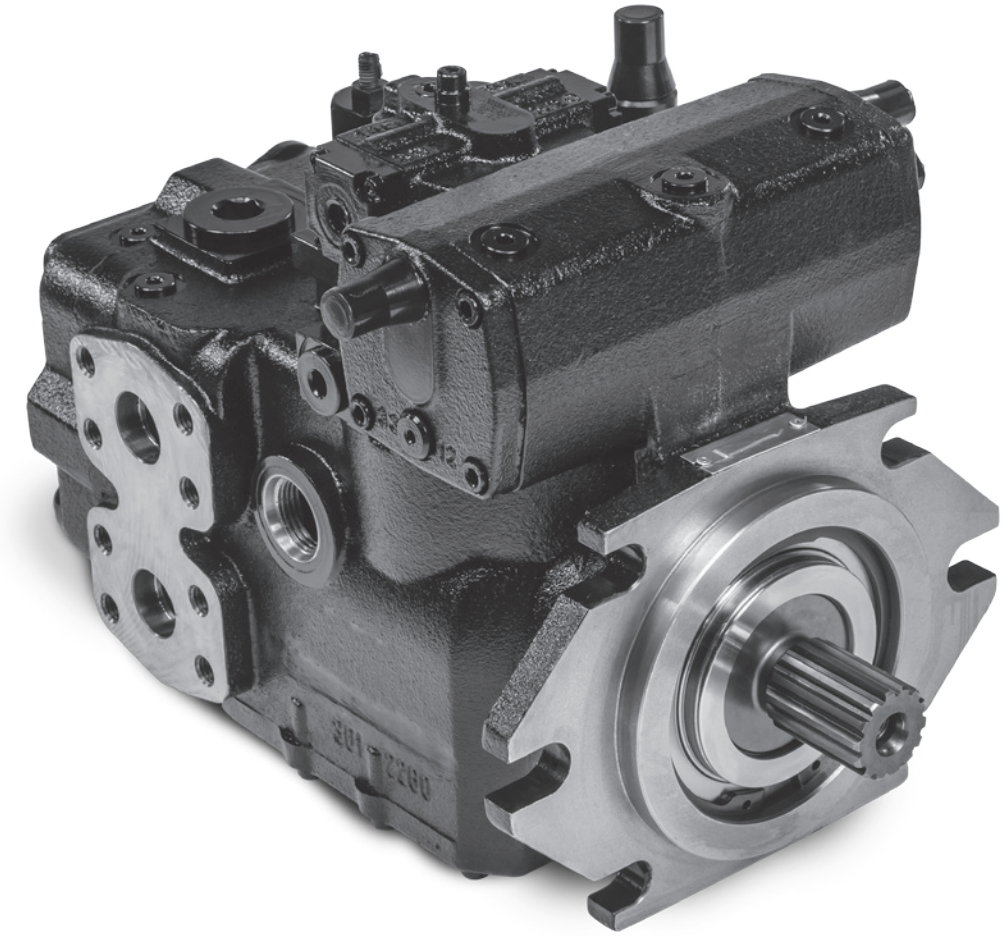


C136 Variable Displacement Axial Piston Pump Service Information

HY28-2688-02/C/US January 2017

Parker

ENGINEERING YOUR SUCCESS.

Contents

Parker Hannifin Corporation
Hydraulic Pump and Power Systems Division
United States

Installation Information

Guidelines

Pump case should be filled prior to start up and plumbed to ensure it remains filled with fluid under all conditions. Pump case pressure should not exceed 4 bar (58 PSI) continuous pressure, 6 bar (87 PSI) on cold start up.

Care should be taken to ensure line velocities are not above standard design specifications as noted in *Table 1*. Raised line velocities will cause an increase in pressure loss in the hoses and cause premature failure under certain conditions. Pressure in the suction line of the pump should never be below .8 bar (11.6 PSI) absolute. Maximum suction pressure is 4 bar (58 PSI) continuous and 6 bar (87 PSI) on cold startup.

Long line lengths and sharp turns in the fluid conveyance will add additional pressure loss or restriction to the system. It is recommended to keep the line lengths as short as possible and to avoid as many fluid direction changes in the system as possible.

Table 1

Function	Fluid Velocity m/sec (Ft/sec)
Suction	0.6-1.2 (2-4)
Case Drain	1.5-3 (5-10)
Pressure	3-6 (10-20)

Orientation

The C series pump can be installed in many different orientations, see *Figure A* for examples. If you want to mount the unit in an orientation not shown, please contact technical support.

It is suggested that the pump be mounted so that it is level or below minimum fluid level in the hydraulic reservoir. The pump can be mounted above fluid level but extra attention must be paid to ensure that the case remains filled at all times and proper suction pressure is maintained.

Regardless of installation orientation, the highest case drain port (L1, L2) should always be used and should return below fluid level.

Air bleed port should only be used while filling the case of the unit to ensure the unit is completely filled with fluid. Once the unit is filled, the air bleed port should be closed via a port plug or shut-off valve.

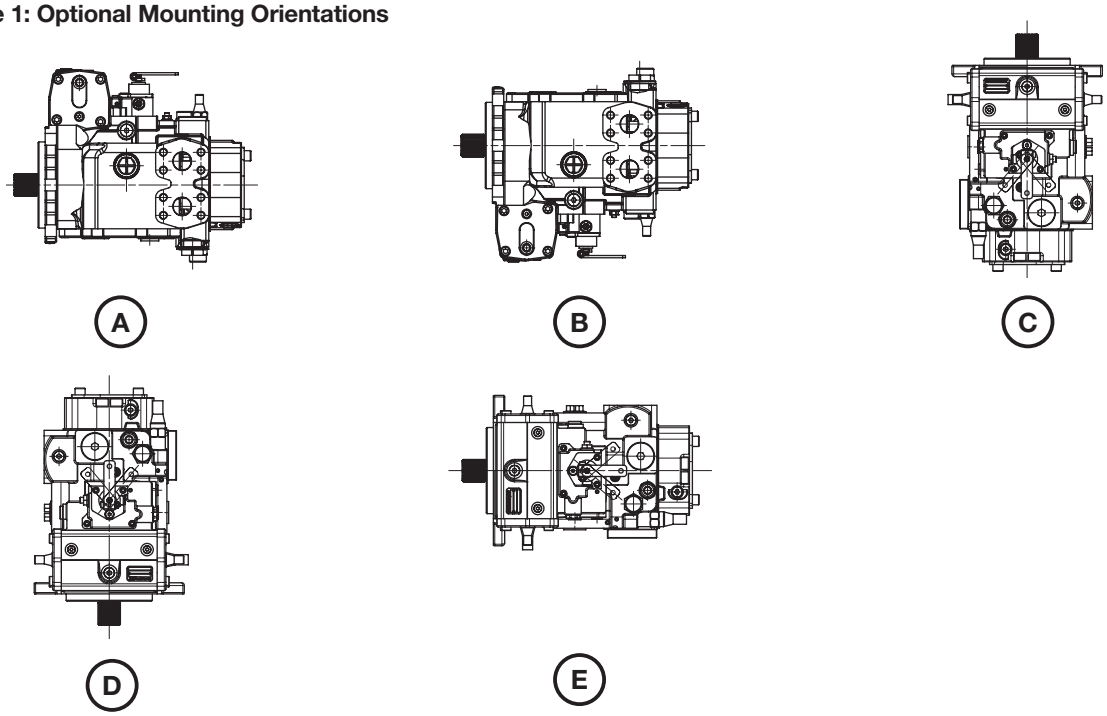
Fluid

Parker recommends using a fluid with a petroleum base that contains agents which provide oxidation inhibition and antirust, antifoam and de-aerating properties as described in Parker standard HF-1. Where antiwear additive fluids are specified, see Parker standard HF-0.

Use fluids with a minimum viscosity index of 90. Higher viscosity index extends the range of operating temperatures but may reduce the service life of the fluid.

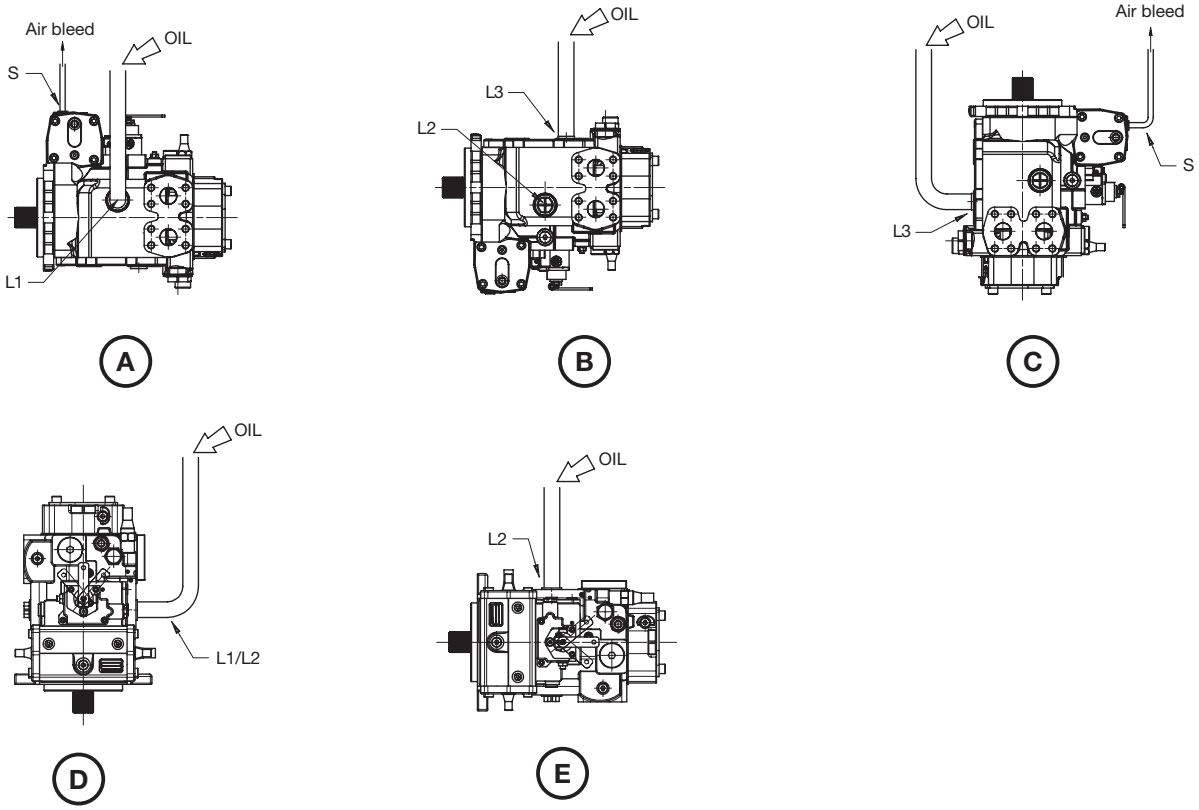
It is recommended that the reservoir, hydraulic fluid and fluid conveyance items be cleaned prior to use. Filtration of the fluid is recommended before and during use. Maximum fluid contamination level is 20/18/15 per ISO 4406:1999. Better cleanliness levels will increase the life of the system.

Figure 1: Optional Mounting Orientations



**Contamination can cause issues when mounting in this orientation. Ensure system is clean when this orientation is used.*

Figure 2: Case Drain And Air Bleed Recommendations



Customer must verify adequate cooling flow through pump case in their application.

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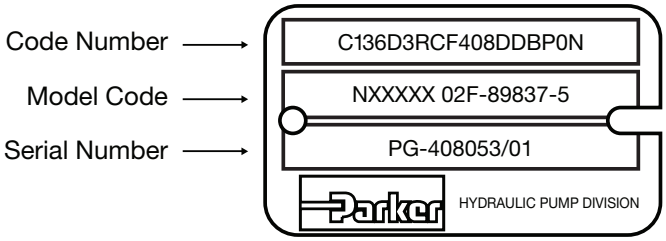
Unit Identification

All Parker Hydraulic Pump and Power Systems Division products are supplied with an identification plate. Units can be properly identified only if all information is supplied.



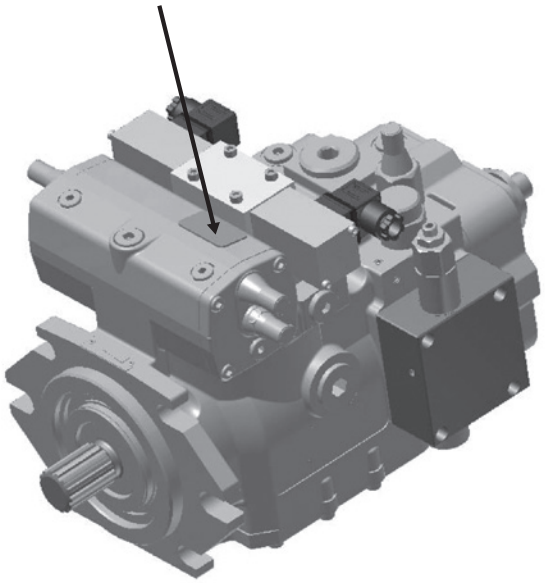
DO NOT REMOVE, ALTER OR DAMAGE THE DATA PLATE.

C Series Identification Tag
The Identification tag on the C series pumps will have the following layout:

The top line of the model code will contain the model code for the unit.

The second line of the tag will also have model code information. It is also important to note the final digit of the model code is truncated as it would not leave enough space for the code number, which will also be on the second line of the identification tag. The code number is generated by Parker Hydraulic Pump and Power Systems Division and will be specific to a single model code combination.

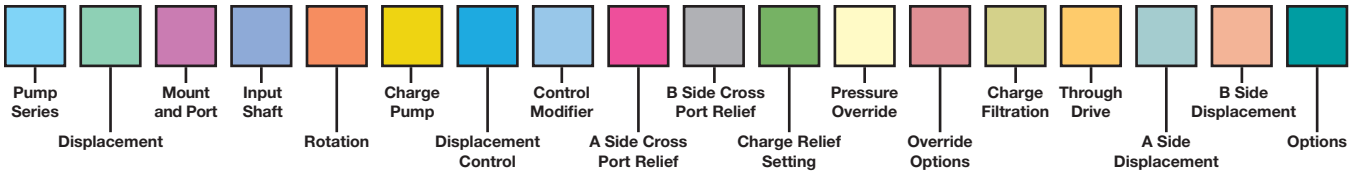
The third line of the model code will contain the unit serial number. Serial number provides month and year of production as well as the batch number.



Serial number detail:
The first two digits of the serial number provide the year and month of production. The letter in position 1 indicated the year of production while the letter in position 2 indicates the month of production. See the tables for details on positions 1 and 2. The remaining digits identify the batch number the unit was produced in.

Position 1 Letter	Year
A	2001
B	2002
C	2003
D	2004
E	2005
F	2006
G	2007
H	2008
J	2009
K	2010
L	2011
M	2012
N	2013
P	2014
Q	2015
R	2016
S	2017
T	2018
U	2019
V	2020
W	2021
X	2022
Y	2023
Z	2024

Position 2 Letter	Month
A	January
B	February
C	March
D	April
E	May
F	June
G	July
H	August
J	September
K	October
L	November
M	December



Pump Series	
C	C Series closed circuit pump

Displacement	
055	055 cc/rev (3.35 CIR)
081	081 cc/rev (4.94 CIR)
136	136 cc/rev (8.3 CIR)

Mount and Port Options	
C	SAE C 2/4 bolt mount with SAE ports (55 and 81 only)
D	SAE D 2/4 bolt mount with SAE ports (55 and 81 only)
G	SAE C 2/4 bolt mount with ISO ports (136 only)
H	SAE D 2/4 bolt mount with ISO ports (136 only)

Rotation	
R	CW (clockwise)
L	CCW (counter clockwise)
As viewed looking at the shaft	

Charge Pump		055	081	136
A	18 cc/rev (1.1 CIR)	#	#	—
B	23.1 cc/rev (1.41 CIR)	—	X	X
C	27.3 cc/rev (1.65 CIR)	—	X	#
D	11 cc/rev (0.67 CIR)	X	—	—
E	14 cc/rev (0.85 CIR)	X	—	—
X	No charge pump	X	X	X

 # = Standard option
X = Available
— = Not available

Pump Control	
A	Manual lever
C	Hydraulic proportional control with internal feedback
D	Hydraulic proportional control without internal feedback
E	Electric non proportional
F	Electric proportional with internal feedback
G	Electric proportional without internal feedback
H	Electric proportional with internal feedback and hydraulic override
J	Automotive control electrical
K	Automotive control hydraulic

Input Shaft		055	081	136
1	SAE C 14T 12/24 DP 1 1/4" OD ANSI B92.1a-1976	#	#	—
2	21T 16/32 DP 1 3/8" OD ANSI B92.1a-1976	X	X	—
3	SAE D-E 13T 8/16 DP 1 3/4" OD ANSI B92.1a-1976	—	—	#
4	SAE F 15T 8/16 DP 2" OD ANSI B92.1a-1976	—	—	X
5	23T 16/32 DP 1 1/2" OD ANSI B92.1a-1976	—	—	X
6	27T 16/32 DP 1 3/4" OD ANSI B92.1a-1976	—	—	X
7	W40x2x30x18 DIN 5480	—	—	X
8	W45x2x30x21 DIN 5480	—	—	X

 # = Standard option
X = Available
— = Not available

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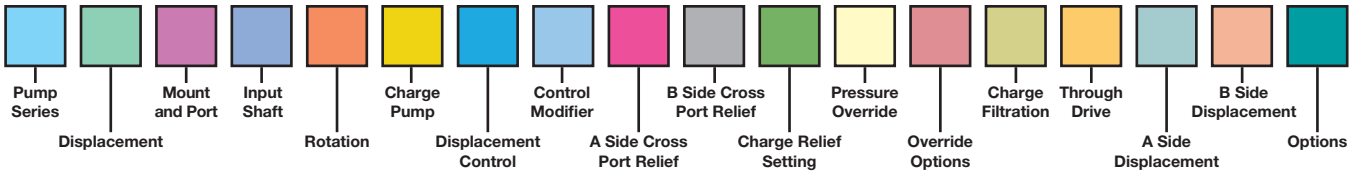


Pump Control										Control Modifier			
A	C	D	E	F	G	H	J	K		Pump control selection determines what modifier is used			
#	—	A	—	—	—	—	—	—	<->	0	0	0	No control orifices
—	—	X	—	—	—	—	—	—	<->	0	0	5	0.5 mm (.019 in) Control orifice
—	X	X	—	—	—	—	—	—	<->	0	0	6	0.6 mm (.024 in) Control orifice
—	X	X	—	—	—	—	—	—	<->	0	0	7	0.7 mm (.027 in) Control orifice
—	#	X	—	—	—	—	—	—	<->	0	0	8	0.8 mm (.031 in) Control orifice
—	X	#	—	—	—	—	—	—	<->	0	0	9	0.9 mm (.035 in) Control orifice
—	X	X	—	—	—	—	—	—	<->	0	1	2	1.2 mm (.047 in) Control orifice
—	—	—	—	X	—	—	—	—	<->	2	0	0	12 VDC, No control orifice
—	—	—	—	X	—	—	—	—	<->	2	0	6	12 VDC, 0.6 mm (.024 in) Control orifice
—	—	—	—	X	—	—	—	—	<->	2	0	7	12 VDC, 0.7 mm (.027 in) Control orifice
—	—	—	—	#	X	X	—	—	<->	2	0	8	12 VDC, 0.8 mm (.031 in) Control orifice
—	—	—	X	X	—	—	—	—	<->	2	1	2	12 VDC, 1.2 mm (.047 in) Control orifice
—	—	—	—	X	—	—	—	—	<->	2	2	0	12 VDC, 2.0 mm (.079 in) Control orifice
—	—	—	—	X	—	—	—	—	<->	4	0	0	24 VDC, No control orifice
—	—	—	—	X	—	—	—	—	<->	4	0	6	24 VDC, 0.6 mm (.024 in) Control orifice
—	—	—	—	X	—	—	—	—	<->	4	0	7	24 VDC, 0.7 mm (.027 in) Control orifice
—	—	—	—	#	#	#	—	—	<->	4	0	8	24 VDC, 0.8 mm (.031 in) Control orifice
—	—	—	X	X	—	—	—	—	<->	4	1	2	24 VDC, 1.2 mm (.047 in) Control orifice
—	—	—	—	X	—	—	—	—	<->	4	2	0	24 VDC, 2.0 mm (.079 in) Control orifice
—	—	—	—	—	—	—	X	—	<->	D			No inching valve, 12 VDC coils, J control only
—	—	—	—	—	—	—	X	—	<->	E			Hydraulic inching valve,12 VDC coils, J control only
—	—	—	—	—	—	—	X	—	<->	F			No inching valve, 24 VDC coils, J control only
—	—	—	—	—	—	—	X	—	<->	G			Hydraulic inching valve, 24 VDC coils, J control only
—	—	—	—	—	—	—	—	X	<->	H			Hydraulic inching valve, K control only
—	—	—	—	—	—	—	—	X	<->	X			No inching valve, K control only
—	—	—	—	—	—	—	X	X	<->		2		1.2 mm (.047 in) Control orifice
—	—	—	—	—	—	—	X	X	<->		5		1.5 mm (.059 in) Control orifice
—	—	—	—	—	—	—	X	X	<->			P	Prepared for flushing valve
—	—	—	—	—	—	—	X	X	<->			1	Flushing valve installed with 1.5 mm orifice
—	—	—	—	—	—	—	X	X	<->			2	Flushing valve installed with 2.0 mm orifice
—	—	—	—	—	—	—	X	X	<->			3	Flushing valve installed with 2.5 mm orifice

 # = Standard option
X = Available
— = Not available
A = Without pressure override only

Example modifier with J/K control

G	5	P	*Hydraulic inching valve, 24VDC coils with a 1.5 mm control orifice and prepared for flushing*

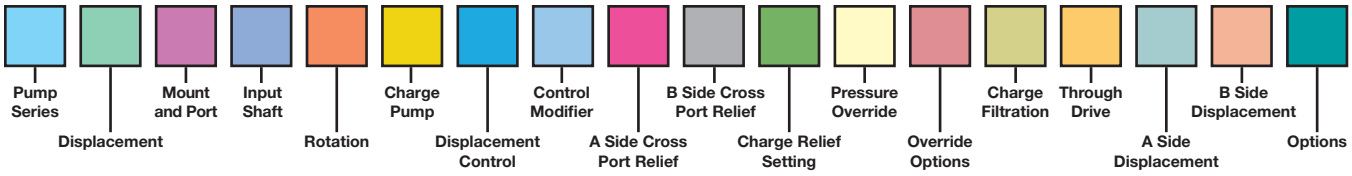
When ordering J/K control specify starting input RPM, input RPM at rated torque and rated input torque (NM)

A Side Cross Port Relief	
A	250 Bar (3625 PSI)
B	350 Bar (5075 PSI)
C	420 Bar (6090 PSI)
D	450 Bar (6525 PSI)

B Side Cross Port Relief	
A	250 Bar (3625 PSI)
B	350 Bar (5075 PSI)
C	420 Bar (6090 PSI)
D	450 Bar (6525 PSI)

Charge Relief Setting		055	081	136
A	20 Bar (290 PSI)	X	X	—
B	22 Bar (319 PSI)	#	#	#
C	25 Bar (362 PSI)	X	X	X

 # = Standard option
X = Available
— = Not available



Pressure Override	
X	No pressure override
P	Hydraulic internal pressure override
E	Electrical override
C	Electrical override and hydraulic internal pressure override

Override not available on J/K control.
Pressure override should be set 20-30 bar below cross port relief settings.

Pressure Override					Override Options		
					Pressure override selection determines override option		
X	**P**	**E**	**C**				
X	—	—	—	<->	**X**	**X**	No pressure override
—	X	—	—	<->	**0**	**A**	Locked
—	X	—	—	<->	**0**	**B**	100 Bar (1450 PSI)
—	X	—	—	<->	**0**	**C**	150 Bar (2175 PSI)
—	X	—	—	<->	**0**	**D**	200 Bar (2900 PSI)
—	X	—	—	<->	**0**	**E**	250 Bar (3625 PSI)
—	X	—	—	<->	**0**	**F**	280 Bar (4060 PSI)
—	X	—	—	<->	**0**	**G**	300 Bar (4350 PSI)
—	X	—	—	<->	**0**	**H**	320 Bar (4712 PSI)
—	X	—	—	<->	**0**	**J**	330 Bar (4785 PSI)
—	X	—	—	<->	**0**	**K**	350 Bar (5075 PSI)
—	X	—	—	<->	**0**	**M**	380 Bar (5510 PSI)
—	X	—	—	<->	**0**	**N**	400 Bar (5800 PSI)
—	—	X	—	<->	**1**	**2**	12 VDC coil
—	—	X	—	<->	**2**	**4**	24 VDC coil
—	—	—	X	<->	**2**	**A**	12VDC coil locked override
—	—	—	X	<->	**2**	**B**	12VDC coil, 100 Bar (1450 PSI) override
—	—	—	X	<->	**2**	**C**	12VDC coil, 150 Bar (2175 PSI) override
—	—	—	X	<->	**2**	**D**	12VDC coil, 200 Bar (2900 PSI) override
—	—	—	X	<->	**2**	**E**	12VDC coil, 250 Bar (3625 PSI) override
—	—	—	X	<->	**2**	**G**	12VDC coil, 300 Bar (4350 PSI) override
—	—	—	X	<->	**2**	**K**	12VDC coil, 350 Bar (5075 PSI) override
—	—	—	X	<->	**2**	**M**	12VDC coil, 380 Bar (5510 PSI) override
—	—	—	X	<->	**2**	**N**	12VDC coil, 400 Bar (5800 PSI) override
—	—	—	X	<->	**4**	**A**	24 VDC coil locked override
—	—	—	X	<->	**4**	**B**	24 VDC coil, 100 Bar (1450 PSI) override
—	—	—	X	<->	**4**	**C**	24 VDC coil, 150 Bar (2175 PSI) override
—	—	—	X	<->	**4**	**D**	24 VDC coil, 200 Bar (2900 PSI) override
—	—	—	X	<->	**4**	**E**	24 VDC coil, 250 Bar (3625 PSI) override
—	—	—	X	<->	**4**	**G**	24 VDC coil, 300 Bar (4350 PSI) override
—	—	—	X	<->	**4**	**K**	24 VDC coil, 350 Bar (5075 PSI) override
—	—	—	X	<->	**4**	**M**	24 VDC coil, 380 Bar (5510 PSI) override
—	—	—	X	<->	**4**	**N**	24 VDC coil, 400 Bar (5800 PSI) override

X = *Available*
— = *Not available*

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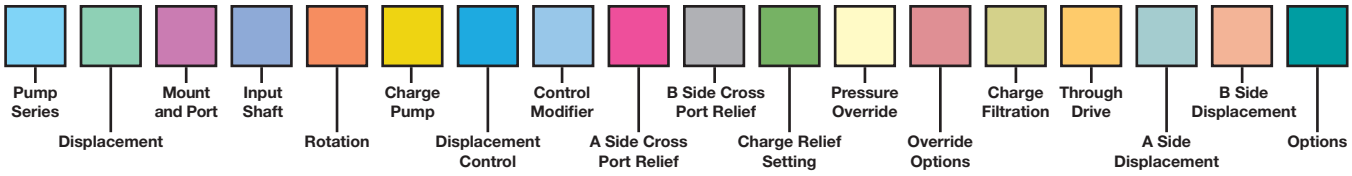


Charge Filtration		055	081	136
X	No charge filter	#	#	#
N	Charge filter with 8 Bar (116 PSI) mechanical bypass indicator	X	X	X
G	Charge filter with 8 Bar (116 PSI) electrical bypass indicator	X	X	X
R	Prepared for remote charge pressure filtration	X	X	X

 # = Standard option
X = Available
— = Not available

A Side Displacement	
00-99	Set displacement of A side between 0-99%
XX	XX = 100% displacement

B Side Displacement	
00-99	Set displacement of B side between 0-99%
XX	XX = 100% displacement

Options		055	081	136
X	No paint, no bypass valve	#	#	#
Y	No paint with bypass valve	X	X	—
P	Paint black, no bypass valve	X	X	X
D	Paint black with bypass valve	X	X	—
M	Special modification contact technical support			

 # = Standard option
X = Available all displacements
— = Not available

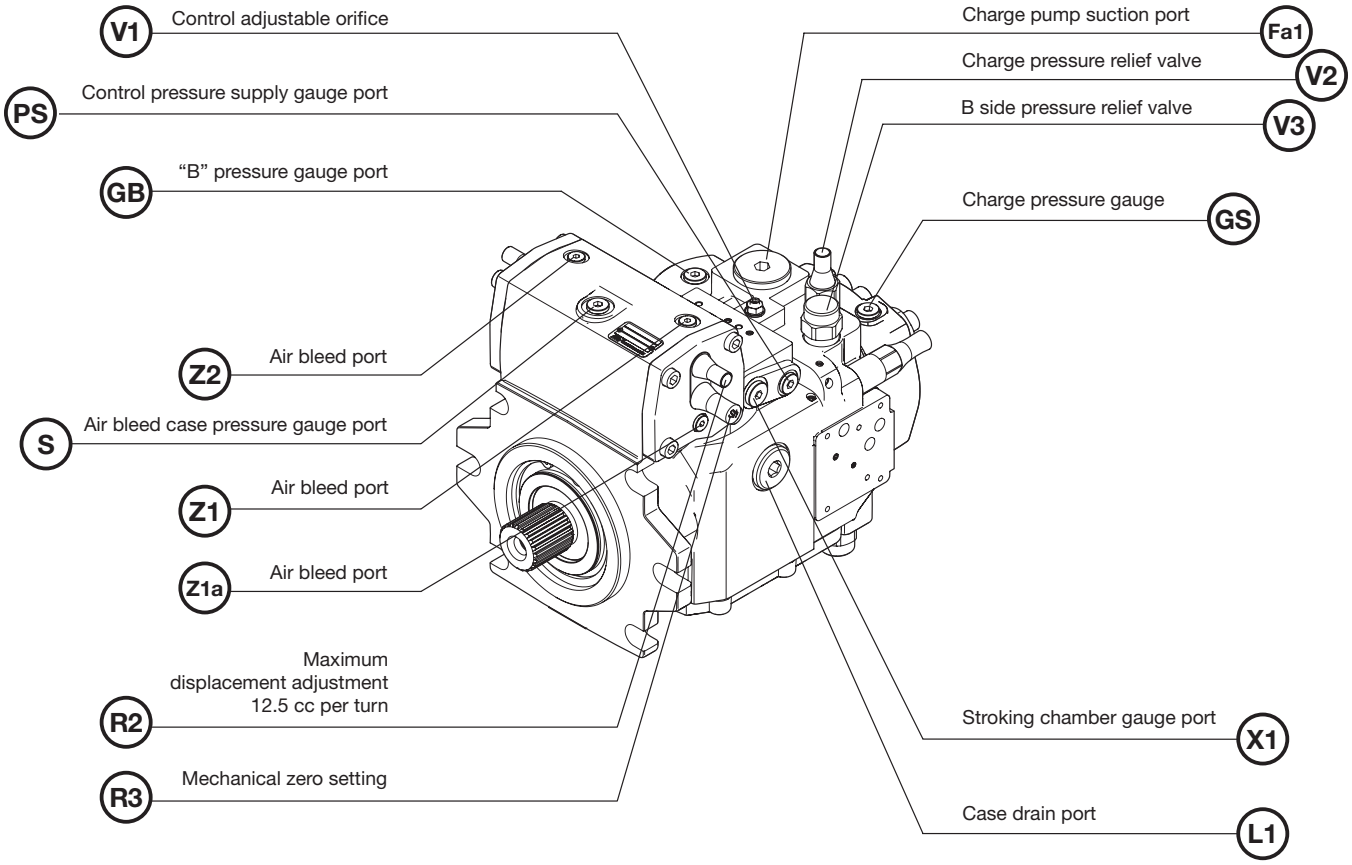
Through Drive		055	081	136
X	No through drive	#	#	#
A	SAE A mount, 9T spline shaft	X	X	X
B	SAE B mount, 13T spline shaft	X	X	X
G	SAE B mount, 15T spline shaft	X	X	X
C	SAE C mount, 14T spline shaft	X	X	X
H	SAE C mount, 17T spline shaft	X	X	X
D	SAE D mount, 13T spline shaft	X	X	X

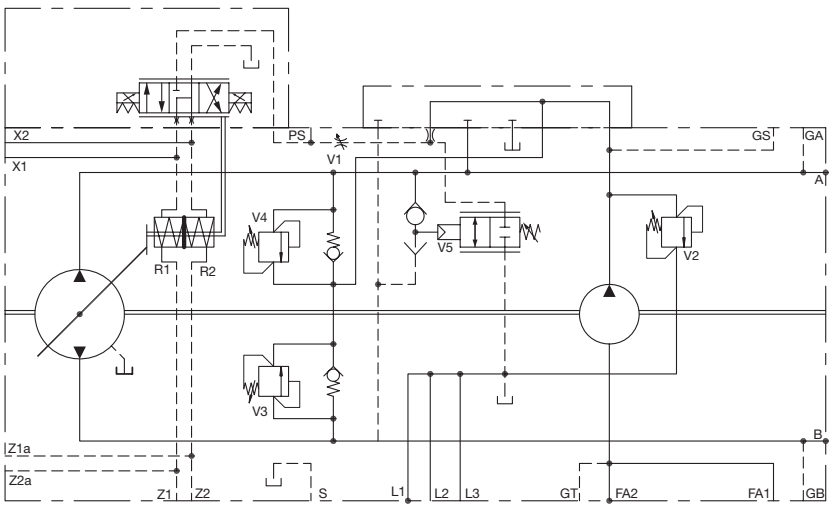
 # = Standard option
X = Available
— = Not available

Example Model Code

C081C1RAF208BBBP0HRAXXXXP

C081 = 81cc frame
C = SAE C 2/4 bolt mount with SAE ports
1 = SAE C 14T 12/24 DP 1-1/4" OD ANSI B92.1A-1976
R = CW rotation (looking at the shaft)
A = 81cc frame 18cc/rev (1.1 CIR) charge pump
F = Electric proportional with internal feedback displacement control
208 = 12 VDC, 0.8mm (.031 in) control orifice
B = A side cross port relief set to 350 bar (5075 PSI)
B = B side cross port relief set to 350 bar (5075 PSI)
B = Charge relief set to 22 bar (319 PSI)
P = Hydraulic internal pressure override
0H = Pressure override set to 320 bar (4712 PSI)
R = Prepared for remote charge pressure filtration
A = SAE A mount through drive with 9T spline shaft coupling
XX = A side displacement set to 100%
XX = B side displacement set to 100%
P = Paint black, no bypass valve





C136 Port Chart		
Port	**Mount D**	**Mount H**
A	1-1/4" SAE Code 62	1-1/4" SAE Code 62
B	1-1/4" SAE Code 62	1-1/4" SAE Code 62
L1	-16 SAE ORB	1" G
L2	-16 SAE ORB	1" G
L3	-12 SAE ORB	3/4" G
FA1	-20 SAE ORB	1-1/4" G
FA2	-20 SAE ORB	1-1/4" G
GA	-4 SAE ORB	1/4" G
GB	-4 SAE ORB	1/4" G
GS	-4 SAE ORB	1/4" G
PS	-4 SAE ORB	1/4" G
Z1 (a)	-4 SAE ORB	1/8" G
Z2 (a)	-4 SAE ORB	1/8" G
X1	-6 SAE ORB	3/8" G
X2	-6 SAE ORB	3/8" G
Y1	-4 SAE ORB	1/4" G
Y2	-4 SAE ORB	1/4" G
GT	-4 SAE ORB	1/4" G

Schematic shown is a C136 with "F" control and override option "P".

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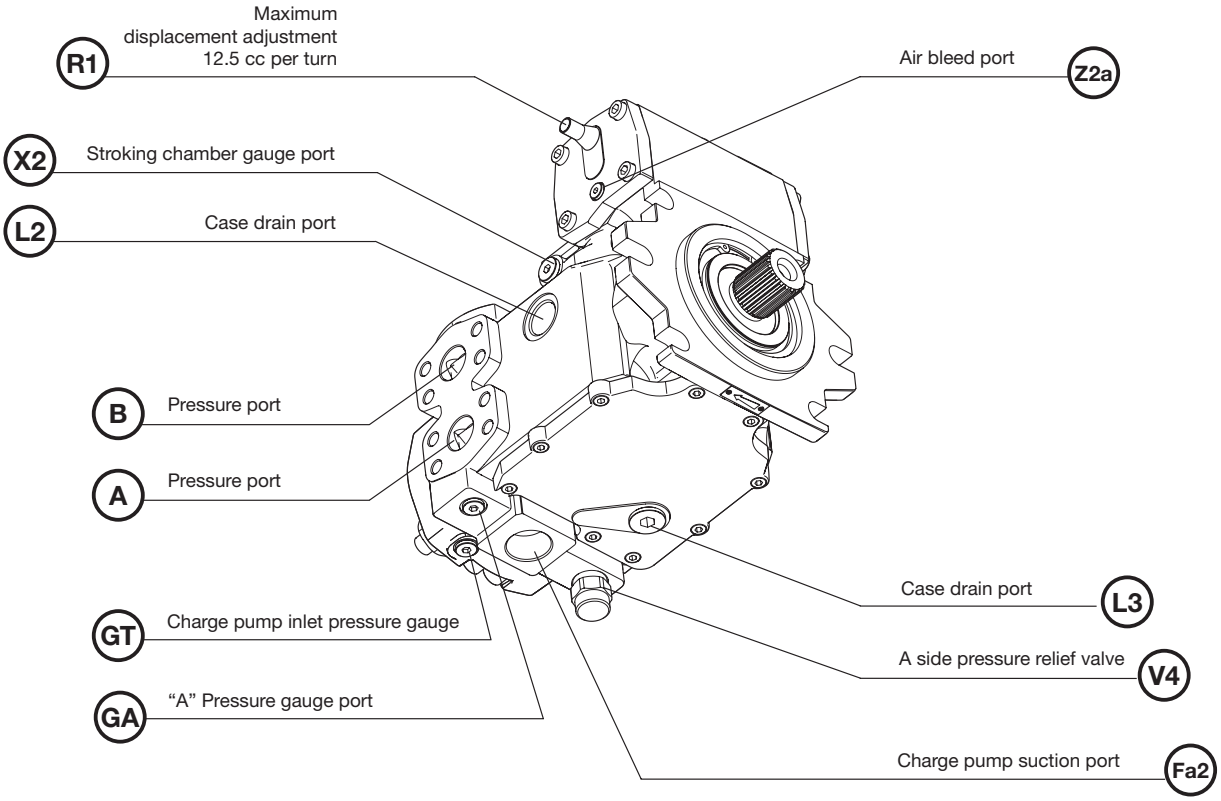
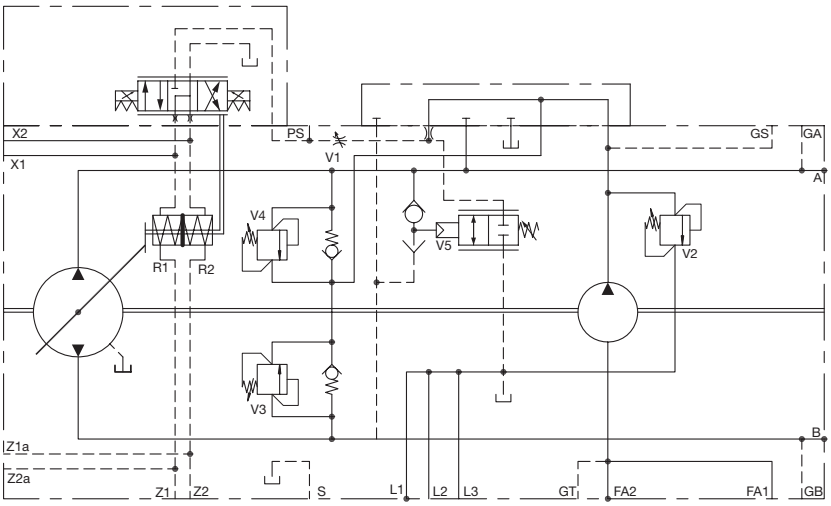




C136 Port Chart		
Port	**Mount D**	**Mount H**
A	1-1/4" SAE Code 62	1-1/4" SAE Code 62
B	1-1/4" SAE Code 62	1-1/4" SAE Code 62
L1	-16 SAE ORB	1" G
L2	-16 SAE ORB	1" G
L3	-12 SAE ORB	3/4" G
FA1	-20 SAE ORB	1-1/4" G
FA2	-20 SAE ORB	1-1/4" G
GA	-4 SAE ORB	1/4" G
GB	-4 SAE ORB	1/4" G
GS	-4 SAE ORB	1/4" G
PS	-4 SAE ORB	1/4" G
Z1 (a)	-4 SAE ORB	1/8" G
Z2 (a)	-4 SAE ORB	1/8" G
X1	-6 SAE ORB	3/8" G
X2	-6 SAE ORB	3/8" G
Y1	-4 SAE ORB	1/4" G
Y2	-4 SAE ORB	1/4" G
GT	-4 SAE ORB	1/4" G

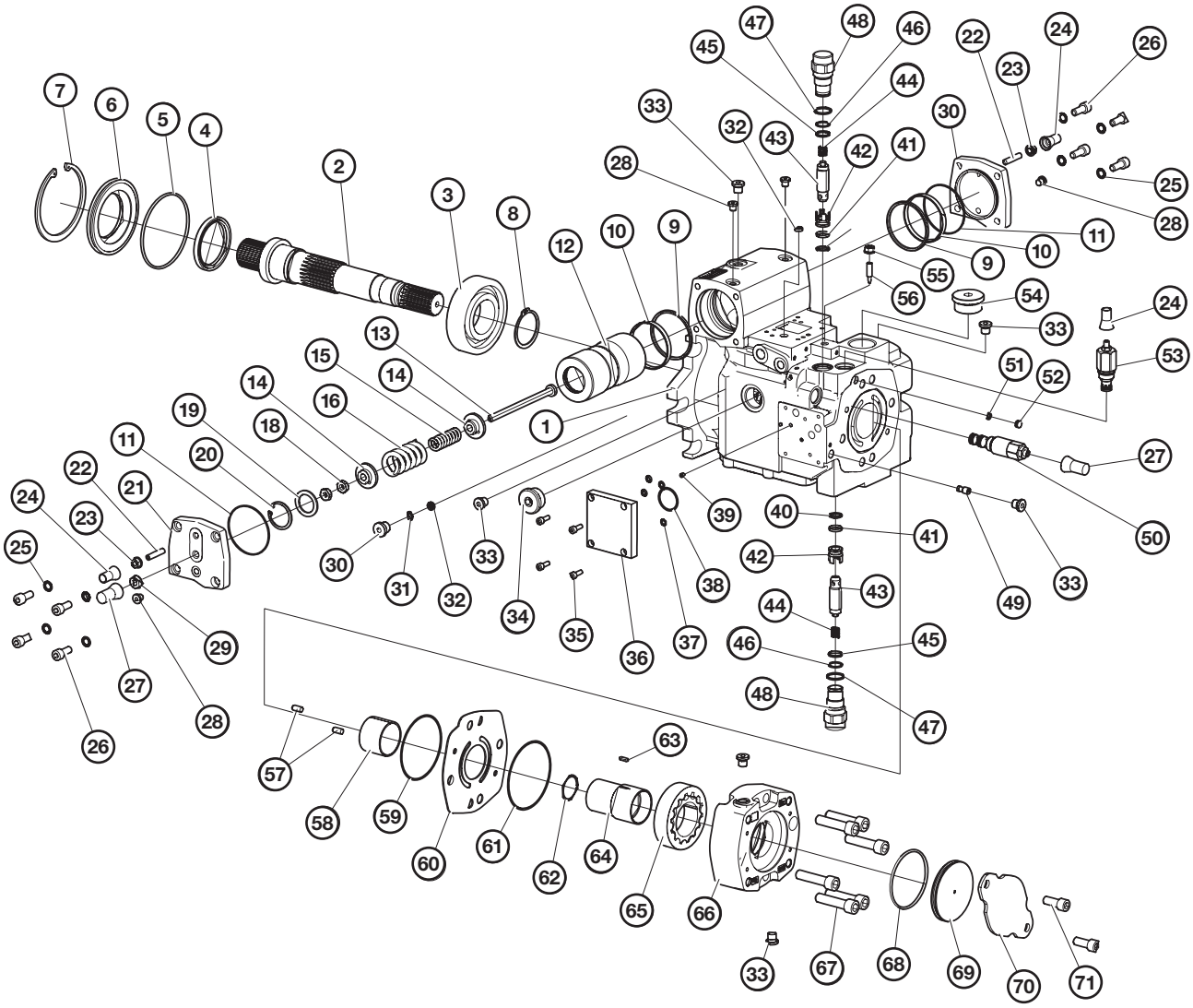
Schematic shown is a C136 with "F" control and override option "P".

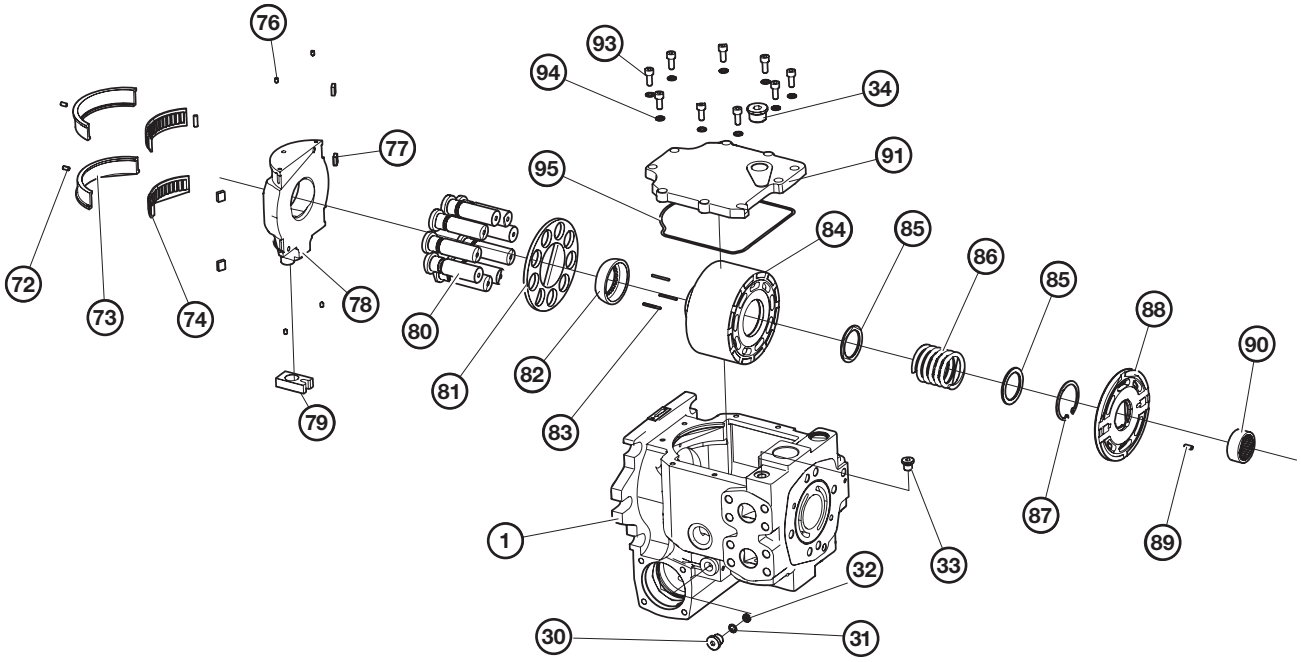
C Series Displacement Controls				
Mount	**Control Code**	**Control Modifier**	**Description**	**Part Number**
All	A	000	A000 controller, manual lever	S2F-19950-5
C/D	C	SELECT KIT	C CONT NO ORF HPDCF SAE S2	S2F-20229-5
G/H	C	SELECT KIT	C CONT, NO ORF HPDCF ISO S2	S2F-20228-5
C/D	D	000	D000 controller, HPDCN, no orifice, SAE	S2F-19962-5
G/H	D	000	D000 controller, HPDCN, no orifice, ISO	S2F-19963-5
C/D	D	005	D005 controller, HPDCN, .5 mm orifice, SAE	S2F-19964-5
G/H	D	005	D005 controller, HPDCN, .5 mm orifice, ISO	S2F-19965-5
C/D	D	009	D009 controller, HPDCN, .9 mm orifice, SAE	S2F-19966-5
G/H	D	009	D009 controller, HPDCN, .9 mm orifice, ISO	S2F-19967-5
All	E/J	212/D2*/E2*	E212 controller, ENPDC, 1.2 mm orifice, 12V S2	S2F-19968-5
All	E/J	212/F2*/G2*	E412 controller, ENPDC, 1.2 mm orifice, 24V S2	S2F-19973-5
All	F	SELECT KIT	F CONT, NO ORF EPDCF 12V S2	S2F-20230-5
All	F	SELECT KIT	F CONT, NO ORF EPDCF 24V S2	S2F-20231-5
All	G	208	G208 controller, EPDCN, 0.8 mm orifice, 12VDC	S2F-19984-5
All	G	408	G408 controller, EPDCN, 0.8 mm orifice, 24VDC	S2F-19985-5
C/D	H	SELECT KIT	H CONT, NO ORF EPDCFH 12V SAE	S2F-20232-5
C/D	H	SELECT KIT	H CONT, NO ORF EPDCFH 24V SAE	S2F-20233-5
C/D	H	SELECT KIT	H CONT, NO ORF EPDCFH 12V ISO	S2F-20234-5
C/D	H	SELECT KIT	H CONT, NO ORF EPDCFH 24V ISO	S2F-20235-5
All	J	D5*/E5*	E215 controller, ENPDC, 1.5 mm orifice, 12VDC, J control only	S2F-19990-5
All	J	F5*/G5*	E415 controller, ENPDC, 1.5 mm orifice, 24VDC, J control only	S2F-19991-5
C/D	K	Any	K control only, SAE ports	S2F-19992-5
G/H	K	Any	K control only, ISO ports	S2F-19993-5

Use control modifier in unit model code to select correct control orifice kit for “C”, “F”, and “H” controls.

Please note that “C”, “F”, and “H” controls above do not have orifices installed. Orifices must be installed prior to installation onto unit. For more information reference product update bulletin PC-0061.

Control Orifice Kits	
Description	**Part Number**
Orifice Kit, 0.6 mm	S2F-20236-5
Orifice Kit, 0.7 mm	S2F-20237-5
Orifice Kit, 0.8 mm	S2F-20238-5
Orifice Kit, 0.9 mm	S2F-20239-5
Orifice Kit, 1.0 mm	S2F-20240-5
Orifice Kit, 1.2 mm	S2F-20241-5
Orifice Kit, 1.5 mm	S2F-20242-5
Orifice Kit, 2.0 mm	S2F-20244-5

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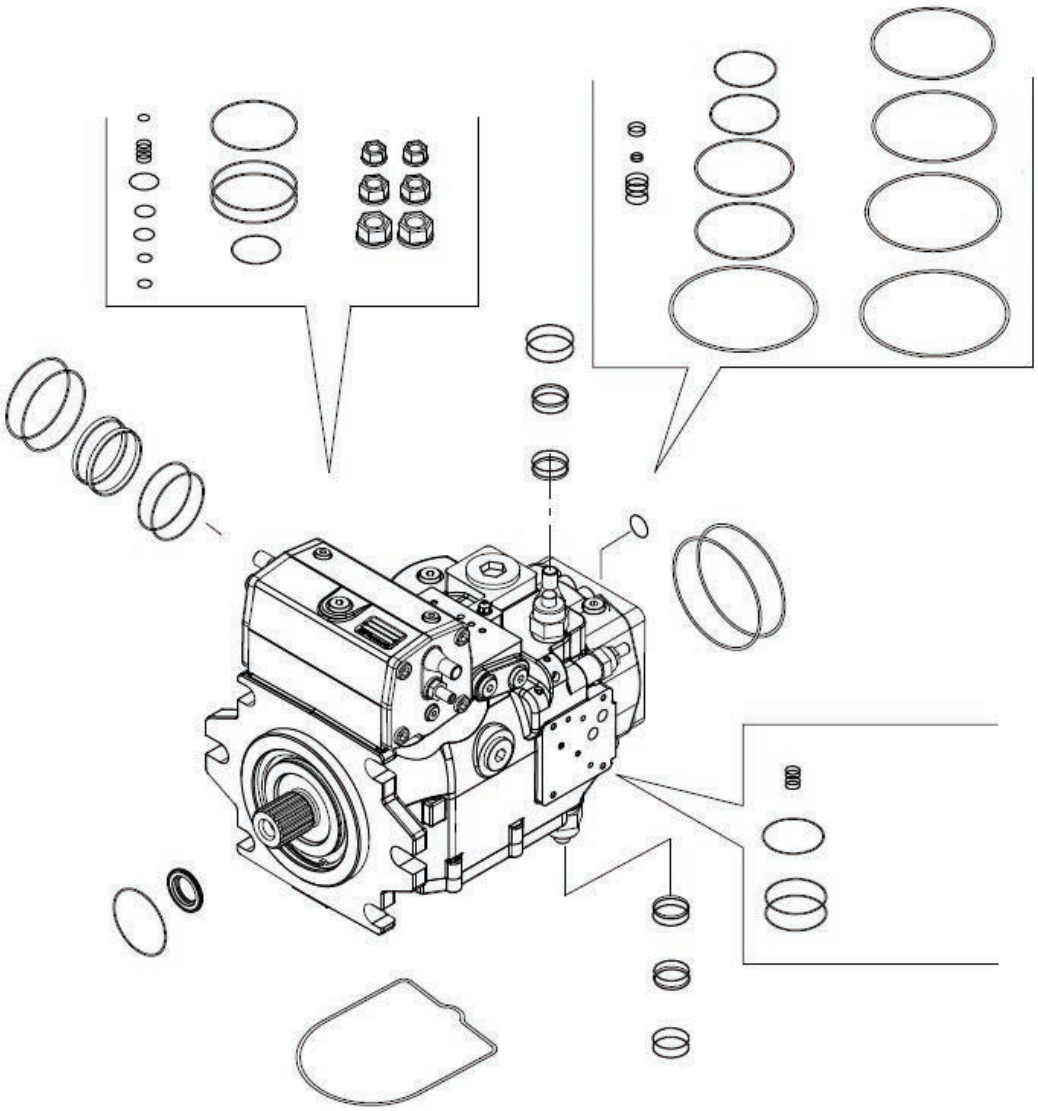
C136 Bill of Material			
Balloon #	**Description**	**Qty**	**Kit**
1	Pump housing	1	Housing kit
2	Shaft	1	Shaft assembly kit
3	Bearing	1	Shaft assembly kit
4*	Shaft seal	1	Shaft retainer kit
5*	Seal	1	Shaft retainer kit
6	Seal retainer	1	Shaft retainer kit
7	Snap ring	1	Shaft assembly kit
8	Snap ring	1	Shaft assembly kit
9*	Ring seal	2	Seal kit
10*	Seal guide	2	Seal kit
11*	O-ring	2	Servo cap kit
12	Servo piston	1	Servo piston kit
13	Threaded rod	1	Servo piston kit
14	Spring guide	2	Servo piston kit
15	Inner spring	1	Servo piston kit
16	Outerspring	1	Servo piston kit
18	M10 Hex head nut	2	Servo piston kit
19	Spacer	1	Servo piston kit
20	Snap ring	1	Servo piston kit
21	Servo cap with centering	1	Servo cap kit
22	M8x40 Threaded rod	2	Servo cap kit
23	M8 Hex head nut	2	Servo piston kit
24	Protective cap	3	NO KIT
25	Washer	8	Servo cap kit
26	M10x25 Socket head screw	8	Servo cap kit
27	Protective cap	2	NO KIT
28**	-4 SAE ORB plug	4	Servo cap kit
29	M10 Hex head nut	1	Servo cap kit
30	1/4 BSPP plug	2	NO KIT
31	Snap ring	2	Housing accessories kit
32	Filter screen	3	Housing accessories kit
33**	-4 SAE ORB plug	6	Housing kit/Charge pump kits
34**	-12 SAE ORB plug	3	Housing kit/Charge pump kits
35	M6x18 Socket head screw	4	Override and options kits
36	Accessory block	1	Override and options kits/ Charge filter kits
37*	O-ring	4	Override and options kits/ Charge filter kits
38*	O-ring	1	Override and options kits/ Charge filter kits
39	Orifice	1	Housing accessories kit
40*	O-ring	4	Relief assembly kits
41*	O-ring	4	Relief assembly kits
42	Valve seat	2	Relief assembly kits
43	Valve assembly	2	Relief assembly kits
44	Spring	2	Relief assembly kits
45*	O-ring	2	Relief assembly kits
46*	O-ring	2	Relief assembly kits

C136 Bill of Material			
Balloon #	**Description**	**Qty**	**Kit**
47*	O-ring	2	Relief assembly kits
48	Valve cap	2	Relief assembly kits
49	Shuttle	1	Shuttle kit
50	POR Cartridge	1	Override and options kits
51*	O-ring	1	Seal kit
52	Plug	1	Housing accessories kit
53	Charge relief	1	Charge relief kit
54	-16 SAE ORB plug	2	NO KIT
55	M8 Seal lock nut	1	Throttle valve kit
56	Throttle valve	1	Throttle valve kit
57	Pin	2	Bushing kit
58	Bushing	1	Bushing kit
59*	O-ring	1	Charge pump kits
60	Spacer	1	Charge pump kits
61	O-ring	1	Charge pump kits
62	Snap ring	1	Charge pump kits
63	Key	1	Charge pump kits
64	Coupling	1	Charge pump kits
65	Gerotor	1	Charge pump kits
66	Charge pump housing	1	Charge pump kits
67	M14x60 Socket head screw	4	Charge pump kits
68	O-ring	1	Through drive kits
69	Blocking cover	1	Through drive kits
70	Gerotor cap	1	Through drive kits
71	M12x20 Socket head screw	2	Through drive kits
72	Dowel pin	2	Swash plate kit
73	Swash bearing guide	2	Swash plate kit
74	Bearing	2	Swash plate kit
76	M5x6 Screw	4	Swash plate kit
77	Bearing stop	4	Swash plate kit
78	Swash plate	1	Swash plate kit
79	Feedback link	1	Swash plate kit
80	Piston	9	Rotating group
81	Retainer	1	Rotating group
82	Ball seat	1	Rotating group
83	Pin	3	Rotating group
84	Barrel	1	Rotating group
85	Spacer	2	Rotating group
86	Spring	1	Rotating group
87	Snap ring	1	Rotating group
88	Valve plate	1	Valve plate kit
89	Pin	1	Valve plate kit
90	Bearing	1	Housing bearing kit
91	Cover	1	Housing cover kit
93	M8x20 Socket head screw	9	Housing cover kit
94	Lock washer	9	Housing cover kit

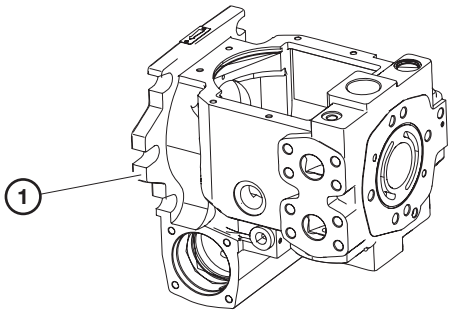
*items are part of the pump seal kit
**hardware item used in multiple kits

Seal Kit	
Includes all seals for the pump	S2F-20037-5



Parker Hannifin Corporation
Hydraulic Pump and Power Systems Division
United States

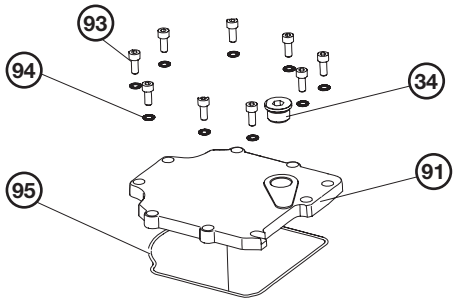
Housing		
Mount Option	**Description**	**Part Number**
D	C136 SAE D 2/4 bolt mount with SAE ports	S2F-19994-5
H	C136 SAE D 2/4 bolt mount with ISO ports	S2F-19995-5
If needing housing for units J or K control option contact technical support		



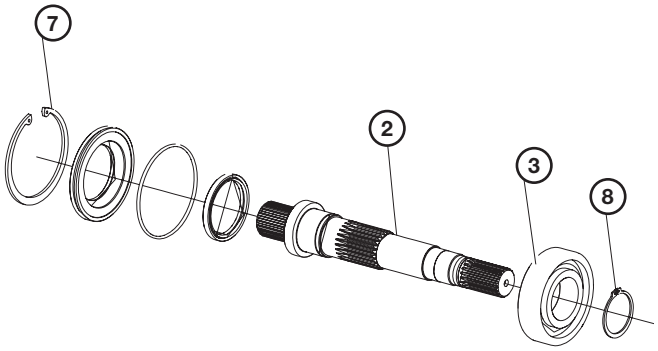
Housing Accessory Kit	S2F-20031-5

Shuttle Kit	S2F-20029-5

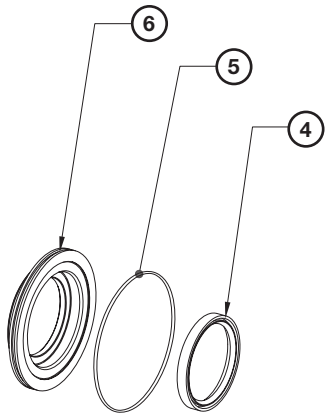
Housing Cover Kit		
Mount Option	**Description**	**Part Number**
D	C136 Housing cover kit SAE	S2F-20014-5
H	C136 Housing cover kit ISO	S2F-20027-5



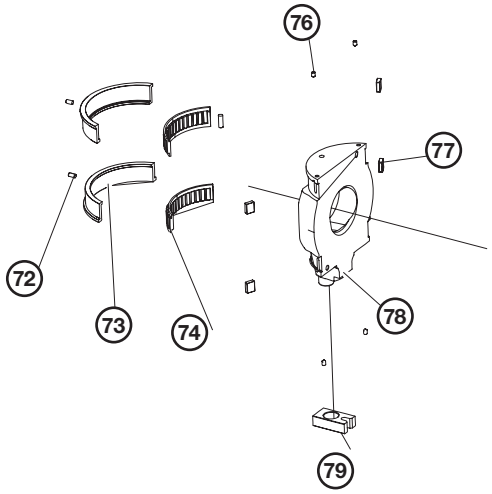
Shaft Assembly Kit		
Shaft Option	**Description**	**Part Number**
3	SAE D 13T 8/16 DP shaft kit C136	S2F-19996-5
4	SAE F 15T 8/16 DP shaft kit C136	S2F-19997-5
5	SAE 23T 16/32 DP shaft kit C136	S2F-19998-5
6	SAE 27T 16/32 DP shaft kit C136	S2F-19999-5
7	W40x2x30x18 DIN 5480 shaft kit C136	S2F-20000-5
8	W45x2x30x21 DIN 5480 shaft kit C136	S2F-20001-5



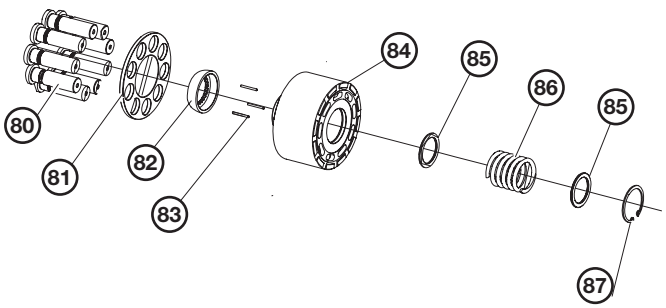
Shaft Retainer Kit	S2F-20002-5



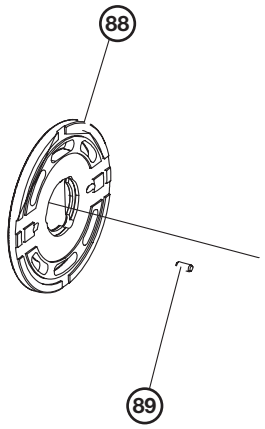
Swashplate Kit	S2F-20015-5



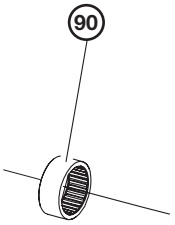
Rotating Group	S2F-20016-5



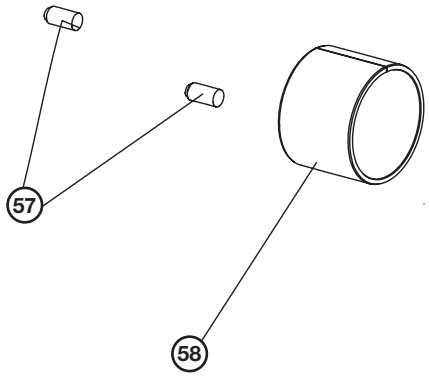
Valve Plate Kit		
Rotation	**Description**	**Part Number**
R	C136 CW rotation kit	S2F-20011-5
L	C136 CCW rotation kit	S2F-20012-5
Consult factory for control options J/K.		



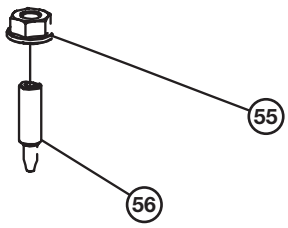
Housing Bearing	S2F-20033-5



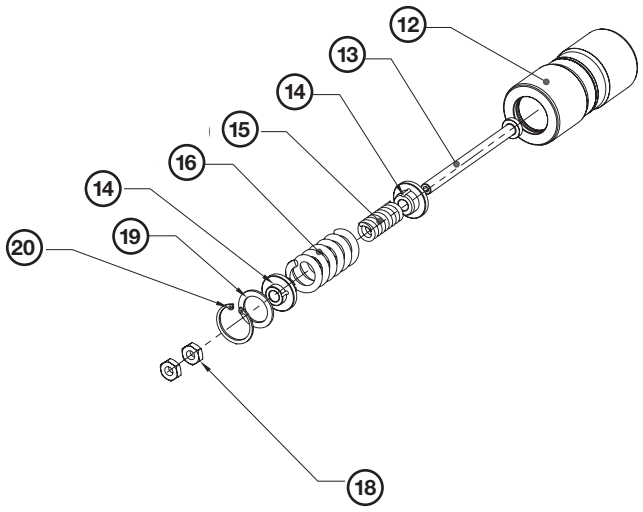
Bushing Kit	S2F-20030-5



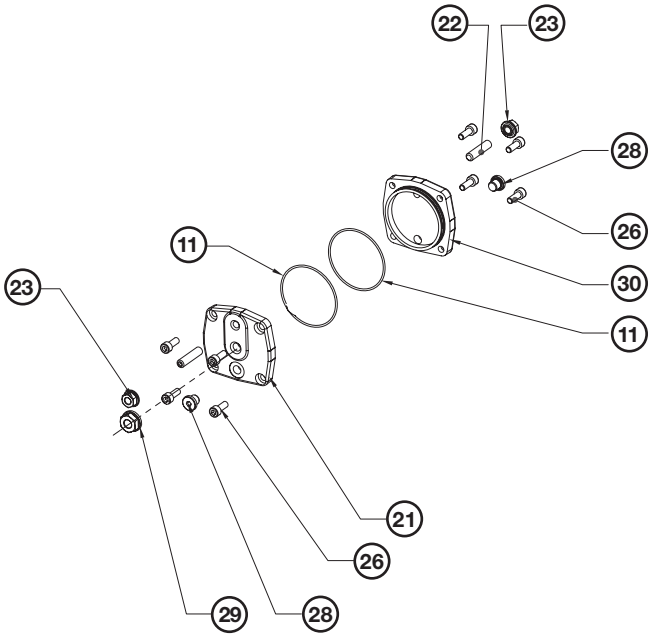
Throttle Valve Kit	S2F-20034-5



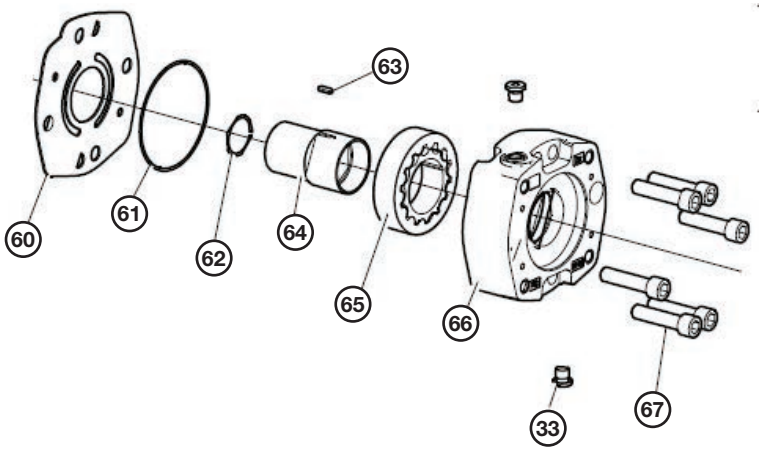
Servo Piston Kit	S2F-20003-5



Servo Cap Kit	S2F-20004-5

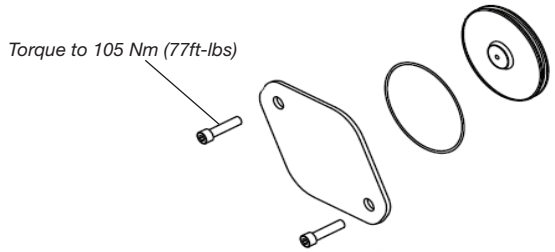


Charge Pump Kits				
Mount Options	**Charge Pump Option**	**Through Drive Option**	**Description**	**Part Number**
D	B	X/A/B/G/C/H/E	Kit 23cc with SAE ports	S2F-20017-5
H	B	X/A/B/G/C/H/E	Kit 23cc with ISO ports	S2F-20018-5
D	C	X/A/B/G/C/H/E	Kit 27cc with SAE ports	S2F-20019-5
H	C	X/A/B/G/C/H/E	Kit 27cc with ISO ports	S2F-20020-5
D	B	D/F/L	Kit 23cc with SAE ports D thru drive	S2F-20021-5
H	B	D/F/L	Kit 23cc with ISO ports D thru drive	S2F-20022-5
D	C	D/F/L	Kit 27cc with SAE ports D thru drive	S2F-20023-5
H	C	D/F/L	Kit 27cc with ISO ports D thru drive	S2F-20024-5
D	X	X/A/B/G/C/H/E	Blocking kit SAE ports	S2F-20025-5
D	X	D/F/L	Blocking kit SAE ports D thru drive	S2F-20026-5

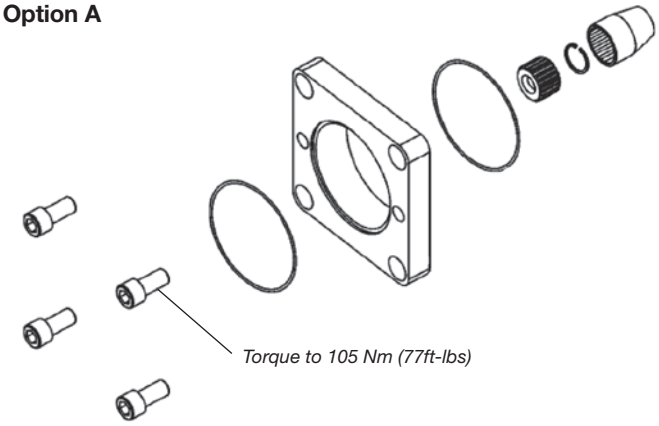


Through Drive Kits		
Through Drive Option	**Description**	**Part Number**
X	Through drive blanking kit	S2F-19938-5
A	C136 SAE A Through drive kit, 2 blt w/ 9T coupling	S2F-20005-5
B	C136 SAE B Through drive kit, 2 blt w/ 13T coupling	S2F-20006-5
G	C136 SAE B Through drive kit, 2 blt w/ 15T coupling	S2F-20007-5
C	C136 SAE C Through drive kit, 2/4 blt w/ 14T coupling	S2F-20008-5
H	C136 SAE C Through drive kit, 2/4 blt w/ 17T coupling	S2F-20009-5
D	C136 SAE D Through drive kit, 2/4 blt w/ 13T coupling	S2F-20010-5
E	Order C option kit	–
F	Order D option kit	–

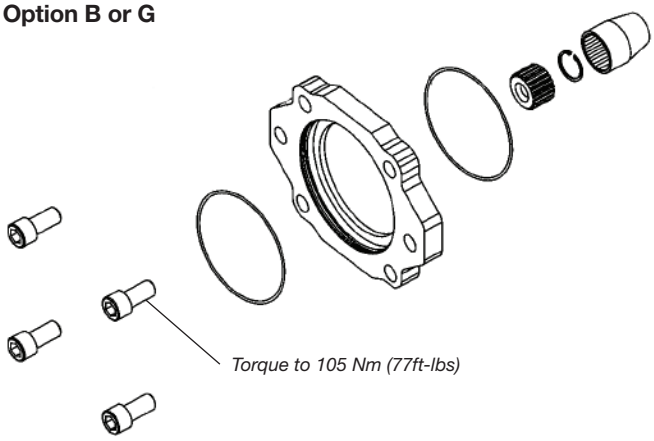
Option X



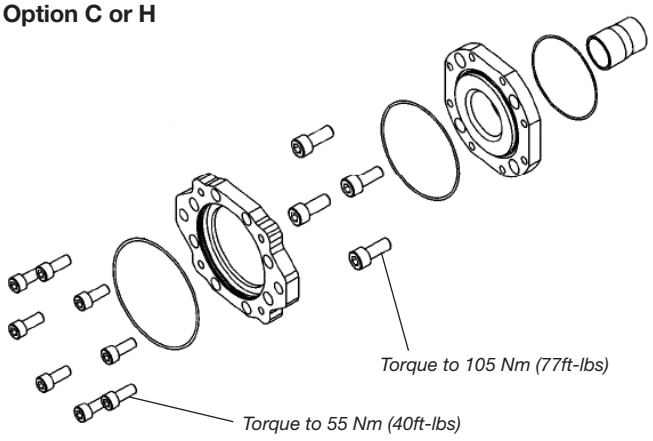
Option A



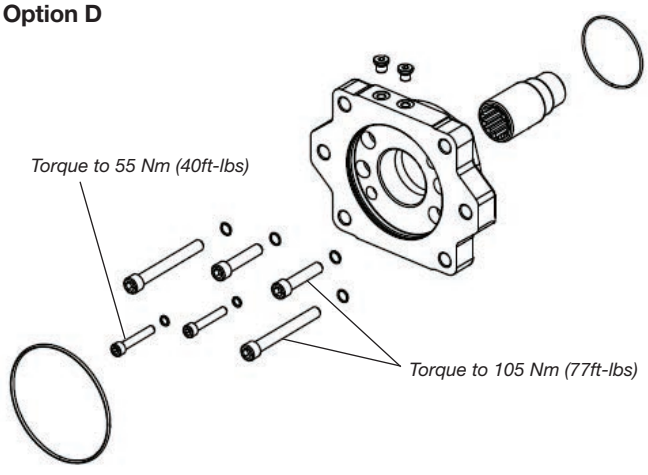
Option B or G



Option C or H



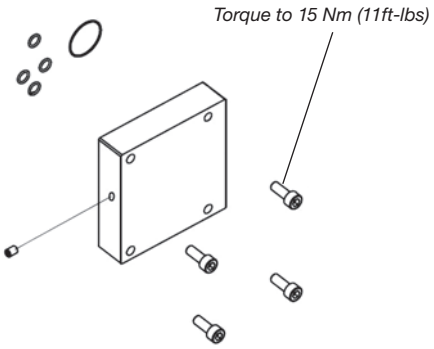
Option D



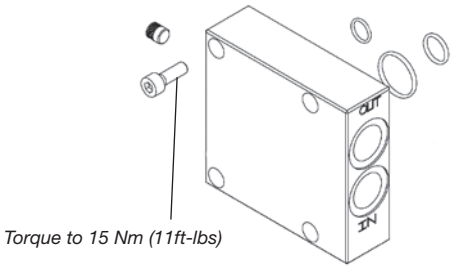
Override Kits/Charge Filter Options					
Mount	**Pressure Override**	**Override Option**	**Charge Filtration**	**Description**	**Part Number**
D/H	X	XX	X	Accessory blocking plate	S2F-19915-5
D	P/X	*	R	Remote charge filter block, SAE ports	S2F-19922-5
D/H	*	*	N	Charge filter assembly with mechanical 8 bar indicator	S2F-19920-5
D/H	*	*	G	Charge filter assembly with electrical 8 bar indicator	S2F-19921-5
D/H	E	12	*	Electrical override 12 VDC	S2F-19917-5
D/H	E	24	*	Electrical override 24 VDC	S2F-19918-5
D/H	C	2*	X/N/G	Mechanical POR with 12 VDC electrical override	Use S2F-20013-5 with S2F-19917-5
D/H	C	4*	X/N/G	Mechanical POR with 24 VDC electrical override	Use S2F-20013-5 with S2F-19918-5
				Replacement Element for charge filter	S2F-20040-5

*any valid option
For C pressure override codes both electrical and mechanical override are used.

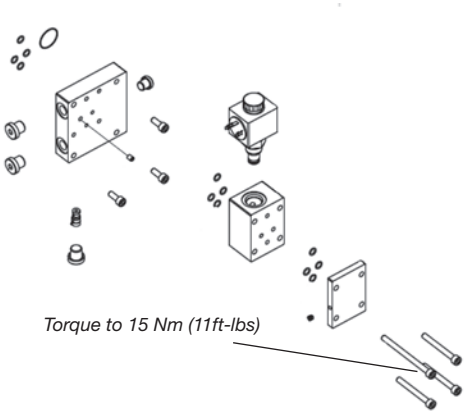
S2F-19915-5



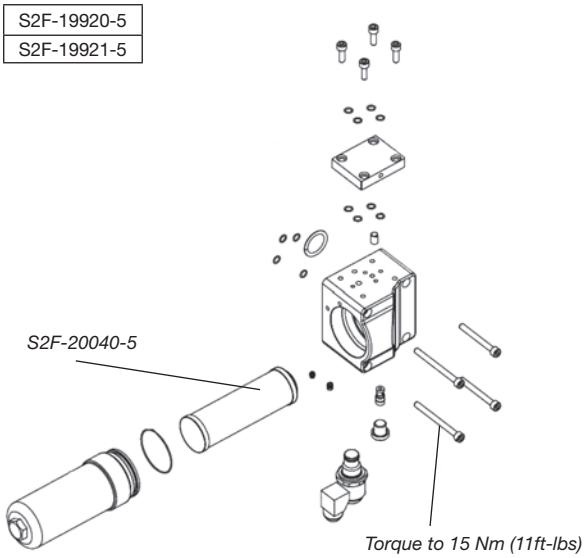
S2F-19922-5



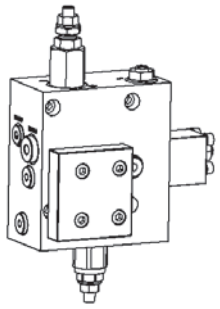
S2F-19917-5
S2F-19918-5



S2F-19920-5
S2F-19921-5

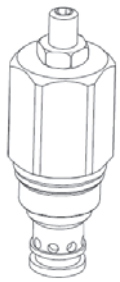


Automotive Control Valve and Accessories	
Description	**Part Number**
Automotive control valve with inching ISO ports	S2F-20060-5
Flushing valve with 1.5 mm orifice	S2F-20061-5
Flushing valve with 2.0 mm orifice	S2F-20062-5
Flushing valve with 2.5 mm orifice	S2F-20063-5
Flushing valve with blanking plate	S2F-20064-5
Items will only mount onto units shipped with J/K controls. If attempting to convert a non J/K control unit contact Technical Support for assistance.	



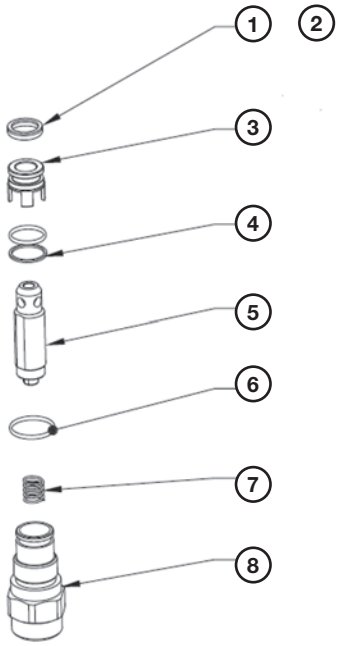
Pressure Override Cartridge	S2F-20013-5
Item includes cartridge and O-rings only	

Charge Pressure Relief	S2F-19929-5
Cartridge and O-rings	



Relief Assembly Kits		
Cross Port Code	**Description**	**Part Number**
A	250 bar relief assembly	S2F-19925-5
B	350 bar relief assembly	S2F-19926-5
C	420 bar relief assembly	S2F-19927-5
D	450 bar relief assembly	S2F-19928-5
Kits include items 1 through 8.		

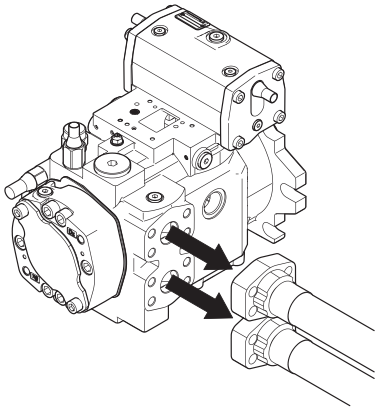
Relief Only		
Cross Port Code	**Description**	**Part Number**
A	250 bar relief assembly	S2F-20041-5
B	350 bar relief assembly	S2F-20042-5
C	420 bar relief assembly	S2F-20043-5
D	450 bar relief assembly	S2F-20044-5
Kits include item 5 only.		



Introduction

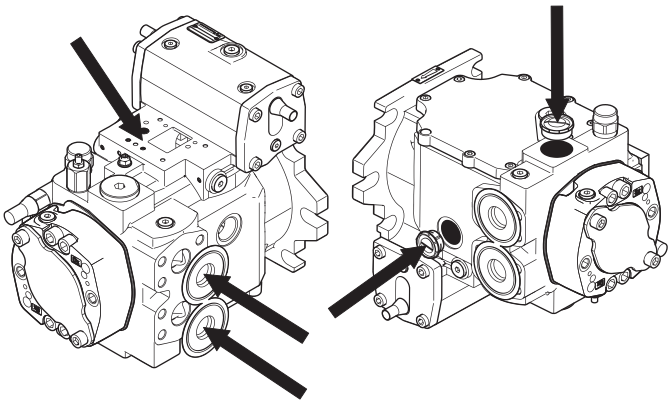
Before removing the pump, you need to take all precautions necessary to ensure safety. Stop the machine. Check that the system is not under pressure. Discharge or disconnect accumulators. Verify that there are no suspended loads connected to the machine.

Before disconnecting the various pipes or hoses, clean the pump to avoid the accidental ingress of dirt. If there are electrical connections, check that they are not under tension.

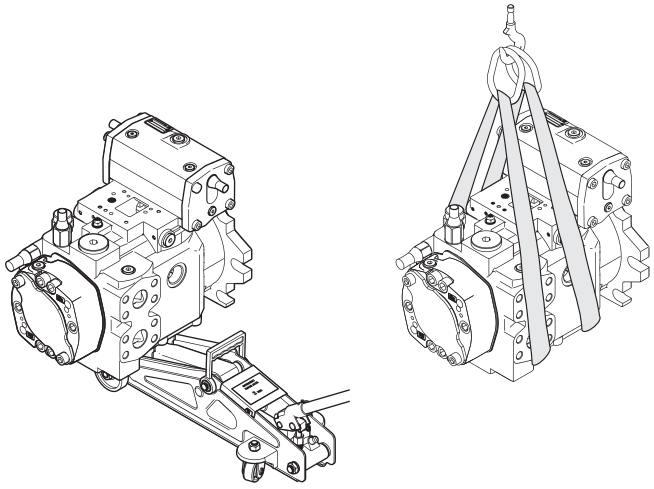


Remove the suction, pressure, case drain and pilot lines and any electrical connections.

CAUTION:
The hydraulic circuit and the pump may be hot!
Start the disassembly operations only after cooling.



After removing the hoses, apply the protections at all the open ports to prevent the ingress of foreign bodies.



Move the pump by lifting straps, eyebolts or, if not possible, lift it with a hydraulic trolley jack.

Note:
Make sure you apply the straps firmly to the pump before you move it to prevent an accidental fall and damage of objects and/or injury to persons. If you use a jack, make sure the pump is securely resting on the plate.

Figure 1

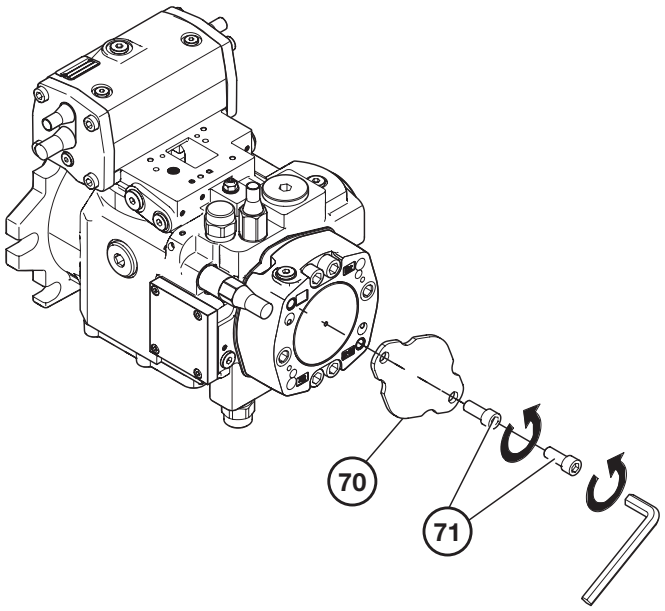
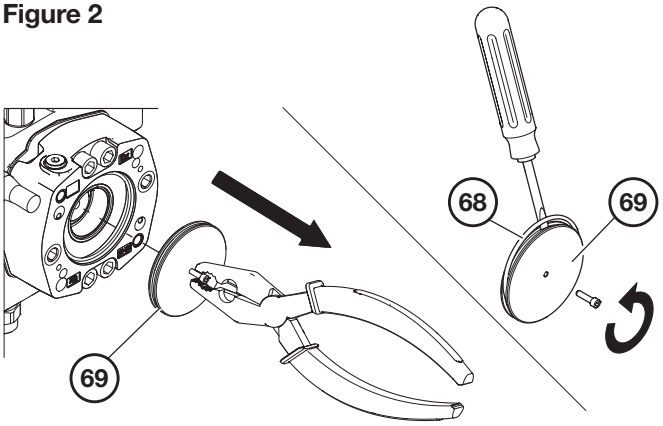


Figure 2



Remove the cover (69) by means of a puller or a screw M5.

Note:
Remove the O-ring (68), being careful not to damage it with sharp or pointed tools.

Figure 3

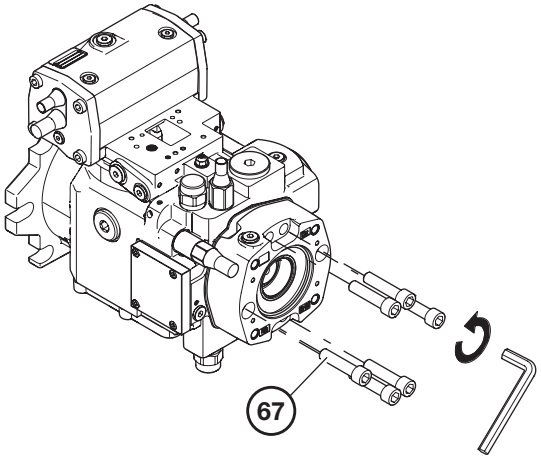
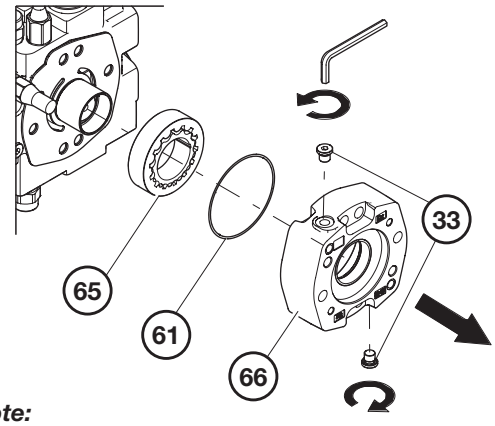
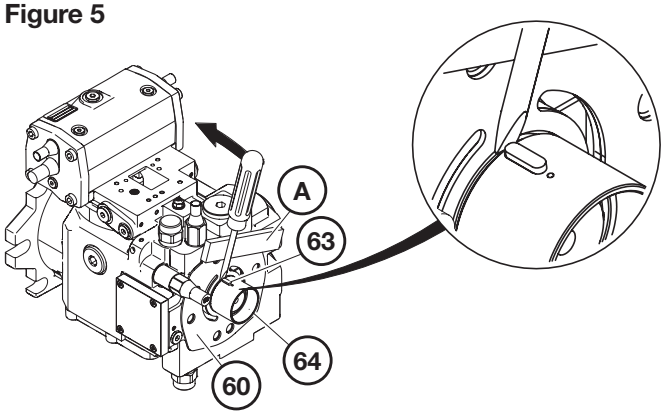


Figure 4



Note:
To avoid damage, don't remove the O-ring (61) with pointed or sharp instruments. Don't damage the surfaces of the gerotor (65).

Figure 5



To remove the coupling (64), leverage the key shaft (63) using a flat-blade screwdriver and a smooth support (A).

Note:
Be very careful not to damage the surface of the coupling (64) and the flange (60).

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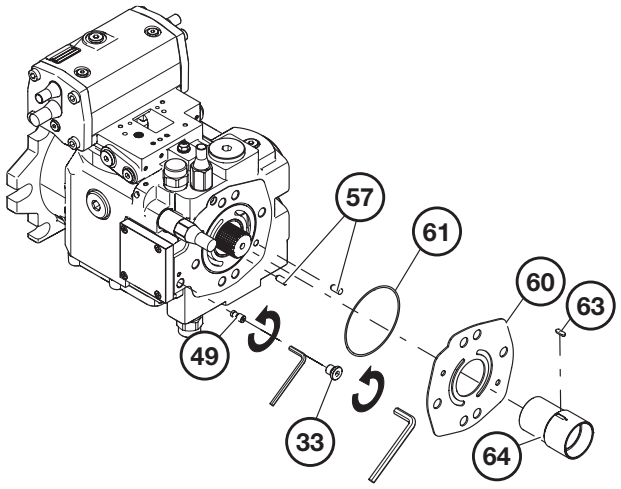
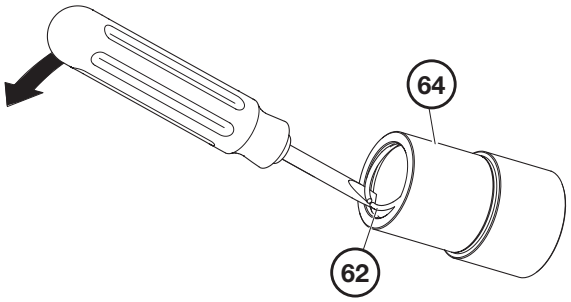
Figure 6

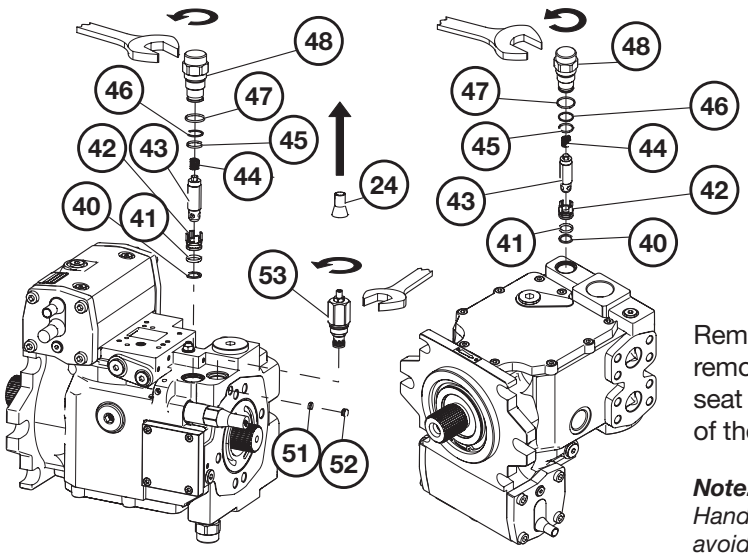


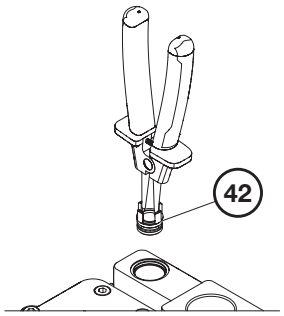


Remove the snap ring (62) of the coupling (64) with a screwdriver.

Note:
To avoid damage, don't remove the O-ring (61) with pointed or sharp instrument.

Figure 7





Remove the plug (52) with its O-ring (51) only after removing the charge pressure relief (53). Remove the seat (42) with a snap ring plier, by gripping on the fins of the seat.

Note:
Handle with care to avoid damage to the valves. To avoid damage, don't remove the O-ring with pointed or sharp instrument.

Figure 8

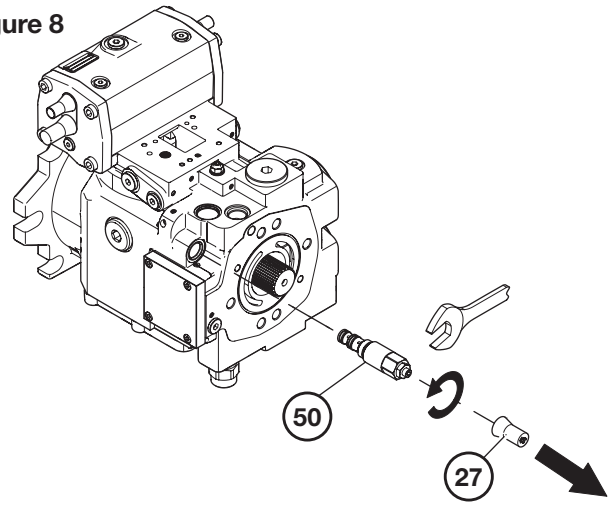


Figure 9

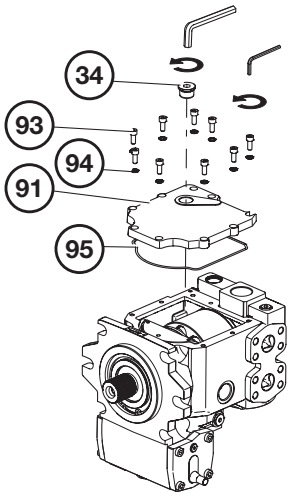
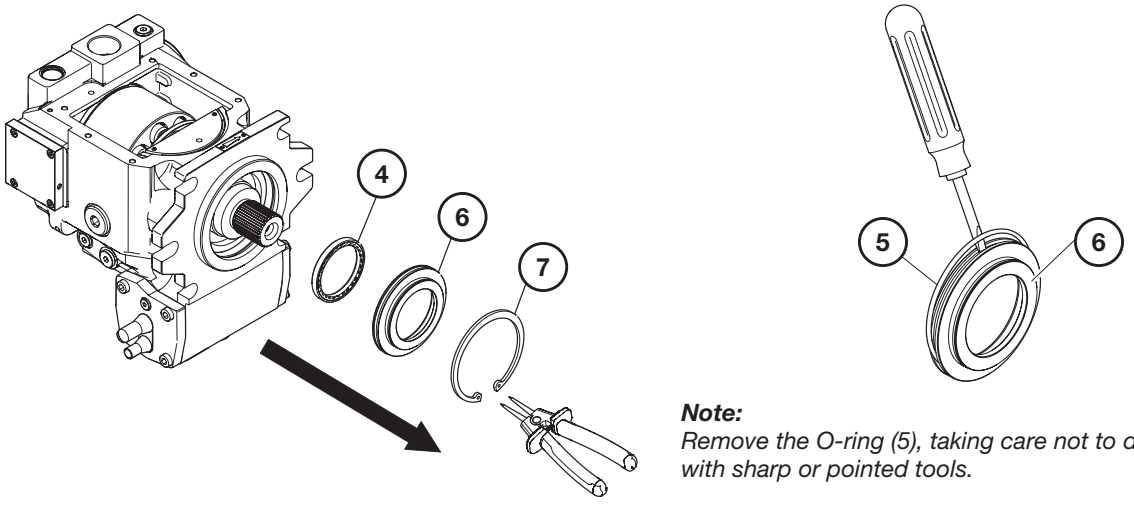
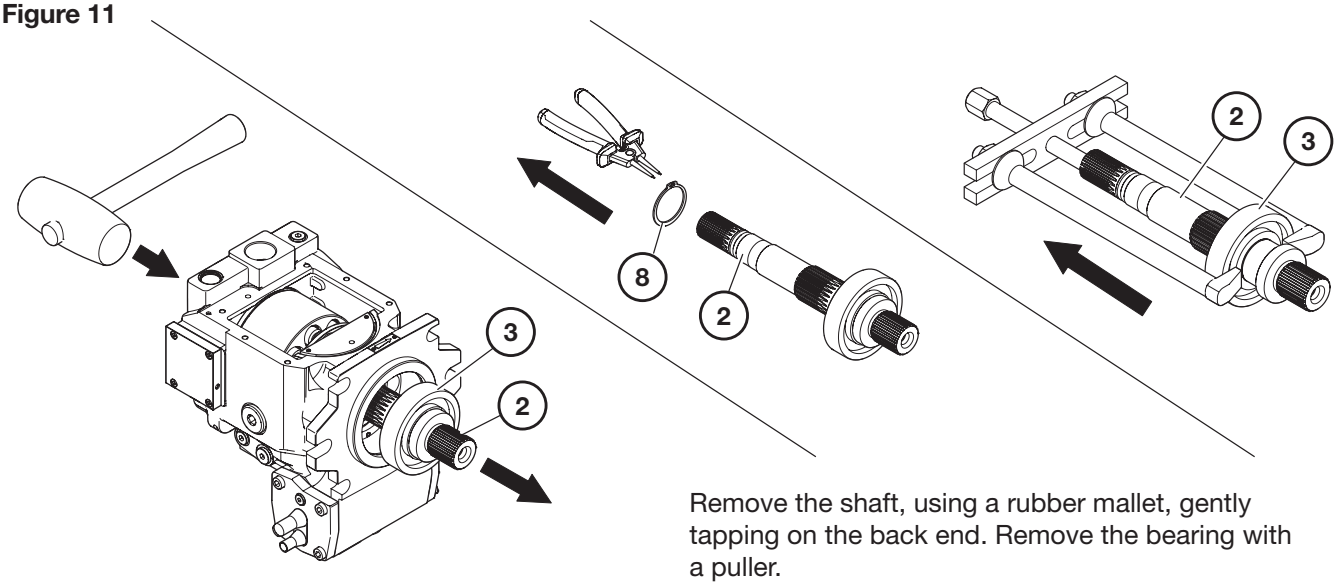


Figure 10



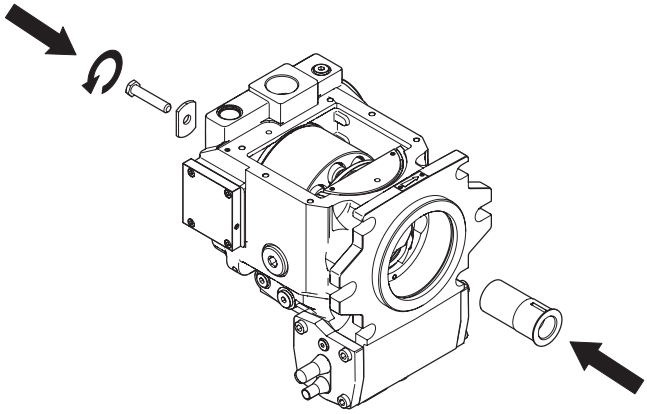
Note:
Remove the O-ring (5), taking care not to damage it with sharp or pointed tools.

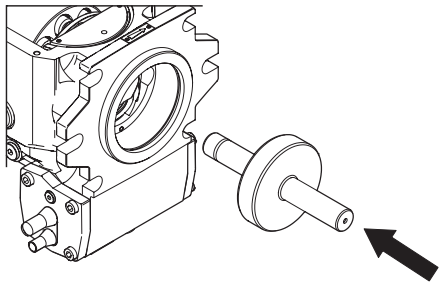
Figure 11



Remove the shaft, using a rubber mallet, gently tapping on the back end. Remove the bearing with a puller.

Figure 12

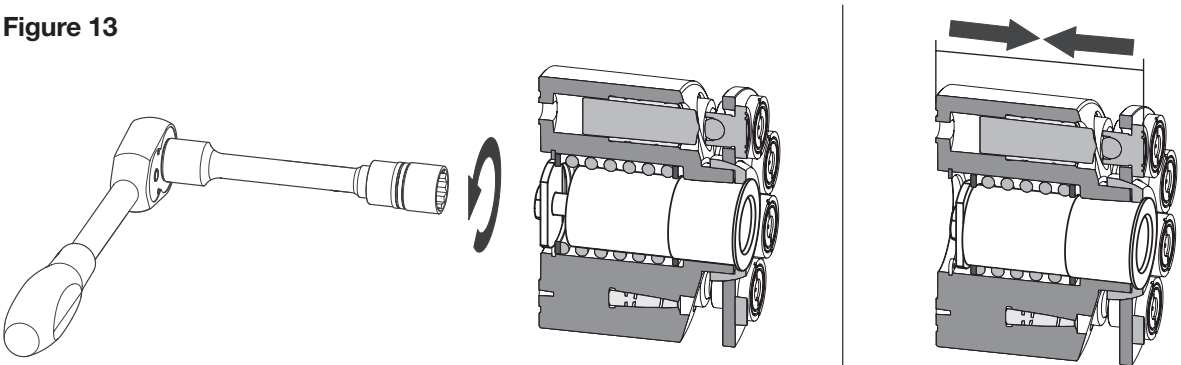




Insert the tool kit assembling/disassembling rotating group (S2F-20046-5). Properly set the washer of the tool kit, which must touch the spacer holding the inner spring.

Note:
Always use the S2F-20046-5 tool. Never tighten the screw before inserting the sleeve, in order to prevent the rotating block from falling into the pump housing.

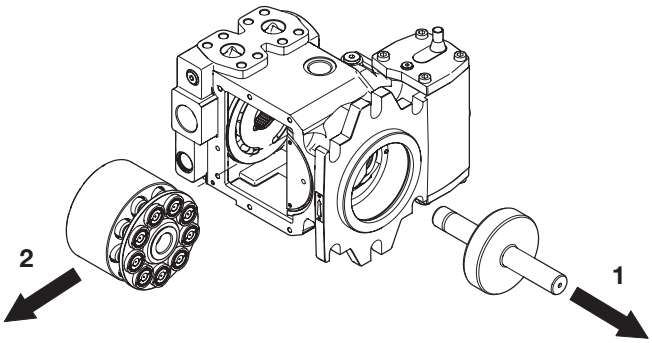
Figure 13

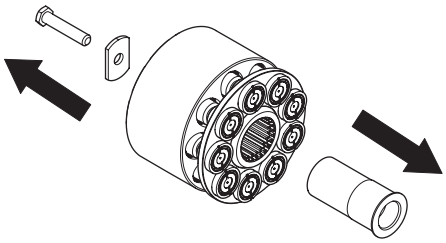


Tighten the screw of the tool kit to the stop.

Note:
Always insert the centering tool of the kit, before tightening the screw.

Figure 14

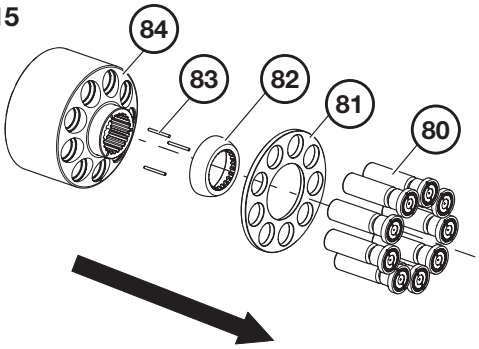




Place the pump on one side as in the figure and, keeping in position the rotating block, first remove the centering tool 1 and subsequently extract the rotating block 2. Remove the tool kit (S2F-20046-5).

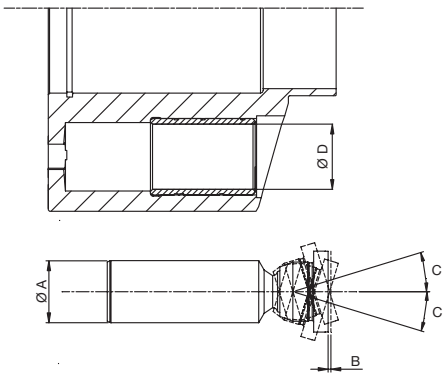
Note:
Don't remove the centering tool without being sure to prevent the rotating block from falling. Pay attention to the pistons during the removal of the rotating block, which may exit from the bores. Don't remove the rotating block without the proper tool kit.

Figure 15



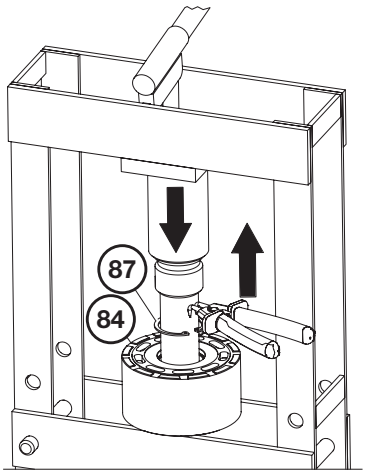
Note:
Handle with care to avoid damage. Check clearances and diameters of the components as shown in the table in Figure 16.

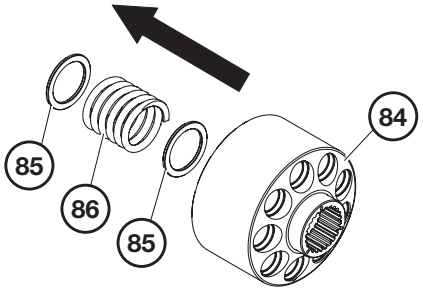
Figure 16



	Piston Diameter A (mm)	Piston Slipper Movement B (mm)	Slipper Angle (max) C (°)	Piston Bore Diameter D (mm)
C136	24.99 - 24.985	0.07	17°	25.02 - 25.03

Figure 17

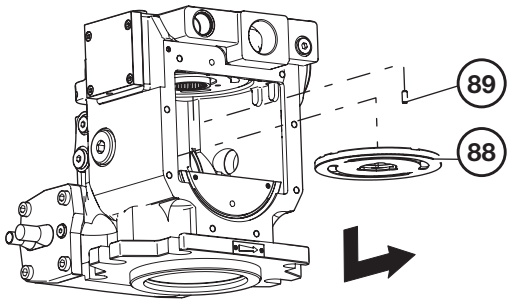




Compress the internal spring of the rotating unit (84) with a press so that the snap ring (87) can be removed.

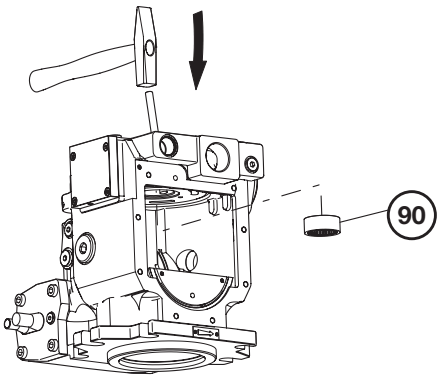
WARNING:
The kit is subjected to elastic load. Do not remove the snap ring before compressing the spring.

Figure 18



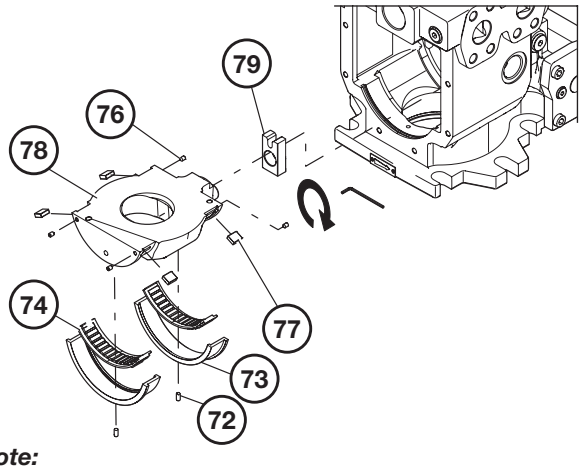
Note:
Handle with care to avoid damage. Perform a visual inspection of wear and/or presence of grooves or scratches. If so, replace the part.

Figure 19



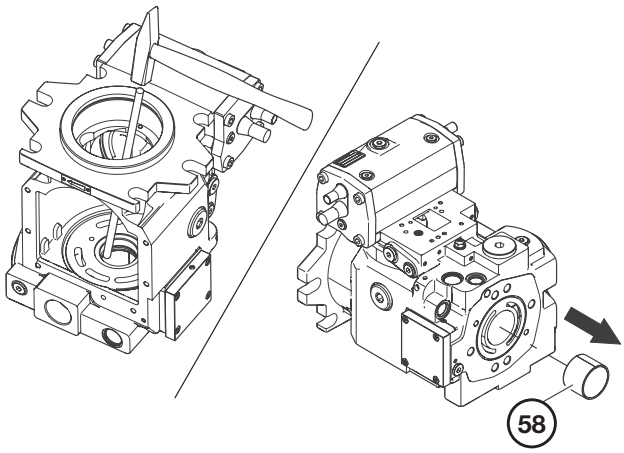
Remove the needle bearing (90) (only if it needs to be replaced) using a metal rod and a hammer. Do not hit too hard to avoid damage the seat.

Figure 20



Note:
Check the condition of the needle bearing (74) is not damaged and that the needles do not show scratches or dents.

Figure 21



Note:
Remove the bushing (58) only if replacement is necessary.

Figure 22

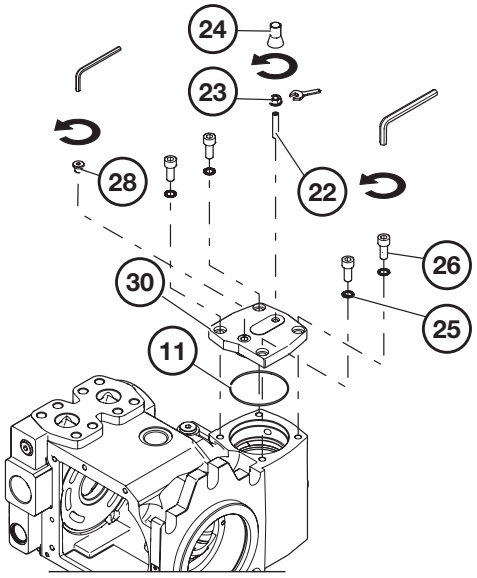


Figure 23

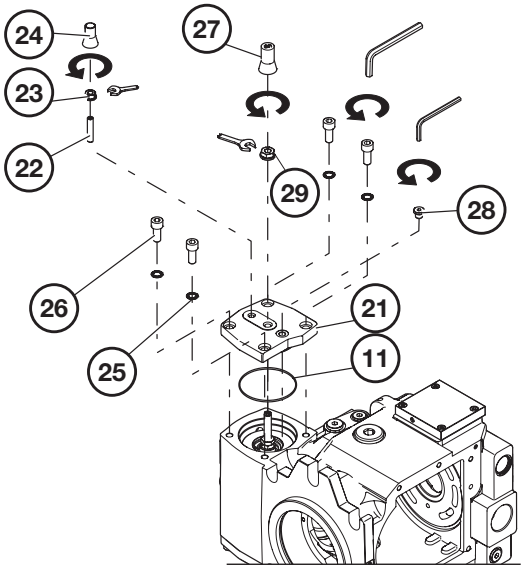


Figure 24

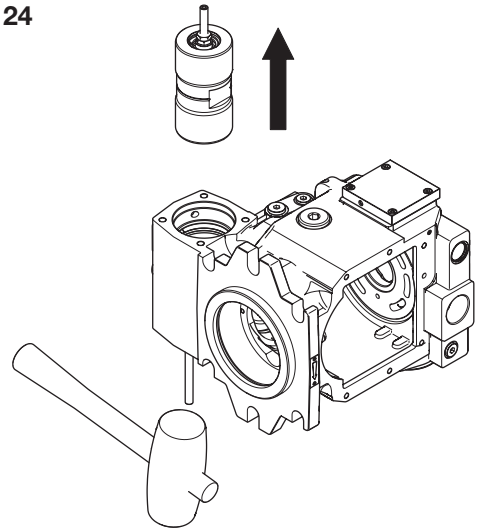


Figure 25

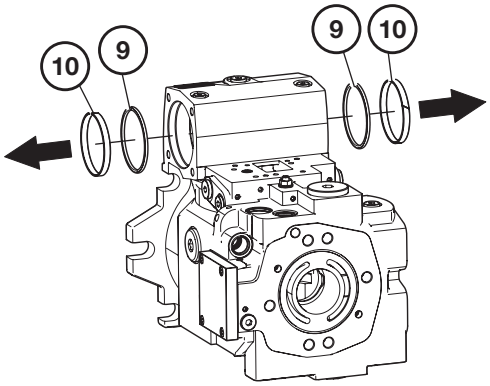
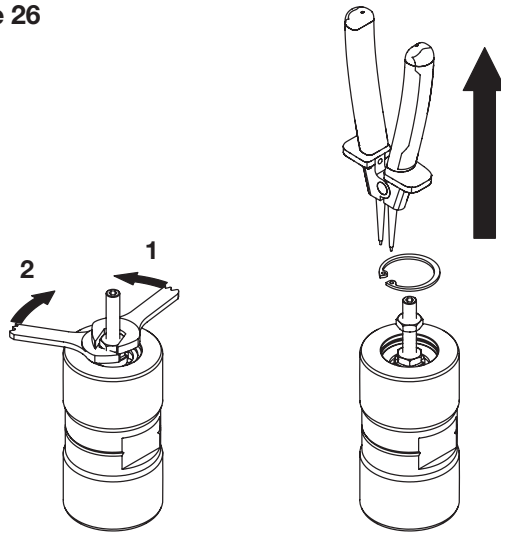
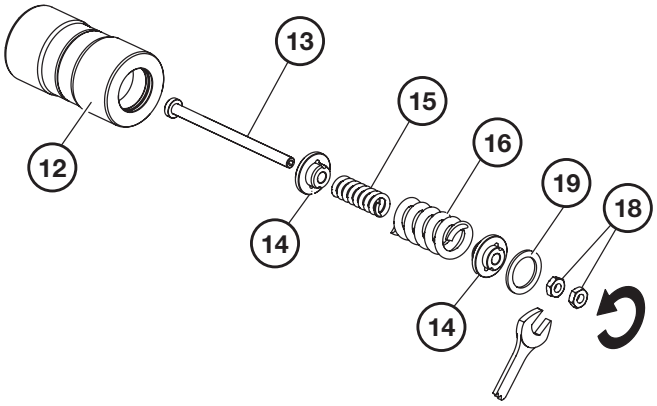


Figure 26





WARNING:
Assembly subjected to elastic load. Never remove the snap ring before you compress the spring (15) by tightening the nut (18).

Figure 27

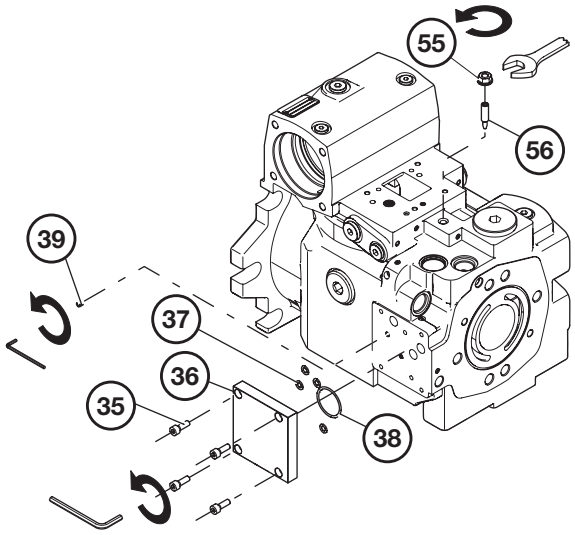


Figure 28

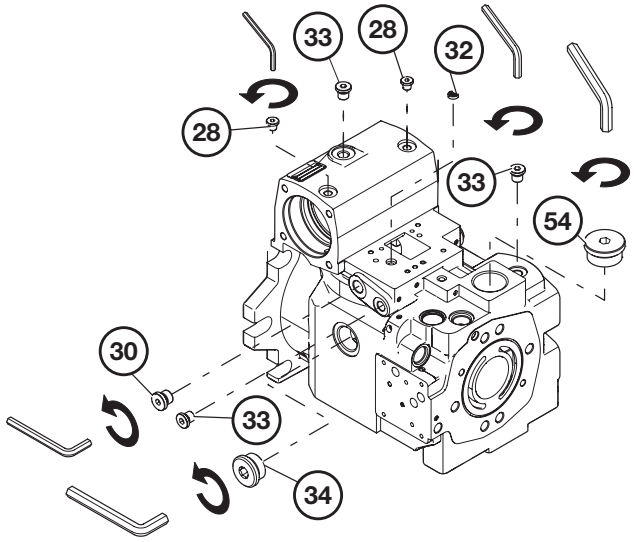


Figure 29

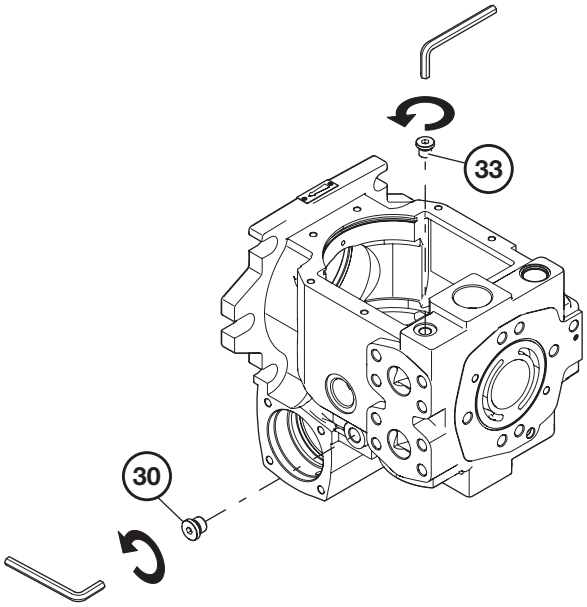
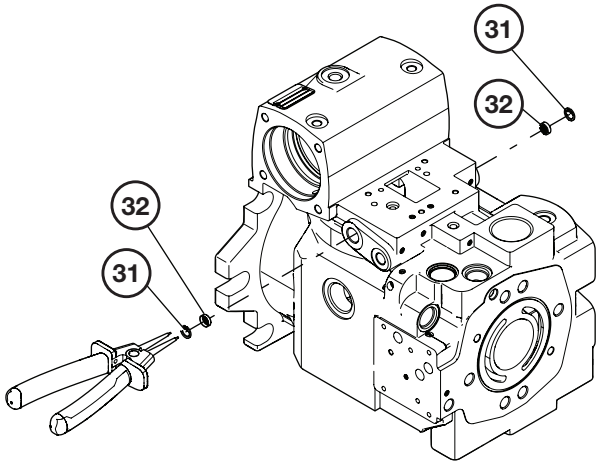


Figure 30



Note:
Check the condition and cleanliness of the filter.

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Figure 31

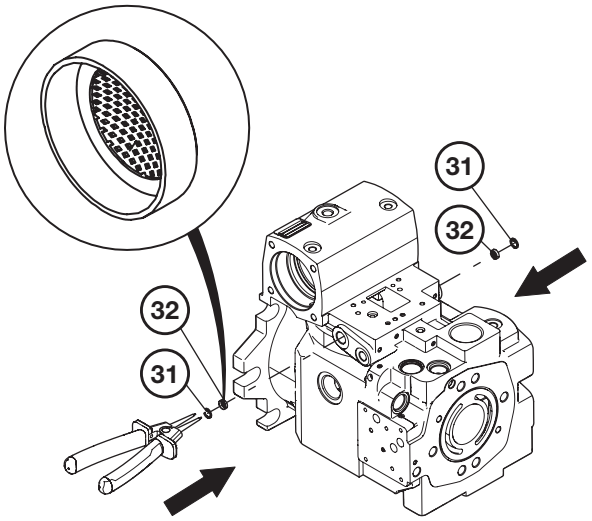


Figure 32

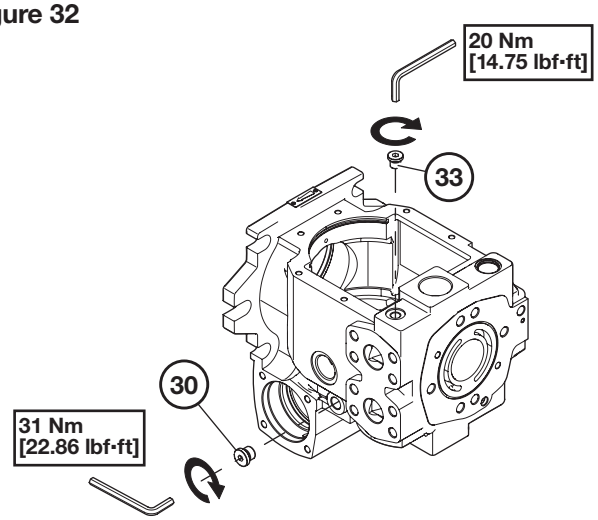


Figure 33

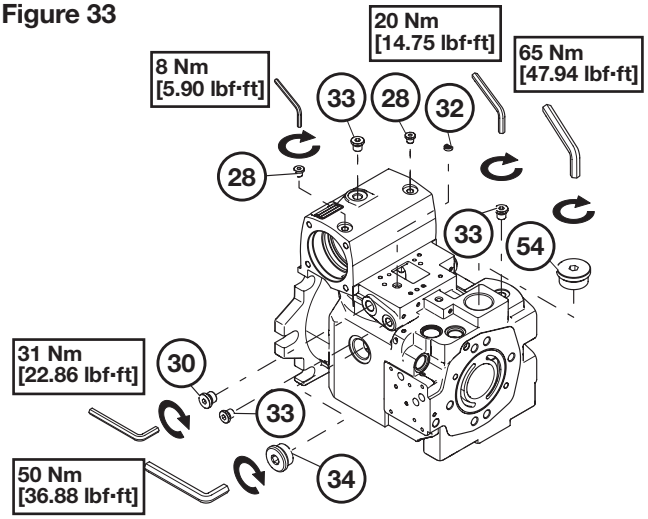


Figure 34

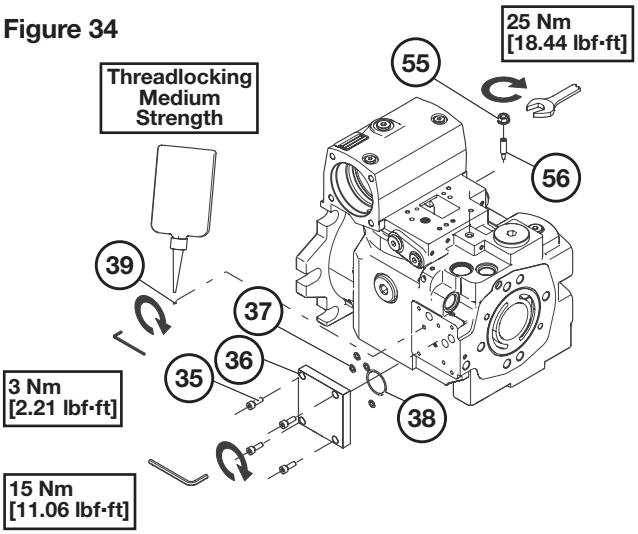


Figure 35

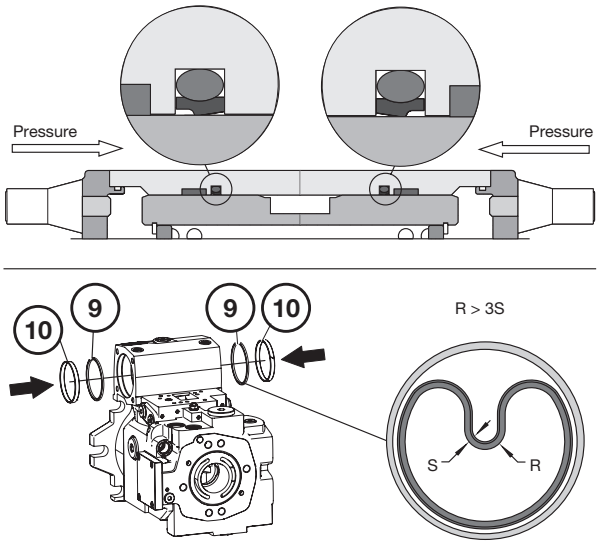


Figure 36

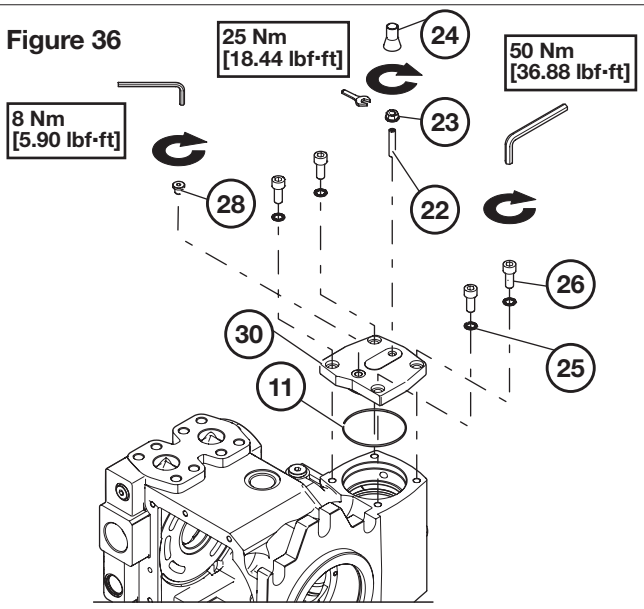
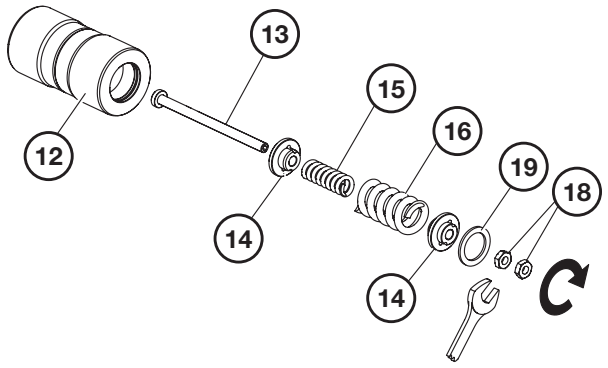
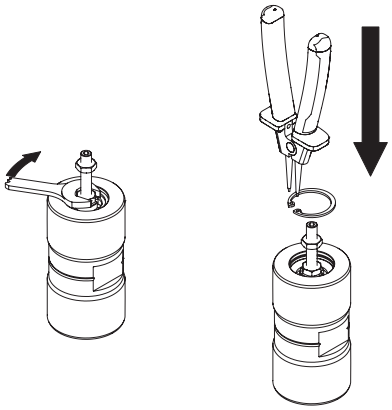


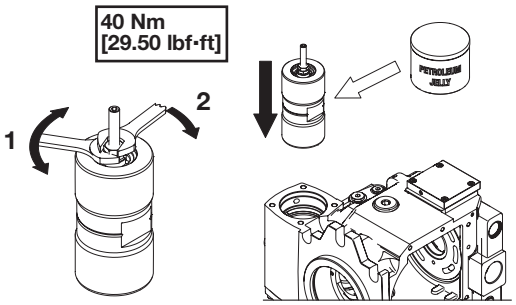
Figure 37





Screw the nut (18) until the seat of the snap ring is completely visible.

Figure 38



Adjustment of the lock nuts: act on the first of the two nuts (18) so as to eliminate all axial float between the various components, then tighten the second lock nut. Insert the piston into the pump housing. Place the milling plane of the piston facing the lower side of the body and as much as possible aligned with respect to the axis. Check the piston is free to move with only the friction due to the seals.

WARNING:
When inserting the piston, one can gently tap on the end of it by the means of a plastic hammer. Do not use steel hammers.

Figure 39

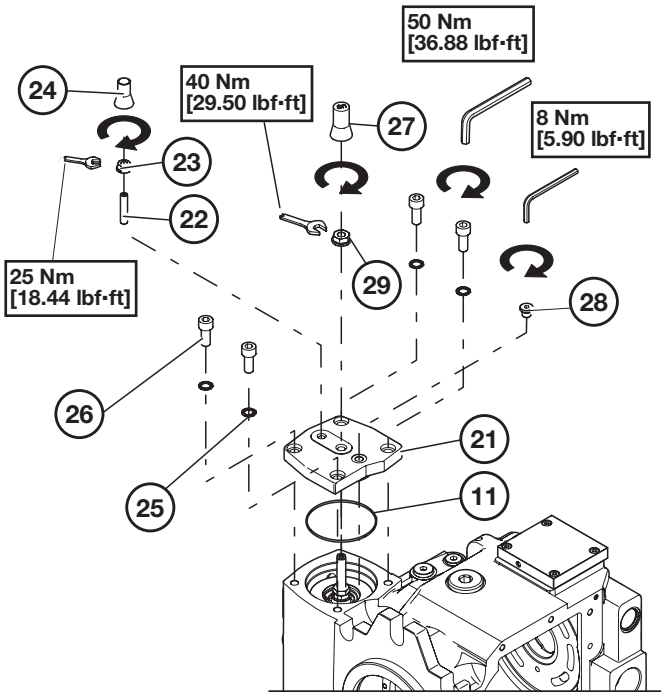
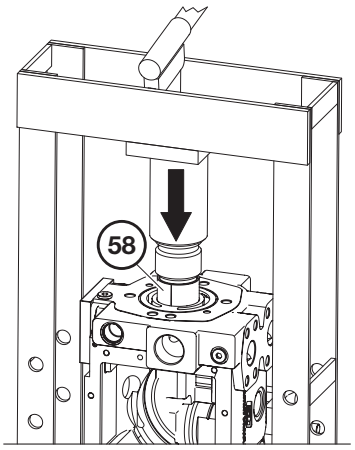
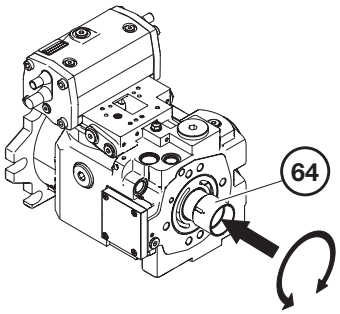


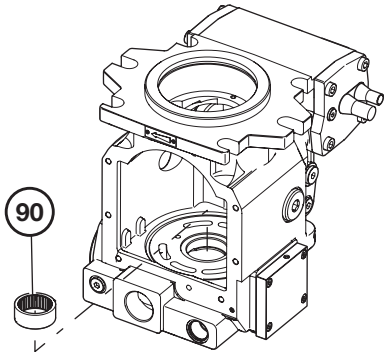
Figure 40





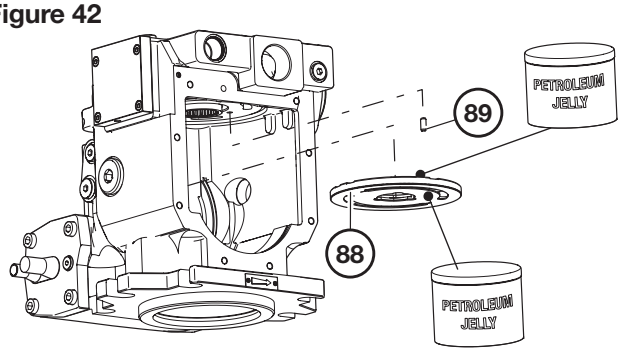
Insert the bushing (58) by the means of a press keeping it squared with the flat and aligned to the seat of the pump housing. Once inserted verify that the coupling (64), slides freely inside the bushing (58).

Figure 41



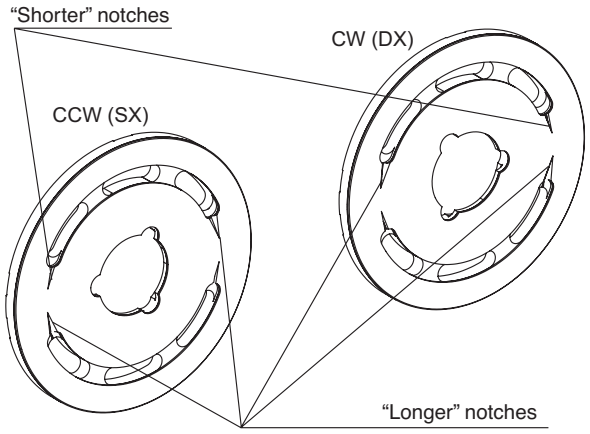
Check the status of the needle bearing (90) before mounting.

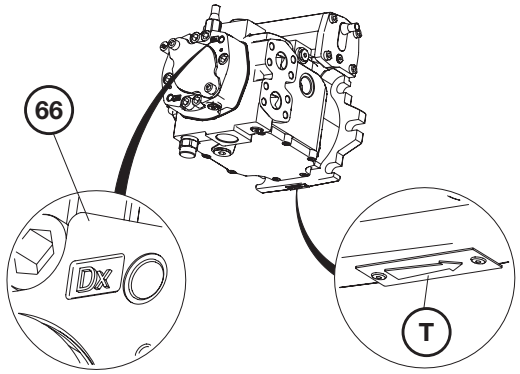
Figure 42



Make sure there are no dents or burrs on the surface of the valve plate. See explanations mounting of the valve plate (88) in *Fig.43* and *Fig.44*.

Figure 43

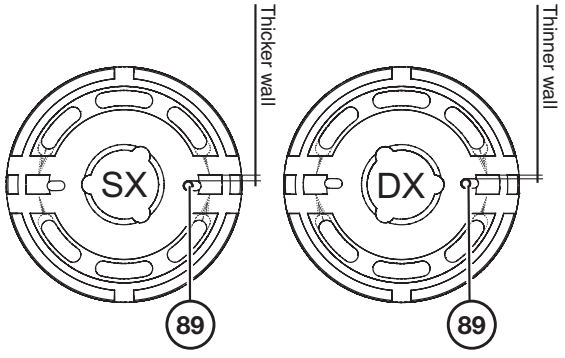




When mounting the valve plate (88), before installation, check if it is CCW (SX) for pumps left, or CW (DX) for pumps right. The direction of rotation is indicated in the gerotor pump housing (66) or in the direction plate (T) on the underside of the housing pump.

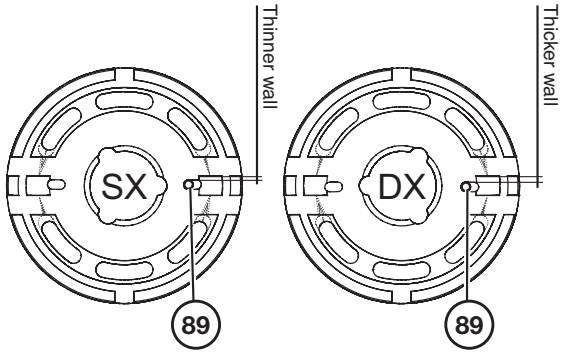
Figure 44

Versions with A-B-C-D-E-F-G-H control – and with J/K control with setting torque >= 400Nm [295 lbf·ft].



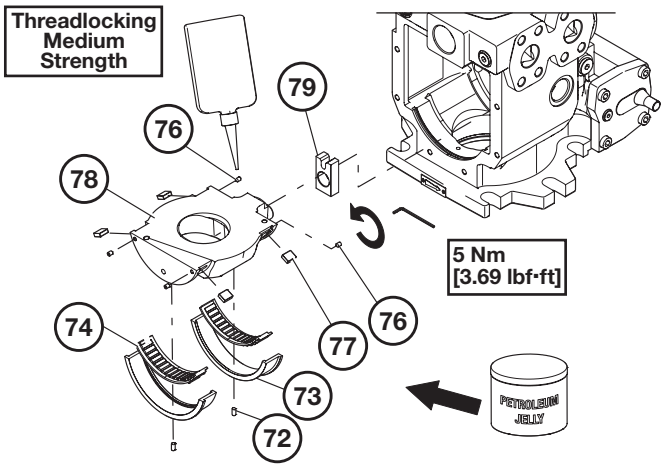
CCW (SX): The thicker wall is in correspondence with the "shorter" notch on the other side of the valve plate.
CW (DX): The thinner wall is in correspondence with the "longer" notch.

Version with J/K control (Automotive) with setting torque < 400Nm [295lbf·ft].



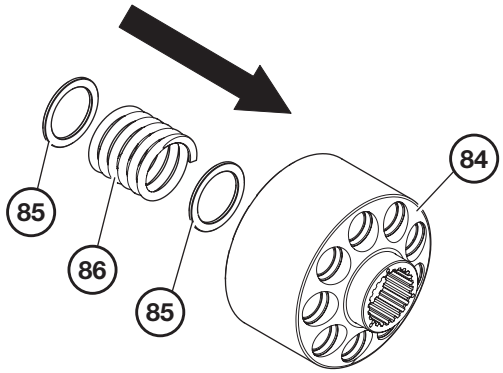
CCW (SX): The thinner wall is in correspondence with the"shorter" notch on the other side of the valve plate.
CW (DX): The thicker wall is in correspondence with the "longer" notch.

Figure 45



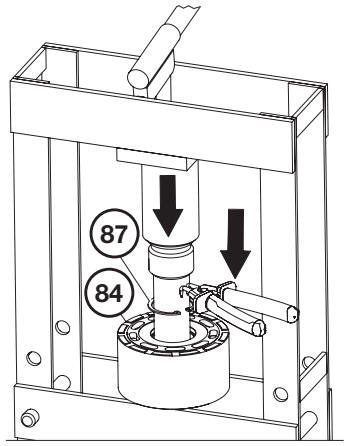
During assembly verify that the swash plate (78) rests correctly on the needle bearings (74).

Figure 46



Pre-mounting the rotating group, with the components indicated in the figure.

Figure 47



Compress the internal spring of the rotating group (84) through a press so that you can insert the snap ring (87).

WARNING:
Assembly subjected to elastic load. Make sure you have correctly installed the snap ring before removing the rotating group from the press.

Figure 48

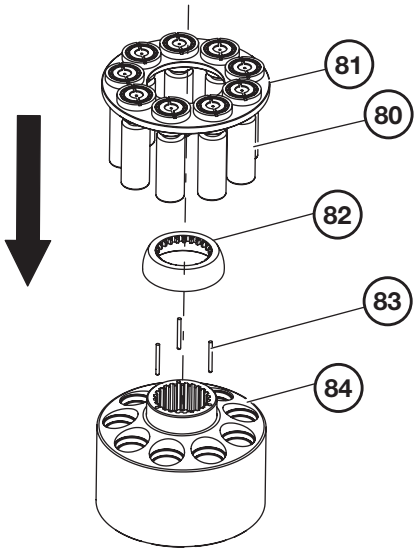
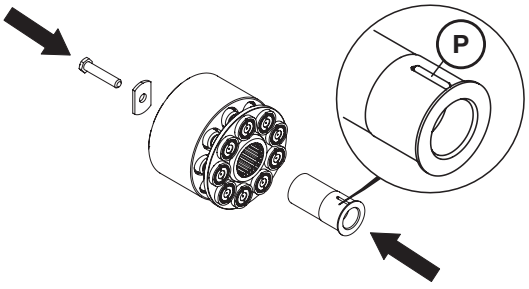


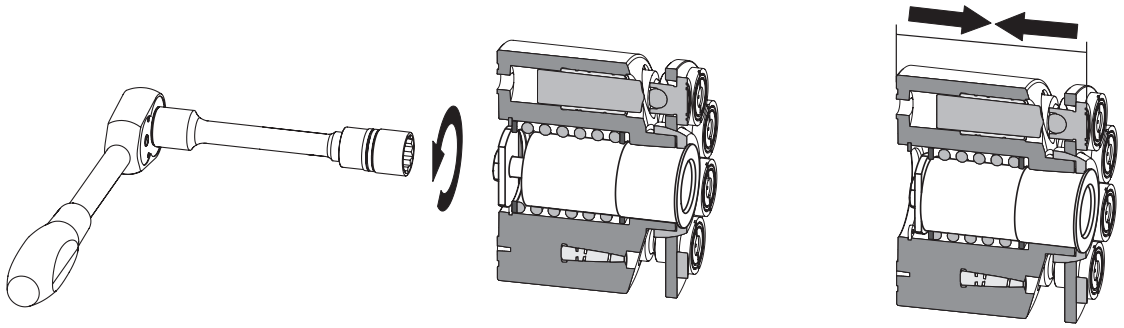
Figure 49



Insert the tool kit assembling/disassembling rotating group (S2F-20046-5). Insert the pin (P) to maintain the splines aligned. Secure it with grease.

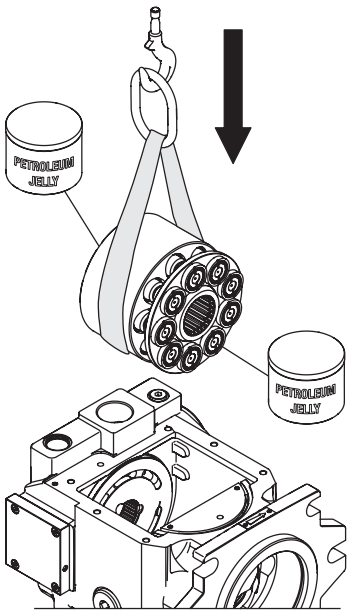
Note:
Always use the proper equipment. Place the slot (P), always facing upward to prevent it from falling into the pump during assembly procedure.

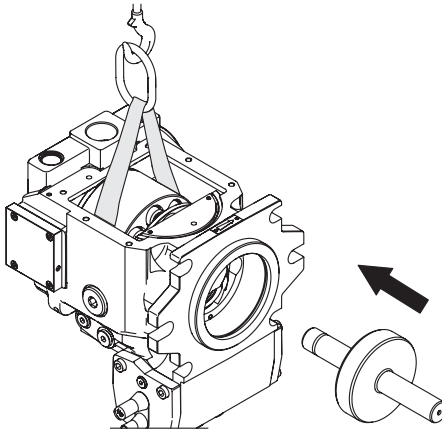
Figure 50



Tighten the screw of the tool kit to the stop.

Figure 51

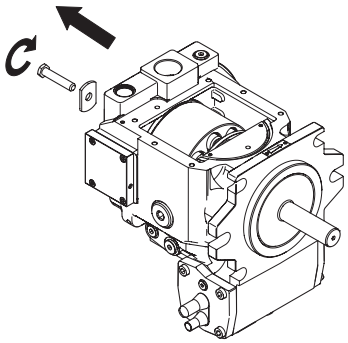


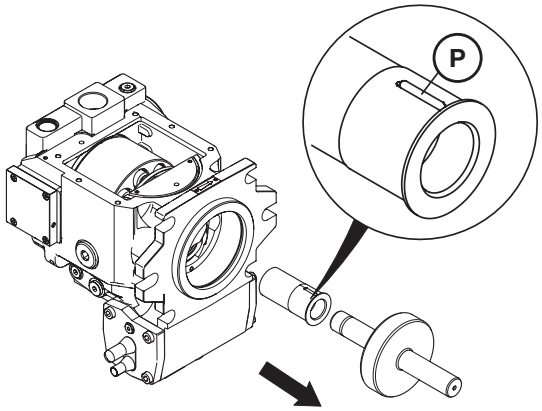


Insert the rotating assembly into the pump body by a sling, and align it with the centering tool of the kit (S2F-20046-5).

Note:
Pay attention to the pistons, which can exit from their bores and become entangled in the swashplate.

Figure 52

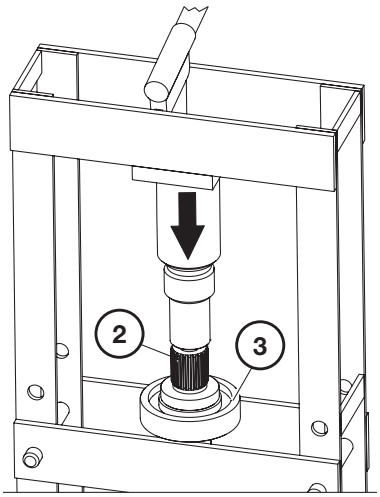




Remove the tool kit assembling/disassembling rotating group (S2F-20046-5).

Note:
Be very careful, when removing the tool kit, not to drop the pin (P).

Figure 53



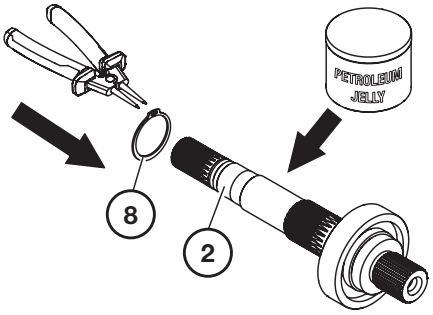
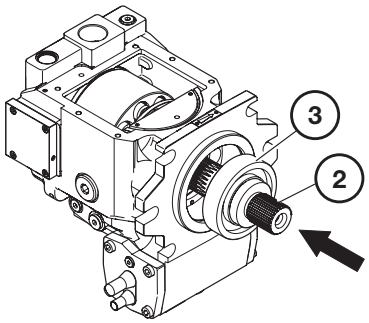


Figure 54



Before inserting the shaft make sure that the cylinder block and its components are aligned with the housing pump.

Figure 55

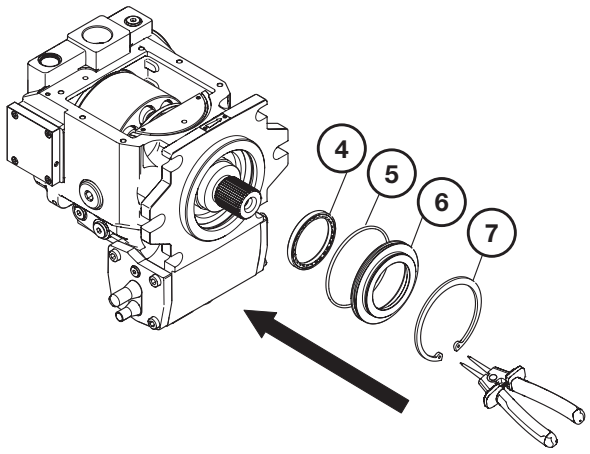


Figure 56

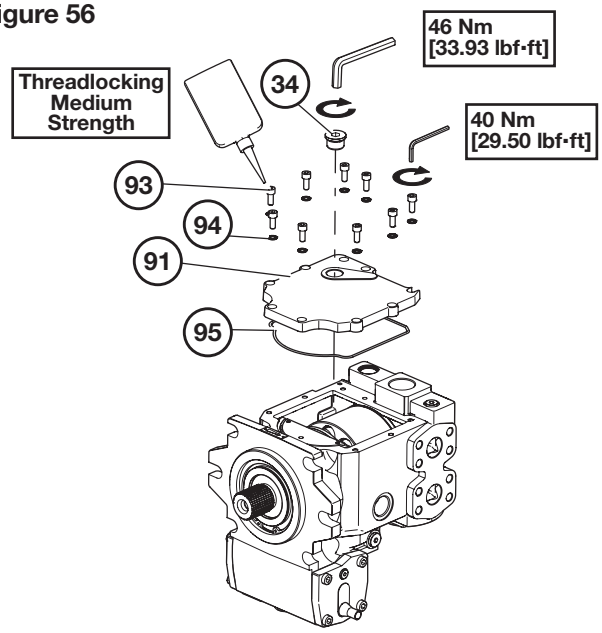


Figure 57

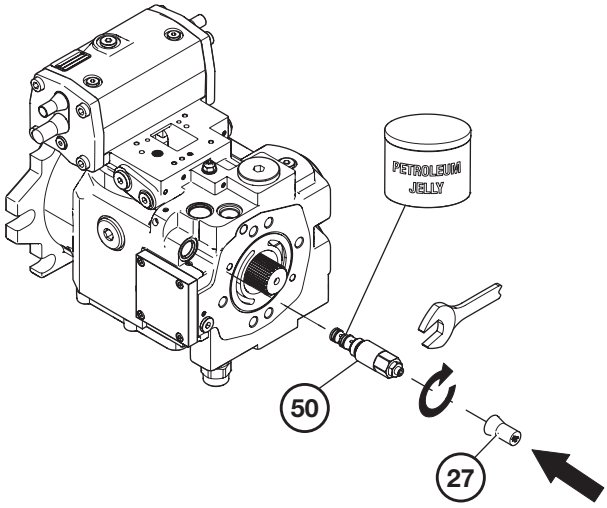


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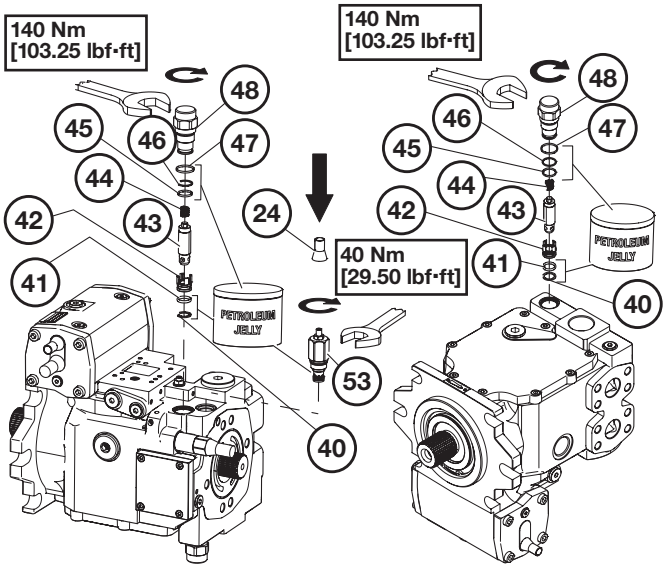
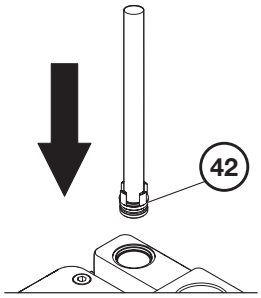
Figure 58

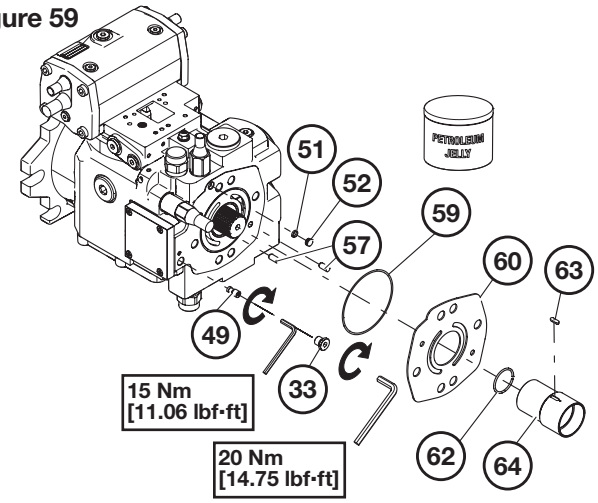




Insert the seat (42) with a cylindrical rod of soft material (eg: bronze or Teflon) to avoid damaging the sealing region of the seat.

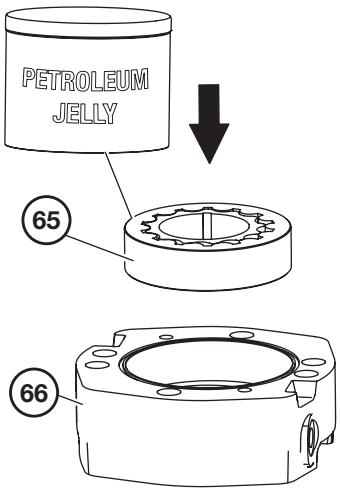
Note:
Handle with care to avoid damage to the valves. Always check the condition of the O-ring. Grease the O-ring before installing the valve.

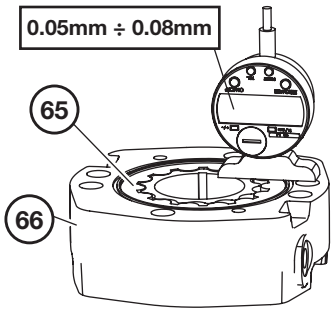
Figure 59



Note:
Always check the condition of the O-ring, may not have any cuts or bruises.

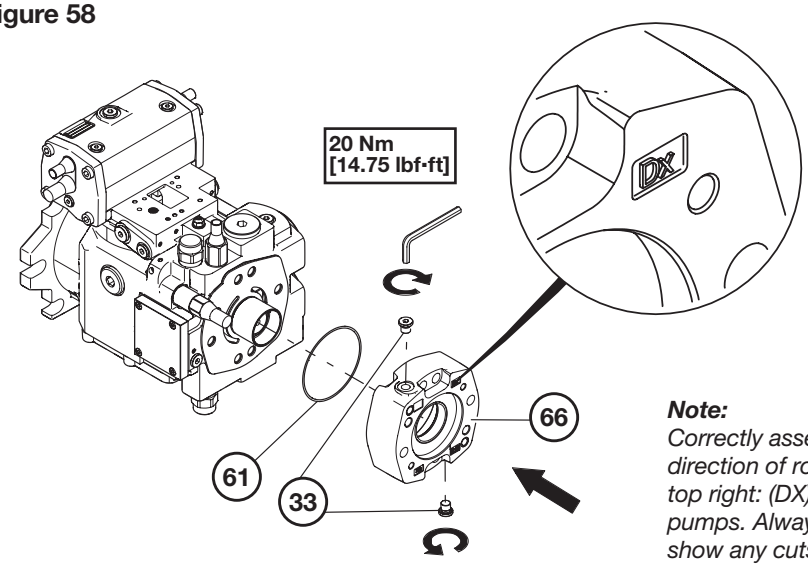
Figure 60





After the insertion of the gerotor (65), with a micrometer, check that the height difference between the boost pump casing (66), and the gerotors (65) falls within the tolerances described in figure. Take the measurement at various points. If the measurement is not within the parameters described, you must adjust the height of the gerotor (65) or of the body (66) by lapping or with very fine sandpaper fixed on a flat plate.

Figure 58



Note:
Correctly assemble the body (66) according to the direction of rotation of the pump. Place the letters at the top right: (DX) for CW pumps, or (SX) for pumps CCW pumps. Always check the condition of the O-ring: it must not show any cuts or dents.

Figure 62

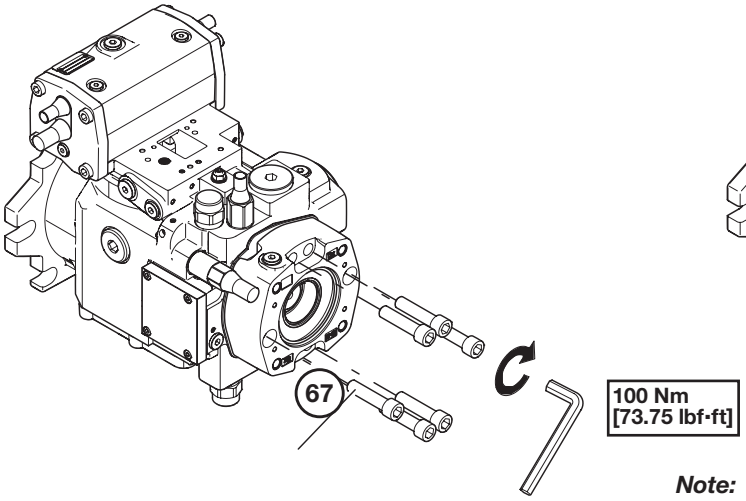
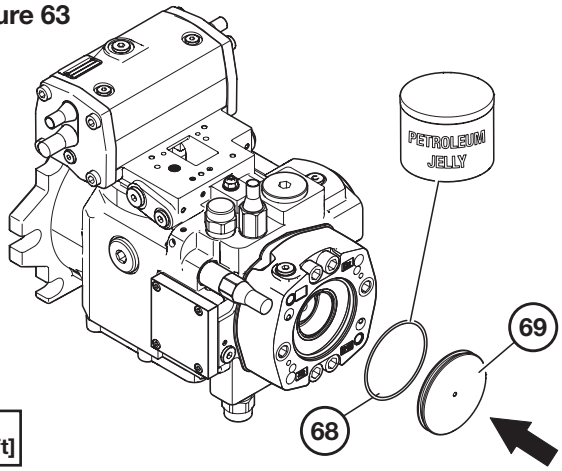
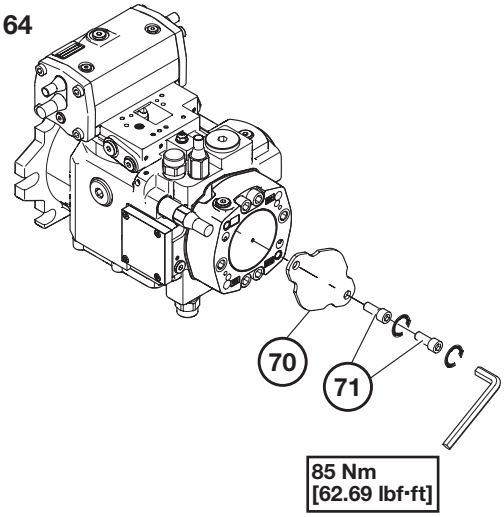


Figure 63



Note:
Always check the condition of the O-ring: it must not show any cuts or dents.

Figure 64



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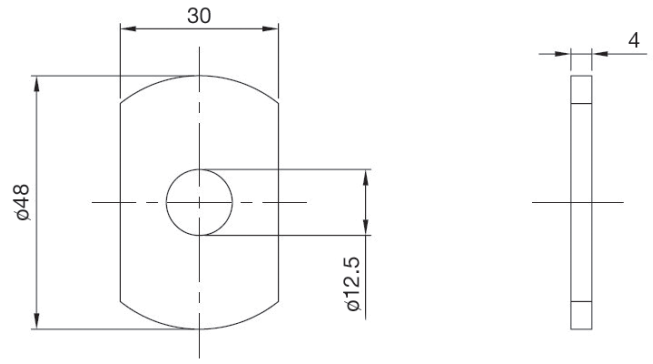
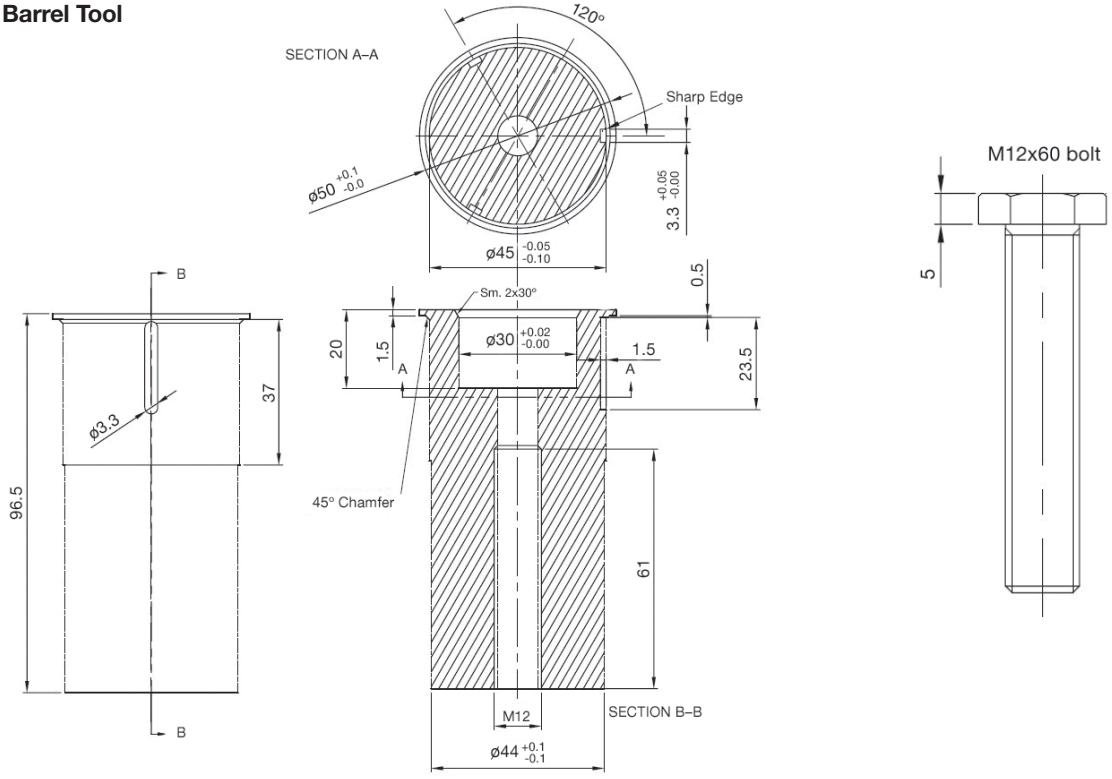
Compression Washer

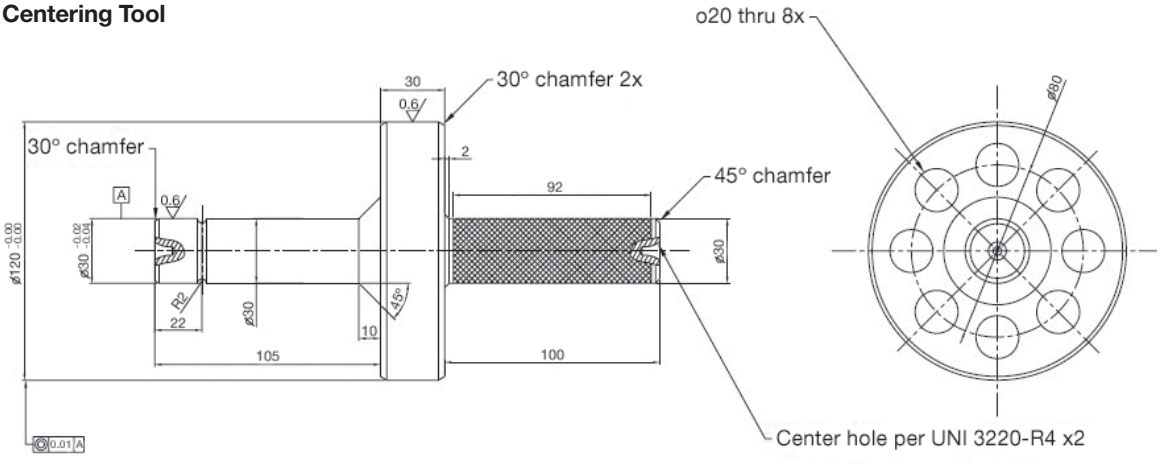


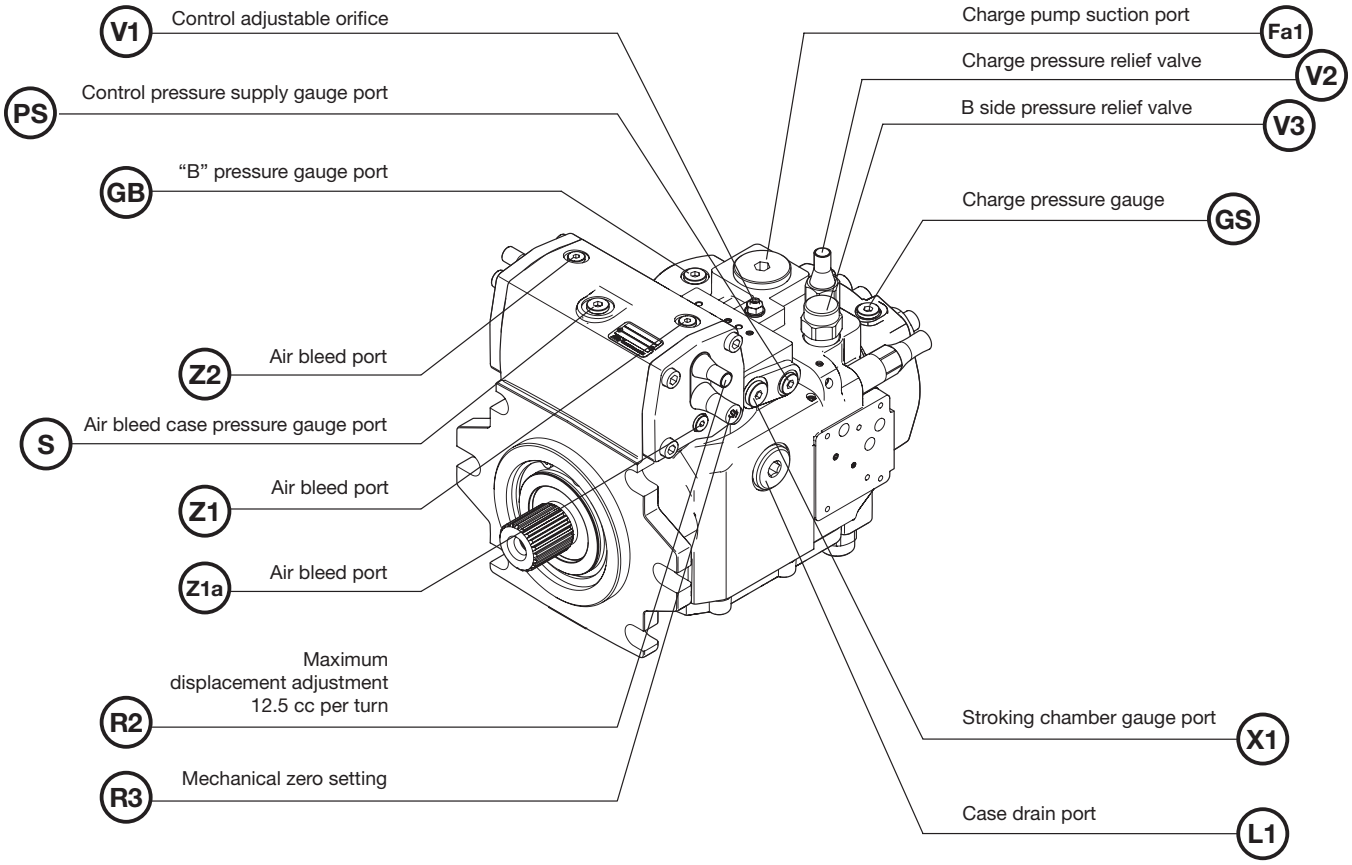
It is suggested that you have the S2F-20046-5 rotating group removal kit available when performing disassembly and assembly of the C series pumps. This tool is available from your Parker representative. The detailed drawings are provided as a reference.

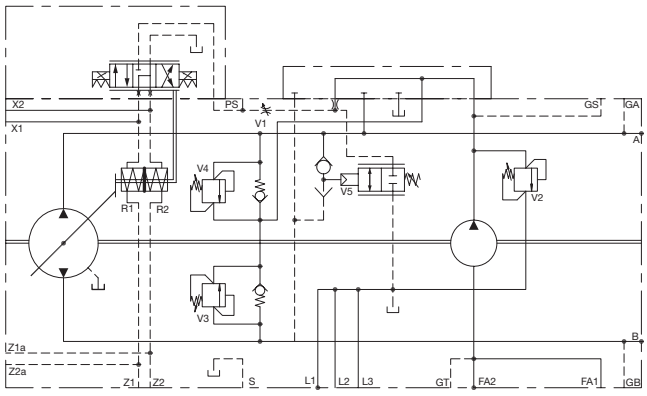
Barrel Tool



Centering Tool







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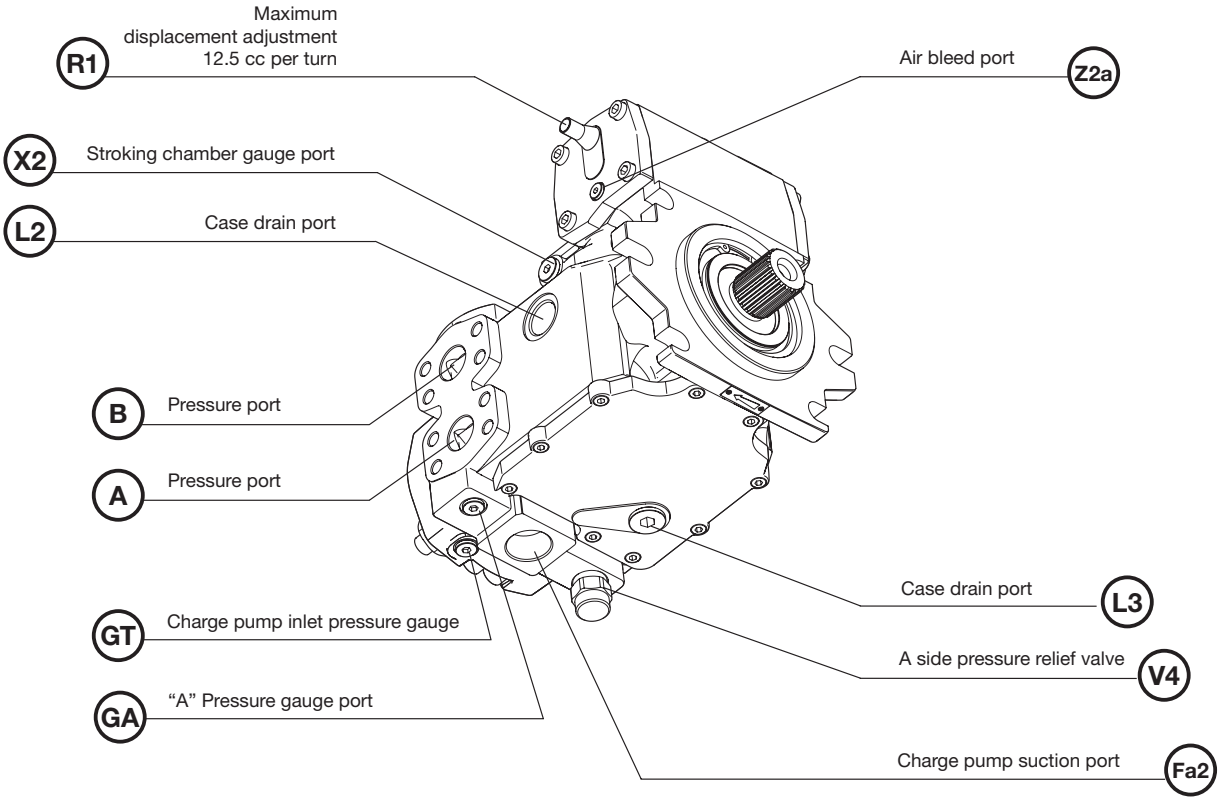
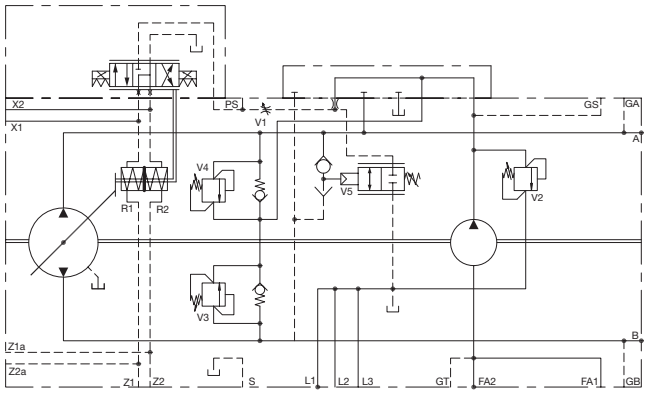

R1
Maximum displacement adjustment 12.5 cc per turn
X2
Stroking chamber gauge port
L2
Case drain port
B
Pressure port
A
Pressure port
GT
Charge pump inlet pressure gauge
GA
"A" Pressure gauge port
Air bleed port
Z2a
Case drain port
L3
A side pressure relief valve
V4
Charge pump suction port
Fa2


X2
X1
PS
V1
GS
GA
A
V4
V5
V2
R1
R2
V3
B
Z1a
Z2a
Z1
Z2
S
L1
L2
L3
GT
FA2
FA1
GB

Suggested gauges
P1 & P2 = 0-25 bar (0-365 PSI)
GS = 0-60 bar (0-870 PSI)
GA & GB = 0-600 bar (0-8700 PSI)

Setting Charge pressure relief valve (V2)
Insert 60 bar (870 PSI) pressure gauge into port GS. Check to ensure test stand and pump rotations are correct and bring prime mover up to 1000 RPM, run until oil temperatures are greater than 68°C (20°F). Loosen charge relief lock nut and adjust CW to increase pressure or CCW to reduce pressure. Once completed, torque nut to 40 N-m (29 ft-lb).

Setting mechanical Pressure override (override option P)
Insert gauges into Ports GA, GB. Ensure test stand and pump rotations are correct and bring unit up to operating speed.

Loosen POR valve lock nut and operate control to 30-40% of maximum flow. Slowly increase load until POR valve activates. Adjust POR valve adjustment CW to increase setting and CCW to reduce setting. Tighten lock nut to 40 N-m (29 ft-lb). Reduce load to ensure pump flow is returned to the circuit and then increase load until POR activates and ensure setting has not changed. Run for 10-15 seconds to ensure no pressure oscillations are occurring when the POR is active. Repeat test in opposite flow directions to ensure setting is unchanged.

Centering of the pump servo piston
Insert gauges into Ports GA, GB. Ensure test stand and pump rotations are correct and bring unit up to operating speed.

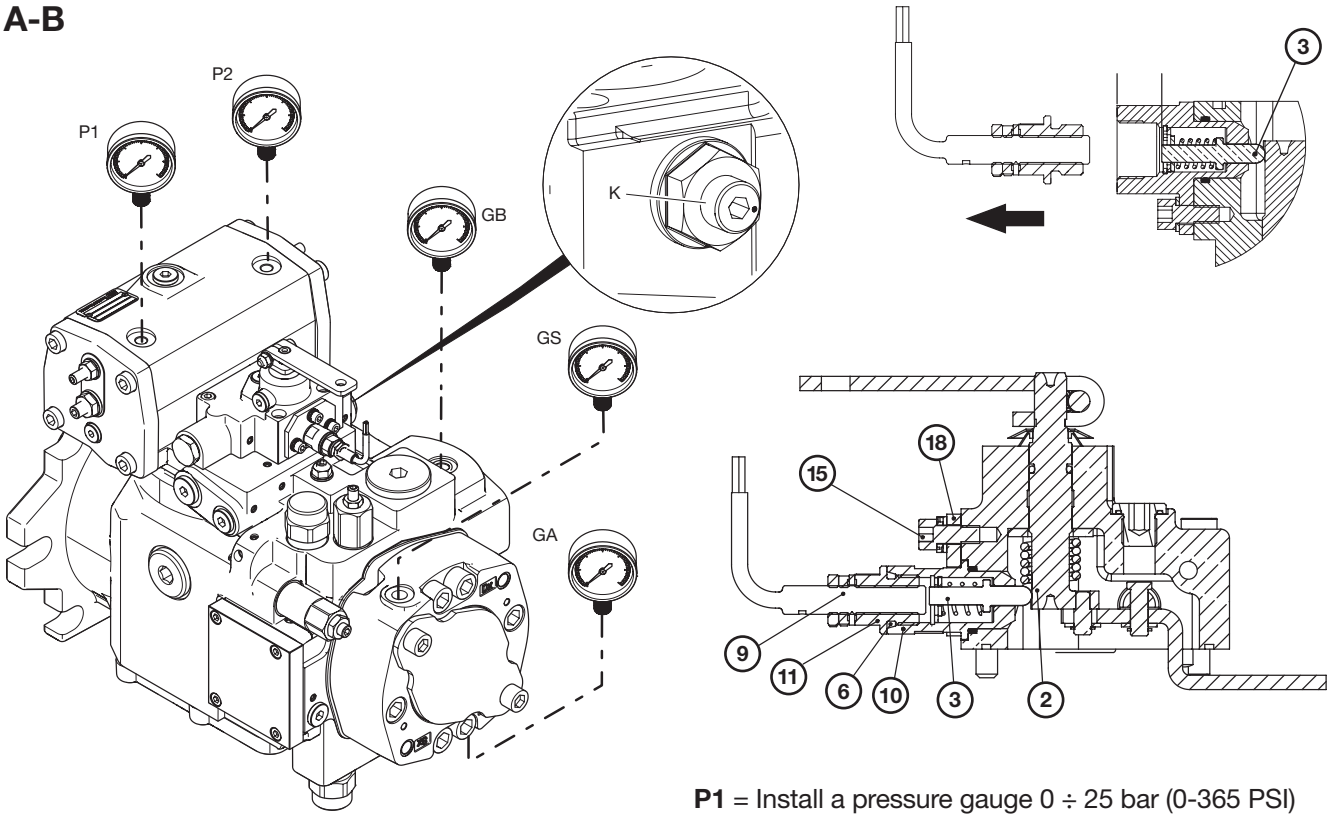
Loosen lock nut and screw variable control orifice V1 closed (do not over tighten) to cut off oil supply to pump displacement control. Remove plug from port PS to ensure no pressure is being delivered to the controller. Loosen the lock nut on R3 and adjust the screw while observing the gauges in Port GA and GB. Stop turning the adjustment when pressure starts to raise in GA or GB, then reverse the direction of the adjustment until pressure in GA and GB are the same. Note the position of the adjustment.

Continue adjusting R3 in opposite direction until pressure increases in opposite gauge. Turn adjustment back until pressure is the same in both ports. Note this position.

With both positions noted, turn the adjustment to a position halfway between the two positions and tighten the R3 lock nut to 40 N-m (29 ft-lb).

Adjust variable control orifice back open and tighten lock nut to 15 N-m (11 ft-lb).

A-B



P1 = Install a pressure gauge 0 ÷ 25 bar (0-365 PSI)
P2 = Install a pressure gauge 0 ÷ 25 bar (0-365 PSI)
GS = Install a pressure gauge 0 ÷ 60 bar (0-870 PSI)
GA = Install a pressure gauge 0 ÷ 600 bar (0-8700 PSI)
GB = Install a pressure gauge 0 ÷ 600 bar (0-8700 PSI)
K = Setting screw for zero setting

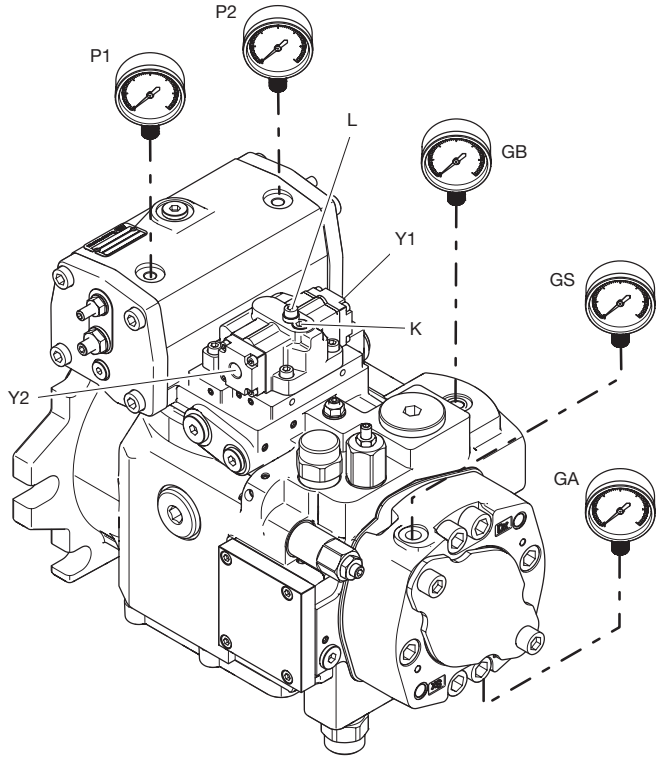
Hydraulic zero-setting of the controls A-B
Plug the pressure gauges P1-P2 and check the pressure on the servopiston sides: max Δp accepted = 1 bar (14.5 PSI). Set this value within this range adjusting the screw (K). At the rotation speed of normal use, Swivel the pump to maximum displacement, via the control lever, then suddenly release the lever: the pump must swivel back to zero flow within 2 seconds. Repeat the procedure for both flow directions: there must be no significant difference between the two flow directions (equal pressure on GA and GB, max. 2-3 bar differential) (30-40 PSI). If this should occur, act on the control hydraulic zero-setting screw (K) unblocking the screw for eccentric fixing, turning them in order to restore the control zero-setting, until the proper control operation is achieved.

Check the control operation repeating procedure as described above in both the flow directions. The pump must always restore the zero flow position.

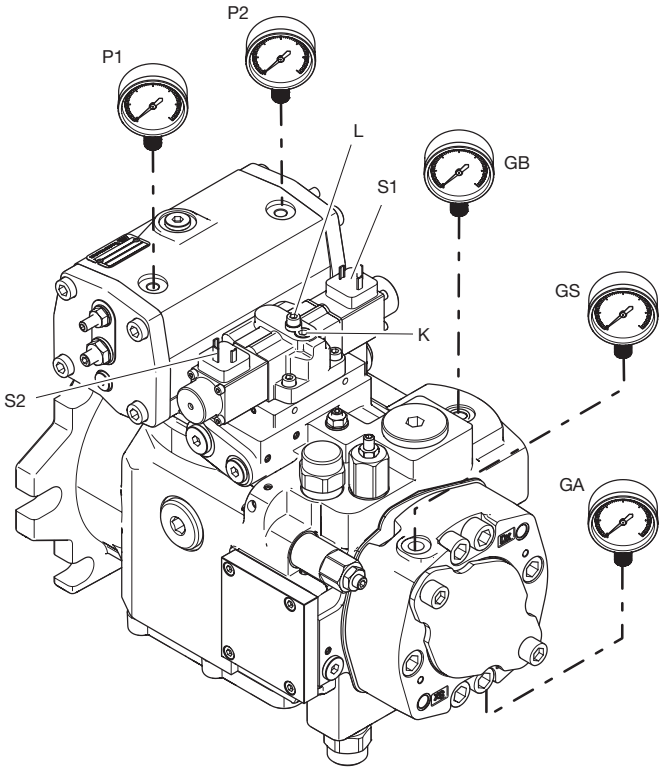
Only for B control, after the mechanical and hydraulic zero-setting

1. Remove sensor with its plug to expose piston (3). With the proper tool, (depth gauge) identify the deepest point and place it at the max. depth by rotating the eccentric sleeve (10).
2. Hold the sleeve (10) into the above position with the screws (15), but don't tighten them. Assembly sensor seat (11) with the O-Ring (6) on sleeve (10). Screw sensor (9) until is in contact with piston (3). Do not force it. Unscrew sensor (9) 1 and a half turns, or until led switches off. When led switches off unscrew sensor another quarter of turn.
3. Screw nuts M8x1 with torque 5 Nm (3.5 ft-lb).
4. Be sure that the sleeve (10) can turn to be adjusted. If not, unscrew without removing the screws (15).
5. Move the lever (2) in both directions and check the right behavior of the device. If the setting is not correct, repeat from point 2.
6. Once the setting has been proved correct, tighten the screws (15) with 6 Nm torque (4.5 ft-lb).

C

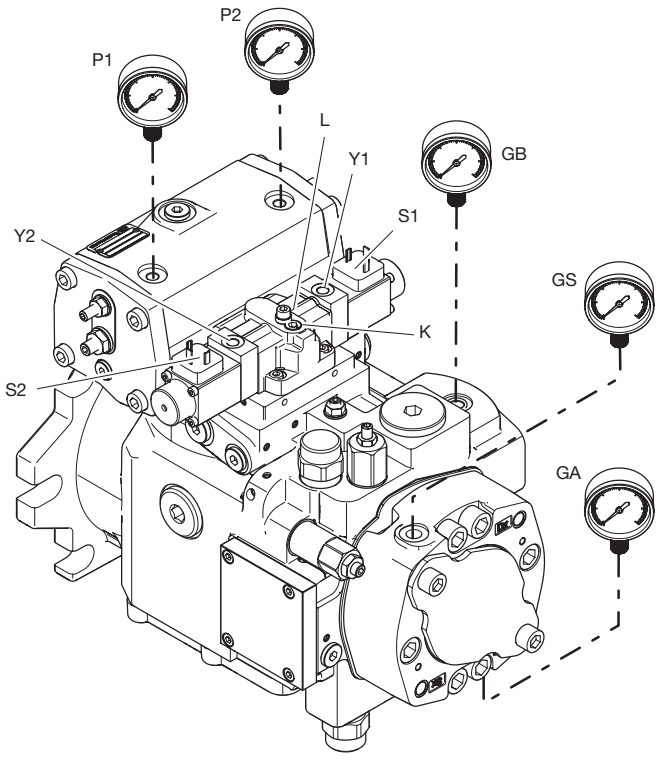


F



P1 = Install a pressure gauge 0 ÷ 25 bar (0-365 PSI)
P2 = Install a pressure gauge 0 ÷ 25 bar (0-365 PSI)
GS = Install a pressure gauge 0 ÷ 60 bar (0-870 PSI)
GA = Install a pressure gauge 0 ÷ 600 bar (0-8700 PSI)
GB = Install a pressure gauge 0 ÷ 600 bar (0-8700 PSI)
S1/S2 = Input electrical signal
Y1/Y2 = Hydraulic input signal
K = Setting screw for zero setting
L = Locking screw of screw “K”

H



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Hydraulic zero-setting of the controls C-F-H
Plug the pressure gauges P1-P2 and check the pressure on the servopiston: max Δp accepted = 1 bar. (14.5 PSI) Set this value within this range adjusting the screw (K).

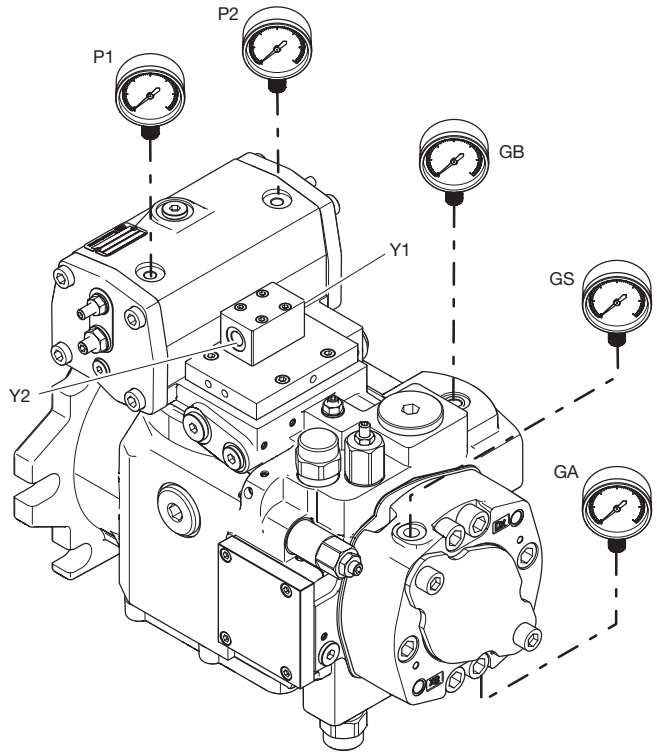
At the rotation speed of normal use, Swivel the pump to maximum displacement, via the Hydraulic control (C) or electric control (F-H), then suddenly release the said input command: the pump must swivel back to zero flow within 2 second. Repeat the procedure for both flow directions: there must be no significant difference between the two flow directions (equal pressure on GA and GB, max. 2-3 bar differential) (30-45 PSI).

If this should occur, act on the control hydraulic zero-setting screw (K) unblocking the screw (L) for eccentric fixing, turning them in order to restore the control zero-setting, until the proper control operation is achieved.

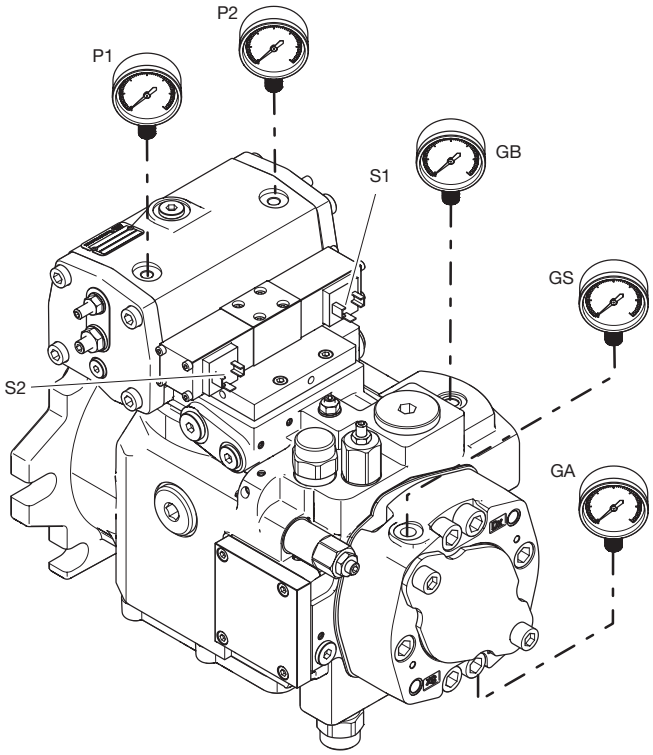
Check the control operation repeating procedure as described above in both the flow directions. The pump must always restore the zero flow position.

Alternative supply current to the solenoids S1-S2 (or pressure to Y1-Y2): check the current (or pressure) of the control start and the max flow value with and without load. If the parameters do not fall within the expected values, check the hydraulic zero.

D



G



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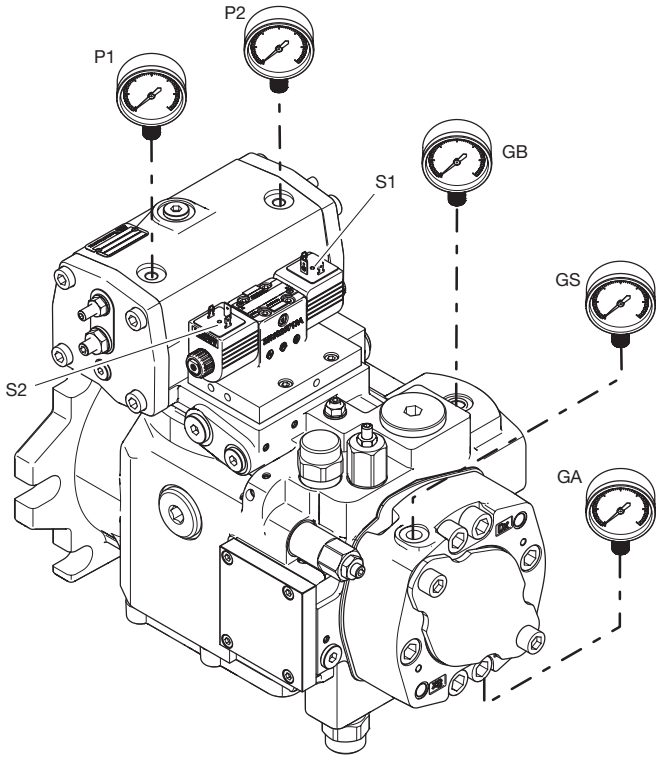
S1/S2 = Input electrical signal
Y1/Y2 = Hydraulic input signal
K = Setting screw for zero setting
L = Locking screw of screw “K”

Check for correct operation controls D-G-E
Feed voltage/current to solenoids S1-S2 (or feed pressure to Y1-Y2) to check the current (or pressure) of the control start and the max flow with and without load. If the parameters do not fall within the expected values the control or the pump must be checked for damage or wear.

E



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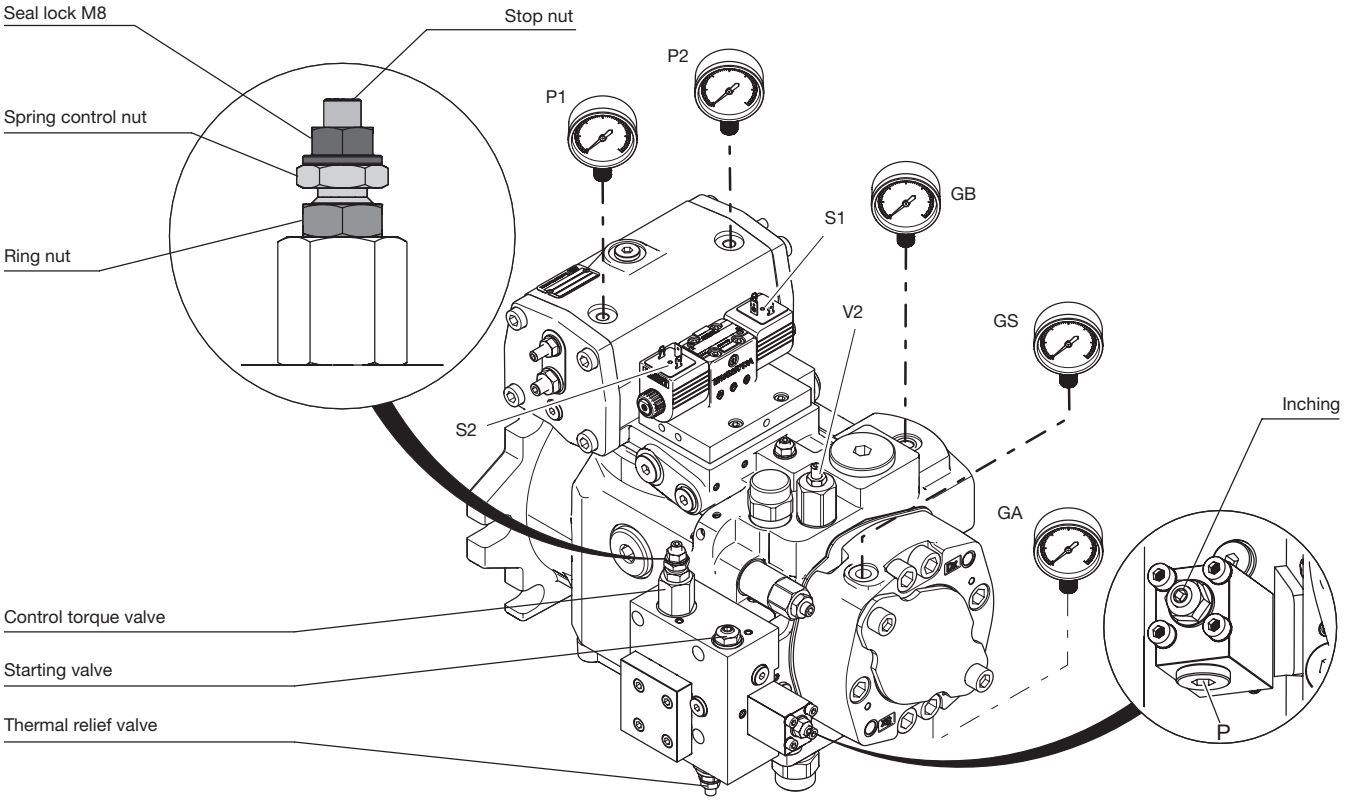
S1/S2 = Input electrical signal
Y1/Y2 = Hydraulic input signal
K = Setting screw for zero setting
L = Locking screw of screw “K”

Alternately activate solenoids S1-S2 to check proper functioning of the “ON-OFF” control

J/K



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GB = Install a pressure gauge 0 ÷ 600 bar (0-8700 PSI)
V2 = Adjusting the boost pressure
S1/S2 = Input electrical signal
Y1/Y2 = Hydraulic input signal

Introduction
This procedure requires that the control is mounted on the pump and the pump is installed in the machine or in the Test Rig.

Setting Instructions Automotive Controls
To test Automotive Control. Set engine speed to 1000 RPM. Unscrew nut on starting valve – screw clockwise the starting valve screw fully in.

Set charge pressure relief valve to 22 bar (320 PSI).

Unscrew nut on inching valve. Screw clockwise the setting screw fully in, then adjust it out (counter-clockwise), one and a half turn.

Lock the nut of inching valve to 25 Nm Torque (18 ft-lb).

Unscrew nut on thermal relief valve and clockwise turn its setting screw fully in. Lock the nut of thermal relief valve to 25 Nm Torque.

Unscrew the ring nut and the stop nut (loose seal lock M8) on torque valve. Screw clockwise control nut fully in, and then screw clockwise stop nut adjuster fully in (be careful not to over-torque it).

Run the pump at the required starting speed request. Supplying one of the input signals of the automotive control.

Unscrew (counter-clockwise) the starting valve adjuster until the pump starts to go into stroke (no more than 8-10 l/min [2.25 GPM]).

Then lock the starting valve nut to 25 Nm torque (18 ft-lb).

Verify how many RPM are needed to reach full pump stroke (400 – 550 RPM).

Keep pump's RPM constant at maximum torque setting value. On torque valve, unscrew the stop nut adjuster 4 turns and lock seal-lock M8 nut to 25 Nm torque (18 ft-lb).

Increase working pressure until the pump reaches torque setting.

Unscrew control nut until pump flow starts to decrease, do not move stop nut adjuster. Screw ring nut to 20 Nm torque (15 ft-lb).

Verify pump's torque curve changing the working pressure. If pump displacement decreases too quickly, loosen seal lock of stop nut and screw (clockwise) in, if necessary. Then lock the seal lock of stop nut to 25 Nm torque (18 ft-lb).

Inching Check (Pump at Max Speed and in FW Or REV)
- **Mechanical Inching:** verify that rotating the lever to full stroke, the pump flow goes to zero.
- **Hydraulic Inching:** verify that putting 15 bar (218 PSI) on inching port the flow goes to zero.

Control Setting Values							
			Opening Screw Restrictor (V1) (Turns)	**Minimum Value Of Piloting Pressure On Starting**	**Maximum Value Of Piloting Pressure On Starting**	**Minimum Value Of Piloting Pressure On Finish**	**Maximum Value Of Piloting Pressure On Finish**
A	Manual lever control with feedback	–	1	–	–	–	–
B	Manual lever with feedback with neutral position micro switch	–	1	–	–	–	–
C	Hydraulic proportional with feedback	(*)	1	5 bar	7 bar	16 bar	19.5 bar
D	Hydraulic proportional without feedback	(*)	–	5 bar	7 bar	12 bar	15 bar
F	Electric proportional with feedback	24V (*)	1	180 mA	240 mA	540 mA	660 mA
		12V (*)	1	360 mA	460 mA	1080 mA	1320 mA
G	Electric proportional without feedback	24V (*)	1	235 mA	365 mA	585 mA	715 mA
		12V (*)	1	470 mA	730 mA	1170 mA	1430 mA
E	Electric on/off		1	–	–	–	–
H	Electric proportional with feedback, with hydraulic emergency override	24V (**)	1	180 mA	240 mA	540 mA	660 mA
		12V (**)	1	360 mA	460 mA	1080 mA	1320 mA

**Max case pressure: 1 bar*
***Testing functionality hydraulic emergency*

Troubleshooting Matrix	
Symptom	**Possible Causes**
Pump not operating in either direction	Low fluid level in reservoir
	Charge pump suction line plugged or disconnected
	Cross port relief damaged
	Wrong input rotation
	Command to pump control may be faulty
	Damaged actuator
Symptom	**Possible Causes**
Pump operates sluggish or generates erratic movement	Low fluid level in reservoir
	Charge pump suction line restricted
	Improper charge pressure, check charge relief
	Command to pump control may be faulty
	Damaged actuator
Symptom	**Possible Causes**
Transmission operating hot	Heat exchanger improperly sized
	Heat exchanger damaged/plugged
	Excessive operation over cross port reliefs
	Cross port relief damaged
	Actuator damaged/bypassing fluid
	Low fluid level in reservoir
Symptom	**Possible causes**
Excessive noise from system	Improper shaft alignment
	Charge pump suction line restricted/cavitation of charge pump
	Low fluid level in reservoir
	Aeration of hydraulic fluid in tank
Symptom	**Possible causes**
Leakage from shaft seal	Case drain pressure too high
	Seal damaged
Symptom	**Possible causes**
High case drain pressure	Drain hose improperly sized
	Drain hose restricted or blocked
Symptom	**Possible Causes**
Slow actuator speed	Prime mover RPM is slow
	Improper charge pressure, check charge relief
	Charge pump suction line restricted
	Oil temperature too high
Symptom	**Possible Causes**
Low actuator output force	Cross port relief damaged
	Cross port relief improperly set
	Actuator damaged
	Oil temperature too high

When diagnosing, it is suggested that you have two 8700 PSI (600 bar) pressure gauges (system pressure), a 870 PSI (60 bar) pressure gauge (charge pressure), a vacuum gauge (charge inlet), tachometer (engine RPM), amp meter (electric motor current draw), and temperature gun (to measure system temperatures).

Parker Hannifin Corporation
Hydraulic Pump and Power Systems Division
United States

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January 2017 Revisions:
Updated model code, miscellaneous typo errors corrected, updated controller kits for Series II control.

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