow S.p.A.

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TITLE	SECTION
GENERAL SAFETY RECOMMENDATIONS	
STORAGE INSTRUCTIONS	
OUTLINE DRAWING	
ASSEMBLY DRAWING	
IMPELLER ASSEMBLY DRAWING	
STUFFING BOX ASSEMBLY DRAWING	
INSTRUCTION MANUAL	
Initial Inspection	Section 1
Installation	Section 2
Recommended lifting procedures	Section 3
Start-up	Section 4
Gear drive lubrication	Section 5
Storage procedures	Section 6
Bolt tightening torque recommendations	Section 7
FLEXIBLE COUPLING	
GEAR DRIVE MAINTENANCE INSTRUCTIONS	
General	Section 1
Parts removal	Section 2
Gear drive assembly	Section 3
SHAFT INSTALLATION	
Installation	Section 1
Removal	Section 2
STUFFING BOX INSTRUCTIONS	
Procedure for seating the packing by "running in"	Section 1
Keeping the packing seated	Section 2
What if it leaks	Section 3
Packing specification	Section 4
Repacking stuffing box	Section 5
INSTALLATION OF IMPELLER	
SPARE PARTS LIST	

GENERAL SAFETY RECOMMENDATION

NOTE: READ THIS SECTION CAREFULLY before operating or servicing
IF YOU DON'T UNDERSTAND SOME PARTS OF THIS INSTRUCTIONS, DO NOT TRY TO INSTALL OR
OPERATE THIS MIXER. PLEASE REPORT ANY PROBLEM IMMEDIATELY TO LIGHTNIN ITALIA S.R.L.

In general all site rules must be followed in operation and maintenance of your equipment

MIXER INSTALLATION, HANDLING AND LIFTING

Use only adequate lifting equipment. DO NOT try to lift the mixer by hand.

POWER SUPPLY CONNECTION

Don't connect motor leads until all components are assembled, the mixer installed and all bolts properly tightened as shown in the manual.

To prevent electrical shock, don't touch the mixer or the power supply cable when you have wet hands or feet, but also when you are in contact with a wet or humid surface.

Disconnect motor leads or otherwise lock-out power supply before servicing the mixer. Precautionary measures to prevent the possibility of applying power to the equipment when maintenance is being carried out MUST BE OBSERVED.

MIXER OPERATION

Protective guards must be fitted when the equipment is operating.

Don't touch with hands, or any other part of your body, mixer components (shaft, motor, impellers, seal, coupling, etc.). Don't try to handle the mixer if is running.

Don't use the mixer with purposes that differ from the original. Don't operate the seal device where temperature and pressure are higher than scheduled values.

It is very important to consider the following check-list before operating the mixer:

Make sure to have hearted the mixer

Make sure to have installed all the safety guards.

Make sure to have firmly secured all the detachable parts.

Read the instruction manual carefully.

Check for free movement of all rotating components.

Make sure to have made all external connections (electrical, hydraulic, etc.) in compliance with regulations.

DO NOT GET into the tank when the motor is connected and the shaft is not yet firmly fixed to the mixer.

MAINTENANCE

Do not modify the mixer (power rating, rotation speed, shaft length, impellers, etc.) without consulting Lightnin Italia S.r.l.

Disconnect motor leads or otherwise lock-out power supply before servicing the mixer.

When the mixer needs a repair, or when some parts need to be replaced, use only procedures and spare parts approved by LIGHTNIN.

Do not touch mixer motor and the upper part of the shaft , until they have been cooling for one hour.

Make sure the gear chamber has been filled with the correct amount of lubricant (grease or oil) before start up.

STORAGE INSTRUCTIONS

Please REVIEW and FOLLOW all instructions in this section.

FAILURE TO PROPERLY STORE AND PROTECT EQUIPMENT AS OUTLINED MAY VOID ANY WARRANTY, EXPRESSED OR IMPLIED

GENERAL RECCOMENDATIONS

- As soon as you have uncrated your mixer, check it for shipping damage and report any damage immediately to the carrier and to our factory.
- The mixer is shipped as complete unit ready to install after unbolting from the shipping skid. All unpainted steel surfaces are coated with a rust preventative is easily removed with kerosene or similar solvents.
- Do not remove wrappings or protective coating in the mixer is to be stored before it is placed in operation. Store the mixer in a clean dry location, with circulating air free from wide or rapid variations in temperature.
- If it is stored for more than a year, the condition of the grease gear lubricant should be checked before the mixer is installed.

EXTENDED STORAGE RECOMMENDATIONS

SECTION 1 - STORAGE CONSIDERATIONS

LIGHTNIN Mixers and Aerators, like all precision equipment, must be protected against corrosion during prolonged periods of inactivity. The primary cause of corrosion is condensation due to fluctuating temperatures, high humidity, or both. Properly treated and located in clean and dry surrounding, inactive equipment can be successfully stored for up to one year without damage from corrosive attack.

Electric motors or other prime movers are not prepared for indoor storage beyond the period shown below by LIGHTNIN. Outdoor storage of electric motors is not recommended by any motor manufacturer. For storage periods beyond those shown below, refer to motor maintenance instructions furnished with this manual for further details.

SECTION 2 - STORAGE OF NEW UNITS

Lightnin Mixers are factory treated with high quality corrosion inhibitors and rust preventatives. With reasonable care at the site, the products will effectively protect new, uninstalled units from corrosion due to water and water vapour, for up to one year, depending on how the unit is stored. Outdoor, unprotected storage is not permitted under any circumstances unless unit has been specifically prepared for such storage at the factory prior to shipment.

2.1 UNINSTALLED, PROTECTED STORAGE

Depending on the conditions under which a new unit which has not been installed is stored, the initial factory applied corrosion protection treatment will last up to one year. Actual preservation periods, as a function of storage conditions are defined in Table 12. This Table also defines the required intervals at which the corrosion protection must be renewed.

Table 1 - Corrosion Protection Periods

STORAGE CONDITIONS	PROTECTION PERIODS (MONTHS)	
	INITIAL	RE-PRESERVATION
Indoor in a dry ambient atmosphere with controlled temperatures	12	12
Indoor in a dry ambient atmosphere without temperature control	6	6
Outdoors as crated with suitable protection from the elements. Coverings must be waterproof, but have provisions for free circulation of air to avoid build-ups of condensation. Equipment must be elevated at least 300 mm above ground level to reduce moisture pickup.	4	4

2.2 INSTALLED, INOPERATIVE UNITS

Units that have been installed, but not serviced for operation and which will be inactive for more than three months must be prepared for storage per Paragraph 3 below.

2.3 INSTALLED, OPERATIVE UNITS

Units that have been installed, serviced for operation and run, but which will be inactive for more than three months must be prepared for storage per Paragraph 4 below.

2.4 PERIODIC INSPECTION

All protective coatings and wrapping must be maintained in good condition. Stored units should be visually inspected periodically to insure that the factory wrappings and coating are intact. If factory wrappings and coatings are accidentally removed or damaged, reapply them over the exposed areas.

SECTION 3 - CORROSION PROTECTION RENEWAL

Table 1 defines the length of time which units, originally preserved at the factory, may be stored under various conditions.

This Table also defines the time period after which a stored unit must be re-preserved. Careful adherence to the protection renewal procedures defined herein will afford adequate protection for the same period covered by a factory prepared unit when stored under conditions defined in Table 1.

In order to re-preserve a stored unit, the following steps must be taken:

- 3.1 Remove all covers and protective wrappings.
- 3.2 Remove the oil filler plug or inspection cover, dipstick and breather plug(s) in the gear drive.
- 3.3 The interior of the unit must be treated with Vapor Phase Inhibitor (VPI) product to retard corrosion. Approved products are listed in Table 2. Use only approved VPI products. Distribute the required quantity of the VPI product through one or more the openings, directing the product to all corners for maximum coverage. With an assembly unit, the liquid product is generally easiest to apply, through the use of a fine mist sprayer and it is strongly recommended.
- 3.4 Replace the oil filler plug and inspection cover, dipstick and breather plug(s) which were removed to permit application of the VPI.
- 3.5 Seal off breathing passages by wrapping with VPI treated paper and waterproof tape. Add a tablespoon of one of the VPI products defined in Table 2 to the exposed cavities before sealing up with VPI paper and tape.

MANUFACTURER	PRODUCT	FORM
Daubert Chemical Co. Oak Brooks, IL	MOTORSTOR VCI No. 10	LIQUID
Shell Oil Co. Syracuse, NY	POWDER VPI CRYSTALS	POWDER

- 3.6 The factory provided coating on exposed steel surfaces is AGIP RUSTIA 100/F or equivalent rust preventative. Check all steel surfaces to determine the integrity of this coating. If it is damaged or disturbed, clean the surfaces with kerosene or a similar solvent, allow them to dry thoroughly and recoat completely with AGIP RUSTIA 100/F or equivalent. It can be applied with a brush or sprayed on.
- 3.7 Refer to electric motor maintenance instructions furnished with the manual for further details on re-preservation of the electric motor.

SECTION 4 - STORAGE OF DEACTIVATED UNITS

Under normal circumstances, units that have been in service but will be idle less than 3 months, must be run for at least 15 minutes every week, to redistribute oil and grease, and receive regular maintenance. If this procedure is followed carefully, such units do not require re-preservation.

If an inactive unit will be subjected to conditions of very high humidity, extreme temperature fluctuations, or other potentially harmful environmental conditions, the unit should be preserved as described below.

Inactive units subjected to potentially harmful environmental conditions as described above and all units which will be inactive for more than 3 months should be preserved as follows:

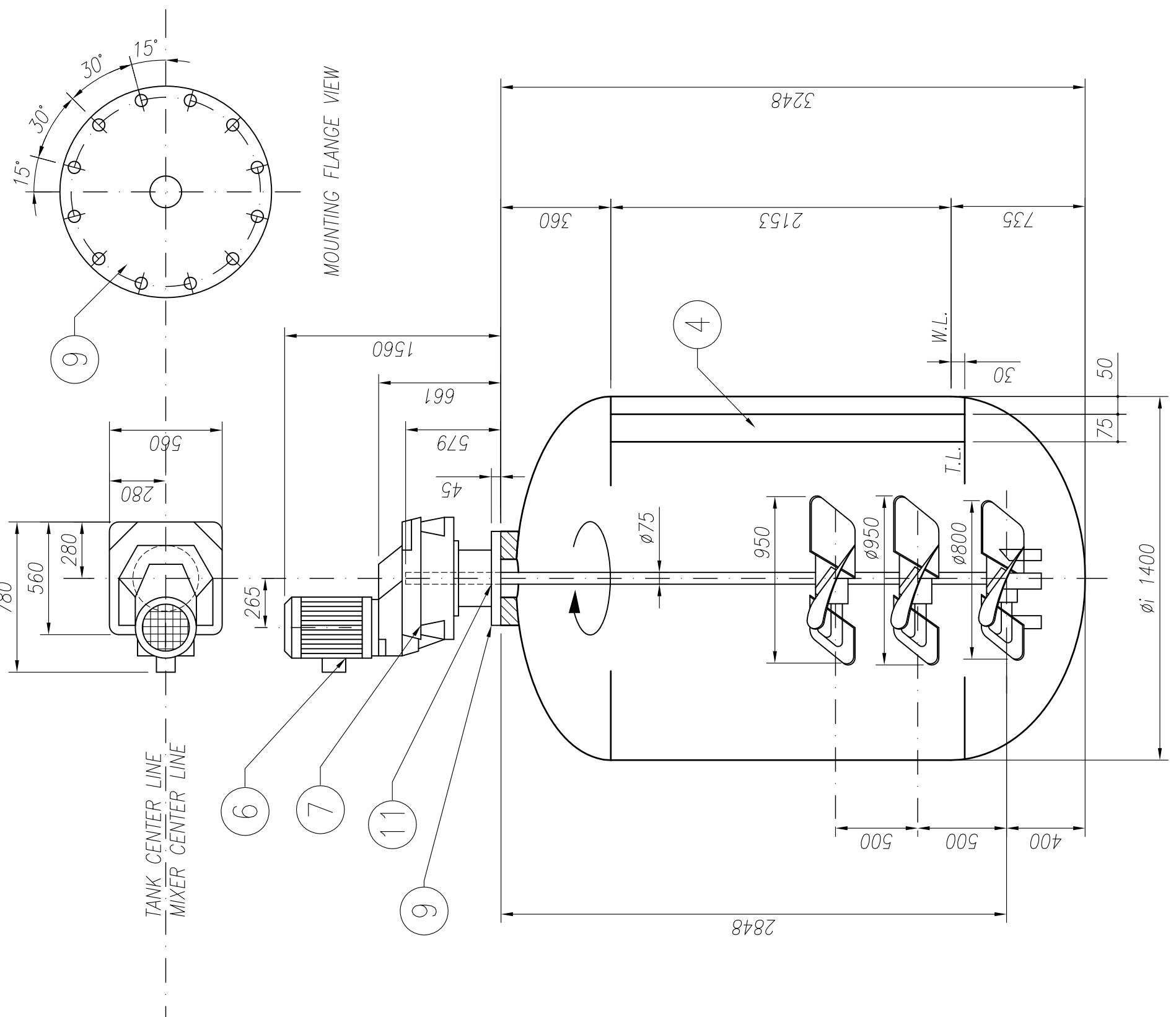
- 4.1. Drain the oil from the gear box and replace the drain plug. Discard the used oil.
- 4.2. Remove the dipstick and breather assembly. Store the breather in a safe place. Tape the dipstick tight against the housing with waterproof tape.
- 4.3. The interior of the unit must be treated with a Vapour Phase Inhibitor (VPI) product to retard corrosion. Approved products are listed in Table 2.
- 4.4. Seal the breather and dipstick openings with solid plugs.
- 4.5. Cover units stored outdoors with waterproof covering, allowing for free air circulation.
- 4.6. Visually inspect the drive and, every 4 months, add additional VPI as outlined in Step 3, above.

SECTION 5 - START-UP PREPARATION

When unit is removed from storage, perform the following steps before placing the unit in service:

- 5.1. Remove all wrappings and coverings.
- 5.2. Install dipstick, dipstick plug, and any other accessories which were removed for storage.
- 5.3. Service the unit with lubricants as defined in the instruction manual.
- 5.4. Check shaft for free rotation.
- 5.5. Install all safety guards.

1 Questo disegno non è in scala	mm	1 This drawing is not to scale
2 Le dimensioni sono in		2 Dimensions are in
3 Materiale parti a contatto con il prodotto	Carbon steel	3 Intank mixer parts materials
4 Frangiflotti (forniti dal cliente)	Q.ty 3 @ 120°	4 Baffles (by client)
5 Giranti	A320	5 Impellers
- tipo	3	- type
- n° di pale		- n° of blades
- velocità di rotazione	84 rpm	- speed
Spostamento girante lungo l'albero		Impeller adjustment on shaft
- superiore	±300 mm	- upper
- intermedia	±225 mm	- middle
- inferiore	+450 mm	- lower
Con incrementi di	75 mm	In increments of
Apertura min. per introd. giranti	450 mm	Minimum opening required
6 Motore	BY BALLESTRA	6 Motor
- potenza	15 kW	- power
- giri / minuto	1450 rpm	- rpm
- volt / fasi / cicli	415 / 3 / 50	- V / ph / Hz
- protezione	IP55	- enclosure
- grandezza / forma	160 / V1	- frame / mounting
7 Riduttore	LIGHTNING	7 Gearbox
- modello	17	- model
- rapporto di riduzione	17 : 1	- ratio
8 Carichi progetto sul		8 Tank nozzle
bocchello del serbatoio		desing data
- carico verticale	14500 N	- downward load
- momento torcente	2400 Nm	- torque
- momento flettente	5100 Nm	- bending moment
9 Flanga di montaggio	12" ANSI 150#	9 Mounting flange
- diametro esterno	482,6	- outside diameter
- diametro centro fori	431,8	- bolt circle diameter
- numero fori / bulloni	12 / 7/8	- n° of holes / bolt holes dia
I fori stanno a cavallo dell'asse		Bolts straddle the axis center
10 Peso agitatore		10 Mixer weight
- gruppo di azionamento	450 kg	- unit
- motore	180 kg	- motor
- albero	90 kg	- shaft
- giranti	200 kg	- impellers
totale	920 kg	total
11 Tenuta a baderne	2	11 Stuffing box
- n° di baderne		- n° of packing
- Materiali - baderne	PTFE	- Materials - packing
- premitreccia	BRONZO	- packing gland
- separatore	---	- separator
12 Rumorosità attesa a 1 mt	≤ 80 dB(A)	12 Expected noise at 1 mt



MODELLO AGITATORE / MIXER MODEL: 17C-15

CLIENTE / CLIENT: DESMET

ITEM: 63A1A/B

ANSWER

ANSWER

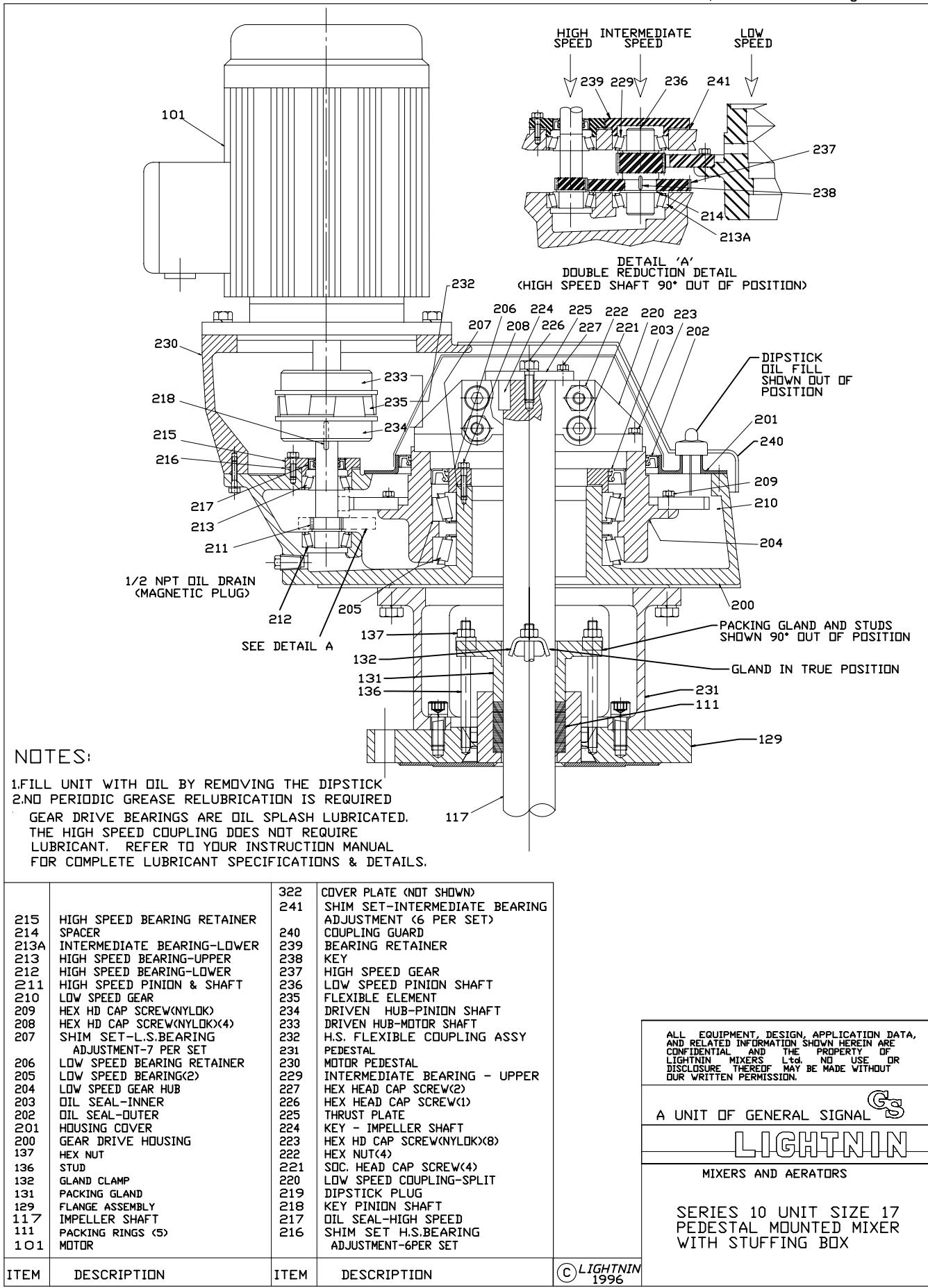
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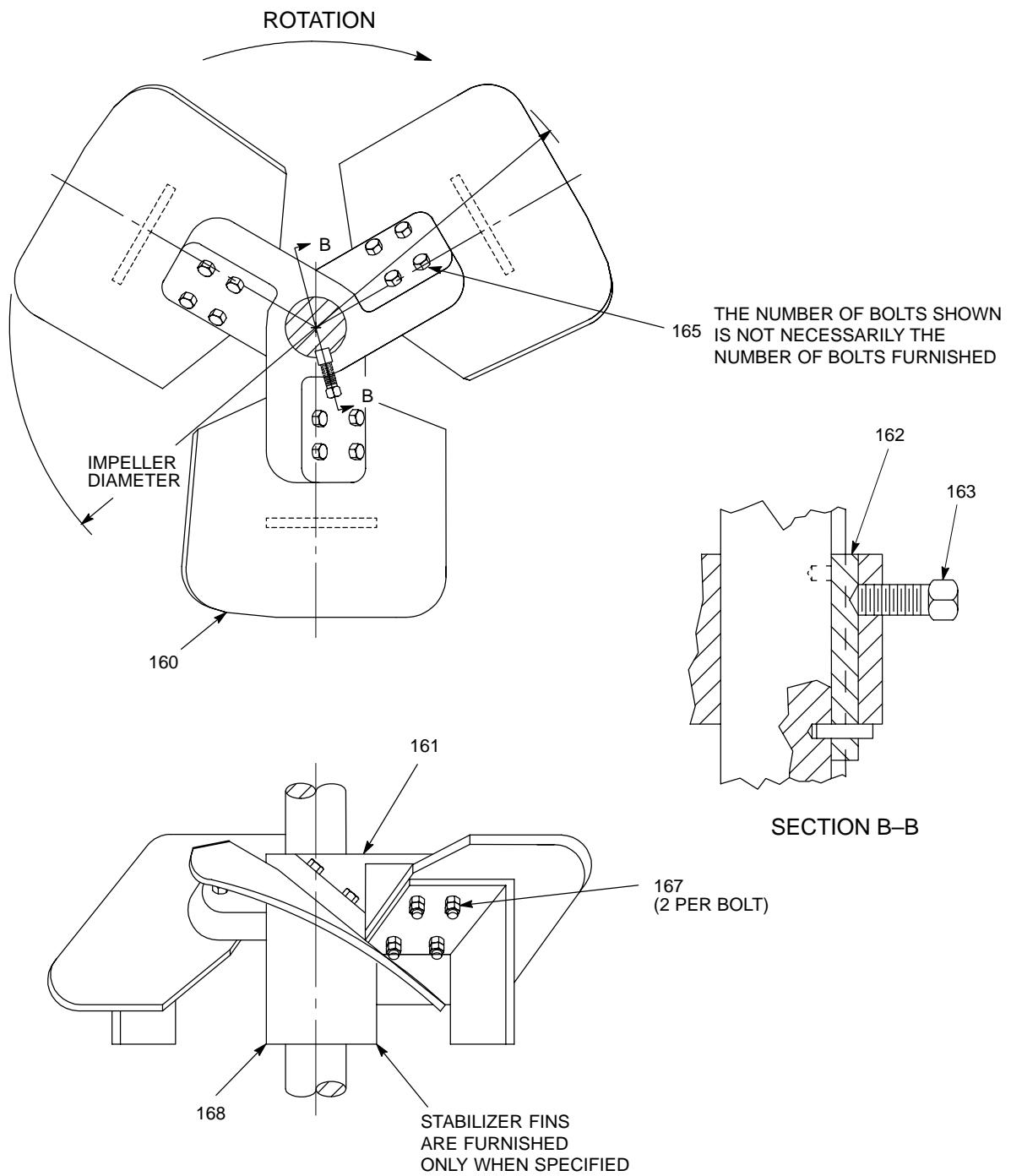
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AxFLOW LIGHTNING
AGITATORI LIGHTNING COSTRUITI SU LICENZA/LIGHTNING MIXER MANUFACTURED UNDER LICENCE

BY AXLOW S.P.A. BUCCINASCO (MI) ITALY
REV. 0

TERZI NON SONO CONSENTITI SENZA LA NOSTRA APPROVAZIONE SCRITA
OR DISCLOSURE THEREOF MAY BE MADE WITHOUT OUR WRITTEN PERMISSION





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

168	STABILIZER FINS
167	HEX NUT
165	HEX HD. CAP SCREW
163	SET SCREW
162	HOOK KEY
161	HUB
160	BLADE
ITEM	PART NAME

IMPELLER DIAMETER	MINIMUM OPENING
30	16
40	21
50	26
60	31
70	36
80	41

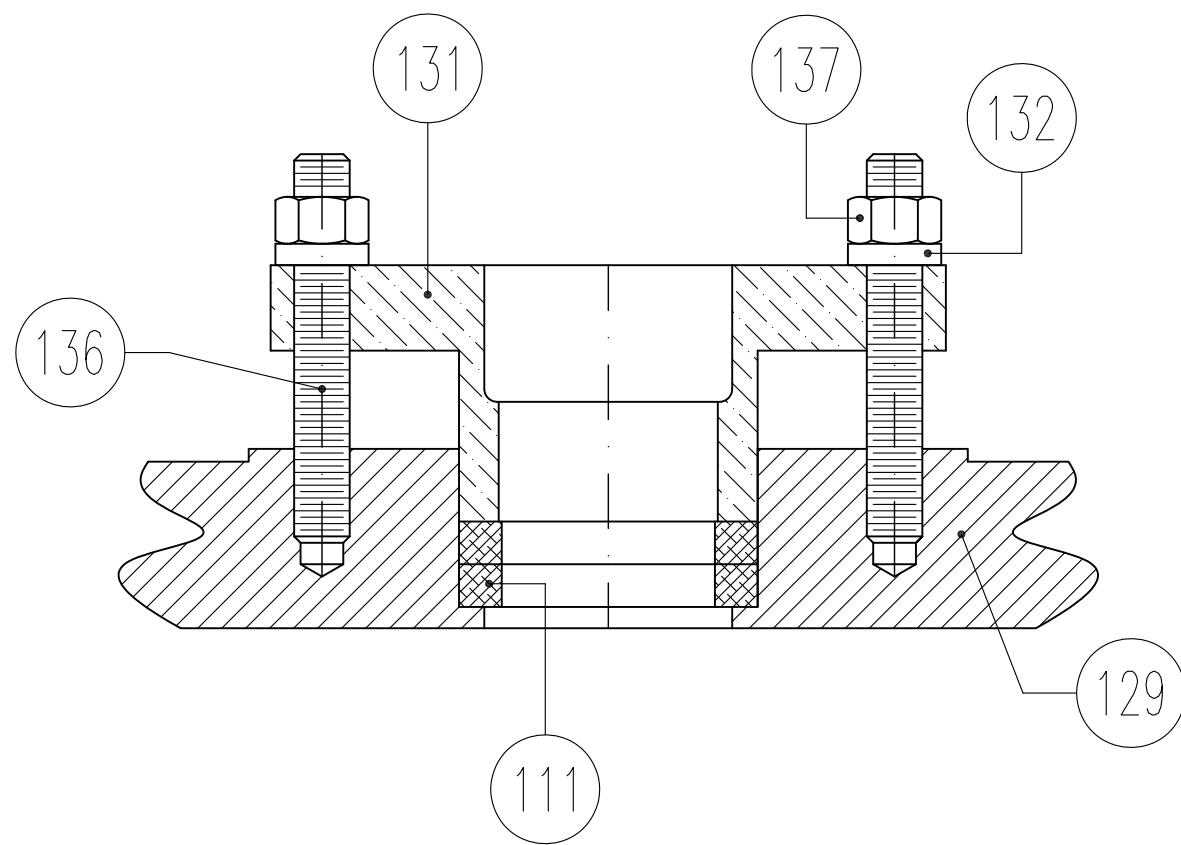
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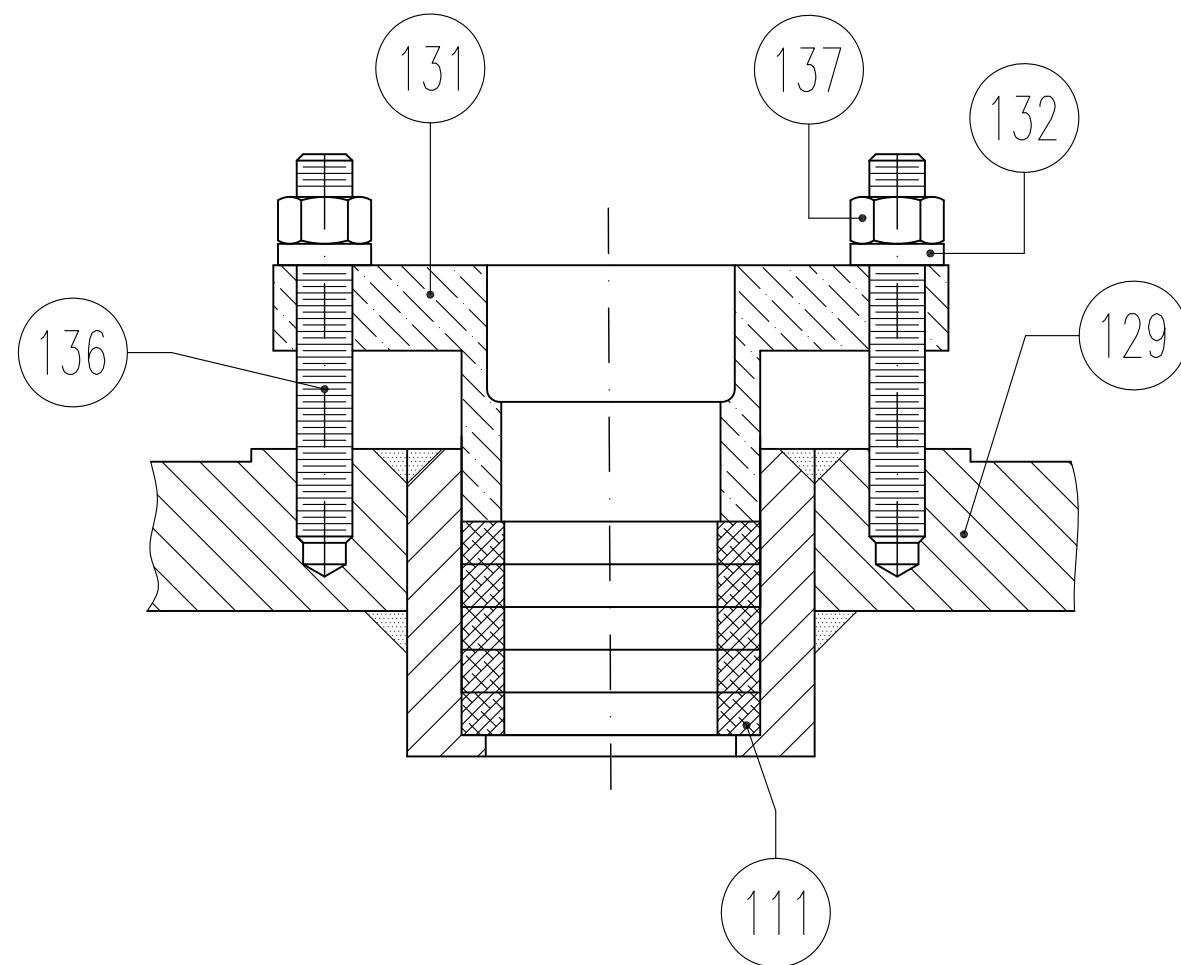
CERTIFIED
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2001

LIGHTNIN
MIXERS AND AERATORS
ASSEMBLY DRAWING
A320
AXIAL FLOW IMPELLER
**ONE PIECE HUB W/
BOLTED BLADES**

BASSE PRESSIONI
LOW PRESSURE



ALTE PRESSIONI
HIGH PRESSURE



 **AxFLOW S.p.A.**

LIGHTNING

AGITATORI LIGHTNING COSTRUITI SU LICENZA DA: / LIGHTNING MIXER MANUFACTURED UNDER LICENCE BY: AXFLOW S.p.A. BUCCINASCO (MI) ITALY

137	2	DADI	HEX NUT	TITOLO: Particolare assieme zona tenuta Baderna tipologia std. basse pressioni 2 anelli alte pressioni 5÷7 anelli		
136	2	PRIGIONIERI	STUD			
132	2	PIASTRINE	GLAND CLAMP			
131	1	PREMITRECCIA	PACKING GLAND			
129	1	FLANGIA	FLANGE			
111	2÷5	BADERNA	PACKING RING			
Pos.	Q.tà	DESCRIZIONE	DESCRIZIONE	DIS. N° / DRW. N°	REV.	DIS./DRN. MF 03/01/05
				10/C/AS	0	CNTR./CKD.
						APP./APP.

GENERAL INSTRUCTIONS FOR LIGHTNIN® SERIES 10 – MODELS 14, 15, 16, 17

SECTION 1 - INITIAL INSPECTION, SHIPPING ARRANGEMENTS

- 1.1 Check shipping crates and your **LIGHTNIN** equipment for possible shipping damage. Report any damage immediately to the carrier and our factory.
- 1.2 All Series 10 mixers are shipped completely assembled except for the lower shaft, impeller assembly, and mechanical seal, if supplied. The in-tank shaft and impeller blades will be crated separately or secured to the main shipping skid.
- 1.3 All mixers are treated with corrosion inhibitors for protection during shipment and possible storage.
 - a. All steel surfaces not protected with permanent coatings are covered with a rust preventative that is easily removed with kerosene or similar solvents.
 - b. All internal surfaces are protected against corrosion due to water or water vapor in case the mixer will not be put into service right away.
- 1.4 The dipstick/oil fill plug is packaged separately and should be identified. A plastic plug is installed in the opening to ensure that the mixer remains sealed and properly preserved during shipment. DO NOT remove this plug until the mixer is put into service.
- 1.5 Factory applied inhibitors will protect mixers from internal corrosion for periods up to (1) year if stored indoors in clean, dry surroundings. OUTDOOR STORAGE IS NOT RECOMMENDED. Review the section on storage carefully if the mixer is to be stored or inactive for an extended period.

SECTION 2 - INSTALLATION

- 2.1 Recommended lifting procedures are covered in Section 3 of these instructions. Important mounting and operating information is shown on the installation drawings.
 - a. Mixer weight and design loads imposed by the mixer for mounting structure design.
 - b. Location and mounting dimensions.
 - c. Baffle information (when required).
- 2.2 Install the dipstick/oil fill plug.
- 2.3 Lower the shaft and impeller hub assembly into the vessel and support in an upright position.
- 2.4 Angle Mount Mixers: Lower shaft must be installed vertically with the mixer in a level horizontal position.
To avoid insufficient gear drive lubrication, install the mixer as shown on the Installation Drawing.
- 2.5 Place the mixer on the mounting structure or tank nozzle. Refer to Section 3 for proper lifting procedures.
- 2.6 Refer to the shaft installation instructions before inserting impeller shaft into gear drive for important assembly procedures and tightening torques.
- 2.7 IMPELLER ASSEMBLY
 - a. When installing the impeller/s on a shaft, refer to the impeller drawing and instructions. Make sure the impellers are installed for the shaft rotation indicated and that impeller hardware is tightened to the specific torques listed in the impeller instructions.
 - b. For angle mount mixers supplied with a **LIGHTNIN** mechanical seal, it may be necessary to install the impeller/s from inside the tank.
- 2.8 Tighten all in-tank hardware to the specific torques listed in either Section 7 or special torques that will be listed on individual instruction sheets where applicable.
- 2.9 It is the customer's responsibility to touch up any paint damage incurred during installation and/or shipping.

SECTION 3 - RECOMMENDED LIFTING PROCEDURES

CAUTION: FAILURE TO LIFT THE MIXER AS DESCRIBED IN THESE INSTRUCTIONS MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

3.1 GENERAL LIFTING INSTRUCTIONS

- a. WE DO NOT RECOMMEND that you include the lower shaft and impeller assembly as part of the mixer being lifted.
- b. When taking up slack on the lifting sling or strap, avoid sudden impact loading of the lifting devices.
- c. The mixer must be supported until it is securely bolted to the mounting structure.
- d. If removed, re-install the coupling shield and the safety guard prior to start-up.

3.2 LIFTING PROCEDURE

- a. Refer to Figure 1 for proper lifting scheme.
- b. Place a "choker" sling or strap around the motor pedestal (230). Ensure the strap is BELOW the strap retention flange.
- c. DO NOT lift by wrapping a sling or strap around the motor. The motor connection is not designed to support the weight of the entire mixer.

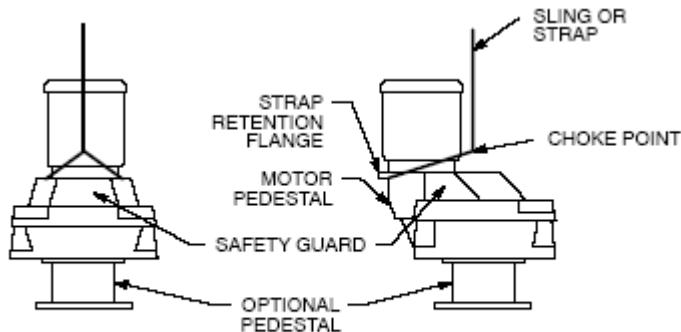


FIGURE 1

SECTION 4 - START-UP

4.1 Dipstick / Breather

- a. For mixers without angle risers, the gear drive dipstick/oil fill plug is removed prior to shipment and replaced with a solid plug to provide an airtight housing.
- b. For mixers with angle risers, the breather is removed prior to shipment and replaced with a solid plug to provide an airtight housing.

4.2 FILL THE GEAR DRIVE WITH OIL TO THE PROPER LEVEL. Refer to Section 5 for recommended oil and viscosity recommendations.

4.3 Refer to the motor maintenance instructions before connecting the motor to the power source.

- a. Rotate the motor shaft to check for free rotation.
- b. It is recommended that stator windings be checked for insulation resistance. If resistance is less than one megaohm, windings should be dried thoroughly.
- c. Check the motor nameplate for proper line voltage and correct connections according to the wiring diagram.
- d. Before making permanent motor lead connections, check impeller shaft rotation. Jog the motor to determine if rotation is correct, then make permanent connections. Make sure the mixer is properly grounded in accordance with applicable UL codes.

4.4 If your mixer is equipped with a mechanical seal, refer to the seal instructions for pressure, temperature and lubricant specifications.

- 4.5 Before filling and/or pressurizing vessel:
 - a. Run mixer in air and check for any unusual noises.
 - b. Check output RPM.
 - c. Check all bolts for tightness. After two weeks of operation, recheck hardware for tightness.
- 4.6 After filling and/or pressurizing vessel:
 - a. Jog the motor or rotate the input shaft by hand to ensure impellers are free of obstructions.
 - b. Never start up the mixer with the impeller/s imbedded in solids or set-up liquids.
 - c. Take load reading.
- 4.7 Install and secure the coupling shield (247) and safety guard (240) before operating the mixer.

SECTION 5 - GEAR DRIVE LUBRICATION

WARNING: EYE PROTECTION MUST BE WORN AT ALL TIMES WHILE SERVICING THIS MIXER.

- 5.1 Fill the gear drive with oil to the proper level using only one of the products listed in Table 1 as appropriate for the expected ambient temperature range. If the oils listed in Table 1 are not available, the EP oils listed in Table 2 may be used as a substitute. Use only one type of oil in any single mixer. Do not mix oil types, grades or brands in any mixer. If it becomes necessary to add oil to a mixer prior to the normal drain interval, be sure to use only the same type, brand and grade oil used at the original fill. Do not use any product not listed in Table 1 without prior factory approval (refer to Paragraph 5.8 for additional details).

In selecting an oil from Table 1, use the grade that most closely suits the average ambient temperature range that may be expected before the next oil change. If the expected ambient temperature overlaps two temperature ranges defined in Table 1, use the lower viscosity grade.

- 5.2 Lubrication instruction revisions

Both AGMA Standards and Lubricant Manufacturer's offerings change, over time. The lubricant information in this general instruction may be different than in older versions. In most cases **LIGHTNIN** urges the customer to be consistent with AGMA lubrication standards, but we recognize that they may have had successful field experience based on the older instructions. Immediate conversion is not required, however a gradual transition to the current lubrication standards is recommended.

MANUFACTURER	BRAND	Ambient Temperature °C (°F)		
		-25° to -5° C (-15° to +25°F) (AGMA 2 S, ISO 68)	-10° to +40° C (+15° to +100° F) (AGMA 3 S, ISO 100)	+30° to +55° C (+90° to +130° F) (AGMA 4 S, ISO 150)
EXXONMOBIL	MOBIL	Mobil SHC 68	Mobil SHC 100	Mobil SHC 150
EXXONMOBIL	EXXON	No Product	No Product	MobilGear SHC 150
CHEVRON	CHEVRON	No Product	No Product	Tegra 150
CHEVRON	TEXACO	No Product	No Product	Pinnacle EP 150
SHELL	SHELL	No Product	No Product	Omala HD 150

Table 1 – Approved Synthetic Oils

Temperature Range °C (°F)			-10° to +5° C (+10° to +40° F)	+5° to +20° C (+40° to +70° F)	+20° to +40° C (+70° to +100° F)	+40° to +55° C (+100° to +130° F)
MANUFACTURER	BRAND	PRODUCT	AGMA Viscosity Grade			
			2 EP – 3 EP	3 EP – 4 EP	4 EP – 5 EP	5 EP – 6 EP
EXXONMOBIL	MOBIL	MobilGear 600 XP	68 - 100	100 - 150	150 - 220	220 - 320
EXXONMOBIL	EXXON	Spartan EP	100	100 - 150	150 – 220	220 - 320
CHEVRON	CHEVRON	Gear Compound EP	100	100 - 150	150 – 220	220 - 320
CHEVRON	TEXACO	Meropa	100	100 - 150	150 – 220	220 - 320
SHELL	SHELL	Omala	100	100 - 150	150 – 220	220 - 320

Table 2 – Approved Petroleum Based EP Oils

5.3 Filling mixer with oil:

- a. Mixers mounted vertical on tank centerline can be filled by removing the dipstick/oil fill plug. Add the amount of oil stamped on the mixer nameplate. Replace the dipstick/oil fill plug and recheck oil level. The dipstick full mark should always be used as the most accurate guide to the actual oil level in a specific mixer. Always stop the mixer to check the oil level.
 - b. Mixers with angular offset mounting are furnished with a stand pipe type arrangement for oil measurement. The stand pipe/oil drain assembly must be adjusted to maintain the elevation of the stand pipe in respect to the top face of the gear drive (see Figure 2), using the values in the table. Once this has been accomplished, fill the stand pipe to the top and replace the oil plug. The oil level should be maintained within 1/8" of the top of the stand pipe.

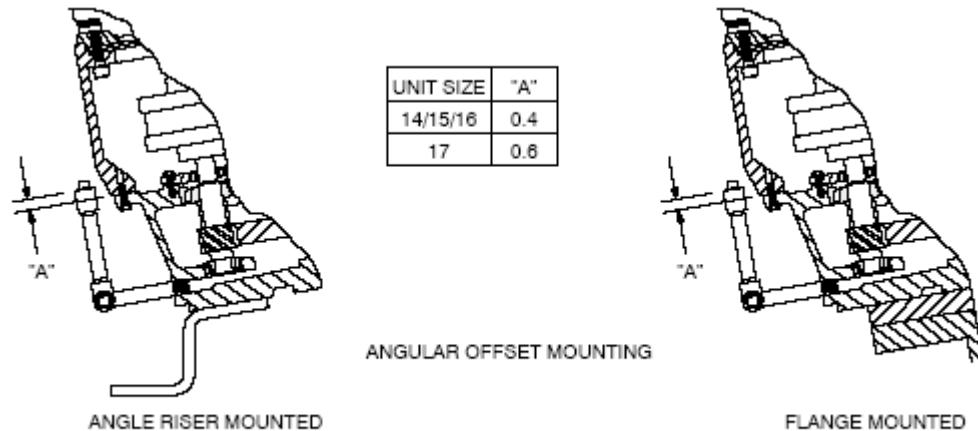


FIGURE 2

CAUTION: DUE TO LUBRICATION CONSIDERATIONS, MAXIMUM ALLOWABLE INPUT SPEED IS 2000 RPM.

Series 10 Mixers are supplied with one of the following dipsticks:

- a. 220021PSP (blade #219646) for use with input speeds of 1800, 1200 or 900 RPM.
 - b. 220022PSP (blade #219649) for use with input speeds at or below 600 RPM.

Mixer size	Input RPM	
	1800, 1200, 900	600 and Below
14 & 15	8 (9)	9 (10)
16	17 (18)	18 (20)
17	21 (23)	23 (25)

Oil Capacity – Liters (Quarts)

If the mixer is to be operated at or below 600 RPM for an extended period of time, and dipstick 220021PSP has been furnished, fill the gear drive housing with oil to a point 11mm (7/16 inch) **OVER** the full mark on the dipstick. When normal operation resumes (input speed above 600 RPM), the excess oil must be removed or oil spillage will occur.

If the mixer is to be operated above 600 RPM for an extended period of time, and dipstick 220022PSP has been furnished, drain the gear drive housing of oil to a point 11mm (7/16 inch) **BELOW** the full mark on the dipstick. When normal operation resumes (input speed below 600 RPM), oil must be added or gear drive damage will occur.

CAUTION: DIPSTICK 220022PSP WAS NOT DESIGNED TO REGISTER THE LOWER OIL LEVEL MENTIONED ABOVE. TO ENSURE PROPER LOW OIL LEVEL READING, DIPSTICK 220021PSP MUST BE USED.

- 5.4 The oil change frequency required for the gear drive is dependant upon the type of oil being used and the overall operating conditions. In general, higher operating or local ambient temperatures or adverse operating conditions will require more frequent oil changes. Table 3 provides specific guidance regarding the oil change interval for these gear drives. These oil change intervals must be adhered to.

Duty Classification	Oil Selected from Table	Oil Change Interval (Whichever occurs first)	
		Operating Hours	Calendar Months
Intermittent	2	2500	6
	1	5000	12
Continuous (24 Hours Per Day)	2	4380	6
	1	8760	12

Table 3 – Recommended Normal Oil Change Intervals

- 5.5 The lubricant change interval may be extended if a comprehensive oil analysis program is established. Such a program must include both spectrographic and ferrographic analyses as well as viscosity, total acid number, total based number, and water content. If such an analysis program is in place, the oil should only be changed when degradation or contamination is indicated by the analysis results. In no case should the oil change interval exceed 36 months.

DO NOT MIX oil types, grades or brands in the same mixer. If, at any oil change interval, it is necessary to change lubricant, it is necessary to flush the mixer as follows:

- a. Drain existing lubricant from gear drive as fully as possible.
- b. Refill mixer as described above with new lubricant.
- c. Operate gears drive long enough to reach normal operating temperature, usually at least two hours.
- d. Drain and discard the lubricant from the gear drive.
- e. Refill mixer with new lubricant and return to service.

- 5.6 More frequent oil change intervals, of one half to two thirds of the periods listed in Table 3, may be necessary if unfavorable operating conditions that tend to degrade the oil or cause excessive condensation exist. Unfavorable conditions are defined as:
- a. Intermittent operation with rapid changes in oil temperature.
 - b. Wide fluctuations in ambient temperatures over short time spans.
 - c. Harmful vapors, chemical fumes, dusty atmospheres or prolonged humid atmospheres.
 - d. If adverse operating conditions are present, reputable lubricant suppliers can test oil and recommend economical oil change schedules.
- 5.7 No periodic grease relubrication is required except for the motor bearings. All gear drive bearings are lubricated by oil splash. Refer to the motor maintenance instructions for motor bearing lubricant specifications and recommended frequency of relubrication.
- 5.8 ALTERNATE OILS
- a. Care must be taken to choose an appropriate alternate lubricant.
 - b. The selection of an alternate oil should be done only after thorough evaluation by a qualified individual. Lubrication is a complex subject with numerous variables.
- NOTE: The gear drive contains elastomers, gear case sealer and other materials that may not be suitable for use with an alternate oil. It is the customer's responsibility to ensure that the oil is compatible.
- c. All lubricants DO NOT perform equally, even though they may be the same AGMA viscosity grade. Each lubricant has different performance levels based on the specific additives and formulations. **It is the Customer's responsibility to understand the performance capability of the alternate lubricant they will be using.**
 - d. **LIGHTNIN DOES NOT APPROVE OR INVESTIGATE ALTERNATE OILS.** We recognize, however, that alternate oils may perform adequately and provide other benefits to the customer. Customers may want an alternate oil due to cost, availability or commonality of use with other equipment. In light of this, **LIGHTNIN provides general guidance for the customer or a third party to evaluate alternate oils.**
 - e. **LIGHTNIN** offers general guidelines for evaluating alternate oils, however, successful field experience is critical to the selection.
 - f. Most lubricant manufacturers can provide, upon request, product specification data sheets for each of their products. These data sheets generally provide all or most of the data required.
 - g. If a lubrication related failure occurs, the Customer's lubricant evaluation and field experience would be considered in the failure analysis.
 - h. **The Warranty may be voided if the customer has not conducted a proper lubricant evaluation, before using the alternate lubricant.**
 - i. For suggestions of a third party to perform an oil evaluation, the Society of Tribologists and Lubrication Engineers may be contacted at www.stle.org.

TABLE 4
MINIMUM PHYSICAL AND PERFORMANCE REQUIREMENTS FOR
EXTREME PRESSURE AND SYNTHETIC GEAR LUBRICANTS

PROPERTY	TEST PROCEDURE	ACCEPTANCE CRITERIA		
Flash Point (°F)	ASTM D 92	400 (Minimum)		
Viscosity	ASTM D 445	Per Table 6		
Viscosity Index	ASTM D 2270	EP: 90 (Minimum), SYN: 120 (Minimum)		
Oxidation Stability	ASTM D 2893 (Increase in Kinematic Visc. of a sample at 250°F)	6% Maximum		
Rust Protection	ASTM D 665 B (24 hrs in synthetic sea water)	No Rust		
Corrosion Protection	ASTM D 130 (Copper strip corrosion after 3 hrs. @ 212°F	1b strip		
Foam Suppression	ASTM D 892 (Must be within the limits shown)	Maximum Volume of Foam (ml) after: Sequence: I II III Temp. °F: 75 200 75 After 5 Min. Blow: 75 75 75 After 10 Min. Rest: 10 10 10		
Demulsibility	ASTM D 2711 MOD (Must be within the limits shown)	AGMA Grades EP Syn. . 2-7 8-13 Max. % H ₂ O in oil 2.0 2.0 1.0 Max. Cuff after centrifuging (ml) 1.0 4.0 2.0 Min. Total free water collected during entire test (start w/ 90 ml of water) (ml) 80.0 50.0 60.0		
Cleanliness	None	Must be free from grit and abrasives.		
Pour Point	ASTM D 97			
Timken OK Load (lbs.)	ASTM D 2782	60 (Minimum)		
FZG Test (No. of stages passed)	DIN 51 354 (A/8.3/90°C parameters)	12 (Minimum)		
Filterability	None	Must be filterable to 25 microns without the loss of additives.		

SECTION 6 - STORAGE PROCEDURES

LIGHTNIN Mixers and Aerators, like all precision equipment, must be protected against corrosion during prolonged periods of inactivity. The primary cause of corrosion is condensation due to fluctuating temperatures and/or high humidity. Properly treated and located in clean, dry surroundings, inactive equipment can be successfully stored without damage from corrosion attack.

REVIEW AND FOLLOW THE PROCEDURES THAT FOLLOW. FAILURE TO PROPERLY STORE AND PROTECT THE EQUIPMENT AS OUTLINED MAY VOID ANY WARRANTY, EXPRESSED OR IMPLIED.

Electric motors or other prime movers are not prepared for indoor storage beyond the periods listed by **LIGHTNIN**. OUTDOOR STORAGE OF MOTORS IS NOT RECOMMENDED BY ANY MOTOR MANUFACTURER. For storage periods beyond those mentioned, refer to motor maintenance instructions furnished with this manual for further details.

The seal cartridge of mechanical seal mixers is not filled with lubricant. Fill the seal cartridge with lubricant as outlined in the seal maintenance instructions of this manual.

6.1 STORAGE OF NEW MIXERS

LIGHTNIN mixers are factory treated with high quality corrosion inhibitors and rust preventatives. The products used will effectively protect mixers from corrosion due to water and water vapor for the following initial periods depending on how the mixers are stored.

a. LENGTH OF CORROSION PROTECTION

1. 12 months, when stored in a dry, ambient atmosphere with controlled temperatures. Corrosion protection to be reapplied at 12 month intervals.
2. 6 months, when stored indoors in a dry, ambient atmosphere without temperature control. Corrosion protection to be reapplied at 6 month intervals.
3. 6 months, when stored outdoors as crated, with suitable protection from the elements. Coverings must be waterproof, but have provisions for free circulation of air to avoid buildups of condensation. Equipment must be elevated at least 300mm (12 inches) above ground level to reduce moisture pickup. CORROSION PROTECTION TO BE REAPPLIED AT 4 MONTH INTERVALS AFTER INITIAL STORAGE.

b. STORAGE OF INSTALLED MIXERS

1. Mixers that have been installed, but not filled with oil and will be inactive for an extended period should be prepared per 6.2
2. Mixers that have been installed, filled with oil and run, but will be inactive for an extended period should be prepared for storage per 6.3.

c. STORAGE OF CRATED MIXERS

For mixers that will be stored for periods longer than 6 months as crated indoors without temperature control or outdoors, remove the dipstick/oil fill plug (located on top of the gear drive) per Section 4.1. Add 0.06 liter (2 ounces) of "MOTORSTOR" and replace the plug.

d. INSPECTION

Inspect factory installed wrappings and coatings. If factory wrappings and coatings are accidentally removed or damaged, reapply them over the exposed areas. Corrosion inhibitors deteriorate rapidly when exposed to air and water vapors.

6.2 CORROSION PROTECTION RENEWAL

Careful adherence to the renewal procedures will afford adequate protection for the same period covered by a factory prepared mixer when stored under conditions as defined in 6.1. These procedures should be repeated at the same intervals as noted in 6.1.

- a. The interior of the gear drive must be treated with a vapor phase inhibitor. Two types of products can be used:

"MOTORSTOR" VCI No. 10 preservative oil, a product of Daubert Chemical Co., Oak Brook, IL. (This is the factory applied product) or

SHELL "VPI 260" crystals (powder form), a product of Shell Oil Co., Syracuse, NY.

- b. Prepare the mixer as follows:

1. Remove cover and protective wrappings.
2. Remove oil fill plug and add 0.06 liter (2 ounces) of "MOTORSTOR" to sump oil.
3. Add fresh grease to the motor bearings. Remove relief plugs and add lubricant until fresh grease appears at the

relief. Replace plugs.

4. Rotate motor shaft by hand to distribute grease and turn over oil in gear sump.
5. Spray "MOTORSTOR" or equal preservative oil to exposed cavities.
6. Seal off breathing passages with VPI paper and wrap with waterproof tape.

6.3 STORAGE OF INACTIVE MIXERS

Mixers that have been in service, but will be idle less than 3 months, should be run at least 15 minutes every week and receive regular maintenance. Mixers inactive more than 3 months should be prepared as follows:

- a. Check the condition of the oil. (Lubricant suppliers can furnish oil checking service).
- b. If the oil condition is good, add 0.06 liter (2 ounces) of "MOTORSTOR" rust preventative oil to the regular oil.
- c. If the oil has deteriorated, or is due to be changed under normal schedules, drain the gear drive completely.
 1. Spray a mist of "MOTORSTOR" in the gear drive, directing the spray to all corners for maximum coverage.
 2. Add 0.06 liter (2 ounces) of "MOTORSTOR" (or 5 grams of SHELL VPI 260 can be used as an alternate).
- d. Remove the dipstick/oil fill plug and store in a safe place. Seal the opening with a solid plug.
- e. Cover mixers stored indoors with a waterproof covering, allowing for free air circulation.
- f. Inspect the drive every 4 months and:
 1. Regrease all motor bearings. Rotate motor shaft.
 2. Add additional "MOTORSTOR" as outlined above.
 3. Rotate shafts to distribute fresh oil and grease.

6.4 START-UP PREPARATION

- a. Remove all wrappings and coverings.
- b. Rotate shafts to check for free movement.
- c. Install the dipstick/oil fill plug.
- d. Check oil fill level, with the mixer stopped, and fill if necessary.

SECTION 7 - BOLT TIGHTENING TORQUE RECOMMENDATIONS

Inadequately or improperly tightened hardware can loosen due to vibration or the load reactions imposed by fluid forces. This can result in reduced equipment service life or damage and failure.

7.1 Recommended torques for tightening metric bolts and screws on **LIGHTNIN** Mixers and Aerators and their mounting structures are listed in Table 5 for your general reference. These average torque values should be considered only as guides and not as absolute values.

The amount of torque required to maintain a tight connection can vary considerably for bolts of the same size under different operating conditions. Variations such as basic joint design, compression factors, type and strength of base and hardware material, surface finish of mating parts and lubrication are only some of the factors that influence the tightness of bolted connections for given bolt torques.

UNLESS SPECIFICALLY LISTED ELSEWHERE IN THE DETAILED INSTRUCTIONS, TIGHTEN THE MIXER AND MOUNTING HARDWARE TO THE RECOMMENDED VALUES SHOWN IN TABLE 5. A torque wrench must be used to ensure compliance with these torque requirements.

Certain assembly connections may require special torques that are not listed in Table 5. These torques can be found in the detailed assembly and disassembly sections of your manual. **REVIEW YOUR MANUAL CAREFULLY TO DETERMINE WHERE SPECIAL TORQUES ARE REQUIRED.**

For severe duty service, torques higher than listed, to tighten a bolt to maximum capacity, can often be used. However, due to the many variables previously mentioned, the only absolute method to determine optimum torque is to deliberately yield a bolt under actual conditions. If a bolt does yield or shear, 75% of the torque applied in yielding the bolt can be used to obtain a tight connection that is satisfactory.

ALL BOLTS SHOULD BE RETIGHTENED 12 HOURS AFTER ASSEMBLY, AND AT EACH SCHEDULED SHUT DOWN THEREAFTER.

TABLE 5
RECOMMENDED TIGHTENING TORQUES FOR COMMERCIAL
GRADE STEEL, GR5, 304 AND 316 STAINLESS STEEL (1) (2)

BOLT THREAD SIZE	TIGHTENING TORQUES (FT-LBS) (3) GRADE 5.6 OR 304/316 SS BOLTS LUBRICATED	TIGHTENING TORQUES (FT-LBS) (3) GRADE 8.8 BOLTS LUBRICATED	ISO MARKING REFERENCE GUIDE (2)
M5	1.7	4.1	HEX HEAD CAP SSREWS
M6	3.0	7.0	
M7	5.0	12	
M8	7.0	17	
M10	14	34	
M12	25	59	
M14	39	93	HEX NUT
M16	62	146	
M18	85	200	
M20	120	284	
M22	178	386	
M24	207	491	
M27	303	718	SOCKET HEAD CAP SSREWS
M30	412	975	
M33	561	1327	
M36	720	1704	
M39	932	2205	
M42	1153	2727	

(1) ALL BOLTS SHOULD BE COATED WITH OIL, GREASE OR AN ANTI-SEIZE COMPOUND WHENEVER POSSIBLE. THE THREADS AND BEARING FACE OF BOLT HEADS AND/OR NUTS SHOULD BE LUBRICATED.

(2) TORQUE VALUES SHOWN SUPERSEDE PREVIOUS TABLES THAT MAY HAVE ALLOWED LOWER VALUES. IT IS RECOMMENDED THAT ONLY FASTENERS BE USED THAT ARE PROPERLY MARKED, INCLUDING MANUFACTURER'S TRADE MARKING. ONLY FASTENERS MARKED AS SHOWN ARE GUARANTEED TO MEET SPECIFICATION AND PERFORMANCE REQUIREMENTS.

(3) CONVERSION FACTORS:

FRiction LOCKING DEVICES MULTIPLY LUBRICATED VALUE BY 1.15. THESE TORQUES PERTAIN TO BOLTS OR NUTS WITH FRiction LOCKING DEVICES SUCH AS NYLON PELLETS OR PATCHES, FIBER INSERTS OR UPSET THREADS.

DRY VALUES MULTIPLY LUBRICATED VALUE BY 1.33.

Metric Values in N·m

1FT-LB = 1.3558 N·m

7.2 Recommended torques for tightening ANSI standard bolts and screws are listed in Table 6 for your general reference. These average torque values should be considered only as guides and not as absolute values.

The amount of torque required to maintain a tight connection can vary considerably for bolts of the same size under different operating conditions. Variations such as basic joint design, compression factors, type and strength of base and hardware material, surface finish of mating parts and lubrication are only some of the factors that influence the tightness of bolted connections for given bolt torques.

UNLESS SPECIFICALLY LISTED ELSEWHERE IN THE DETAILED INSTRUCTIONS, TIGHTEN THE MIXER AND MOUNTING HARDWARE TO THE RECOMMENDED VALUES SHOWN IN TABLE 6. A torque wrench must be used to ensure compliance with these torque requirements.

Certain assembly connections may require special torques that are not listed in Table 6. These torques can be found in the detailed assembly and disassembly sections of your manual. REVIEW YOUR MANUAL CAREFULLY TO DETERMINE WHERE SPECIAL TORQUES ARE REQUIRED.

For severe duty service, torques higher than listed, to tighten a bolt to maximum capacity, can often be used. However, due to the many variables previously mentioned, the only absolute method to determine optimum torque is to deliberately yield a bolt under actual conditions. If a bolt does yield or shear, 75% of the torque applied in yielding the bolt can be used to obtain a tight connection that is satisfactory.

ALL BOLTS SHOULD BE RETIGHTENED 12 HOURS AFTER ASSEMBLY, AND AT EACH SCHEDULED SHUT DOWN THEREAFTER.

**TABLE 6
RECOMMENDED TIGHTENING TORQUES FOR COMMERCIAL
GRADE STEEL, GR5, 304 AND 316 STAINLESS STEEL (1) (2)**

BOLT THREAD SIZE	TIGHTENING TORQUES (FT-LBS) (4) GRADE 2, 3 OR 304/316 SS BOLTS LUBRICATED	TIGHTENING TORQUES (FT-LBS) (4) GRADE 5 BOLTS LUBRICATED	MARKING GRADE	STEEL SAE GRADE MARKING REFERENCE GUIDE (2)
1/4 - 20	4.6	7.2		SAE GRADES 0, 1 AND 2
5/16 - 18	9.6	15		
3/8 - 16	17	26		
7/16 - 14	27	42		SAE GRADE 3
1/2 - 13	41	64		
9/16 - 12	60	92		
5/8 - 11	83	128		SAE GRADE 5
3/4 - 10	146	226		
7/8 - 9 (3)	142	365		
1 - 8	212	547		ALL SOCKET HEAD CAP SCREWS SAE GRADE 5
1 1/8 - 7	301	675		
1 1/4 - 7	425	952		
1 3/8 - 6	557	1249		
1 1/2 - 6	739	1657		
1 3/4 - 5 (3)	754	1600		
2 - 4 1/2	1134	2406		
2 1/4 - 4 1/2	1659	3519		
2 1/2 - 4	2269	4813		

(1) ALL BOLTS SHOULD BE COATED WITH OIL, GREASE OR AN ANTI-SEIZE COMPOUND WHENEVER POSSIBLE. THE THREADS AND BEARING FACE OF BOLT HEADS AND/OR NUTS SHOULD BE LUBRICATED.

(2) TORQUE VALUES SHOWN SUPERSEDE PREVIOUS TABLES THAT MAY HAVE ALLOWED LOWER VALUES. IT IS RECOMMENDED THAT ONLY FASTENERS BE USED THAT ARE PROPERLY MARKED, INCLUDING MANUFACTURER'S TRADE MARKING. ONLY FASTENERS MARKED AS SHOWN ARE GUARANTEED TO MEET SPECIFICATION AND PERFORMANCE REQUIREMENTS.

(3) ALLOWABLE BOLT STRESS VALUES CHANGE AT THESE LOCATIONS AND IS REFLECTED IN THE SUGGESTED TORQUE VALUES.

(4) CONVERSION FACTORS:

FRiction LOCKING DEVICES MULTIPLY LUBRICATED VALUE BY 1.15. THESE TORQUES PERTAIN TO BOLTS OR NUTS WITH FRiction LOCKING DEVICES SUCH AS NYLON PELLETS OR PATCHES, FIBER INSERTS OR UPSET THREADS.

DRY VALUES MULTIPLY LUBRICATED VALUE BY 1.33.

METRIC VALUES IN N-M

1FT-LB = 1.3558 N-M

Istruzioni Montaggio - Smontaggio Bussole Coniche

Taper bush installation and removal Instructions

*Instructions pour le montage et
démontage du moyeu conique*



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TAPER BUSH INSTALLATION AND REMOVAL INSTRUCTIONS

INSTALLATION

- Clean shaft, bore and outside of bushings, and bore of hubs (taking bushings from hubs is already assembled). Remove any oil, lacquer or dirt.
- Being careful not to damage bore or hubs, slip shaft into pulley.
- Slip bushings onto shaft and into hubs. Oil thread and point of set screws or thread and under head of cap screws. Place screws loosely in holes that are threaded on hub side (shown "O" thus in diagram)
- Locate shaft in position desired and tighten screws in each bushing slightly, so that bushings are snug in hubs.
- Tighten screws alternately and evenly in one bushing only until all are pulled up very tightly. See table for wrench torque. Avoid excessive wrench torque to prevent damage to the threads. Now hammer against large end of bushing using a heavy steel or bronze bar held against bushing.
- Screw can now be tightened a little more using the specified torque. Repeat this alternate hammering and screw re-tightening until the specified wrench torque no longer turns the screws after hammering.
- Check to make sure that the surface on both sides of the split are evened up. Fill the other holes with grease to exclude dirt.

REMOVAL

- Remove all screws. Oil thread and point of set screws or thread and under head of cap screws.
- Insert screws in holes that are threaded on bushing side (shown thus • in diagram).
- In sizes where washers are found under screw heads, be sure to use these washers:
Note that one screw in each hub is left over and is not used in this loosening operation.
- Tighten screws alternately until bushings are loosened in hubs. If bushing does not loosen immediately tap on hub.

TORQUE WRENCH SETTING

AB BALBONI TAPER BUSH CODE	TAPER BUSH CODE	SCREW		TORQUE WRENCH SETTING	SOCKET HEAD SCREW
A28B20	1108	GRUB SCREW	1/4"	6 Nm	3 mm
A30B25	1210	GRUB SCREW	3/8"	20 Nm	5 mm
A40B25	1610	GRUB SCREW	3/8"	20 Nm	5 mm
A50B30	2012	GRUB SCREW	7/16"	30 Nm	6 mm
A65B45	2517	GRUB SCREW	1/2"	50 Nm	6 mm
A75B50	3020	GRUB SCREW	5/8"	90 Nm	8 mm
A90B90	3535	VTCEI	1/2"	110 Nm	10 mm
A100B100	4040	VTCEI	5/8"	190 Nm	12 mm



GEAR DRIVE MAINTENANCE INSTRUCTIONS FOR **LIGHTNIN®** SERIES 10 MODEL 17

SECTION 1 – GENERAL

- 1.1 Series 10 gear drives are precision manufactured and assembled to provide long trouble-free service when properly maintained. If it becomes necessary to disassemble the unit, careful precise re-assembly is necessary.
 - a . Equipment that may be required to service a unit, in addition to standard mechanics tools, are hoist, slings, arbor press, wheel pullers, torque wrench, feeler gauges, dial indicator and micrometers.
 - b . When disassembling a unit, clean external surfaces adjacent to covers to prevent dirt from entering the housing.
 - c . During disassembly, keep old shim-pack sets with their respective cages and retainers for reference when reassembling.
 - d . It is recommended that oil seals, O-rings and gaskets be replaced when units are disassembled.
 - e . Refer to the Mixer Assembly drawing included in this manual for parts identification.
 - f . Refer to the General Instructions for bolt tightening torques.
 - g . HIGH SPEED COUPLINGS as standard are either elastomer flexible element type (standard duty) or TYPE H or T10 tapered grid (variable speed/variable torque applications).
 - h . Determine the type high speed coupling furnished and refer to the appropriate Coupling Instructions for required alignment and assembly procedures. Coupling identifiers are located on the coupling components.
- 1.2 **Prior to servicing the gear drive**, do the following:
 - a . **Disconnect the motor leads or otherwise lock-out power supply.**
 - b . Drain oil from gear drive by removing the 1/2" NPT oil drain plug.
 - c . Remove safety guard (240) and coupling shield (247).
 - d . Remove the low speed coupling (220) and impeller shaft (117) per the Shaft Installation and Removal Instructions included in this manual.

SECTION 2 – PARTS REMOVAL

WARNING: EYE PROTECTION MUST BE WORN AT ALL TIMES WHILE SERVICING THIS MIXER.

2.1 SEAL REPLACEMENT

- a . We recommend that oil seals and O-rings be replaced when the unit is dismantled. Carefully check for nicks, gouges and deformities if they are not being replaced.
- b . Coat O-rings and the rubber lip of all oil seals with a light grease before installing.
- c . Be sure to install all oil seals in the correct orientation (with the closed side of the metal case facing upward). Refer to mixer assembly drawing.
- d . Install oil seals with the appropriate seal driver, being careful not to damage the metal case. If new oil seals are being used, coat seal cases with Permatex #1 or equivalent and press into bores with the proper seal driver. Apply a coating of grease to the oil seal lip and cavity.
- e . If a bearing has been removed and its condition is suspect, clean the bearing with a solvent and allow to dry. DO NOT SPIN dry bearings. Dip the bearings in a light oil for protection before spinning to check bearing condition.

2.2 MOTOR REMOVAL

- a . If a TAPER GRID HIGH SPEED COUPLING is furnished:
 - 1 . Remove the split cover and grids.
 - 2 . Remove the cap screws connecting the motor pedestal (230) to the gear drive housing (200) and remove the motor (101), motor coupling half (233) and motor pedestal as an assembly.
- b . If an ELASTOMER TYPE HIGH SPEED COUPLING is furnished, proceed per Section 2.2a-2.

2.3 LOW SPEED GEAR REMOVAL

- a . Remove the drive cover (201) and oil seal (202). Scrape off all gasket material from the cover and the gear drive housing.
- b . Remove all of the hex head cap screws (209) holding the gear (210) to the gear hub (204).
- c . Upon removal of the cap screws (209), you will find that two of the holes in the gear are tapped with M16 threads. Install two jacking screws or bolts, 75mm (3 inch) long with at least 40mm (1-1/2 inch) of thread into the tapped holes. Tighten these screws until the gear is free of the gear hub, then pick up the gear by the jacking screws and lift it out of the gear housing. (see Figure 1)
- d . Inspect the gear for damage and replace if necessary. We strongly recommend that the gear (210) and low speed pinion (236) be replaced as a set.

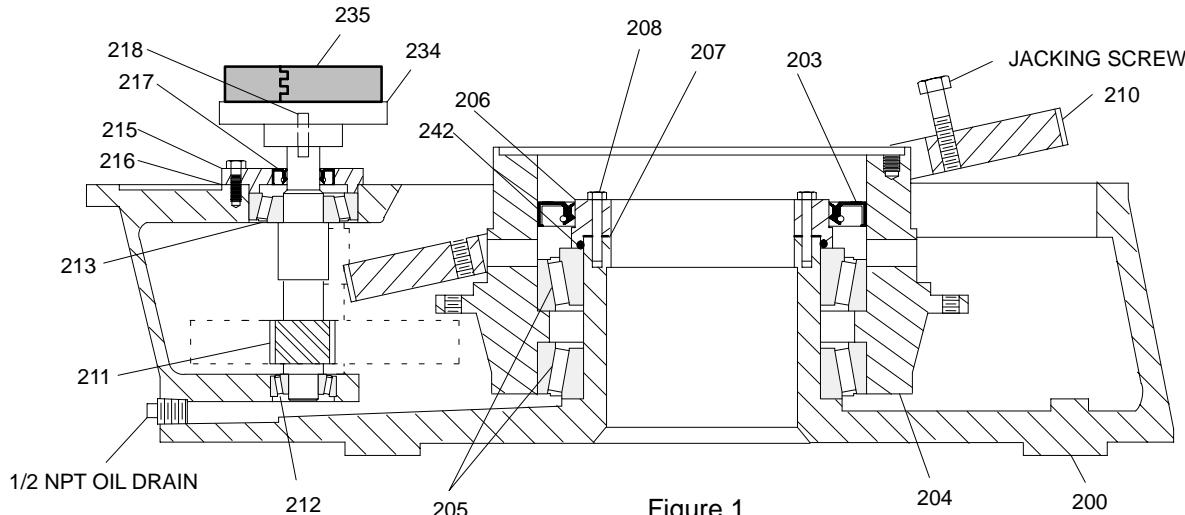
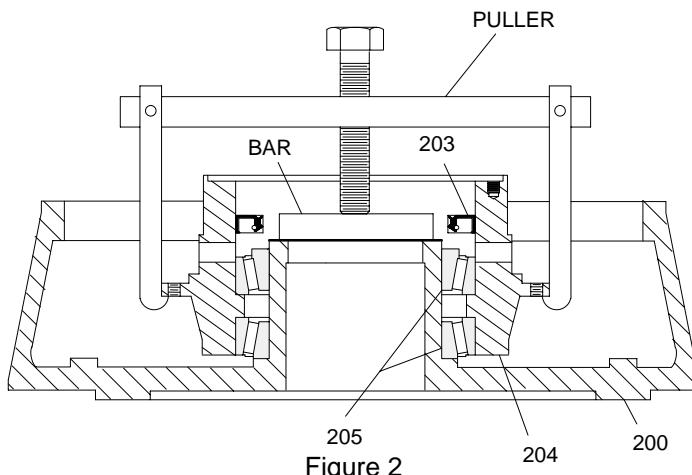


Figure 1

2.4 LOW SPEED GEAR HUB AND BEARING REMOVAL

- a . Remove the low speed bearing retainer (206), shim set (207) and O-ring (242).
- b . Place a 25mm (1 inch) thick steel rectangular bar across the top of the bearing pedestal of the gear drive housing as shown in Figure 2. Using a large gear puller, pull the low speed gear hub (204) and the low speed bearings (205) off of the bearing pedestal of the gear drive housing. Refer to Figure 2.
- c . Inspect the bearings and replace if necessary. If the bearings are replaced, a new shim set (207) will be required. Using a drift, drive the outer races from the bearing pedestal. The inner race and rollers of the lower low speed bearing can be removed from the bearing pedestal of the gear drive housing by using a puller on the bearing cage. Only do so if you have determined that the bearing must be replaced, since the puller will damage the bearing.



2.5 HIGH SPEED PINION REMOVAL

IMPORTANT: To remove the high speed pinion shaft (211) it is necessary to first loosen the low speed pinion shaft (236).

- a . Remove bearing retainer (239) and the shim set (241), being careful not to damage the shim set.
- b . Install a piece of threaded stock into the $5/8\text{--}11$ tapped hole in the end of the low speed pinion shaft (236). Then install a 30mm (1 $\frac{1}{4}$ inch) high spacer, thrust plate and hex nut as shown in Figure 3.
- c . Tighten the hex nut, raising the low speed pinion shaft until the upper intermediate bearing is free of its housing.
- d . Move the low speed pinion shaft (236) away from the high speed pinion and shaft (211).
- e . Remove the high speed pinion shaft coupling half (234) and the flexible element (235) (WOODS SURE-FLEX COUPLINGS ONLY) from the high speed pinion shaft (211).
- f . Remove the high speed bearing retainer (215) and the shim set (216), being careful not to damage the shim set.
- g . The high speed pinion shaft (211) and bearings (213 & 213) can now be lifted out of the gear housing. Inspect the pinion shaft and replace if necessary.
- h . Inspect the high speed bearings (212 & 213) and replace if necessary. If the bearings or the pinion shaft are replaced, a new shim set (216) will be required. If the bearings must be replaced, the outer race of the lower bearing can be removed from its bore with a small puller.

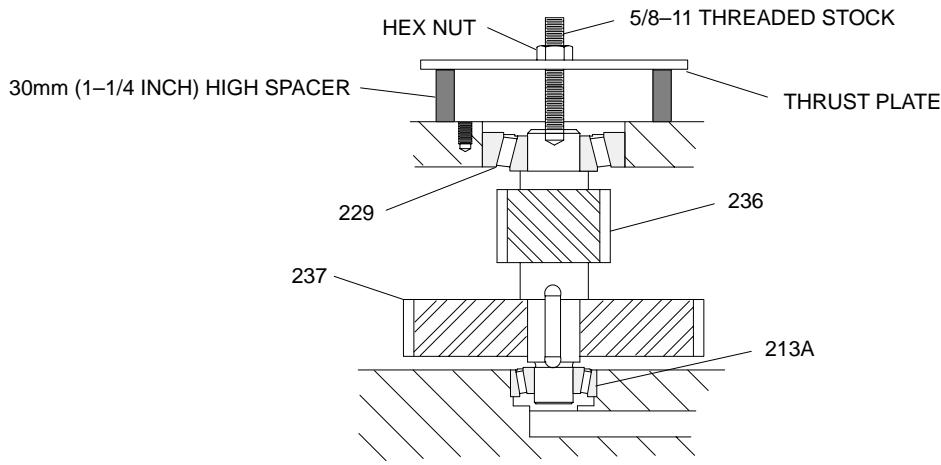


Figure 3

2.6 LOW SPEED PINION AND GEAR REMOVAL

- a . Return low speed pinion shaft (236) to its original position.
- b . Replace the upper spacer, thrust plate and hex nut, and install a second spacer between the high speed gear (237) and the underside of the gear drive housing (see Figure 4). This will press the gear off the shaft.
- c . Tighten the hex nut, raising the low speed pinion shaft (236) until it is clear of the high speed gear (237) and remove the shaft.
- d . Remove the spacer (214).
- e . Inspect the intermediate bearings (213A & 229) and replace if necessary. If the bearings or the pinion shaft are replaced, a new shim set (241) will be required. If the bearings must be replaced, the outer race of the lower bearing can be removed from its bore with a small puller.

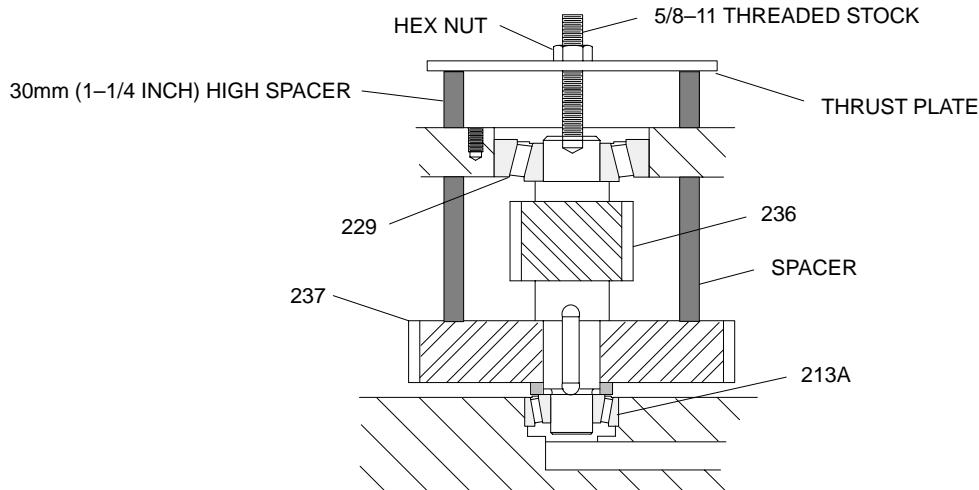


Figure 4

SECTION 3 – GEAR DRIVE ASSEMBLY

3.1 INTERMEDIATE BEARING INSTALLATION

- a . Coat the bearing bores in the gear drive housing (200) and the low speed pinion shaft (236) with oil prior to installing the intermediate bearings (229 & 213A).
- b . Press the outer race of the intermediate bearing (213A) into the gear drive housing. Refer to the assembly drawing for the correct bearing orientation. Make sure the races are seated against the shoulder by checking for a gap with feeler gauges.
- c . Preheat the inner races of the intermediate bearings (229 & 213A), and the high speed gear (237) in an oil bath or oven with a maximum temperature of 135° C (275° F).
- d . Remove the upper intermediate bearing (229) from the oil bath or oven, and press it onto the low speed pinion shaft. Check for proper seating with feeler gauges. Refer to assembly drawing for correct orientation of the bearing races.
- e . Place two spacers (approx. 13mm (1/2 inch) high) next to the lower intermediate bearing bore as shown in Figure 5.
- f . Place the low speed pinion shaft (236), with upper bearing inner race and key (238) installed, into the gear drive housing, positioned so that it is above the top of the housing.
- g . Remove high speed gear (237) from the oil bath or oven and place it on the spacers as shown in Figure 5.

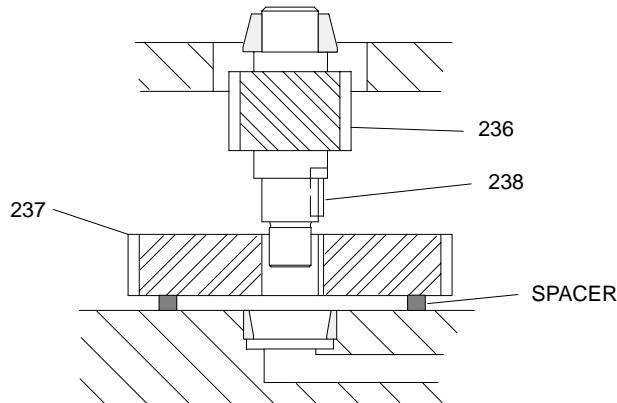


Figure 5

-
- h . Press the low speed pinion shaft (236) into the high speed gear (237). Check for proper seating with feeler gauges. Remove the spacers.
 - i . Remove the inner race of the lower intermediate bearing (213A) from the oil bath or oven, and place it into position in the outer race already installed.
 - j . Place the spacer (214) on the lower intermediate bearing inner race and press the pinion shaft and gear assembly in place. Check for proper seating with feeler gauges.
 - k . Install the outer race of the upper intermediate bearing (229) and slide it into the bearing bore.

3.2 HIGH SPEED BEARING, PINION SHAFT AND GEAR INSTALLATION

- a . Coat the bearing bores in the gear drive housing (200) and the pinion shaft (211) with oil prior to installing the high speed bearings (212 & 213).
- b . Press the outer race of the lower high speed bearing (212) into the bore of the gear drive housing (200) and press the inner race of the lower high speed bearing onto the end of the pinion shaft (211). Check for proper seating with feeler gauges. Refer to assembly drawing for correct orientation of the bearing races.
- c . Set the pinion shaft and high speed bearings (212 & 213) in the gear drive housing.
- d . Install the upper high speed bearing outer race on the pinion shaft (211) and slide it into the bearing bore.

3.3 LOW SPEED BEARING INSTALLATION

- a . Coat the bearing bores in the gear hub (204) and the bearing pedestal of the gear drive housing (200) with oil prior to installing new bearings.
- b . Press the outer races of both low speed bearings (205) into the gear hub (204). Refer to assembly drawing for the correct bearing orientation. Make sure the races are seated against the shoulders by checking for a gap with feeler gauges.
- c . Preheat the inner races of the low speed bearings in an oil bath or oven with a maximum temperature of 135° C (275° F).
- d . Remove one of the inner races from the oil bath or oven, and slide it down the bearing pedestal, seating it against the bottom of the gear drive housing.
- e . Place the gear hub over the bearing pedestal and rest it on the lower bearing.
- f . Slide the second inner race and rollers onto the bearing pedestal, seating it into the upper outer race in the gear hub.

3.4 SETTING THE AXIAL PRELOAD IN THE LOW SPEED ROLLER BEARINGS

NOTE: Hex head cap screws (208) are furnished with Nylok inserts and should only be installed once. To establish proper preload, use hardware that does not contain a locking patch or pellet, then use new hardware for final assembly. **USE ONLY THE QUANTITY OF BOLTS LISTED IN 3.4.a TO INITIALLY SET THE PRELOAD.**

- a . To set the bearings, install the low speed bearing retainer (206) without the shims (207). Install four M8 x 40mm long bolts (without locking patch or pellet) in a symmetrical pattern.
- b . Tighten the bolts in a symmetrical pattern to 18 ft-lbs. It is critical that these bolts be tightened only to the torque indicated, and no greater.

NOTE: This is the torque for setting the preload ONLY.
- c . Rotate the gear hub (204) at least five revolutions in one direction, and tighten the bolts again to 18 ft-lbs.
- d . Repeat preceding step until the bolt load does not change after the gear hub is rotated.
- e . With a feeler gauge, measure the gap between the low speed bearing retainer (206) and the top of the drywell. Do this in four places in close proximity to the bolts in the bearing retainer. These gap measurements should be close in value, but some difference is expected. If more than .005" difference is present, repeat Steps 3.4.a through 3.4.d. If the measurements are close to one another, take the average of the four measurements, and this is the total number of shims (207) that must be added between the low speed bearing retainer (206) and the drywell.
- f . The bolts apply a load capable of deflecting the bearings the desired amount of .003". The gap measured is the desired shim pack thickness.
- g . Remove the bearing retainer (206) and add the required shims (207).

- h . Install O-ring (242) and low speed bearing retainer (206). Insert new hex head cap screws (208) with unused Nylok inserts, and tighten to 20 ft-lbs.

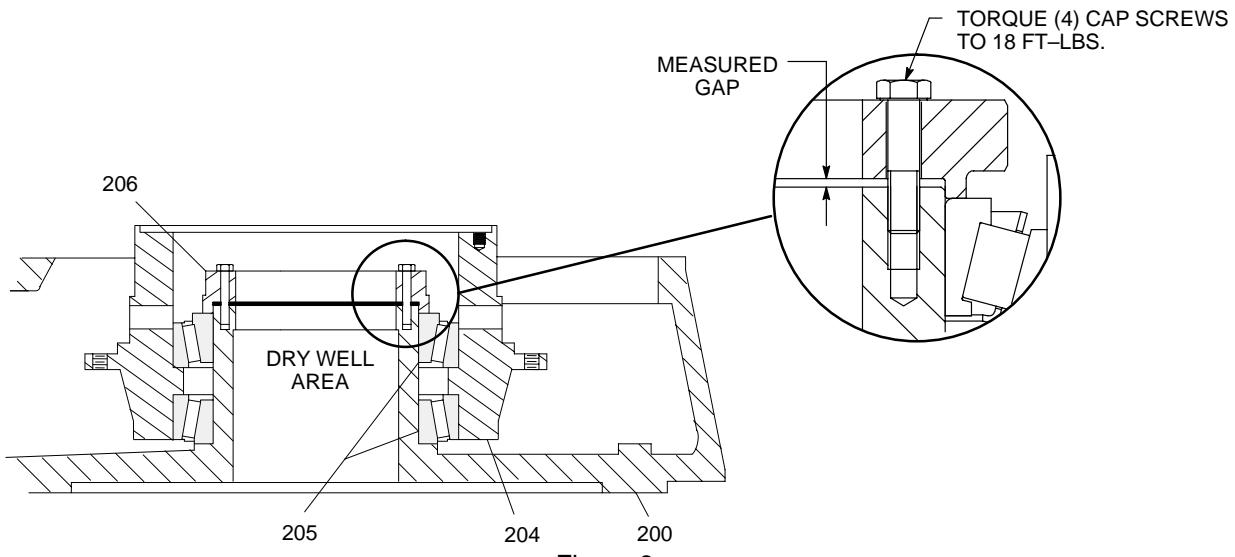


Figure 6

- i . Apply Loctite #515 gasket eliminator to the outer diameter of the oil seal (203) and install the oil seal. Refer to Machine Assembly drawing for the correct orientation. Align the seal to within .007" TIR using a dial indicator.
- j . With the use of two jacking screws or bolts, as described in Section 2.3-c, set the low speed gear (210) in place on the gear hub (204). You may have to rotate the pinion shaft to mesh the gear and pinion together. Be sure to line up the holes in the gear with the holes in the gear hub. Remove the jacking screws.
- k . Install the hex head cap screws (209) and secure the gear to the gear hub by drawing the gear down on the gear hub evenly with the cap screws (209).

3.5 SETTING THE AXIAL FLOAT IN THE INTERMEDIATE ROLLER BEARINGS

- a . To seat the bearings, install the bearing retainer (239) without the shim set (241) and tighten the cap screws. Remove the bearing retainer and hardware.
- b . Install the bearing retainer (239) with a full new shim set (241) and tighten the cap screws. Remove the plug from the center of the bearing retainer and install a hex head cap screw (5/8-11 x 1-1/2" lg. minimum) into the tapped hole in the end of the pinion shaft (211).
- NOTE: The hex head cap screw must be installed so that it bottoms out in the tapped hole. Rotate the pinion shaft (211) to align the bearing rollers.
- c . Measure the axial float per the following procedure (refer to Figure 7):
- 1 . Set up a dial indicator on the end of the cap screw.
 - 2 . Grasp the cap screw and move the pinion shaft up and down while measuring the axial float with the dial indicator.
- d . Remove shims and repeat steps "b" and "c" until an axial FLOAT of 0.013mm to 0.05mm (.0005 to .0020 inches) is attained.
- e . Rotate low speed shaft by hand and check for smooth operation.

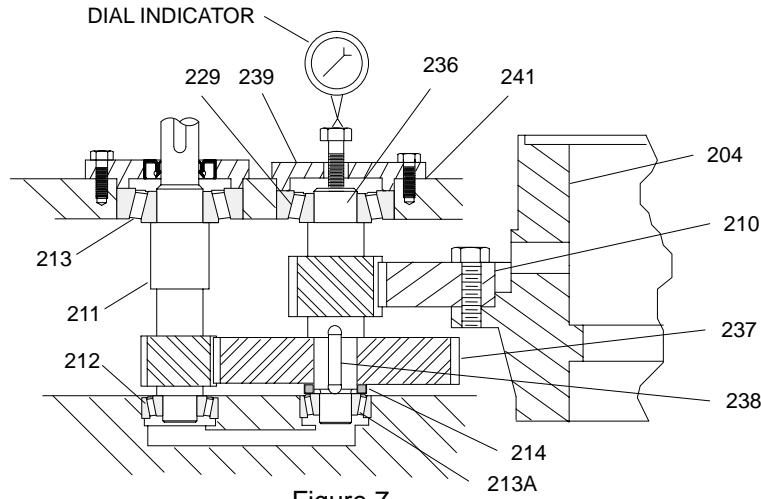


Figure 7

3.6 SETTING THE AXIAL FLOAT IN THE HIGH SPEED ROLLER BEARINGS

- a . To seat the bearings, install the high speed bearing retainer (215) without the shim set (216), and tighten the hardware. Remove the bearing retainer and hardware.
- b . Install the high speed bearing retainer with a full new shim set (216) and tighten the hardware. Rotate the pinion shaft (211) to align the bearing rollers.
- c . Measure the axial float per the following procedure (refer to Figure 8):
 - 1 . Install the coupling hub (234) on the pinion shaft (211) and tighten set screw.
 - 2 . Set up a dial indicator on the end of the pinion shaft.
 - 3 . Grasp the coupling hub (234) and move the pinion shaft up and down while measuring the axial float with the dial indicator.
- d . Remove shims and repeat steps "b" and "c" until an axial FLOAT of 0.013mm to 0.05mm (.0005 to .0020 inches) is attained.
- e . Rotate high speed shaft by hand and check for smooth operation.
- f . Loosen the set screw on the coupling hub (234) and move the hub down the shaft as far as possible for easy installation of motor and flexible coupling element.

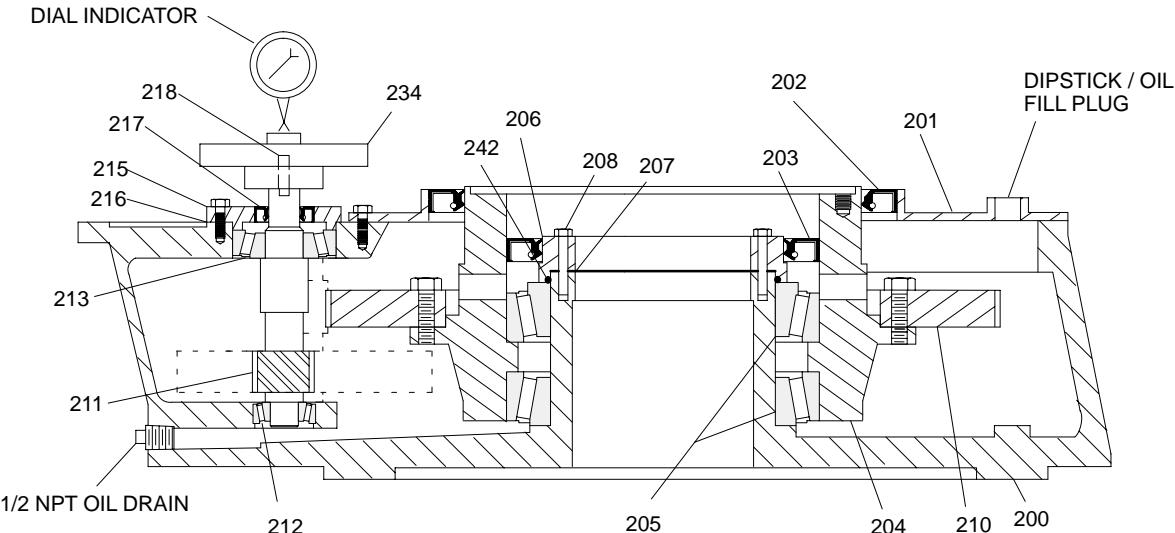


Figure 8

3.7 FINAL ASSEMBLY

- a . Apply Loctite #515 gasket eliminator to the outer diameter of oil seal (202) and drive a new outer oil seal into the bore of the drive cover (201).
- b . Apply a bead of non-hardening RTV silicone caulk around the top of the gear drive housing (200).
- c . Install the drive cover and seal assembly and fasten with the required hardware. Be sure to engage the pin holes in the cover with the alignment pins in the gear drive housing.
- d . If a TAPER GRID HIGH SPEED COUPLING is furnished:
 - 1 . Install the motor (101), motor pedestal (230) and motor coupling hub (233).
 - 2 . Install flexible elements, secure hubs, covers and lubricate coupling.
- e . If an ELASTOMER TYPE HIGH SPEED COUPLING is furnished:
Install the motor (101), motor pedestal (230), motor coupling hub (233) and the coupling flexible element (235) as an assembly. ELASTOMER TYPE couplings do not require lubrication.
- f . Refer to the appropriate Coupling Instructions for required assembly procedures.
- g . Re–fill the unit with oil with the mixer stopped. Refer to the General Instructions for oil specifications and capacity. Check oil level with the dipstick.
- h . Install the impeller shaft (117) and the low speed coupling (230) per the Shaft Installation and Removal Instructions.
- i . Install the coupling shield (247) and safety guard (240) before re–connecting power.

SERIES10 MIXER

SHAFT & SEAL INSTALLATION

Refer to Mixer Assembly drawing

SECTION 1 - INSTALLATION

For the first installation, mount the flange unit on tank nozzle with the right gasket and bolts not furnished by Lightnin.

- 1.1 Disconnect motor leads or otherwise lock-out power supply.
- 1.2 Remove safety guard (240) from unit.
- 1.3 Lower down impeller shaft (117) an sling or chain fall thru stuffing box seal and thru pedestal (231) and flange (129). Supported shaft (117) in up-right positions using two block woods or similar.

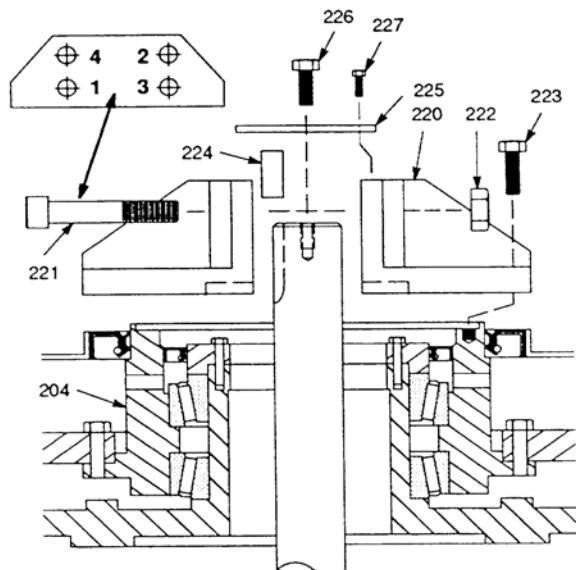
WE STRONGLY RECOMMEND THAT EITHER THE EYEBOLT OR HOIST RING BE OF THE SAFETY SWIVEL TYPE WITH A 360° ROTATIONAL CAPABILITY.

EYEBOLT TABLE

Unit Size	Eyebolt Size	Working load capacity lbs.
15	M12	1400
16	M12	2600
17	M16	6000

- 1.4 Lower down gear drive unit with your pedestal (231) on flange surface.
- 1.5 Connect flange (129) with pedestal (231) and impeller shaft (117) with shaft (117A)
- 1.6 Tighten the hardware to the proper torques in the following sequence:
 - a. Shaft cap screw (226). This draws the shaft up to the thrust plate (225).
 - b. Socket head cap screws (221) and hex nuts (222). Restrain the hex nut, then **TIGHTEN THE CAP SCREWS TO THE TORQUE LISTED IN THE TABLE BELOW**, keeping the gap between the coupling halves approximately equal from side to side.

Item 221 Cap Screw Tightening Torques Table



UNIT SIZE	THREAD SIZE	TORQUE
15	M16	112 Nm
16	M20	257 Nm
17	M20	257 Nm

- c. Cap screws (223) and then (227) cap screws. Use the torque values listed in the General Instruction.

- 1.7 Rotate input shaft by hand to check for free rotation of the shafts.
- 1.8 If not yet installed, set the packing into the mixer flange.
- 1.9 Tighten packing gland screws.
- 1.10 Refer to the appropriate section for stuffing box maintenance.
- 1.11 Install and secure the coupling guard (240) before operating mixer.

SECTION 2 REMOVAL

- 2.1 Jog the motor or rotate the shaft to make sure the impeller/shaft is not embedded in tank contents or otherwise seized.
- 2.2 Disconnect motor leads or otherwise lock-out power supply.
- 2.3 Remove the packing gland and the packing.
- 2.4 Remove coupling guard (240).
- 2.5 Remove two hex screw between shaft (117) to (117A)
- 2.6 Insert two wood supports under shaft coupling (117)
- 2.7 Remove remains screws
- 2.8 Disconnect the gear drive from pedestal (231).
- 2.9 Remove cap screws (227), (226) and (223), and thrust plate (225).
- 2.10 Remove the (4) low speed coupling socket head cap screws (221).
- 2.11 Remove the coupling halves (220).

STUFFING BOX INSTRUCTION**(drawing N. Q915639)**

Low Pressure Stuffing Boxes are supplied with two rings of packing and no separators. The packing rings are impregnated with lubricant and no further lubrication is required.

There are two ways of seating the packing. One Way consists of merely pushing each ring of packing in as tight and firm as you can by hand, as you pack the box. This method is common on top entering mixers, where leakage is not critical. Home-made tamping tools are common. They are made out of a piece of a half round of pipe or tubing that will fit in between the box and the shaft. You can push down on each ring of packing by hitting or tamping from outside the box.

After the packing is installed, it can be seated further by "running in".

SEZIONE 1 - PROCEDURE FOR SEATING THE PACKING BY "RUNNING IN"

The stuffing box should be operated with the least possible gland force.

It is most important for good stuffing box performance that the gland should not be cocked in any way, but should have its axis as nearly coincident with the shaft axis as possible.

Check the packing gland adjustment frequently for the first few days of operation, until the best gland setting has been obtained.

Make sure gland nuts (818) are only finger tight then turn on the mixer.

Tighten the gland nuts (818) as evenly as possible, about $\frac{1}{4}$ to $\frac{1}{2}$ turn every 10 minutes or so until the box is hot to the touch. (NOTE: never over tighten the gland nuts (818) while the unit is running because this can cause damage to the shaft, the packing and the lubricant).

Stop the unit . Immediately while the packing is still hot and soft, seat the packing down in the box by tightening the gland nuts (818).

Let it all stand for at least 10 to 15 minutes. This gives the packing a chance to adjust and conform under heat and pressure.

Loosen the gland nuts (818) until they are only finger tight. The packing has now been "run in" and seated once. This is enough for most applications.

SEZIONE 2 - KEEPING THE PACKING SEATED

Tightening the gland nuts by the right amount , every other minute would completely nullify the renout of the shafts, and keep the stuffing box on tip-top shape. However, "every other minutes" is not practical or necessary. The problem, of course, is to know just how much to tighten the nuts and how often.

If you have no past experience to go by , we would suggest a $\frac{1}{4}$ to $\frac{1}{2}$ turn on the gland nuts every 24 hours.

For the first week, stop by at more frequent intervals to see how the box is doing and revise the amount of turns and/or the scheduled frequency as required.

SEZIONE 3 - WHAT IF IT LEAKS?

If sometimes you find the box leaking unacceptably and it must be corrected in a short amount of time, the natural impulse is to quickly overtighten the gland nuts. While this might temporarily seal off the

leak, IT CAN CAUSE PERMANENT DEMAGE to the shaft and packing and it is not recommended, we recommended stopping the mixer and resealing the packing by tightening down hard on the gland nuts. BE SURE AND LOOSEN THE NUTS TO FINGER TIGHT BEFORE TURNING THE MIXER ON AGAIN.

However, if the mixer cannot be stopped, or if the packing is not hot enough to seat, we recommended taking a $\frac{1}{4}$ to $\frac{1}{2}$ turn every 10 minutes or so until the leak is reduced to an acceptable level.

SEZIONE 4 - PACKING SPECIFICATION

A LIGHTNIN standard packing and separator and combination is furnished unless otherwise specified.

PACKING TYPE	MAX TEMPERATURE (°C)
Interlace braid bleached multifilament Teflon yarn impregnated with Teflon dispersion.	260

If the packing and separators are not installed at our factory, a separate package containing the stuffing box components will be attached to the unit.

SEZIONE 5 - REPACKING STUFFING BOX

- Remove the split packing gland (57). Remove the rings (53) of packing by poking them out carefully with a thin tool.
- Thoroughly clean the shaft and stuffing box. Flush out any old lubricant.
- Check the shaft surface for damage. If the shaft is damaged, do not repack the stuffing box until the shaft surface is repaired. Be sure the shaft and stuffing box are in alignment.
- Cut coil packing to exact length so that the ends meet with no gap or overlap.
- Thoroughly coat each packing ring and separator with a suitable lubricant.
- Replace rings of packing, one at a time, in the exact order as shown.

NOTE: Install each packing ring and separator with their joints staggered 90 degrees and carefully seat each packing ring by firm, even tamping on the separator above each packing ring with a piece of split pipe.

- Replace split packing gland (57), packing gland clamps and gland adjusting hex nuts (818)
- Seat the packing in accordance with previous sections

INSTALLATION OF A320 AXIAL FLOW IMPELLER

(One piece hub / bolted on blades)

Reference drawing: No. L-16919C

SEZIONE 1 - GENERAL

- 1.1 Refer to installation drawing to check the minimum opening required to pass the impeller inside the vessel.
- 1.2 Impellers are shipped disassembled for ease of shipment and handling at the job site.

SEZIONE 2 – IMPELLER ASSEMBLY

- 2.1 Mate the three blades with the hub ears and install the hardware with the hex nuts (167).
- 2.2 It is essential that hardware securing blades to the hub is tightened to specific torque. It is also important that tight connections are maintained as impellers are usually subjected to a wide range of adverse loading conditions imposed by fluid force reactions. Recommended torques are given on Table 1 in this manual.

SEZIONE 3 – IMPELLER ASSEMBLY TO SHAFT

- 3.1 Coat the shaft with a lubricant to facilitate movement and slide the impeller up the shaft slightly above the desired location.
- 3.2 Insert the hook key (162) pin into the shaft keyway pin hole.
- 3.3 Lower the impeller gently over the hook key (162) until the hub is resting on the protruding pin. Do not allow the impeller to drop on the pin. The pin is a safety device designed to support the weight of the impeller but not to withstand impacts.
- 3.4 Install the set screw (163). After the set screw (163) is properly seated in the countersunk hole in the hook key, then tighten the set screw against key (162).

SEZIONE 4 - REPOSITIONING

When you need to change the impeller position on the shaft, read the following instructions.

- 4.1 Remove the set screw (163).
- 4.2 Raise the impeller until the hook key (162) is exposed.
- 4.3 Relocate the hook key (162) in the desired position.
- 4.4 Retighten all hardware as noted in steps 3.2 e 3.3.
- 4.5 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 after two weeks, but within 3 months of operation.

TRIPOD STEADY BEARING INSTRUCTIONS

Refer to steady bearing Assembly drawing

SECTION 1 – GENERAL INSTRUCTIONS

THE UNIT SHOULD NOT BE OPERATED WHILE THE STEADY BEARING IS DRY. THE STEADY BEARING MUST BE LUBRICATED BY THE TANK CONTENTS OR BY SOME OTHER TYPE OF LUBRICANT.

- 1.1 The steady bearings are designed to provide excellent service under all normal conditions.
- 1.2 The rate of wear of steady bearing bushing can vary considerably depending on the severity of the operating conditions. It is important that periodic examinations of the bushing be made to establish, in advance, some indications of the rate of wear.
- 1.3 If the bushing becomes too badly worn, serious damage to other steady bearing components can result. Therefore, it is recommended that the bushing be examined after 500 hours of operation.
- 1.4 On the basis of this examination, determine the intervals of time between subsequent inspection and/or replacements.

SECTION 2 – INSTALLATION

- 2.1 Place the tripod (1) without welding it to the bottom of the tank. After the impeller(s) are mounted on the shaft and the lower shaft is coupled to the upper shaft, slide the shaft sleeve in position (4) and install retaining screws (5).
- 2.2 Place the bushing holder (2) including the bushing (3) on shaft and attach it to the tripod with the three bolts furnished with all steady bearing components, aligning as much as possible the bushing holder holes and the tripod ones.
- 2.3 With the unit in position, plumb the lower shaft and check its perpendicularity with the steady bearing mounting surface. If not within $\pm \frac{1}{4}^{\circ}$ correct with tapered gasket, a dutchman or shims.
- 2.4 Check the clearance between the shaft sleeve (4) and the tripod (1).
- 2.5 Turn the shaft by hand and align the steady bearing tripod as closely as possible.
- 2.6 Weld the tripod in this position. Loosen the screws connecting the tripod and the bushing holder. Make the shaft turning by hand again and obtain final steady bearing alignment by adjusting the bushing holder position. tighten all screws
- 2.7 The steady bearing is now ready for use.

SECTION 3 - REPLACING THE BUSHING

- 3.1 Loosen bolts connecting the bushing holder (2) and the tripod (1).
- 3.2 Slide down the bushing holder (2) with the bushing (3) and remove it from the tripod (1).
- 3.3 The bushing (3) is fitted in its holder (2) with interference, use an extractor or tap with a piece of tube on its bottom to remove it. To insert a new bushing, preheat the bushing to 100 - 120 °C.

SECTION 4 - REPLACING THE SLEEVE

- 4.1 Once the bushing holder (2) and the bushing (3) have been removed, loosen and remove the two locking screws (5) and slide down the sleeve (4) and remove it from the tripod (1).
- 4.2 Before installing the new sleeve (4) clean and lubricate the shaft edge.



**SCHEDA PARTI DI RICAMBIO
(SPARE PARTS)**
per (for)

AGITATORE LIGHTNIN MODELLO(<i>LIGHTNIN MIXER MODEL</i>)	17C
RIDUTTORE (<i>REDUCER</i>)	17
RAPPORTO (<i>RATIO</i>)	17:1

Q.TA' (Q.TY)	DESCRIZIONE (DESCRIPTION)	POS. (P/N)	CODICE (CODE)	
1	PARAOILIO(OUTER OIL SEAL)	202	115515	
1	PARAOILIO(INNER OIL SEAL)	203	115514	
2	CUSCINETTI (L.S. BEARING)	205	117129	
1	CUSCINETTO (LOWER H.S. BEARING)	212	117126	
1	CUSCINETTO (UPPER H.S. BEARING)	213	117075	
1	CUSCINETTO (LOWER INT. BEARING)	213A	117075	
1	PARAOILIO (H.S. OIL SEAL)	217	115520	
1	CUSCINETTO (UPPER INT. BEARING)	229	117128	
2	RASAMENTI (SHIM SET)	207	217188	
1	RASAMENTO (SHIM SET)	216	210358	
1	RASAMENTO (SHIM SET)	241	210352	
1	ELEMENTO FLESSIBILE GIUNTO (FLEXIBLE ELEMENT) FRAME 160	235	GB20	
2	TENUTA BADERNA (STUFFING BOX)16X16	111	BDN 16X16	

Riferimento disegno N. S921087 REV.A (RIDUTTORE)
(Ref. drawing n.) (REDUCER)

When ordering parts, specify: model, serial number, item number and drawing.

In fase di ordine specificare sempre il numero del disegno, la posizione, il modello del riduttore ed il nostro eventuale numero di commessa.