



Series 45 Axial Piston Open Circuit Pumps

Technical Information

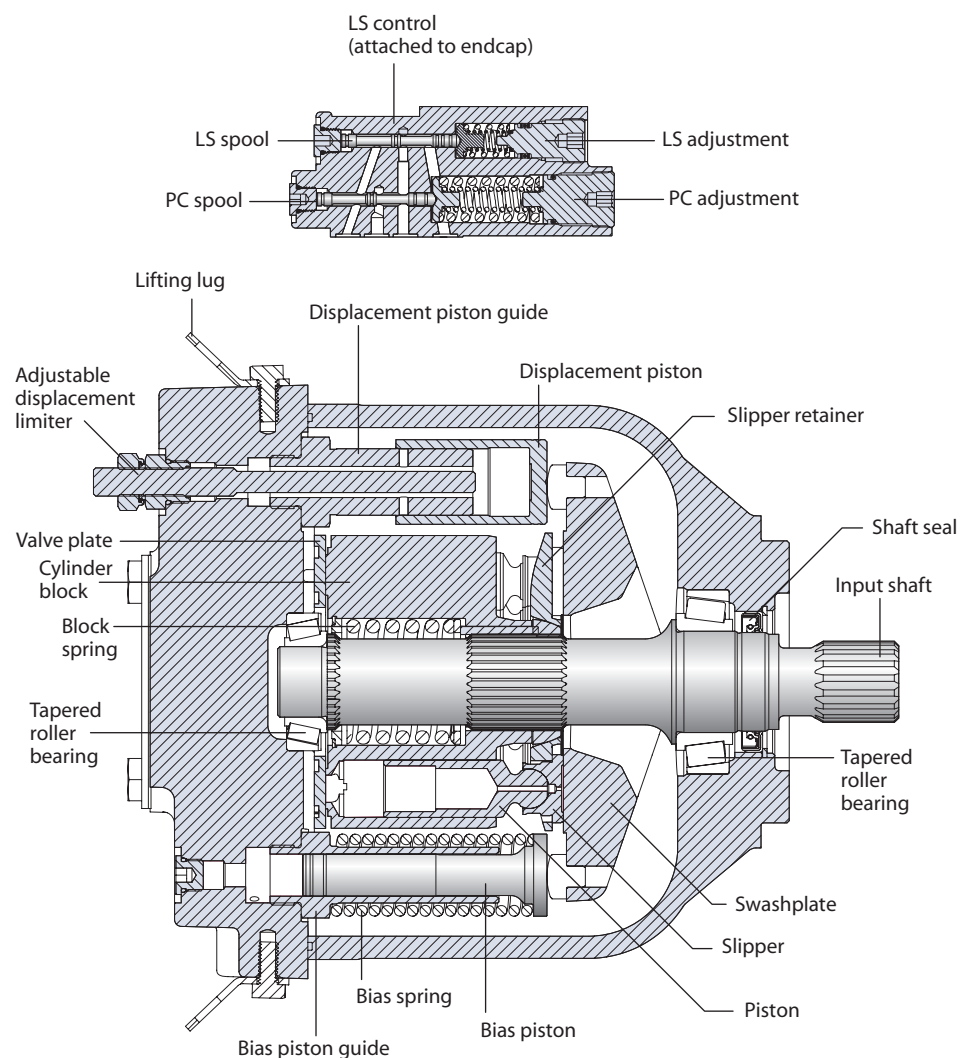
Frame E

DESIGN

Series 45 Frame E 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 E cross section



P104 001E



Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

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

		Model		
Feature	Unit	E100B	E130B	E147C
Maximum Displacement	cm ³ [in ³]	100 [6.10]	130 [7.93]	147 [8.97]
Flow at rated speed (theoretical)	l/min [US gal/min]	245 [64.7]	286 [75.6]	309 [81.6]
Input torque at maximum displacement (theoretical)	N•m/bar [lbf•in/1000 psi]	1.592 [972]	2.069 [1263]	2.340 [1428]
Mass moment of inertia of internal rotating components	kg•m ² [slug•ft ²]	0.0128 [0.0094]	0.0128 [0.0094]	0.0128 [0.0094]
Weight	Axial ports	52 [114]		
	Radial ports	56 [123.5]		
Rotation		Clockwise, Counterclockwise		
Mounting		SAE-C		
Auxiliary mounting (See page 95)		SAE-A, SAE-B, SAE-BB, SAE-C, SAE-CC		
System ports (type)		4-bolt split flange		
System ports (location)		Axial, Radial		
Control types (See page 91)		PC, Remote PC, LS, LS with internal bleed		
Shafts (See page 93)	Splined	13-tooth, 14-tooth, 17-tooth		
	Straight	Ø 38.08 mm [1.5 in]		
Displacement limiters (See page 97)		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

			Model		
Rating		Units	E100B	E130B	E147C
Input speed ¹	minimum	min ⁻¹ (rpm)	500	500	500
	continuous		2450	2200	2100
	maximum		2880	2600	2475
Working pressure	continuous	bar [psi]	310 [4495]	310 [4495]	260 [3770]
	maximum		400 [5800]	400 [5800]	350 [5075]
External shaft loads	External moment (M _e)	N•m [lbf•in]	455 [4030]	360 [3190]	396 [3500]
	Thrust in (T _{in}), out (T _{out})	N [lbf]	2846 [640]	1735 [390]	2113 [475]
	Thrust out (T _{out})		7740 [1740]	6672 [1500]	7117 [1600]
Bearing life	at 140 bar [2030 psi]	B ₁₀ hours	77 200	32 700	21 600
	at 210 bar [3045 psi]		19 800	8400	5500
	at 260 bar [3770 psi]		9700	4116	2700
	at 310 bar [4495 psi]		5400	2300	—
Mounting flange load moments	Vibratory (continuous)	N•m [lbf•in]	1920 [17 000]		
	Shock (max)		6779 [60 000]		

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

Sound levels²

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 ⁻¹ (rpm)	Rated speed	1800 min ⁻¹ (rpm)	Rated speed	1800 min ⁻¹ (rpm)	Rated speed
E100B	75	77	77	78	77	80
E130B	77	81	78	81	78	81
E147C	77	78	78	78	—	—

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



Series 45 Axial Piston Open Circuit Pumps

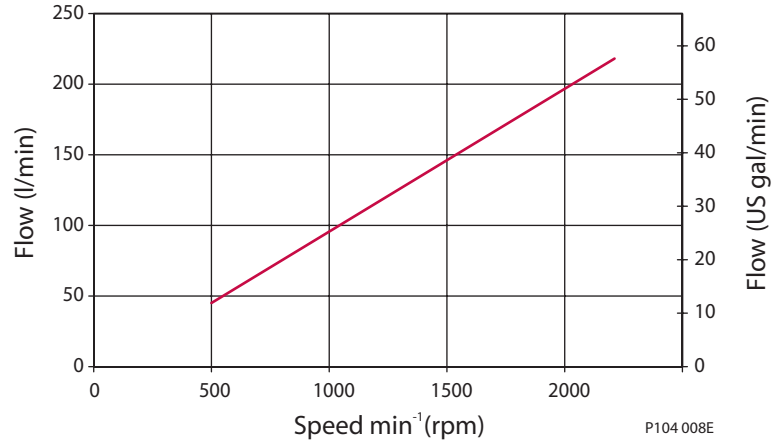
Technical Information

Frame E

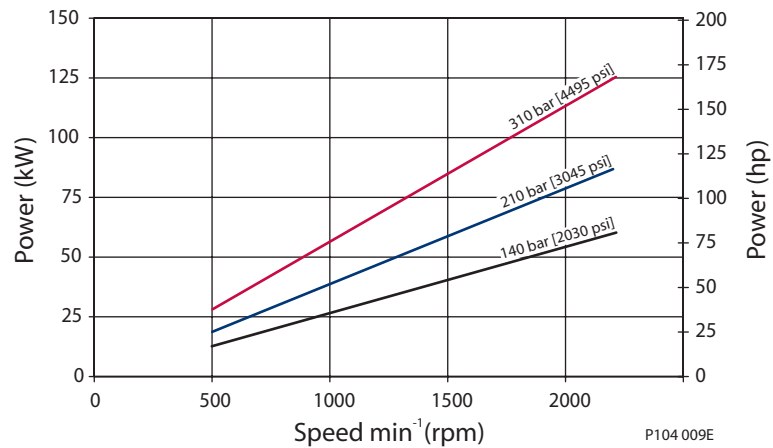
PERFORMANCE E100B

Flow and power data valid
at 49°C [120°F] and viscosity
of 17.8 mm²/sec [88 SUS].

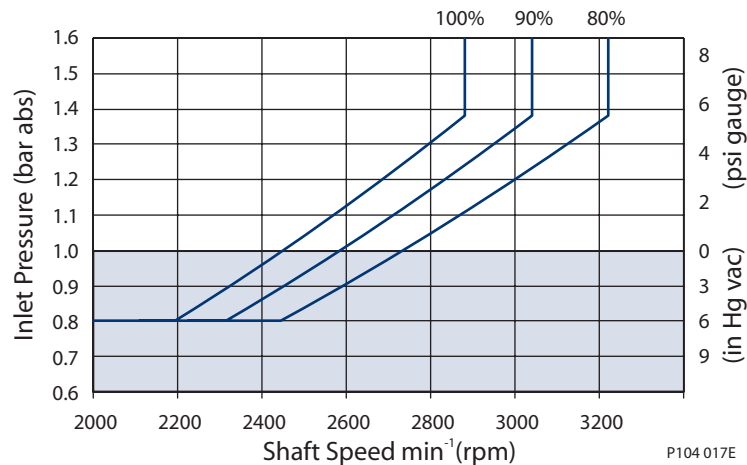
Flow vs. speed



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.



Series 45 Axial Piston Open Circuit Pumps

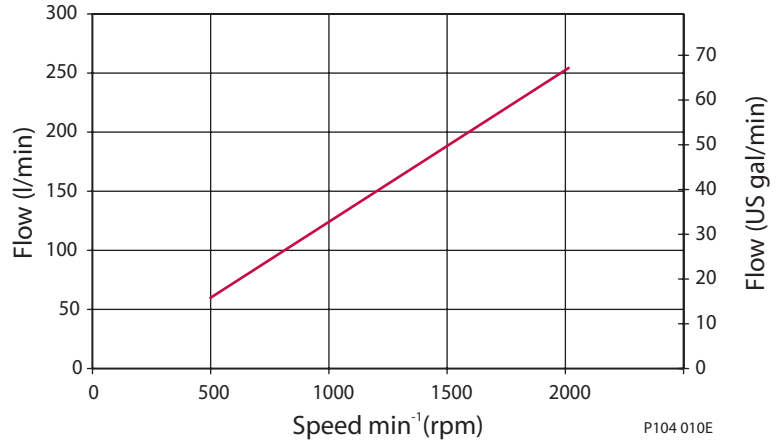
Technical Information

Frame E

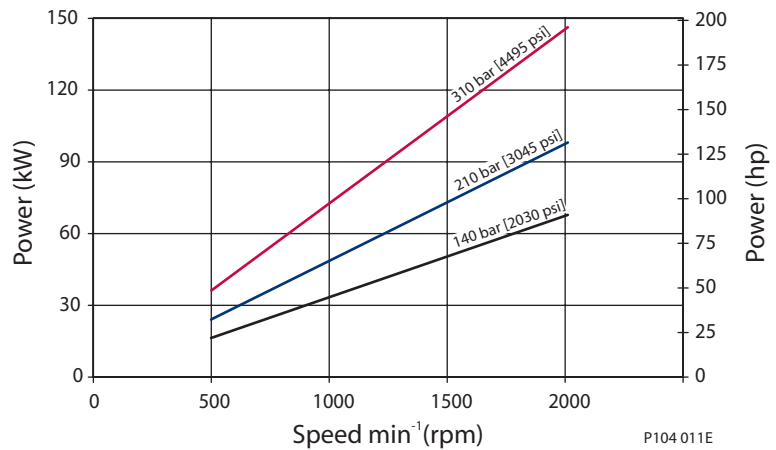
PERFORMANCE E130B

Flow and power data valid at 49°C [120°F] and viscosity of 17.8 mm²/sec [88 SUS].

Flow vs. speed

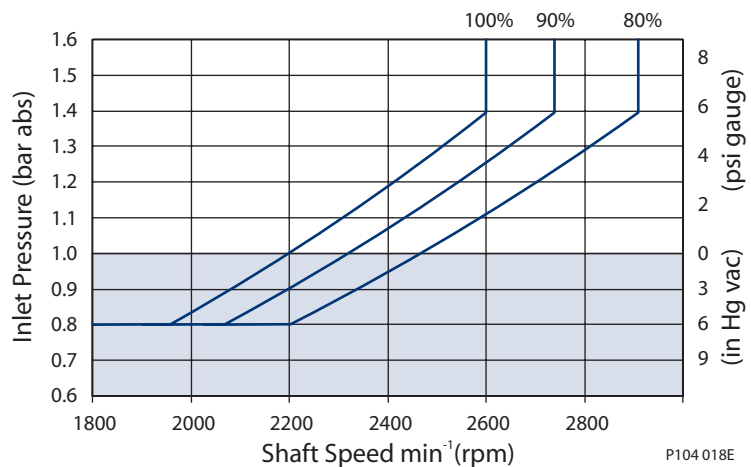


Input power vs. speed



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





Series 45 Axial Piston Open Circuit Pumps

Technical Information

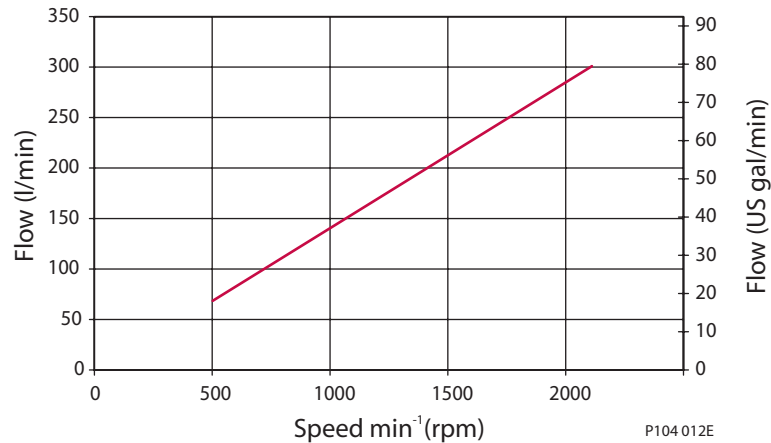
Frame E

PERFORMANCE

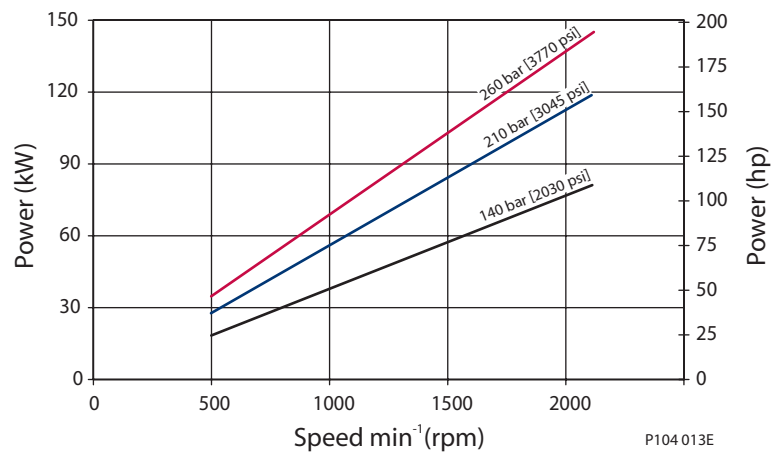
E147C

Flow and power data valid at 49°C [120°F] and viscosity of 17.8 mm²/sec [88 SUS].

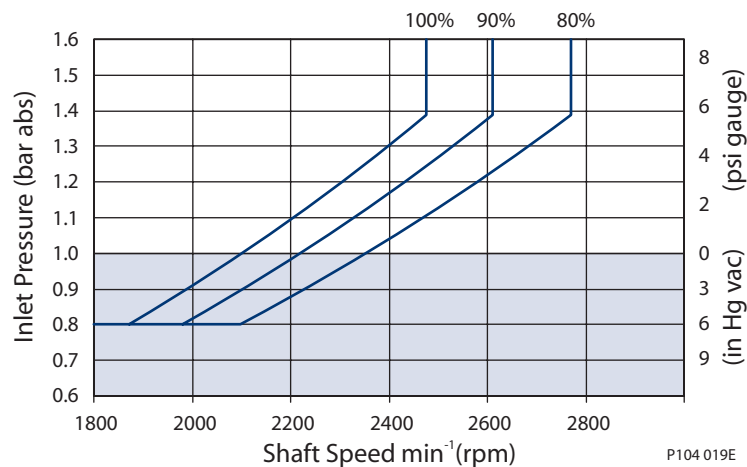
Flow vs. speed



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.



Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

ORDER CODE

R	S	P	C	D	E	F	G	H	J			K			L	M	N
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3

R Product

ER	E Frame, variable displacement open circuit pump
----	--

S Rotation

L	Left hand (counterclockwise)
R	Right hand (clockwise)

P Displacement and pressure rating

100B	100 cm ³ /rev [6.10 in ³ /rev], 310 bar [4495 psi] continuous working pressure
130B	130 cm ³ /rev [7.93 in ³ /rev], 310 bar [4495 psi] continuous working pressure
147C	147 cm ³ /rev [8.97 in ³ /rev], 260 bar [3770 psi] continuous working pressure

C Control type

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

* Use only with 100, and 130 cm³ displacements.

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

Example	10 = 100 bar
10-31	100 to 310 bar [1450 to 4495 psi] (100B, 130B)
10-26	100 to 260 bar [1450 to 3770 psi] (147C)

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

Example	20 = 20 bar
10-30	10 to 30 bar [145 to 435 psi]
NN	Not applicable (use with PC controls)
RP and BP	Must be 20 bar

F Not used

NN	Not applicable
----	----------------



Diagram illustrating a 24-hour day with 24 slots. The slots are labeled R, S, P, C, D, E, F, G, H, J, K, L, M, N. Slots J and K are highlighted with blue boxes and have blue labels above them. Slots J and K are also labeled with '1 2 3' below them.

N	None (standard)
----------	-----------------

3	Standard orifice
---	------------------

S1	14-tooth, 12/24 pitch (ANSI B92.1 1970 - Class 5)
S2	17-tooth, 12/24 pitch (ANSI B92.1 1970 - Class 5)
S4	13-tooth, 8/16 pitch (ANSI B92.1 1970 - Class 5)
K5	Ø 38.08 mm [1.5 in], straight keyed
S5	14-tooth spline 12/24 pitch (ANSI B92.1 1970 - Class 5 (not available for units with auxiliary mounting pads)

N	None
A	SAE-A, 9-tooth coupling
T	SAE-A, 11-tooth coupling
B	SAE-B, 13-tooth coupling
V	SAE-BB, 15-tooth coupling
C	SAE-C, 14-tooth coupling
W	SAE-CC, 17-tooth coupling

Code	Location	Port type	Inlet size	Outlet size
P	Radial	4-bolt split-flange	2 ½ in.	1 ¼ in.
L	Axial	4-bolt split-flange	2 ½ in.	1 ¼ in.

A	Single lip seal, viton
----------	------------------------

1	SAE-C 4-bolt, SAE O-ring boss housing ports
---	---

N	Not applicable
---	----------------

NNN	None
AAA	Adjustable, factory set at max angle

NNN	None
-----	------

NNN	None
-----	------



Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

CONTROLS

Pressure compensated control (PC)

Specifications

PC control setting range

Model	bar	psi
E100B	100–310	1450–4495
E130B	100–310	1450–4495
E147C	100–260	1450–3770

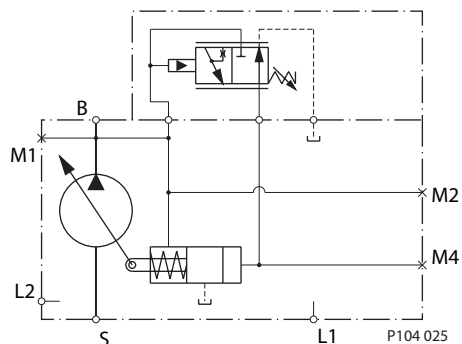
Response/recovery times*

(ms)	Response	Recovery
E100B	45	175
E130B	55	175
E147C	60	190

* 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
E100B	100–310	1450–4495
E130B	100–310	1450–4495
E147C	100–260	1450–3770

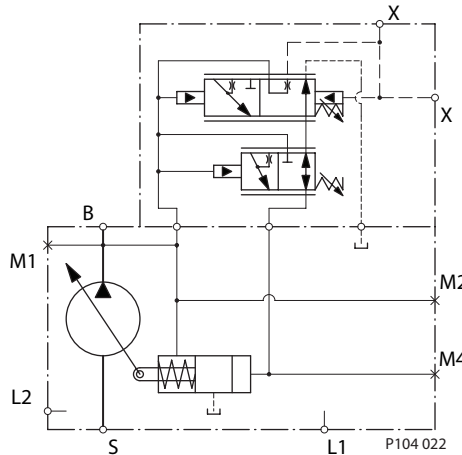
Response/recovery times*

(ms)	Response	Recovery
E100B	45	175
E130B	55	175
E147C	60	190

* For definitions, see page 10.

Schematic diagram

Remote PC schematic



LS setting

Model	bar	psi
All	20	290

Legend

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



Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

CONTROLS (continued)

Specifications

Load sensing control (LS)

PC setting range

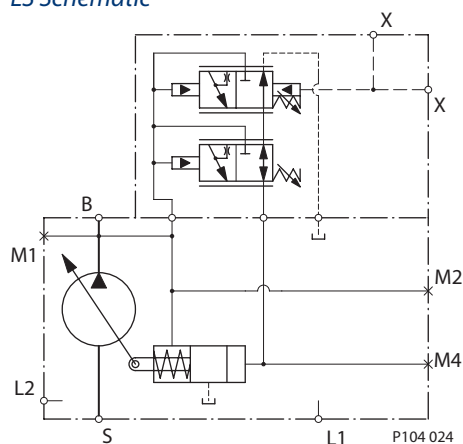
Model	bar	psi
E100B	100–310	1450–4495
E130B	100–310	1450–4495
E147C	100–260	1450–3770

Response/recovery times*

(ms)	Response	Recovery
E100B	45	200
E130B	50	200
E147C	60	200

* For definitions, see page 11.

Schematic diagram LS Schematic



LS setting range

Model	bar	psi
All	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

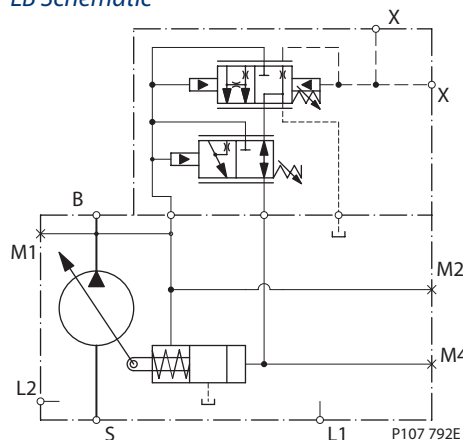
Model	bar	psi
E100B	100–310	1450–4495
E130B	100–310	1450–4495
E147C	100–260	1450–3770

Response/recovery times*

(ms)	Response	Recovery
E100B	45	200
E130B	50	200
E147C	60	200

* For definitions, see page 11.

Schematic diagram LB Schematic



LS setting range

Model	bar	psi
All	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



Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INPUT SHAFTS

Shaft data

Code	Description	Maximum torque rating ¹ N·m [lbf·in]	Drawing
S1	14-tooth spline 12/24 pitch (ANSI B92.1 1970 - Class 5)	1093 [9675]	14 TOOTH 12/24 PITCH 30° PRESSURE ANGLE 29.634 [1.167] PITCH FILLET ROOT SIDE FIT COMPATIBLE WITH ANSI B92.1-1970 CLASS 5 ALSO MATES WITH FLAT ROOT SIDE FIT Ø31.14 ± 0.08 [1.226 ± 0.003] 33.7 ± 0.5 [1.33 ± 0.02] 48 [1.89] 8 ± 0.8 [0.31 ± 0.03] COUPLING MUST NOT PROTRUDE BEYOND THIS POINT P104 038E
S2	17-tooth spline 12/24 pitch (ANSI B92.1 1970 - Class 5)	1044 [9240]	17 TOOTH 12/24 PITCH 30° PRESSURE ANGLE 35.983 [1.417] PITCH DIA FILLET ROOT SIDE FIT COMPATIBLE WITH ANSI B92.1-1970 CLASS 5 ALSO MATES WITH FLAT ROOT SIDE FIT Ø36.66 ± 0.08 [1.443 ± 0.003] 34 ± 0.15 [1.339 ± 0.006] 54 [2.126] 8 ± 0.8 [0.31 ± 0.03] COUPLING MUST NOT PROTRUDE BEYOND THIS POINT P104 036E
S4	13-tooth spline 8/16 pitch (ANSI B92.1 1970 - Class 5)	1551 [13 730]	13 TOOTH 8/16 PITCH 30° PRESSURE ANGLE 41.28 [1.625] PITCH DIA FILLET ROOT SIDE FIT COMPATIBLE WITH ANSI B92.1-1970 CLASS 5 ALSO MATES WITH FLAT ROOT SIDE FIT Ø43.94 ± 0.08 [1.73 ± 0.003] 42 ± 0.15 [1.654 ± 0.006] 67 [2.638] 8 ± 0.8 [0.31 ± 0.03] COUPLING MUST NOT PROTRUDE BEYOND THIS POINT P104 035E

1. See *Input shaft torque ratings*, page 18 for an explanation of maximum torque.



Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INPUT SHAFTS

(continued)

Code	Description	Maximum torque rating ¹ N•m [lbf•in]	Drawing
K5	Ø 38.08 mm [1.5 in] Straight keyed	1161 [10 270]	9.525 [0.375] X 38.1 [1.5] LONG SQUARE KEY Ø38.075 ± 0.025 [1.5 ± 0.0009] Ø42.26 ± 0.125 [1.664 ± 0.005] 54 [2.13] 8 ± 0.8 [0.31 ± 0.03] COUPLING MUST NOT PROTRUDE BEYOND THIS POINT P104 037E

1. See *Input shaft torque ratings*, page 18 for an explanation of maximum torque.



Series 45 Axial Piston Open Circuit Pumps

Technical Information

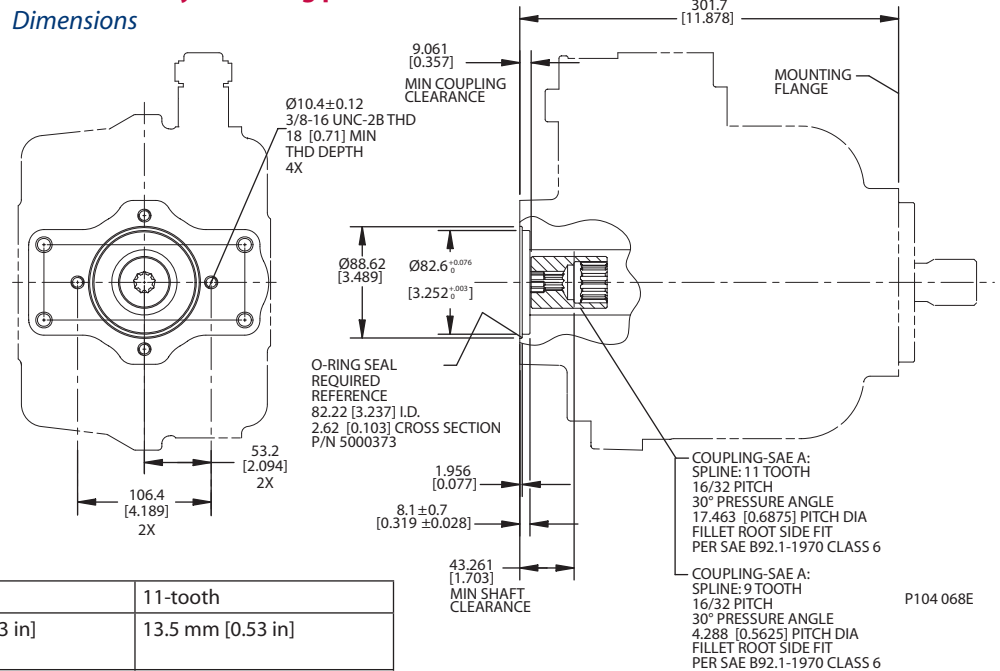
Frame E

AUXILIARY MOUNTING PADS

See page 18 for mating pump pilot and spline dimensions.

SAE-A auxiliary mounting pad

Dimensions



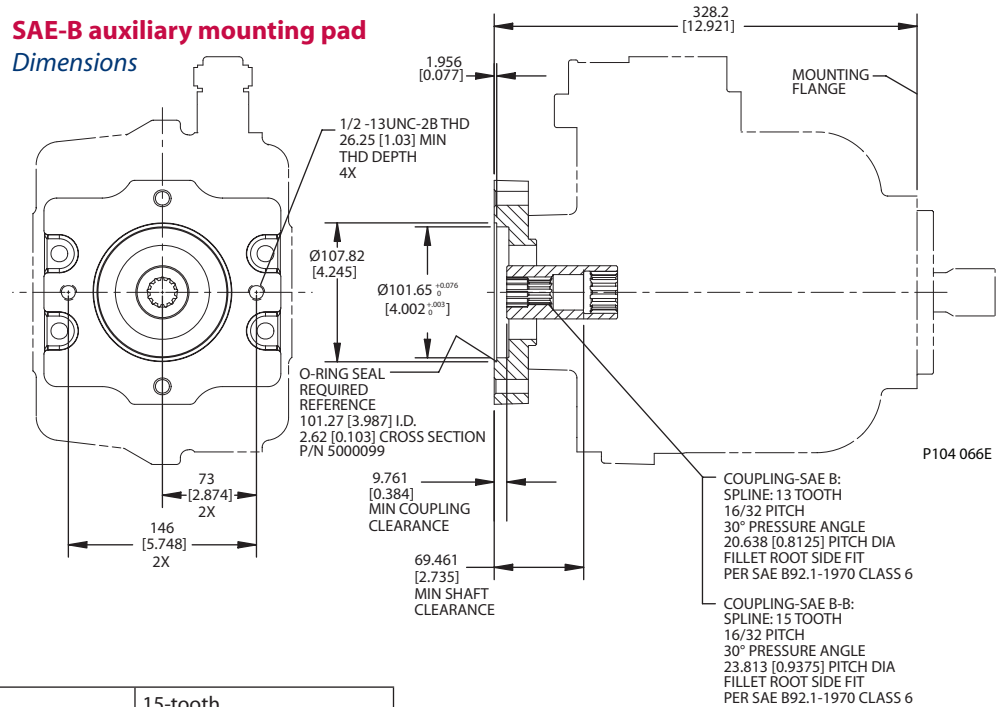
Specifications

Coupling	9-tooth	11-tooth
Spline minimum engagement	13.5 mm [0.53 in]	13.5 mm [0.53 in]
Maximum torque	107 N·m [950 lbf·in]	147 N·m [1300 lbf·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]	16.1 mm [0.63 in]
Maximum torque	249 N·m [2200 lbf·in]	339 N·m [3000 lbf·in]



Series 45 Axial Piston Open Circuit Pumps

Technical Information

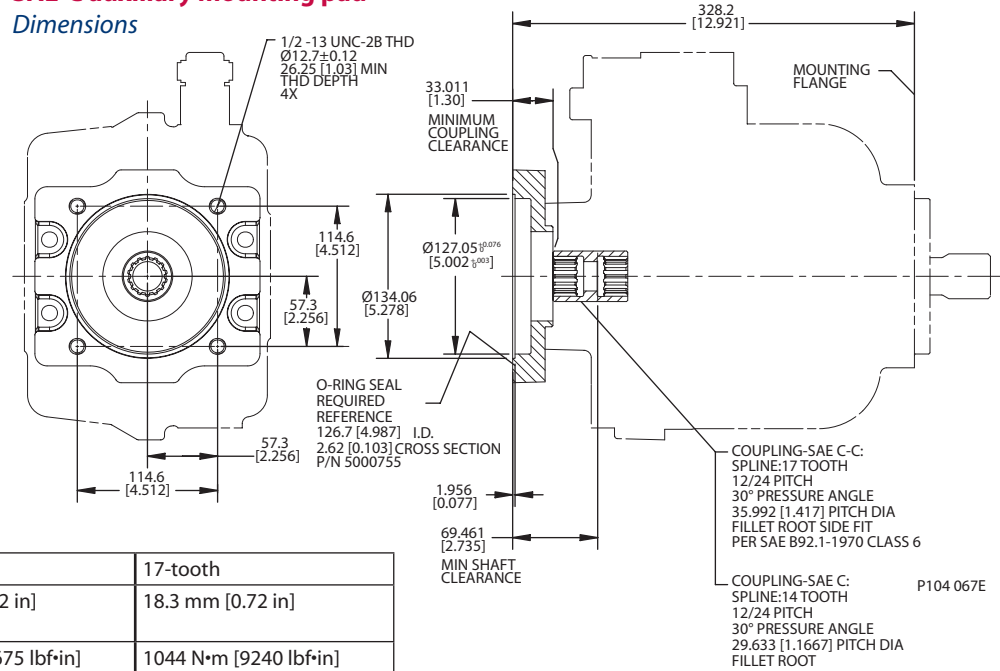
Frame E

AUXILIARY MOUNTING PADS (continued)

See page 18 for mating pump pilot and spline dimensions.

SAE-C auxiliary mounting pad

Dimensions

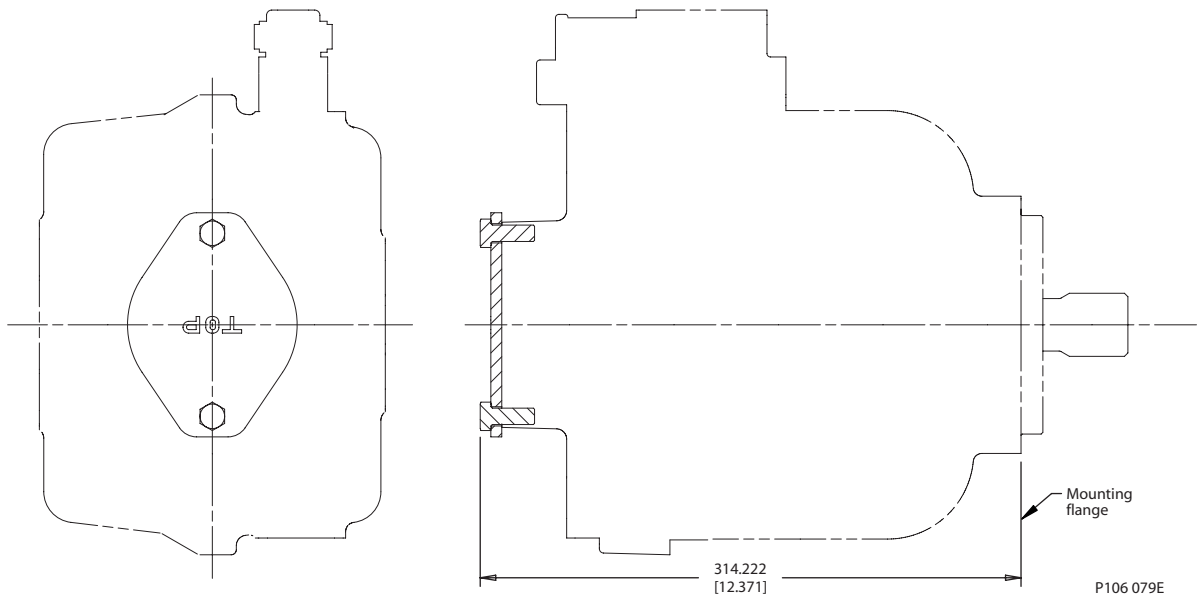


Specifications

Coupling	14-tooth	17-tooth
Spline minimum engagement	18.3 mm [0.72 in]	18.3 mm [0.72 in]
Maximum torque	1093 N·m [9675 lbf·in]	1044 N·m [9240 lbf·in]

Running cover

Dimensions





Series 45 Axial Piston Open Circuit Pumps

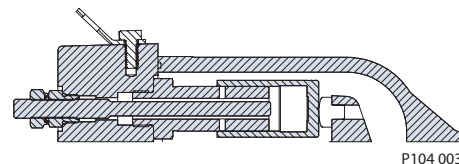
Technical Information

Frame E

DISPLACEMENT LIMITERS

E 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

E100B	40 to 100 cm ³ [2.44 to 6.1 in ³]
E130B	70 to 130 cm ³ [4.27 to 7.93 in ³]
E147C	87 to 147 cm ³ [5.31 to 8.97 in ³]

Displacement per turn

E100B	8.4 cm ³ /rev [0.51 in ³ /rev]
E130B	8.4 cm ³ /rev [0.51 in ³ /rev]
E147C	8.4 cm ³ /rev [0.51 in ³ /rev]



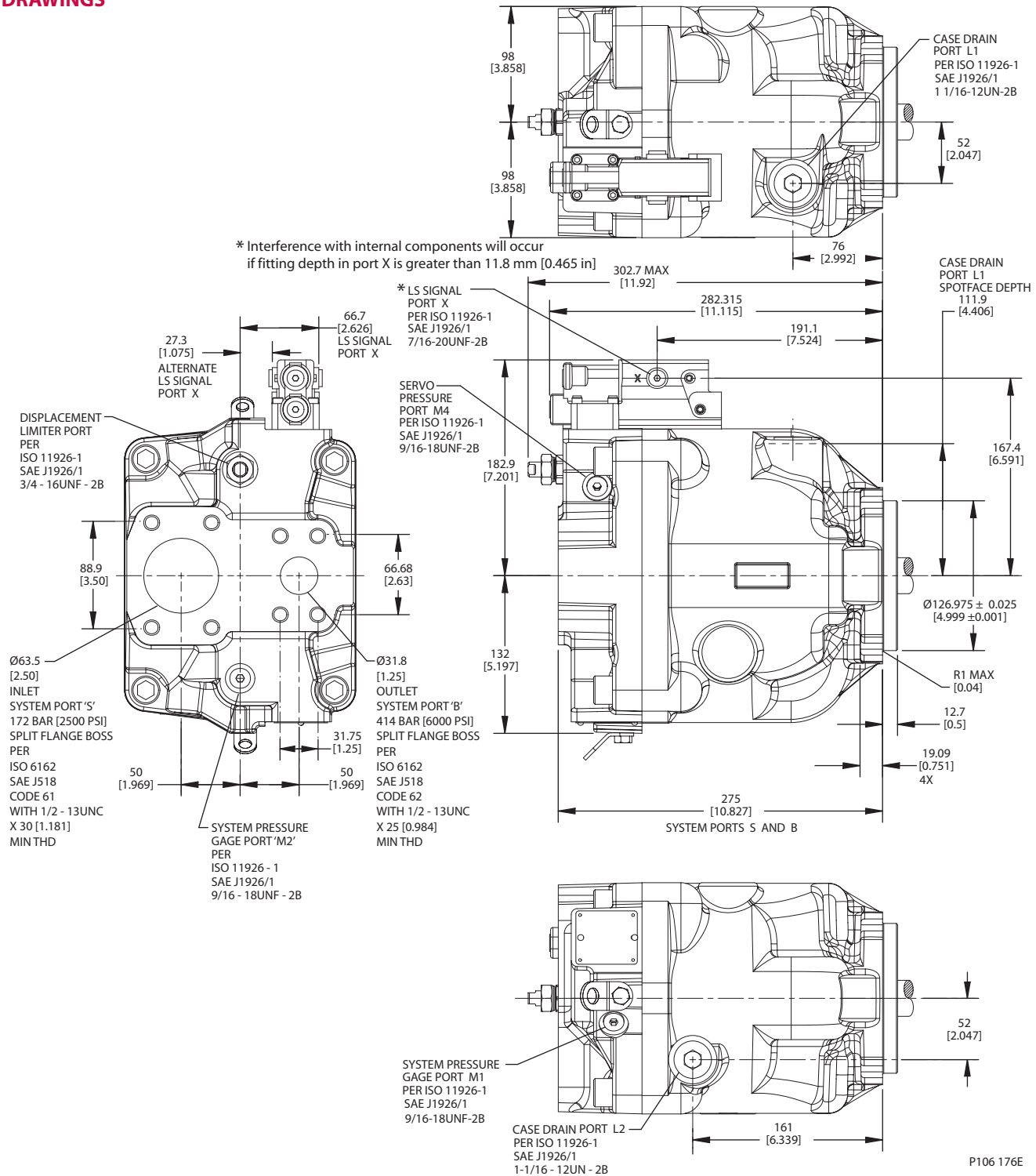
Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS

Axial ported endcap, clockwise rotation





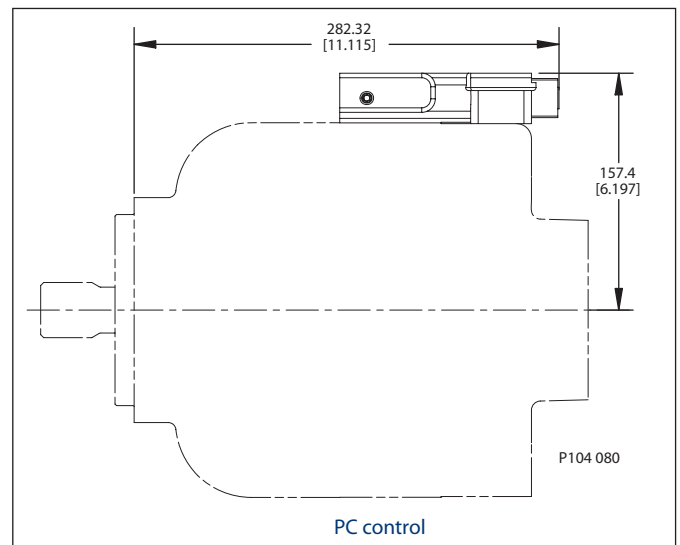
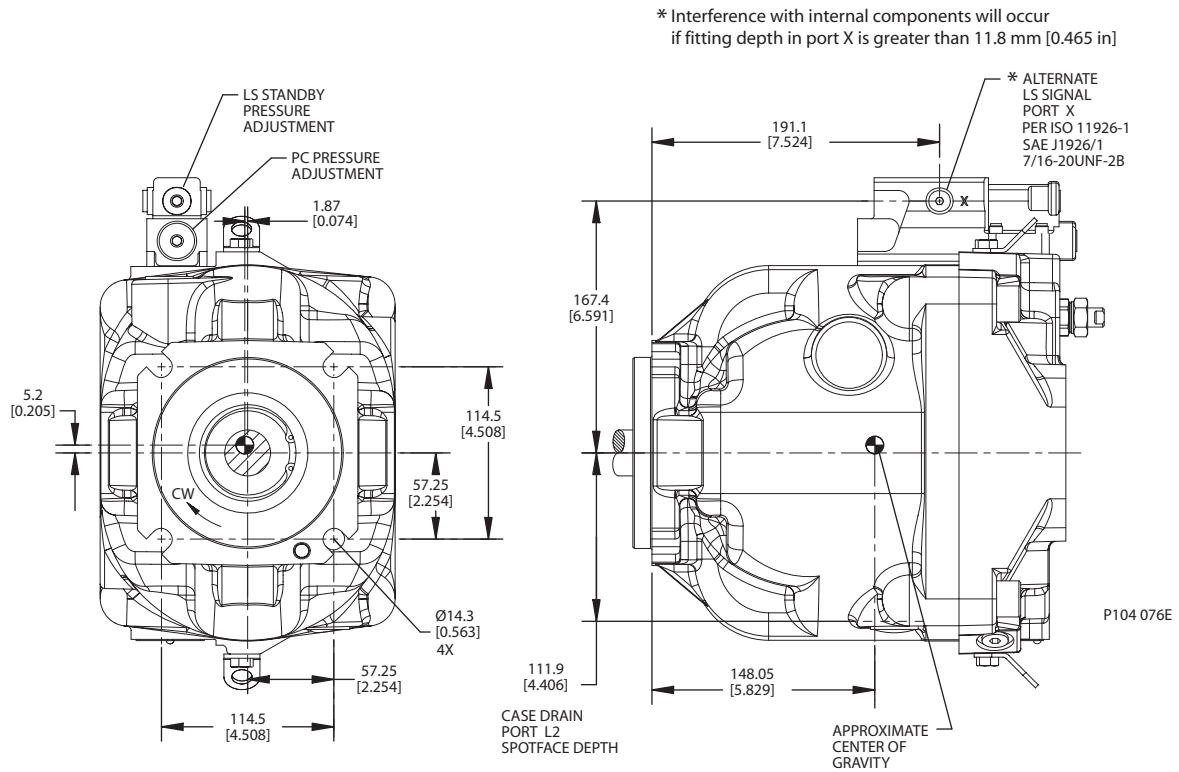
Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS (continued)

Axial ported endcap, clockwise rotation (continued)



Third-angle
projection
mm [in]



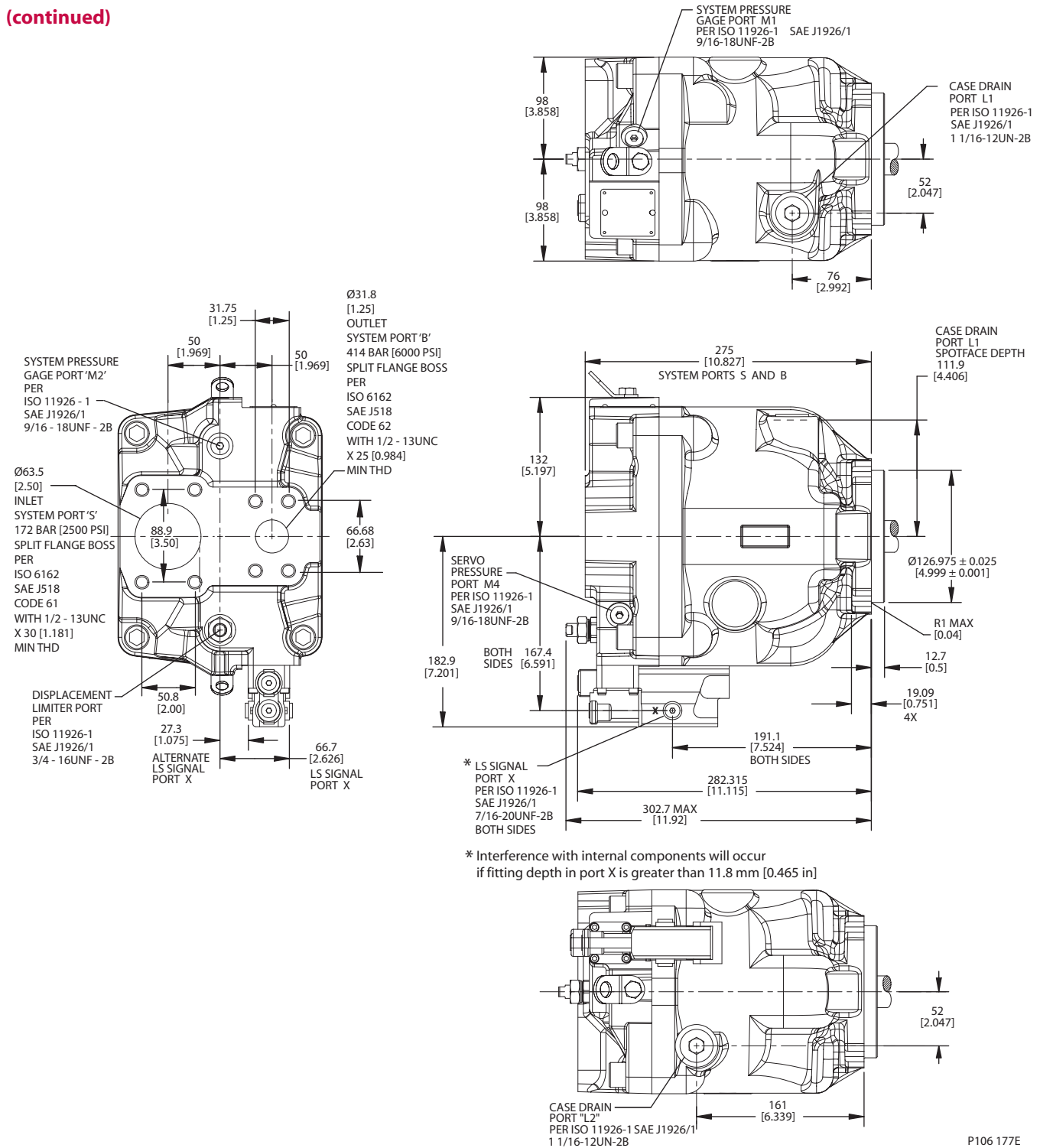
Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS (continued)

Axial ported endcap, counterclockwise rotation



P106 177E





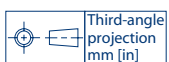
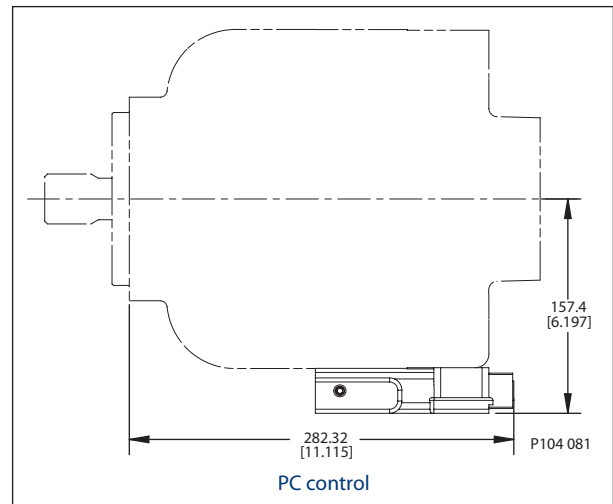
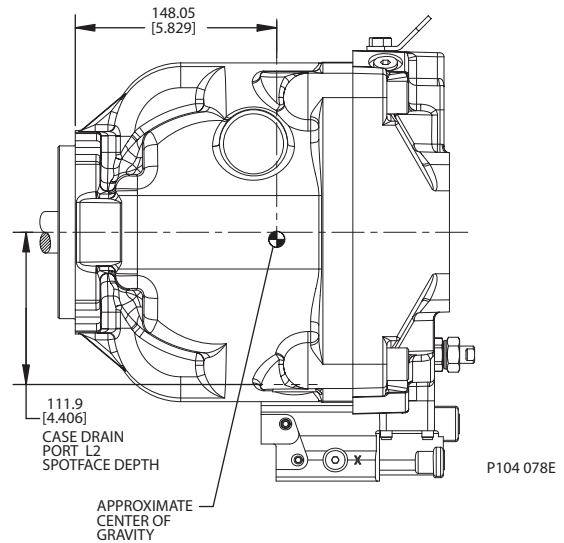
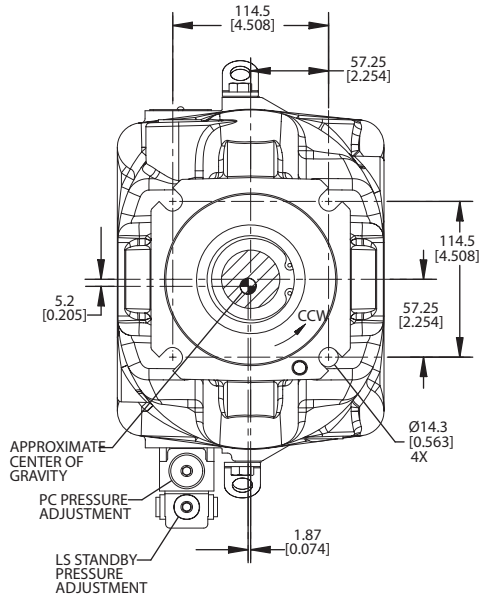
Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS (continued)

Axial ported endcap, counterclockwise rotation (continued)





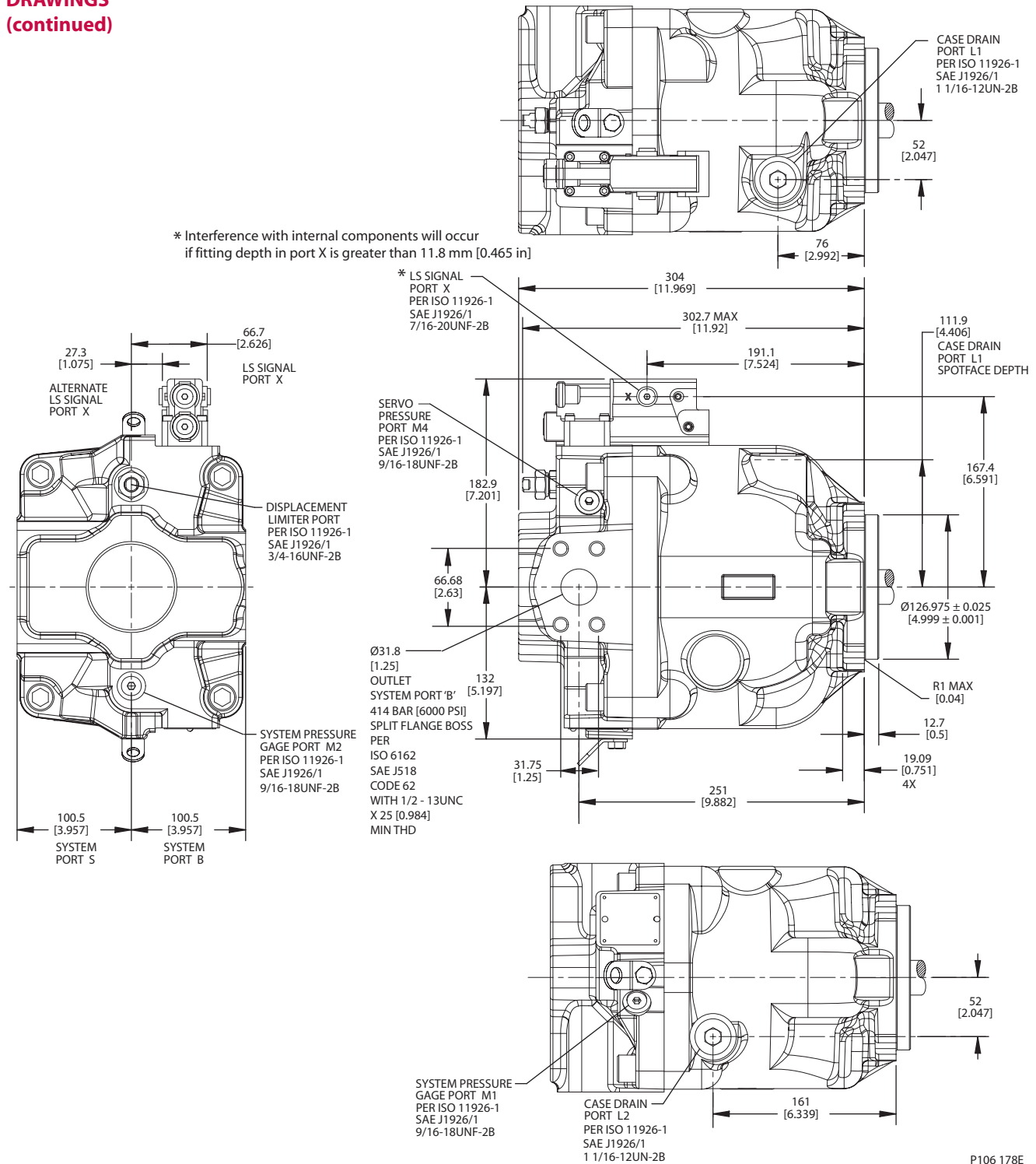
Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS (continued)

Radial ported endcap, clockwise rotation



P106 178E





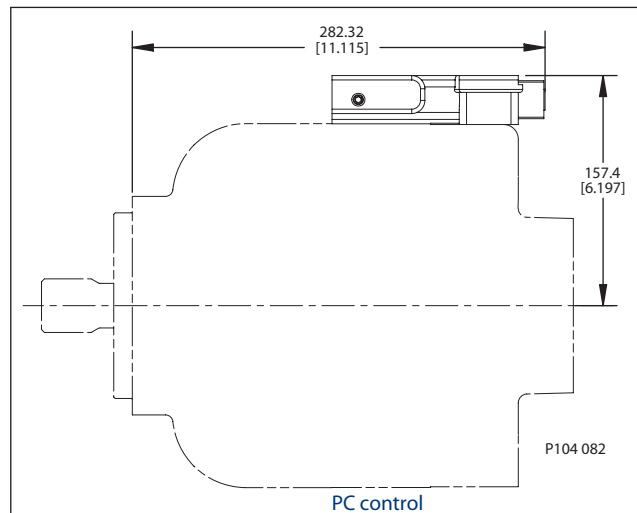
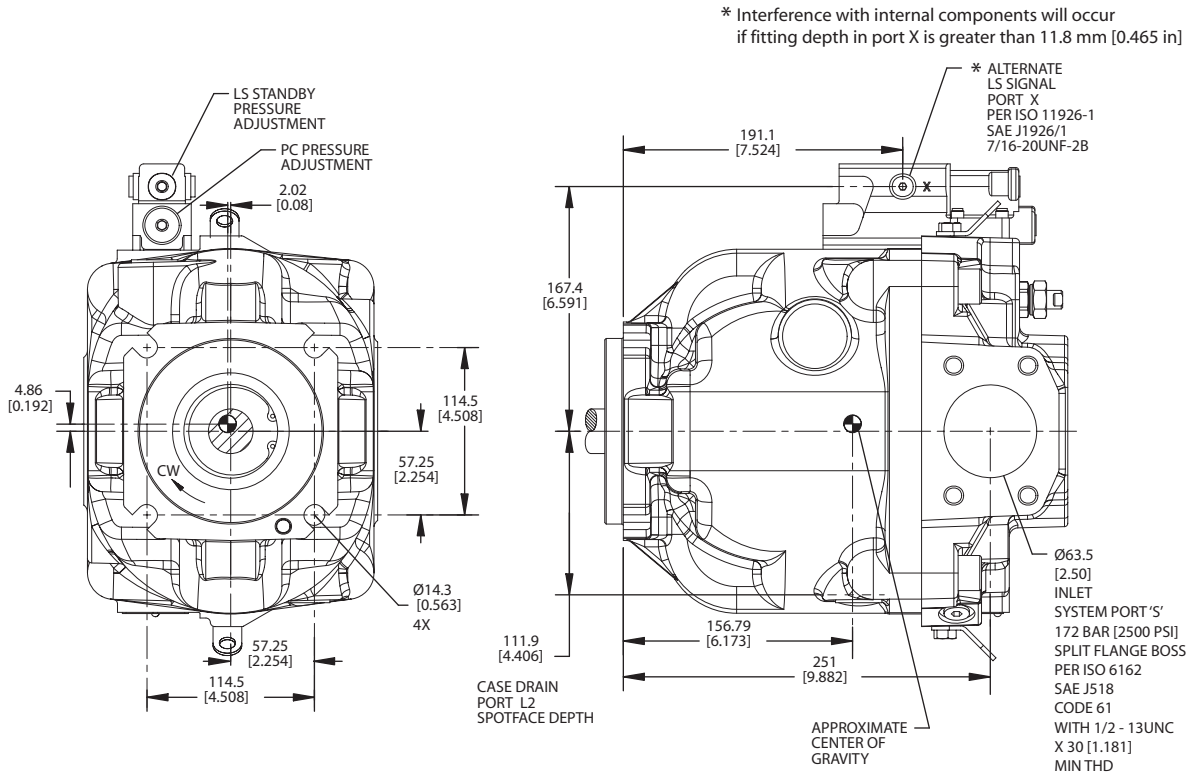
Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS (continued)

Radial ported endcap, clockwise rotation (continued)





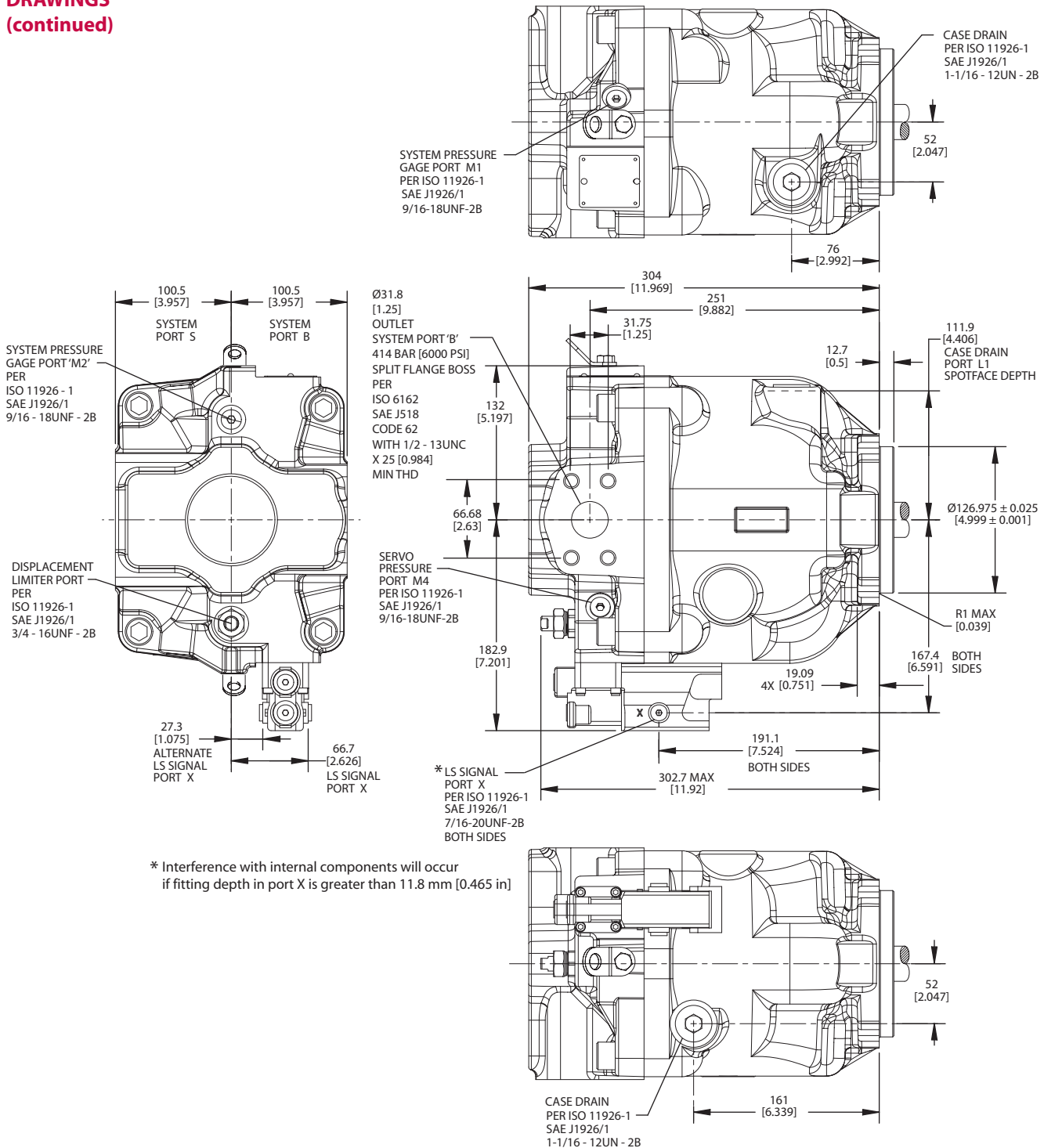
Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS (continued)

Radial ported endcap, counterclockwise rotation



P106 179E





Series 45 Axial Piston Open Circuit Pumps

Technical Information

Frame E

INSTALLATION DRAWINGS (continued)

Radial ported endcap, counterclockwise rotation (continued)

