

IL2505



Read through the safety information and overhaul instructions carefully before installing your Waterous CX Series Fire Pump.

NOTE: Instructions subject to change without notice

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Safety Information



Read through and communicate safety information to the end user of this Waterous Fire Pump.



WARNING

Death or serious personal injury might occur if proper operating procedures are not followed. The pump operator, as well as individuals connecting supply or discharge hoses to the apparatus must be familiar with these pump operating instructions as well as other operating instructions and manuals for the apparatus, water hydraulics and component limitation.



WARNING

Pressure Hazard. May result in personal injury.

Prior to connection or removal of hoses, caps or other closures with pump intake or pump discharge connections, relieve pressure by opening drains or bleeder valves. Bleeder valves should also be used while filling a hose connected to an intake with water.



WARNING

Scalding Water Hazard. May result in serious burns.

When operating the pump, be sure to open at least one discharge valve slightly to prevent the pump from overheating. If the pump runs for a few minutes completely closed, it may heat the water enough to scald someone when the valve is opened. Overheating can damage the packing, seals and other pump parts. If the apparatus builder has installed a by-pass system or other provision designed to prevent overheating, opening a discharge valve may be unnecessary.



WARNING

Rotating Parts Hazard or Unexpected Truck Movement. May result in serious personal injury or death.

Stop the engine, set parking brake and chock the wheels before going under the truck to adjust packing or to check packing gland temperature.

OEM Installation Warnings



WARNING

Unexpected Truck Movement. May result in serious personal injury or death.

Failure to properly install the pump shift control and pump shift indicator system in the apparatus or failure to incorporate in the Pump Operator's Panel Engine Speed Interlock System may result in unexpected truck movement which may result in serious personal injury or death.



WARNING

Inability to Pump Water. May result in serious personal injury or death.

Failure to properly install the pump shift control and pump shift indicator system in the apparatus or failure to incorporate in the Pump Operator's Panel Engine Speed Interlock System may result in the inability to pump water which may result in serious personal injury or death.



WARNING

Exceeding Power Train Torque Ratings. May result in inability to pump water causing serious personal injury or death.

This fire pump may have the capability under certain pumping conditions to exceed the torque rating of the power train.

A means to control the engine output to a torque level no greater than the power train's continuous-duty torque rating must be considered when specifying power train components and engine control system parameters.

Introduction

This instruction covers the installation of a Waterous CX Series single stage fire pumps. Four different CX models are available as follows:

Model	Intake	Discharge
CXS	6 in. Victaulic® Tee with a Front Facing 5 in. Victaulic® Connection	4 in. ANSI Flange or Manifold with 4 in. End Flanges and Eight (8) 2-1/2 in., 4-Bolt Side Pads or Manifold with 3-1/2 in. End Flanged and two (2) 2-1/2 in. 4-Bolt and two (2) 2-1/2 NPT Side Pads
CXV	6 in. Victaulic®	

(See the next page for diagrams of pumps)

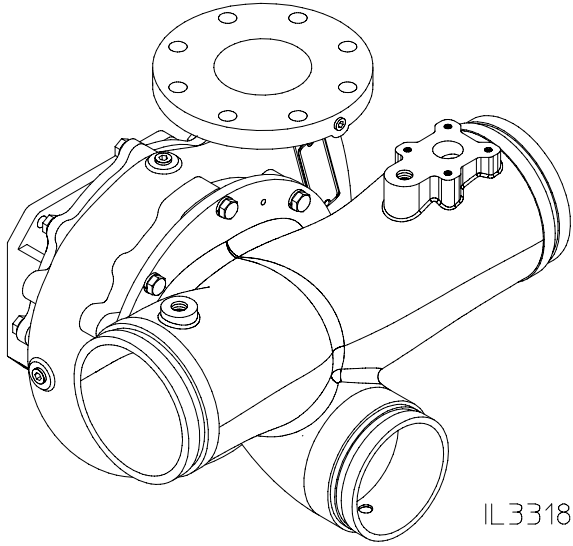
The CX pump is available with the following transmissions:

- **C20 Series:** The C20 transmission is an aluminum, split-shaft, chain driven transmission that transmits power from the truck's transmission to either the fire pump or the drive axle of the truck.
- **K Series:** The K transmission is an iron, two-gear speed increaser designed primarily to be driven by a power take-off (PTO) or power divider.
- **PA Series:** The PA transmission an aluminum chain drive transmission designed to be driven off the ten-bolt power take-off (PTO) provision available on the left side of the Allison MD or HD automatic transmission.
- **T Series:** The T transmission is an iron, two-gear speed increaser designed to be mounted directly to an engine bell housing.
- **D Series:** Direct drive from a power take-off (PTO).

The following installation instructions are available:

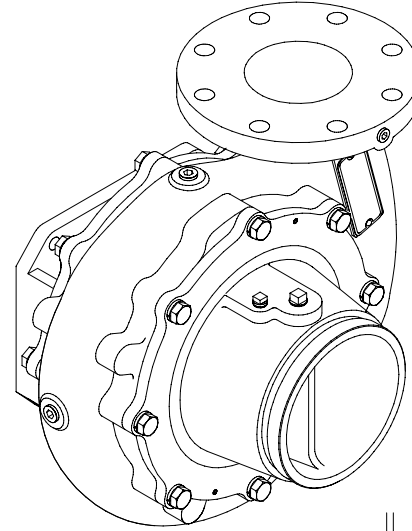
Instruction Name	Instruction Number	
Monarch™ Intake Valve (BFV)	F-1031, Section 2318	
Drain Valves	F-1031, Section 3008	
Pressure Control System	F-1031, Section 3010	
Overheat Protection Manager (OPM)	F-1031, Section 3015	
Foam Manager™ Systems	FoamPro® System	F-1031, Section 3012
	Advantus® System	F-1031, Section 3026
	Aquis™ System	F-1031, Section 3031
Eclipse™ ES CAFSystem	F-1031, Section 3018	
Priming Systems	F-1031, Section 3023	
Shift Unit	F-1031, Section 3030	

CXS Models



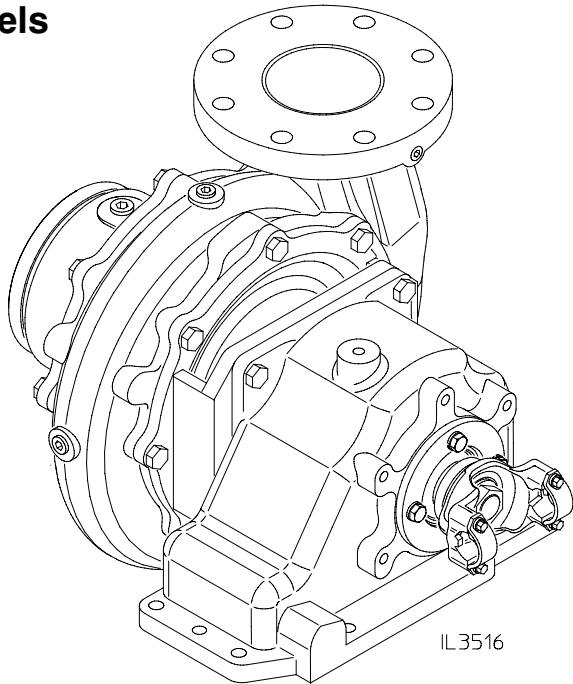
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CXV Models



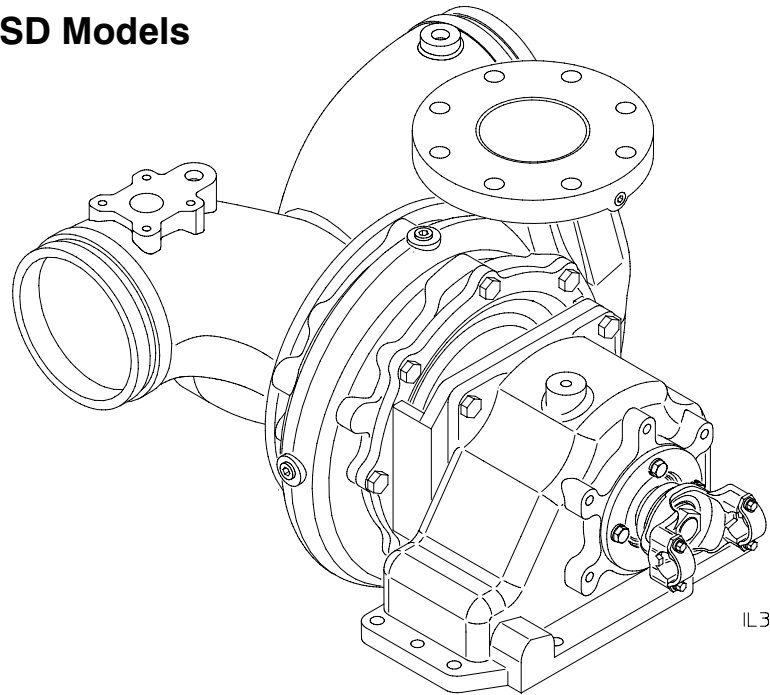
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CXD Models



IL3516

CXSD Models



IL3448

Pump Mounting with C20 Series Transmission

NOTE: Remove shipping brackets and discard. Do not use for mounting pump.

Select a mounting location which will make the pump and its accessories readily accessible for maintenance and which will make the pump driveshaft parallel with the output shaft of the chassis transmission or bearing housing. Also, select the location so that when the apparatus is loaded, the universal joints on the propeller shaft will have a proper working angle. Note that the C20 Series transmission is available with a range of drop sizes (see Table 1 and Figure 1, Dimension "A").

Table 1. C20 Series Transmission Drop Ranges

Table 1. C20 Series Transmission Drop Ranges	
Model	Dim A. (IN/mm)
C20C	13.811 / 350.80
C20D	14.856 / 377.34
C20E	16.920 / 429.77
C20F	18.972 / 481.99

***NOTE:** 2.27 ratio drop values shown. Drop values vary for other output ratios, see dimensional drawings for specific drops by ratio.

Table 2 gives maximum universal joint angles for installations where propeller shaft flanges are parallel and yokes are aligned. Refer to this table when positioning a pump to determine proper shaft angles. Be sure to keep at least a minimum of 1° U-joint operating angle, but do not exceed those specified in the table. This is the preferred method of propeller shaft installation. For additional information on this method, or for alternative methods, see driveshaft installation guidelines such as Spicer®/Driveshaft Installation Techniques.

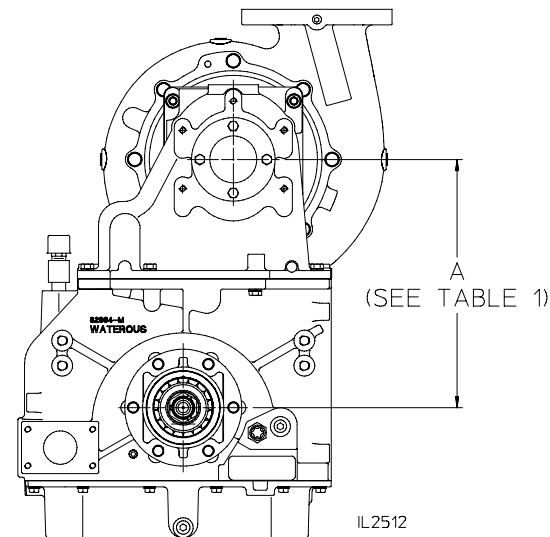
CAUTION

Be sure the propeller shafts used are of the slip-joint design. Frame deflection, temperature changes and similar factors may cause a propeller shaft without slip-joints to produce severe axial loads on the bearings and damage the pump / transmission.

Table 2. Maximum U-joint Operating Angles

Driveshaft RPM	Maximum Operating Angle
5000	3.2°
4500	3.7°
4000	4.2°
3500	5.0°
3000	5.8°
2500	7.0°
2000	8.7°
1500	11.5°

Figure 1. Drop Size Dimensions



Figures 2 and 3 show the mounting areas on an CXC20 pump. To mount the pump/transmission to the vehicle chassis, attach brackets (not supplied by Waterous) on either side of the transmission. Position the pump/transmission within the vehicle frame rails, blocking temporarily to provide correct shaft angularity. With the pump/transmission in the correct position, secure the brackets (not supplied) to the vehicle frame using a three point mounting technique. The bracket on one side of the transmission shall use only one bolt when attaching to the rail. The bracket on the other side of the transmission should be attached to the chassis rail using two bolts. This three point technique will allow for slight vehicle frame twist without undo stress on the pump/transmission assembly.

The transmission cap also contains five (5) mounting holes for further support of the CXC20.

Support the pump by fashioning a bracket (not supplied by Waterous) and mount it to the the intake side of the pump using the existing intake mounting screw holes.

NOTE: You will need to remove one or more intake mounting screws from the intake side of the pump and replace them with longer screws to compensate for the thickness of the bracket.

NOTE: Tighten the mounting screws to standard torque specifications.

Connect shift unit per installation instruction F-1031, Section 3030.

Pump Mounting with C20 Series Transmission (Continued)

Figure 2. CXVC20 Dimensions

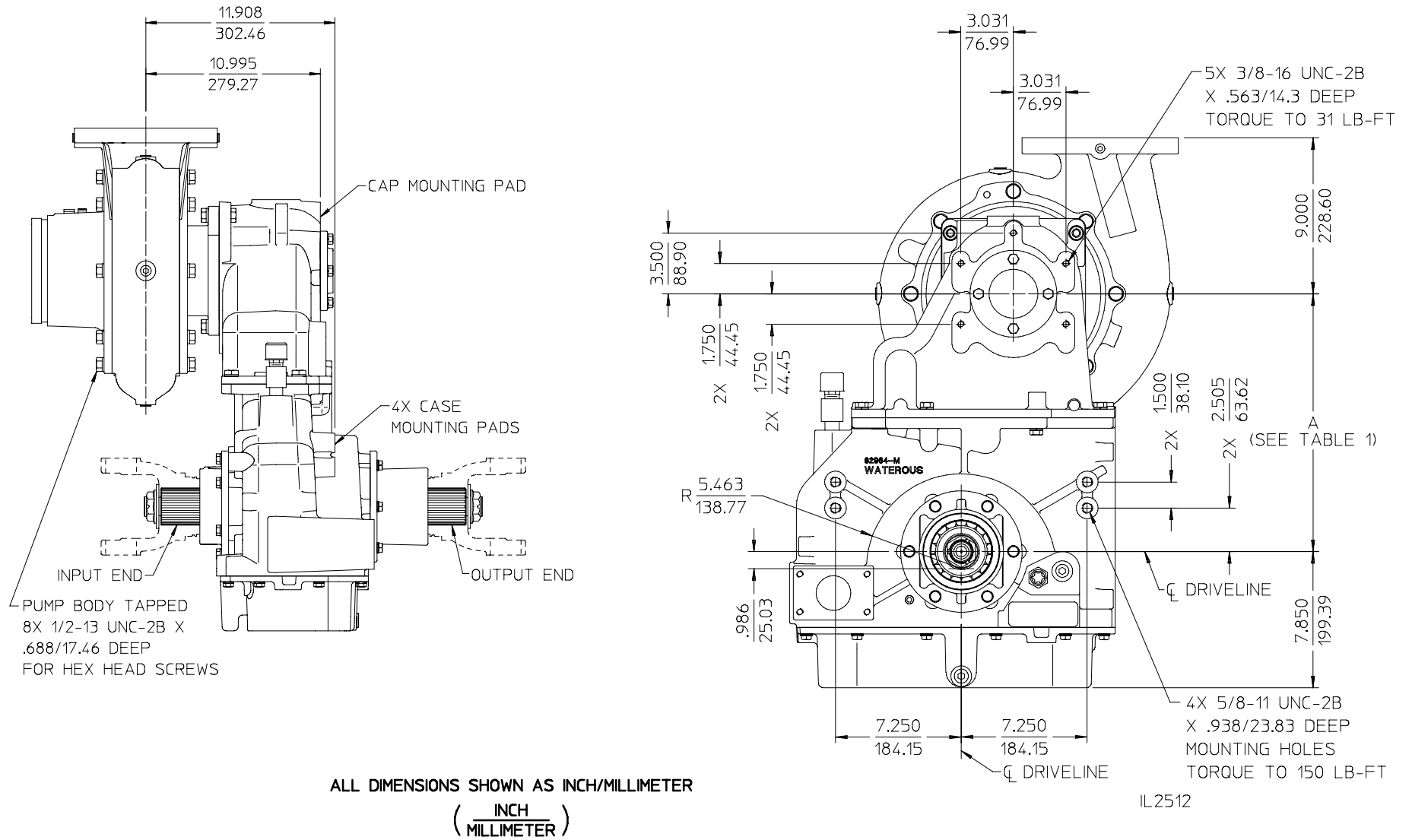
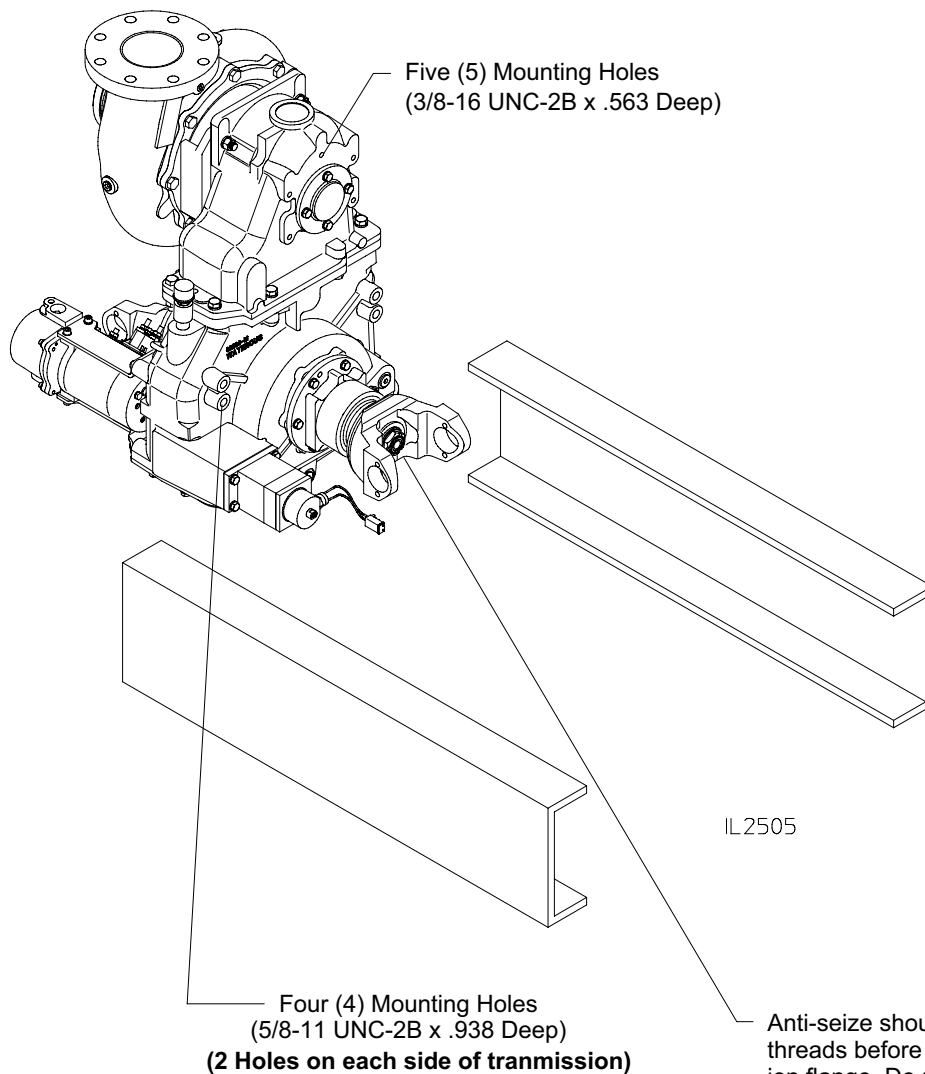


Figure 3. CXVC20 Mounting

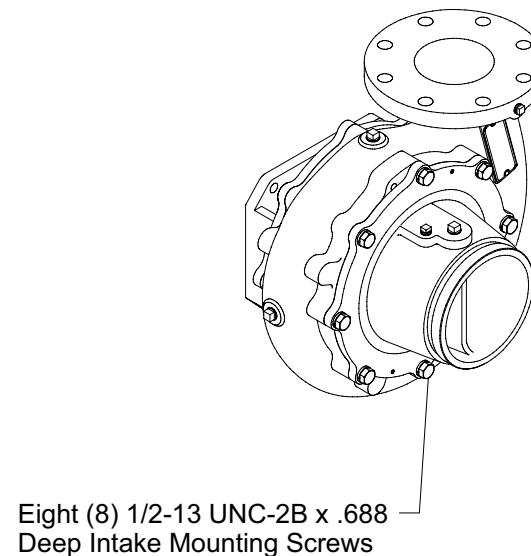
Mounting Holes on Transmission



Mounting Holes on Pump Intake

Remove the screw(s) and install bracket (not supplied by Waterous). Tighten bracket to the intake of the pump using 1/2 in. screw(s).

NOTE: Use longer 1/2 in. screws to secure the bracket to the pump than were originally supplied with the pump to compensate for the thickness of the bracket.



Anti-seize should be applied to the shaft threads before installing end yoke or companion flange. Do not reuse self-locking nuts, Torque to 475-525 lb-ft.

Tachometer

Electronic Tachometer Drive

(Optional on C20 Series, Standard on PA Series Transmissions)

The magnetic pick-up in the transmission mates with an Amphenol connector (P/N MS3106A-10SL-4S). This connector should be wired to a wall mount receptacle on the operator's panel. Cable assembly 63033 available from Waterous.

C20 Series Transmission:

To verify the rotational speed of the drive shaft, the frequency (Hz) reading from the tachometer sensor should be multiplied by 10.

$$\text{Hz} \times 10 = \text{RPM}$$

PA Series Transmission:

To verify the rotational speed of the drive shaft, the frequency (Hz) reading from the tachometer sensor should be multiplied by 6.

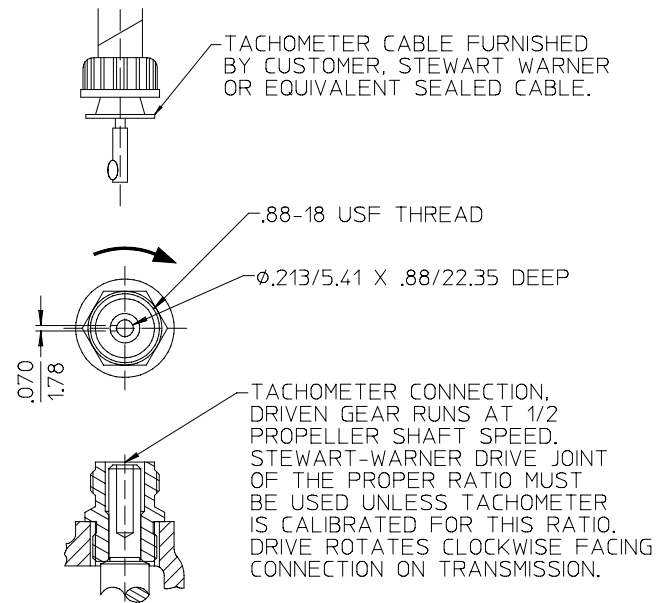
$$\text{Hz} \times 6 = \text{RPM}$$

NOTE: Frequency reading can be measured with hand held multimeter. Cable connector assembly V 3398 available for connecting wall mount receptacle to multimeter.

Mechanical Tachometer Drive

(Optional on K and T Transmissions Only)

Install a cable from the tachometer take-off on the driveshaft (front housing of the transmission).



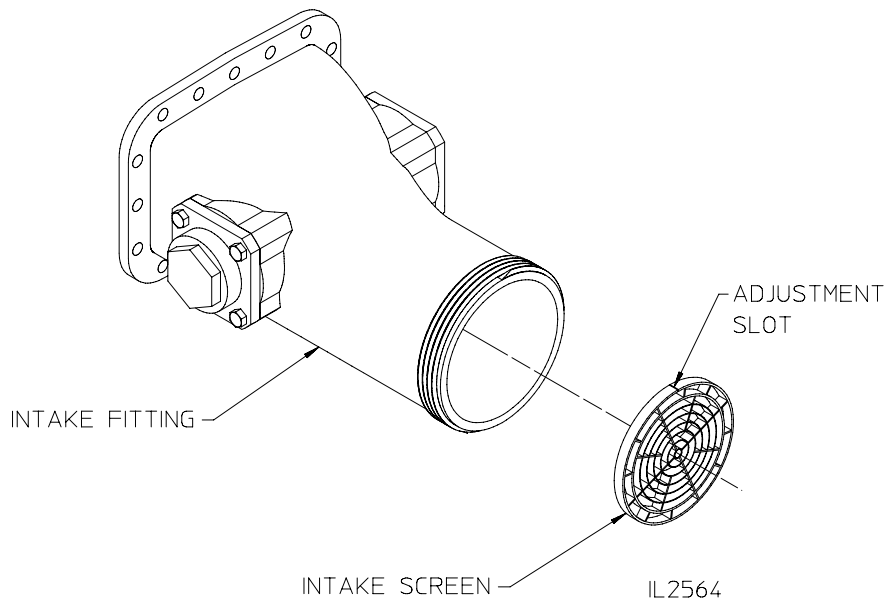
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Optional Corrosion Protection

Zinc Intake Screens

Waterous offers zinc intake screens that fit 4, 4-1/2, 5 and 6 inch intake fittings sizes. The screen is designed to fit in the counter bore in the inside diameter of the fittings. There must be a strong electrical contact between the screen and the intake fitting. Remove any corrosion, debris or paint from the counter bore that will insulate the screen from the intake fitting. If the screen does not fit tightly, adjust the gap of the slot on the outside diameter of the screen to ensure a tight fit.

NOTE: Zinc intake screens are die-cast which results in a slight taper from one side to the other. Install the screen with the thinner cross-section facing out to minimize flow restriction.



Zinc Anodes

Zinc anodes may be mounted in the intake piping or, if no intake pads are available, in the discharge piping.

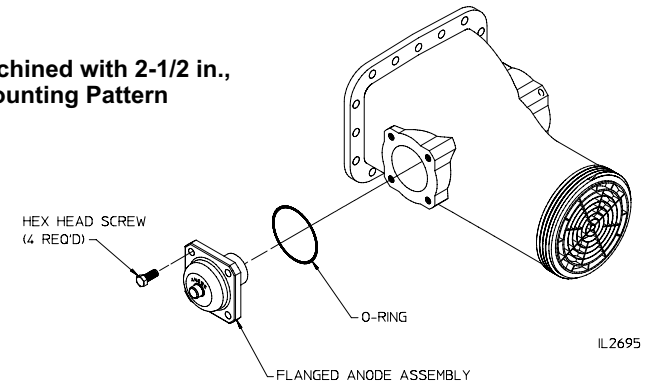
NOTE: The zinc must make contact with water to be effective. Do not paint or use any other coating on the zinc elements.

Zinc anodes are available for the following:

- Pads machined with 2-1/2 in., 4-bolt mounting patterns
- Pads machined with 2-1/2 in. or 3 in. NPT taps.

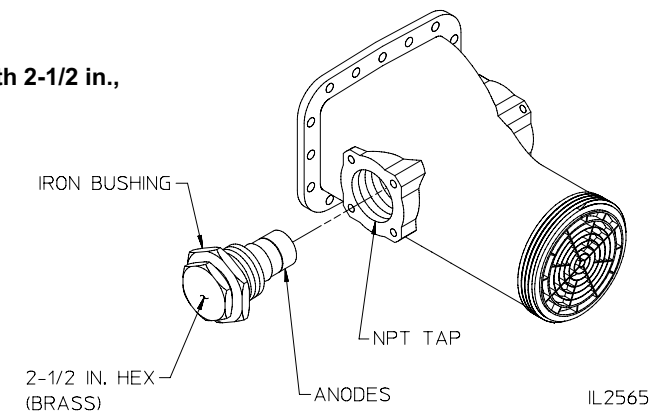
Zinc Anodes - Bolt On

Pads Machined with 2-1/2 in., 4-bolt Mounting Pattern



Zinc Anodes - Threaded

Pads Machined with 2-1/2 in., or 3 in. NPT Taps



Final Checks

After the pump, accessories, piping and miscellaneous connections are completely installed, check the items listed below:

Lubrication

CAUTION

Failure to properly lubricate the pump and transmission may result in serious damage to the equipment.

C20 Series Transmission

Add any type of automatic transmission fluid (ATF) through the fluid level hole or by removing the breather. Approximately 6 quarts is required to fill the transmission when completely drained. The fluid should be level with bottom of the fluid level hole.

K Series Transmission

Add any type of SAE 80W-90 gear oil through the fluid level hole or by removing the breather. Approximately 1 quart is required to fill the transmission when completely drained. The fluid should be level with bottom of the fluid level hole.

PA Series Transmission

Add any type of automatic transmission fluid (ATF) through the fluid level hole or by removing the breather. Approximately 3 quarts is required to fill the transmission when completely drained. The fluid should be level with bottom of the fluid level hole.

T Series Transmission

Add any type of SAE 80W-90 gear oil through the fluid level hole or by removing the breather. Approximately 1 quart is required to fill the transmission when completely drained. The fluid should be level with bottom of the fluid level hole.

D Series Direct Drive

Drive housing contains sealed ball bearings. Lubrication is not required.

Testing

Perform the tests listed in F-1031, Section 1000, "*Centrifugal Fire Pump Principles of Operation, Inspection Tests and Troubleshooting Guide.*" During the running tests, monitor the smoothness of operation, listen for unusual noises and check for leaks.

C20 Transmission Temperature Specifications

The maximum temperature permitted at transmission external surfaces is 250° F (121° C)