

## **Volvo Engine or PTO/Pump Speed Calculator**

### **How to Use**


**Tool Purpose:** The purpose of this tool is to confirm the match of proprietary Volvo PTO and pump products to an I-Shift transmission.

**Prepare:** Before interacting with this tool, you will need to gather some information from your customer. Your customer or body builder will typically know what engine speed, or pump speed they want to maintain and how many gallons per minute (GPM) of hydraulic pump output they need to support. Here is the information you need to collect to begin:


1. What is your customer's application i.e. dump body, bulk hauling, etc.? Consider the following questions about the application the truck will be working in. The answers to the following questions will narrow your PTO product search.
2. Will the truck need to be able to move at road speed while working in the application, i.e. snow plow, street sweeper, etc.? You will need a clutch-independent REPTO (Rear Engine mounted PTO) or FEPTO (Front engine mounted PTO).
3. Will the truck need to be able to move, but at a very slow speed (6 mph or less), while working in the application, i.e. dump, paving, roll-off, etc.? A clutch-dependent PTO, which will be mounted to the I-Shift, will work to serve these applications.
4. Will the truck need to be stationary, and not move at all, while working in the application, i.e. bucket trucks, cranes, etc.? Again, a clutch-dependent PTO, which will be mounted to the I-Shift, will work to serve these applications.

**Example 1:** The customer's application is snow plow/salt spreader. You need a clutch-independent REPTO. The customer's requirement is to pump 30-35 GPM.

1. Scroll down this screen and click on "Click Here for REPTO Information"



### Engine or PTO / Pump Speed Calculator R9.0



Engine Speed  RPM

PTO Ratio  %

Pump / PTO Speed  RPM

} To Calculate PTO / Pump Speed Enter Data in White Boxes

Pump / PTO Speed  RPM

PTO Ratio  %

Engine Speed  RPM


} To Calculate Engine Speed Enter Data in White Boxes

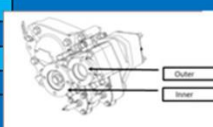
*Speed Ratios for I-Shift Transmission Mounted PTOs*



Power Take-off	ATO2612D / ATO3112D		AT2112D		
	OverDrive		Direct		
	Low / N1	High / N2	Low / N1	High / N2	
<b>Sales Code / Variant</b>					
<i>Single</i>					
T4XAKX	PTR-FL	0.93	1.18	0.73	0.93
T4XDMX	PTR-DM	1.35	1.72	1.06	1.35
<i>Double and Triple</i>					
T4XF1X	PTRD-F Inner	0.77	0.98	0.60	0.77
	PTRD-F Outer	1.65	2.10	1.30	1.65
T4XG1X	PTRD-D Inner	0.77	0.98	0.60	0.77
	PTRD-D Outer	1.65	2.10	1.30	1.65
T4XH1X	PTRD-D1 Inner	0.77	0.98	0.60	0.77
	PTRD-D1 Outer	1.65	2.10	1.30	1.65
T4XJ1X	PTRD-D2 Inner	0.77	0.98	0.60	0.77
	PTRD-D2 Outer	1.65	2.10	1.30	1.65



**New Update**



**AMT - F**



 [<< Click Here for Hydraulic Pump Specifications >>](#) 

 [<< Click Here for Pump Volvo Part Numbers >>](#) 

[<< Click Here for Power Take-Off Information >>](#)

[<< Click Here for Hydraulic Pump Suction Fitting Information >>](#)

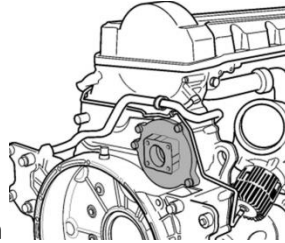
[<< Click Here for REPTO Information >>](#)

[<< Click here for the Volvo I - Shift Transmission Gear Ratios >>](#)

2. What engine is installed in the truck? Reference the table below to see REPTO options that match up with each engine. The customer has a D11 with a DIN mount PTO, the ratio is 1.08% (see Ratio outlined in red in the table below).

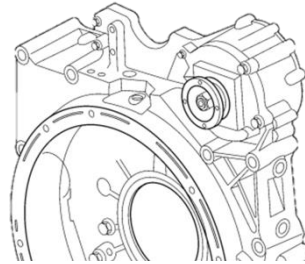
How to read this table:

Engine: Find the engine that is in your customer's truck; D11, D13, or D16 (The D16 is not available in newer models after 2016).



Drive/Ratio: DIN = A direct mount option

DIN mount allows for a direct mount Hydraulic Pump i.e. for snow plow application.



SAE = A flange mount option

SAE Flange allows for remote mount Hydraulic Pump i.e. for cement mixer application.

Sales Code: Used when ordering a truck with the REPTO option.

Part Number: Each component that is included.

Description: A written description that corresponds to each component.

QTY: The quantity of each component that is needed.

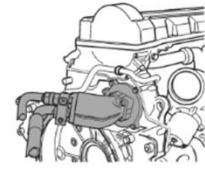
Rotation: Bodybuilders may ask for this information

Max HP: Bodybuilders may ask for this information

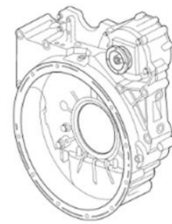
Torque: Bodybuilders may ask for this information

Rear Engine Power Take-Off (REPTO)										
Engine	Drive Type	Part Number	Description	QTY	Rotation	Ratio	Max HP	Torque		
11L	DIN 5642	21909758	REPTO Unit	1	Same as Engine Rotation CCW	1.08	250 HP Maximum	740/480	480/650	148/211
		976068	O-Ring	1						
		984850	Bolt	2						
		984820	Bolt	2						
11L	SAE 1400	21912452	REPTO Unit	1						
		976068	O-Ring	1						
		984850	Bolt	2						
		984820	Bolt	2						
13L	DIN 5642	21912752	REPTO Unit	1						
		976068	O-Ring	1						
		984850	Bolt	2						
		984820	Bolt	2						
13L	SAE 1400	21913220	REPTO Unit	1						
		976068	O-Ring	1						
		984850	Bolt	2						
		984820	Bolt	2						
16L	DIN 5642	21912752	REPTO Unit	1						
		976068	O-Ring	1						
		984850	Bolt	2						
		984820	Bolt	2						
16L	SAE 1400	21913220	REPTO Unit	1						
		976068	O-Ring	1						
		984850	Bolt	2						
		984820	Bolt	2						

Torque "=" lb.ft. / Nm



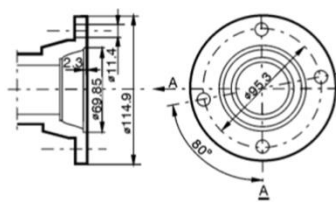
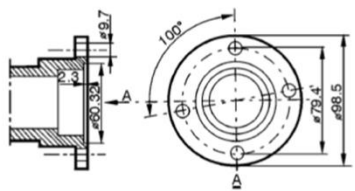
DIN Drive



SAE 1400 Flange

Misc. REPTO Information

Technical Reg.	20538824
Drive Type	Part No.
SAE 1410 Flange	1667973
SAE 1300 Flange	1526019
Square Flange	21264675
100 Flange	20738739



SAE 1400 Flange Dimensions

3. Click on Pump Info to see if there are any pumps that meet the customers' requirement. Do we have any pumps that can pump 30-35 GPM?

Parker Bent Axial Piston Fixed Pump Specifications

Pump	Pump Flow (gpm) at Pump Speed (RPM)								CG
	1000 RPM	1200 RPM	1400 RPM	1600 RPM	1800 RPM	2000 RPM	2200 RPM		
F1-25	6.8	8.1	9.4	10.8	12.2	13.5	14.9	85mm	
F1-41	10.8	12.9	15.1	17.2	19.4	21.6	23.7	85mm	
F1-61	15.7	18.9	22	25.1	28.3	31.4	34.6	85mm	
F1-81	21.6	25.9	30.2	34.5	38.8	43.1		85mm	
F1-101	27	32.4	37.8	43.2	48.5			85mm	
F2-42/42	11.3 / 10.8	13.6 / 13.0	15.9 / 15.2	18.1 / 17.3	20.4 / 19.5	Over Speed	Over Speed	119mm	
F2-53/53	14.3 / 13.7	17.1 / 16.5	20.0 / 19.2	22.9 / 22.0	25.6 / 24.7			119mm	



Pump Model:  Select Pump

Pump Speed:  RPM

Displacement: 4.98 CU.IN./Rev

Pump Flow:  GPM

Select the Pump and enter the Pump Speed above for the GPM

We can see that the F1-81 pump has the potential to offer the GPM that the customer needs. In the calculator box to the right we can select F1-81 from the dropdown menu and manually enter 1700 to see if we can get close to the 35 GPM the customer wants. We find that the F1-81 at 1700 RPM can supply 36.6 GPM. This is very close to the high side of what the customer wants; offer this option.

**Example 2:** The customer's application is a crane truck that hangs/installs billboards. You need a clutch-dependent PTO that will be mounted to the I-Shift. The customer has the ATO2612D transmission with a single output DIN mount PTO. His body builder advised that 1100 RPM is optimal engine speed and the pump needs a flow rate of no more than 40 GPM.

### Engine or PTO / Pump Speed Calculator R9.0

Engine Speed  RPM

PTO Ratio  %

Pump / PTO Speed 0 RPM

To Calculate PTO / Pump Speed Enter Data in White Boxes

Pump / PTO Speed  RPM

PTO Ratio  %

Engine Speed 0 RPM

To Calculate Engine Speed Enter Data in White Boxes

**Speed Ratios for I-Shift Transmission Mounted PTOs**

Power Take-off		ATO2612D / ATO3112D		AT2112D	
		OverDrive		Direct	
Sales Code / Variant		Low / N1	High / N2	Low / N1	High / N2
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T4XAKX	PTR-FL	0.93	1.18	0.73	0.93
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	PTRD-D Outer	1.65	2.10	1.30	1.65
T4XH1X	PTRD-D1 Inner	0.77	0.98	0.60	0.77
	PTRD-D1 Outer	1.65	2.10	1.30	1.65
T4XJ1X	PTRD-D2 Inner	0.77	0.98	0.60	0.77
	PTRD-D2 Outer	1.65	2.10	1.30	1.65

**New Update**

**AMT - F**

1. Click on the Pump Info worksheet to see if we have any pumps that closely meet the 40 GPM requirement. Only the Parker Bent Axial Piston Fixed Pump offers the F1-101 which has GPM close to the requirement, but the RPM of 1400 exceeds the acceptable engine speed of 1100 RPM.

**Parker Bent Axial Piston Fixed Pump Specifications**

Pump	Pump Flow (gpm) at Pump Speed (RPM)								CG
	1000 RPM	1200 RPM	1400 RPM	1600 RPM	1800 RPM	2000 RPM	2200 RPM		
<b>F1-25</b>	6.8	8.1	9.4	10.8	12.2	13.5	14.9	85mm	
<b>F1-41</b>	10.8	12.9	15.1	17.2	19.4	21.6	23.7	85mm	
<b>F1-61</b>	15.7	18.9	22	25.1	28.3	31.4	34.6	85mm	
<b>F1-81</b>	21.6	25.9	30.2	34.5	38.8	43.1		85mm	
<b>F1-101</b>	27	32.4	37.8	43.2	48.5	Over Speed	Over Speed	85mm	
<b>F2-42/42</b>	11.3 / 10.8	13.6 / 13.0	15.9 / 15.2	18.1 / 17.3	20.4 / 19.5	Over Speed	Over Speed	119mm	
<b>F2-53/53</b>	14.3 / 13.7	17.1 / 16.5	20.0 / 19.2	22.9 / 22.0	25.6 / 24.7	Over Speed	Over Speed	119mm	



2. Use the back button to access the main worksheet. This will help us to identify the PTO speed that works at 1100 RPM engine speed. Enter the desired RPM (1100) and the PTO ratio for the DIN mount PTO that our customer is working with. We now know that 1485 RPM is what we need to meet a flow rate of up to 40 MPG.

**Engine or PTO / Pump Speed Calculator R9.0**

Engine Speed: 1100 RPM  
 PTO Ratio: 1.35%  
 Pump / PTO Speed: 1485 RPM

To Calculate PTO / Pump Speed Enter Data in White Boxes

Pump / PTO Speed:   
 PTO Ratio:   
 Engine Speed: 0 RPM

To Calculate Engine Speed Enter Data in White Boxes

Calculate Clear Contents

3. Go back to the Pump Info worksheet to see what flow rate we can expect from the F1-101 pump with 1485 RPM. Using the calculator to the right of the pump table, select F1-101 from the dropdown list and enter 1485 RPM. Click Calculate and the GPM that this offers is 40.1 GPM. But the body builder advised that we don't exceed 40 GPM and the RPM is still higher that requested.

**Parker Bent Axial Piston Fixed Pump Specifications**

Pump	Pump Flow (gpm) at Pump Speed (RPM)							CG
	1000 RPM	1200 RPM	1400 RPM	1600 RPM	1800 RPM	2000 RPM	2200 RPM	
F1-25	6.8	8.1	9.4	10.8	12.2	13.5	14.9	85mm
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F2-42/42	11.3 / 10.8	13.6 / 13.0	15.9 / 15.2	18.1 / 17.3	20.4 / 19.5	Over Speed	Over Speed	119mm
F2-53/53	14.3 / 13.7	17.1 / 16.5	20.0 / 19.2	22.9 / 22.0	25.6 / 24.7			119mm



Pump Model: F1-101 Select Pump  
 Pump Speed: 1485 RPM  
 Displacement: 6.23 CU.IN./Rev  
 Pump Flow: 40.1 GPM

Calculate Reset Fields

Select the Pump and enter the Pump Speed above for the GPM

4. The customer/body builder can decide if they want to consider operating the engine at higher RPM to achieve the flow rate or if they prefer a lower flow rate to bring the engine speed down.