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**.

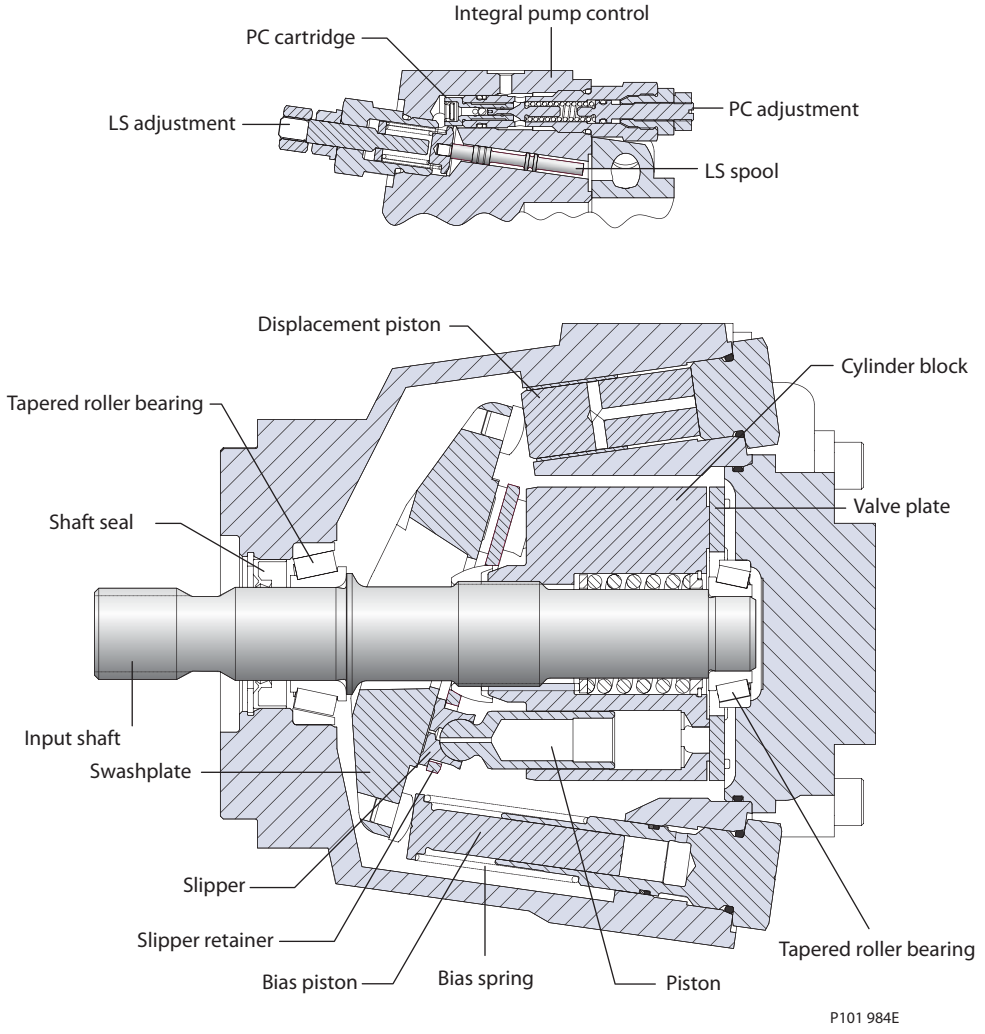
Frame H

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



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	Model H75D
Maximum Displacement		cm^3 [in^3]	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		$kg•m^2$ [$slug•ft^2$]	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 (*See page 51*)			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 (*See page 46*)			PC, LS, LS with internal bleed	
Shafts (*See page 48*)		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 (*See page 52*)			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	Model H75D
Input speed[1]	minimum	min^{-1} (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_e)	N•m [lbf•in]	226 [2000]	226 [2000]
	Thrust in (T_{in}), out (T_{out})	N [lbf]	2200 [495]	2200 [495]
Bearing life	at 140 bar [2030 psi]	B_{10} 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.

For more information on noise levels, *see page 20*.

Sound levels[2]

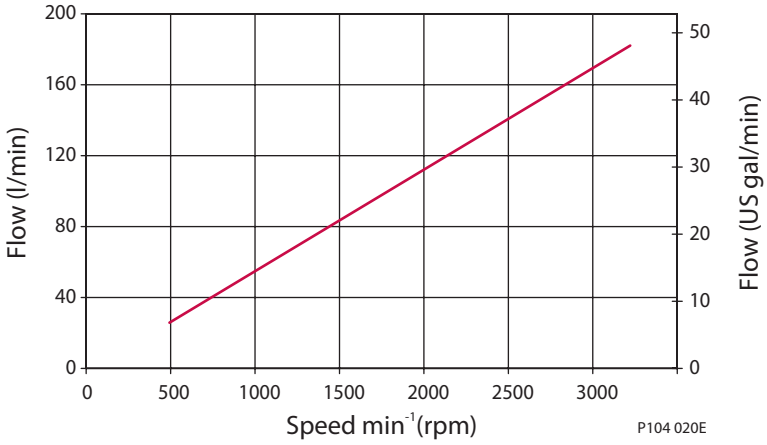
dB(A)	210 bar [3045 psi]		260 bar [3770 psi]		310 bar [4495 psi]	
Model	1800 min^{-1}(rpm)	Rated speed	1800 min^{-1}(rpm)	Rated speed	1800 min^{-1}(rpm)	Rated speed
H57B	69	72	70	73	71	74
H75D	71	74	—	—	—	—

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

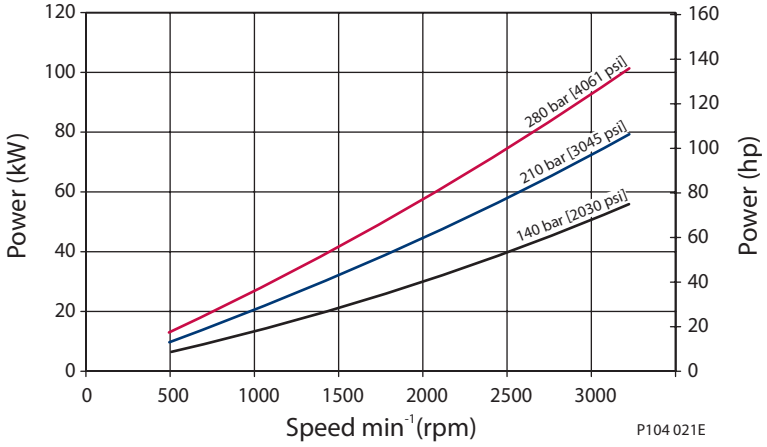
Performance H57B

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

Flow vs. speed

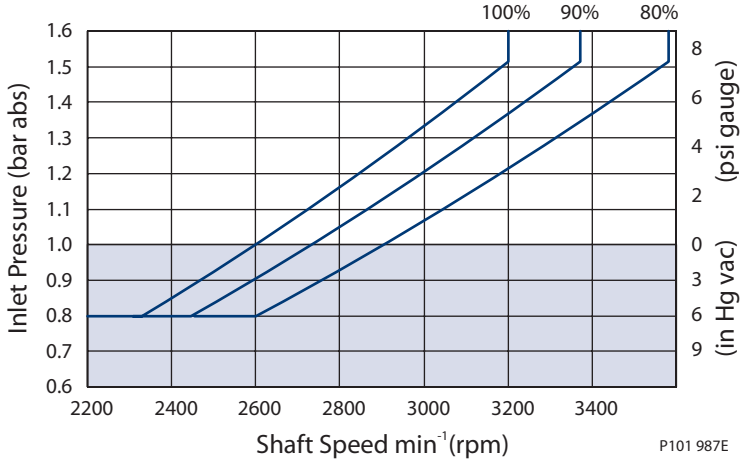


Input power vs. speed



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.

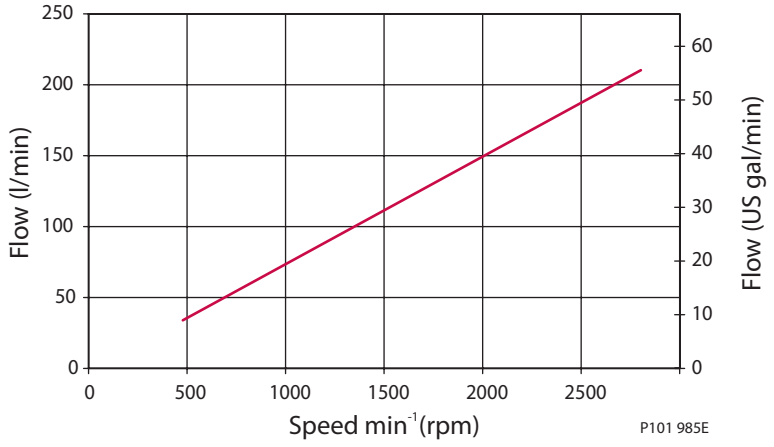
Inlet pressure vs. speed



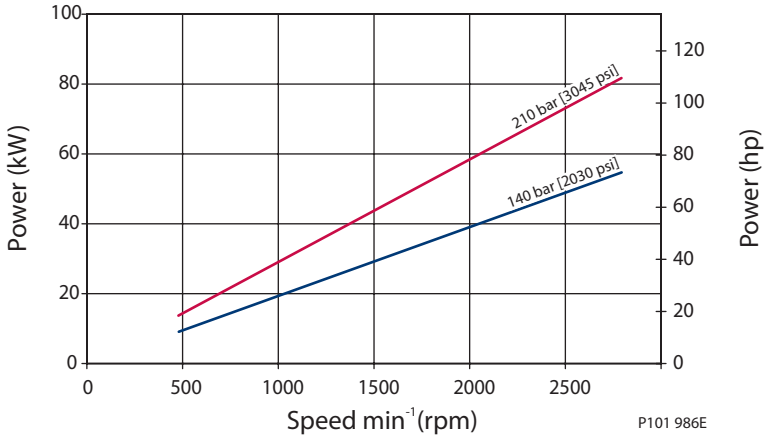
Performance H75D

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

Flow vs. speed

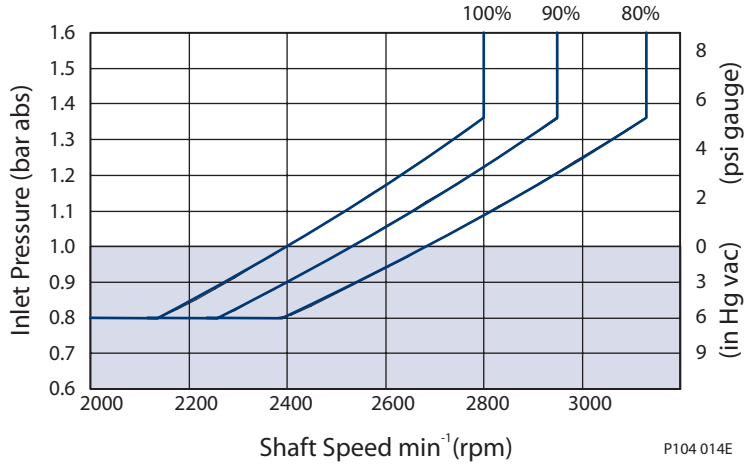


Input power vs. speed



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.



Order Code

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

R Product

HR	H Frame, variable displacement open circuit pump

S *Rotation*

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

P Displacement and pressure rating

057B	057 cm^3/rev [3.48 in^3/rev], 310 bar [4495 psi] continuous working pressure
075D	075 cm^3/rev [4.58 in^3/rev], 210 bar [3045 psi] continuous working pressure

C Control type

PC	Pressure compensated control
LS	Load sensing / pressure compensating control
LB	Load sensing / pressure compensating control with internal bleed orifice

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

Example	10 = 100 bar
10–31	100 to 310 bar [1450 to 4495 psi] (057B)
10–21	100 to 210 bar [1450 to 3045 psi] (075D)

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

Example	20 = 20 bar
10–35	10 to 35 bar [145 to 508 psi]
NN	Not applicable (use with PC controls)

F *Not used*

NN	Not applicable

G *Pilot orifice*

N	None (standard for PC control)
A	Ø 0.8 mm [0.031 in] (standard with LS and LB controls)

H *Gain orifice*

3	Standard orifice

Order Code (continued)

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

J1 *Input shaft*

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

J2 *Auxiliary mounting flange*

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

J3 *System port size and location*

Code	Location	Port type	Inlet size	Outlet size
2	Radial	4-bolt split-flange	2 in.	1 in.
4	Axial	4-bolt split-flange	2 in.	1 in.
3	Axial	SAE O-ring boss	1 7/8 in.	1 5/16 in.

K1 *Shaft seal*

A	Single lip seal, viton

K2 *Mounting flange and housing port style*

1	SAE-C 4-bolt, SAE O-ring boss housing ports
6	SAE-B 2-bolt, SAE O-ring boss housing ports

K3 *Not used*

N	Not applicable

L *Displacement limiter*

NNN	None
AAA	Adjustable, factory set at max angle
Axx	Adjustable, factory set at xx% of maximum displacement (5% increments), *Example: A90=90%*

M *Special hardware*

NNN	None

N *Special features*

NNN	None

Controls

Pressure compensated control (PC)

Specifications

PC control setting range

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

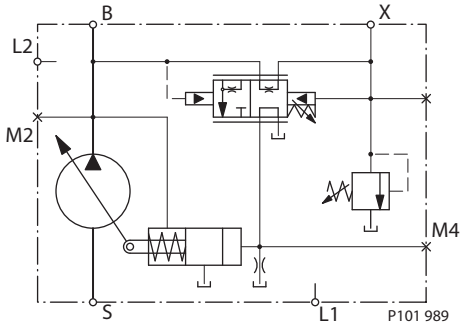
*Response/recovery times**

(ms)	Response	Recovery
H57B	30	125
H75D	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
H57B	100–310	1450–4495
H75D	100–210	1450–3045

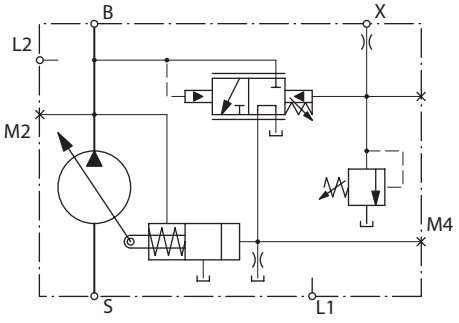
*Response/recovery times**

(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

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

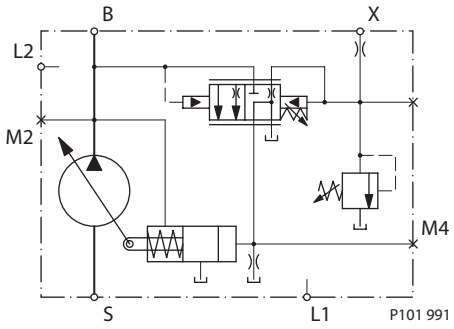
*Response/recovery times**

(ms)	Response	Recovery
H57B	30	90
H75D	30	95

* For definitions, *see page 13*.

Schematic diagram

LS Schematic



LS setting range

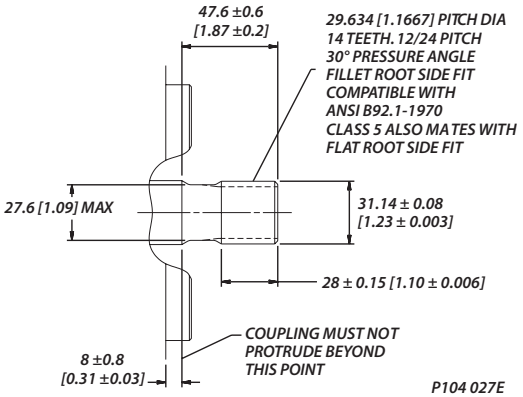
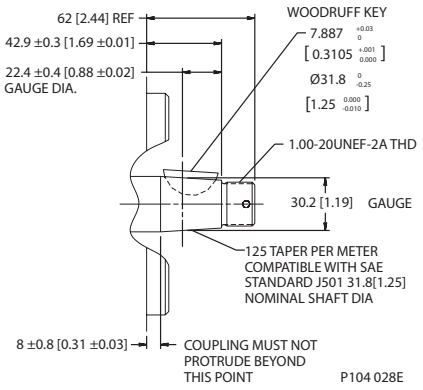
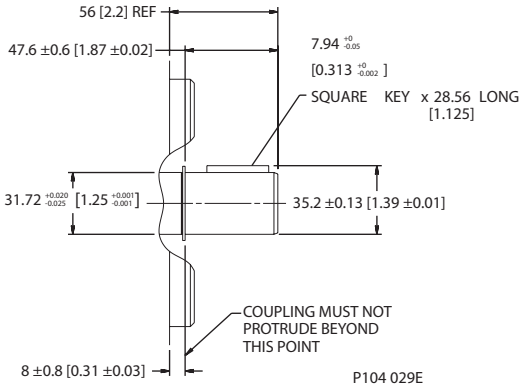
Model	bar	psi
All	10–35	145–508

Legend

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

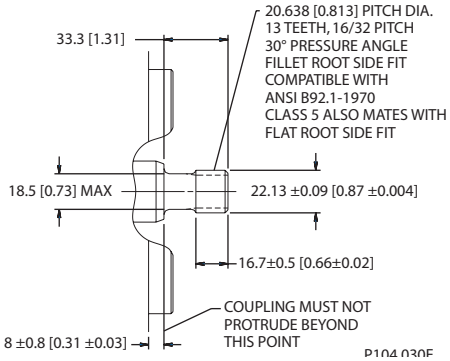
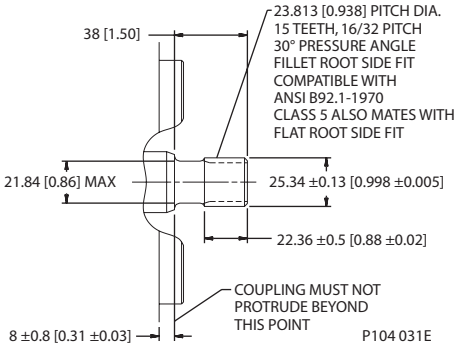
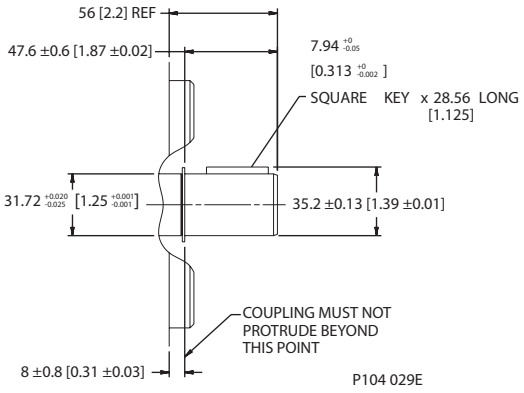
Input Shafts

Shaft data

Code	Description	Availability		Torque rating[1]		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]	

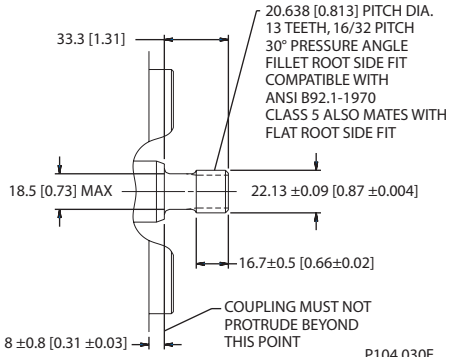
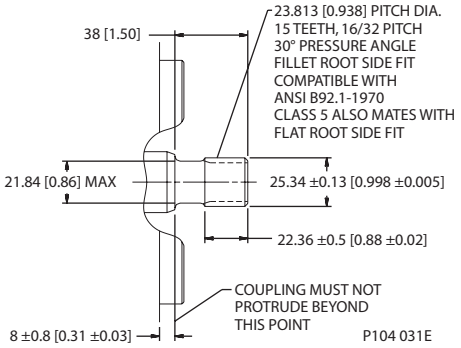
1. See *Input shaft torque ratings*, page 19 for definitions of continuous and maximum torque.

input Shafts (continued)

Code	Description	Availability		Torque rating[1]		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[1]		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]	

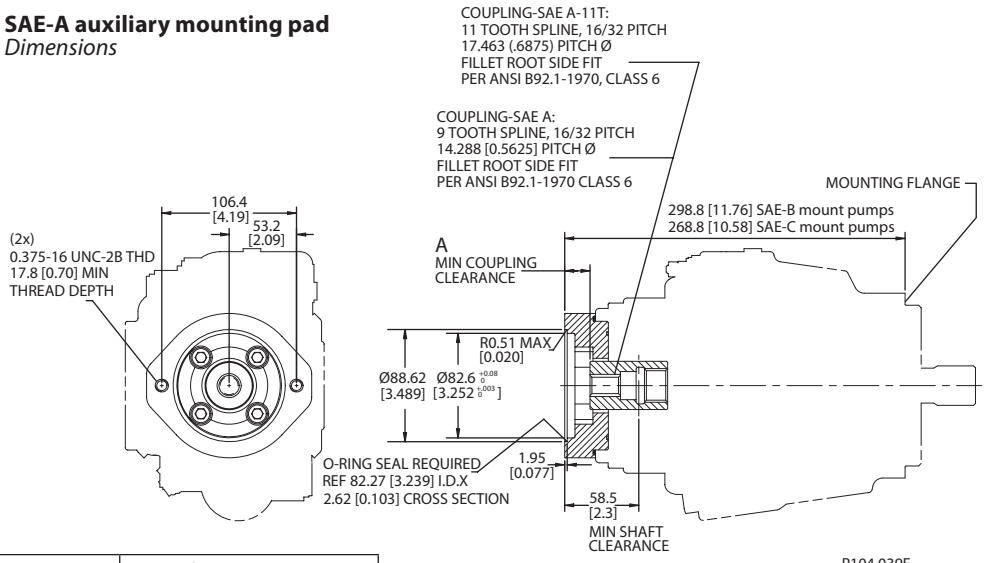
1. See *Input shaft torque ratings*, page 19 for definitions of continuous and maximum torque.

Auxiliary Mounting Pads

See page 19 for mating pump pilot and spline dimensions.

SAE-A auxiliary mounting pad

Dimensions



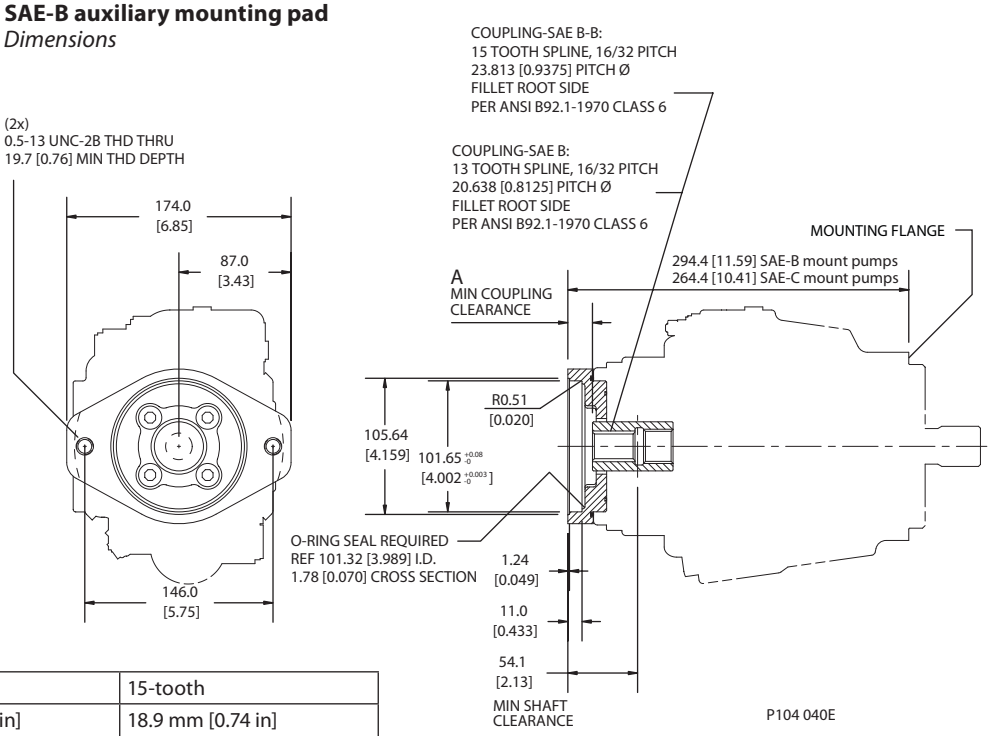
Specifications

Coupling	9-tooth	11-tooth
Spline minimum engagement	13.5 mm [0.53 in]	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

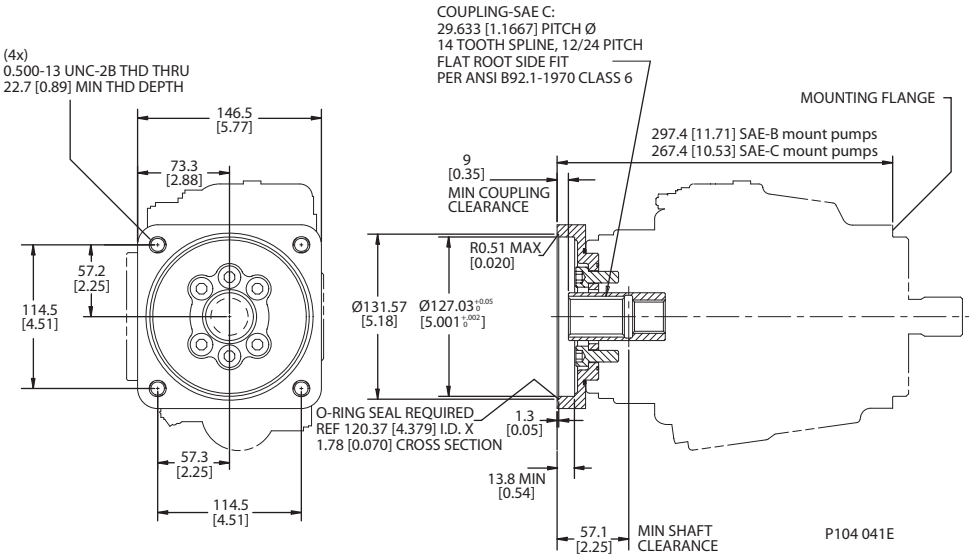
Coupling	13-tooth	15-tooth
Spline minimum engagement	14.2 mm [0.56 in]	18.9 mm [0.74 in]
Continuous torque	124 N•m [1100 lbf•in]	235 N•m [2080 lbf•in]
Maximum torque	249 N•m [2200 lbf•in]	339 N•m [3000 lbf•in]
Dimension A	20.7 mm [0.81 in]	12.7 mm [0.5 in]

Auxiliary Mounting Pads (continued)

See page 19 for mating pump pilot and spline dimensions.

SAE-C auxiliary mounting pad

Dimensions



Specifications

Coupling	14-tooth
Spline minimum engagement	18.3 mm [0.72 in]
Continuous torque	235 N•m [2080 lbf•in]
Maximum torque	339 N•m [3000 lbf•in]

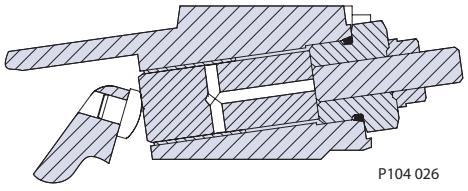
Displacement Limiters

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

Setting range

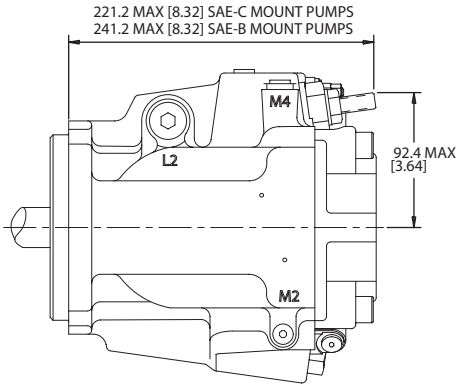
H57B	43 to 57 cm^3 [2.61 to 3.48 in^3]
H75D	56 to 75 cm^3 [3.43 to 4.58 in^3]

Displacement limiter cross-section

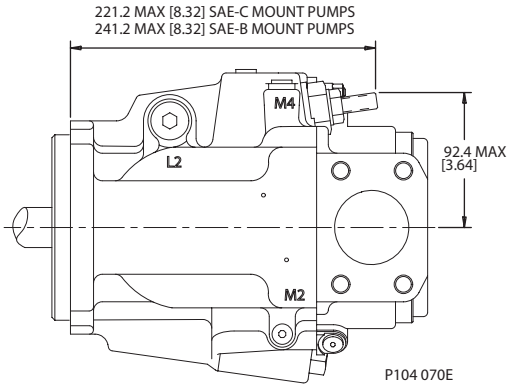


Installation Drawings

Adjustable displacement limiter



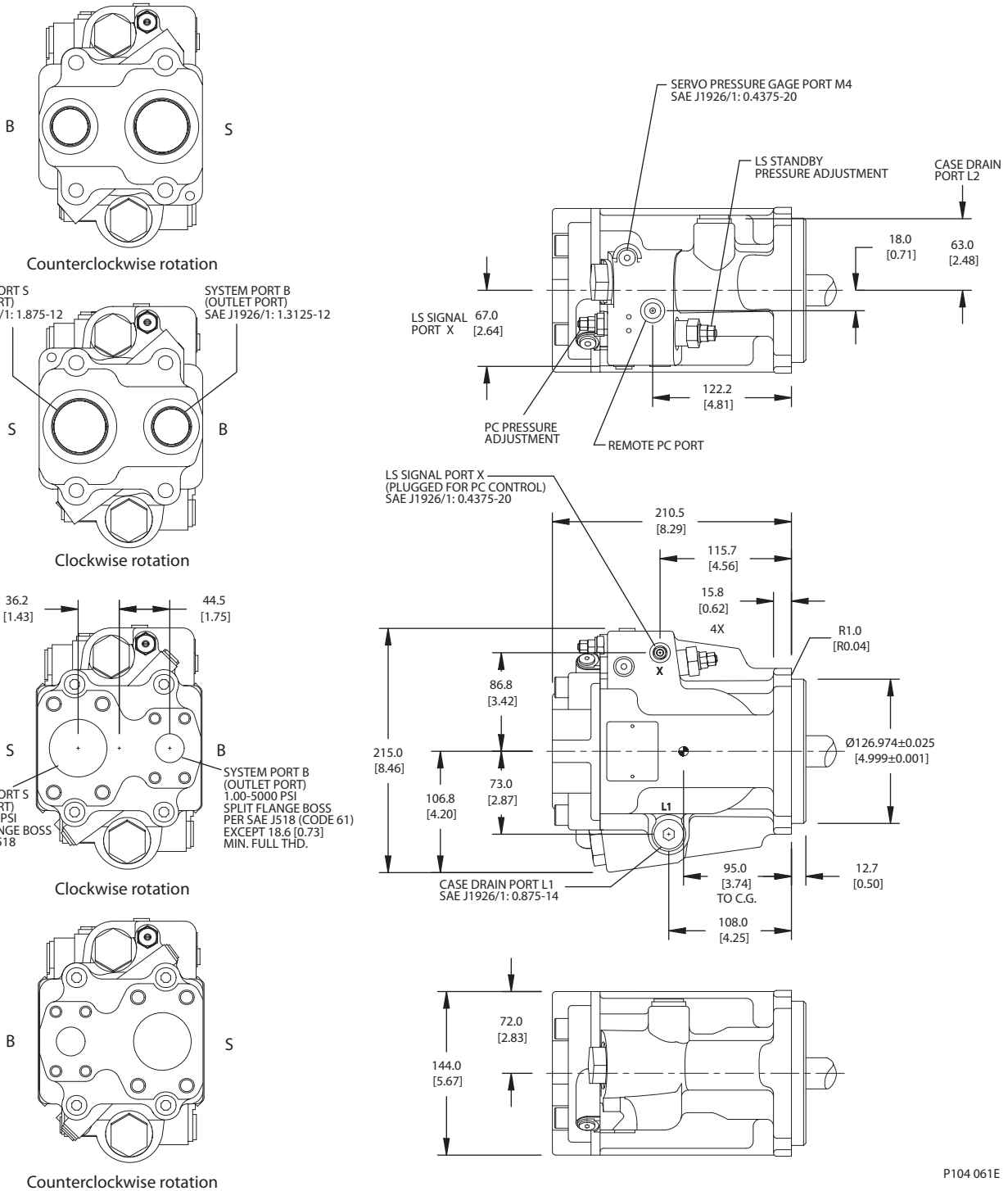
Axial ported units



Radial ported units

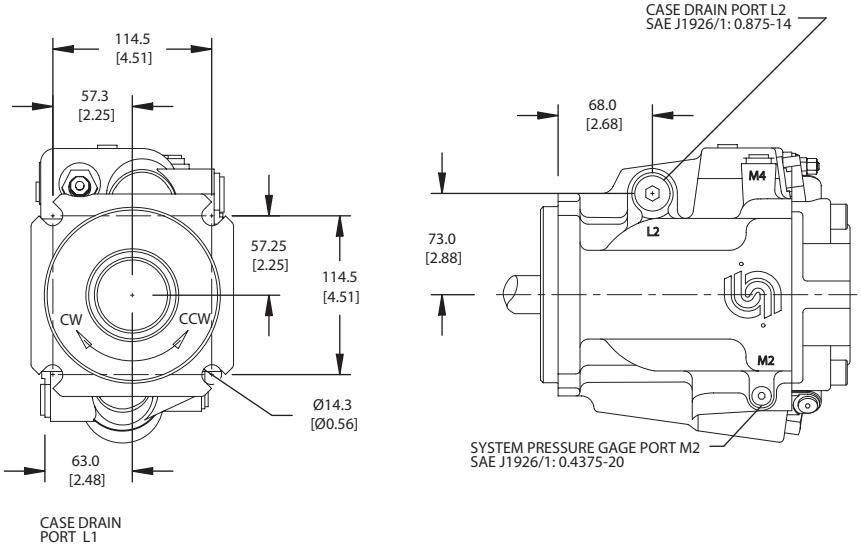
Installation Drawings (continued)

SAE-C mounting flange, axial ported endcap



Installation Drawings (continued)

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

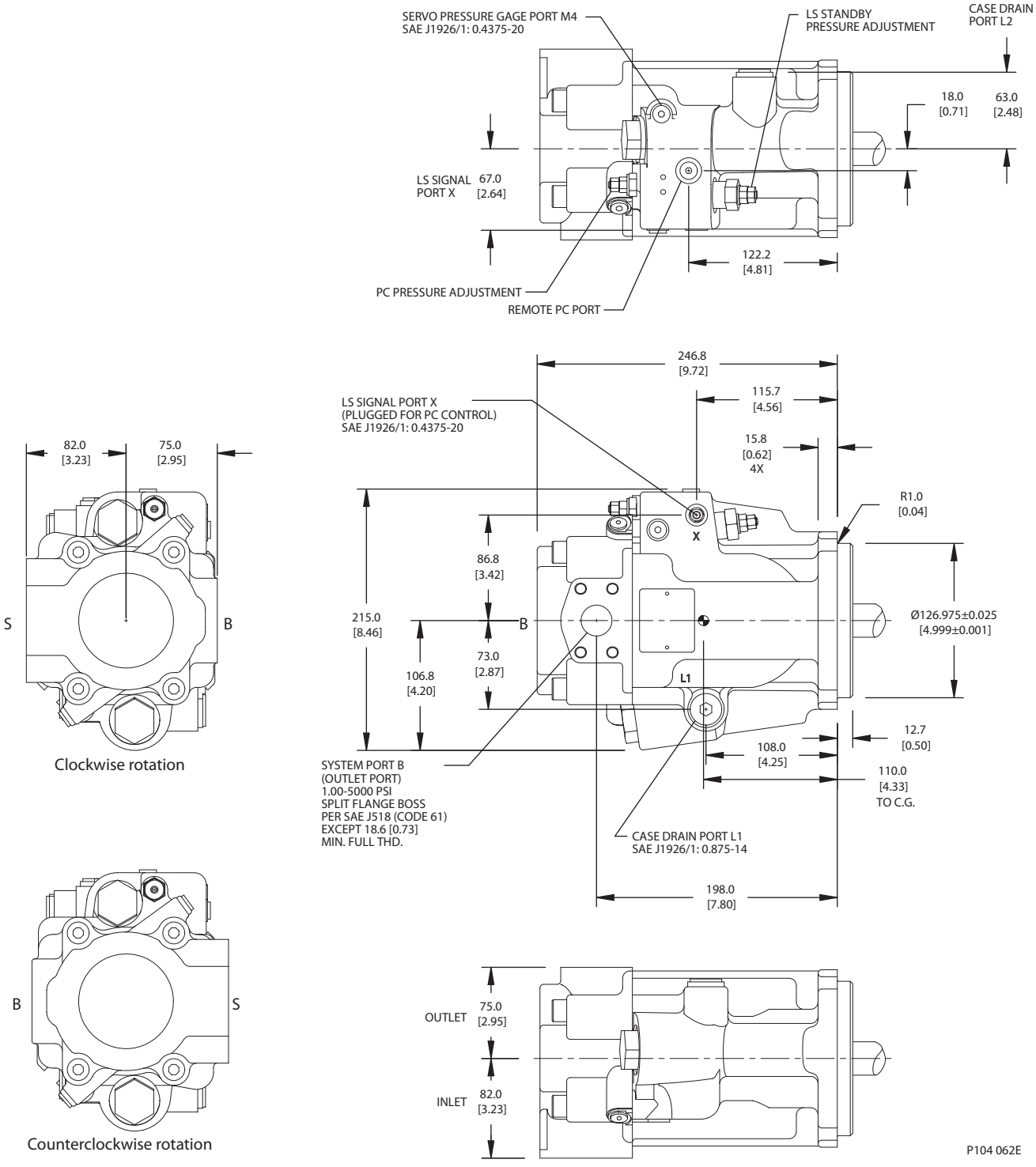


P104 061E

Third-angle projection mm [in]

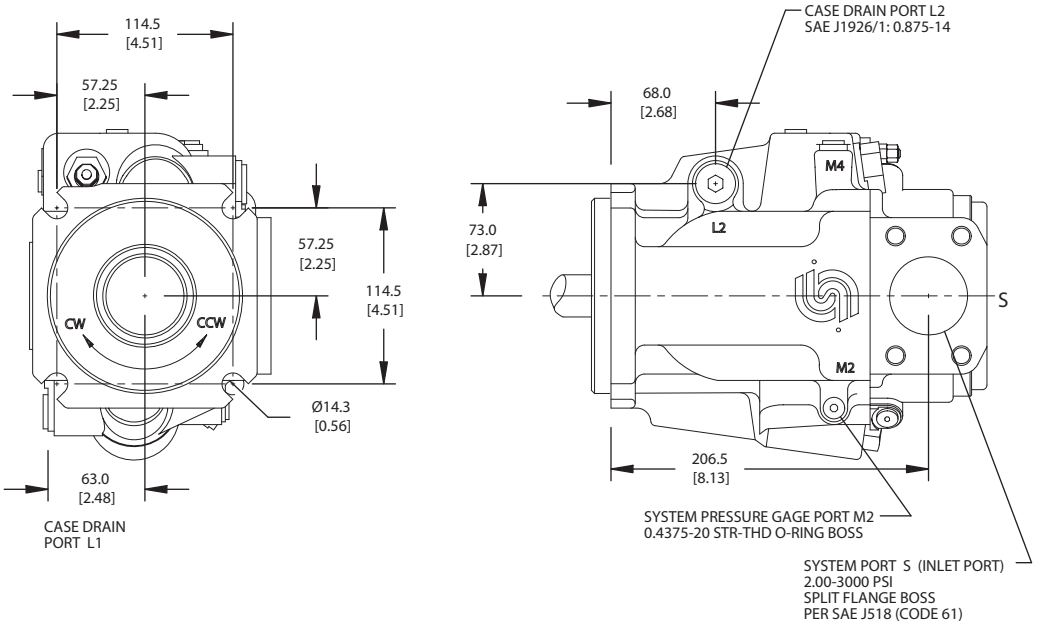
Installation Drawings (continued)

SAE-C mounting flange, radial ported endcap



Installation Drawings (continued)

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



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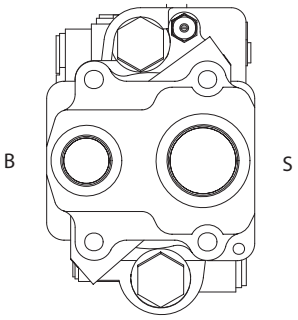
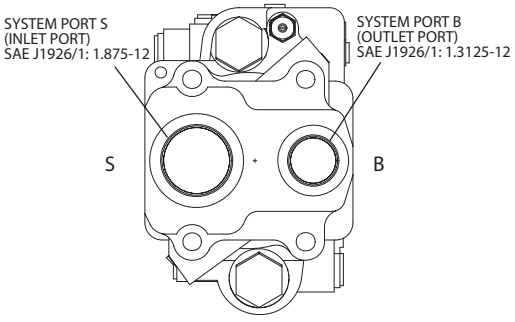
Third-angle projection
mm [in]

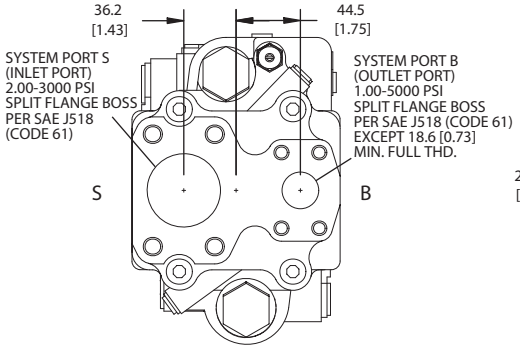
Installation Drawings (continued) SAE-B mounting flange, axial ported endcap



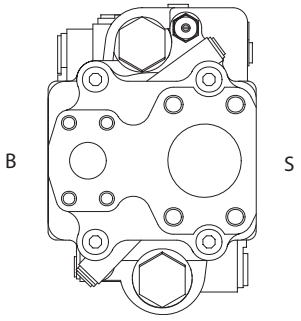
Counterclockwise rotation



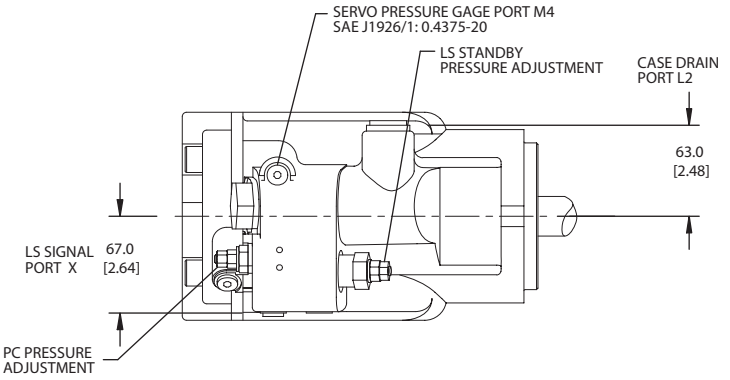
Clockwise rotation

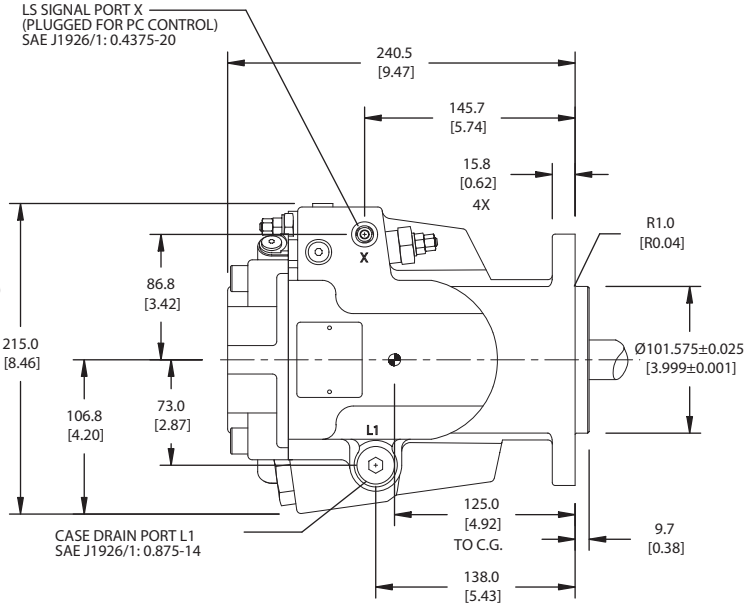


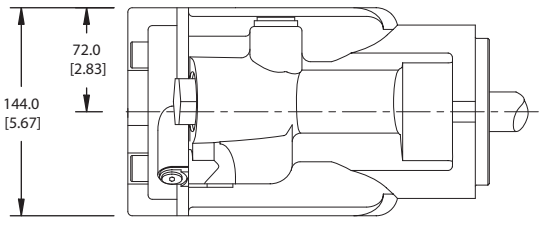
Clockwise rotation



Counterclockwise rotation







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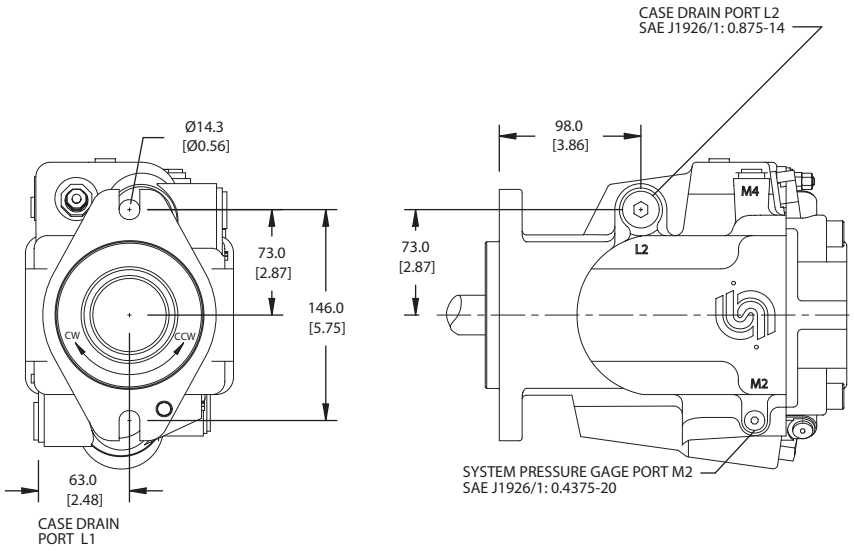
Third-angle projection
mm [in]

Installation Drawings (continued)

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



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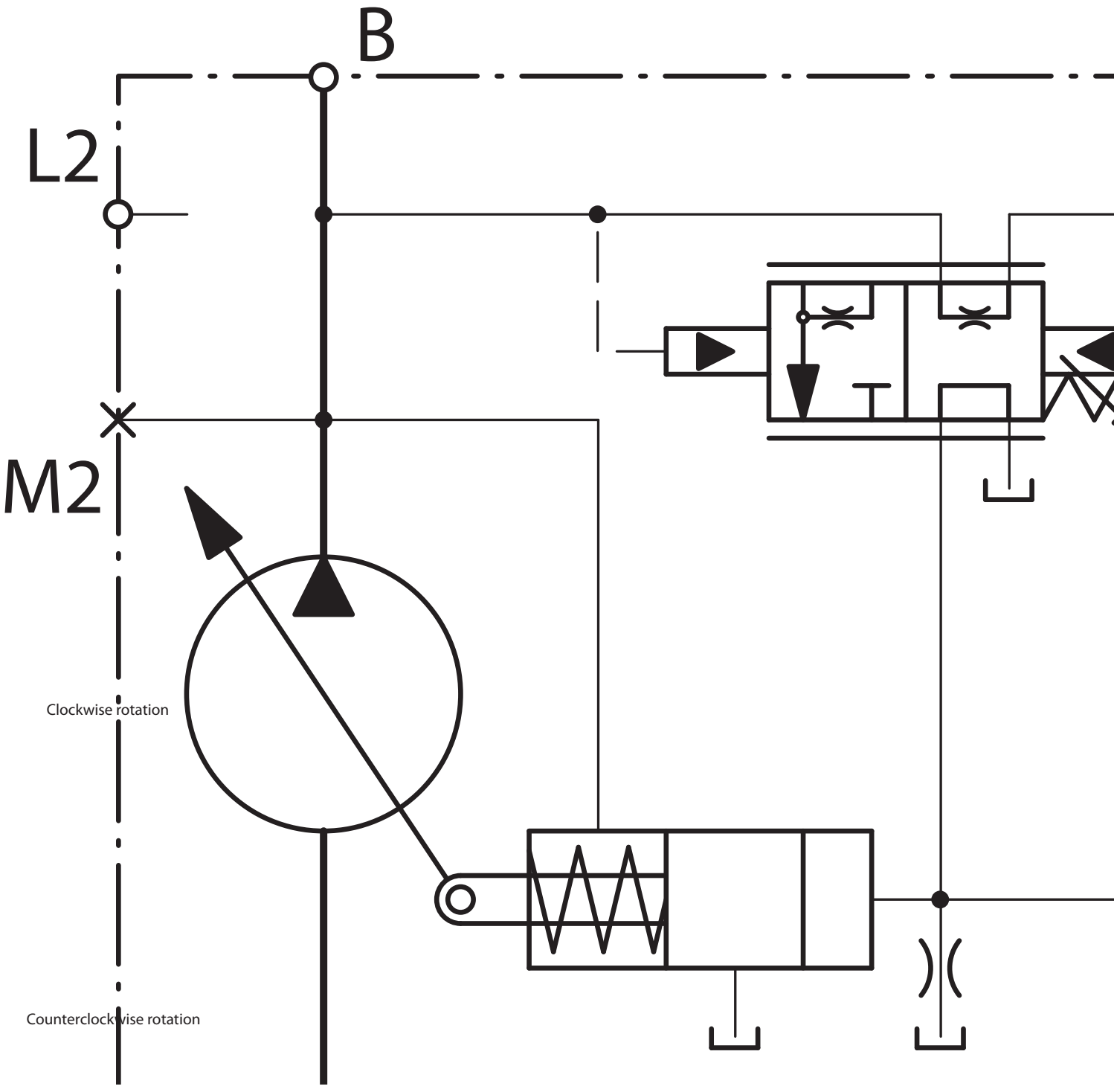
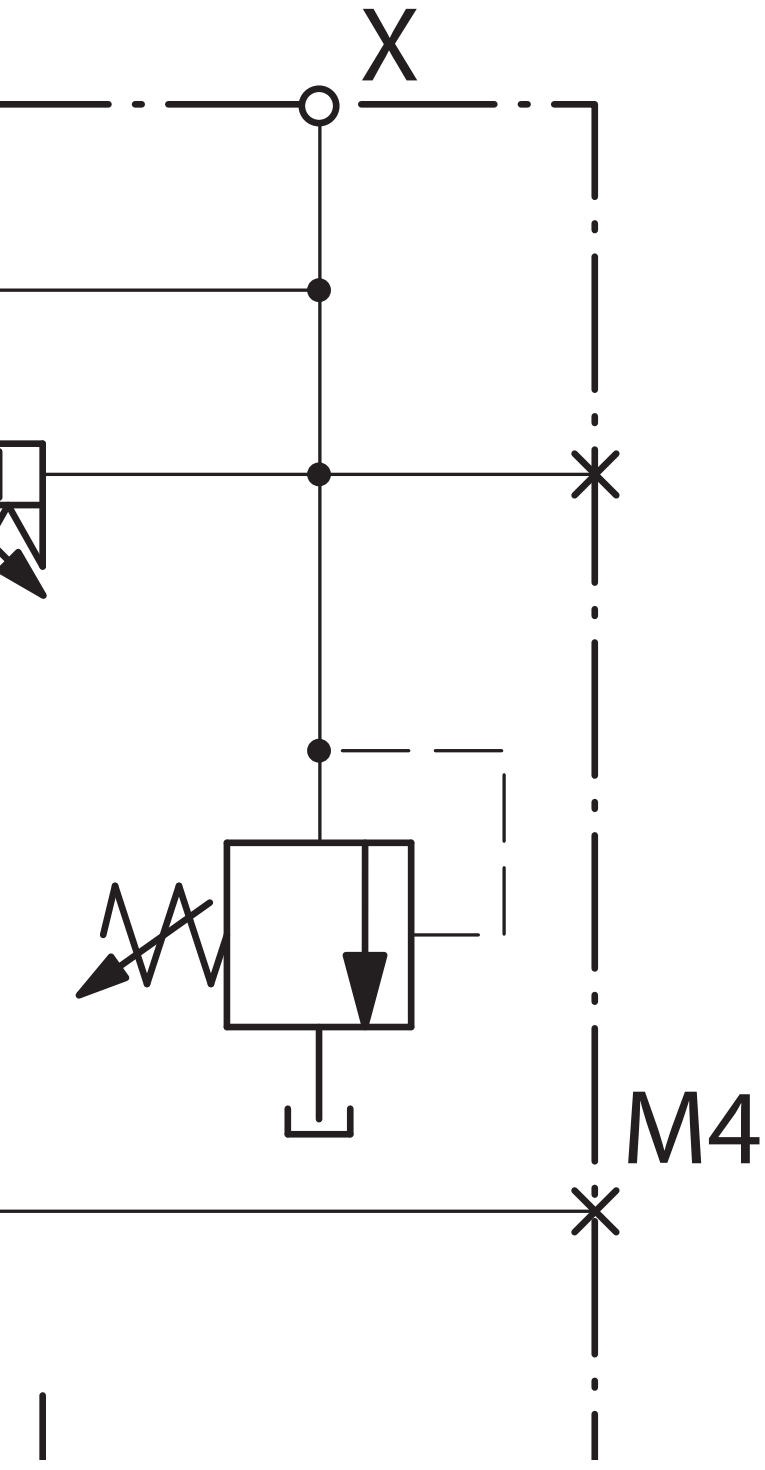
Third-angle projection mm [in]

Installation Drawings (continued)

SAE-B mounting flange, radial ported endcap



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



Third-angle projection mm [in]

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