

MAKING MODERN LIVING POSSIBLE



Technical Information

Series 45

H Frame

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**General Information**

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**.

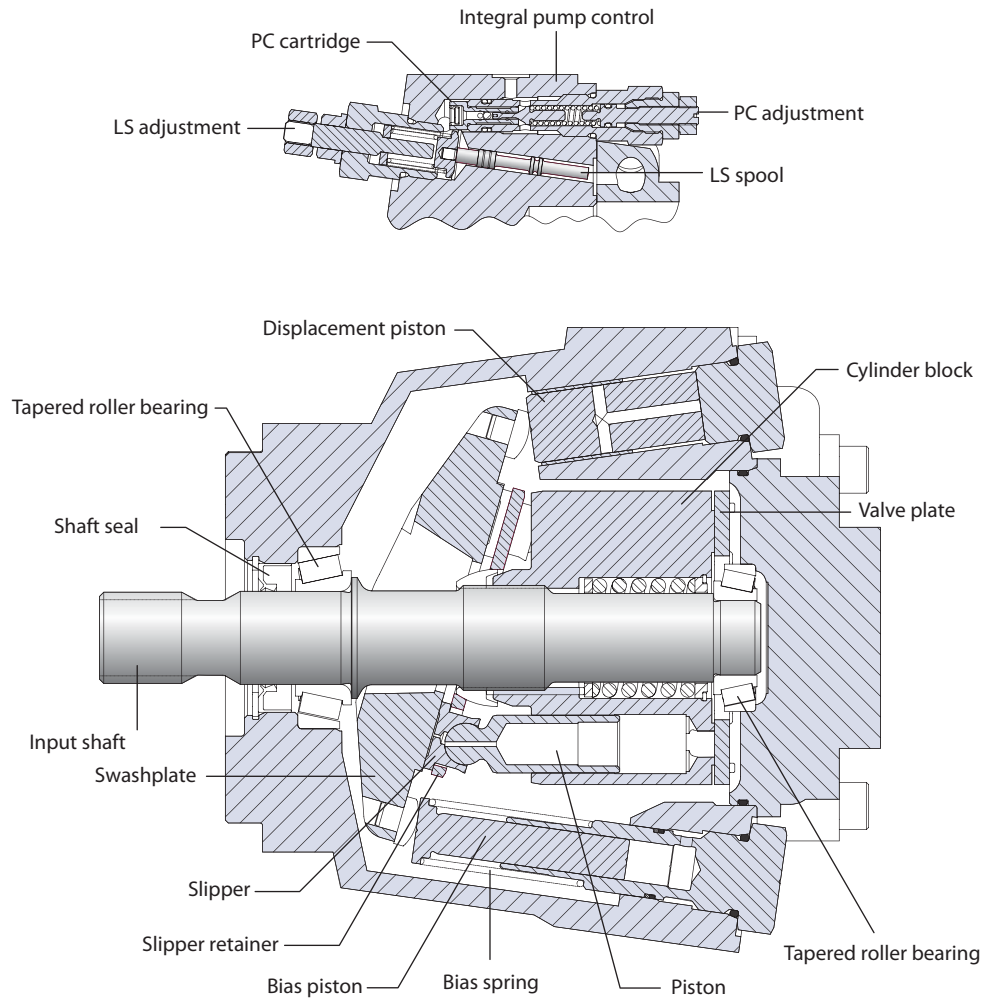
Frame H

Design

Series 45 Frame H 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 integral, adjustable, two-stage control senses system pressure (PC and LS controls) and load pressure (LS only). The pump control ports system pressure to the displacement piston to control pump output flow.

Frame H cross section



P101 984E

**Specifications**

For general operating parameters, including fluid viscosity, temperature, and inlet and case pressures, [see page 14](#). For system design parameters, including installation, filtration, reservoir, and line velocities, [see page 16](#).

*Features and options*

Feature		Unit	Model	
			H57B	H75D
Maximum Displacement		cm <sup>3</sup> [in <sup>3</sup> ]	57 [3.48]	75 [4.58]
Flow at rated speed (theoretical)		l/min [US gal/min]	148.2 [39.2]	180 [47.5]
Input torque at maximum displacement (theoretical)		N·m/bar [lbf·in/1000 psi]	0.907 [554]	1.194 [729]
Mass moment of inertia of internal rotating components		kg·m <sup>2</sup> [slug·ft <sup>2</sup> ]	0.00430 [0.00318]	0.00420 [0.00310]
Weight	Axial ports	kg [lb]	24 [53]	
	Radial ports		27 [60]	
Rotation			Clockwise, Counterclockwise	
Mounting			SAE-B, SAE-C	
Auxiliary mounting ( <a href="#">See page 51</a> )			SAE-A, SAE-B, SAE-BB, SAE-C	
System ports (type)			SAE O-ring boss, 4-bolt split flange	
System ports (location)			Axial, Radial	
Control types ( <a href="#">See page 46</a> )			PC, LS, LS with internal bleed	
Shafts ( <a href="#">See page 48</a> )		Splined	13 tooth, 14 tooth, 15 tooth	
		Tapered	Ø 31.75 mm [1.25 in], 1:8 taper	
		Straight	Ø 31.75 mm [1.25 in]	
Displacement limiters ( <a href="#">See page 52</a> )			Optional, adjustable	

For definitions of pressure and speed ratings, [see page 15](#). For more information on external shaft loads, [see page 17](#); mounting flange loads, [see page 18](#).

*Ratings*

Rating		Units	Model	
			H57B	H75D
Input speed <sup>1</sup>	minimum	min <sup>-1</sup> (rpm)	500	500
	continuous		2600	2400
	maximum		3200	2800
Working pressure	continuous	bar [psi]	310 [4495]	210 [3045]
	maximum		400 [5800]	300 [4350]
External shaft loads	External moment (M <sub>e</sub> )	N·m [lbf·in]	226 [2000]	226 [2000]
	Thrust in (T <sub>in</sub> ), out (T <sub>out</sub> )	N [lbf]	2200 [495]	2200 [495]
Bearing life	at 140 bar [2030 psi]	B <sub>10</sub> hours	29 712	10 755
	at 210 bar [3045 psi]		6834	2474
	at 260 bar [3770 psi]		3151	—
	at 310 bar [4495 psi]		1666	—
Mounting flange load moments	Vibratory (continuous)	N·m [lbf·in]	SAE-C: 1500 [14 000], SAE-B: 735 [6500]	
	Shock (max)		SAE-C: 5650 [50 000], SAE-B: 2600 [23 000]	

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 20](#).

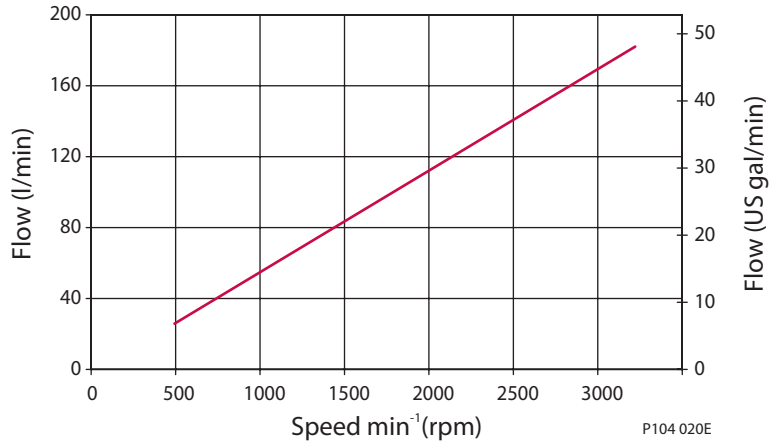
dB(A)	210 bar [3045 psi]		260 bar [3770 psi]		310 bar [4495 psi]		
	Model	1800 min <sup>-1</sup> (rpm)	Rated speed	1800 min <sup>-1</sup> (rpm)	Rated speed	1800 min <sup>-1</sup> (rpm)	Rated speed
H57B		69	72	70	73	71	74
H75D		71	74	—	—	—	—

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

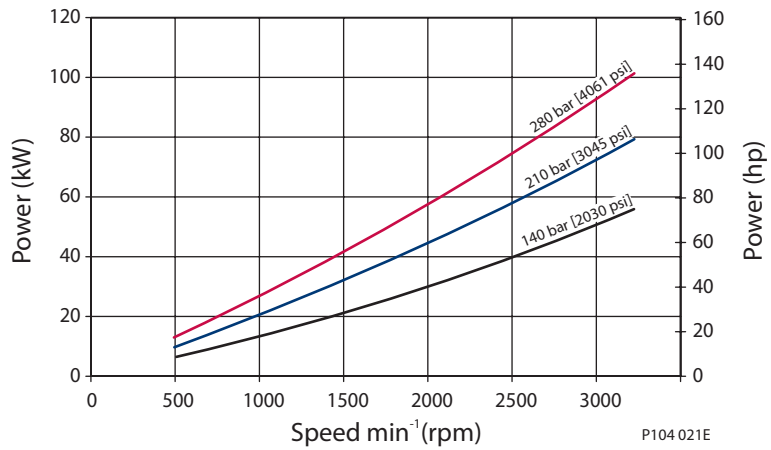
**Performance**  
**H57B**

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*

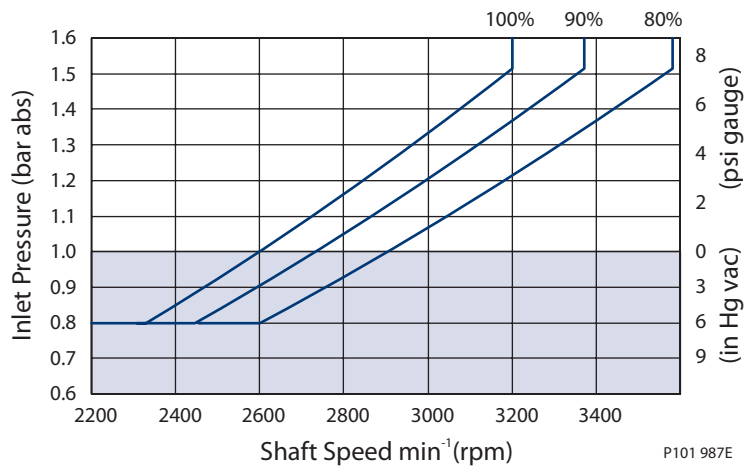


*Input power vs. speed*



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.

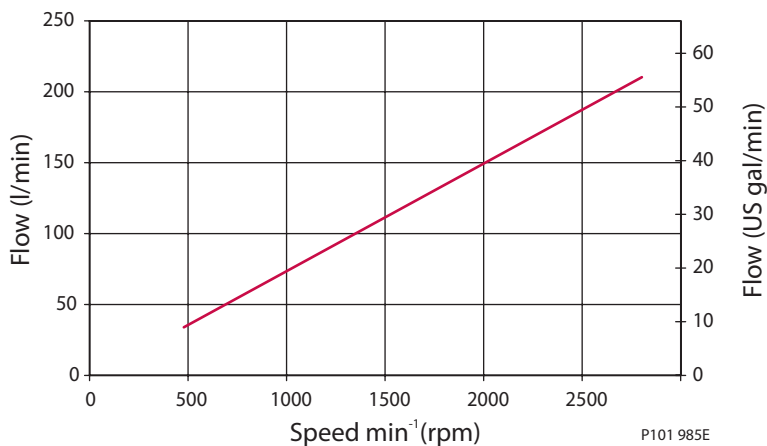
*Inlet pressure vs. speed*



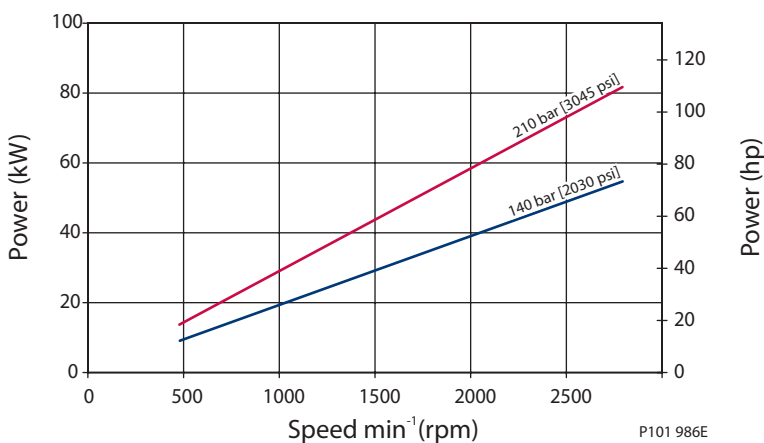
**Performance  
H75D**

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

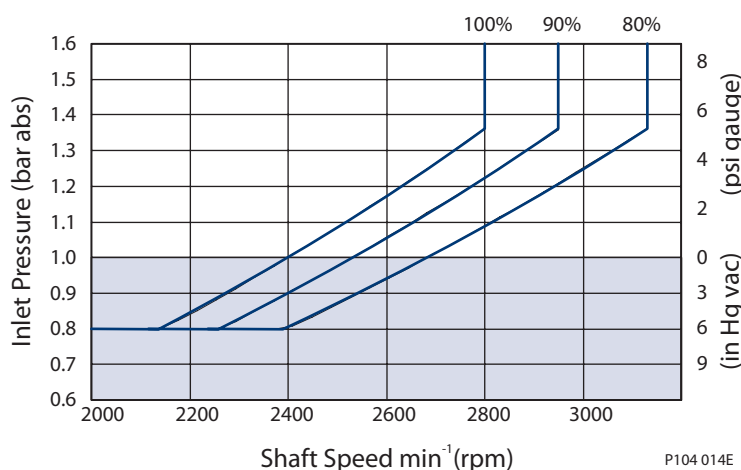
*Flow vs. speed*



*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  
(continued)**

R
S
P
C
D
E
F
G
H


J	1	2	3
K	1	2	3

L
M
N

**J1 Input shaft**

SAE-C mounting flange pumps (housing code K2=1)	
<b>S1</b>	14 tooth, 12/24 pitch (ANSI B92.1 1970 - Class 5)
<b>T0</b>	Ø 31.75 mm [1.25 in], 1:8 taper
<b>K4</b>	Ø 31.75 mm [1.25 in], straight keyed
<b>C2</b>	13 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)
<b>C3</b>	15 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)
SAE-B mounting flange pumps (housing code K2=6)	
<b>L4</b>	Ø 31.75 mm [1.25 in], straight keyed
<b>D2</b>	13 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)
<b>D3</b>	15 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)

**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.
<b>3</b>	Axial	SAE O-ring boss	1 7/8 in.	1 5/16 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
<b>6</b>	SAE-B 2-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
<b>Axx</b>	Adjustable, factory set at xx% of maximum displacement (5% increments), Example: A90=90%

**M Special hardware**

<b>NNN</b>	None
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**N Special features**

<b>NNN</b>	None
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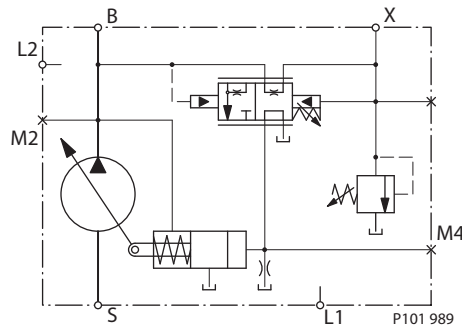
**Controls**
**Pressure compensated control (PC)**
*Specifications*
*PC control setting range*

Model	bar	psi
<b>H57B</b>	100–310	1450–4495
<b>H75D</b>	100–210	1450–3045

*Response/recovery times\**

(ms)	Response	Recovery
<b>H57B</b>	30	125
<b>H75D</b>	30	130

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

*Schematic diagram PC schematic*

*Legend*

- B = Outlet
- S = Inlet
- L1, L2 = Case drain
- M2 = System pressure gauge port
- M4 = Servo pressure gauge port
- X = Not used

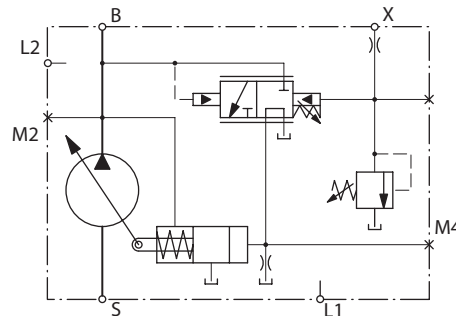
**Load sensing control (LS)**
*Specifications*
*PC setting range*

Model	bar	psi
<b>H57B</b>	100–310	1450–4495
<b>H75D</b>	100–210	1450–3045

*Response/recovery times\**

(ms)	Response	Recovery
<b>H57B</b>	30	90
<b>H75D</b>	30	95

\* For definitions, [see page 13](#).

*Schematic diagram LS Schematic*

*LS setting range*

Model	bar	psi
<b>All</b>	10–35	145–508

*Legend*

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

**Controls  
(continued)**

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

*PC setting range*

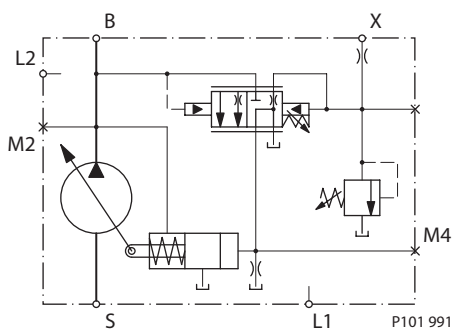
Model	bar	psi
H57B	100–310	1450–4495
H75D	100–210	1450–3045

*Response/recovery times\**

(ms)	Response	Recovery
H57B	30	90
H75D	30	95

\* For definitions, [see page 13](#).

*Schematic diagram* **LS Schematic**



*LS setting range*

Model	bar	psi
All	10–35	145–508

*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	Availability		Torque rating <sup>1</sup>		Drawing
		SAE-C flange	SAE-B flange	Continuous N•m [lbf•in]	Maximum N•m [lbf•in]	
S1	14 tooth spline 12/24 pitch (ANSI B92.1 1970 - Class 5)	●	—	283 [2500]	734 [6495]	
T0	Ø 31.75 mm [1.25 in] 1:8 taper (SAE J501)	●	—	N/A	734 [6495]	
K4	Ø 31.75 mm [1.25 in] Straight keyed	●	—	N/A	655 [5797]	

1. See [Input shaft torque ratings](#), page 19 for definitions of continuous and maximum torque.

input Shafts  
(continued)

Code	Description	Availability		Torque rating <sup>1</sup>		Drawing
		SAE-C flange	SAE-B flange	Continuous N·m [lbf·in]	Maximum N·m [lbf·in]	
C2	13-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	●	—	102 [900]	282 [2495]	
C3	15-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	●	—	192 [1700]	362 [3200]	
L4	Ø 31.75 mm [1.25 in] Straight keyed	—	●	N/A	655 [5800]	

1. See [Input shaft torque ratings](#), page 19 for definitions of continuous and maximum torque.

input Shafts  
(continued)

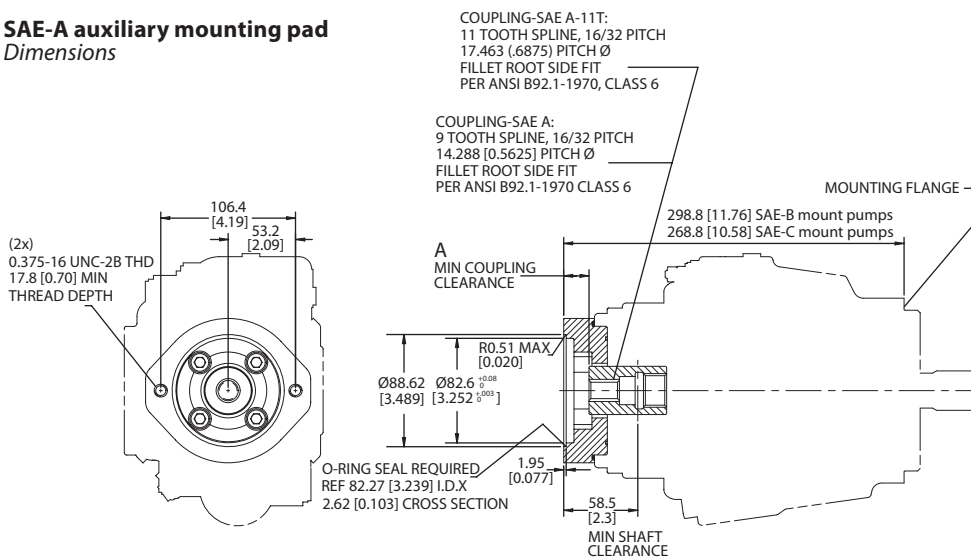
Code	Description	Availability		Torque rating <sup>1</sup>		Drawing
		SAE-C flange	SAE-B flange	Continuous N·m [lbf·in]	Maximum N·m [lbf·in]	
D2	13-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	—	●	102 [900]	282 [2495]	
D3	15-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	—	●	192 [1700]	362 [3200]	

1. See [input shaft torque ratings](#), page 19 for definitions of continuous and maximum torque.

Auxiliary Mounting Pads

SAE-A auxiliary mounting pad  
Dimensions

See page 19 for mating pump pilot and spline dimensions.

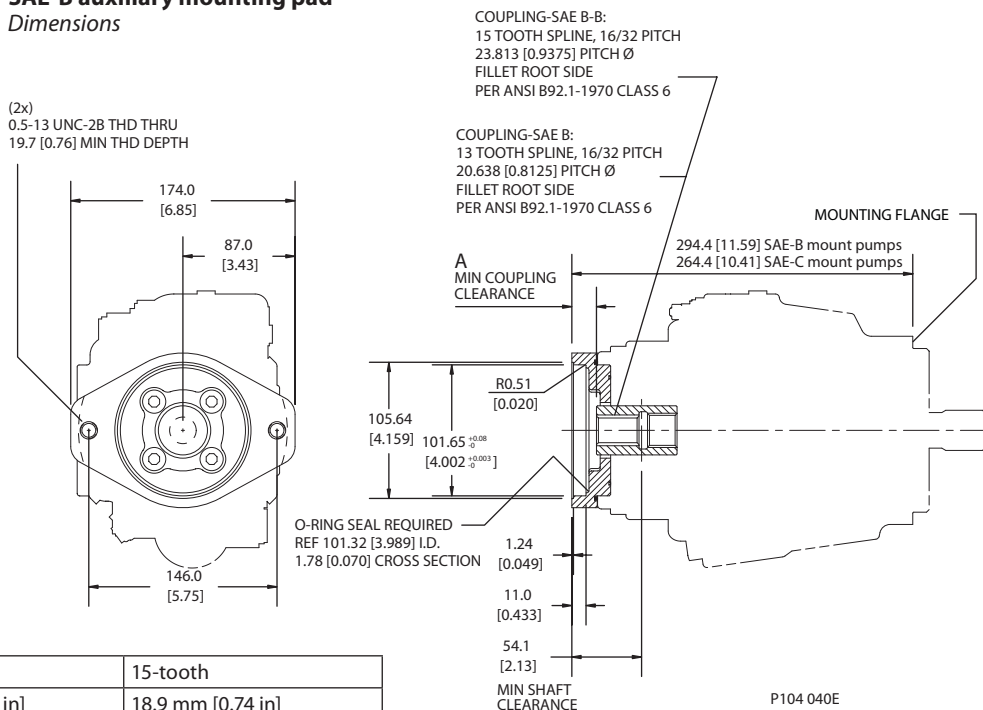


Specifications

Coupling	9-tooth	11-tooth
Spline minimum engagement	13.5 mm [0.53 in]	15 mm [0.59 in]
Continuous torque	51 N·m [450 lbf·in]	90 N·m [800 lbf·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 19 for mating pump pilot and spline dimensions.



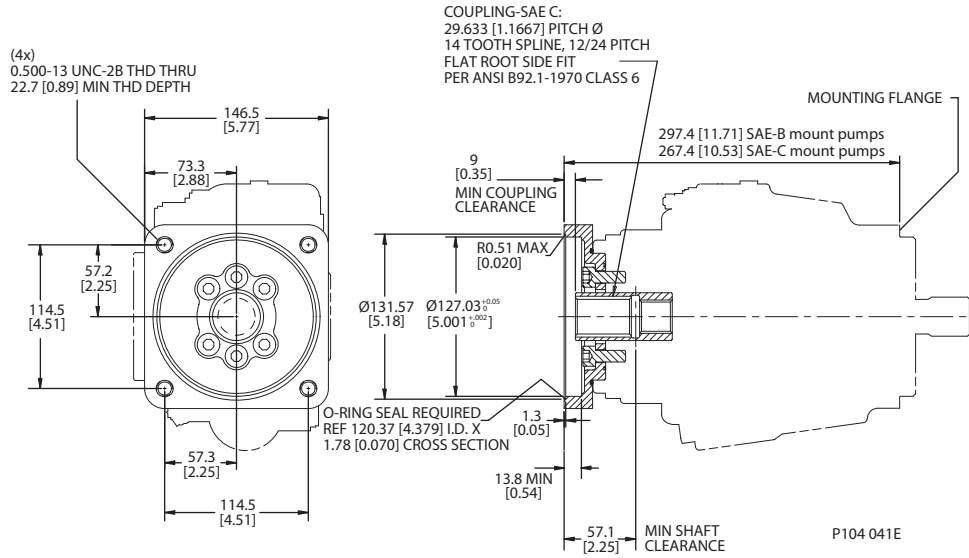
Specifications

Coupling	13-tooth	15-tooth
Spline minimum engagement	14.2 mm [0.56 in]	18.9 mm [0.74 in]
Continuous torque	124 N·m [1100 lbf·in]	235 N·m [2080 lbf·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)**

See page 19 for mating pump pilot and spline dimensions.

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



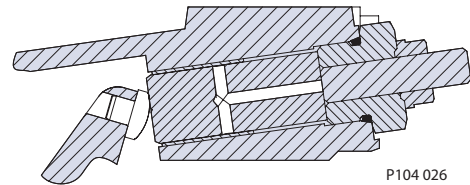
*Specifications*

<b>Coupling</b>	14-tooth
<b>Spline minimum engagement</b>	18.3 mm [0.72 in]
<b>Continuous torque</b>	235 N·m [2080 lbf·in]
<b>Maximum torque</b>	339 N·m [3000 lbf·in]

**Displacement Limiters**

H 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*



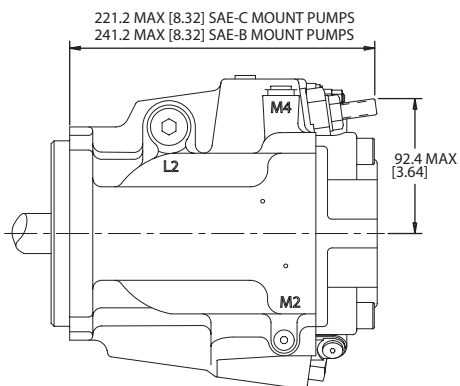
*Setting range*

<b>H57B</b>	43 to 57 cm <sup>3</sup> [ 2.61 to 3.48 in <sup>3</sup> ]
<b>H75D</b>	56 to 75 cm <sup>3</sup> [3.43 to 4.58 in <sup>3</sup> ]

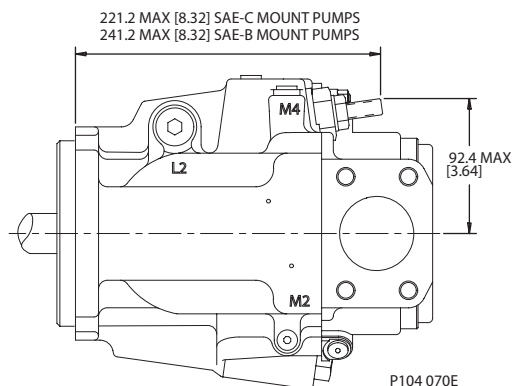


Installation Drawings

Adjustable displacement limiter



Axial ported units

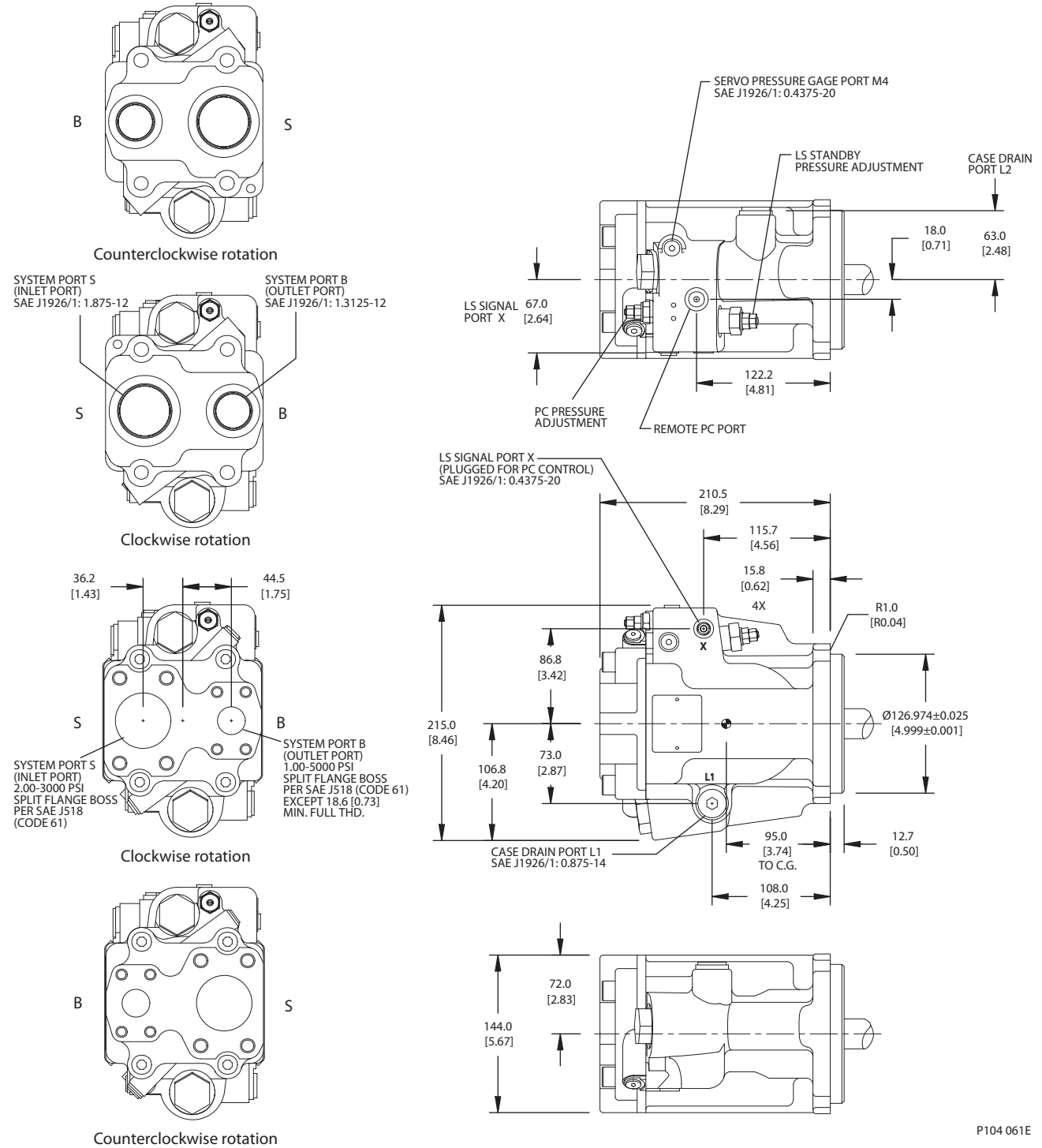


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Radial ported units

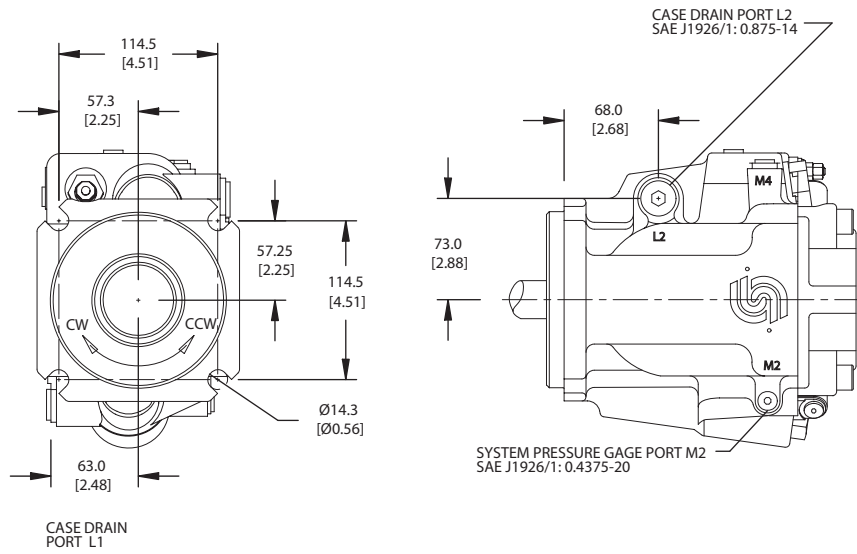
Installation Drawings  
(continued)

SAE-C mounting flange, axial ported endcap

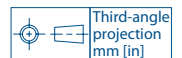


Installation Drawings  
(continued)

SAE-C mounting flange, axial ported endcap (continued)

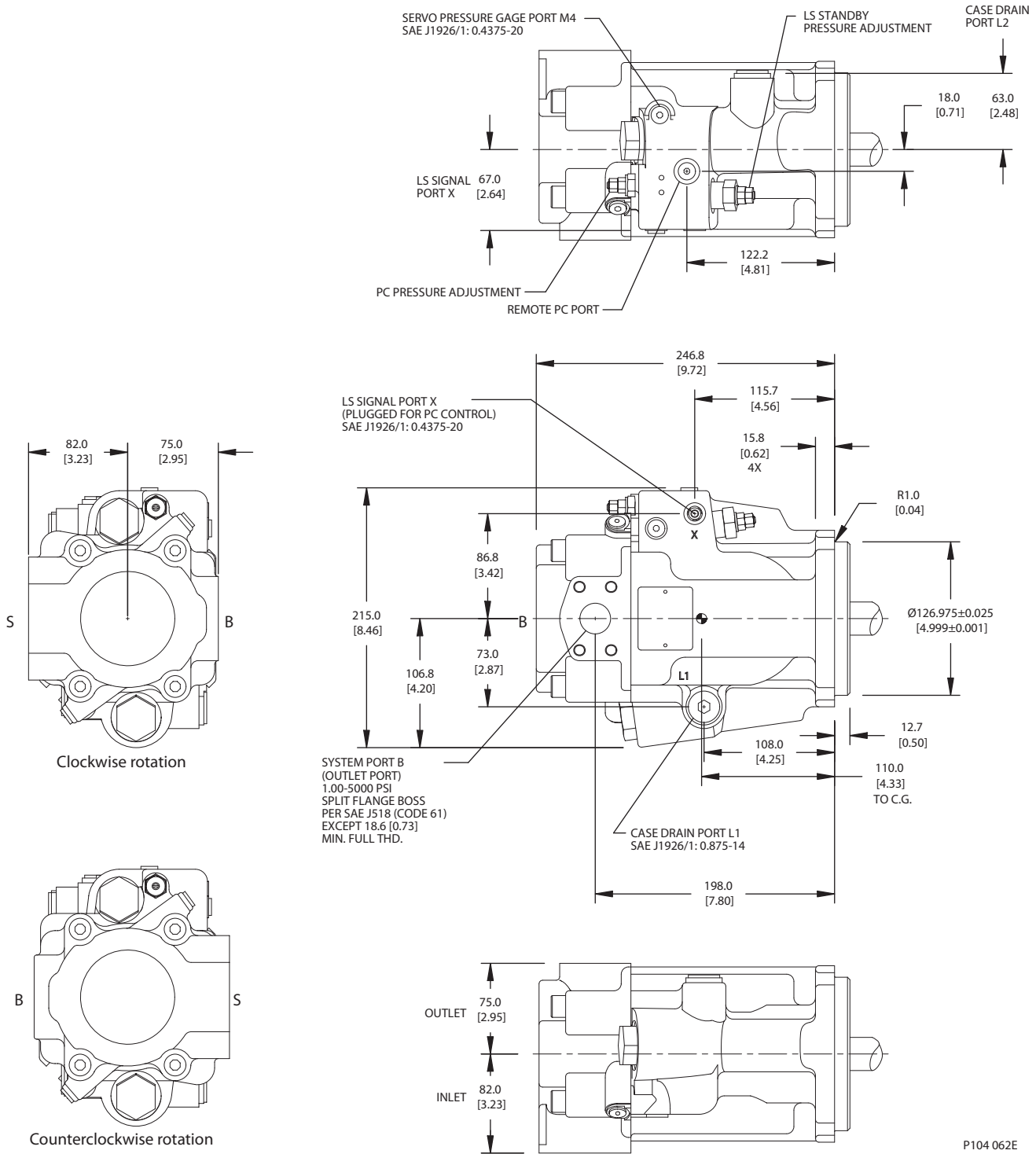


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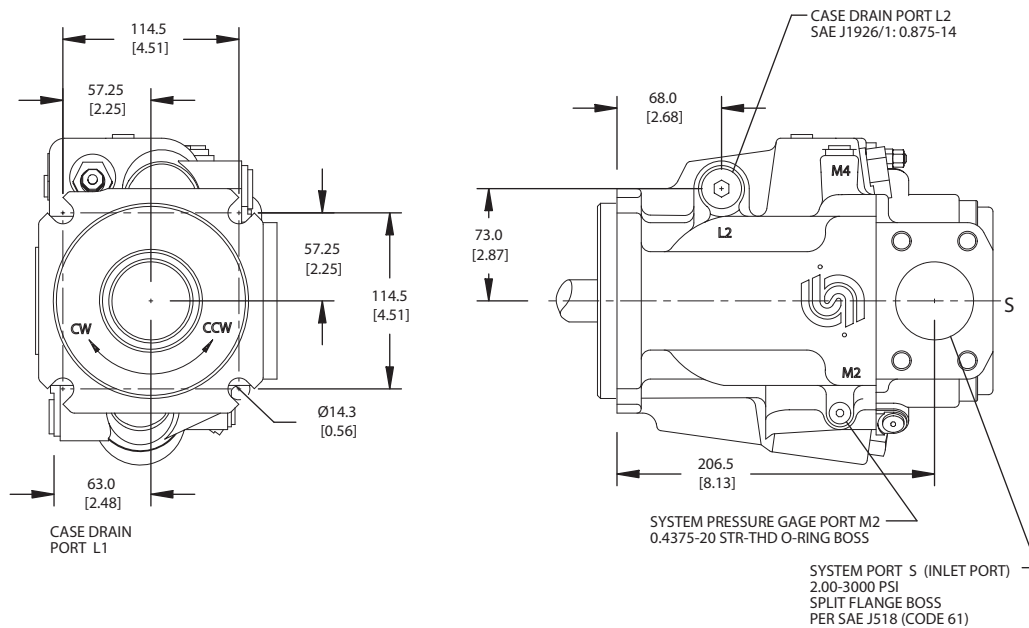
Installation Drawings  
(continued)

SAE-C mounting flange, radial ported endcap



Installation Drawings  
(continued)

SAE-C mounting flange, radial ported endcap (continued)

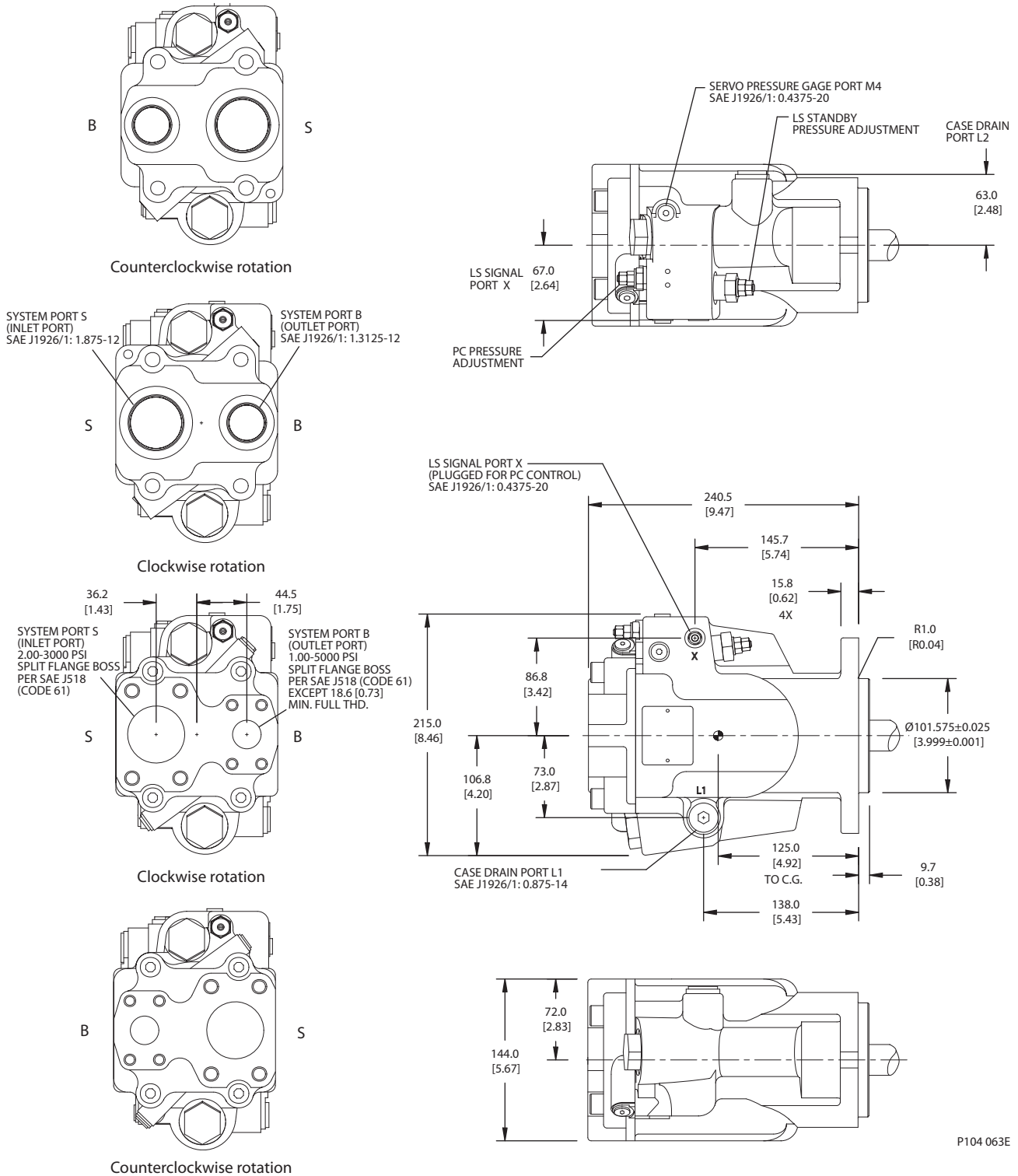


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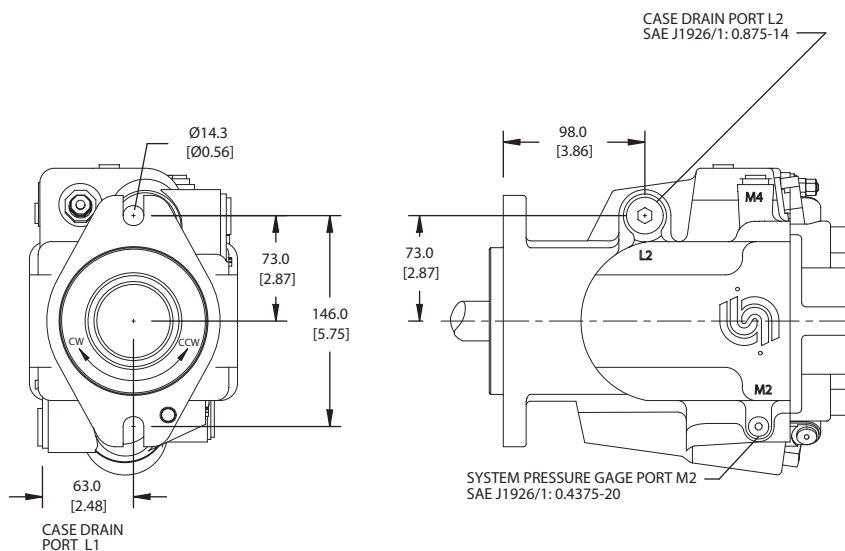
Installation Drawings  
(continued)

SAE-B mounting flange, axial ported endcap



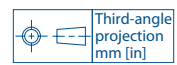
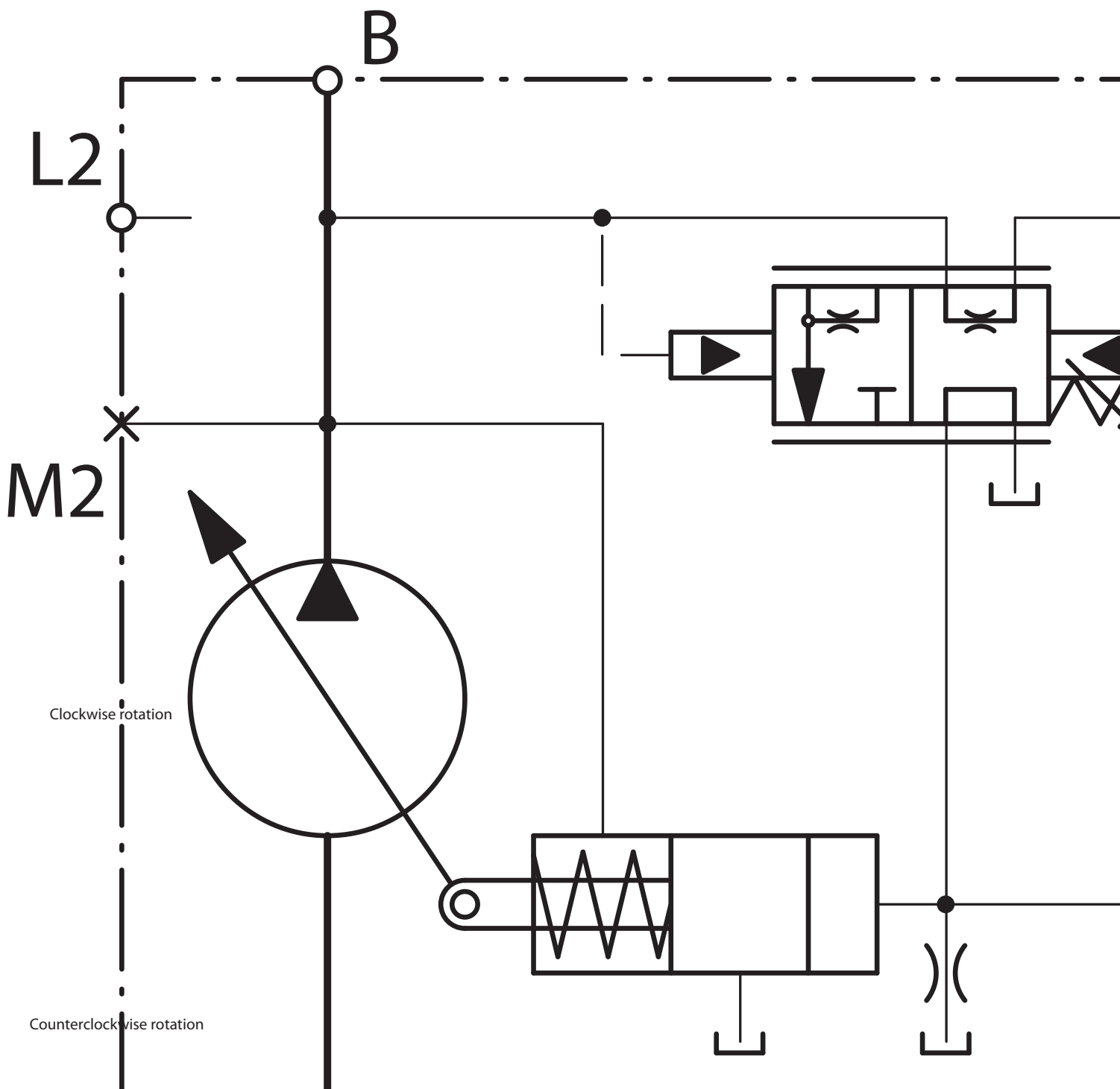
Installation Drawings  
(continued)

SAE-B mounting flange, axial ported endcap (continued)



P104 063E

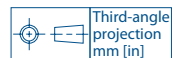
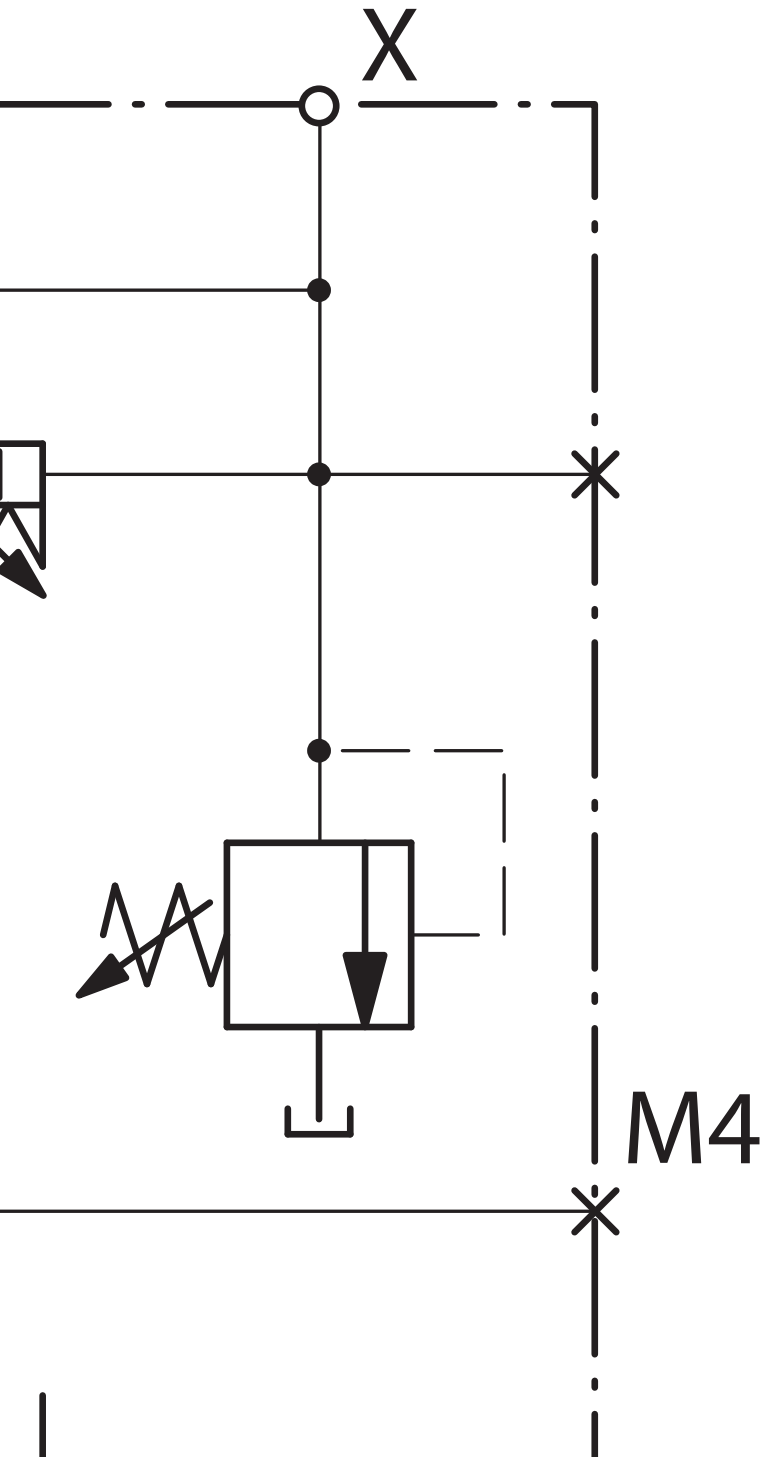






Installation Drawings  
(continued)

SAE-B mounting flange, radial ported endcap (continued)





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Local address:

**Danfoss Power Solutions US Company**

2800 East 13th Street  
Ames, IA 50010, USA  
Phone: +1 515 239 6000

**Danfoss Power Solutions GmbH & Co. OHG**

Krokamp 35  
D-24539 Neumünster, Germany  
Phone: +49 4321 871 0

**Danfoss Power Solutions ApS**

Nordborgvej 81  
DK-6430 Nordborg, Denmark  
Phone: +45 7488 2222

**Danfoss Power Solutions**

22F, Block C, Yishan Rd  
Shanghai 200233, China  
Phone: +86 21 3418 5200

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