

MAKING MODERN LIVING POSSIBLE



Technical Information

# Series 45 G Frame

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**Frame G**

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This information was removed from:

*Series 45 Axial Piston Open Circuit Pumps Technical Information Manual* **520L0519**

Rev E November 2006

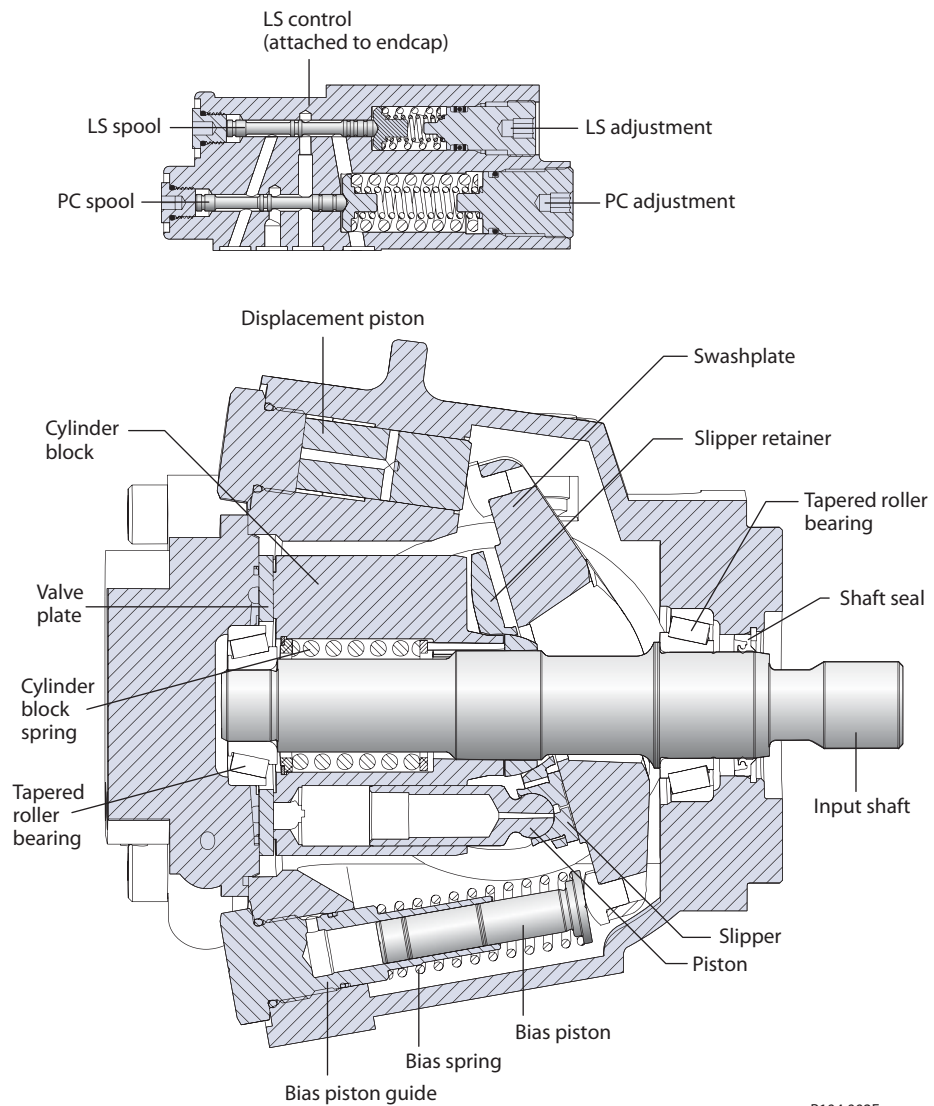
For more information regarding the Series 45 product line refer to the current version of **520L0519**.

**Design**

Series 45 Frame G pumps have a dual servo piston design with a cradle-type swashplate set in polymer-coated journal bearings. The bias piston increases swashplate angle. The displacement piston decreases swashplate angle. At equal pressure, the larger diameter displacement piston overpowers the bias piston. Nine reciprocating pistons displace fluid from the pump inlet to the pump outlet as the cylinder block rotates on the pump input shaft. The block spring holds the piston slippers to the swashplate via the slipper retainer. The cylinder block rides on a bi-metal valve plate optimized for high volumetric efficiency and low noise. Tapered roller bearings support the input shaft and a viton lip-seal protects against shaft leaks.

An adjustable one spool (PC only, not shown) or two spool (LS) control senses system pressure and load pressure (LS controls). The control ports system pressure to the displacement piston to control pump output flow.

Frame G cross section



P104 002E

**Specifications**

For general operating parameters, including fluid viscosity, temperature, and inlet and case pressures, [see page 13](#). For system design parameters, including installation, filtration, reservoir, and line velocities, [see page 15](#).

*Features and options*

Feature		Unit	Model	
			G74B	G90C
Maximum Displacement		cm <sup>3</sup> [in <sup>3</sup> ]	74 [4.52]	90 [5.49]
Flow at rated speed (theoretical)		l/min [US gal/min]	177.6 [46.9]	198 [52.3]
Input torque at maximum displacement (theoretical)		N·m/bar [lbf·in/1000 psi]	1.178 [719]	1.432 [874]
Mass moment of inertia of internal rotating components		kg·m <sup>2</sup> [slug·ft <sup>2</sup> ]	0.00630 [0.00465]	0.00650 [0.00480]
Weight	Axial ports	kg [lb]	29 [63]	
	Radial ports		36 [80]	
Rotation		Clockwise, Counterclockwise		
Mounting		SAE-C		
Auxiliary mounting ( <a href="#">See page 74</a> )		SAE-A, SAE-B, SAE-BB, SAE-C		
System ports (type)		4-bolt split flange		
System ports (location)		Axial, Radial		
Control types ( <a href="#">See page 71</a> )		PC, Remote PC, LS, LS with internal bleed		
Shafts ( <a href="#">See page 73</a> )	Splined	14 tooth, 17 tooth		
	Straight	Ø 31.75 mm [1.25 in]		
Displacement limiters ( <a href="#">See page 75</a> )		Optional, adjustable		

For definitions of pressure and speed ratings, [see page 14](#). For more information on external shaft loads, [see page 16](#); mounting flange loads, [see page 17](#).

*Ratings*

Rating		Units	Model	
			G74B	G90C
Input speed <sup>1</sup>	minimum	min <sup>-1</sup> (rpm)	500	500
	continuous		2400	2200
	maximum		2800	2600
Working pressure	continuous	bar [psi]	310 [4495]	260 [3770]
	maximum		400 [5800]	350 [5075]
External shaft loads	External moment (M <sub>e</sub> )	N·m [lbf·in]	300 [2655]	
	Thrust in (T <sub>in</sub> ), out (T <sub>out</sub> )	N [lbf]	2900 [650]	
Bearing life	at 140 bar [2030 psi]	B <sub>10</sub> hours	41 383	19 847
	at 210 bar [3045 psi]		9048	4339
	at 260 bar [3770 psi]		4062	1948
	at 310 bar [4495 psi]		2101	—
Mounting flange load moments	Vibratory (continuous)	N·m [lbf·in]	1580 [14 000]	
	Shock (max)		5650 [50 000]	

1. Input speeds are valid at 1 bar absolute [0 in Hg vac] inlet pressure. See [Inlet pressure vs. speed](#) charts.

*Sound levels<sup>2</sup>*

For more information on noise levels, [see page 19](#).

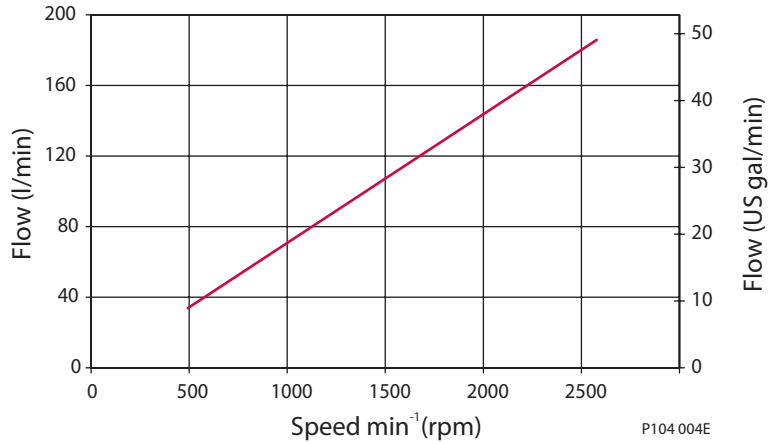
dB(A)	210 bar [3045 psi]		260 bar [3770 psi]		310 bar [4495 psi]		
	Model	1800 min <sup>-1</sup> (rpm)	Rated speed	1800 min <sup>-1</sup> (rpm)	Rated speed	1800 min <sup>-1</sup> (rpm)	Rated speed
G74B		75	78	74	76	75	77
C90C		74	76	75	77	—	—

2. Sound data was collected in a *semi-anechoic* chamber. Values have been adjusted (-3 dB) to reflect *anechoic* levels.

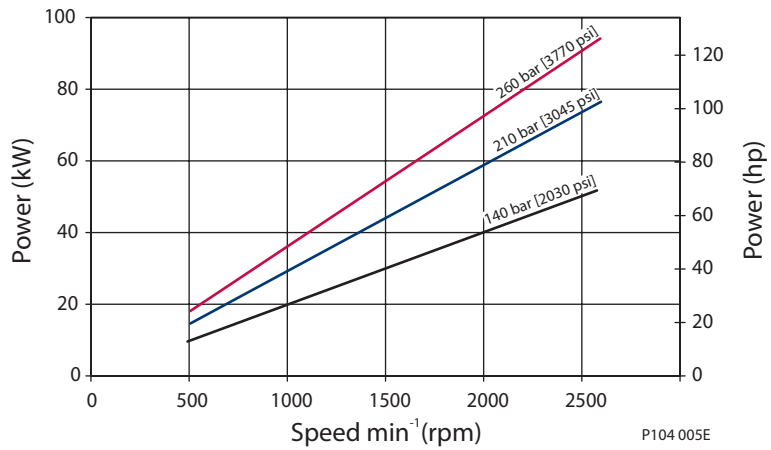
**Performance**  
**G74B**

Flow and power data valid at 49°C [120°F] and viscosity of 17.8 mm<sup>2</sup>/sec [88 SUS].

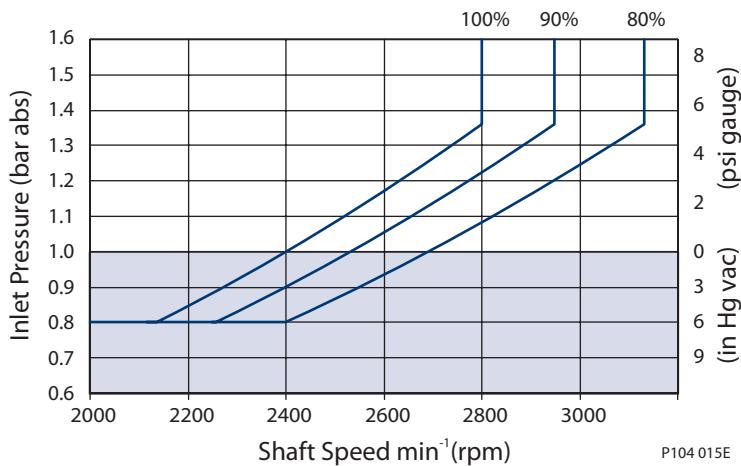
*Flow vs. speed*



*Input power vs. speed*



*Inlet pressure vs. speed*

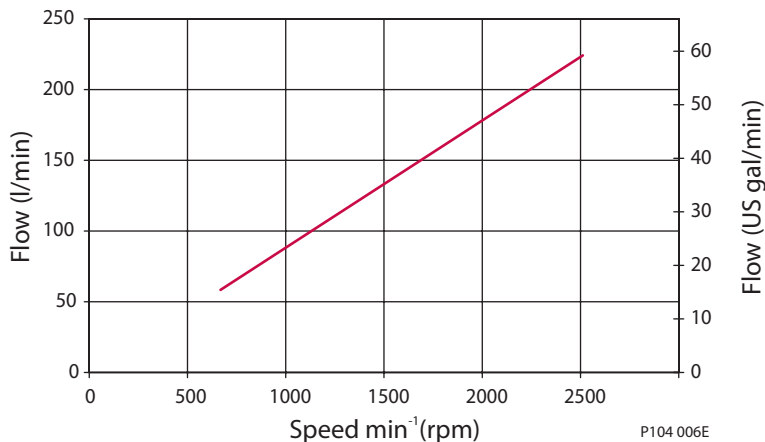


The chart on the right shows allowable inlet pressure and speed at various displacements. Greater speeds and lower inlet pressures are possible at reduced displacement. Operating outside of acceptable limits reduces pump life.

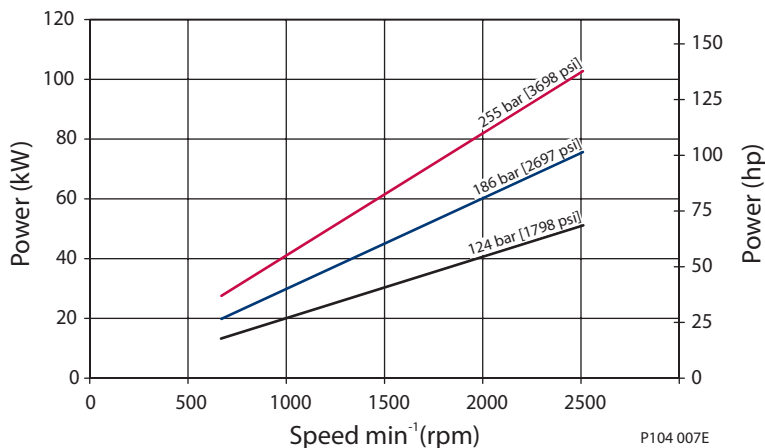
**Performance  
G90C**

Flow and power data valid at 49°C [120°F] and viscosity of 17.8 mm<sup>2</sup>/sec [88 SUS].

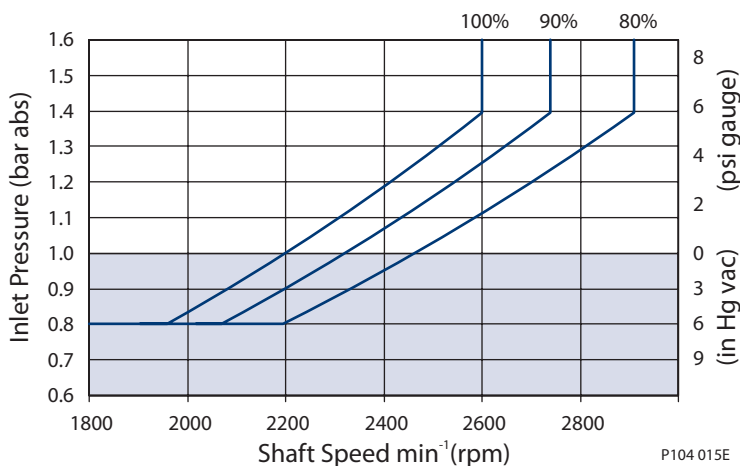
*Flow vs. speed*



*Input power vs. speed*



*Inlet pressure vs. speed*



The chart on the right shows allowable inlet pressure and speed at various displacements. Greater speeds and lower inlet pressures are possible at reduced displacement. Operating outside of acceptable limits reduces pump life.

**Order Code**

**R S P C D E F G H          L M N**  

 $\begin{array}{c} \text{J} \\ \hline 1 \ 2 \ 3 \end{array}$ 
 $\begin{array}{c} \text{K} \\ \hline 1 \ 2 \ 3 \end{array}$

**R Product**

<b>GR</b>	G Frame, variable displacement open circuit pump
-----------	--------------------------------------------------

**S Rotation**

<b>L</b>	Left hand (counterclockwise)
<b>R</b>	Right hand (clockwise)

**P Displacement and pressure rating**

<b>074B</b>	074 cm <sup>3</sup> /rev [4.52 in <sup>3</sup> /rev], 310 bar [4495 psi] continuous working pressure
<b>090C</b>	090 cm <sup>3</sup> /rev [5.49 in <sup>3</sup> /rev], 260 bar [3770 psi] continuous working pressure

**C Control type**

<b>PC</b>	Pressure compensated control 100-280 bar [1450-4060 psi]
<b>BC</b>	Pressure compensated control 290-310 bar [4205-4495 psi]
<b>RP</b>	Remote pressure compensated control 100-280 bar [1450-4060 psi]
<b>BP</b>	Remote pressure compensated control 290-310 bar [4205-4495 psi]
<b>LS</b>	Load sensing / pressure compensating control 100-280 bar [1450-4060 psi]
<b>BS</b>	Load sensing / pressure compensating control 290-310 bar [4205-4495 psi]
<b>LB</b>	Load sensing / pressure compensating control with internal bleed orifice 100-280 bar [1450-4060 psi]
<b>BB</b>	Load sensing / pressure compensating control with internal bleed orifice 290-310 bar [4205-4495 psi]

**D PC setting (2 digit code, 10 bar increments)**

<b>Example</b>	10 = 100 bar
<b>10-31</b>	100 to 310 bar [1450 to 4495 psi] (074B)
<b>10-26</b>	100 to 260 bar [1450 to 3770 psi] (090C)

**E Load sensing setting (2 digit code, 1 bar increments)**

<b>Example</b>	20 = 20 bar
<b>10-30</b>	10 to 40 bar [145 to 435 psi]
<b>NN</b>	Not applicable (use with PC controls)

**F Not used**

<b>NN</b>	Not applicable
-----------	----------------



**Order Code  
(continued)**

R
S
P
C
D
E
F
G
H

J  
 1 2 3  
 ───  
 ───

K  
 1 2 3  
 ───  
 ───

L
M
N

**G** *Pilot orifice*

<b>N</b>	Standard
----------	----------

**H** *Gain orifice*

<b>3</b>	Standard
----------	----------

**J1** *Input shaft*

<b>S1</b>	14 tooth, 12/24 pitch (ANSI B92.1 1970 - Class 5)
<b>S2</b>	17 tooth, 12/24 pitch (ANSI B92.1 1970 - Class 5)
<b>K4</b>	Ø 31.75 mm [1.25 in], straight keyed

**J2** *Auxiliary mounting flange*

<b>N</b>	None
<b>A</b>	SAE-A, 9-tooth coupling
<b>T</b>	SAE-A, 11-tooth coupling
<b>B</b>	SAE-B, 13-tooth coupling
<b>V</b>	SAE-BB, 15-tooth coupling
<b>C</b>	SAE-C, 14-tooth coupling

**J3** *System port size and location*

Code	Location	Port type	Inlet size	Outlet size
<b>2</b>	Radial	4-bolt split-flange	2 in.	1 in.
<b>4</b>	Axial	4-bolt split-flange	2 in.	1 in.

**K1** *Shaft seal*

<b>A</b>	Single lip seal, viton
----------	------------------------

**K2** *Mounting flange and housing port style*

<b>1</b>	SAE-C 4-bolt, SAE O-ring boss housing ports
----------	---------------------------------------------

**K3** *Not used*

<b>N</b>	Not applicable
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**L** *Displacement limiter*

<b>NNN</b>	None
<b>AAA</b>	Adjustable, factory set at max angle (074B)
<b>CAA</b>	Adjustable, factory set at max angle (090C)

**M** *Special hardware*

<b>NNN</b>	None
------------	------

**N** *Special features*

<b>NNN</b>	None
------------	------

**Controls**

**Pressure compensated control (PC)**

*Specifications*

*PC control setting range*

Model	bar	psi
<b>G74B</b>	100–310	1450–4495
<b>G90C</b>	100–260	1450–3770

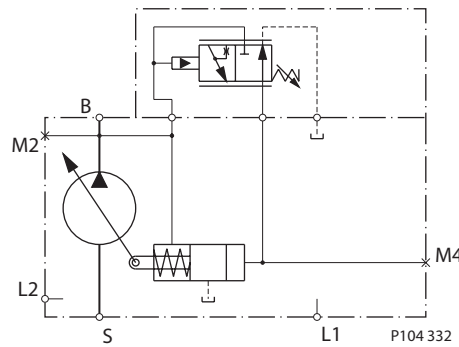
*Response/recovery times\**

(ms)	Response	Recovery
<b>G74B</b>	35	130
<b>G90C</b>	40	140

\* For definitions, [see page 9](#).

*Schematic diagram*

*PC schematic*



*Legend*

- B = Outlet
- S = Inlet
- L1, L2 = Case drain
- M2 = System pressure gauge port
- M4 = Servo pressure gauge port

**Remote PC control (RP)**

*Specifications*

*PC control setting range*

Model	bar	psi
<b>G74B</b>	100–310	1450–4495
<b>G90C</b>	100–260	1450–3770

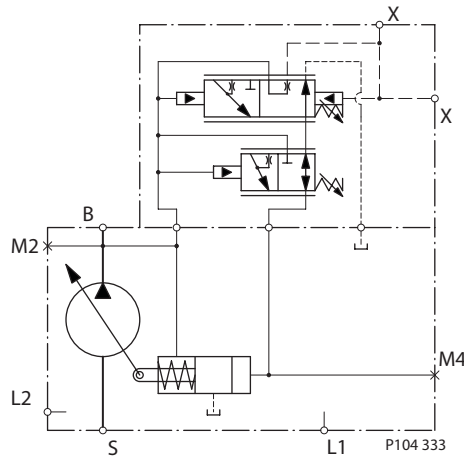
*Response/recovery times\**

(ms)	Response	Recovery
<b>G74B</b>	35	130
<b>G90C</b>	40	140

\* For definitions, [see page 10](#).

*Schematic diagram*

*Remote PC schematic*



*Legend*

- B = Outlet
- S = Inlet
- L1, L2 = Case drain
- M2 = System pressure gauge port
- M4 = Servo pressure gauge port
- X = Remote PC port

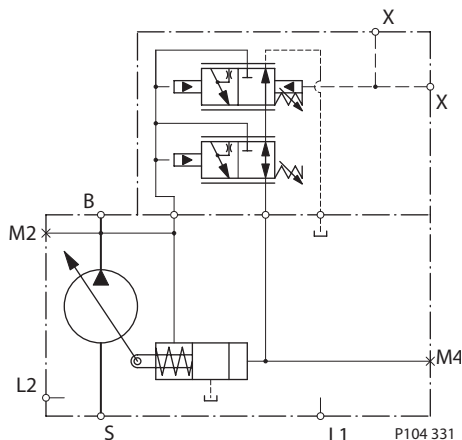
**Controls (continued)**
**Load sensing control (LS)**
*Specifications*
*PC setting range*

Model	bar	psi
<b>G74B</b>	100–310	1450–4495
<b>G90C</b>	100–260	1450–3770

*Response/recovery times\**

(ms)	Response	Recovery
<b>G74B</b>	35	100
<b>G90C</b>	40	130

\* For definitions, [see page 11](#)

*Schematic diagram*
*LS Schematic*

*LS setting range*

Model	bar	psi
<b>All</b>	10–30	145–435

*Legend*

- B = Outlet
- S = Inlet
- L1, L2 = Case drain
- M2 = System pressure gauge port
- M4 = Servo pressure gauge port
- X = LS signal port

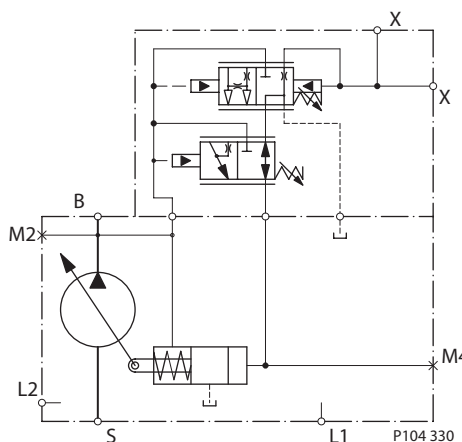
**Load sensing control with internal bleed orifice (LB)**
*Specifications*
*PC setting range*

Model	bar	psi
<b>G74B</b>	100–310	1450–4495
<b>G90C</b>	100–260	1450–3770

*Response/recovery times\**

(ms)	Response	Recovery
<b>G74B</b>	35	100
<b>G90C</b>	40	130

\* For definitions, [see page 11](#).

*Schematic diagram*
*LB Schematic*

*LS setting range*

Model	bar	psi
<b>All</b>	10–30	145–435

*Legend*

- B = Outlet
- S = Inlet
- L1, L2 = Case drain
- M2 = System pressure gauge port
- M4 = Servo pressure gauge port
- X = LS signal port

Input Shafts

Shaft data

Code	Description	Maximum torque rating <sup>1</sup> N·m [lbf·in]	Drawing
S1	14 tooth spline 12/24 pitch (ANSI B92.1 1970 - Class 5)	734 [6500]	
S2	17 tooth spline 12/24 pitch (ANSI B92.1 1970 - Class 5)	1017 [9000]	
K4	Ø 31.75 mm [1.25 in] Straight keyed	734 [6495]	

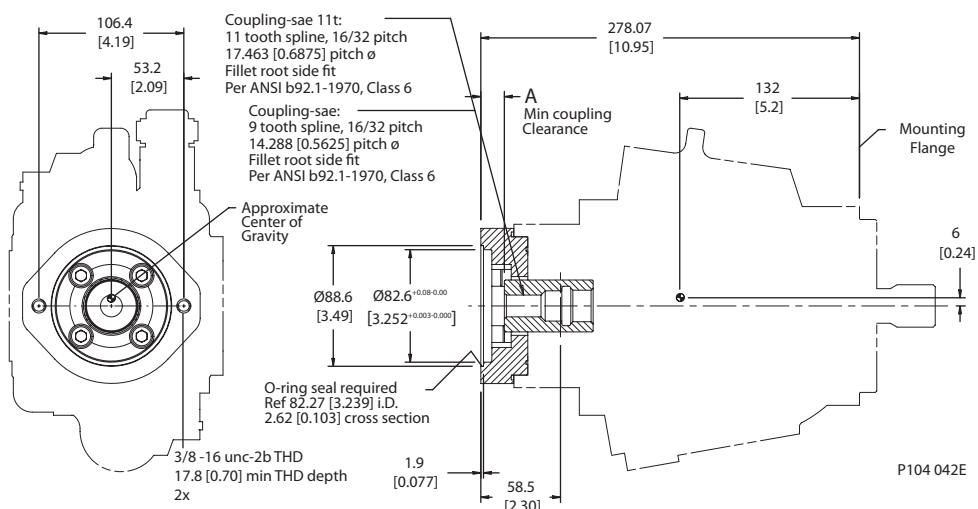
1. See [Input shaft torque ratings](#), page 18 for an explanation of maximum torque.

Auxiliary Mounting Pads

SAE-A auxiliary mounting pad

Dimensions

See page 18 for mating pump pilot and spline dimensions.



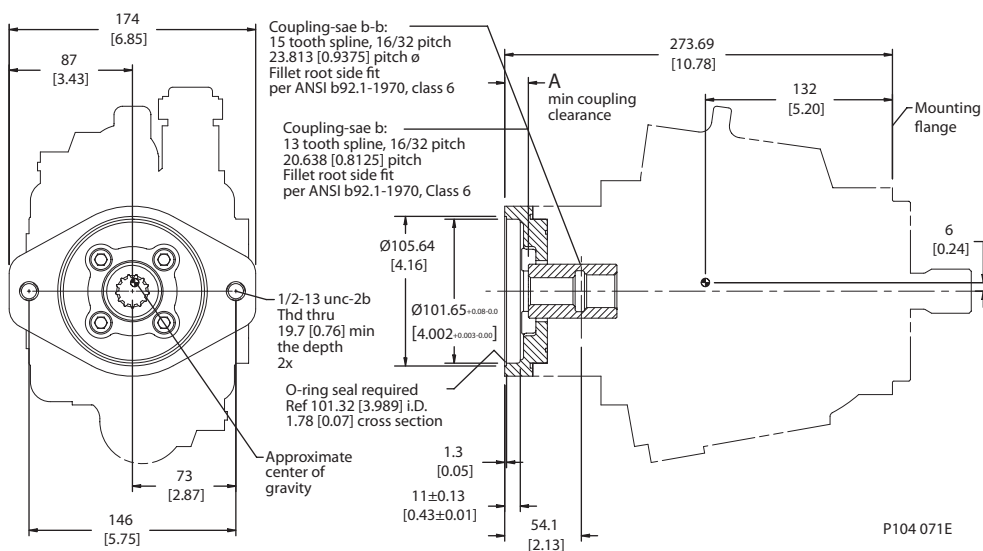
Specifications

Coupling	9-tooth	11-tooth
Spline minimum engagement	13.5 mm [0.53 in]	15 mm [0.59 in]
Maximum torque	107 N·m [950 lbf·in]	147 N·m [1300 lbf·in]
Dimension A	21.1 mm [0.83 in]	16.1 mm [0.63 in]

SAE-B auxiliary mounting pad

Dimensions

See page 18 for mating pump pilot and spline dimensions.



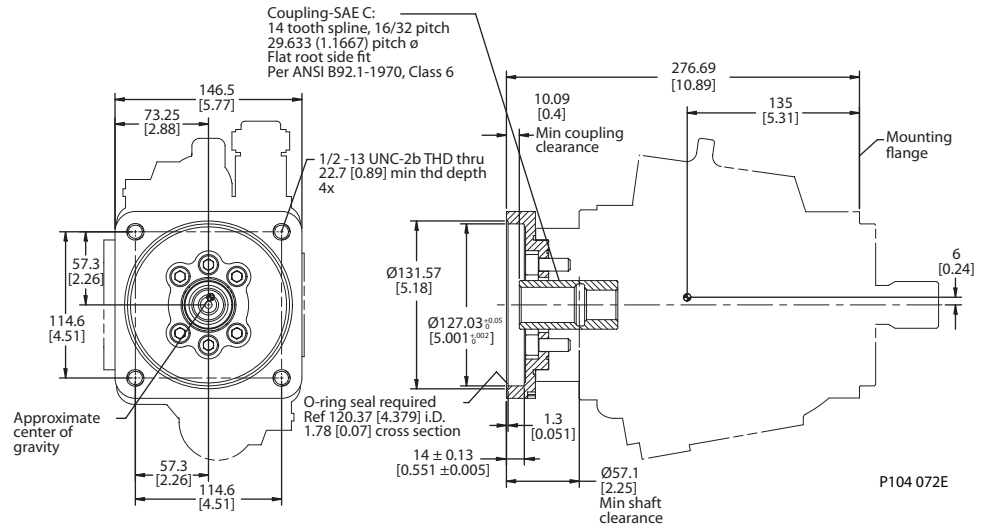
Specifications

Coupling	13-tooth	15-tooth
Spline minimum engagement	14.2 mm [0.56 in]	18.9 mm [0.74 in]
Maximum torque	249 N·m [2200 lbf·in]	339 N·m [3000 lbf·in]
Dimension A	20.7 mm [0.81 in]	12.7 mm [0.5 in]

**Auxiliary Mounting Pads (continued)**

**SAE-C auxiliary mounting pad**  
*Dimensions*

See page 18 for mating pump pilot and spline dimensions.



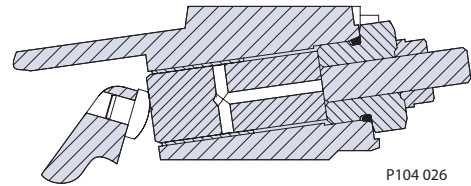
*Specifications*

<b>Coupling</b>	14-tooth
<b>Spline minimum engagement</b>	18.3 mm [0.72 in]
<b>Maximum torque</b>	339 N·m [3000 lbf·in]

**Displacement limiter**

G Frame open circuit pumps are available with an optional adjustable displacement limiter. This adjustable stop limits the pump's maximum displacement.

*Displacement limiter cross-section*



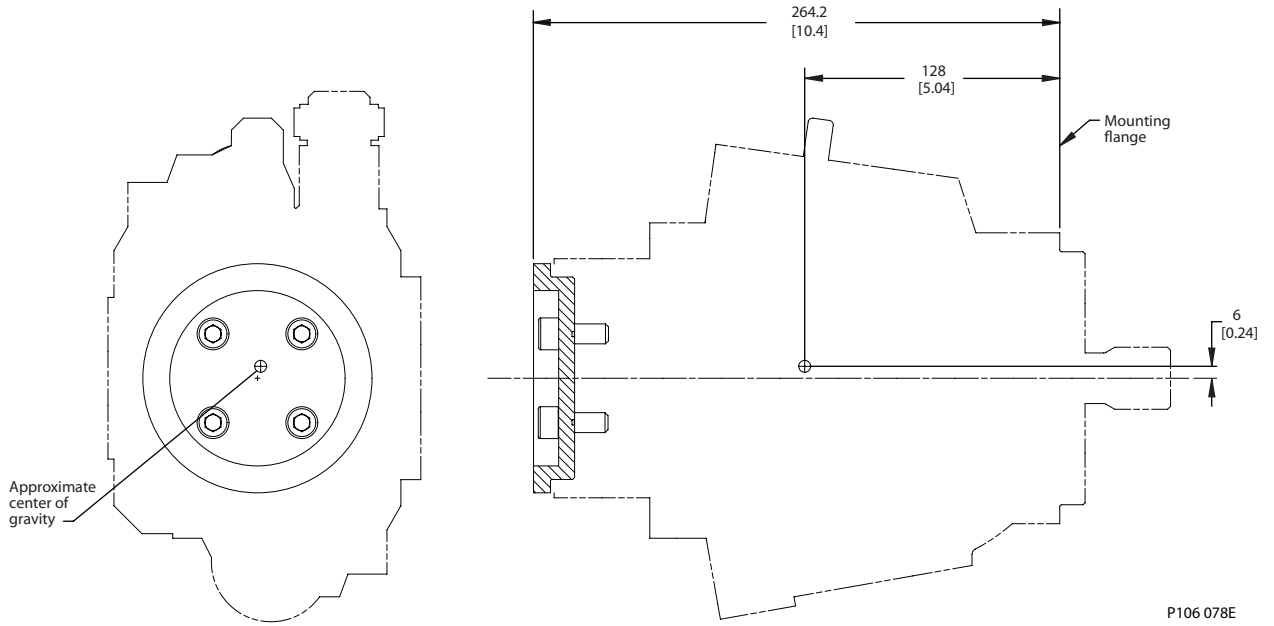
*Setting range*

<b>G74B</b>	56 to 74 cm <sup>3</sup> [3.39 to 4.52 in <sup>3</sup> ]
<b>G90C</b>	68 to 90 cm <sup>3</sup> [4.12 to 5.49 in <sup>3</sup> ]

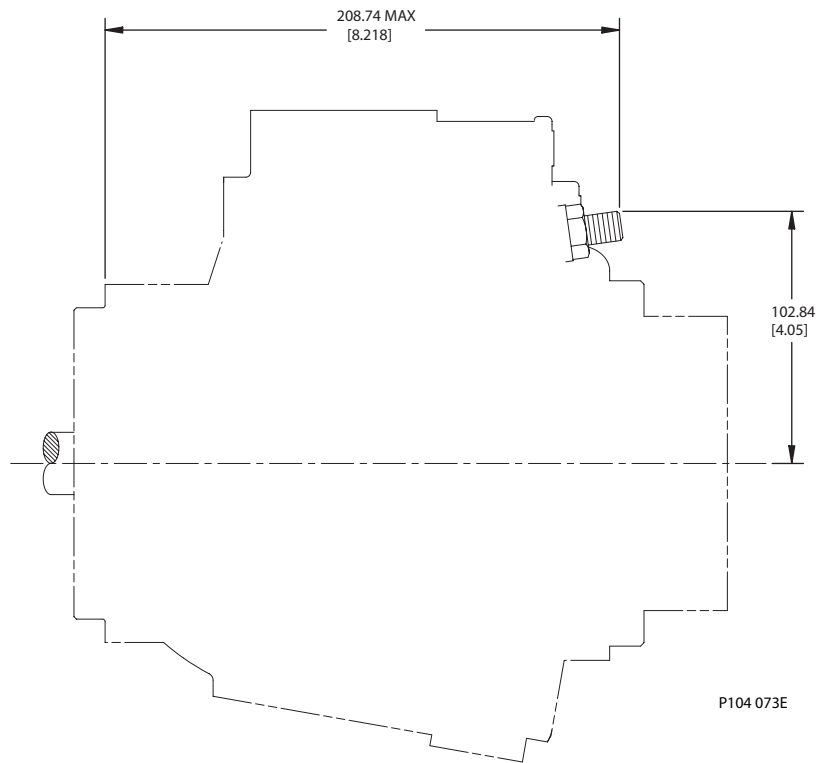
1. See *Input shaft torque ratings*, page 19 for definitions of continuous and maximum torque.

Installation Drawings

Running cover  
Dimensions

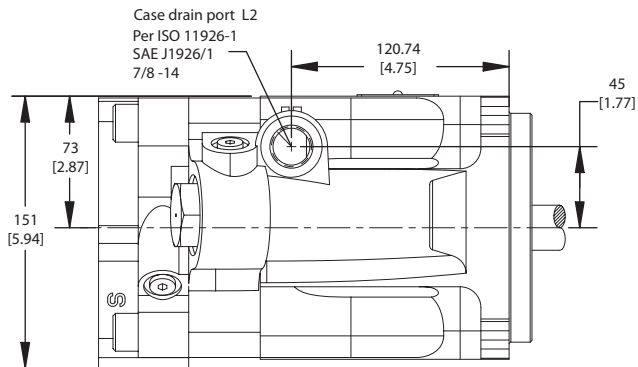
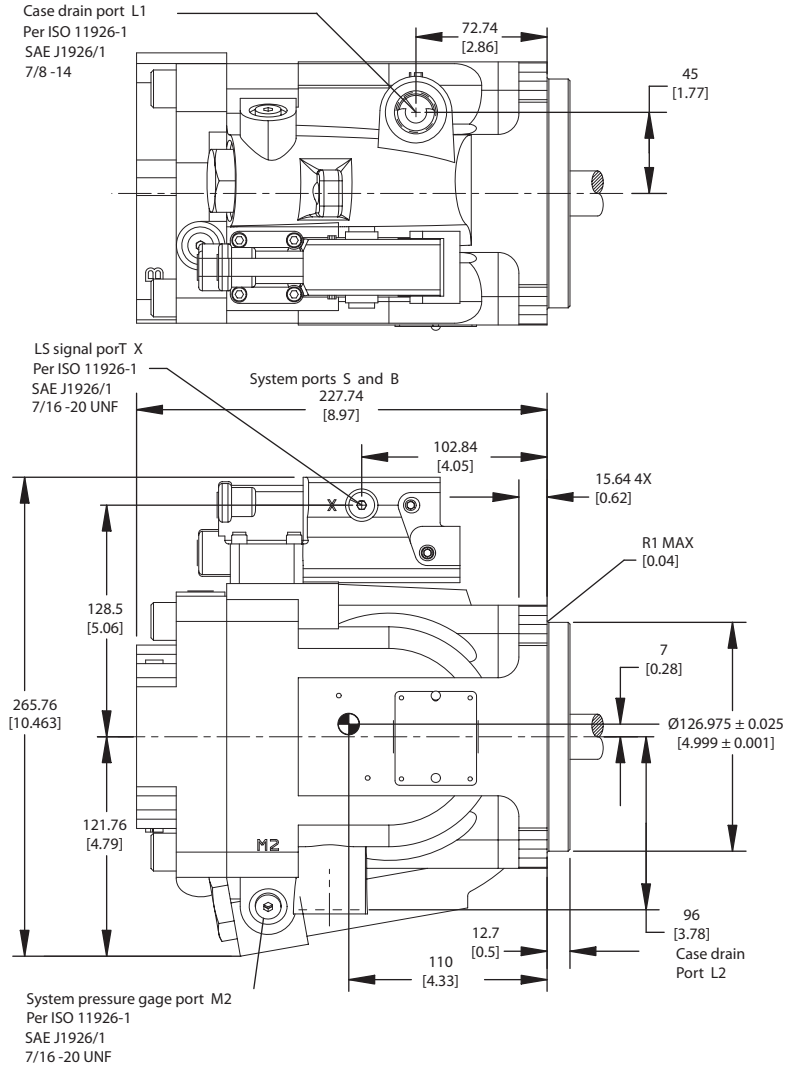
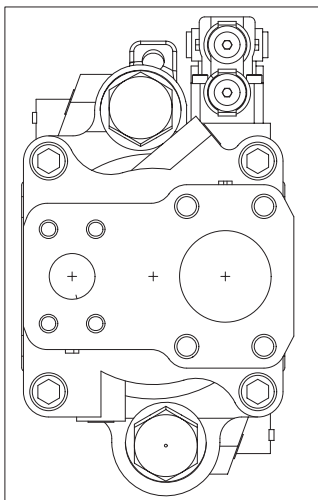
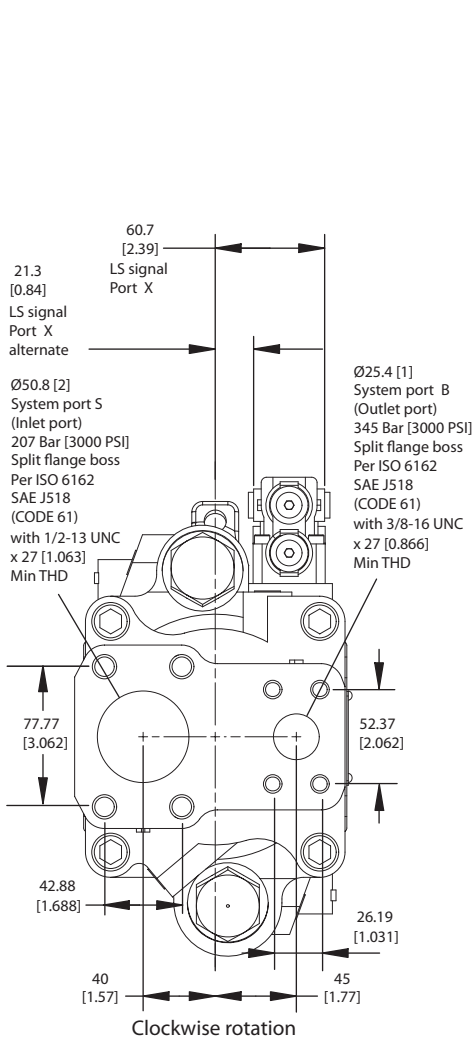


Adjustable displacement limiter  
Dimensions



Installation Drawings  
(continued)

Axial ported endcap



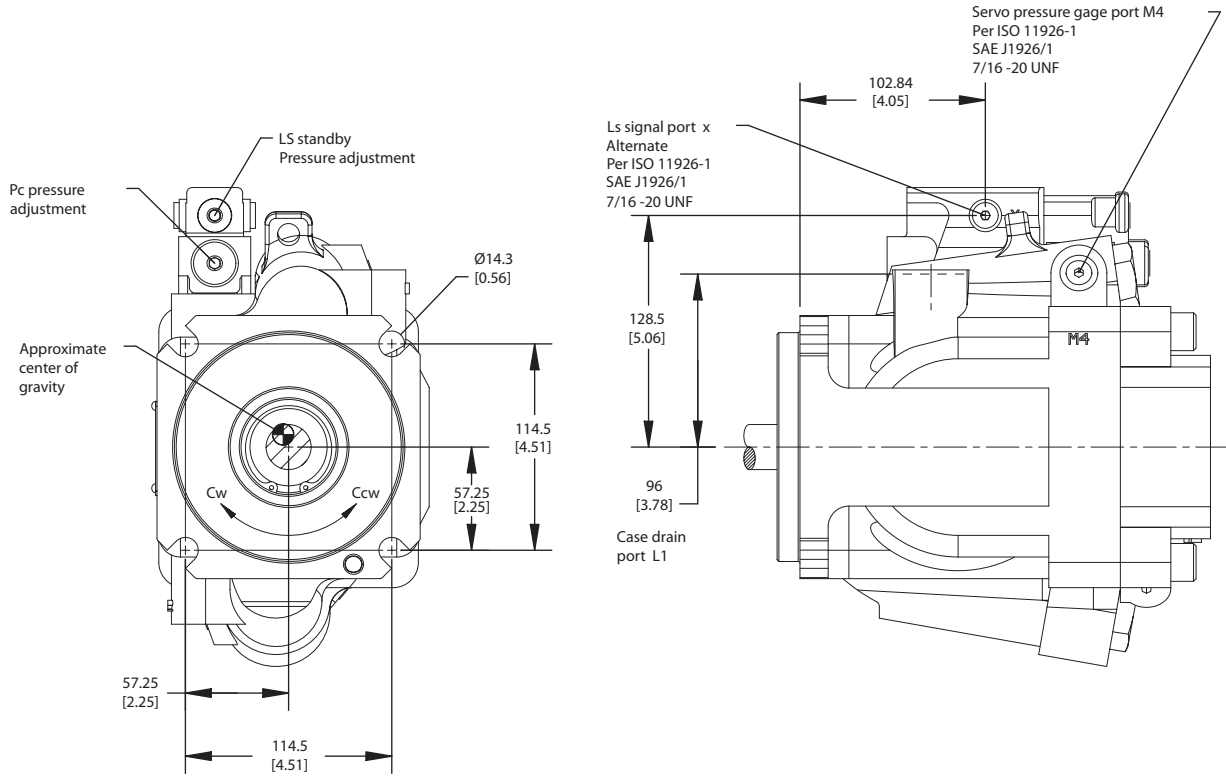
P106 174E





Installation Drawings  
(continued)

Axial ported endcap (continued)

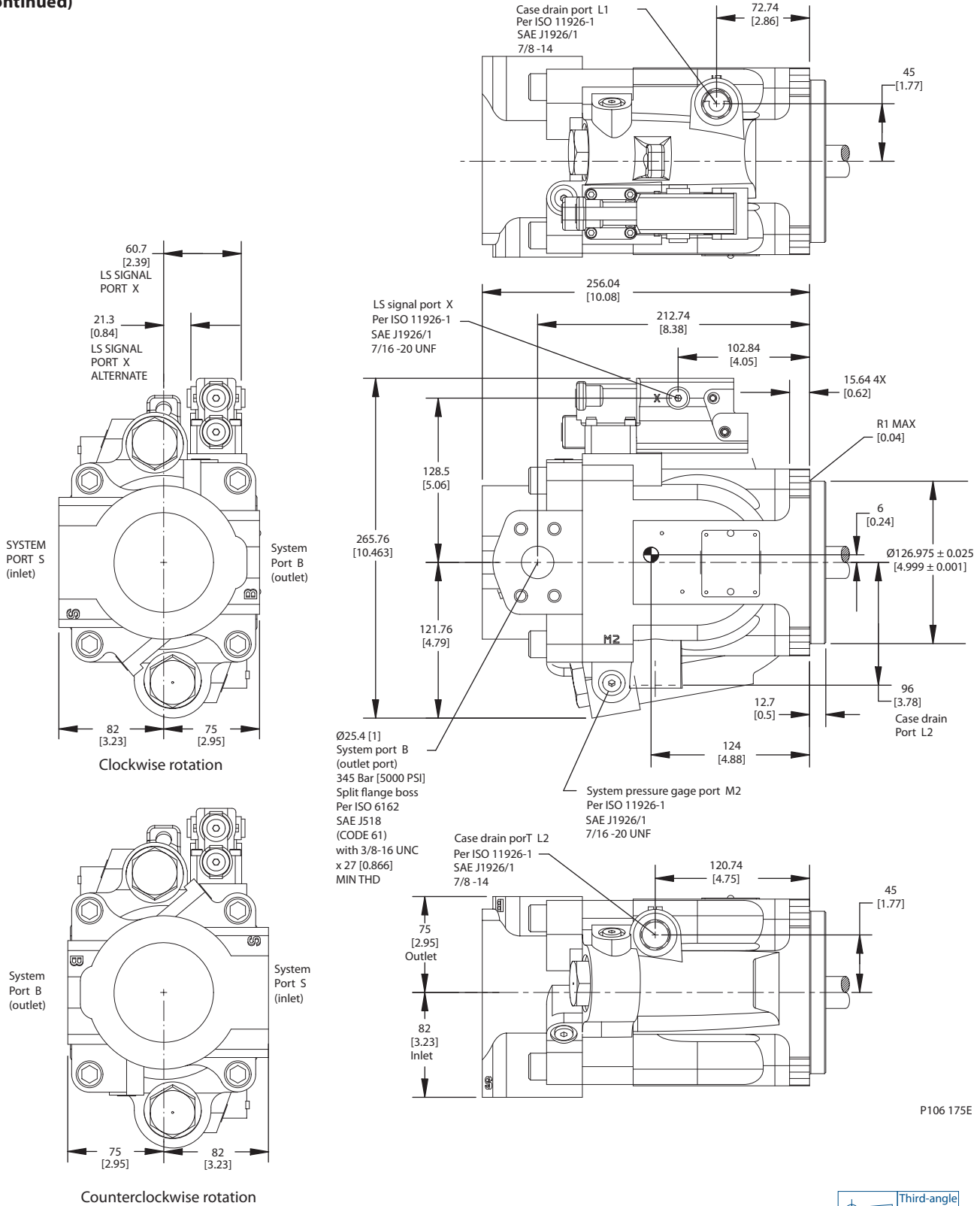


P104 074e



Installation Drawings  
(continued)

Radial ported endcap

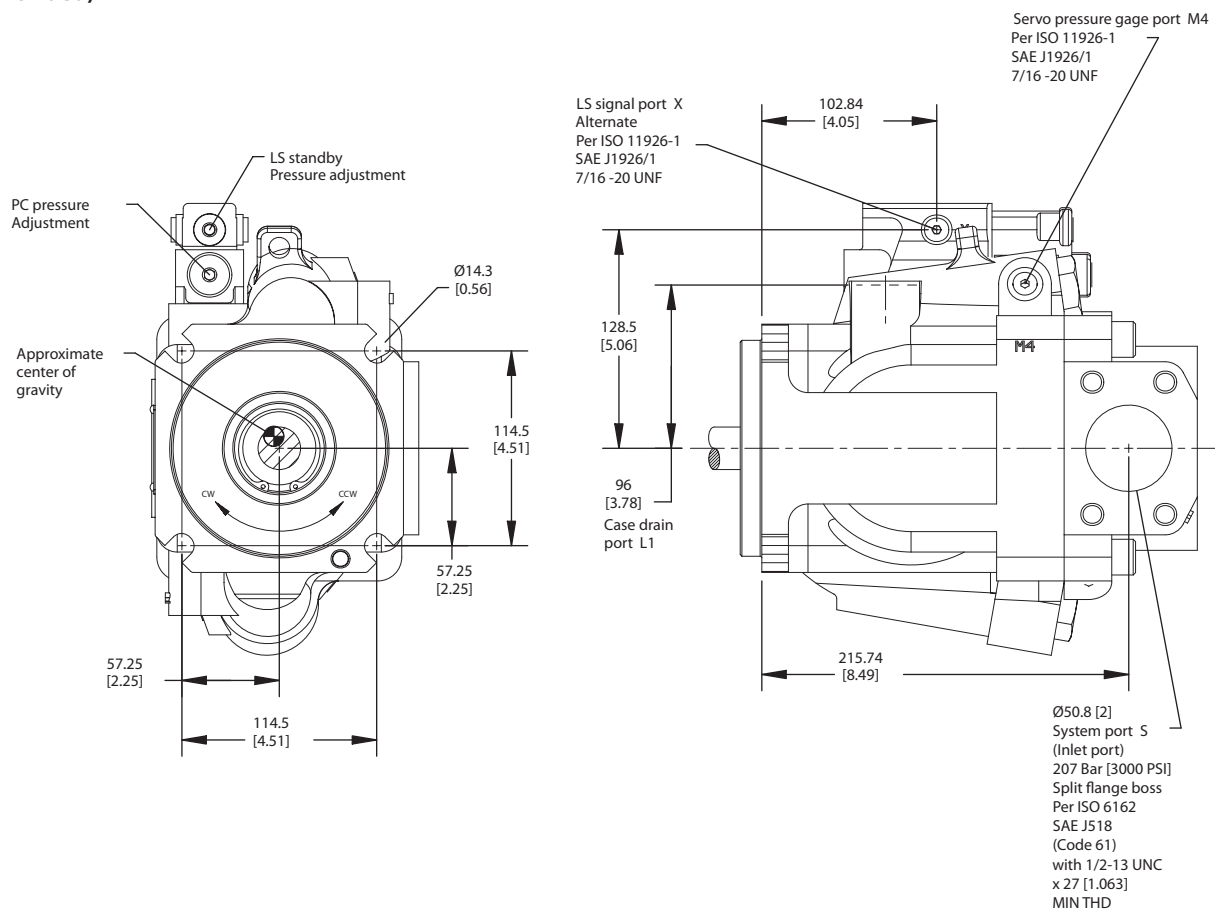


P106 175E



Installation Drawings  
(continued)

Radial ported endcap (continued)



P104 075E





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