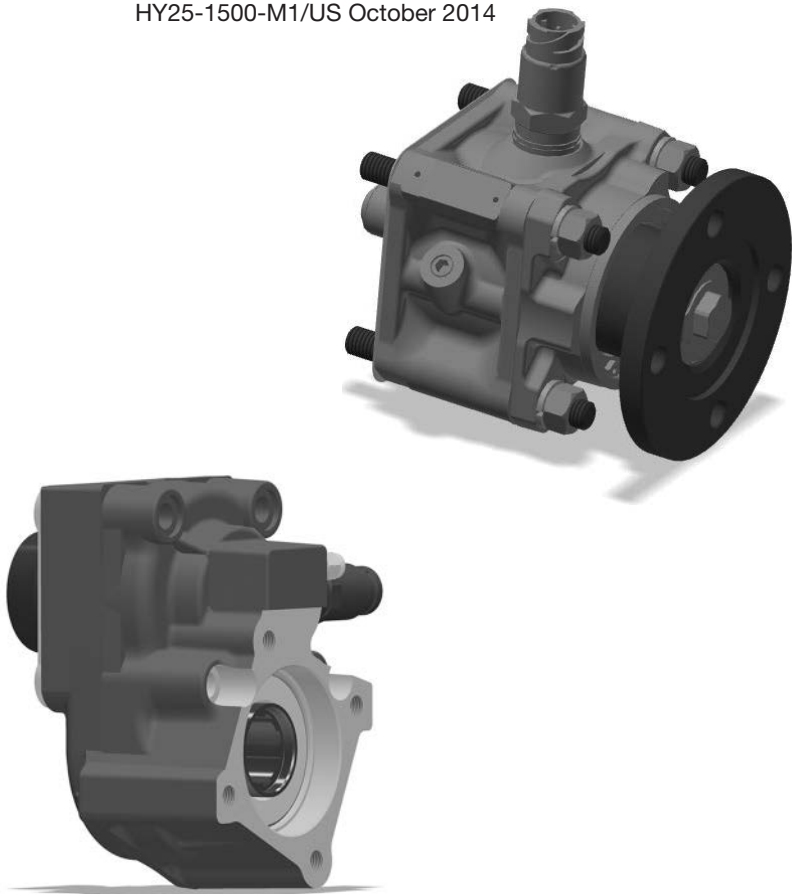


Effective: HY25-1501Z-M1/US November 2022
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HY25-1500-M1/US October 2014



Power Take-Offs Owner's Manual

ZF Adapter Manual – 512, 524 Series



WARNING — User Responsibility

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

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Patent Information

The Chelsea® Power Take-Off or its components shipped with this owner's manual may be manufactured under one or more of the following U.S. patents:

7,159,701 7,007,565 6,962,093 1,326,036 60,321,840.7 9494227 B2

Other patents pending.

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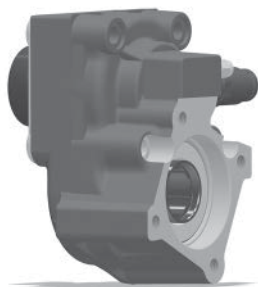
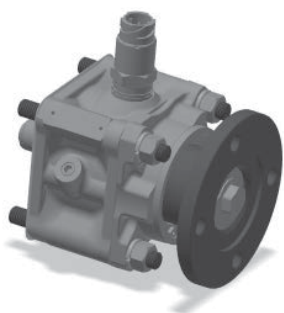
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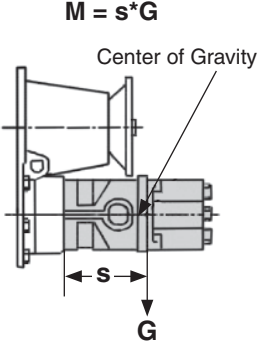
ZF



Direct Mount Pump Support Requirements

ZF-AS Tronic/ZF Meritor FreedomLine™

Limit - The FreedomLine™ transmission PTO flange will accommodate a maximum combined gravity torque of 37 lb-ft [50 Nm], taking into account all accessories (i.e. PTO, pump, fittings, etc.) attached directly to the transmission PTO flange.

Gravity Torque Equation	Parameters
 <p>$M = s \cdot G$</p> <p>Center of Gravity</p>	G = Combined weight of all accessories (i.e. PTO, pump, fittings, etc.)
	M = Gravity torque
	s = Distance between the center of gravity of all accessories (i.e. PTO, pump, fittings, etc.) and the flange mounting face

PTO Driveshaft Angle – The PTO driveshaft angle must not exceed 7 degrees at the transmission.

Overview – ZF-AS Tronic/ZF-FreedomLine™ Transmissions

FreedomLine™ transmissions are designed to operate in automatic or manual mode through a two-pedal driving system (brake and accelerator). Clutch actuation and transmission shifts are pneumatically powered and electronically controlled using a TCU (ZMTEC). PTO installers must ensure that PTOs are integrated in a manner that permits proper transmission control of PTO engagement and PTO disengagement. FreedomLine™ transmissions are designed to communicate transmission – PTO activity to drivers via the transmission display in the vehicle.

CAUTION: To prevent damage to components, PTO interface with FreedomLine™ transmissions must be in accordance with PTO manufacturer guidelines. Any attempt to bypass transmission-control may result in damage to FreedomLine™ transmissions.

! All capscrews and studs are to be assembled using a medium-strength, thread locking product (such as Loctite® 243) to prevent loosening due to vibration. See directions on product. Tighten all assembly hardware to the torque values shown in this manual.

! **Mandatory action needed.**

PTO Installation – 524 Series

ZF-AS Tronic/ZF-FreedomLine™ Transmissions

1. Installation of the 524 Series on the AS Tronic & Freedomline™ transmissions is the same as the standard installation instructions found on page 4 except for the following.

AS Tronic & FreedomLine™

2. The 524 must be positioned as shown in **Fig. 6**. This will allow for proper lubrication of the PTO. **The oil feed port on the transmission and the PTO oil feed port must line up for proper operation.** Also there may be a transmission end yoke swing diameter clearance issue if not mounted in this position.

IMPORTANT: Failure to remove plug will result in premature PTO failure.

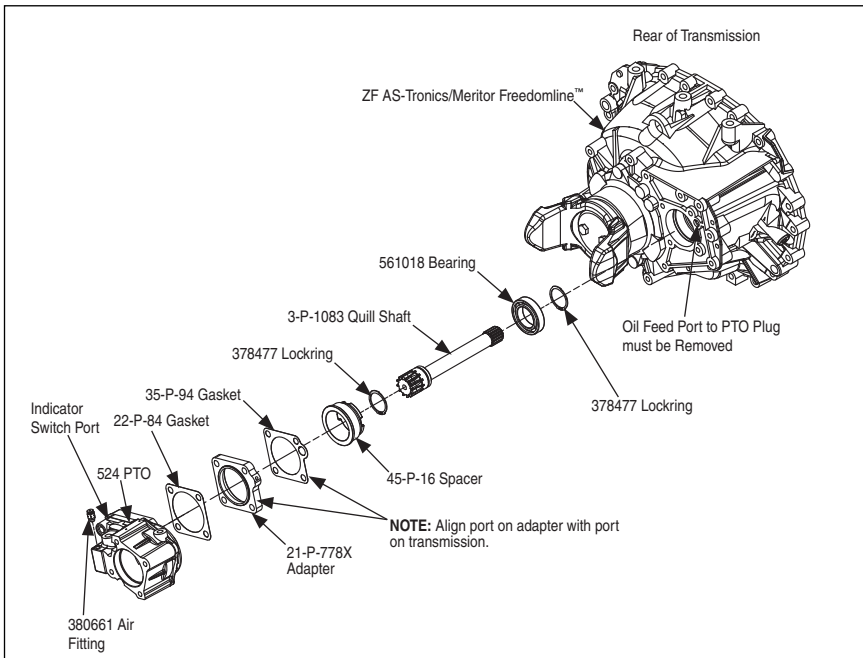


Figure 6

PTO Installation – 524 Series (Continued)

FreedomLine™

3. For installation of the 524 Series on the ZF Meritor Freedomline™ transmissions a wiring harness must be used to connect the transmission control to the PTO.
4. Connect Chelsea wiring harness 75-P-9 to the ZF Meritor PTO harness connector. (**Fig. 7**)
5. For complete FreedomLine™ wiring installation see page 9.

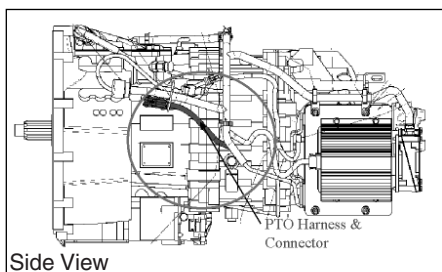
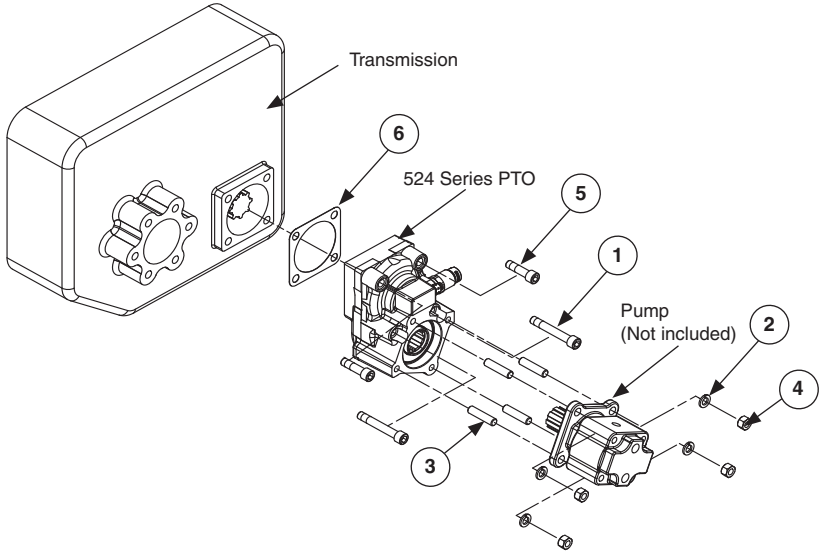


Figure 7

Input AH w/ XY Output DIN 5462 524 Series

Transmissions: See chart below.

NOTE: PTOs require supplementary cooling from the transmission cooling line. The lubrication hose must be supplied between the transmission oil cooler return line and the PTO.



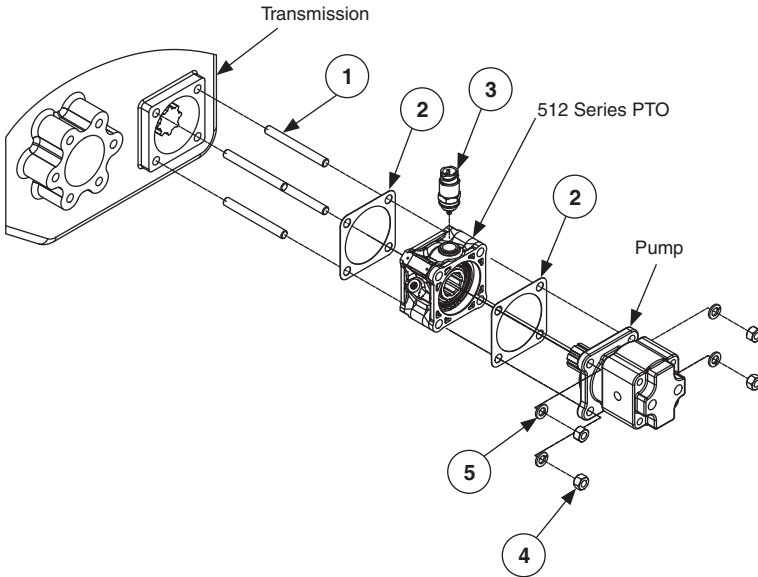
Transmission	Kit Designator	PTO 524
ZF S6-65/66/70/75/80/90	AH	(45 MM-SPLINE)
ZF 6S-800	AH	
ZF 6S-1000	AH	
ZF 6S-1200	AH	

Item	Part Number	Description	Torque	
1	330012X	M12-1.75 (Long) Capscrew	60 lb-ft	[80 Nm]
2	330041X	M12 Lockwasher		
3		M12-1.75 x 50 mm Stud	15 lb-ft	[20 Nm]
4		M12-1.75 Nut		
5	330012X	M12-1.75 (Short) Capscrew	60 lb-ft	[80 Nm]
6	22-P-84	Gasket		

General Installation 512 Series

Transmissions: See chart below.

NOTE: Only Chelsea PTO 329861-15X can be used with direct mounted pumps.



Transmission	Kit Designator	PTO 524
ZF S6-65/66/70/75/80/90	AH	(45 MM-SPLINE)
ZF 6S-800	AH	
ZF 6S-1000	AH	
ZF 6S-1200	AH	

Item	Part Number	Description	Torque	
1		M12 Stud	16-24 lb-ft	[22-32 Nm]
2		Gasket		
3		Indicator Switch		
4		M12 Hex Nut	59-66 lb-ft	[80-90 Nm]
5		M12 Lockwasher		

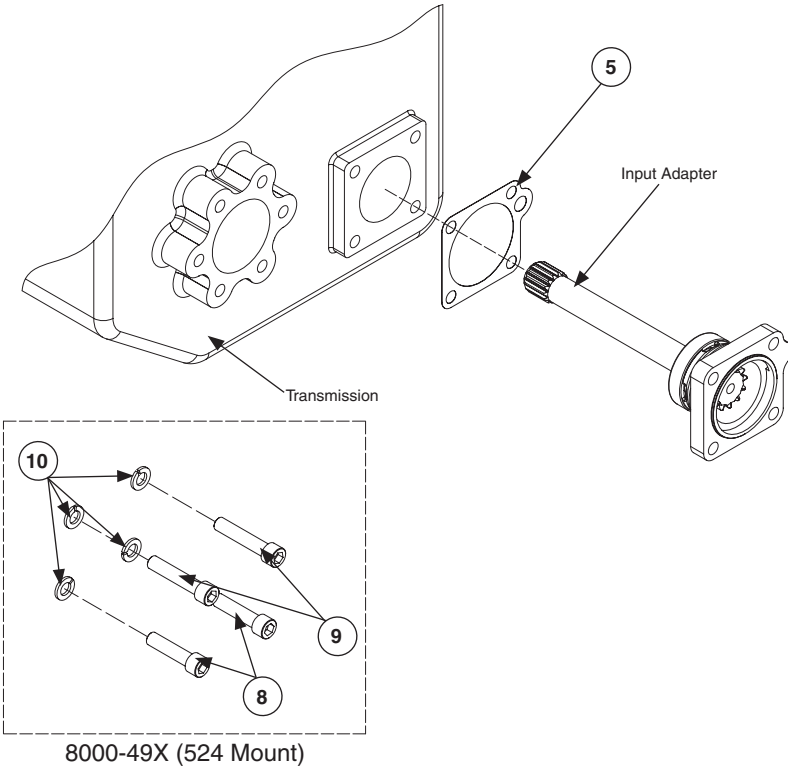
329993X – Input Adapter Kit 524 Series

Transmissions:

12AS-2301, 12AS1930TO, 12AS2130TO, 12AS2330TO, 12AS2530TO,
12AS-2301, 12AS1630TD, 12AS1930TD, 12AS2130TD, 12AS2330TD,
12AS2530TD, 16AS-2601, 16AS2630TO, 16AS-2601, 16AS2230TD

Kit Designator: AC

NOTE: PTOs require interface coupling with a 45 mm - 12 Tooth Spline for this application.



Item	Part Number	Description	Torque	
5	35-P-94	Gasket		
8		M12-1.75 x 130 mm Capscrew	59-66 lb-ft	[80-90 Nm]
9		M12-1.75 x 110 mm Capscrew	59-66 lb-ft	[80-90 Nm]
10		M12 Lockwasher	59-66 lb-ft	[80-90 Nm]

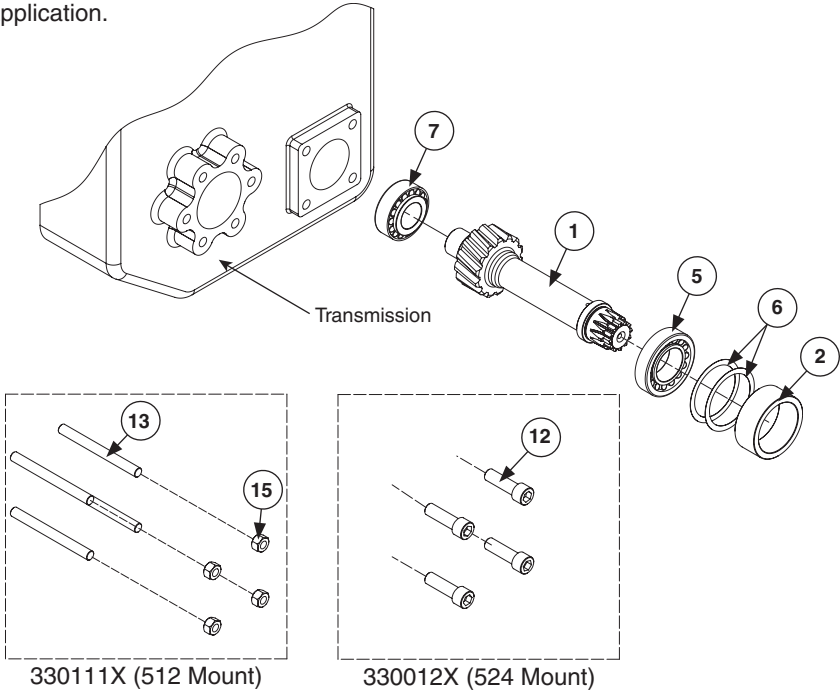
329997X – Input Adapter Kit 512/524 Series

Transmissions:

9S-1110TO (9.48-0.75), 9S-1310TO (9.48-0.75)

Kit Designator: AQ

NOTE: PTOs require interface coupling with a 45 mm - 12 Tooth Spline for this application.



Item	Part Number	Description	Torque	
1	329997X	Shaft Quill ZF9S-1110		
2		Spacer		
5		Bearing - Tapered Cone		
6		Shim (0.2 mm) Shim (0.3 mm) Shim (0.5 mm)		
7		Bearing - Tapered Cone		
12	330012X	M12-1.75 x 114 mm Lg Capscrew M12-1.75 x 90 mm Lg Capscrew M12 Lockwasher	59-66 lb-ft	[80-90 Nm]
13	330111X	M12-1.75 x 118 mm Lg Stud	16-24 lb-ft	[22-32 Nm]
15		M12-1.75 Locknut M12 Hex Nut	59-66 lb-ft	[80-90 Nm]

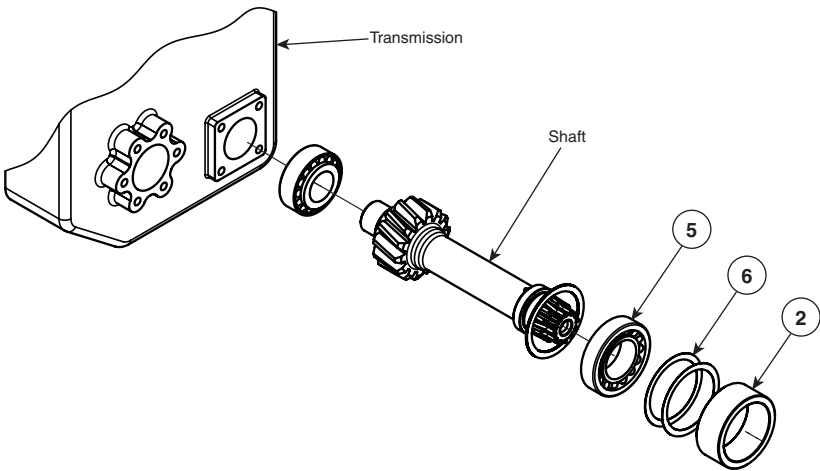
329997X – Input Adapter Kit 512/524 Series (Continued)

For Axial Play

It is very important to check the axial end play in the shaft assembly after completion of assembly. The axial end play should be .002"-.004" (0.05 mm-0.10 mm).

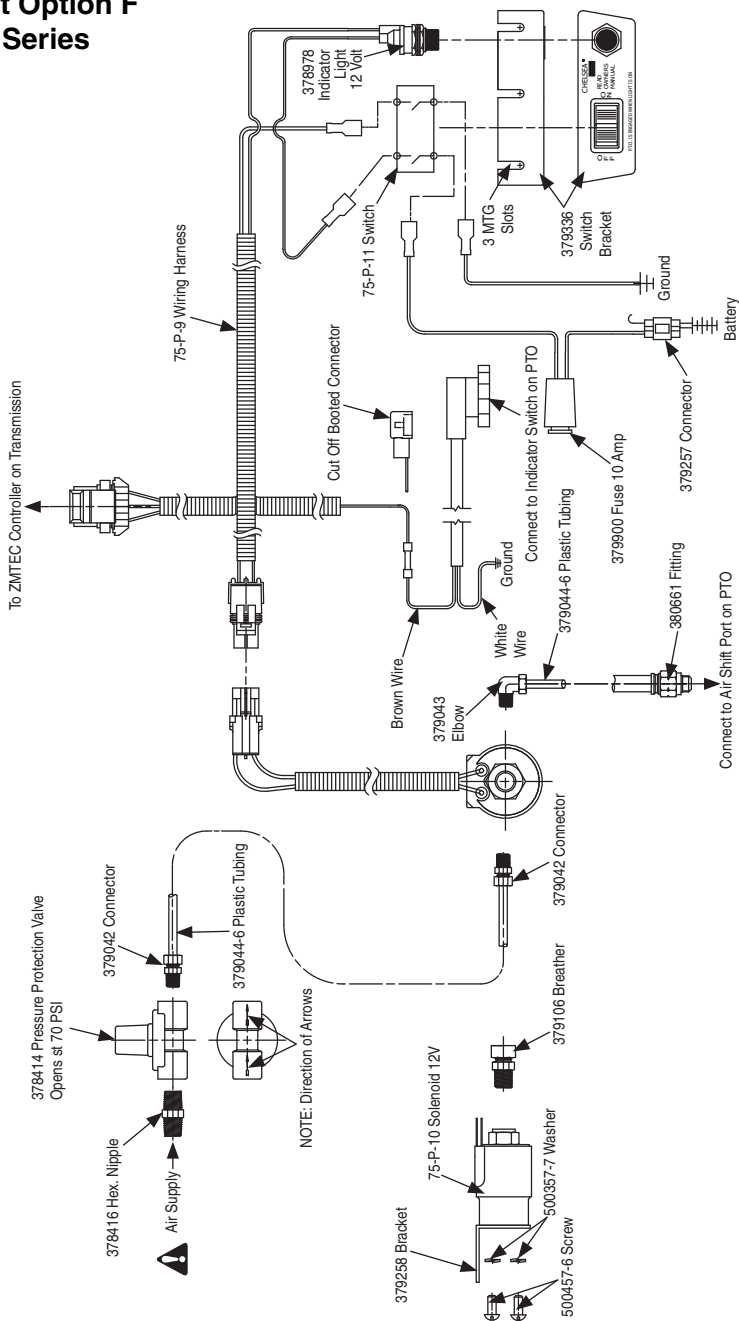
Setting the Axial End Play:

1. Assemble the complete shaft assembly in the transmission. Lightly push the external bearing cup against the inside of the bearing and check that the shaft does not have any end play but can be rotated manually.
2. Place shims (Item #6) between the bearing (Item #5) and the spacer (Item #2) combining the various thicknesses until the spacer is inside the transmission mounting surface by .002"-.004" (0.05 mm-0.10 mm). This will be the axial end play defined for the taper roller bearings.



Item	Part Number	Description	Torque
2	329997X	Spacer	
5		Bearing - Tapered Cone	
6		Shim (0.2 mm)	
		Shim (0.3 mm)	
	Shim (0.5 mm)		

Installation Kit: 328388-82X (12V)



WARNING: Connect directly to air supply. Do not use tubing between air supply and pressure protection valve.

Due to the normal and sometime severe torsional vibrations that Power Take-Off units experience, operators should follow a set maintenance schedule for inspections. Failure to service loose bolts or Power Take-Off leaks could result in potential auxiliary Power Take-Off or transmission damage.

Periodic PTO MAINTENANCE is required by the owner/operator to ensure proper, safe, and trouble-free operation.

Daily: Check all air, hydraulic and working mechanisms before operating PTO Perform maintenance as required.

Monthly: Inspect for possible leaks and tighten all air, hydraulic, and mounting hardware, if necessary. Torque all bolts, nuts, etc. to Chelsea specifications. Ensure that splines are properly lubricated, if applicable. Perform maintenance as required.

With regards to the direct mounted pump splines, the PTO requires the application of a specially formulated anti-fretting, high pressure, high temperature grease. The addition of the grease has been proven to reduce the effects of the torsional vibrations, which result in fretting corrosion on the PTO internal splines as well as the pump external splines. Fretting corrosion appears as a “rusting and wearing” of the pump shaft splines. Severe duty applications, which require long PTO running times and high torque may require more frequent regreasing. Applications such as Utility Trucks that run continuously and are lightly loaded also require frequent regreasing due to the sheer hours of running time. It is important to note that service intervals will vary for each and every application and are the responsibility of the end user of the product. Chelsea also recommends that you consult your pump owners manuals and technical services for their maintenance guidelines. Fretting corrosion is caused by many factors and without proper maintenance, the anti-fretting grease can only reduce its effects on components.

Chelsea offers the grease to our customers in two packages. The first is a 5/8 fluid ounce tube (379688), which is included with every applicable PTO, and the second is a 14-ounce grease cartridge (379831).

Warranty: Failure to comply entirely with the provisions set forth in the appropriate Owner's Manual will result in voiding of ALL Warranty consideration.

This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings on the page.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no text or other markings on the paper.

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Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

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11. Security Interest. To secure payment of all sums due from Buyer, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect Seller's security interest.

12. User Responsibility. Buyer, through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and any technical information provided with the Quote or the Products, such as Seller's instructions, guides and specifications. If Seller provides options of or for Products based upon data or specifications provided by Buyer, Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and

reasonably foreseeable uses of the Products. In the event Buyer is not the end-user of the Products, Buyer will ensure such end-user complies with this paragraph.

13. Use of Products, Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. If Buyer uses or resells the Products in any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of Buyer's Property; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms, including any legal or administrative proceedings, collection efforts, or other actions arising from or relating to such failure to comply. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

14. Cancellations and Changes. Buyer may not cancel or modify, including but not limited to movement

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Offer of Sale Continued

of delivery dates for the Products, any order for any reason except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

15. Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

16. Force Majeure. Seller is not liable for delay or failure to perform any of its obligations by reason of any events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, cyber related disruptions, cyber-attacks, ransomware sabotage, delays or failures in delivery from carriers or suppliers, shortages of materials, sudden increases in the price of raw material or components, shutdowns or slowdowns affecting the supply of raw materials or components, or the transportation thereof, oil shortages or oil price increases, energy crisis, energy or fuel interruption, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, embargoes, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by an event of force majeure shall be tolled for the duration of such event of force majeure and rescheduled for mutually agreed dates as soon as practicable after the event of force majeure ceases to exist. The right to allocate capacity is in

the Seller's sole discretion. An event of force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or subcontractors. An event of force majeure in the meaning of these Terms means any circumstances beyond Seller's control that permanently or temporarily hinders performance, even where that circumstance was already foreseen. Buyer shall not be entitled to cancel any orders following its claim of an event of force majeure.

17. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

18. Duration. Unless otherwise stated in the Quote, any agreement governed by or arising from these Terms shall: (a) be for an initial duration of one (1) year; and (b) shall automatically renew for successive one-year terms unless terminated by Buyer with at least 180-days written notice to Seller or if Seller terminates the agreement pursuant to Section 19 of these Terms

19. Termination. Seller may, without liability to Buyer, terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an

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WARNING: This product can expose you to chemicals including Lead and Lead Compounds, and Di (2-ethylhexyl) phthalate (DEHP) which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Offer of Sale Continued

assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets

20. Ownership of Rights. Buyer agrees that (a) Seller (and/or its affiliates) owns or is the valid licensee of Seller's IP and (b) the furnishing of information, related documents or other materials by Seller to Buyer does not grant or transfer any ownership interest or license in or to Seller's IP to Buyer, unless expressly agreed in writing. Without limiting the foregoing, Seller retains ownership of all Software supplied to Buyer. In no event shall Buyer obtain any greater right in and to the Software than a right in a license limited to the use thereof and subject to compliance with any other terms provided with the Software. Buyer further agrees that it will not, directly or through intermediaries, reverse engineer, decompile, or disassemble any Software (including firmware) comprising or contained within a Product, except and only to the extent that such activity may be expressly permitted, either by applicable law or, in the case of open source software, the applicable open source license.

21. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any Intellectual Property Rights except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third-party claim that one or more of the Products infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all

negotiations for settlement or compromise. If one or more Products is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer (including Seller's use of Buyer's Property); or (ii) directed to any Products for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

22. Governing Law. These Terms, the terms of any Quote, and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

23. Entire Agreement. These Terms, along with the terms set forth in the Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the Quote and these Terms, the terms set forth in the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect.

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Offer of Sale Continued

No modification to these Terms will be binding on Seller unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence, 'clickwrap' or other purported electronic assent to different or additional terms. Sections 2-25 of these Terms shall survive termination or cancellation of any agreement governed by or arising from these Terms.

24. No 'Wrap' Agreements/No Authority to Bind. Seller's clicking any buttons or any similar action, such as clicking "I Agree" or "Confirm," to utilize Buyer's software or webpage for the placement of orders, is NOT an agreement to Buyer's Terms and Conditions. **NO EMPLOYEE, AGENT OR REPRESENTATIVE OF SELLER HAS THE AUTHORITY TO BIND SELLER BY THE ACT OF CLICKING ANY BUTTON OR SIMILAR ACTION ON BUYER'S WEBSITE OR PORTAL.**

25. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations

promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer represents that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Law.

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