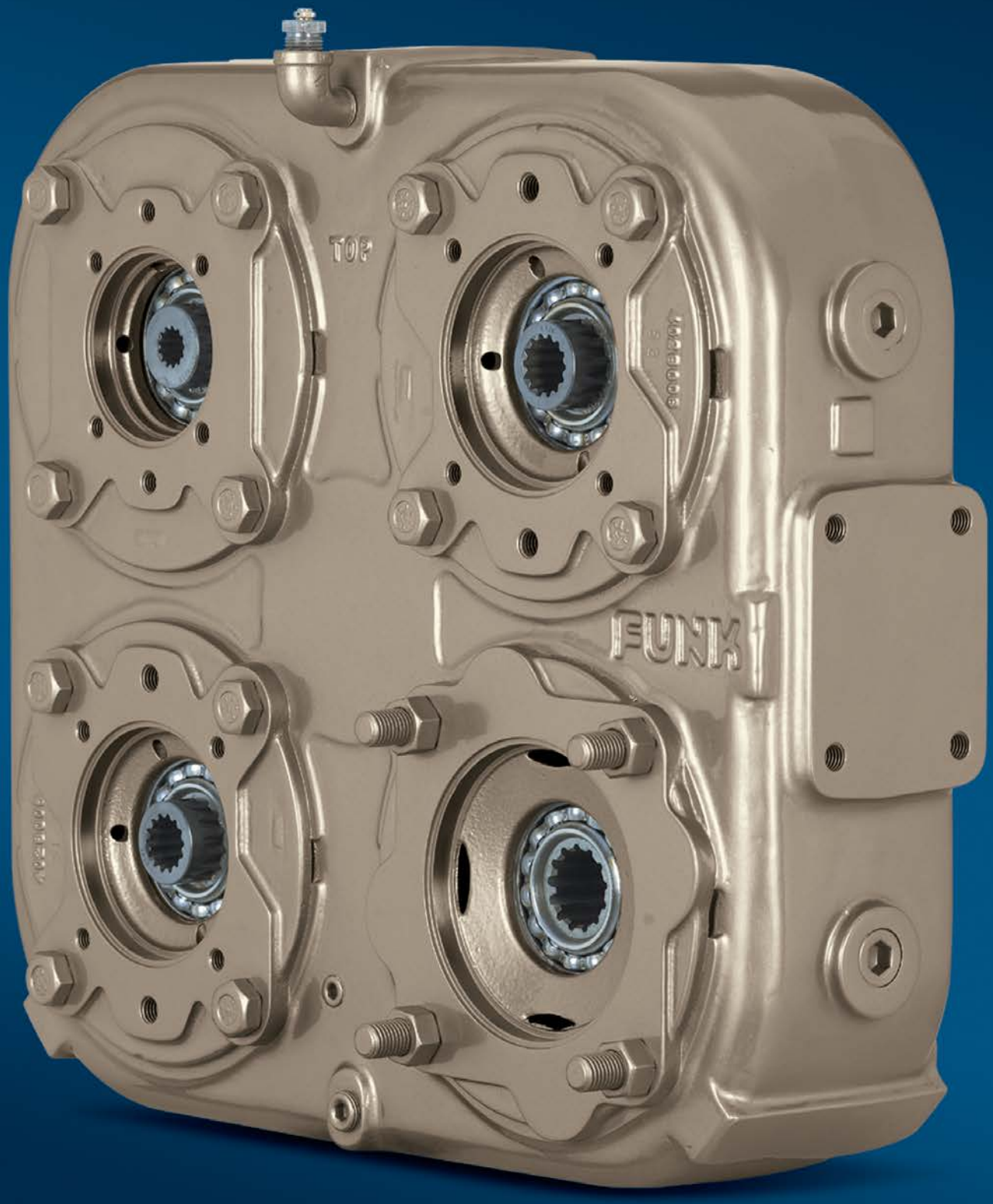
Modular Pump Drives

Selection Guide

JOHN DEERE

For the ultimate in design flexibility



A modular approach to building pump drives

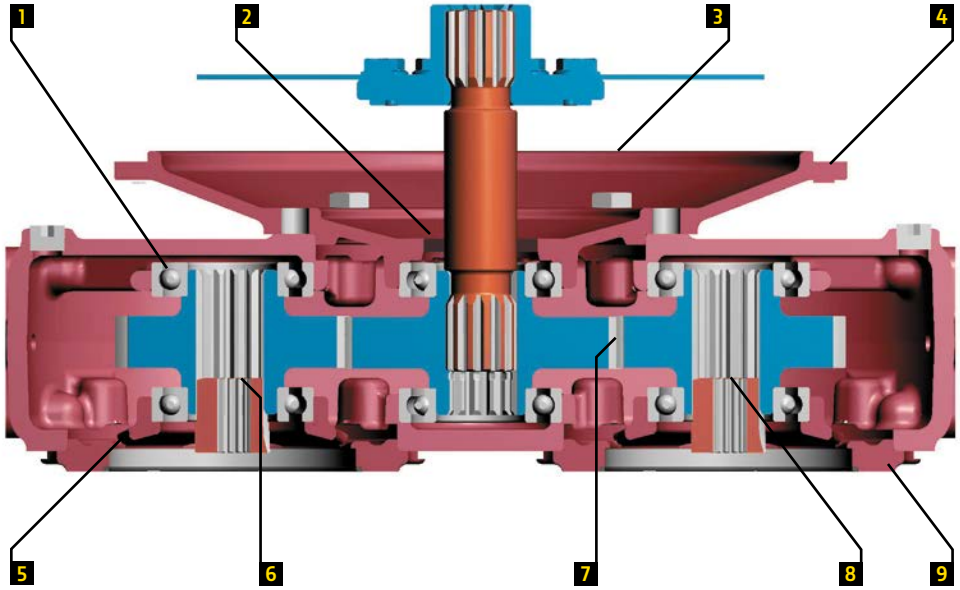
The advantages of customization

With decades of experience behind us, and our unique combination of custom design and modular manufacturing, John Deere can offer highly durable and reliable pump drives. Whether you need a new pump drive or support on an existing drive, our modular assembly system lets us get you what you need fast.

Add up all the advantages — including our many custom options — and it is easy to see why Funk pump drives are the choice of so many equipment OEMs.

The advantages of customization

When you look inside a Funk hydraulic pump drive, you are seeing the result of over 50 years of off-highway power transmission experience. This knowledge led to advancements including the development of the first modular hydraulic pump drive design. Our modular approach gives you a choice of gear ratios, pump adapters, mounting options, and more. With over 5,000 option combinations, we can provide a pump drive that meets your configuration, reliability, and durability needs. Add up all the advantages, and it is easy to see why Funk pump drives are number one.



1 **Ball bearings** include a built-in oil reservoir in the outer race to provide uninterrupted lubrication.

2 **Viton® shaft seals** provide long life in high-temperature applications.

3 **Engine housing adapters** are available for a variety of flywheel sizes.

4 **Cast iron housings** are built to withstand hard use in tough applications.

5 **Dedicated pathways** provide lubrication to bearings and splines.

6 **Internal spline adapters** make it quick and easy to configure pump drives to a variety of applications.

7 **High quality spur gears** provide quiet operation and allow the use of ball bearings.

8 **Wet splines** provide a long, trouble-free life.

9 **Pump adapter plates** can be easily changed for use with different pump sizes.

Introduction

Perfect fit

With thousands of combinations, gear ratios, hydraulic pump adapters, mounting options, and more — we can configure a pump drive to your design specifications.

Modular approach

Built for quiet operation, our pump drives are available in four series up to 708 kW (950 hp) and equipped to operate as independent mount, direct-engine mount, or clutch-driven units. Adapters are available in a variety of engine housings and flywheel sizes.

Integration support

You will also appreciate our integration support network. Our application engineers can help you select the options that best fit your needs. We also offer dedicated OEM service and long-term aftermarket support.

John Deere Power Systems

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Pump drive selection procedure 4

Service factors 5

Clutch capacities 5

Series 28000 ..... 6 – 17

360 hp* (268 kW) max input power

- 750 lb-ft* (1017 Nm) max input torque
- 1, 2, or 3 pump drives
- A, B, C, or D available SAE pump sizes

Series 59000..... 18 – 27

700 hp* (522 kW) max input power

- 1250 lb-ft* (1694 Nm) max input torque
- 2, 3, or 4 pump drives
- A, B, C, or D available SAE pump sizes

Series 56000 ..... 28 – 39

950 hp* (708 kW) max input power

- 2000 lb-ft* (2712 Nm) max input torque
- 2, 4, or 5 pump drives
- D, E, or F available SAE pump sizes

Series 57000..... 38 – 43

950 hp (708 kW) max input power

- 2000 lb-ft* (2712 Nm) max input torque
- 4 pump drives – 14 in and 16 in centers
- C, D, or E available SAE pump sizes

SAE engine flywheel and housing standards..... 44 – 45

SAE hydraulic pump and motor drive standards 46

Formulas 47

* Ratings may vary depending upon application and service. Application and installation are subject to review by John Deere.

Pump drive selection procedure

The performance and reliability of a hydraulic pump drive is directly related to the proper selection of the pump drive series and options. Follow the steps below to determine the options required for your application.

Selection of the proper pump drive series can be accomplished by using either the "torque method" or "power method" described below.

Torque method

1. Determine the net peak torque (lb-ft, or Nm) transmitted to the pump drive from the prime mover. Remember to deduct any continuous parasitic losses.

2. Determine the maximum pump drive input torque (lb-ft, or Nm) required to drive the hydraulic pumps attached to the pump drive. Be sure to consider the pump drive ratio.

3. Using the lesser of the torque values calculated above, select a pump drive series with a maximum input torque capacity that exceeds the torque required for the application.

Power method

1. Determine the net peak power (hp or kW) transmitted to the pump drive from the prime mover.

2. Determine the equivalent power (hp or kW) by multiplying the net peak power by the appropriate service factor for the application. A list of service factors are found on the table on page 5.

3. Using the equivalent power calculated above, select the proper pump drive series with a maximum input power capacity that exceeds the equivalent power for the application.

Additional steps required for determining the proper pump drive configuration:

4. Determine the number of pump pads required by making a selection from the models available within the pump drive series. Be sure to take into consideration the maximum output torque rating per pad, and the center distance between the mounting pads for clearance of the pumps and their hydraulic plumbing.

5. Select the gear ratio from the options available for the selected model that will provide the desired pump speed and flow. Be sure to consider the maximum recommended speed for both the pump drive series and the hydraulic pumps being used.

6. Select the desired input configuration from the available options for the pump drive series:
   - Engine mounted — drive plate or torsional coupling driven
   - Engine mounted — clutch-driven (consider clutch limiting speeds and torque capacity)
   - Remote mounted

7. Select the desired output configurations from the available options for the pump drive series:
   - Pump adapter plates
   - Pump shaft adapter sleeves (if required)
   - Drive shaft or PTO options

8. After the pump drive configuration has been determined, your John Deere Power Systems distributor can assist you in reviewing the application to determine if it will meet your expectations for service life based on the duty cycle provided.

Service factors

Service factors				
Prime mover	**Duration of service**	**Uniform**	**Moderate shock**	**Heavy shock**
Electric motor, steam turbine, or hydraulic motor	Occasional 1/2 hr. per day	0.50	0.80	1.25
	Intermittent 3 hr. per day	0.80	1.00	1.50
	Over 3 hr. up to and incl. 10 hr. per day	1.00	1.25	1.75
	Over 10 hr. per day	1.25	1.50	2.00
Multi-cylinder internal combustion engine	Occasional 1/2 hr. per day	0.80	1.00	1.50
	Intermittent 3 hr. per day	1.00	1.25	1.75
	Over 3 hr. up to and incl. 10 hr. per day	1.25	1.50	2.00
	Over 10 hr. per day	1.50	1.75	2.25
Single cylinder internal combustion engine	Occasional 1/2 hr. per day	1.00	1.25	1.75
	Intermittent 3 hr. per day	1.25	1.50	2.00
	Over 3 hr. up to and incl. 10 hr. per day	1.50	1.75	2.25
	Over 10 hr. per day	1.75	2.00	2.50

Clutch capacities

Operating speeds and working torque		
Clutch model	**Max. safe operating speed (rpm)**	**Working torque lb-ft (Nm)**
C-110	3100	328 (444.4)
C-111	2850	387 (524.4)
SP-211	2850	910 (1233.1)
SP-214	2400	1620 (2195.1)

Important notice

The presence of torsional resonant frequencies in the system can cause damage to components in the drivetrain.

The assembler of the drive and driven equipment is responsible for ensuring that damaging torsional resonant frequencies are not present in the system.

Torsional vibration analysis can be made by the engine manufacturer, torsional coupling supplier, and independent consultants. John Deere is prepared to supply the torsional data relating to the pump drive components and assist in evaluation of analyses in order to prevent damage to transmissions designed and manufactured by John Deere.

Series 28000 single direct drive

Ratings

Input torque	Clutch-dependent
Input speed	Clutch-dependent

Pump rotation

Enginewise

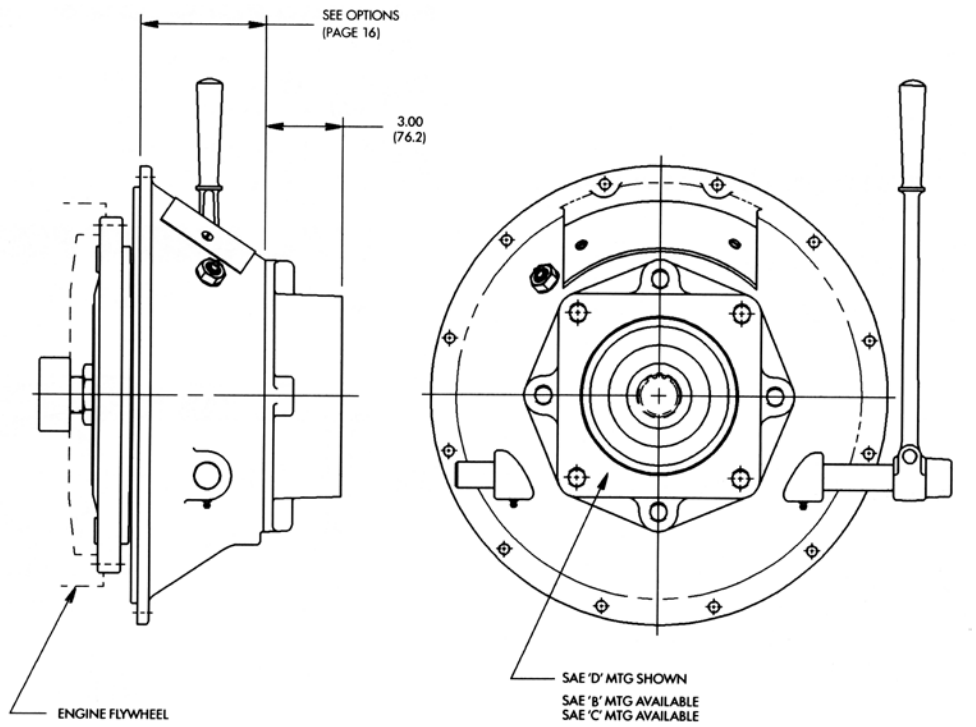
Approximate weight

28T	120 lb (55 kg)

Option selections

Refer to pages 16 – 17.

28T



Ratings

Max input torque	650 lb-ft (880 Nm)
Input speed	As required
Max power	360 hp (268 kW)

Pump rotation

Enginewise

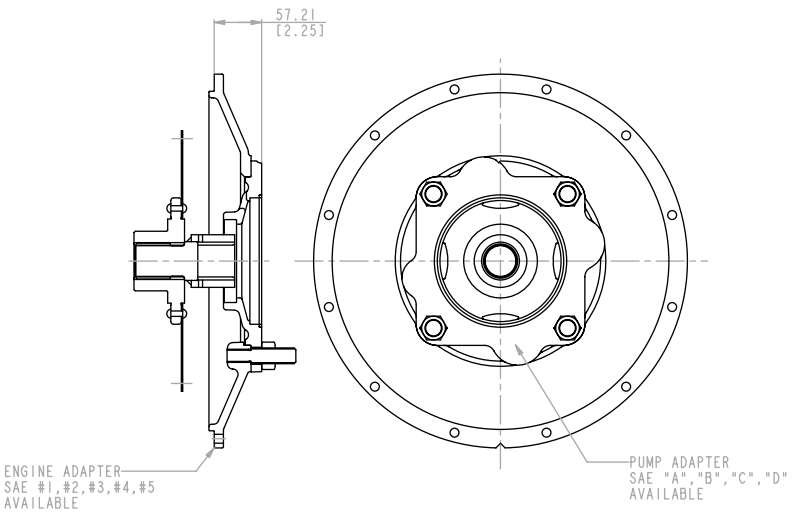
Approximate weight

28105	50 lb (23 kg)

Option selections

Refer to pages 16 – 17.

28105



Ratings

Max input torque	500 lb-ft (678 Nm)
Input speed	As required
Max power	250 hp (186 kW)

Pump rotation

Enginewise

Approximate weight

281FC	35 lb (16 kg)

Flywheel covers

SAE 3

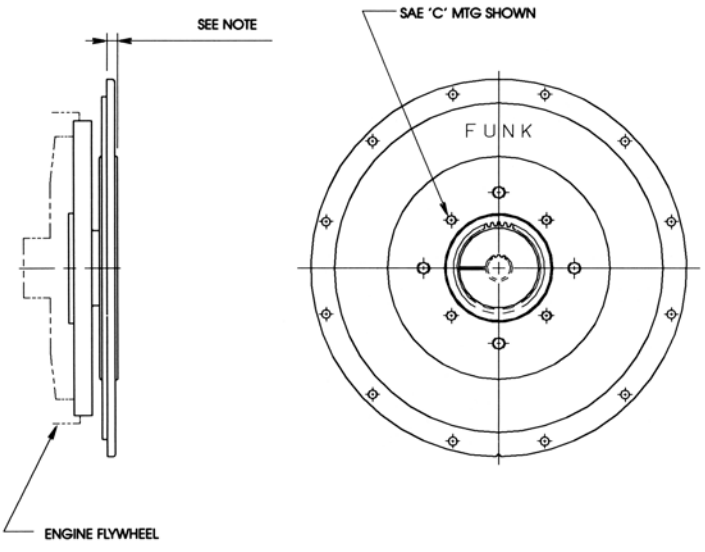
Pump adaptations

SAE C

Drive flange sizes

Nominal clutch size
11-1/2 in (292.1 mm)

281FC (flex coupling)



Note:
0.5 (12.7) – SAE 3
Refer to pages 16 – 17 for other dimensions.

Series 28000 single

Ratings

Max input torque	575 lb-ft (780 Nm)
Max output torque	575 lb-ft (780 Nm)
Max input or output speed	3000 rpm
Max input power	325 hp (242 kW)
Max output power	325 hp (242 kW)

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard™ or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

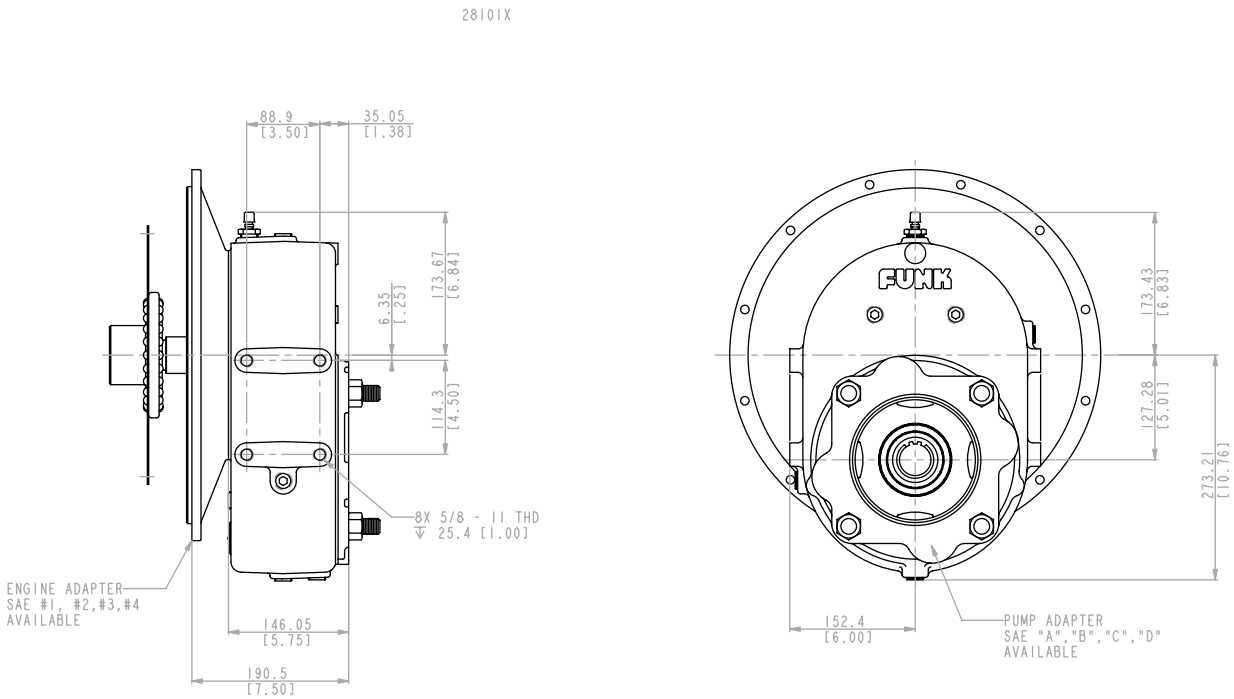
Approximate weight

28101	120 lb (55 kg)
28103	110 lb (50 kg)
28275	175 lb (80 kg)

Option selections

Refer to pages 16 – 17.

28101



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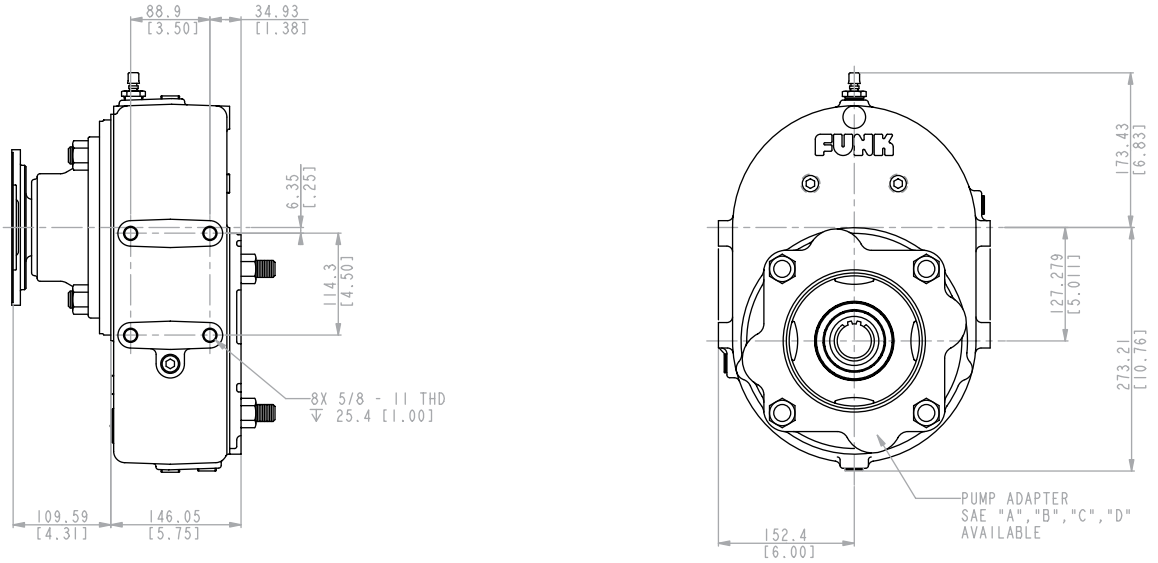
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8X 5/8 - 11 THD
↧ 25.4 [1.00]
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FUNK
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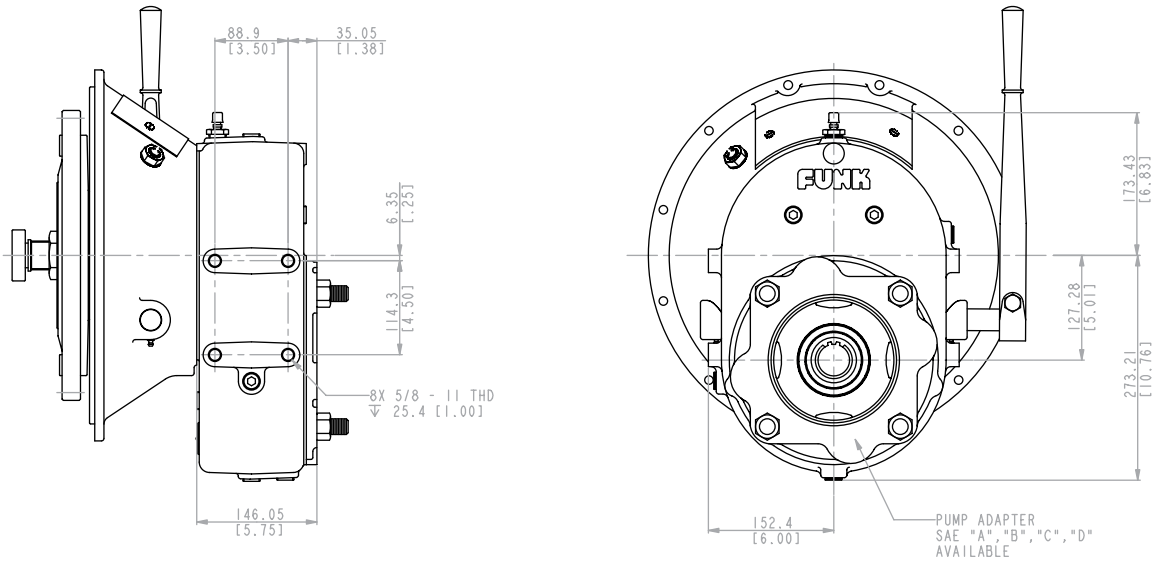
PUMP ADAPTER
SAE "A","B","C","D"
AVAILABLE
152.4
[6.00]

28275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FUNK
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PUMP ADAPTER
SAE "A","B","C","D"
AVAILABLE
152.4
[6.00]

Series 28000 double 127 mm (5 in) gear centers

Ratings

Max input torque	650 lb-ft (881 Nm)
Max output torque	575 lb-ft (780 Nm)
Max input or output speed	3000 rpm
Max input power	360 hp (268 kW)
Max output power	325 hp (242 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

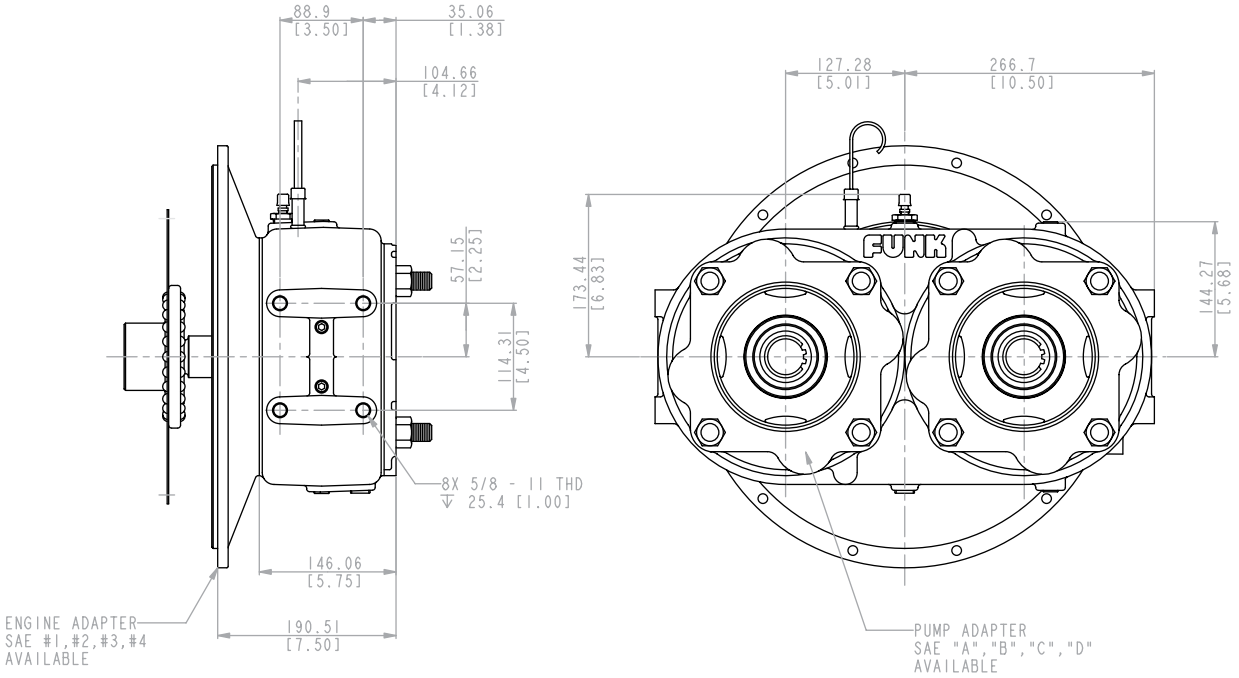
Approximate weight

28102	160 lb (73 kg)
28104	150 lb (68 kg)
28180	215 lb (98 kg)

Option selections

Refer to pages 16 – 17.

28102



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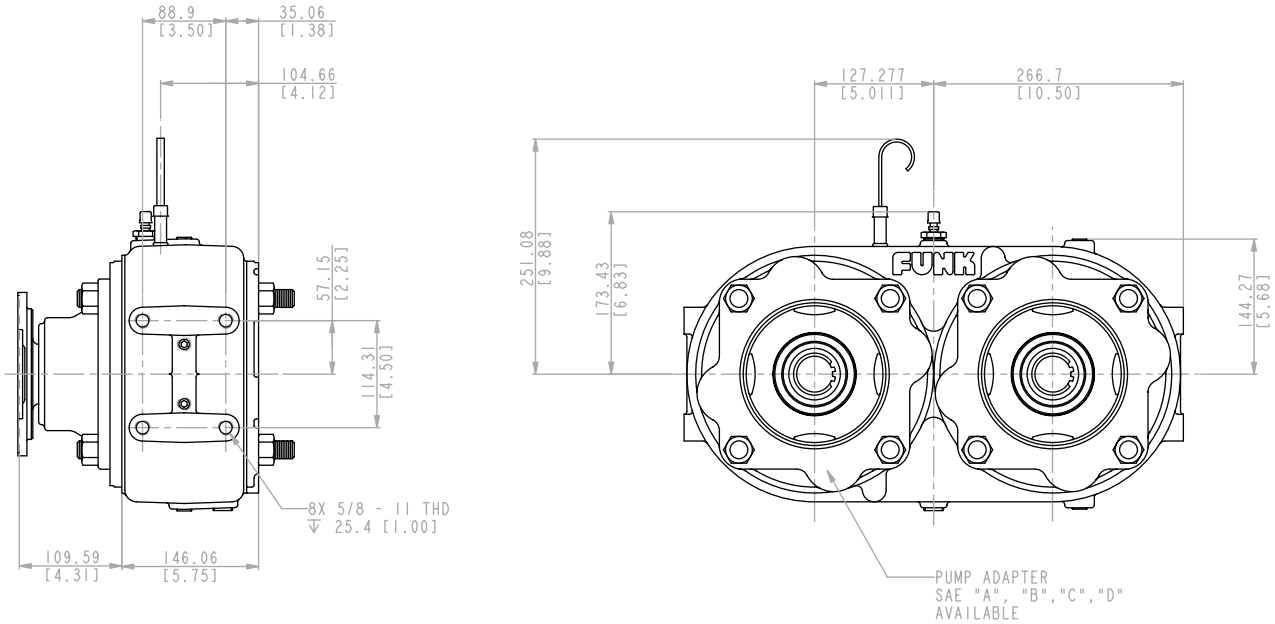
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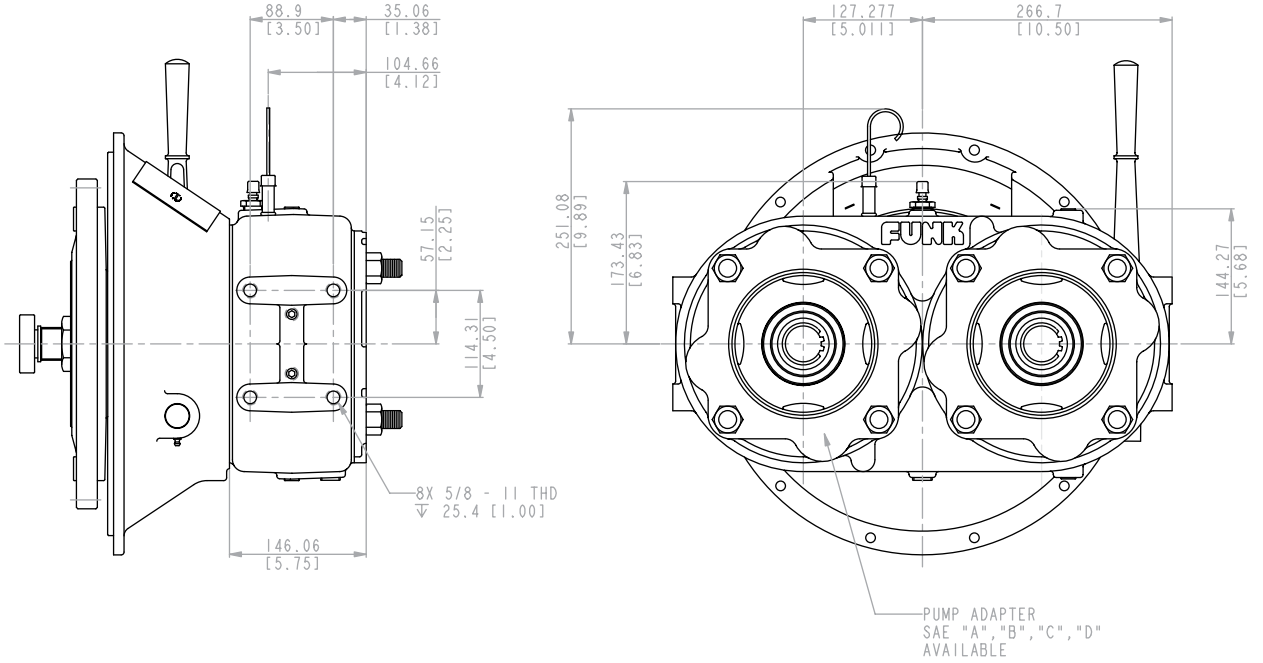
FUNK
PUMP ADAPTER
SAE "A", "B","C","D"
AVAILABLE

28180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8X 5/8 - 11 THD
25.4 [1.00]
146.06
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127.277
[5.011]
266.7
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251.08
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173.43
[6.83]
144.27
[5.68]
FUNK
PUMP ADAPTER
SAE "A","B","C","D"
AVAILABLE

Series 28000 double
152.7 mm (6 in) gear centers

Ratings

Max input torque	750 lb-ft (1017 Nm)
Max output torque	650 lb-ft (881 Nm) per pump pad
Max input or output speed	3000 rpm
Max input power	360 hp (268 kW)
Max output power	360 hp (268 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

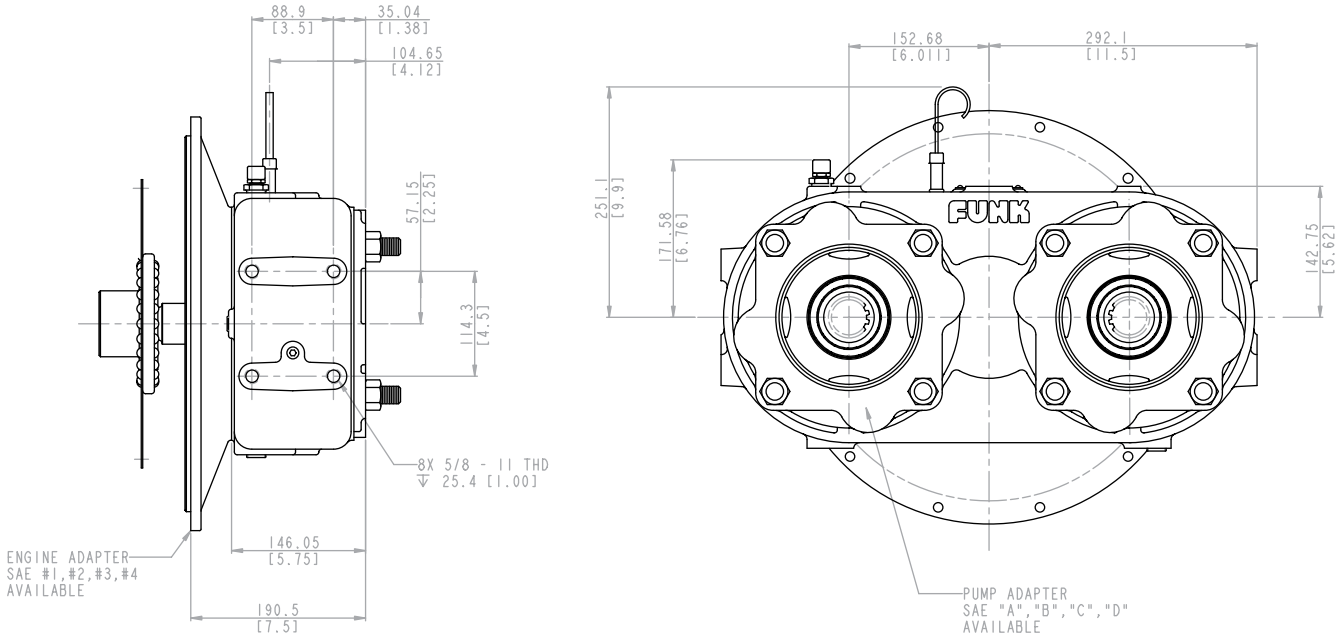
Approximate weight

2826XXP	175 lb (80 kg)
2826XR	165 lb (75 kg)
2826XXC	230 lb (105 kg)

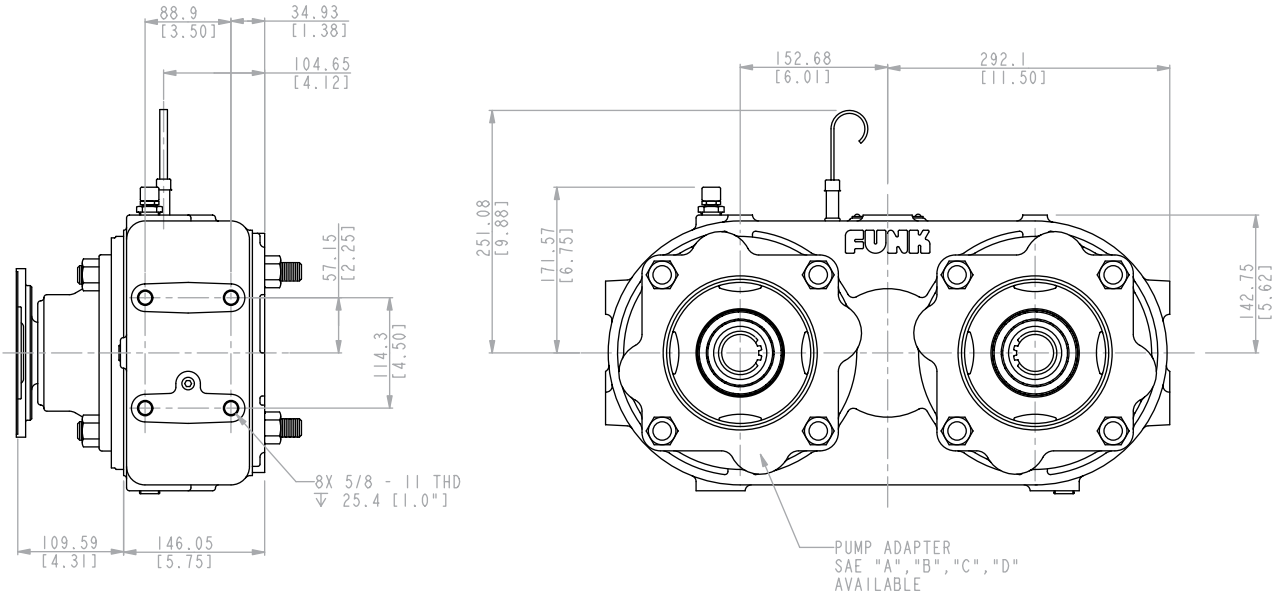
Option selections

Refer to pages 16 – 17.

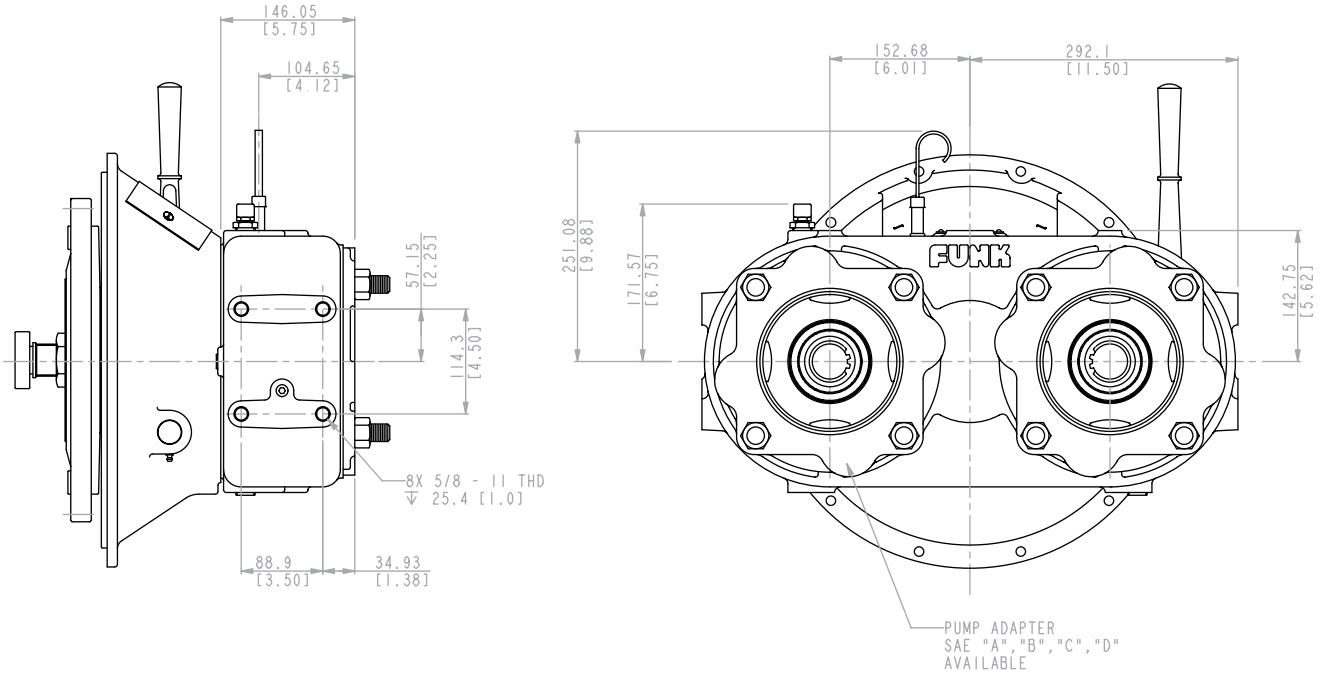
2826XXP



2826XR



2826XXC



Series 28000 triple

Ratings

Max input torque	750 lb-ft (1017 Nm)
Max output torque	650 lb-ft (881 Nm) per pump pad
Max input or output speed	3000 rpm
Max input power	360 hp (268 kW)
Max output power	360 hp (268 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

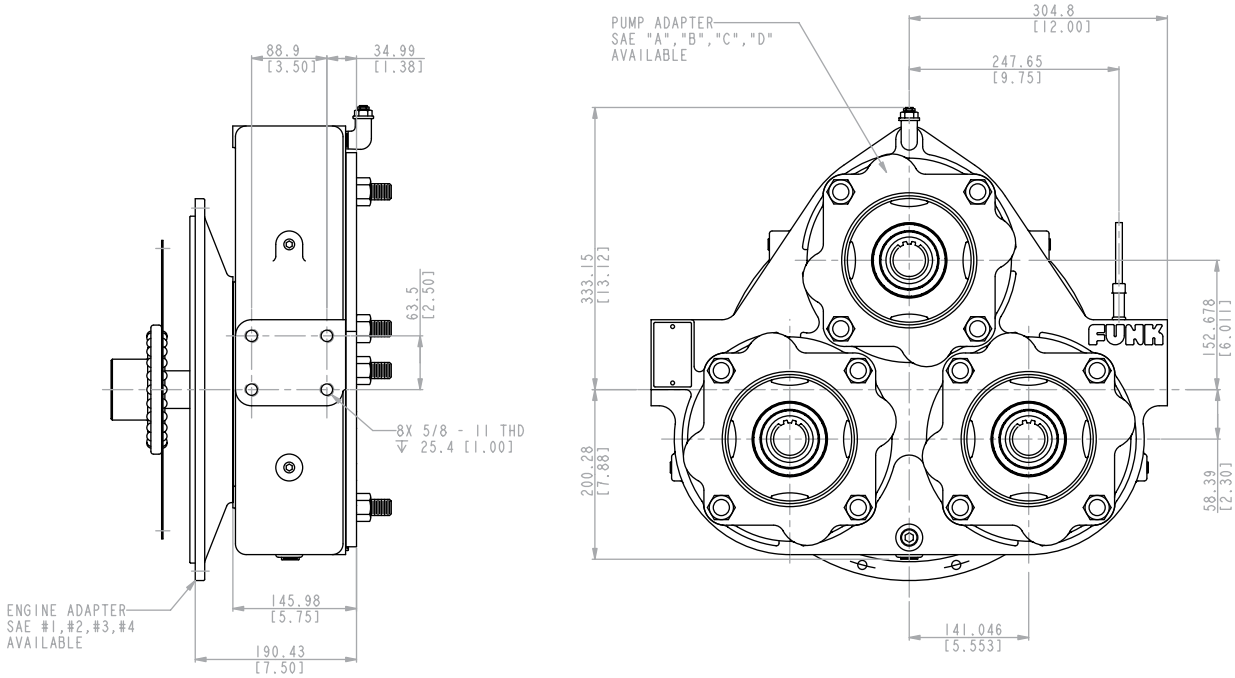
Approximate weight

28211	220 lb (100 kg)
28212	210 lb (96 kg)
28213	275 lb (125 kg)

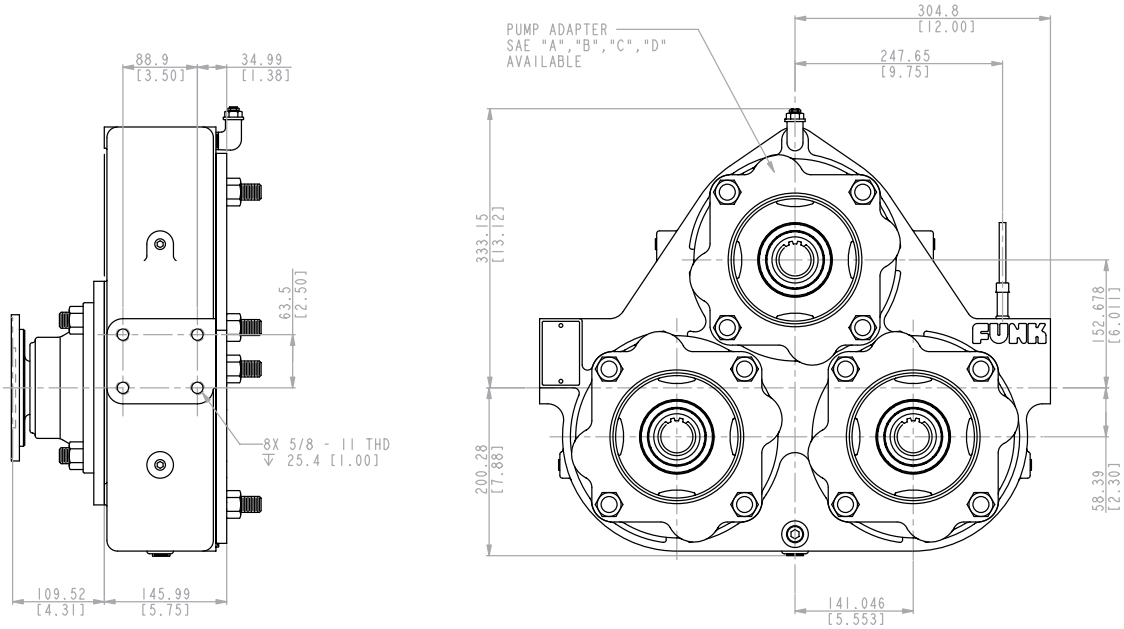
Option selections

Refer to pages 16 – 17.

28211



28212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63.5
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8X 5/8 - 11 THD
25.4 [1.00]
109.52
[4.31]
145.99
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PUMP ADAPTER
SAE "A","B","C","D"
AVAILABLE
304.8
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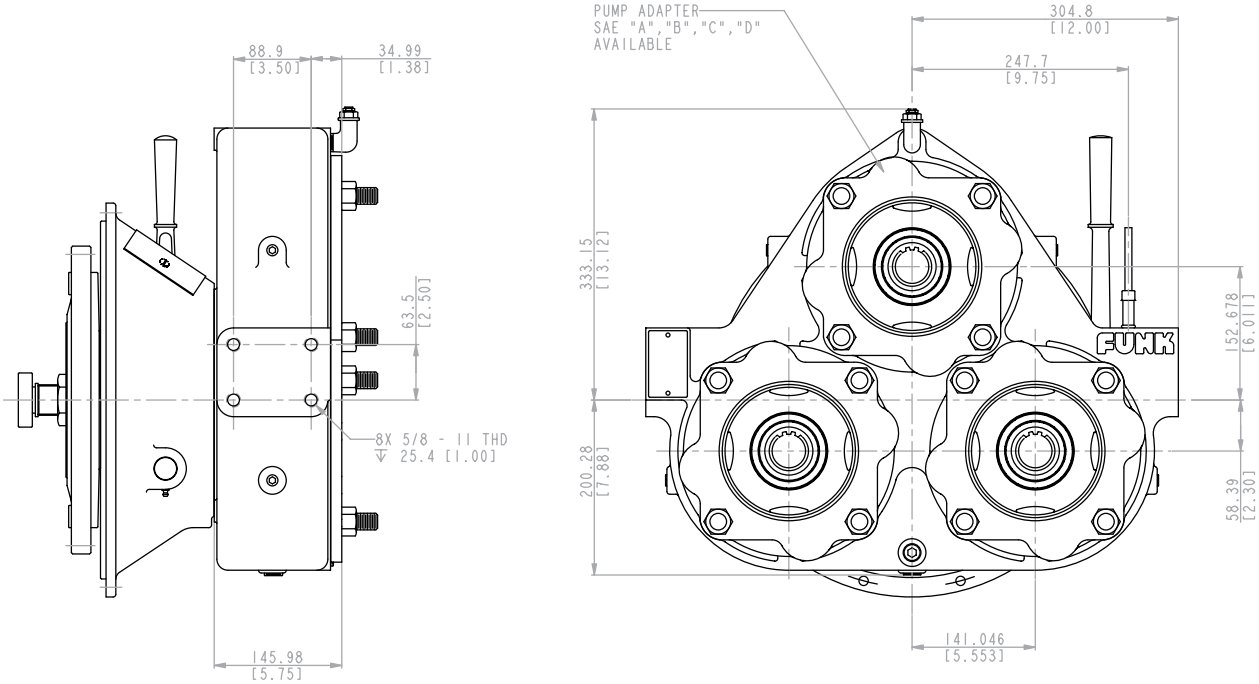
FUNK

28213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PUMP ADAPTER
SAE "A","B","C","D"
AVAILABLE
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[6.011]
200.28
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58.39
[2.30]
141.046
[5.553]
FUNK

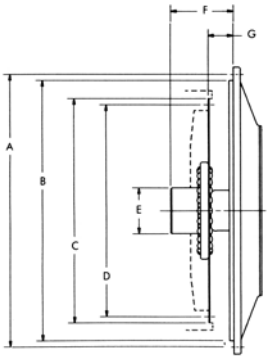
Series 28000 option selections

Input

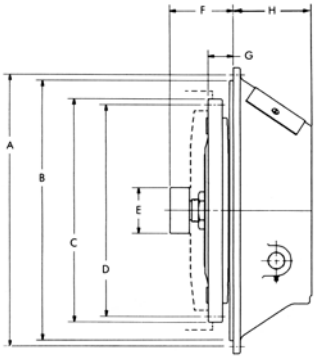
Flywheel cover housing in (mm)			
SAE size	A dimension	B dimension	Bolts required
1[1]	***20.875 (530.2)***	***20.125 (511.2)***	***12-7/16 (11.1)-14***
2	***18.375 (466.7)***	***17.625 (447.7)***	***12-3/8 (9.5)-16***
3	***16.875 (428.6)***	***16.125 (409.6)***	***12-3/8 (9.5)-16***
4	15.000 (381.0)	14.250 (362.0)	12-3/8 (9.5)-16

[1] Not available on 28T.

Plate-driven



Clutch-driven



Clutch cover housing in (mm)				
SAE size	A dimension	B dimension	H dimension	Bolts required
1[2]	20.875 (530.2)	20.125 (511.2)	9.625 (244.5)	12-7/16(11.1)-14
2	18.375 (466.7)	17.625 (447.7)	4.875 (123.8)	12-3/8 (9.5)-16
2[2]	18.375 (466.7)	17.625 (447.7)	9.625 (244.5)	12-3/8 (9.5)-16
3	16.875 (428.6)	16.125 (409.6)	4.875 (123.8)	12-3/8 (9.5)-16
3[2]	16.875 (428.6)	16.125 (409.6)	9.625 (244.5)	12-3/8 (9.5)-16
4	15.000 (381.0)	14.250 (362.0)	4.875 (123.8)	12-3/8 (9.5)-16

[2] SP-211 only.

Drive plate assembly in (mm)							
Nominal flywheel size	C dimension	D dimension	E dimension	F dimension	G dimension	Holes	Hole size
8 (203.2)	10.375 (263.5)	9.625 (244.5)	2.04 (51.8) or 2.44 (62.0)	3.94 (100.0)	2.44 (62.0)	6	13/32 (10.3)
10 (254.0)	12.375 (314.3)	11.625 (295.3)	2.44 (62.0) or 2.83 (71.9)	3.94 (100.0)	2.12 (53.8)	8	13/32 (10.3)
11-1/2 (292.1)	***13.875 (352.4)***	***13.125 (333.4)***	2.44 (62.0) or ***2.83 (71.9)***	***3.94 (100.0)***	***1.56 (39.6)*** or 2.12 (53.8)	***8***	***13/32 (10.3)***
14 (355.6)	***18.375 (466.7)***	***17.250 (438.2)***	2.83 (71.9) or ***3.15 (80.0)***	***3.94 (100.0)***	***1.00 (25.4)***	***8***	***17/32 (13.5)***

Pump drive clutch data in (mm)									
Nominal clutch size	Clutch no.	Working torque	C dimension	D dimension	E dimension (pilot bearing)	F dimension	G dimension	Holes	Hole size
10 (254)	C-110	328 lb-ft (444.4 Nm)	12.375 (314.3)	11.625 (295.3)	2.83 (72.0) or 2.44 (62.0)	3.94 (100.0)	2.12 (53.8)	8	13/32 (10.3)
11-1/2 (292.1)	C-111	387 lb-ft (524.4 Nm)	13.875 (352.4)	13.125 (333.4)	2.83 (72.0) or 2.44 (62.0)	3.94 (100.0)	1.56 (39.6) or 2.12 (53.8)	8	13/32 (10.3)
11-1/2 (292.1)	SP-211	910 lb-ft (1233.1 Nm)	13.875 (352.4)	13.125 (333.4)	2.83 (72.0) or 2.44 (62.0)	3.94 (100.0)	1.56 (39.6) or 2.12 (53.8)	8	13/32 (10.3)

Bold italicized text indicates common Series 28000 options.

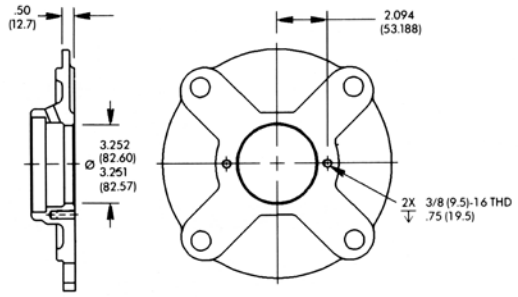
Gear ratios

28000 single and double — 5 in (127 mm)						
.628:1	.71:1	.89:1	1:1	1.12:1	1.41:1	1.592:1
28000 triple and double — 6 in (152 mm)						
.647:1	.714:1	***.787:1***	.826:1	.867:1	***.909:1***	***1:1***
1.10:1	1.27:1	1.40:1				

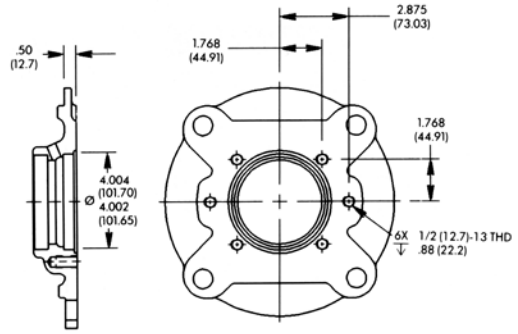
Pump adapter plates

These pump adapter plates are available for Series 28000 (except 28T) models.

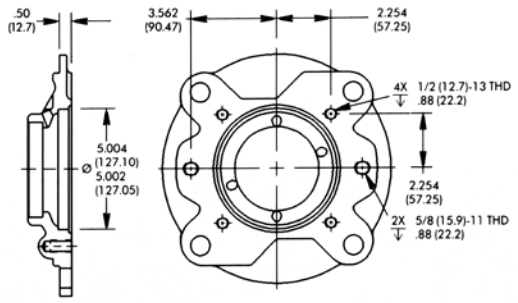
SAE A



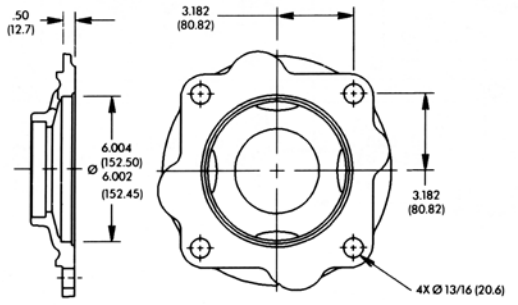
SAE B



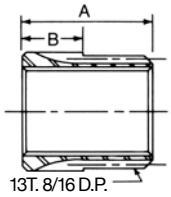
SAE C



SAE D



Spline adapter



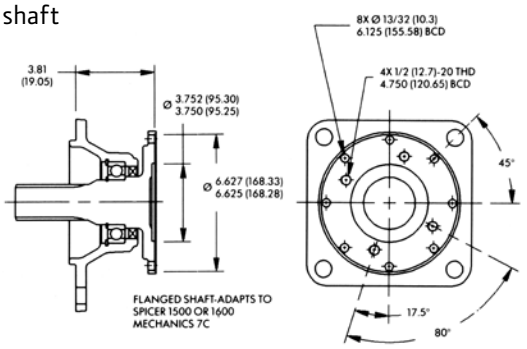
Specifications in (mm)

Output

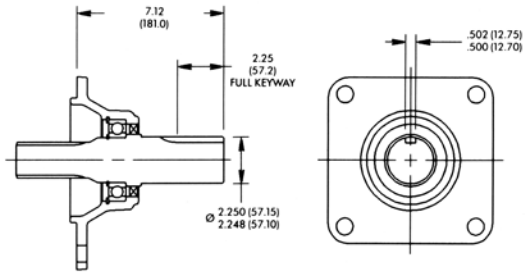
Pump adapter sleeves in (mm)			
SAE size	A dimension	B dimension	Internal spline
B	***1.81 (46.0)***	***.75 (19.1)***	***7/8 (22.2)-13T. 16/32 P.***
C	***2.00 (50.8)*** 1.87 (47.5)	***.94 (23.9)*** .81 (20.6)	***1-1/4 (31.8)-14T. 12/24 P.*** 1-1/4 (31.8)-14T. 12/24 P.
	2.00 (50.8)	.94 (23.9)	1-3/8 (34.9)-21T. 16/32 P.
BB	2.00 (50.8)	.94 (23.9)	1 (25.4)-15T. 16/32 P.

Input or output drive assemblies in (mm)

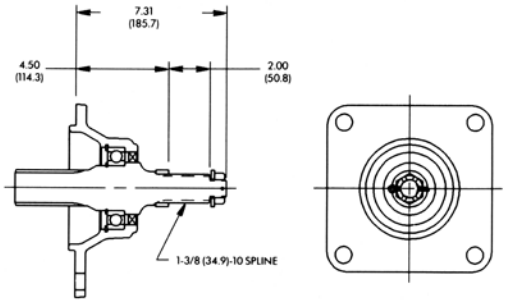
Flanged shaft



2-1/4 (57.2) Diameter keyed shaft



1-3/8 (34.9)-10 Straight-side splined shaft



Bold italicized text indicates common Series 28000 options.

Series 59000 double

Ratings

Max input torque	1250 lb-ft (1695 Nm)
Max output torque	650 lb-ft (881 Nm) per pump pad
Max input or output speed	3000 rpm
Max input power	700 hp (522 kW)
Max output power	360 hp (268 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

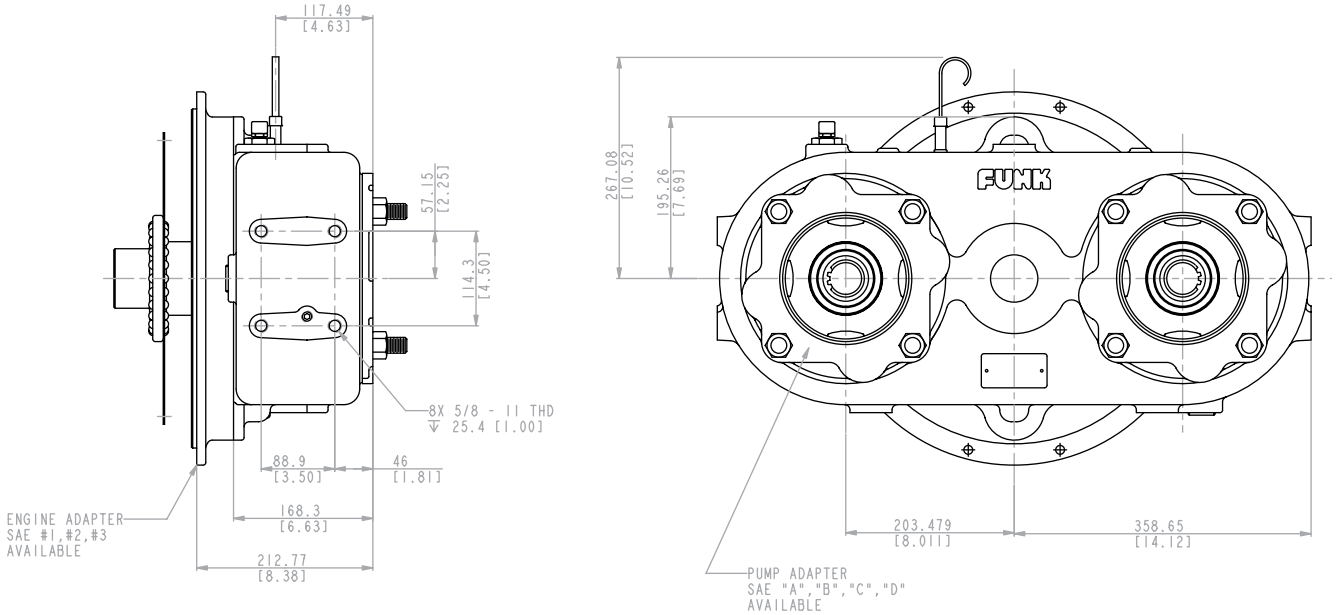
Approximate weight

5928XXP	240 lb (109 kg)
5928XR	215 lb (98 kg)
5928XXC	320 lb (145 kg)

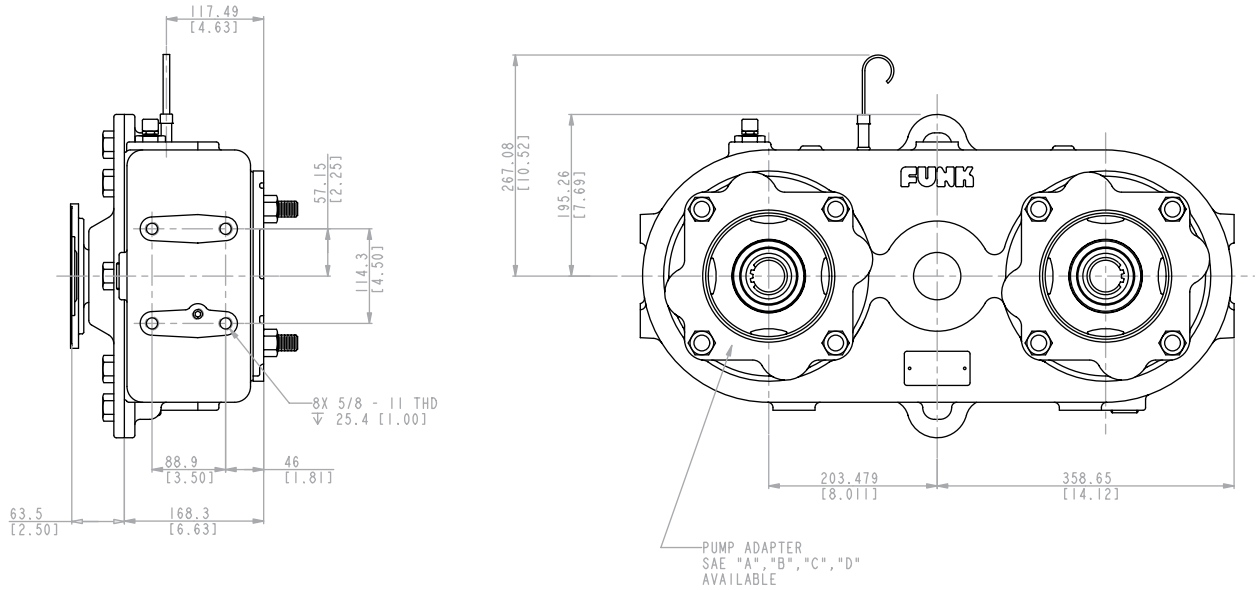
Option selections

Refer to pages 26 – 27.

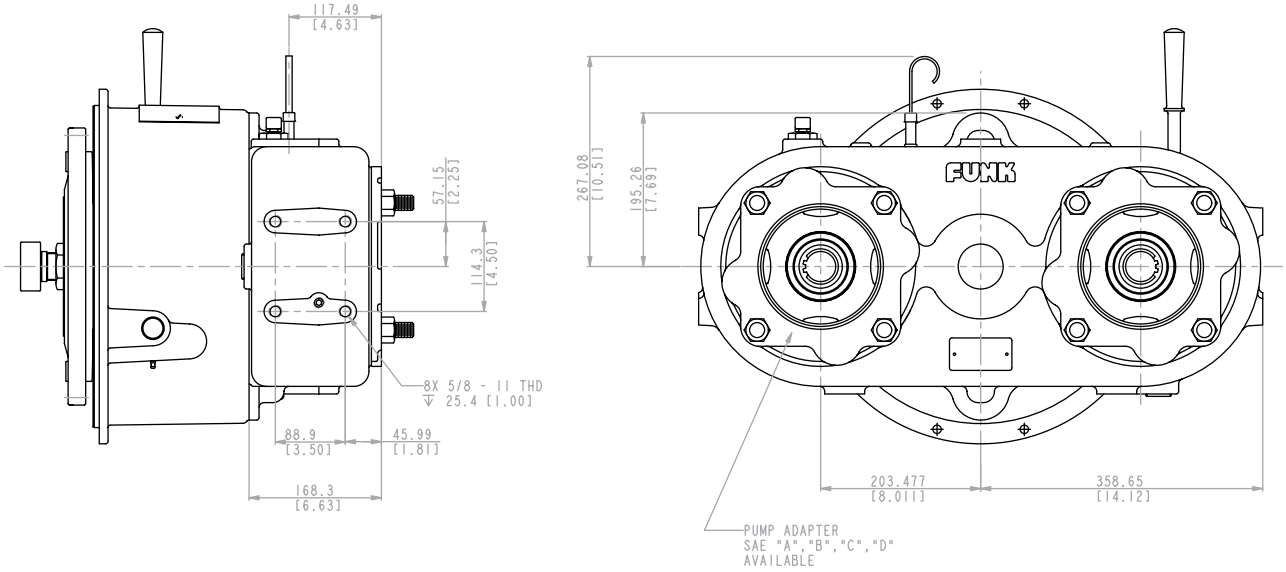
5928XXP



5928XR



5928XXC



Series 59000 triple

Ratings

Max input torque	1250 lb-ft (1695 Nm)
Max output torque	650 lb-ft (881 Nm) per pump pad
Max input or output speed	3000 rpm
Max input power	700 hp (522 kW)
Max output power	360 hp (268 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

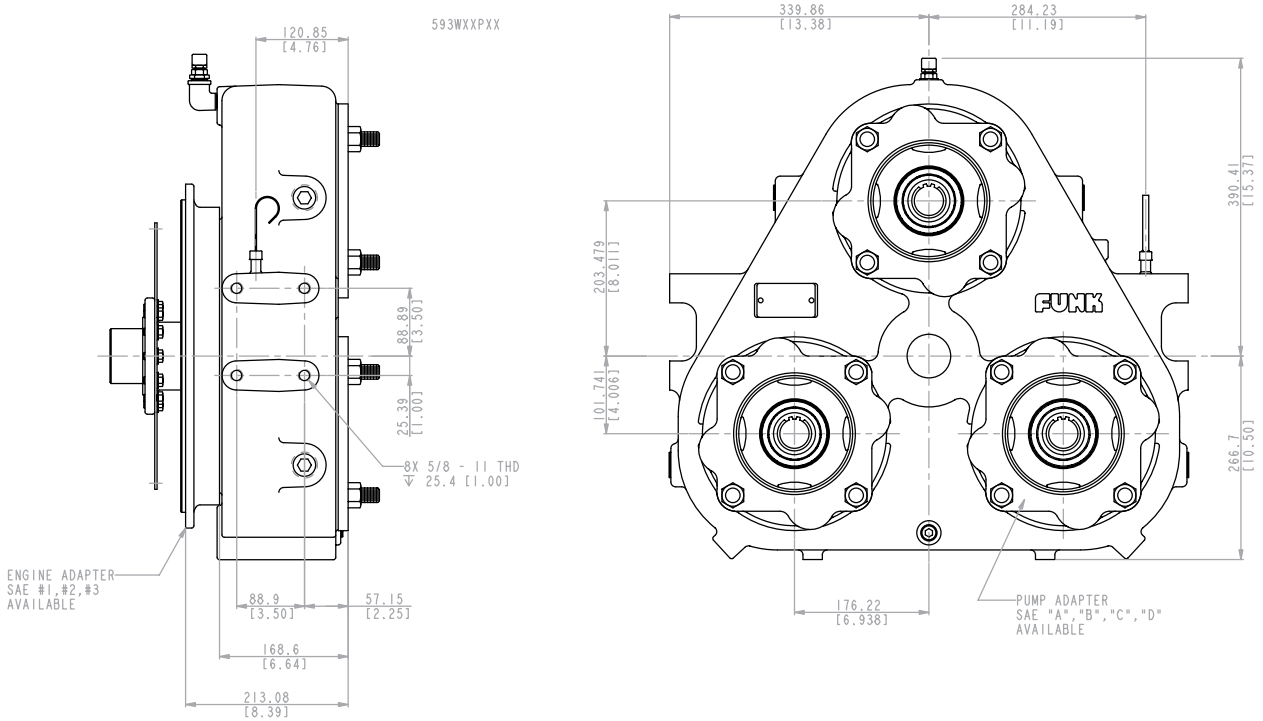
Approximate weight

593WXXP	290 lb (132 kg)
593WXR	265 lb (120 kg)
593WXXC	370 lb (168 kg)

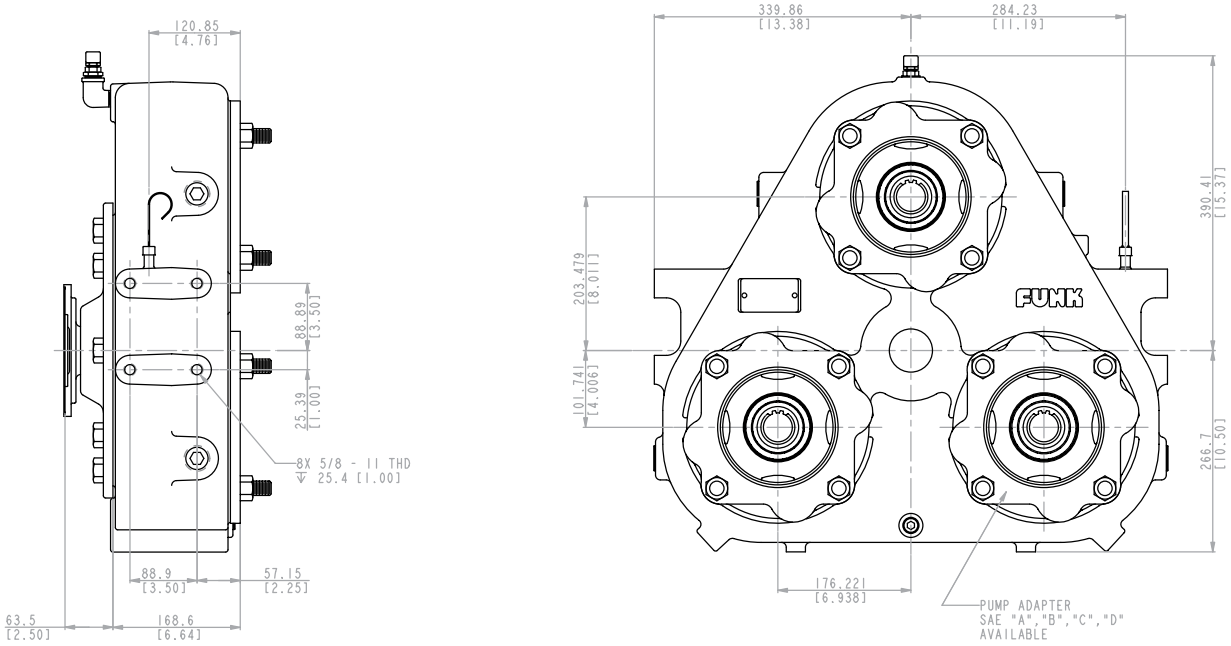
Option selections

Refer to pages 26 – 27.

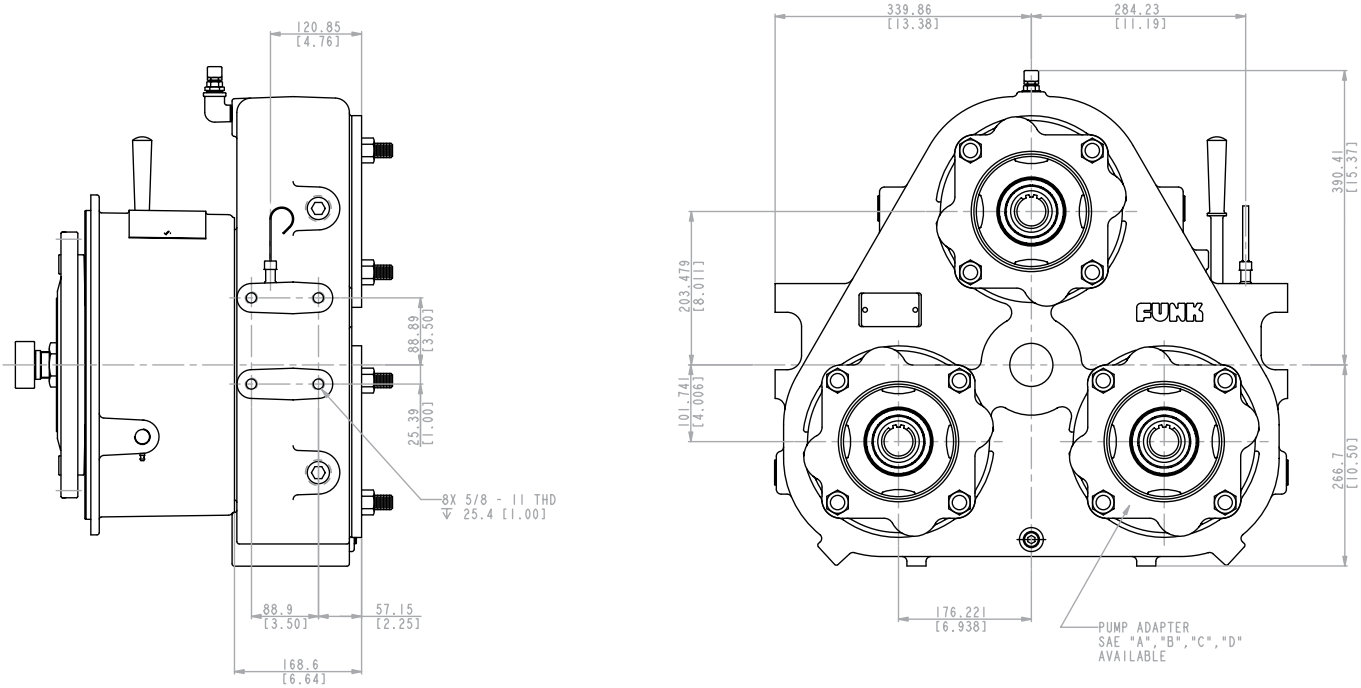
593WXXP



593WXR



593WXXC



Series 59000 four

Ratings

Max input torque	1250 lb-ft (1695 Nm)
Max output torque	650 lb-ft (881 Nm) per pump pad
Max input or output speed	3000 rpm
Max input power	700 hp (522 kW)
Max output power	360 hp (268 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

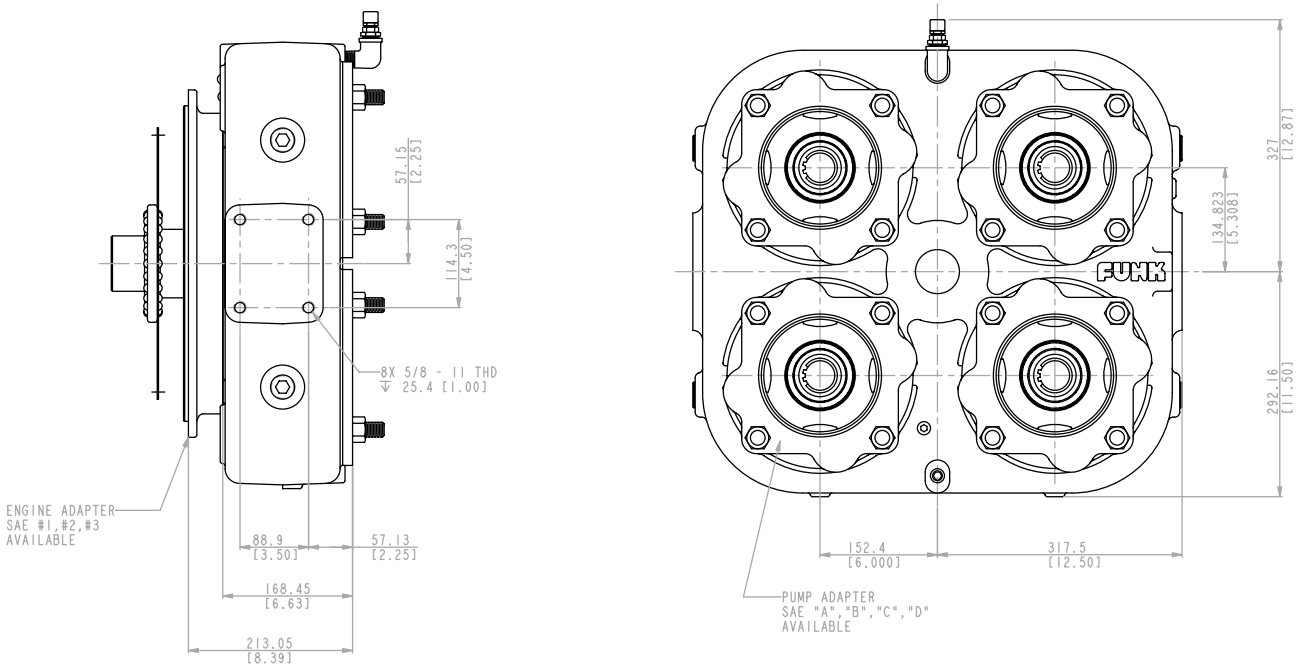
Approximate weight

594PXXP	340 lb (154 kg)
594PXR	315 lb (143 kg)
594PXXC	420 lb (191 kg)

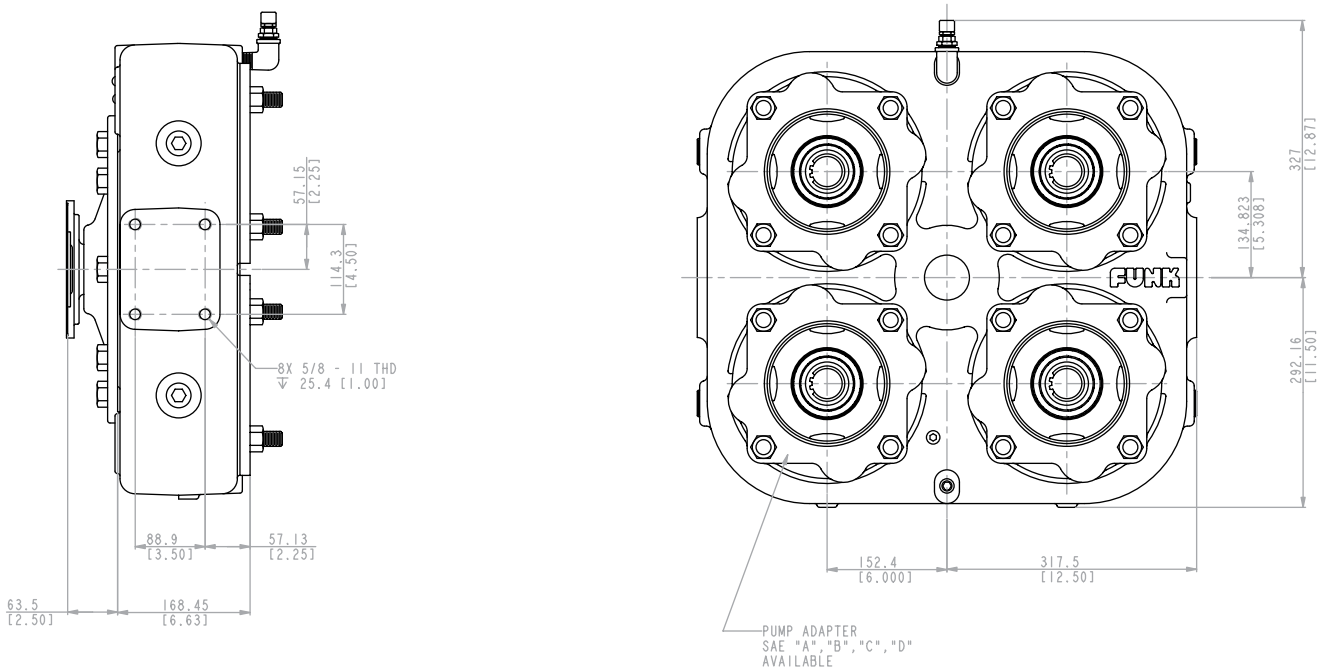
Option selections

Refer to pages 26 – 27.

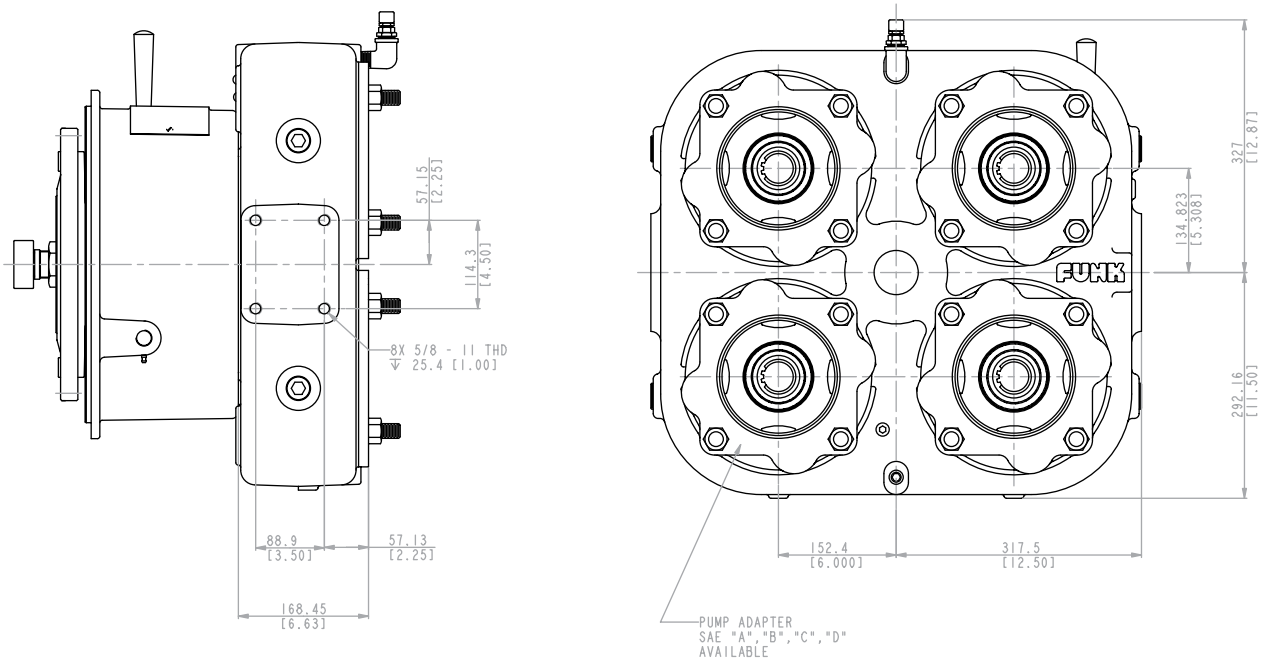
594PXXP



594PXR



594PXXC



Series 59000 four (wide)

Ratings

Max input torque	1250 lb-ft (1695 Nm)
Max output torque	650 lb-ft (881 Nm) per pump pad
Max input or output speed	3000 rpm
Max input power	700 hp (522 kW)
Max output power	360 hp (268 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

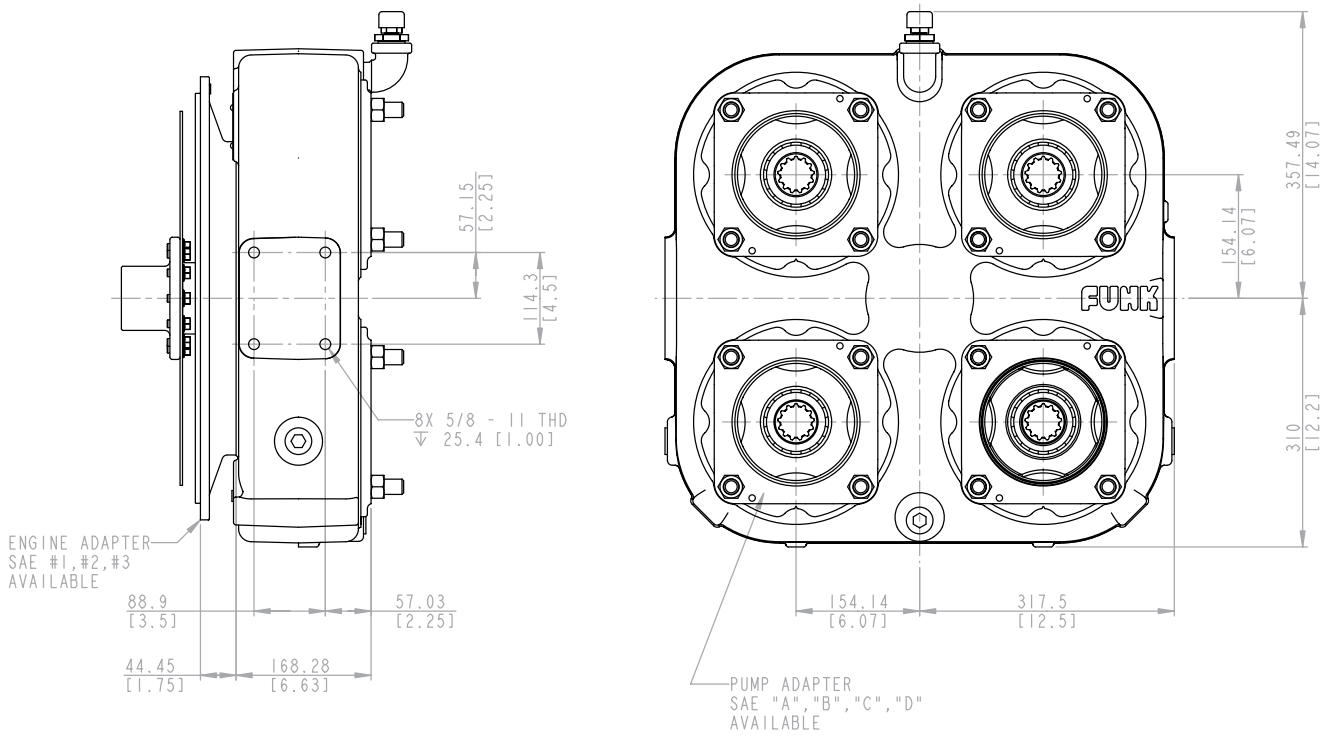
Approximate weight

594WXXP	389 lb (176 kg)
594WXXR	364 lb (165 kg)
594WXXC	469 lb (213 kg)

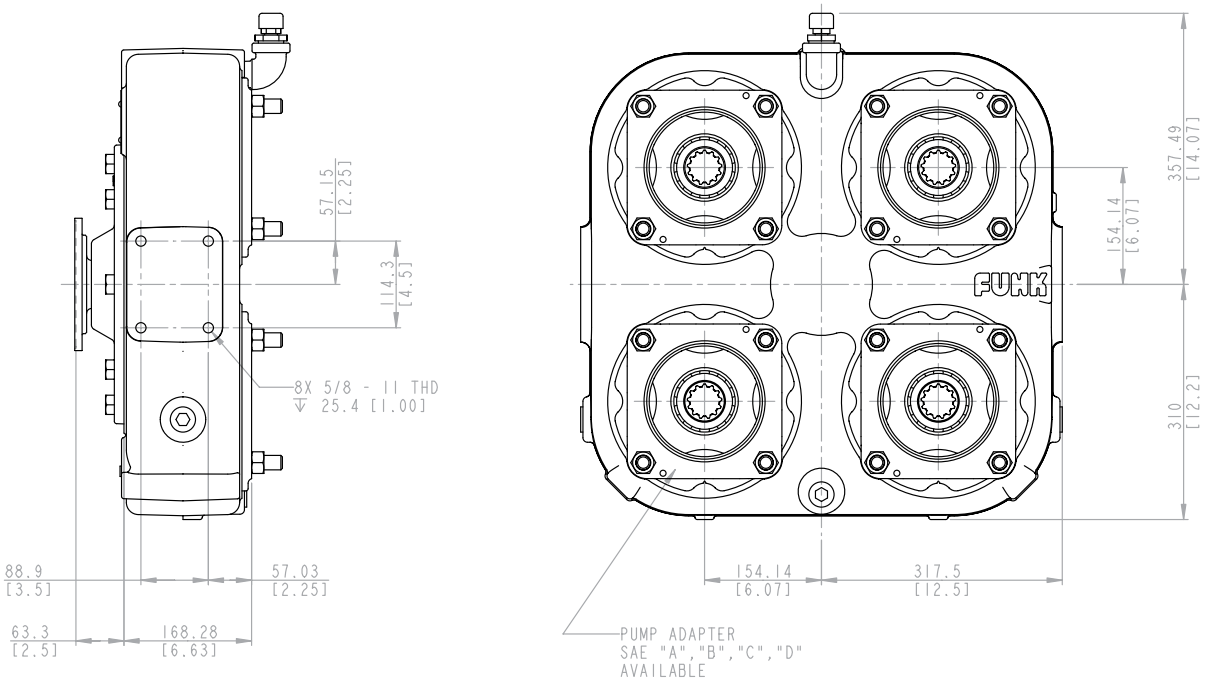
Option selections

Refer to pages 26 – 27.

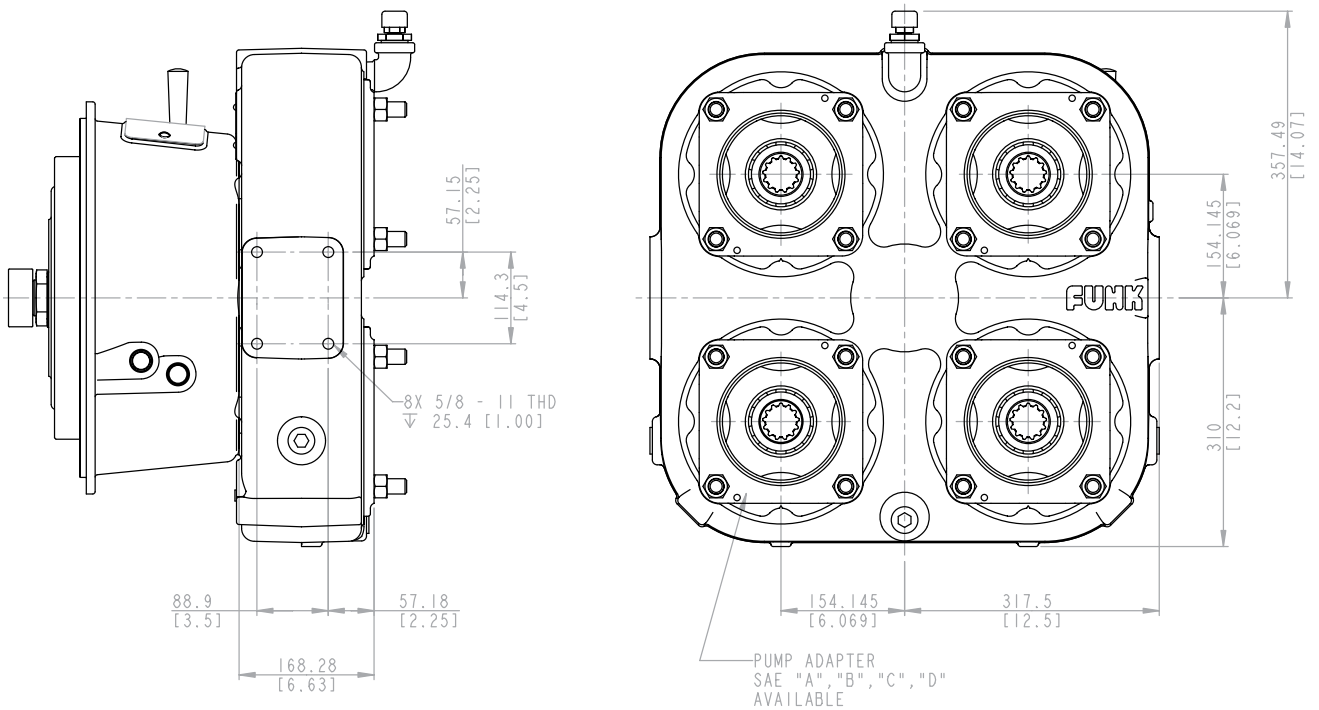
594WXXP



594WXXR



594WXXC

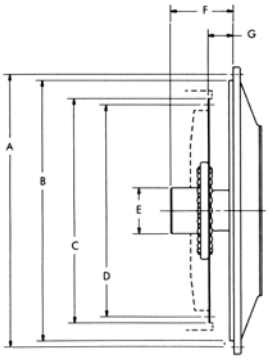


Series 59000 option selections

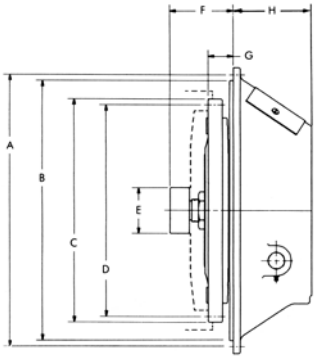
Input

Flywheel cover housing in (mm)			
SAE size	A dimension	B dimension	Bolts required
1	***20.875 (530.2)***	***20.125 (511.2)***	***12-7/16 (11.1)-14***
2	***18.375 (466.7)***	***17.625 (447.7)***	***12-3/8 (9.5)-16***
3	***16.875 (428.6)***	***16.125 (409.6)***	***12-3/8 (9.5)-16***

Plate-driven



Clutch-driven



Clutch cover housing in (mm)				
SAE size	A dimension	B dimension	H dimension	Bolts required
1	20.875 (530.2)	20.125 (511.2)	7.500 (190.5)	12-7/16 (11.1)-14
1*	20.875 (530.2)	20.125 (511.2)	10.250 (260.4)	12-7/16 (11.1)-14
2	18.375 (466.7)	17.625 (447.7)	7.500 (190.5)	12-3/8 (9.5)-16
3	16.875 (428.6)	16.125 (409.6)	7.500 (190.5)	12-3/8 (9.5)-16

* For SP-214 only.

Drive plate assembly in (mm)							
Nominal flywheel size	C dimension	D dimension	E dimension	F dimension	G dimension	Holes	Hole size
10 (254.0)	12.375 (314.3)	11.625 (295.3)	2.44 (62.0) or 2.83 (71.9)	3.94 (100.0)	2.12 (53.8)	8	13/32 (10.3)
11-1/2 (292.1)	***13.875 (352.4)***	***13.125 (333.4)***	2.44 (62.0) or ***2.83 (71.9)***	***3.94 (100.0)***	***1.56 (39.6) or*** 2.12 (53.8)	***8***	***13/32 (10.3)***
14 (355.6)	***18.375 (466.7)***	***17.250 (438.2)***	2.83 (71.9) or ***3.15 (80)***	***3.94 (100.0)***	***1.00 (25.4)***	***8***	***17/32 (13.5)***

Pump drive clutch data in (mm)									
Nominal clutch size	Clutch no.	Working torque	C dimension	D dimension	E dimension (pilot bearing)	F dimension	G dimension	Holes	Hole size
11-1/2 (292.1)	C-111	387 lb-ft (524.4 Nm)	13.875 (352.4)	13.125 (333.4)	2.83 (72.0) or 2.44 (62.0)	3.94 (100.0)	1.56 (39.6)	8	13/32 (10.3)
11-1/2 (292.1)	SP-211	910 lb-ft (1233.1 Nm)	13.875 (352.4)	13.125 (333.4)	2.83 (72.0) or 2.44 (62.0)	3.94 (100.0)	1.56 (39.6)	8	13/32 (10.3)
14 (355.6)	SP-214	1620 lb-ft (2195 Nm)	18.375 (466.7)	17.250 (438.2)	3.15 (80.0) or 2.83 (72.0)	3.94 (100.0)	1.00 (25.4)	8	17/32 (13.5)

Bold italicized text indicates common Series 59000 options.

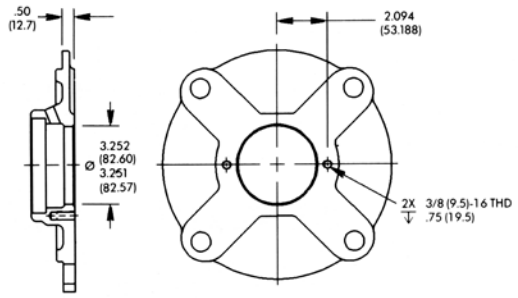
Gear ratios

59000 double, triple, four						
.72:1	.78:1	***.84:1***	.898:1	***1:1***	1.13:1	1.2:1
59000 four (wide)						
1:1						

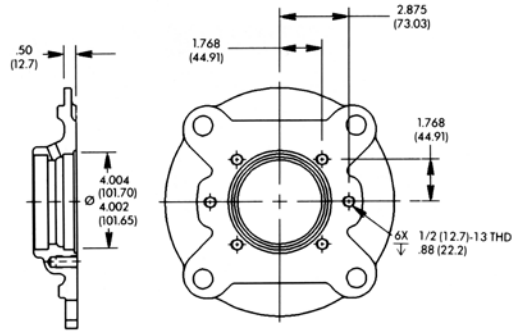
Pump adapter plates

These pump adapter plates are available for Series 59000 models.

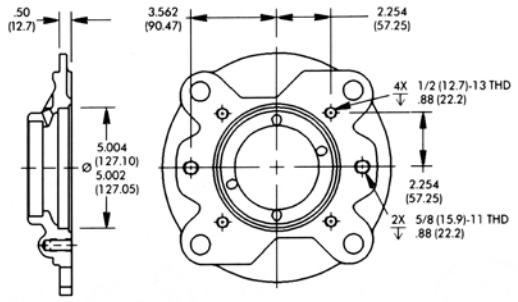
SAE A



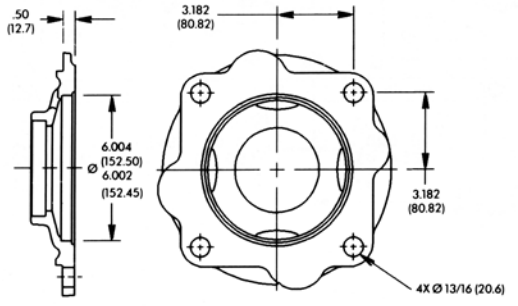
SAE B



SAE C

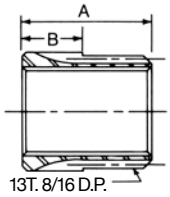


SAE D



Bold italicized text indicates common Series 59000 options.

Spline adapter



Specifications in (mm)

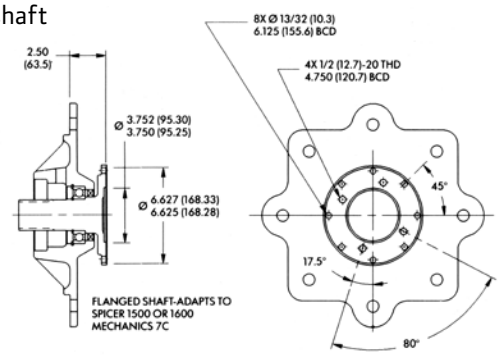
Output

Pump adapter sleeves in (mm)			
SAE Size	A dimension	B dimension	Internal spline
B	***1.81 (46.0)***	***.75 (19.1)***	***7/8 (22.2)-13T. 16/32 P.***
C	***2.00 (50.8)*** 1.87 (47.5)	***.94 (23.9)*** .81 (20.6)	***1-1/4 (31.8)-14T. 12/24 P.*** 1-1/4 (31.8)-14T. 12/24 P.
	2.00 (50.8)	.94 (23.9)	1-3/8 (34.9)-21T. 16/32 P.
BB	2.00 (50.8)	.94 (23.9)	1 (25.4)-15T. 16/32 P.

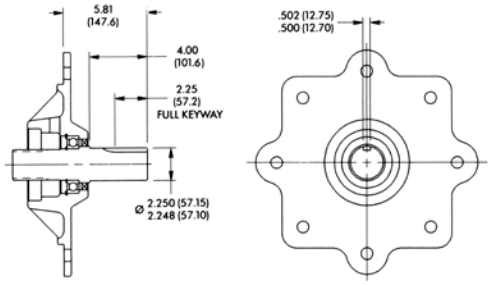
Input drive assemblies in (mm)

Refer to page 17 for output drive assemblies.

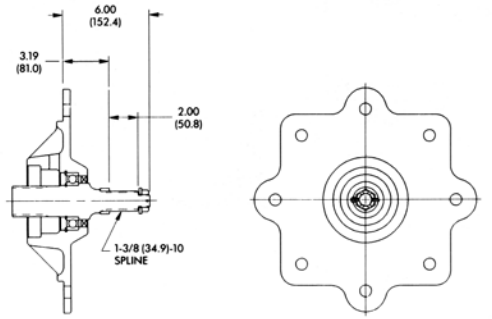
Flanged shaft



2-1/4 (57.2) Diameter keyed shaft



1-3/8 (34.9)-10 Straight-side splined shaft



Series 56000 double

Ratings

Max input torque	2000 lb-ft (2712 Nm) or clutch rating-dependent
Max output torque	2000 lb-ft (2712 Nm) per pump pad
Max input or output speed	2500 rpm
Max input power	950 hp (708 kW) or clutch rating-dependent
Max output power	950 hp (708 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise, except through shaft-drive, enginewise.

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

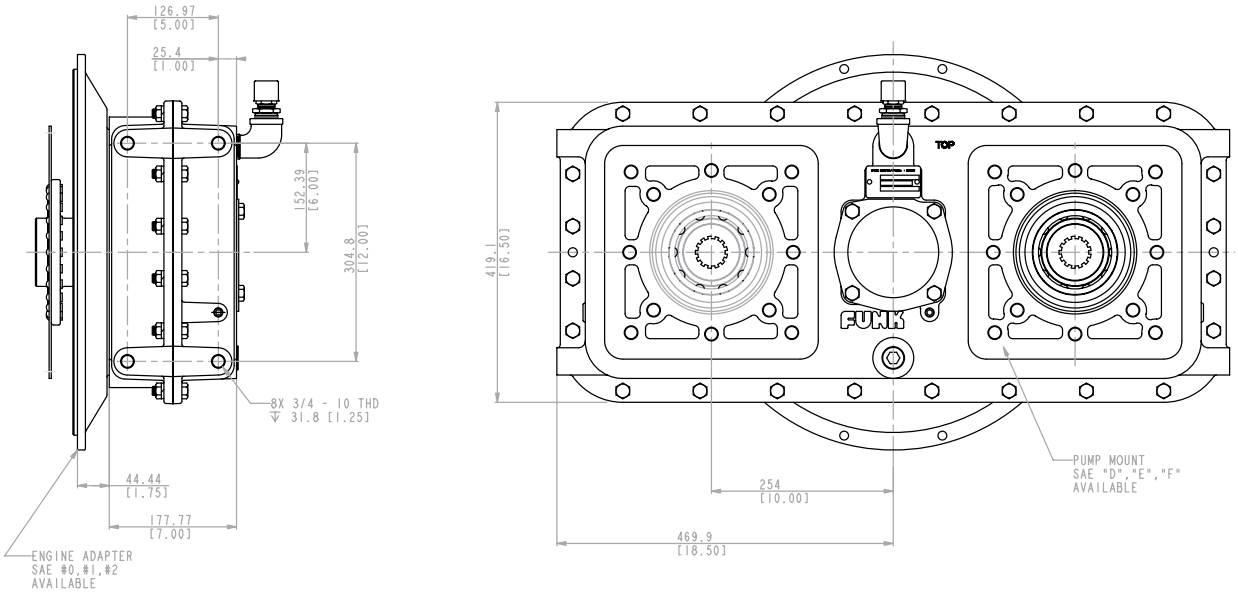
Approximate weight

56005	450 lb (204 kg)
56006	425 lb (193 kg)
56004	600 lb (272 kg)

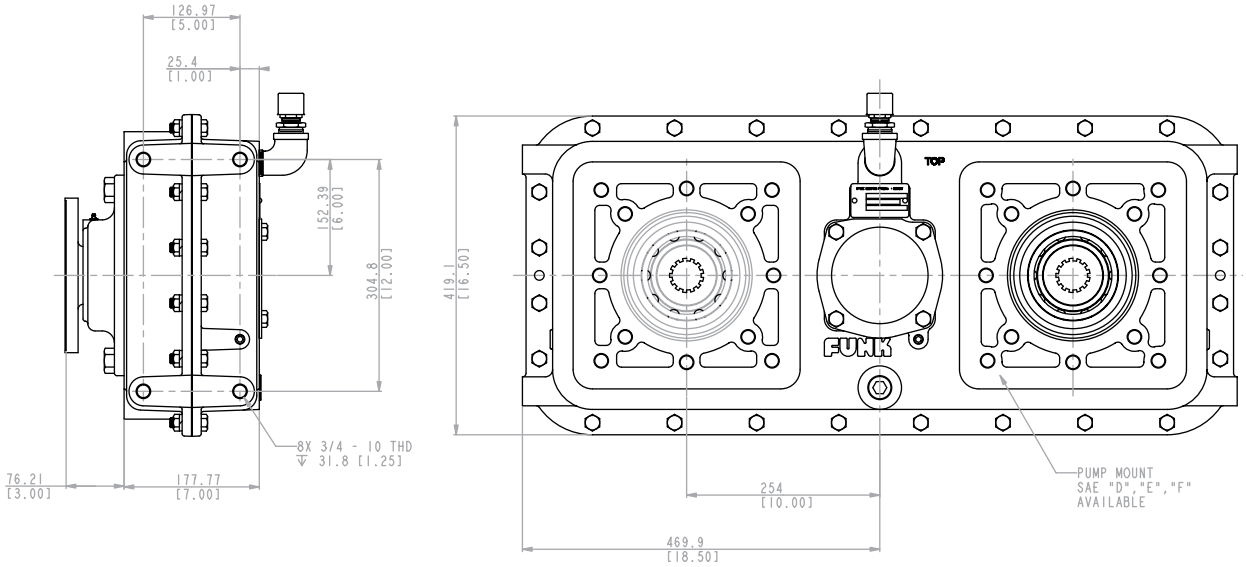
Option selections

Refer to pages 36 – 37.

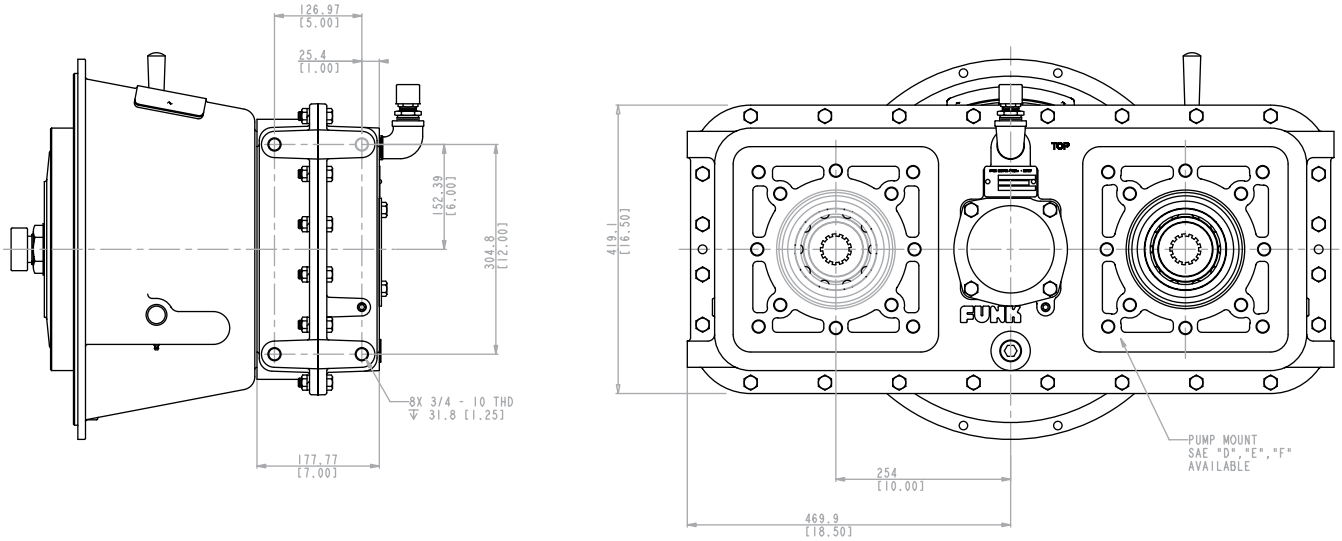
56005



56006


126.97
[5.00]
25.4
[1.00]
152.39
[6.00]
304.8
[12.00]
8X 3/4 - 10 THD
↧ 31.8 [1.25]
76.21
[3.00]
177.77
[7.00]
419.1
[16.50]
TOP
FUNK
254
[10.00]
469.9
[18.50]
PUMP MOUNT
SAE "D","E","F"
AVAILABLE

56004


126.97
[5.00]
25.4
[1.00]
152.39
[6.00]
304.8
[12.00]
8X 3/4 - 10 THD
↧ 31.8 [1.25]
177.77
[7.00]
419.1
[16.50]
TOP
FUNK
254
[10.00]
469.9
[18.50]
PUMP MOUNT
SAE "D","E","F"
AVAILABLE

Series 56000 four

Ratings

Max input torque	2000 lb-ft (2712 Nm)
Max output torque	2000 lb-ft (2712 Nm) per pump pad
Max input or output speed	2500 rpm
Max input power	950 hp (708 kW)
Max output power	950 hp (708 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Anti-enginewise, except through shaft-drive.

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

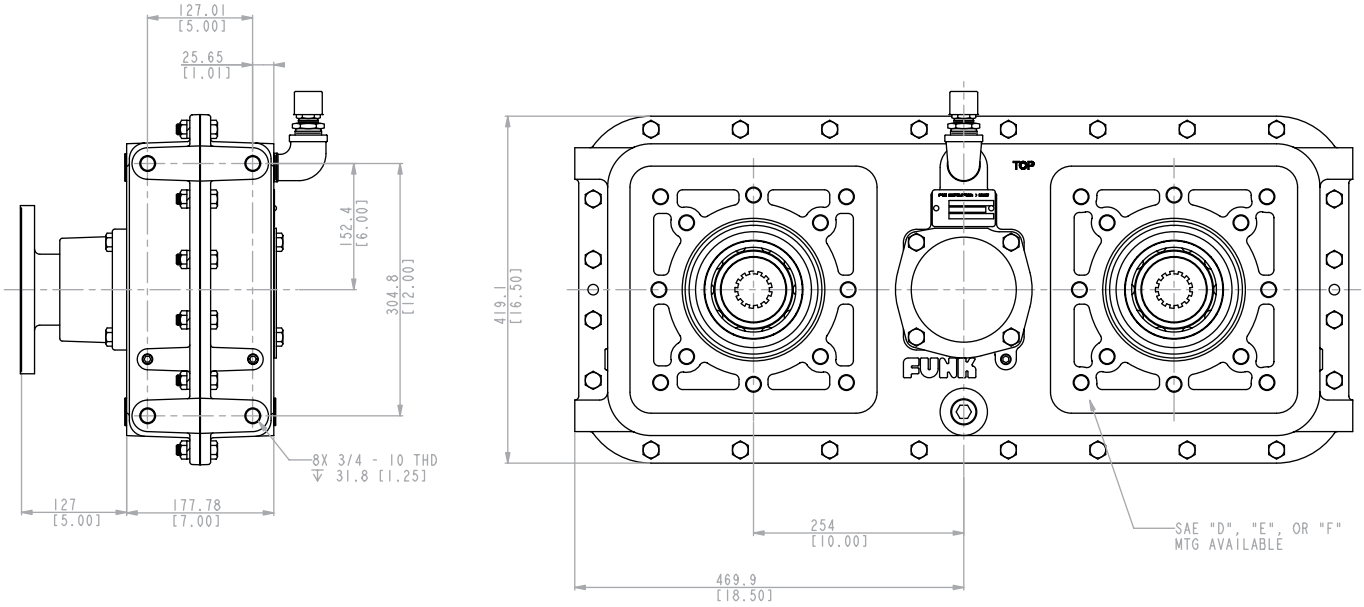
Approximate weight

56009	480 lb (218 kg)

Option selections

Refer to pages 36 – 37.

56009


127.01
[5.00]
25.65
[1.01]
152.4
[6.00]
304.8
[12.00]
8X 3/4 - 10 THD
↧ 31.8 [1.25]
127
[5.00]
177.78
[7.00]
419.1
[16.50]
TOP
FUNK
254
[10.00]
469.9
[18.50]
SAE "D", "E", OR "F"
MTG AVAILABLE

Series 56000 five

Ratings

Max input torque	2000 lb-ft (2712 Nm) or clutch rating-dependent
Max output torque	1500 lb-ft (2034 Nm) per pump pad
Max input or output speed	2500 rpm
Max input power	950 hp (708 kW) or clutch rating-dependent
Max output power	700 hp (522 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Enginewise*

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification, EP gear lubrication specification MIL-L-2105C or API classification GL-5.

Approximate weight

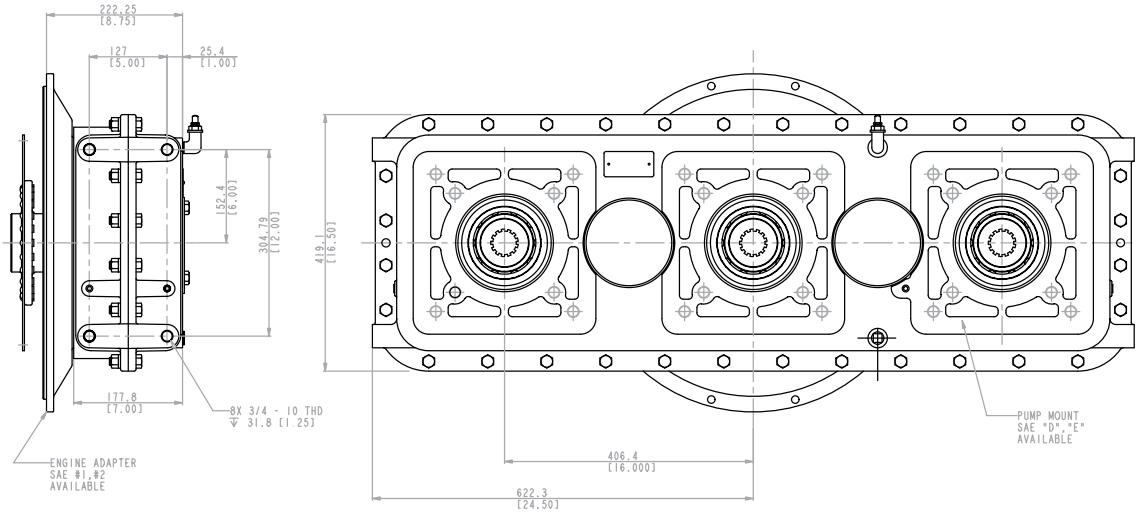
56012	615 lb (279 kg)
56013	580 lb (263 kg)
56011	775 lb (352 kg)

Option selections

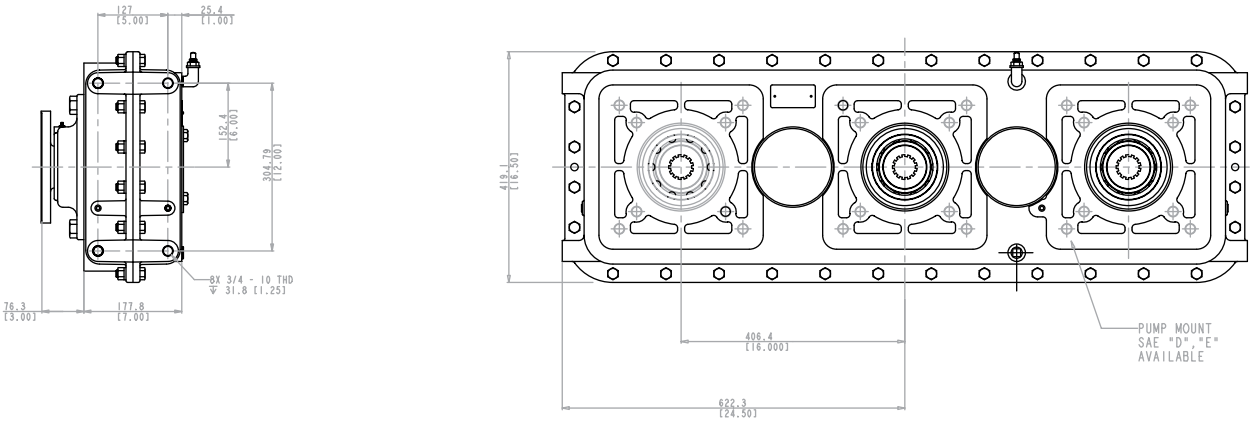
Refer to pages 36 – 37.

*NOTE: Engine side pump mounts on models 56011 and 56012 may be limited on pump size due to interference with adapter housing and/or engine components.

56012



56013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152.4
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304.79
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8X 3/4 - 10 THD
Ø 31.8 [1.25]
76.3
[3.00]
177.8
[7.00]
419.1
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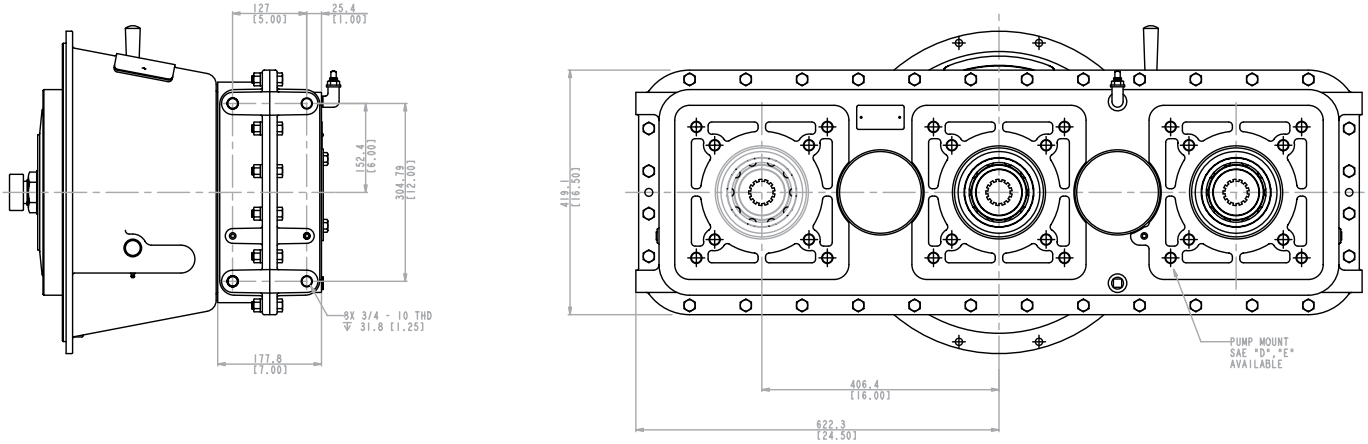
406.4
[16.000]
622.3
[24.50]
PUMP MOUNT
SAE "D","E"
AVAILABLE

56011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[1.00]
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8X 3/4 - 10 THD
Ø 31.8 [1.25]
177.8
[7.00]
419.1
[16.50]
406.4
[16.00]
622.3
[24.50]
PUMP MOUNT
SAE "D","E"
AVAILABLE

Series 56000 five deep sump

Ratings

Max input torque	2000 lb-ft (2712 Nm) or clutch rating-dependent
Max output torque	1500 lb-ft (2034 Nm) per pump pad
Max input or output speed	2500 rpm
Max input power	950 hp (708 kW) or clutch rating-dependent
Max output power	700 hp (522 kW) per pump pad

For further explanation of ratings, see service factors on page 5.

Pump rotation

Enginewise*

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification.

Approximate weight

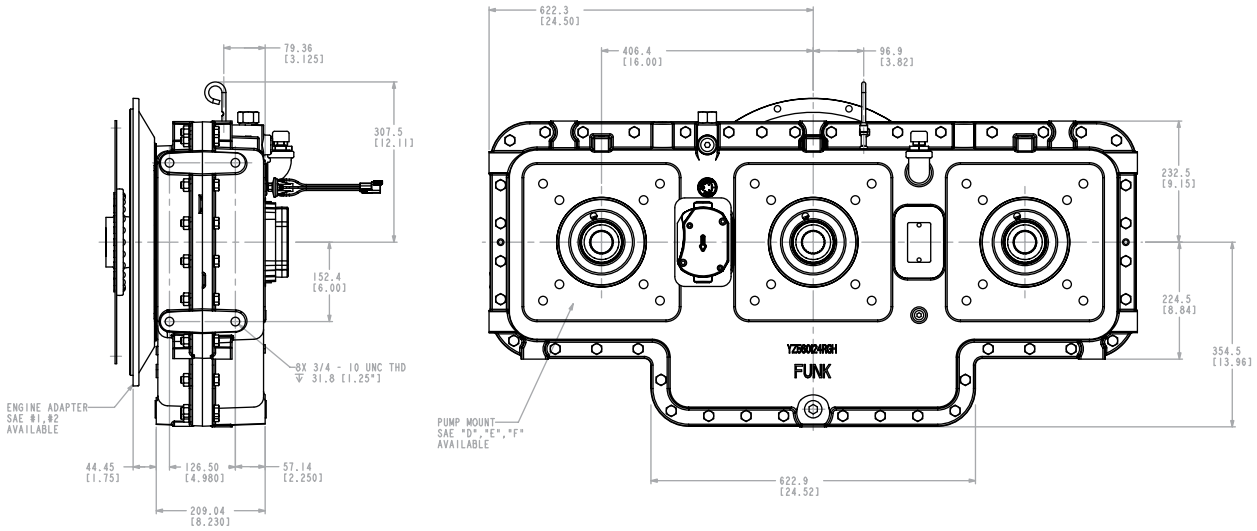
565LXXP	884 lb (402 kg)
565LXR	849 lb (386 kg)
565LXXC	1044 lb (475 kg)

Option selections

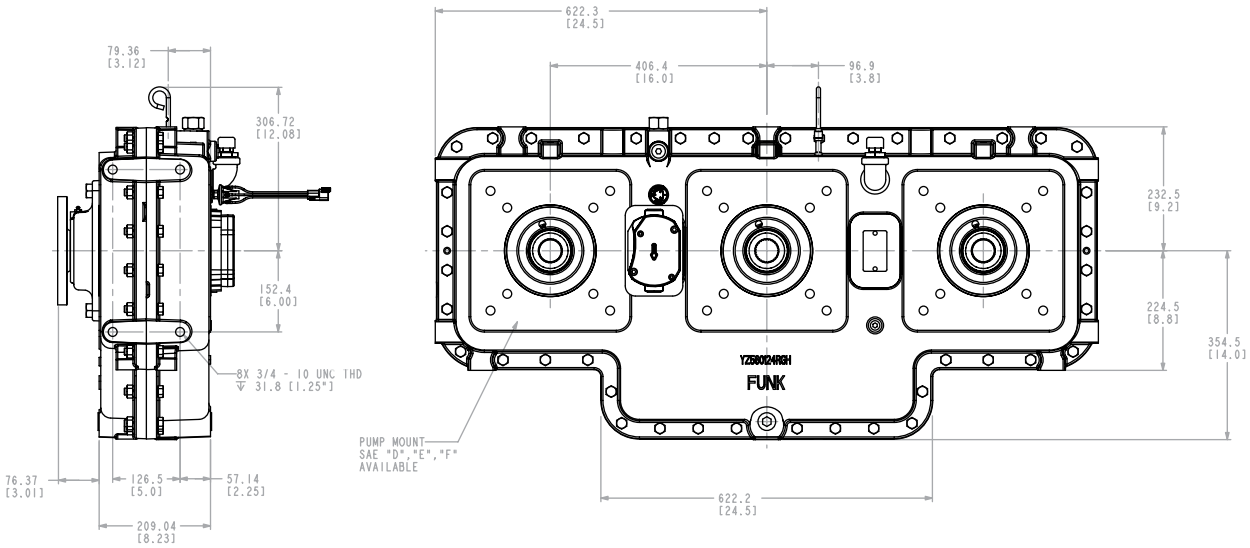
Refer to pages 36 – 37.

*NOTE: Engine side pump mounts on models 565LXXP and 565LXXC may be limited on pump size due to interference with adapter housing and/or engine components.

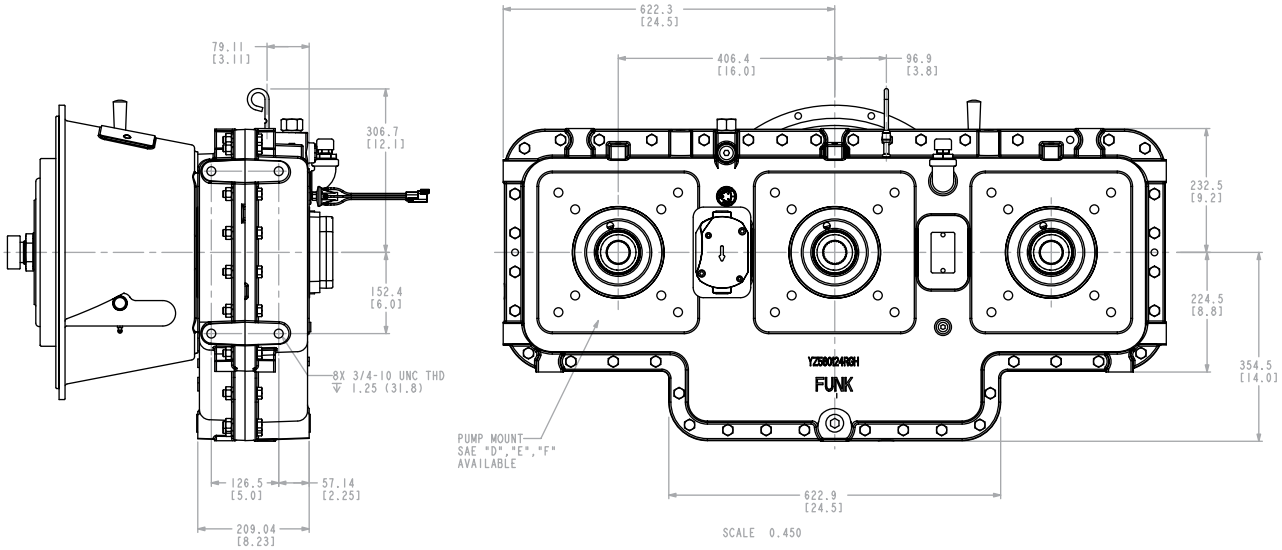
565LXXP



565LXR



565LXXC

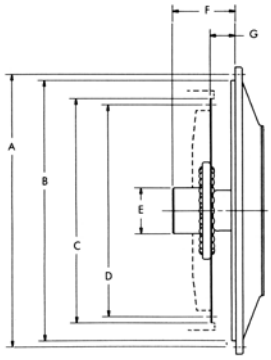


Series 56000 option selections

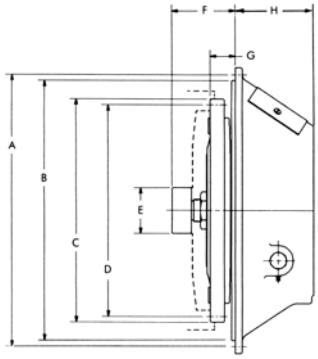
Input

Flywheel cover housing in (mm)			
SAE size	A dimension	B dimension	Bolts required
0	26.750 (679.5)	25.500 (647.7)	16-1/2 (12.7)-13
1	20.875 (530.2)	20.125 (511.2)	12-7/16 (11.1)-14
2	18.375 (466.7)	17.625 (447.7)	12-3/8 (9.5)-16

Plate-driven



Clutch-driven



Clutch cover housing in (mm)				
SAE size	A dimension	B dimension	H dimension	Bolts required
1	20.875 (530.2)	20.125 (511.2)	10.250 (260.4)	12-7/16 (11.1)-14

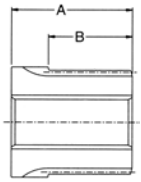
Drive plate assembly in (mm)					
Nominal flywheel size	C dimension	D dimension	G dimension	Holes	Hole size
11-1/2 (292.1)	13.875 (352.4)	13.125 (333.4)	1.56 (39.6)	8	13/32 (10.3)
14 (355.6)	18.375 (466.7)	17.250 (438.2)	1.00 (25.4)	16	17/32 (13.5)
18 (457.2)	22.5 (571.5)	21.375 (542.9)	.62 (15.7)	6	21/32 (16.7)

Pump drive clutch data in (mm)									
Nominal clutch size	Clutch no.	Working torque	C dimension	D dimension	E dimension (pilot bearing)	F dimension	G dimension	Holes	Hole size
11-1/2 (292.1)	SP-211	910 lb-ft (1233.1 Nm)	13.875 (352.4)	13.125 (333.4)	2.44 (62.0) or 2.83 (72.0)	3.94 (100.0)	1.56 (39.6)	8	13/32 (10.3)
14 (355.6)	SP-214	1620 lb-ft (2195 Nm)	18.375 (466.7)	17.250 (438.2)	2.83 (72.0) or 3.15 (80.0)	3.94 (100.0)	1.00 (25.4)	8	17/32 (13.5)

Output

Pump flange data in (mm)				
SAE size	Pilot size	B.C.D.	No. holes	Tap size
B	4.000 (101.6)	5.750 (146.1) 5.000 (127.0)	2 4	1/2 (12.7)-13 1/2 (12.7)-13
C	5.000 (127.0)	7.125 (181.0) 6.375 (161.9)	2 4	5/8 (15.9)-11 1/2 (12.7)-13
D	6.000 (152.4)	9.000 (228.6)	4	3/4 (19.1)-10
E	6.500 (165.1)	12.500 (317.5)	4	3/4 (19.1)-10
F	7.000 (177.8)	13.781 (350.0)	4	1 (25.4)-8

Spline adapter



19T. 8/16P.

Gear ratios

56000 double				
.76:1	.875:1	1:1	1.14:1	1.31:1
56000 four				
.76:1	.875:1	1:1	1.14:1	1.31:1
56000 five				
.875:1	1:1			
56000 five (deep sump)				
.722:1	.857:1			

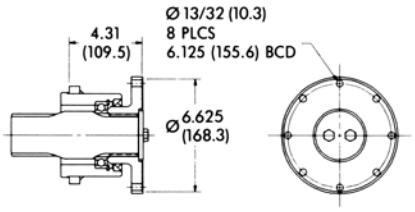
Output

Pump adapter sleeves in (mm)

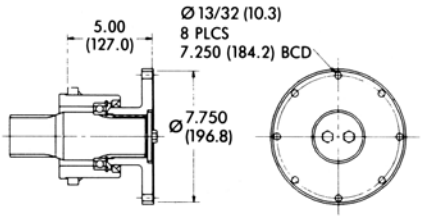
SAE size	A dim.	B dim.	Internal spline
BB*	4.25 (108.0)	1.88 (47.8)	15T. 16/32P.
B*	4.25 (108.0)	1.88 (47.8)	13T. 16/32P.
CC*	4.25 (108.0)	1.88 (47.8)	17T. 12/24P.
C*	4.25 (108.0)	1.88 (47.8)	14T. 12/24P.
D*	4.25 (108.0)	1.88 (47.8)	13T. 8/16P.
D	2.5 (63.5)	1.88 (47.8)	13T. 8/16P.
E	2.5 (63.5)	1.88 (47.8)	13T. 8/16P.
F	2.88 (7.32)	1.88 (47.8)	15T. 8/16P.

* These are for use with add-on adapter plates.

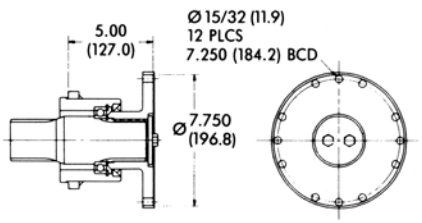
Input drive assemblies in (mm)



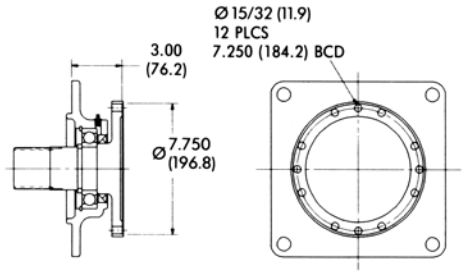
SPICER 1600, MECH 6C OR 7C FLANGE



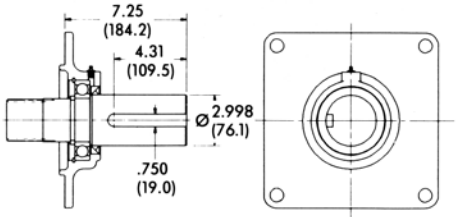
SPICER 1700, MECH 7C OR 8C FLANGE



SPICER 1800 OR 1850 FLANGE



SPICER 1800 OR 1850 FLANGE



Ø 3" KEYED SHAFT

Series 57000 four (14 in centers)

Ratings

Max input torque	2000 lb-ft (2712 Nm) or clutch rating-dependent
Max output torque	2000 lb-ft (2712 Nm) per pump pad
Max input or output speed	2500 rpm
Max input power	950 hp (708 kW) or clutch rating-dependent
Max output power	950 hp (708 kW) per pump pad

Pump rotation

Anti-enginewise

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification.

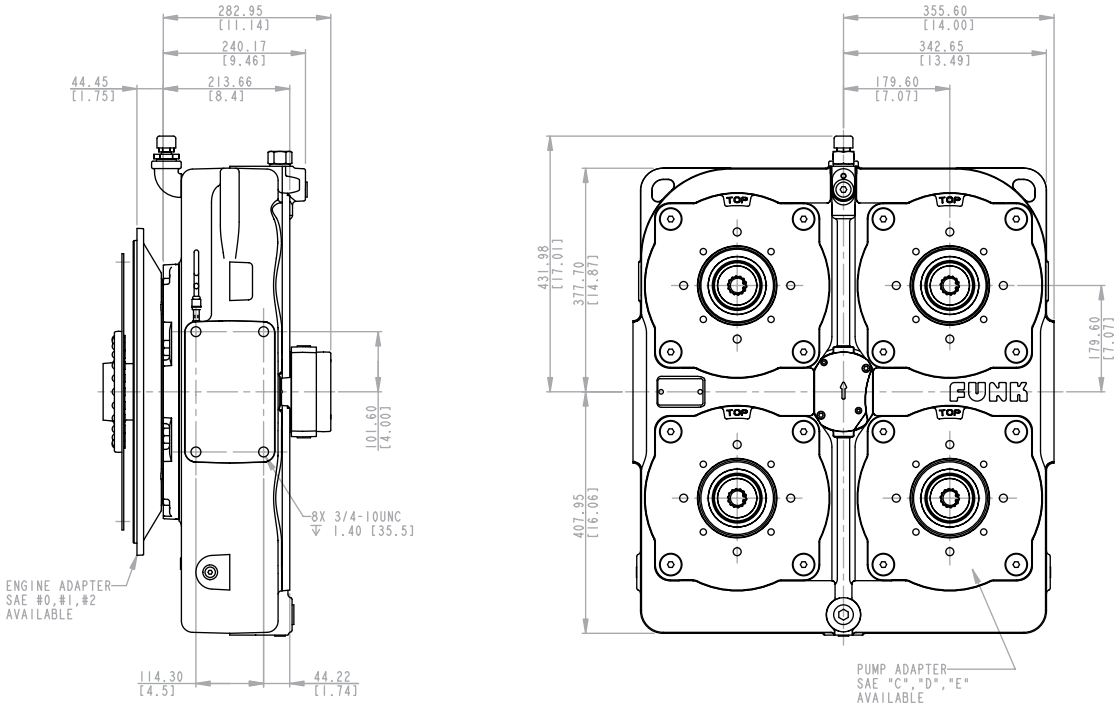
Approximate weight

5714P	725 lb (329 kg)
5714R	700 lb (318 kg)
5714C	775 lb (352 kg)

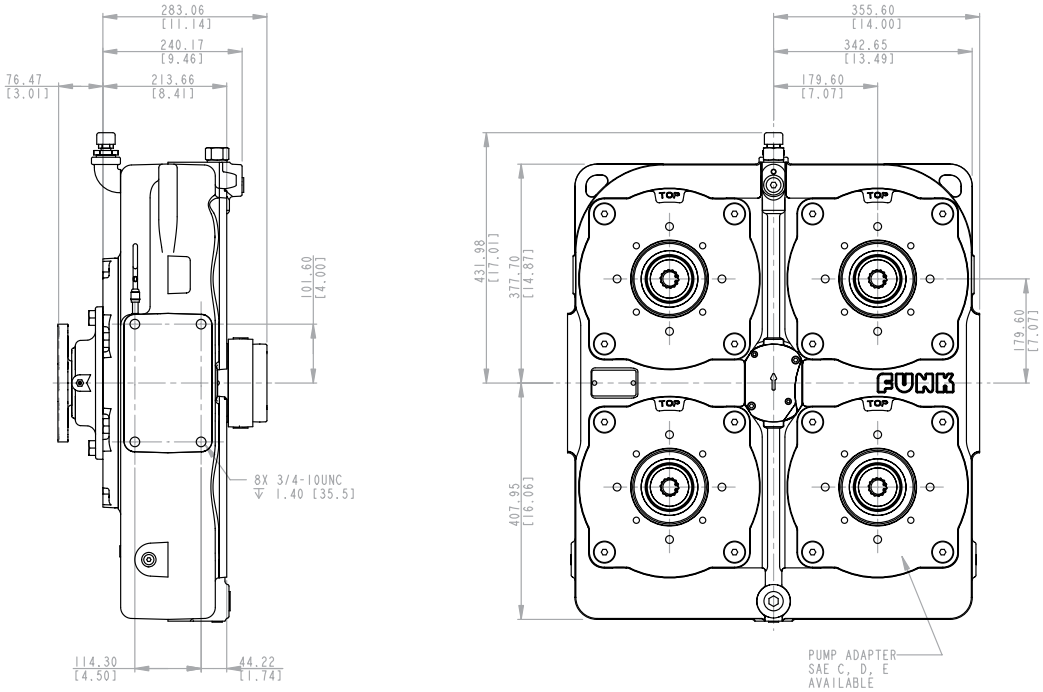
Option selections

Refer to pages 42 – 43.

5714P



5714R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↧ 1.40 [35.5]
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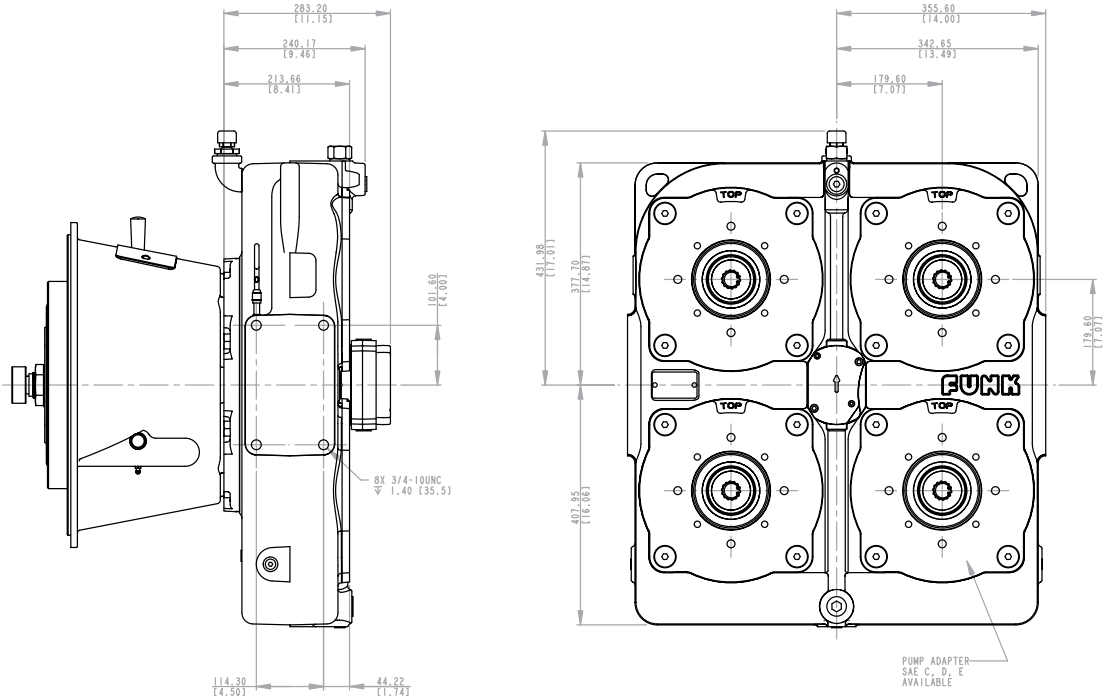
TOP
FUNK
PUMP ADAPTER
SAE C, D, E
AVAILABLE

5714C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TOP
FUNK
PUMP ADAPTER
SAE C, D, E
AVAILABLE

Series 57000 four (16 in centers)

Ratings

Max input torque	2000 lb-ft (2712 Nm) or clutch rating-dependent
Max output torque	2000 lb-ft (2712 Nm) per pump pad
Max input or output speed	2500 rpm
Max input power	950 hp (708 kW) or clutch rating-dependent
Max output power	950 hp (708 kW) per pump pad

Oil

John Deere Hy-Gard or any oil that meets JDM J20C specification.

Approximate weight

5716P	770 lb (350 kg)
5716R	735 lb (334 kg)
5716C	920 lb (418 kg)

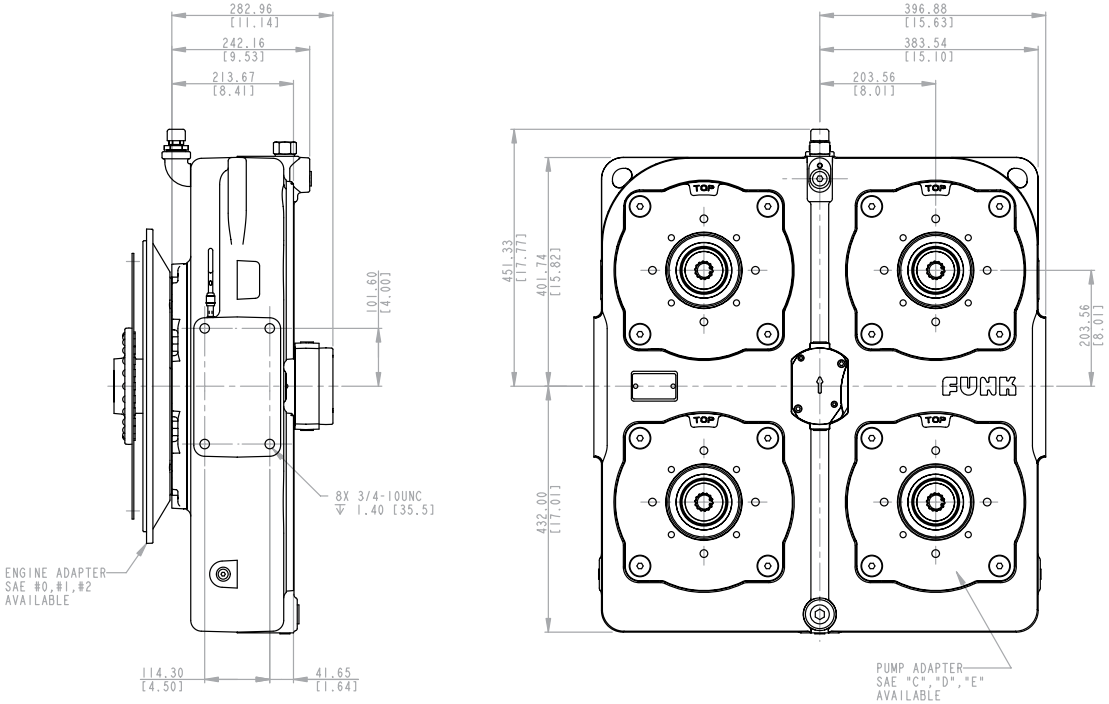
Pump rotation

Anti-enginewise

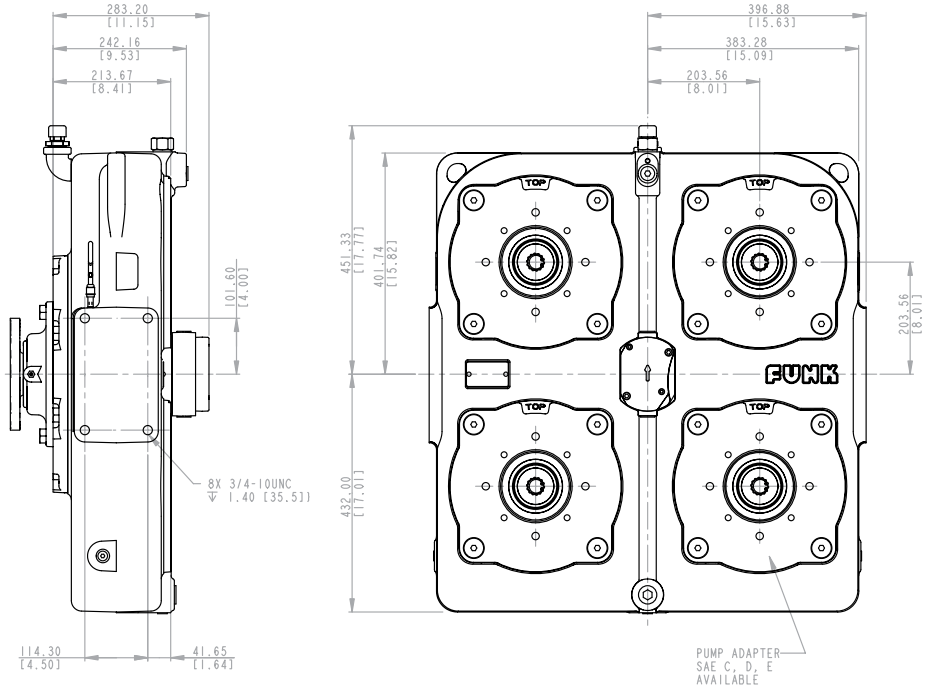
Option selections

Refer to pages 42 – 43.

5716P



5716R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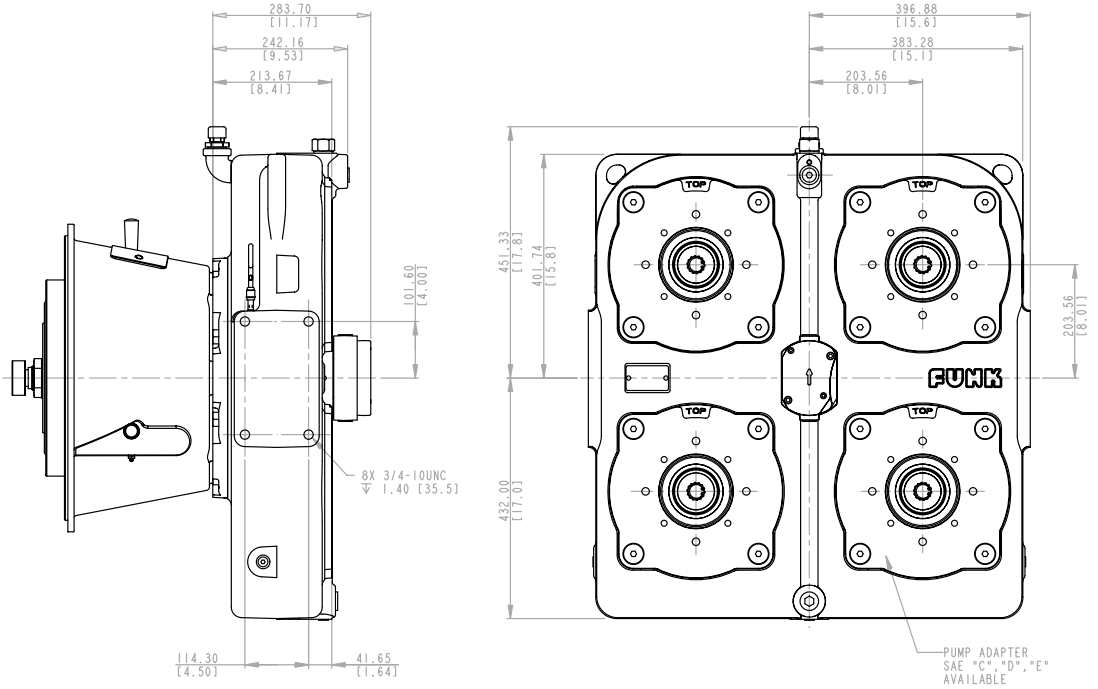
203.56
[8.01]
TOP
FUNK
PUMP ADAPTER
SAE C, D, E
AVAILABLE

5716C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↧ 1.40 [35.5]
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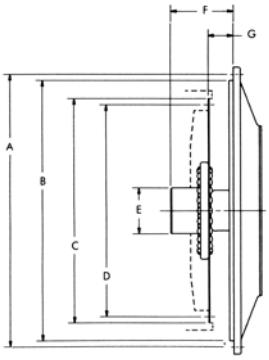
401.74
[15.8]
432.00
[17.01]
203.56
[8.01]
TOP
FUNK
PUMP ADAPTER
SAE "C","D","E"
AVAILABLE

Series 57000 option selections

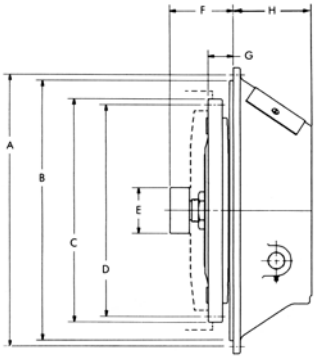
Input

Flywheel cover housing in (mm)			
SAE size	A dimension	B dimension	Bolts required
0	26.750 (679.5)	25.500 (647.7)	16-1/2 (12.7)-13
1	20.875 (530.2)	20.125 (511.2)	12-7/16 (11.1)-14

Plate-driven



Clutch-driven

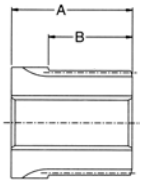


Clutch cover housing in (mm)				
SAE size	A dimension	B dimension	H dimension	Bolts required
1	20.875 (530.2)	20.125 (511.2)	10.250 (260.4)	12-7/16 (11.1)-14

Drive plate assembly in (mm)					
Nominal flywheel size	C dimension	D dimension	G dimension	Holes	Hole size
11-1/2 (292.1)	13.875 (352.4)	13.125 (333.4)	1.56 (39.6)	8	13/32 (10.3)
14 (355.6)	18.375 (466.7)	17.250 (438.2)	1.00 (25.4)	16	17/32 (13.5)
18 (457.2)	22.5 (571.5)	21.375 (542.9)	.62 (15.7)	6	21/32 (16.7)

Pump drive clutch data in (mm)									
Nominal clutch size	Clutch no.	Working torque	C dimension	D dimension	E dimension (pilot bearing)	F dimension	G dimension	Holes	Hole size
14 (355.6)	SP-214	1620 lb-ft (2195 Nm)	18.375 (466.7)	17.250 (438.2)	2.83 (72.0) or 3.15 (80.0)	3.94 (100.0)	1.00 (25.4)	8	17/32 (13.5)

Spline adapter



19T. 8/16P.

Gear ratios

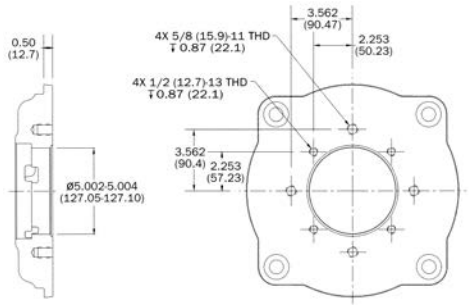
57000 four (14 in centers)		
.667:1	.837:1	1:1
57000 four (16 in centers)		
.774:1	.83:1	1:1

Output

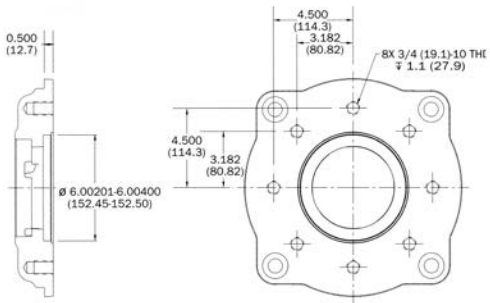
Pump adapter sleeves in (mm)			
SAE size	A dimension	B dimension	Internal spline
C	2.88 (73.15)	2.00 (50.80)	14T. 12/24P.
D	2.5 (63.5)	1.88 (47.78)	13T. 8/16P.
E	2.5 (63.5)	1.88 (47.78)	13T. 8/16P.

Pump adapter plates in (mm)

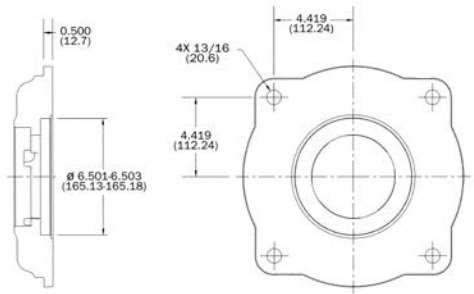
SAE C



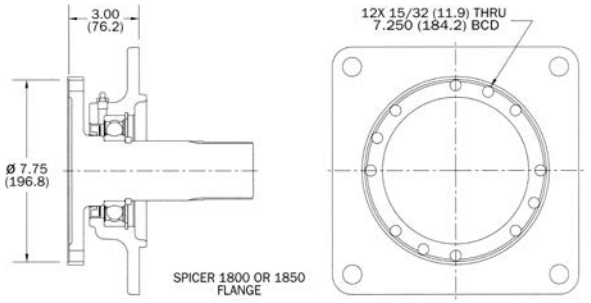
SAE D

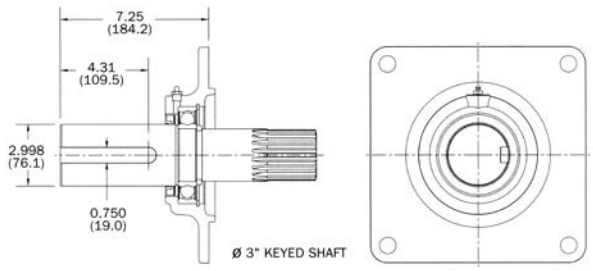


SAE E



Input drive assemblies in (mm)





SAE engine flywheel and housing standards

The table and drawings below give dimensions for flywheel housings. The drawings also show spacing for 8-, 12-, and 16-bolt flange mounting patterns.

Mating housing flanges

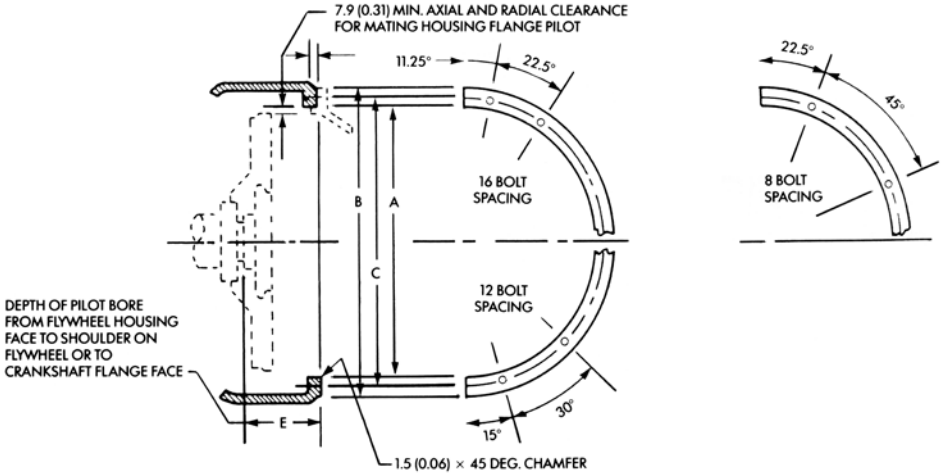
The capscrew holes on the mating housing flanges shall be 1.19 (0.047) larger than the nominal diameter of the capscrews used on the flywheel housing.

The diameter of the pilot on the flange of the mating housing shall be the same as the nominal diameter of the bore in the flywheel housing:

The tolerances shall be +0.000 and -0.13 (0.005), and the maximum eccentricity shall be 0.064 (0.0025) [indicated runout 0.13 (0.005)].

The mating housing flange pilot diameter shall be 6.4 (0.25) long, and its lead-in chamfer shall not exceed 2.0 (0.08) in length. The fillet radius between the mounting flange face and the pilot diameter shall not exceed 1.0 (0.04) R.

The maximum variation of the face of the mating housing flange from its true position, when rotated about its axis, shall be 0.064 (0.0025) [indicated runout 0.13 (0.005)].



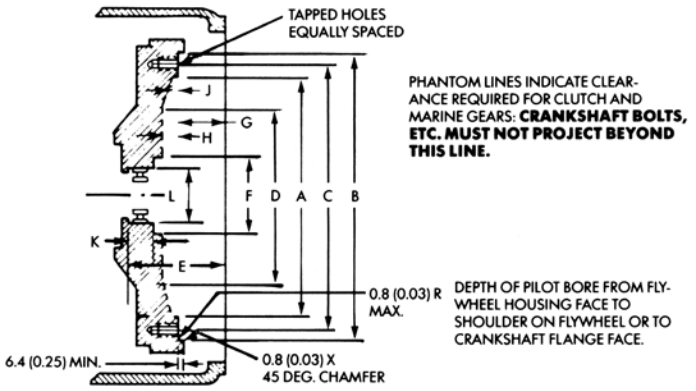
Flywheel housing dimensions mm (in)

SAE no.	A	Tolerance		B	C	E	Tapped holes	
		Bore diameter 0.00	Bore eccentricity/ face deviation				Holes	Hole size
00	787.40 (31.000)	+0.25 (0.010)	0.30 (0.012)	882.6 (34.75)	850.90 (33.500)	100.0 (3.94)	16	1/2-13
0	647.70 (25.500)	+0.25 (0.010)	0.25 (0.010)	711.2 (28.00)	679.45 (26.750)	100.0 (3.94)	16	1/2-13
1/2	584.20 (23.000)	+0.20 (0.008)	0.25 (0.010)	647.7 (25.50)	619.12 (24.375)	100.0 (3.94)	12	1/2-13
1	511.18 (20.125)	+0.13 (0.005)	0.20 (0.008)	552.4 (21.75)	530.22 (20.875)	100.0 (3.94)	12	7/16-14
2	447.68 (17.625)	+0.13 (0.005)	0.20 (0.008)	489.0 (19.25)	466.72 (18.375)	100.0 (3.94)	12	3/8-16
3	409.58 (16.125)	+0.13 (0.005)	0.20 (0.008)	450.8 (17.75)	428.62 (16.875)	100.0 (3.94)	12	3/8-16
4	361.95 (14.250)	+0.13 (0.005)	0.15 (0.006)	403.4 (15.88)	381.00 (15.000)	100.0 (3.94)	12	3/8-16
5	314.32 (12.375)	+0.13 (0.005)	0.15 (0.006)	355.6 (14.00)	333.38 (13.125)	71.4 (2.81)	8	3/8-16
6	266.70 (10.500)	+0.13 (0.005)	0.15 (0.006)	307.8 (12.12)	285.75 (11.250)	71.4 (2.81)	8	3/8-16

The tables and drawings give dimensions for over-center clutch flywheels.

For dimensions of industrial power take-offs with driving-ring-type over-center clutches, see SAE J620.

For flywheel dimensions for engine-mounted torque converters without front disconnect clutch, see SAE J927.



Flywheel dimensions mm (in)						
Clutch no.	A	B[ab]	C	D	E	F
6-1/2	184.2 (7.25)	215.90 (8.500)	200.02 (7.875)	127.0 (5.00)	71.4 (2.81)	63.5 (2.50)
7-1/2	206.2 (8.12)	241.30 (9.500)	222.25 (8.750)	—	71.4 (2.81)	63.5 (2.50)
8	225.6 (8.88)	263.52 (10.375)	244.48 (9.625)	—	100.0 (3.94)	76.2 (3.00)
10	276.4 (10.88)	314.32 (12.375)	295.28 (11.625)	196.8 (7.75)	100.0 (3.94)	76.2 (3.00)
11-1/2	314.5 (12.38)	352.42 (13.875)	333.38 (13.125)	203.2 (8.00)	100.0 (3.94)	—
14	409.4 (16.12)	466.72 (18.375)	438.15 (17.250)	222.2 (8.75)	100.0 (3.94)	101.6 (4.00)
16	460.2 (18.12)	517.52 (20.375)	488.95 (19.250)	254.0 (10.00)	100.0 (3.94)	104.6 (4.12)
18	498.3 (19.62)	571.52 (20.375)	542.92 (21.375)	—	100.0 (3.94)	104.6 (4.12)
21	584.2 (23.00)	673.10 (26.500)	641.35 (25.250)	—	100.0 (3.94)	146.0 (5.75)
24	644.7 (25.38)	733.42 (28.875)	692.15 (27.250)	—	100.0 (3.94)	146.0 (5.75)

Flywheel dimensions mm (in)							
Clutch no.	G	H	J	K[c]	L[bc]	Tapped holes[d]	
						No. holes	Hole size
6-1/2	30.2 (1.19)	12.7 (0.50)	9.7 (0.38)	17.5 (0.69)	52.000 (2.0472)	6	5/16-18
7-1/2	30.2 (1.19)	12.7 (0.50)	12.7 (0.50)	17.5 (0.69)	52.000 (2.0472)	8	5/16-18
8	62.0 (2.44)	12.7 (0.50)	12.7 (0.50)	19.0 (0.75)	62.000 (2.4409)	6	3/8-16
10	53.8 (2.12)	15.7 (0.62)	12.7 (0.50)	28.4 (1.12)	72.000 (2.8346)	8	3/8-16
11-1/2	39.6 (1.56)	28.4 (1.12)	22.4 (0.88)	31.8 (1.25)	72.000 (2.8346)	8	3/8-16
14	25.4 (1.00)	28.4 (1.12)	22.4 (0.88)	38.1 (1.50)	80.000 (3.1496)	8	1/2-13
16	15.7 (0.62)	28.4 (1.12)	22.4 (0.88)	44.4 (1.75)	100.000 (3.9370)	8	1/2-13
18	15.7 (0.62)	31.8 (1.25)	31.8 (1.25)	44.4 (1.75)	100.000 (3.9370)	6	5/8-11
21	0.0 (0.00)	31.8 (1.25)	31.8 (1.25)	57.2 (2.25)	130.000 (5.1181)	12	5/8-11
24	0.0 (0.00)	31.8 (1.25)	31.8 (1.25)	57.2 (2.25)	130.000 (5.1181)	12	3/4-10

NOTE: Suggested tolerances are to be measured on assembled engine; for measuring procedure, see SAE J1033.

[a] Diameter tolerance of driving-ring pilot bore 'B' is +0.13 (0.005), -0.000; maximum eccentricity is 0.13 (0.005) total indicator reading (see footnote b); face runout maximum total indicator reading is 0.0005 times the measured diameter. Diameter tolerance for mating driving-ring, etc. pilot diameter is +0.000, -0.13 (0.005).

[b] Eccentricity between driving-ring pilot bore 'B' and pilot bearing bore 'L' is not to exceed 0.20 (0.008) total indicator reading.

[c] 'K' is length of bore for pilot bearing; 'L' is nominal diameter of bearing. Diameter and fit are to suit installation. Maximum eccentricity is 0.13 (0.005) total indicator reading (see footnote b).

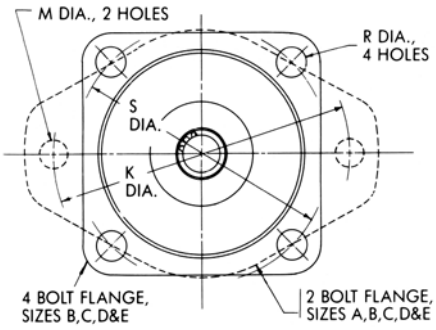
[d] Tapped holes shall be threaded in accordance with UNC Class 2B tolerances of ANSI B1.1 screw threads, and the minimum length of thread engagement shall be 1.5 times the nominal diameter.

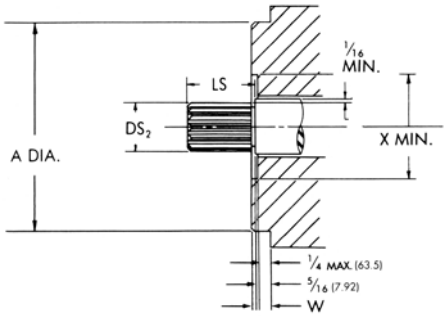
SAE hydraulic pump and motor drive standards

SAE standards

The SAE standards and specifications shown below are intended primarily for hydraulic power transmission pumps and motors on construction and industrial machinery and equipment.

We provide pump mounting flange and spline configurations to match most typical SAE flange sizes used within the power range of the pump drive. Other non-SAE standard spline sizes may be available. Consult your John Deere Power Systems distributor for other spline sizes available.





Mounting dimensions in (mm)										
SAE size	A	W	X	K	S	M	R	DS_2	LS	Spline 30° involute
A	3.250 (82.55) 3.248 (82.49)	0.250 (6.35) 0.230 (5.84)	—	4.188 (106.38)	—	0.438 (11.13)	—	.625 (15.88)	0.938 (23.82)	9 Teeth 16/32 D. P.
B	4.000 (101.60) 3.998 (101.55)	0.380 (9.65) 0.360 (9.14)	2.000 (50.80)	5.750 (146.05)	5.000 (127.00)	0.562 (14.27)	0.562 (14.27)	.875 (22.23)	1.312 (33.32)	13 Teeth 16/32 D. P.
BB	4.000 (101.60) 3.998 (101.55)	0.360 (9.14) 0.340 (8.63)	2.000 (50.80)	5.750 (146.05)	5.000 (127.00)	0.562 (14.27)	0.562 (14.27)	1.000 (25.40)	1.500 (38.10)	15 Teeth 16/32 D. P.
C	5.000 (127.00) 4.998 (126.95)	0.500 (12.70) 0.480 (12.19)	2.500 (63.5)	7.125 (180.98)	6.375 (161.93)	0.68 (17.27)	0.562 (14.27)	1.25 (31.75)	1.875 (46.63)	14 Teeth 12/24 D. P.
CC	5.000 (127.00) 4.998 (126.95)	0.500 (12.70) 0.480 (12.19)	2.500 (63.5)	7.125 (180.98)	6.375 (161.93)	0.688 (17.48)	0.562 (14.27)	1.500 (38.10)	2.125 (53.98)	17 Teeth 12/24 D. P.
D	6.000 (152.40) 5.998 (152.35)	0.500 (12.70) 0.480 (12.19)	2.750 (69.85)	9.000 (228.60)	9.000 (228.60)	0.812 (20.62)	0.812 (20.62)	1.75 (44.45)	2.625 (66.68)	13 Teeth 8/16 D. P.
E	6.500 (165.10) 6.498 (165.05)	0.625 (15.88) 0.605 (15.37)	2.750 (69.85)	12.500 (317.50)	12.500 (317.50)	1.062 (26.97)	0.812 (20.62)	1.75 (44.45)	2.625 (66.68)	13 Teeth 8/16 D. P.
F	7.000 (177.80) 6.998 (177.75)	0.625 (15.88) 0.605 (15.37)	2.750 (69.85)	13.781 (350.04)	13.781 (350.04)	1.062 (26.97)	1.062 (26.97)	1.998 (50.75)	3.125 (79.38)	15 Teeth 8/16 D. P.

Formulas

Fluid power formulas		
	English	Metric
Fluid pressure	Pounds/square inch = force (lb) ÷ unit area (sq in)	Bar = force (N) ÷ area (cm^2) x 10
Cylinder area	Square inches (head end) = π x radius^2 (in) or π x diameter^2 (in) ÷ 4	cm^2 (head end = π x radius^2 (cm) or π x diameter^2 (cm) ÷ 4
Cylinder area	Square inches (rod end) = π ÷ 4 x (diameter piston^2 - diameter rod^2)	cm^2 (rod end) = π x (diameter piston^2 - diameter rod^2) ÷ 4
Cylinder force	Pounds, push or pull = pressure (psi) x net area (sq in)	N = pressure (bar) x area (cm^2) x 10
Cylinder velocity	Feet/second = 231 x flow rate (gpm) ÷ 12 x 60 x net area (sq in)	m/s = flow rate (lpm) ÷ cylinder area (cm^2) x 6
Cylinder volume capacity	Gallons = π x radius^2 (in) x stroke (in) ÷ 231 Gallons = net area (sq in) x stroke (in) ÷ 231	liters = cylinder area (cm^2) x stroke (cm) ÷ 1000
Cylinder flow rate	Gallons/minute = 12 x 60 x velocity (ft/sec) x net area (sq in) ÷ 231	liters/minute = area (cm^2) x velocity (m/s) x 600
Fluid motor torque	Inch pounds = pressure (psi) x F.M. displacement (in^3/rev) ÷ 2π Inch pounds = horsepower x 63025 ÷ rpm Inch pounds = flow rate (gpm) x pressure (psi) x 36.77 ÷ rpm	Nm = pres. (bar) x displacement (cm^3/rev) x efficiency ÷ 20 x π
Fluid motor speed	Revolutions/minute = 231 x flow rate (gpm) ÷ F.M. displacement (in^3/rev)	rpm = flow (lpm) x 1000 ÷ displacement (cm^3/rev)
Fluid motor power	Horsepower output = torque output (in/lb) x rpm ÷ 63025	kW = torque (Nm) x speed (rpm) ÷ 9549
Pump outlet flow	Gallons/minute = rpm x pump displacement (in^3/rev) ÷ 231	lpm = displacement (cm^3/rev) x speed (rpm) ÷ 1000
Pump input power	Horsepower required = flow rate output (gpm) x pressure (psi) ÷ 1714 x efficiency (overall)	kW = flow (lpm) x pressure (bar) ÷ 600 x efficiency
Flow velocity	Feet/second = .3208 x flow rate through I.D. (gpm) ÷ internal area (sq in)	m/s = flow (lpm) ÷ area (cm^2) x 6

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