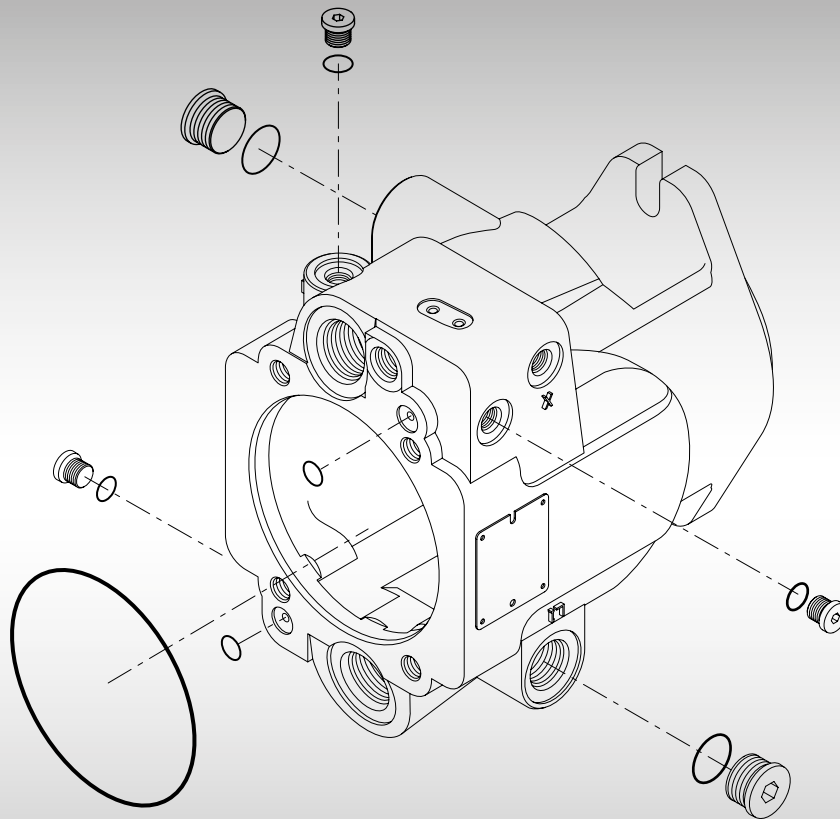




Parts Manual

# Open Circuit Pumps Series 45 Frame H 57 and 75cc




**Contents**

<b>General Information</b>	Service parts identification .....	4
	Nameplate .....	4
	Date code .....	5
	Service bulletins.....	5
	Procedure to identify a part.....	5
<b>Order code</b>	Order code .....	7
<b>Control</b>	Control.....	8-9
<b>Pressure compensating valve</b>	Pressure compensating valve .....	8-9
<b>Orifice</b>	Pilot orifice .....	10-11
	Gain orifice.....	10-11
<b>Input shaft</b>	Shaft .....	10-49
<b>Auxiliary mounting</b>	Auxiliary flange .....	10-49
<b>End cap</b>	End cap.....	10-49
<b>Housing/shaft seal</b>	Housing/shaft seal .....	50-53
<b>Displacement limiter</b>	Displacement limiter.....	54-55
<b>Special hardware</b>	Special hardware .....	56-57
<b>Displacement</b>	Displacement.....	56-57
<b>Seal kit</b>	Overhaul seal kit .....	58



Contents

<b>Service bulletins</b>	
SB-1997-007 (addition of brass sleeve in servo bore) .....	59
SB-1997-008 (adapter pad and radial ported end cap) .....	60
SB-1997-028 (new LB spool).....	61
SB-1997-044 (maximum displacement adjustment screw) .....	62
SB-1998-045 (tamper resistant hardware).....	63
SB-1999-006 ('A' pad auxiliary flange) .....	64
SB-1999-050 (PC cartridge valve) .....	65
SB-2001-026 (end cap and housing interface O-ring) .....	66
SB-2001-028 (piston slipper material) .....	67
SB-2002-022 (load sense adjusting screw).....	68
SB-2002-035 (load sense spring seat) .....	69
SB-2002-036 (bias piston assembly) .....	70
SB-2002-043 (swashplate assembly) .....	71
SB-2002-046 (cylinder block kit and piston assembly) .....	72
SB-2002-051 (piston/slipper assembly and slipper retainer) .....	73
SB-2004-001 (load sense spring guide).....	74
SB-2006-005 (shaft seal).....	75
SB-2008-052 Rev. A (C auxiliary mounting flange).....	76
SB-2011-031 (overhaul seal kit).....	77
SB-2012-020 (displacement limiter) .....	78



## General information

### Service parts identification

The series 45 order code was changed in 2000 with the addition of the 75 cc displacement pump. Previously there were two groups of 57 cc pumps: the 45R057 or 45L057 and the 45RB57 or 45LB57, which have now been combined into the HRR and HRL (H frame), depending on rotation. The H frame includes both the 57 cc and 75 cc displacement pump.

Use this information and procedure to identify the module group, item number, manufacture date, part number, and part name

The parts listed include all parts that may be used when performing either "Minor Repairs," "Major Repairs" or "Conversions" on the H frame open circuit pumps.

### Nameplate

Each unit has a nameplate affixed to its housing. The nameplate includes this information.

#### Model Code

The Sauer-Danfoss model code completely defines the specific unit. Use it when ordering parts to service this product.

#### Model Number

The manufacturing factory uses the Sauer-Danfoss model numbers. On repeat orders, order a complete unit by the model number

#### Serial Number

The Sauer-Danfoss serial number identifies the manufacture date and the unit sequence in the build. The serial number also identifies the units warranty time period.

The letter code indicates the location of original manufacture (assembly). "A" indicates the unit was originally assembled in Ames, Iowa, USA.

The first number (2 digits) indicates the year of manufacture. ("94" would indicate the unit was manufactured in 1994).

The second number (2 digits) indicates the calendar week of manufacture.

The third number (5 digits) is a sequential number used to identify a specific unit.





## General information

### Date code

The date code is the year and week of manufacture. The same item number may list more than one part number. This indicates that there is more than one configuration for that item number. You will see that there are different date codes for the different part numbers. Find the date code of your unit from the nameplate to determine the service part number you need to order.

EXAMPLE: The service part desired is Item C090

Order Code	Item	Date Begin	Date End	Part Number	Part Name	Qty. per Model/Kit
LB	C090	98-02		4570245	Spool	1
	C090	94-34	98-01	4570025	Spool (SB-1995-006)	1

All units using this order code with a date code of 94-34 and up to and including 98-01 must use part number "4570025".

All units with a date code of 98-02 and newer must use part number "4570245".

### Service bulletins

A Service Bulletin Number (SB-\_\_\_\_-\_\_\_\_) may follow the "Part Name" of the part you desire. You must read that Service Bulletin before ordering that part. The information contained in these Service Bulletins, as of the print date of this bulletin, are at the end of this manual. Service Bulletins contain more detailed information, such as: interchangeability, what additional parts are involved, etc. We suggest that you add additional Service Bulletins to this manual as you receive them.

### Procedure to identify a part

#### General

The modular design of Series 45 units results in a simplified service parts list and part number identification procedure. The same item numbers are used for same part names on all units within a product type. (Example: The lip seal - Item K020 has the same item number on all pumps.)

A part number that has another number following it in parentheses makes this a world wide manual. The first number is sold in Germany. The number in parentheses is sold in the United States. (Example: 016014 (9006200-0206); customers would order 9006200-0206 if ordering the part in the United States.)

#### Example of a Part Identification

The nameplate on a Series 45 pump has an Order Code of HRR 057B LS 25 20 NN A 1 S1N4 A1N NNN NNN NNN. Do this to determine the part number of the drive shaft used on this pump.

1) Referring to the input shaft module in the Order Code (see page 7), the input shaft option for this pump is identified by the code "S1N4". (HRR 057B LS 25 20 NN A 1 **S1N4** A1N NNN NNN NNN)

2) Referring to the Service Parts List, find the shaft group.

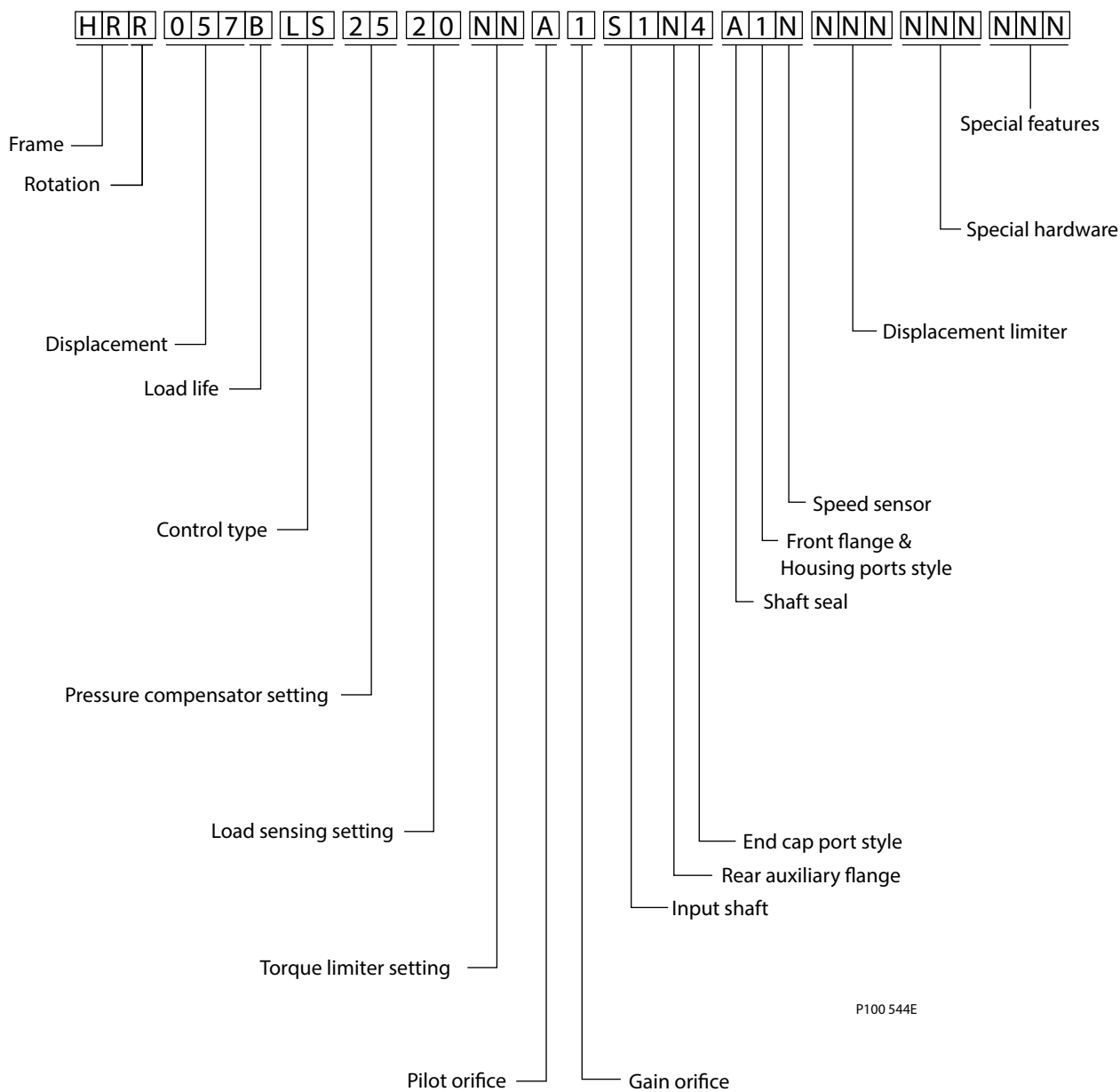
3) Next find the order code that relates to this unit, which is "S1N4". The shaft is found to be item J010 and part number 4570081.



**Notes**



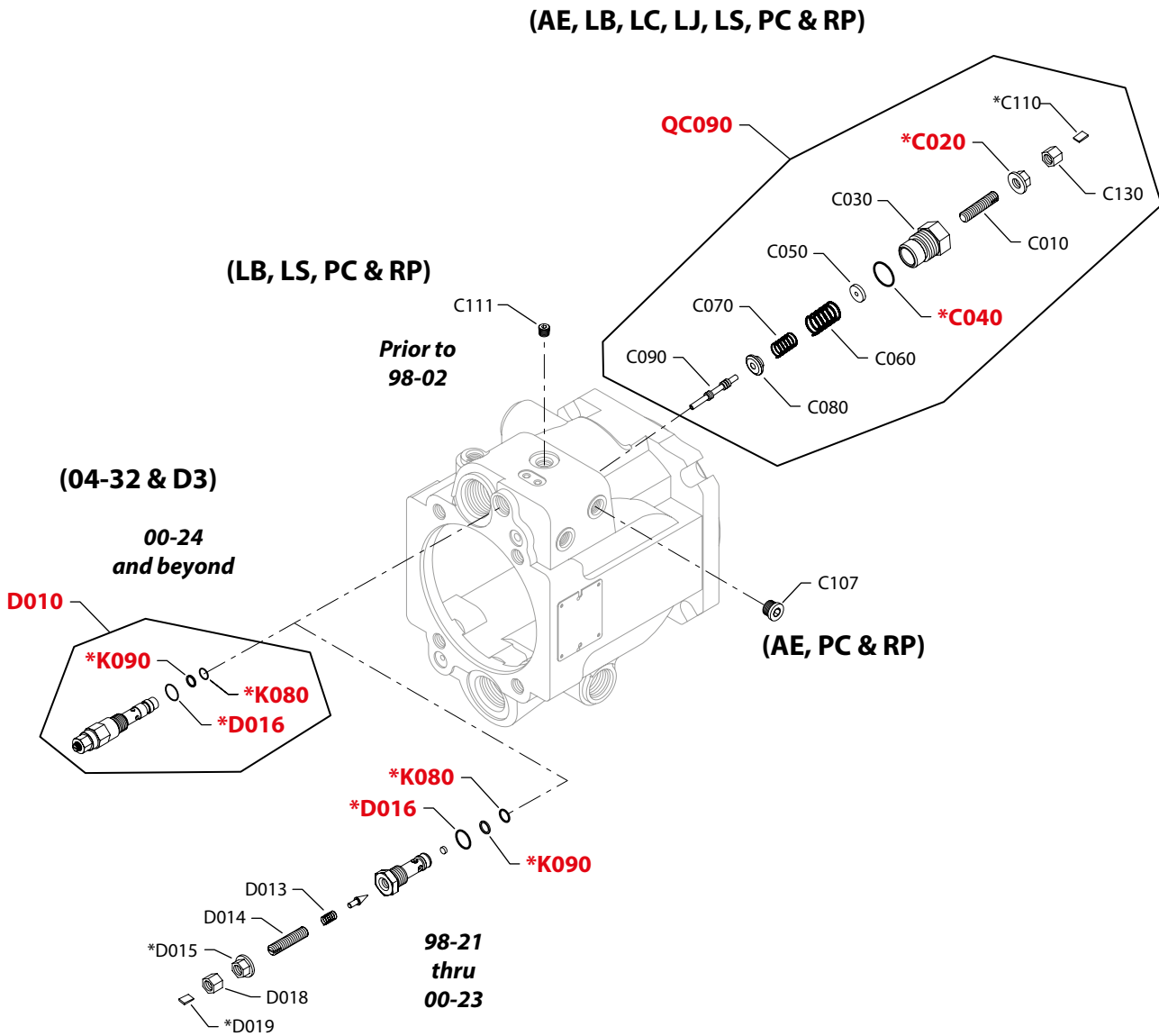
Order code



P100 544E



Control



E100 344E

\* = included in base motor seal kit Q210

Enlarged **bold** type item numbers are recommended part to stock for servicing.




**Control**
**Control Common Parts**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
	C010	94-34		4570439	Slotted set screw (SB-1998-045 & SB-2002-022)	1
	C020	94-34		612291 (9003508-0008)	Seal nut	1
	C030	94-34		4570200	Plug	1
	C040	94-34		001131 (9004201-5000)	O-ring	1
	C050	94-34		4570444	Spring seat (SB-2002-022)	1
	C060	94-34		4570022	Spring	1
	C070	94-34		4570255	Spring	1
	C080	94-34		4570202	Spring guide ( SB-2002-035 & SB-2004-001)	1
	C110	98-21		4570238	Wedge (SB-1998-045)	1
	C130	98-21		4570237	Nut (SB-1998-045)	1

**Control**

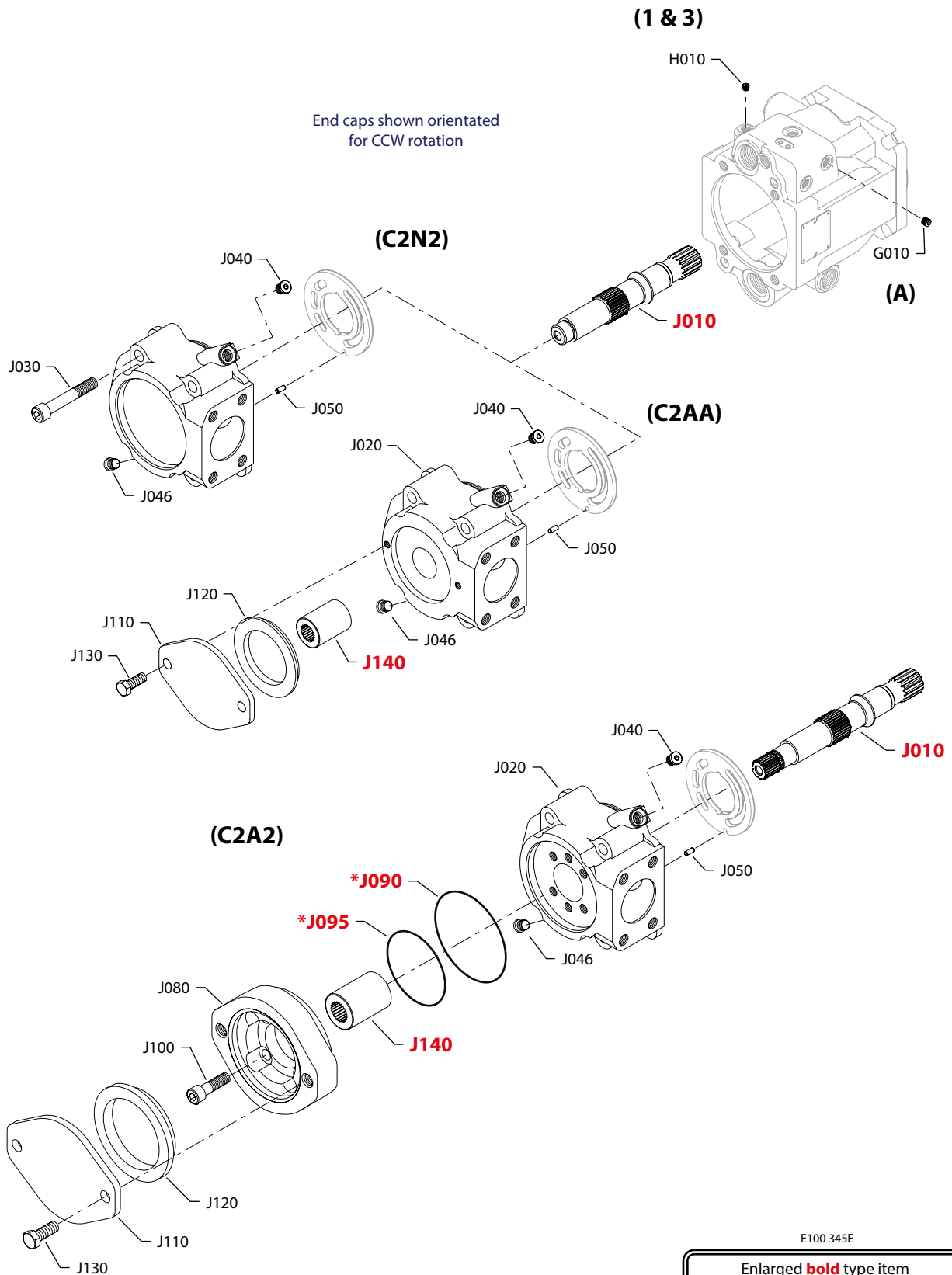
AE	C090	03-34		4570461	Spool	1
	C107	03-34		327007 (9005110-4400)	Plug assembly	1
	QC090	03-34		11082437	Control kit	1
LB	C090	98-02		4570245	Spool (SB-1997-028)	1
	"	94-34	98-01	4570025	Spool	1
	QC090	98-02		4510293	Control kit	1
	C111	94-34	98-01	4570094	Orifice, 0.3mm (SB-1997-028)	1
LC & LJ	C090	94-34		4570025	Spool	1
	QC090	94-34		4510156	Control Kit	1
LS	C090	94-34		4570025	Spool	1
	C111	95-50	98-01	092114 (9007712-0604)	Set screw	1
	QC1	94-34		4510156	Control Kit	1
PC & RP	C090	94-34		4570024	Spool	1
	C107	94-34		327007 (9005110-4400)	Plug assembly	1
	C111	95-50	98-01	092114 (9007712-0604)	Set screw	1
	QC090	94-34		4510155	Control Kit, PC	1

**Pressure compensator valve**

04-32, D3	D010	00-24		4570281	PC valve assembly	1
	"	94-34	00-23	4510296	PC valve kit (SB-1998-045 & SB-1999-050)	1
	D013	94-34	00-23	4570019	Spring	1
	D014	94-34	00-23	4570236	Slotted set screw (SB-1998-045 & SB-1999-050)	1
	D015	94-34	00-23	612291 (9003508-0008)	Seal nut (SB-1999-050)	1
	D016	94-34		085043 (9004201-3700)	O-ring	1
	D018	98-21	00-23	4570237	Nut (SB-1998-045 & SB-1999-050)	1
	D019	98-21	00-23	4570238	Wedge (SB-1998-045 & SB-1999-050)	1
	K085	94-34		144725 (9004105-0110)	O-ring	1
	K090	94-34		5000146 (9006110-0110)	Backup ring	1



Orifice, shaft, auxiliary flange and end cap



\* = included in base motor seal kit Q210

E100 345E  
 Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Orifice, shaft, auxiliary flange and end cap**
**Pilot orifice**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
A	G010	94-34		739144	Orifice, 0.8mm, M6 x 6	1
N		94-34		None	None	

**Gain orifice**

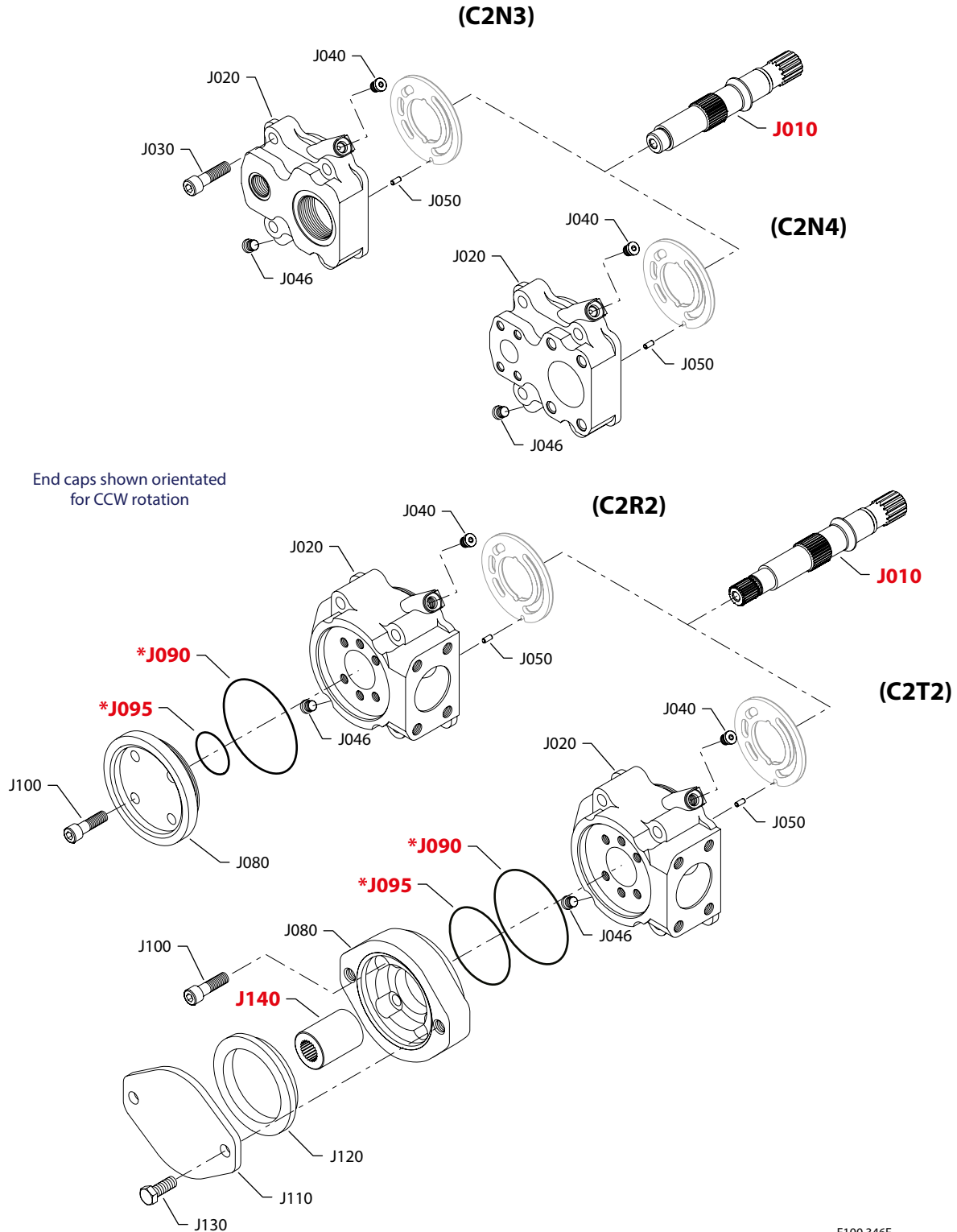
1	H010	94-34		092114 (9007712-0604)	Set screw	1
3	H010	94-34		739136	Orifice, 0.7mm, M6 x 6	1

**Shaft/auxiliary flange/end cap**

C2A2	J010	99-01	00-22	4570296	Shaft, 13-tooth spline	1
	J020	99-01	00-22	4570212	End cap, radial ports	1
	J030	99-01	00-22	5000386	Screw	4
	J046	99-01	00-22	327007 (9005110-4400)	Plug	1
	J046	99-01	00-22	327007 (9005110-4400)	Plug	1
	J050	99-01	00-22	688622 (9004700-1907)	Pin	1
	J080	99-01	00-22	4570289	Adapter flange, SAE A (SB-1999-006)	1
	J090	99-01	00-22	5000099 (9004100-1550)	O-ring	1
	J095	99-01	00-22	545434 (9004100-0420)	O-ring	1
	J100	99-01	00-22	5000489	Screw	4
	J110	99-01	00-22	4460586	Cover plate (SB-1999-006)	1
	J120	99-01	00-22	4800482	A pad seal (SB-1999-006)	1
	J130	99-01	00-22	001925 (9007200-3712)	Screw	2
	J140	99-01	00-22	1701185	Coupling, 9-tooth	1
C2AA	J010	01-11		4570409	Shaft, 13-tooth spline	1
	J020	01-11		4570407	End cap, radial ports	1
	J030	01-11		5000386	Screw	4
	J040	01-11		327007 (9005110-4400)	Plug assembly	1
	J046	01-11		327007 (9005110-4400)	Plug assembly	1
	J050	01-11		688622 (9004700-1907)	Pin	1
	J110	01-11		4460586	Cover plate	1
	J120	01-11		4800482	A pad seal	1
	J130	01-11		001925 (9007200-3712)	Screw	2
	J140	01-11		4570356	Coupling, 9-tooth	1
C2N2	J010	98-12		4570208	Shaft, 13-tooth (45*057 & HR*)	1
	J010	99-01	00-22	4570295	Shaft, 13-tooth (45*B57)	1
	J020	98-12		4570172	End cap, radial ports	1
	J030	98-12		5000386	Screw	4
	J040	98-12		327007 (9005110-4400)	Plug assembly	1
	J046	98-12		327007 (9005110-4400)	Plug assembly	1
	J050	98-12		688622 (9004700-1907)	Pin	1



Shaft, auxiliary flange and end cap



\* = included in base motor seal kit Q210

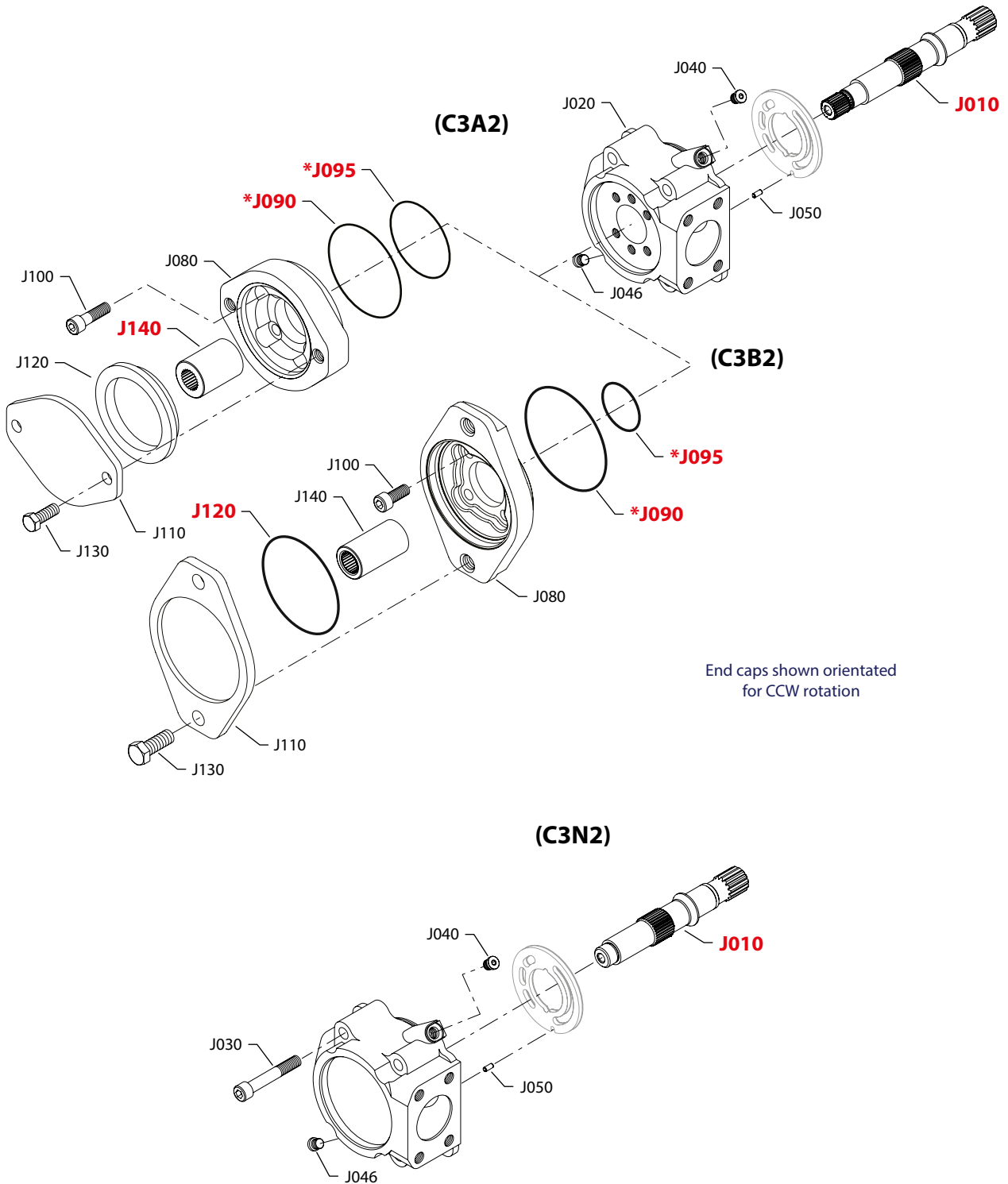
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Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
C2N3	J010	99-01		4570208	Shaft, 13-tooth (45*057 & HR*)	1
	"	99-01	00-22	4570295	Shaft, 13-tooth (45*B57)	1
	J020	99-01		4570294	End cap, axial ports	1
	J030	99-01		5000181 (9007314-1210)	Screw	4
	J040	99-01		327007 (9005110-4400)	Plug assembly	1
	J046	99-01		327007 (9005110-4400)	Plug assembly	1
	J050	99-01		688622 (9004700-1907)	Pin	1
	C2N4	J010	98-12		4570208	Shaft, 13-tooth (45*057 & HR*)
"		99-01	00-22	4570295	Shaft, 13-tooth (45*B57)	1
J020		98-12		4570001	End cap, axial ports	1
J030		98-12		5000181 (9007314-1210)	Screw	4
J040		98-12		327007 (9005110-4400)	Plug assembly	1
J046		98-12		327007 (9005110-4400)	Plug assembly	1
J050		98-12		688622 (9004700-1907)	Pin	1
C2R2		J010	99-01	00-22	4570296	Shaft, 13-tooth
	J020	99-01	00-22	4570212	End cap, radial ports	1
	J030	99-01	00-22	5000386	Screw	4
	J040	99-01	00-22	327007 (9005110-4400)	Plug assembly	1
	J046	99-01	00-22	327007 (9005110-4400)	Plug assembly	1
	J050	99-01	00-22	688622 (9004700-1907)	Pin	1
	J080	99-01	00-22	4570179	Running cover	1
	J090	99-01	00-22	5000099 (9004100-1550)	O-ring	1
	J095	99-01	00-22	314534 (9004104-0310)	O-ring	1
	J100	99-01	00-22	5000489	Screw	4
C2T2	J010	99-01	00-22	4570296	Shaft, 13-tooth spline	1
	J020	99-01	00-22	4570212	End cap, radial ports	1
	J030	99-01	00-22	5000386	Screw	4
	J040	99-01	00-22	327007 (9005110-4400)	Plug assembly	1
	J046	99-01	00-22	327007 (9005110-4400)	Plug assembly	1
	J050	99-01	00-22	688622 (9004700-1907)	Pin	1
	J080	99-01	00-22	4570289	Adapter flange, SAE A (SB-1999-006)	1
	J090	99-01	00-22	5000099 (9004100-1550)	O-ring	1
	J095	99-01	00-22	545434 (9004100-0420)	O-ring	1
	J100	99-01	00-22	5000489	Screw	4
	J110	99-01	00-22	4460586	Cover plate (SB-1999-006)	1
	J120	99-01	00-22	4800482	'A' pad seal (SB-1999-006)	1
	J130	99-01	00-22	049874 (9007200-3716)	Screw	2
	J140	99-01	00-22	1701186	Coupling, 11-tooth	1



Shaft, auxiliary flange and end cap



End caps shown orientated for CCW rotation

\* = included in base motor seal kit Q210

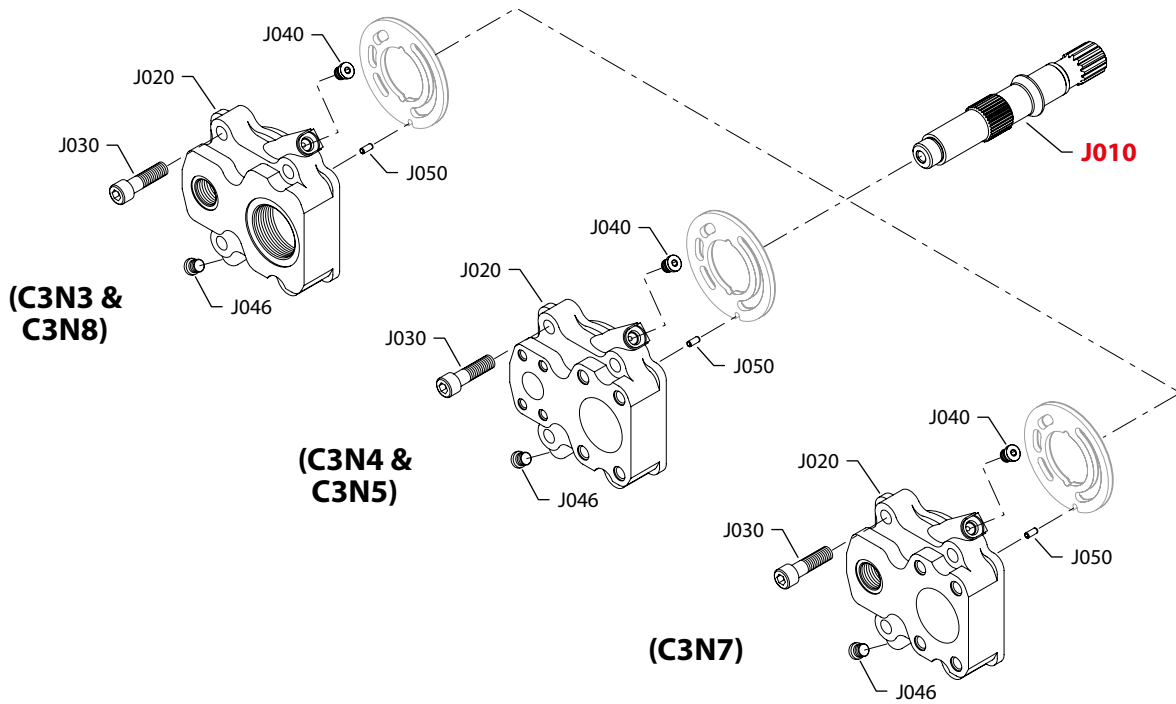
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 Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

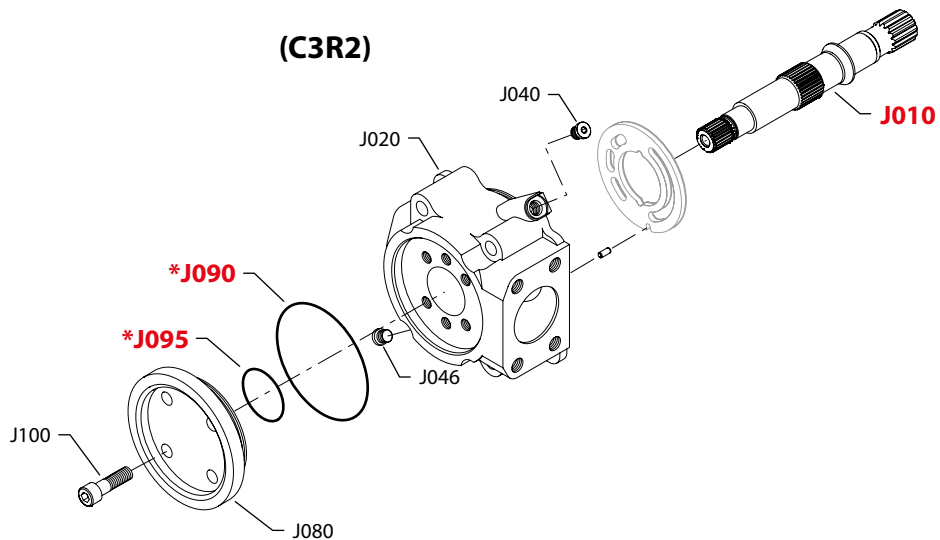
Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
C3A2	J010	96-12		4570170	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-07	00-22	4570297	Shaft, 15-tooth (45*B57)	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-12		5000386	Screw	4
	J040	96-12		327007 (9005110-4400)	Plug assembly	1
	J046	96-12		327007 (9005110-4400)	Plug assembly	1
	J050	96-12		688622 (9004700-1907)	Pin	1
	J080	97-43		4570289	Adapter flange, SAE A (SB-1999-006)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-12	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-12		5000489	Screw	4
	J110	96-12		4460586	Cover plate (SB-1999-006)	1
	J120	96-12		4800482	'A' pad seal (SB-1999-006)	1
	J130	96-12		001925 (9007200-3712)	Screw	2
	J140	96-12		1701185	Coupling, 9-tooth	1
C3B2	J010	96-12		4570170	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-01	00-22	4570297	Shaft, 15-tooth (45*B57)	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-12		5000386	Screw	4
	J040	96-12		327007 (9005110-4400)	Plug assembly	1
	J046	96-12		327007 (9005110-4400)	Plug assembly	1
	J050	96-12		688622 (9004700-1907)	Pin	1
	J080	97-43		4570210	Adapter flange, SAE B (SB-1997-008)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-12	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-12		5000489	Screw	4
	J110	96-12		4460370	Cover plate	1
	J120	96-12		680892 (9004104-0440)	O-ring	1
	J130	96-12		647248 (9007200-5021)	Screw	2
	J140	96-12		1701187	Coupling, 13-tooth	1
C3N2	J010	96-12		4570139	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-01	00-22	4570235	Shaft, 15-tooth (45*B57)	1
	J020	96-12		4570172	End cap, radial ports	1
	J030	96-12		5000386	Screw	4
	J040	96-12		327007 (9005110-4400)	Plug assembly	1
	J046	96-12		327007 (9005110-4400)	Plug assembly	1
	J050	96-12		688622 (9004700-1907)	Pin	1



Shaft, auxiliary flange and end cap



End caps shown orientated for CCW rotation



E100 348E

\* = included in base motor seal kit Q210

Enlarged **bold** type item numbers are recommended part to stock for servicing.

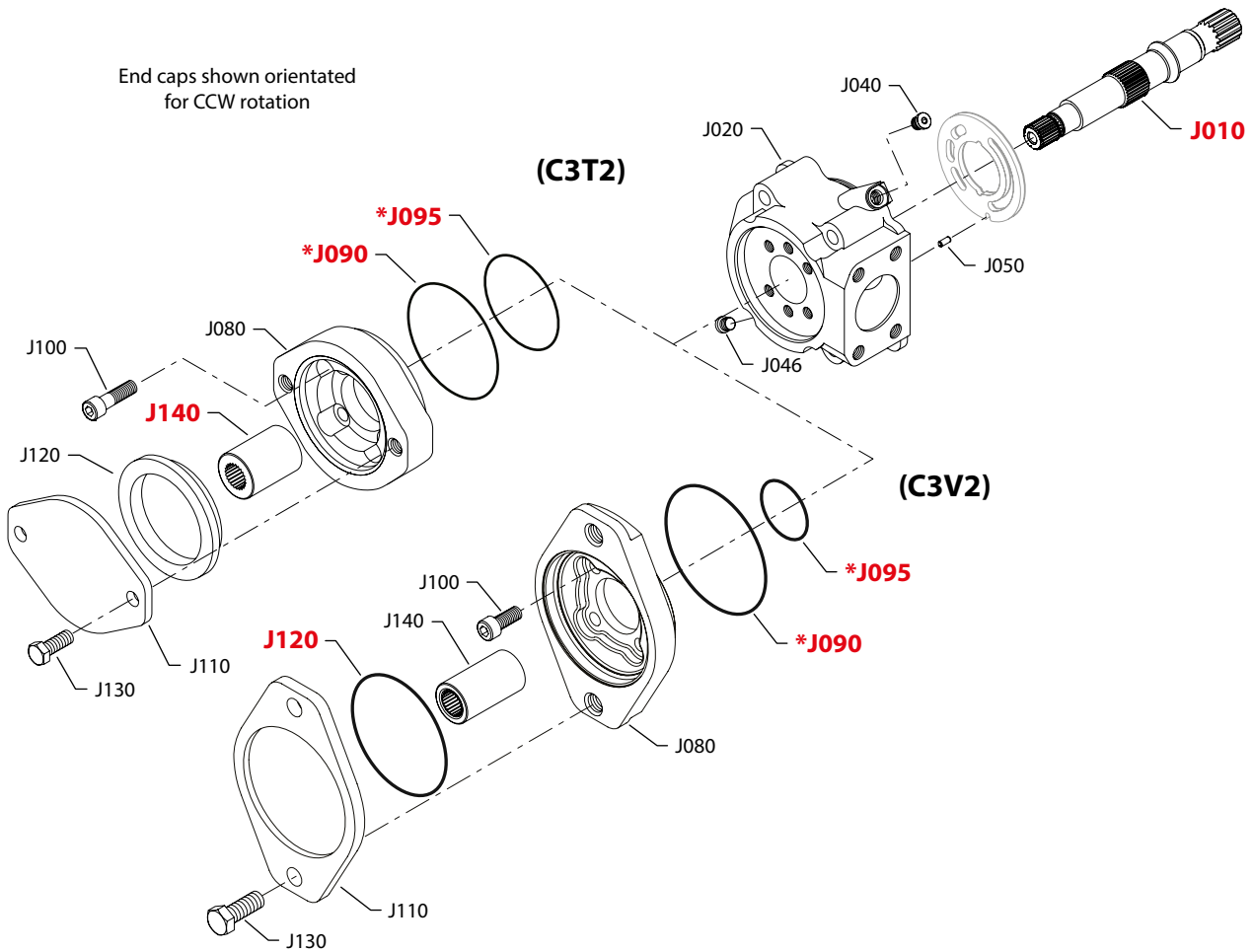



**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
C3N3	J010	99-01		4570139	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-01	00-22	4570235	Shaft, 15-tooth (45*B57)	1
	J020	99-01		4570294	End cap, axial ports	1
	J030	99-01		5000181 (9007314-1210)	Screw	4
	J040	99-01		327007 (9005110-4400)	Plug assembly	1
	J046	99-01		327007 (9005110-4400)	Plug assembly	1
	J050	99-01		688622 (9004700-1907)	Pin	1
C3N4	J010	96-12		4570139	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-01	00-22	4570235	Shaft, 15-tooth (45*B57)	1
	J020	96-12		4570001	End cap, axial ports	1
	J030	96-12		5000181 (9007314-1210)	Screw	4
	J040	96-12		327007 (9005110-4400)	Plug assembly	1
	J046	96-12		327007 (9005110-4400)	Plug assembly	1
	J050	96-12		688622 (9004700-1907)	Pin	1
C3N5	J010	96-37		4570139	Shaft, 15-tooth	1
	J020	96-37		4570185	End cap, metric axial ports	1
	J030	96-37		5000181 (9007314-1210)	Screw	4
	J040	96-37		327007 (9005110-4400)	Plug assembly	1
	J046	96-37		327007 (9005110-4400)	Plug assembly	1
	J050	96-37		688622 (9004700-1907)	Pin	1
C3N7	J010	00-23		4570139	Shaft, 15-tooth	1
	J020	00-23		4570392	End cap, metric axial ports	1
	J030	00-23		5000181 (9007314-1210)	Screw	4
	J040	00-23		327007 (9005110-4400)	Plug assembly	1
	J046	00-23		327007 (9005110-4400)	Plug assembly	1
	J050	00-23		688622 (9004700-1907)	Pin	1
C3N8	J010	98-30	00-22	4570235	Shaft, 15-tooth	1
	J020	98-30	00-22	4570239	End cap, metric axial ports	1
	J030	98-30	00-22	5000181	Screw	4
	J040	98-30	00-22	327007 (9005110-4400)	Plug assembly	1
	J046	98-30	00-22	327007 (9005110-4400)	Plug assembly	1
	J050	98-30	00-22	688622 (9004700-1907)	Pin	1
C3R2	J010	97-34		4570170	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-07	00-22	4570297	Shaft, 15-tooth (45*B57)	1
	J020	97-34		4570212	End cap, radial (SB-1997-008)	1
	J030	97-34		5000386	Screw	4
	J040	97-34		327007 (9005110-4400)	Plug assembly	1
	J046	97-34		327007 (9005110-4400)	Plug assembly	1
	J050	97-34		688622 (9004700-1907)	Pin	1
	J080	97-34		4570179	Running cover	1
	J090	98-25		5000099 (9004100-1550)	O-ring	1
	"	97-34	98-24	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-34		314534 (9004104-0310)	O-ring	1
	J100	97-34		5000489	Screw	4



Shaft, auxiliary flange and end cap



E100 349E

\* = included in base motor seal kit Q210

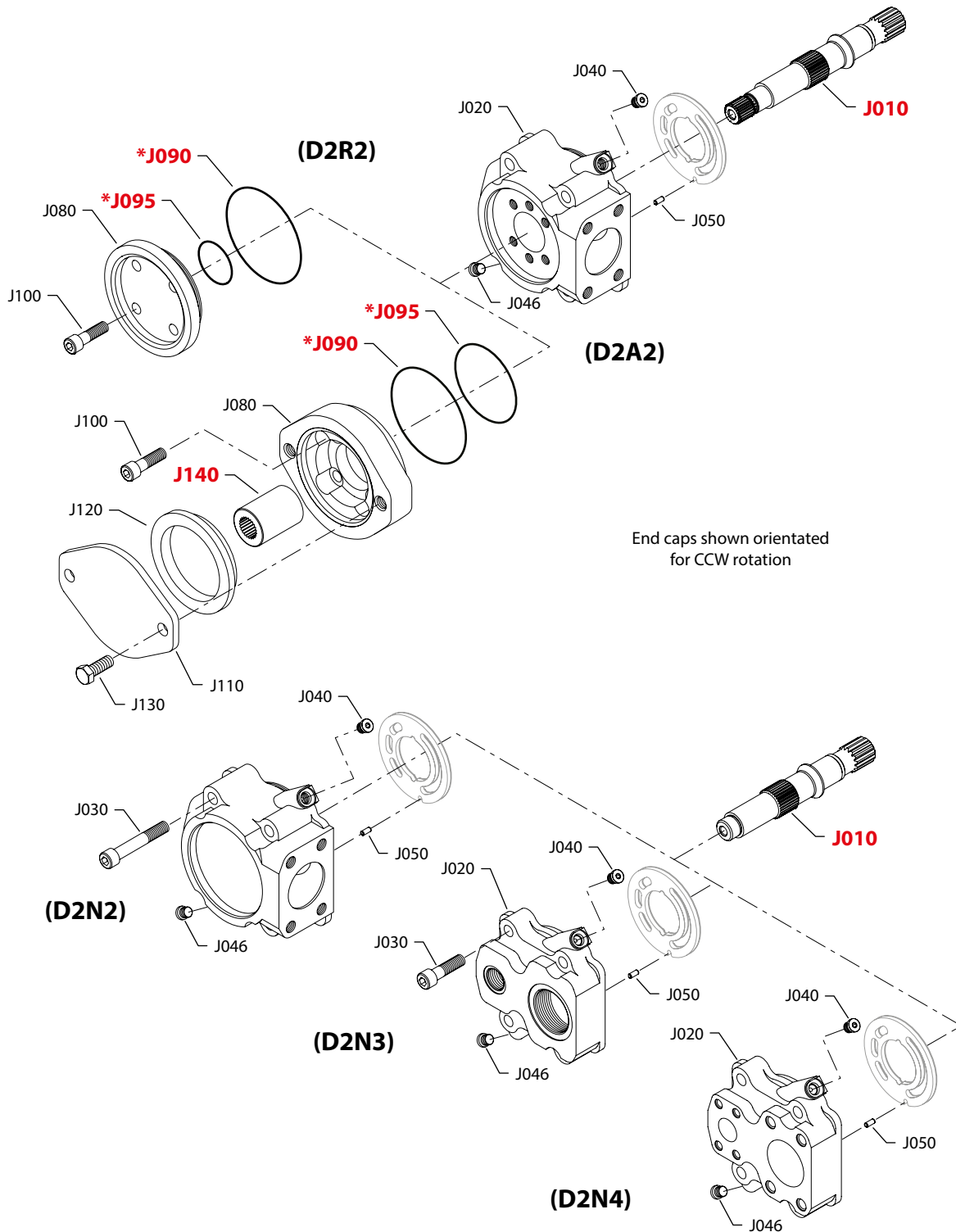
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
C3T2	J010	96-15		4570170	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-07	00-22	4570297	Shaft, 15-tooth (45*B57)	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-15		5000386	Screw	4
	J040	96-15		327007 (9005110-4400)	Plug assembly	1
	J046	96-15		327007 (9005110-4400)	Plug assembly	1
	J050	96-15		688622 (9004700-1907)	Pin	1
	J080	97-43		4570289	Adapter flange, SAE A (SB-1999-006)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-15	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-15		5000489	Screw	4
	J110	96-15		4460586	Cover plate (SB-1999-006)	1
	J120	96-15		4800482	'A' pad seal (SB-1999-006)	1
	J130	96-15		001925 (9007200-3712)	Screw	2
	J140	96-15		1701186	Coupling, 11-tooth	1
C3V2	J010	96-15		4570170	Shaft, 15-tooth (45*057 & HR*)	1
	"	99-07	00-22	4570297	Shaft, 15-tooth (45*B57)	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-15		5000386	Screw	4
	J040	96-15		327007 (9005110-4400)	Plug assembly	1
	J046	96-15		327007 (9005110-4400)	Plug assembly	1
	J050	96-15		688622 (9004700-1907)	Pin	1
	J080	97-43		4570210	Adapter flange, SAE B (SB-1997-008)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-15	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-15		5000489	Screw	4
	J110	96-15		4460370	Cover plate	1
	J120	96-15		680892 (9004104-0440)	O-ring	1
	J130	96-15		647248 (9007200-5021)	Screw	2
	J140	96-15		1701188	Coupling, 15-tooth	1



Shaft, auxiliary flange and end cap



End caps shown orientated for CCW rotation

E100 350E

\* = included in base motor seal kit Q210

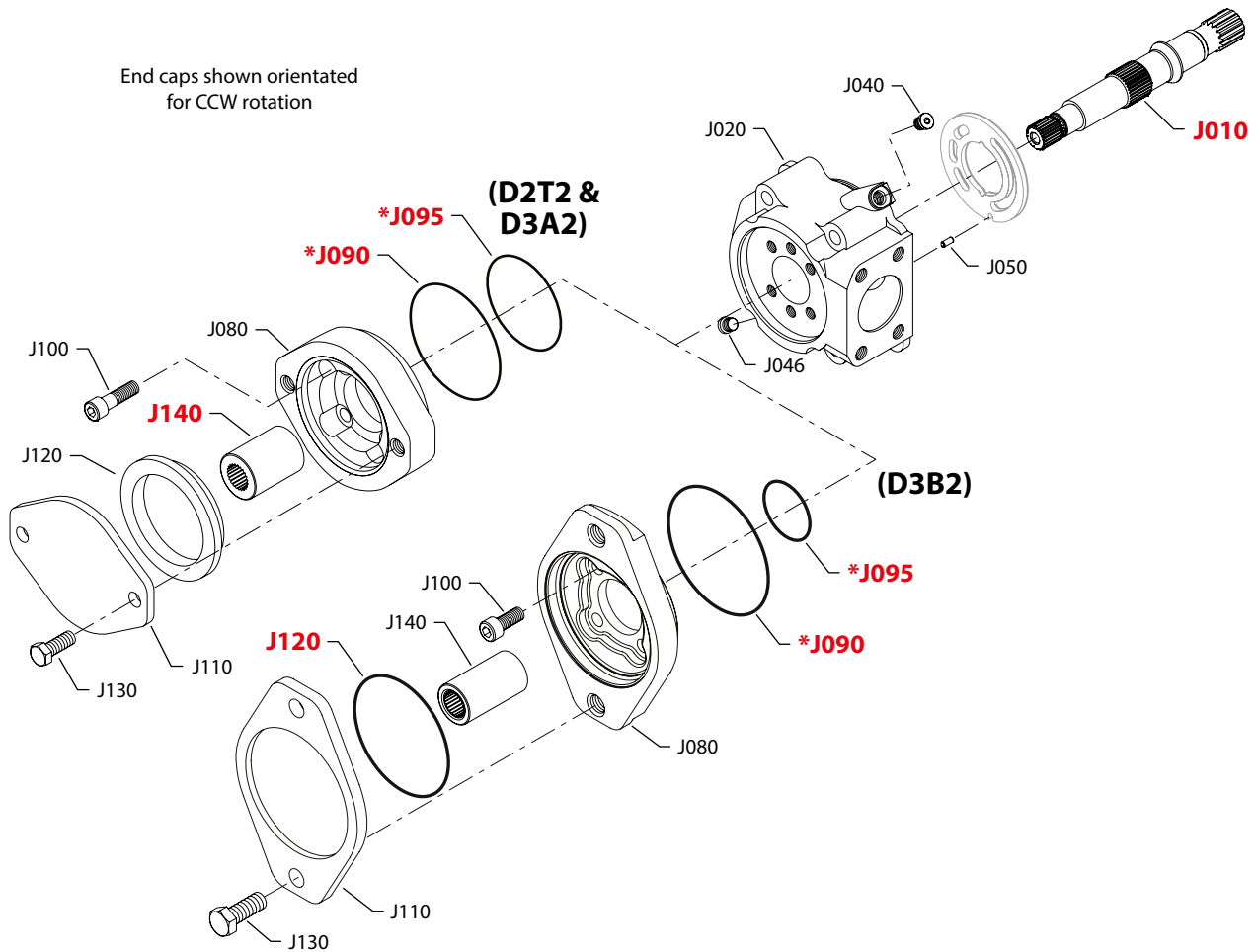
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
D2A2	J010	99-49		4570296	Shaft, 13-tooth spline	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570289	Adapter flange, SAE A	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460586	Cover plate	1
	J120	99-49		4800482	'A' pad seal	1
	J130	99-49		001925 (9007200-3712)	Screw	2
	J140	99-49		1701185	Coupling, 9 tooth	1
D2N2	J010	99-49		4570295	Shaft, 13-tooth spline	1
	J020	99-49		4570172	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
D2N3	J010	99-49		4570295	Shaft, 13-tooth spline	1
	J020	99-49		4570294	End cap, axial ports	1
	J030	99-49		5000181 (9007314-1210)	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
D2N4	J010	99-49		4570295	Shaft, 13-tooth spline	1
	J020	99-49		4570001	End cap, axial ports	1
	J030	99-49		5000181 (9007314-1210)	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
D2R2	J010	99-49		4570296	Shaft, 13-tooth	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570179	Running cover	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		314534 (9004104-0310)	O-ring	1
	J100	99-49		5000489	Screw	4



Shaft, auxiliary flange and end cap



E100 349E

\* = included in base motor seal kit Q210

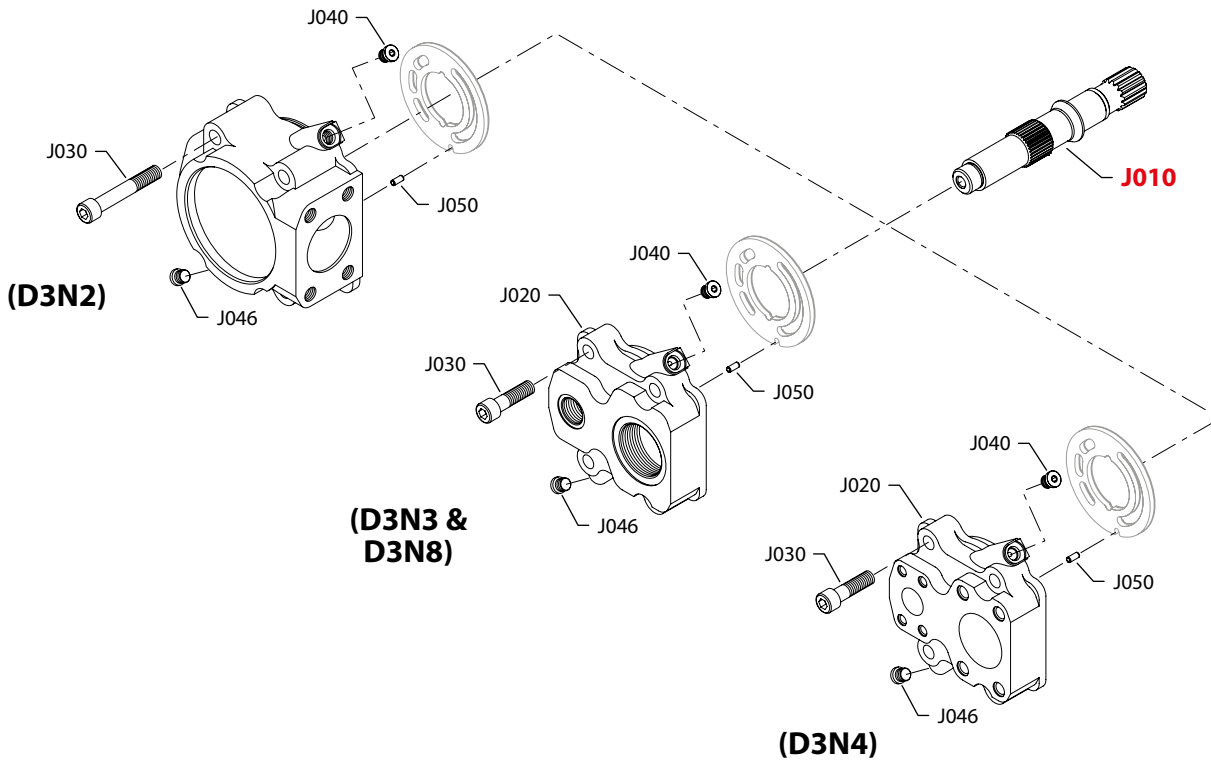
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

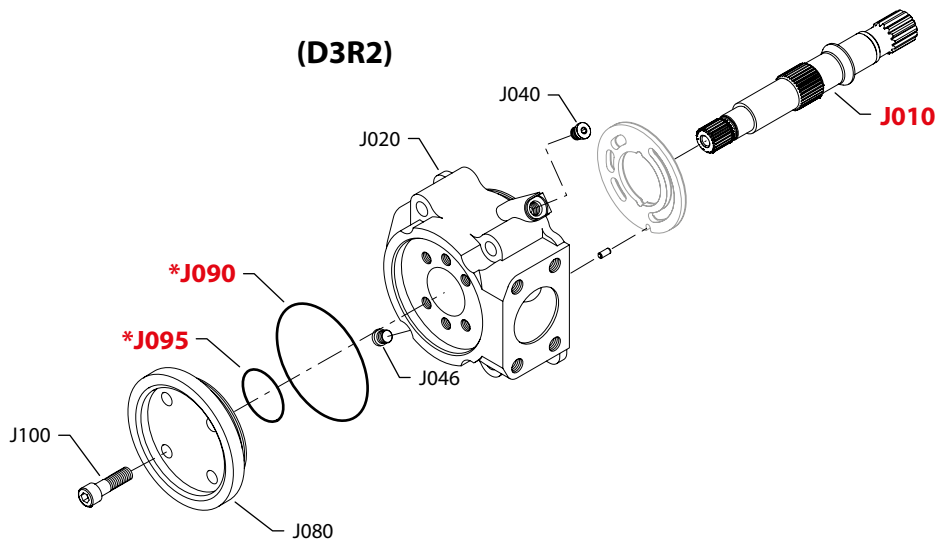
Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
D2T2	J010	99-49		4570296	Shaft, 13-tooth spline	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570289	Adapter flange, SAE A	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460586	Cover plate	1
	J120	99-49		4800482	'A' pad seal	1
	J130	99-49		001925 (9007200-3712)	Screw	2
	J140	99-49		1701186	Coupling, 11-tooth	1
D3A2	J010	99-49		4570297	Shaft, 15-tooth spline	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570289	Adapter flange, SAE A	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460586	Cover plate	1
	J120	99-49		4800482	'A' pad seal	1
	J130	99-49		001925 (9007200-3712)	Screw	2
	J140	99-49		1701185	Coupling, 9-tooth	1
D3B2	J010	99-49		4570297	Shaft, 15-tooth	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570210	Adapter flange, SAE B	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460370	Cover plate	1
	J120	99-49		680892 (9004104-0440)	O-ring	1
	J130	99-49		647248 (9007200-5021)	Screw	2
	J140	99-49		1701187	Coupling, 13-tooth	1



Shaft, auxiliary flange and end cap



End caps shown orientated for CCW rotation



E100 351E

\* = included in base motor seal kit Q210

Enlarged **bold** type item numbers are recommended part to stock for servicing.

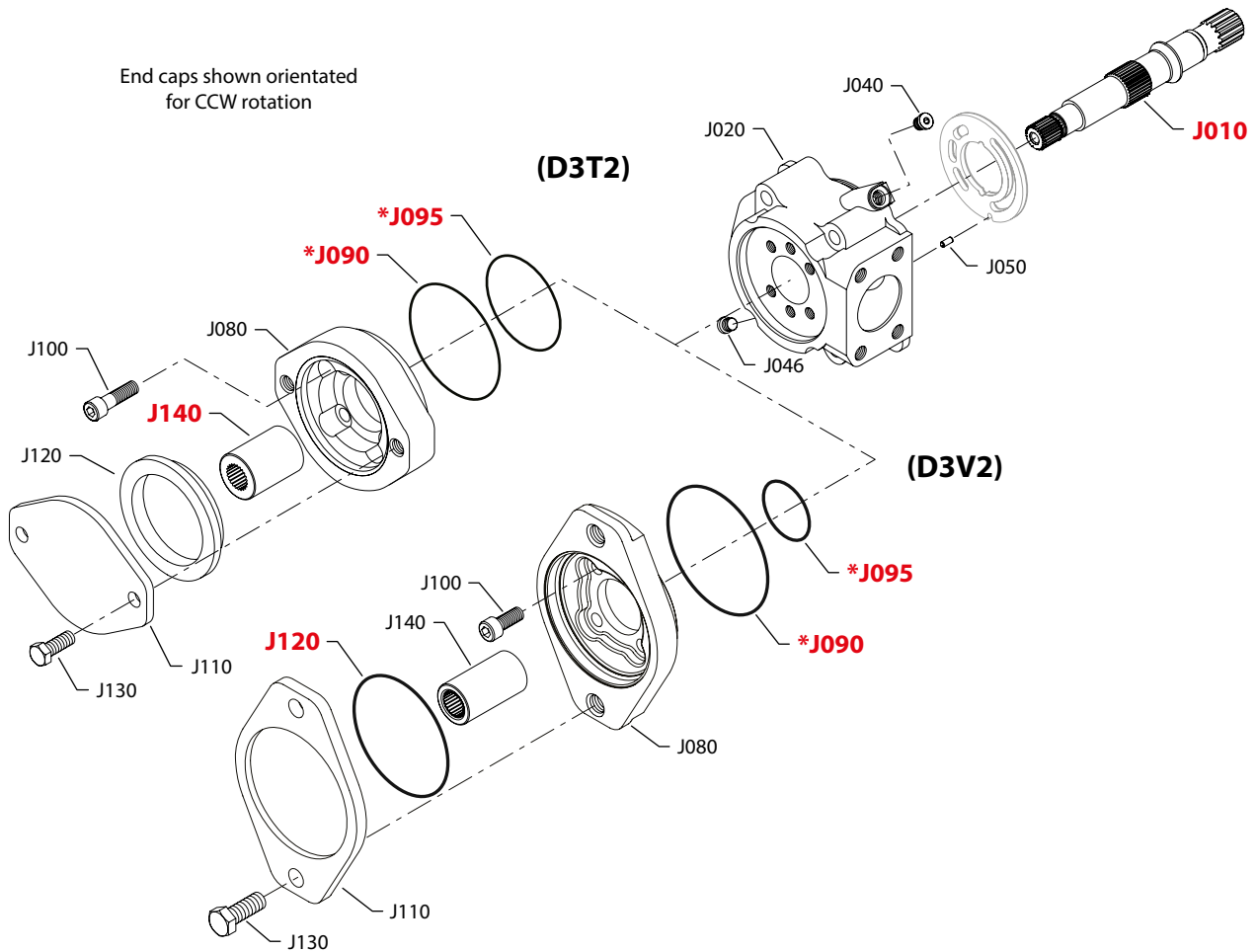



**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
D3N2	J010	99-49		4570235	Shaft, 15-tooth spline	1
	J020	99-49		4570172	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug	1
	J046	99-49		327007 (9005110-4400)	Plug	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	D3N3	J010	99-49		4570235	Shaft, 15-tooth spline
J020		99-49		4570294	End cap, axial ports	1
J030		99-49		5000181 (9007314-1210)	Screw	4
J040		99-49		327007 (9005110-4400)	Plug	1
J046		99-49		327007 (9005110-4400)	Plug	1
J050		99-49		688622 (9004700-1907)	Pin	1
D3N4		J010	99-49		4570235	Shaft, 15-tooth spline
	J020	99-49		4570001	End cap, axial ports	1
	J030	99-49		5000181 (9007314-1210)	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug	1
	J046	99-49		327007 (9005110-4400)	Plug	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	D3N8	J010	99-49		4570235	Shaft, 15-tooth
J020		99-49		4570239	End cap, metric axial ports	1
J030		99-49		5000181 (9007314-1210)	Screw	4
J040		99-49		327007 (9005110-4400)	Plug	1
J046		99-49		327007 (9005110-4400)	Plug	1
J050		99-49		688622 (9004700-1907)	Pin	1
D3R2		J010	99-49		4570297	Shaft, 15-tooth
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug	1
	J046	99-49		327007 (9005110-4400)	Plug	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570179	Running cover	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		314534 (9004104-0310)	O-ring	1
	J100	99-49		5000489	Screw	4



Shaft, auxiliary flange and end cap



E100 349E

\* = included in base motor seal kit Q210

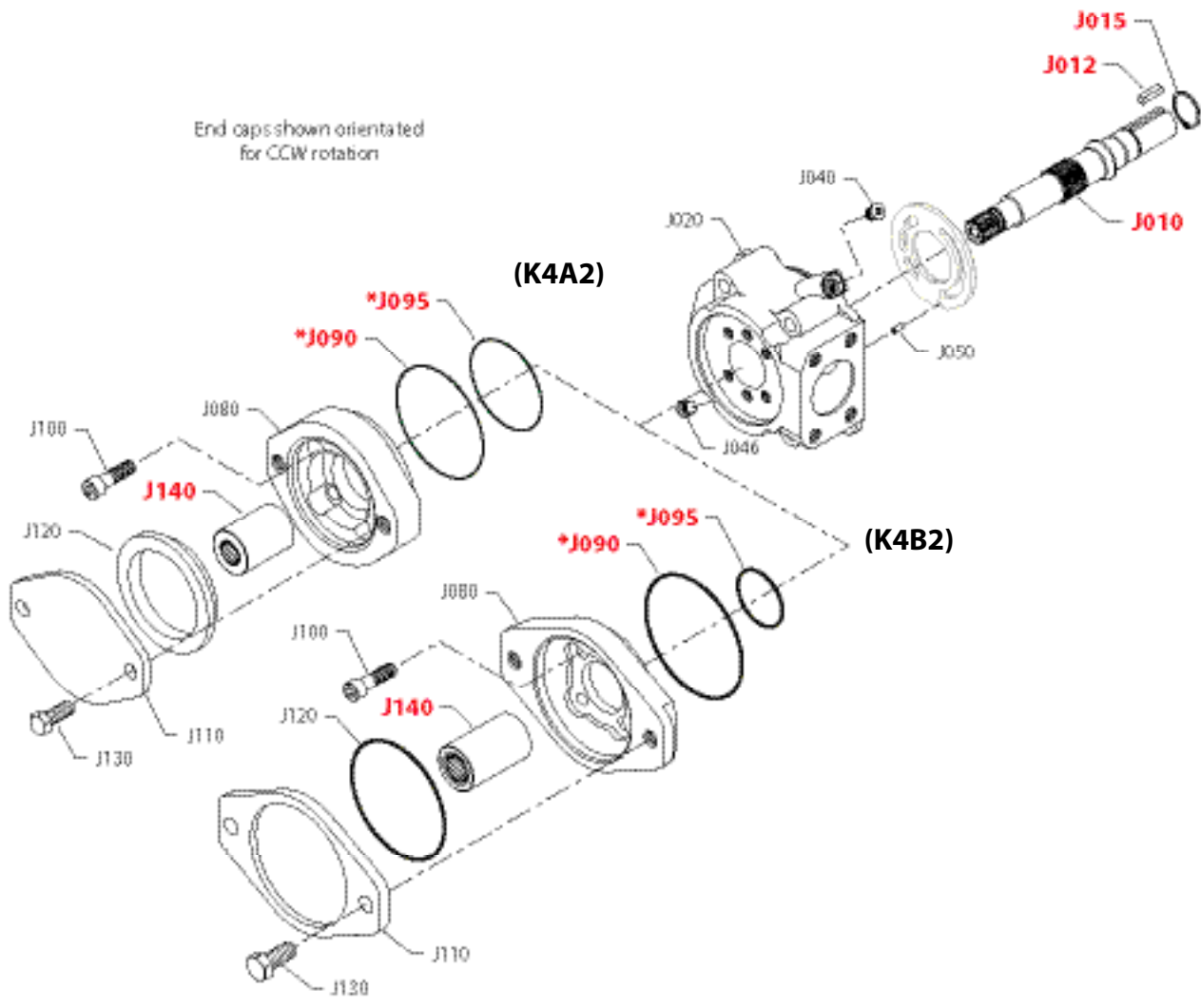
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange and end cap**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
D3T2	J010	99-49		4570297	Shaft, 15-tooth	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570289	Adapter flange, SAE A	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460586	Cover plate	1
	J120	99-49		4800482	'A' pad seal	1
	J130	99-49		001925 (9007200-3712)	Screw	2
	J140	99-49		1701186	Coupling, 11-tooth	1
D3V2	J010	99-49		4570297	Shaft, 15-tooth	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570210	Adapter flange, SAE B	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460370	Cover plate	1
	J120	99-49		680892 (9004104-0440)	O-ring	1
	J130	99-49		647248 (9007200-5021)	Screw	2
	J140	99-49		1701188	Coupling, 15-tooth	1



Shaft, auxiliary flange, end cap and housing



\* = included in base motor seal kit Q210

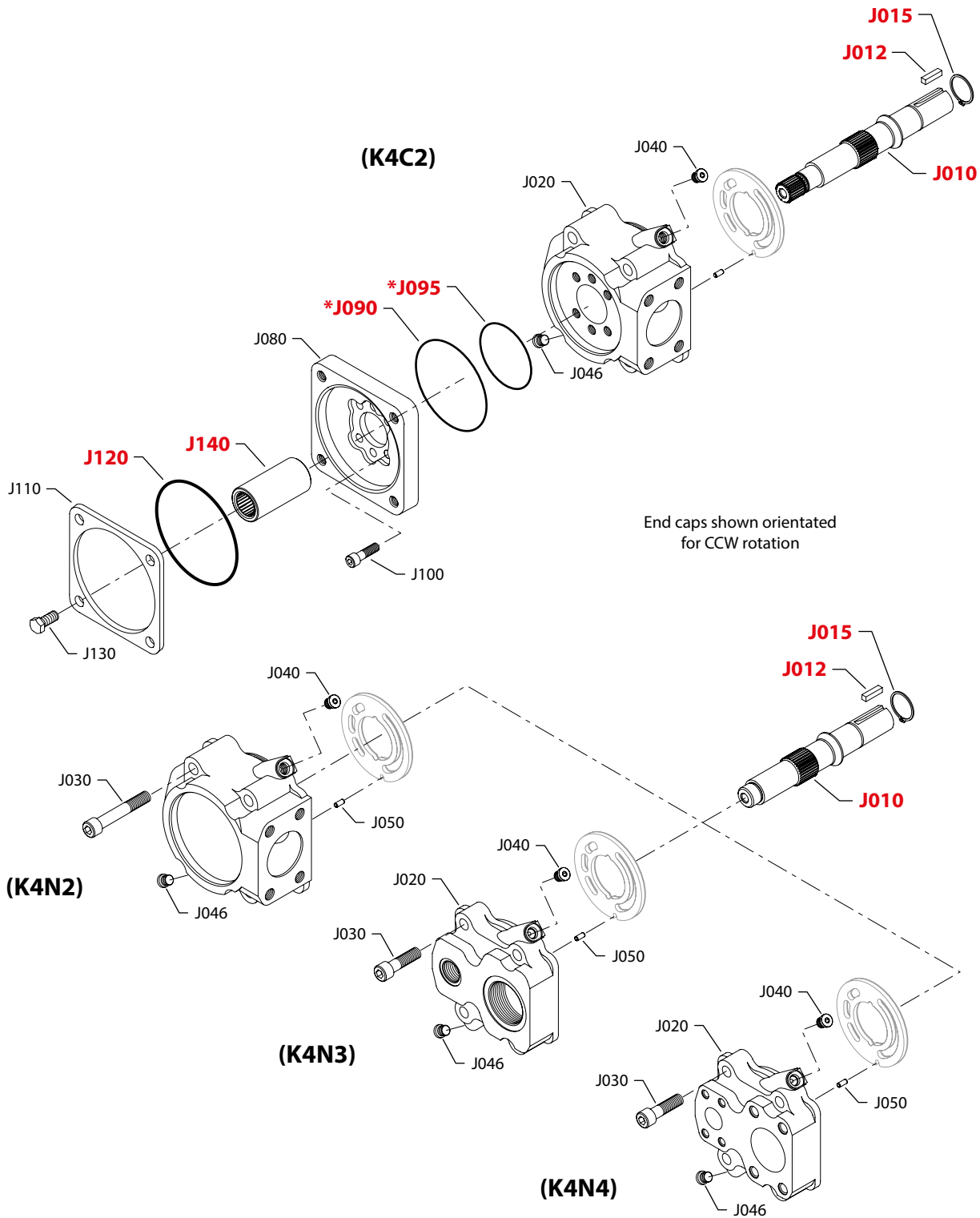
E100 352E  
 Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
K4A2	J010	96-44		4570159	Shaft, keyed (45*057 & HR*)	1
	"	99-08	00-22	4570324	Shaft, keyed (45*B57)	1
	J012	96-44		5000364	Key	1
	J015	96-44		5000365	Retaining ring	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-44		5000386	Screw	4
	J040	96-44		327007 (9005110-4400)	Plug assembly	1
	J046	96-44		327007 (9005110-4400)	Plug assembly	1
	J050	96-44		688622 (9004700-1907)	Pin	1
	J080	97-43		4570289	Adapter flange, SAE A (SB-1999-006)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-44	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-44		5000489	Screw	4
	J110	96-44		4460586	Cover plate (SB-1999-006)	1
	J120	96-44		4800482	'A' pad seal (SB-1999-006)	1
	J130	96-44		001925 (9007200-3712)	Screw	2
	J140	96-44		1701185	Coupling, 9-tooth	1
K4B2	J010	96-44		4570159	Shaft, keyed (45*057 & HR*)	1
	"	99-08	00-22	4570324	Shaft, keyed (45*B57)	1
	J012	96-44		5000364	Key	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-44		5000386	Screw	4
	J040	96-44		327007 (9005110-4400)	Plug assembly	1
	J046	96-44		327007 (9005110-4400)	Plug assembly	1
	J050	96-44		688622 (9004700-1907)	Pin	1
	J080	97-43		4570210	Adapter flange, SAE B (SB-1997-008)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-44	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-44		5000489	Screw	4
	J110	96-44		4460370	Cover plate	1
	J120	96-44		680892 (9004104-0440)	O-ring	1
	J130	96-44		647248 (9007200-5021)	Screw	2
	J140	96-44		1701187	Coupling, 13-tooth	1



Shaft, auxiliary flange, end cap and housing



End caps shown orientated for CCW rotation

E100 353E

\* = included in base motor seal kit Q210

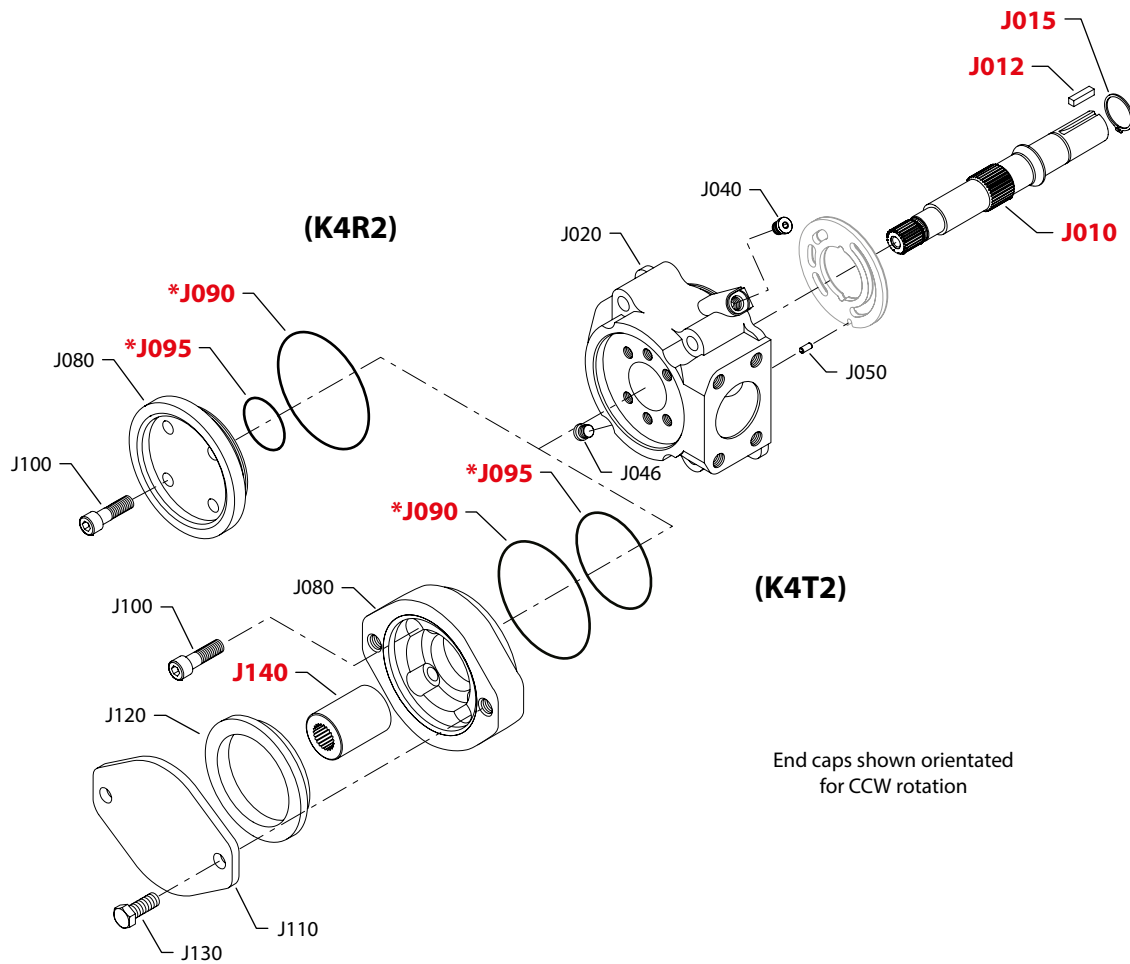
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
K4C2	J010	96-44		4570159	Shaft, keyed (45*057 & HR*)	1
	"	99-08	00-22	4570324	Shaft, keyed (45*B57)	1
	J012	96-44		5000364	Key	1
	J015	96-44		5000365	Retaining ring	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-44		5000386	Screw	4
	J040	96-44		327007 (9005110-4400)	Plug assembly	1
	J046	96-44		327007 (9005110-4400)	Plug assembly	1
	J050	96-44		688622 (9004700-1907)	Pin	1
	J080	97-43		11039356	Adapter flange, SAE C (SB-1999-006 & SB-2008-052 A)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-44	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	K4N2	J100	96-44		5000489	Screw
J110		96-44		8800406	Cover plate (SB-1999-006)	1
J120		96-44		719179 (9004100-0480)	O-ring (SB-1999-006)	1
J130		96-44		647248 (9007200-5021)	Screw	4
J140		96-44		1701189	Coupling, 14-tooth	1
J010		96-18		4570060	Shaft, keyed	1
J012		96-18		5000364	Key	1
J015		96-18		5000365	Retaining ring	1
J020		96-18		4570172	End cap, radial ports	1
J030		96-18		5000386	Screw	4
K4N3	J040	96-18		327007 (9005110-4400)	Plug assembly	1
	J046	96-18		327007 (9005110-4400)	Plug assembly	1
	J050	96-18		688622 (9004700-1907)	Pin	1
	J010	99-07		4570060	Shaft, keyed	1
	J012	99-07		5000364	Key	1
	J015	99-07		5000365	Retaining ring	1
	J020	99-07		4570294	End cap, axial ports	1
	J030	99-07		5000181 (9007314-1210)	Screw	4
K4N4	J040	99-07		327007 (9005110-4400)	Plug assembly	1
	J046	99-07		327007 (9005110-4400)	Plug assembly	1
	J050	99-07		688622 (9004700-1907)	Pin	1
	J010	96-18		4570060	Shaft, keyed	1
	J012	96-18		5000364	Key	1
	J015	96-18		5000365	Retaining ring	1
	J020	96-18		4570001	End cap, axial ports	1
	J030	96-18		5000181 (9007314-1210)	Screw	4



Shaft, auxiliary flange, end cap and housing



End caps shown orientated for CCW rotation

E100 354E

\* = included in base motor seal kit Q210

Enlarged **bold** type item numbers are recommended part to stock for servicing.

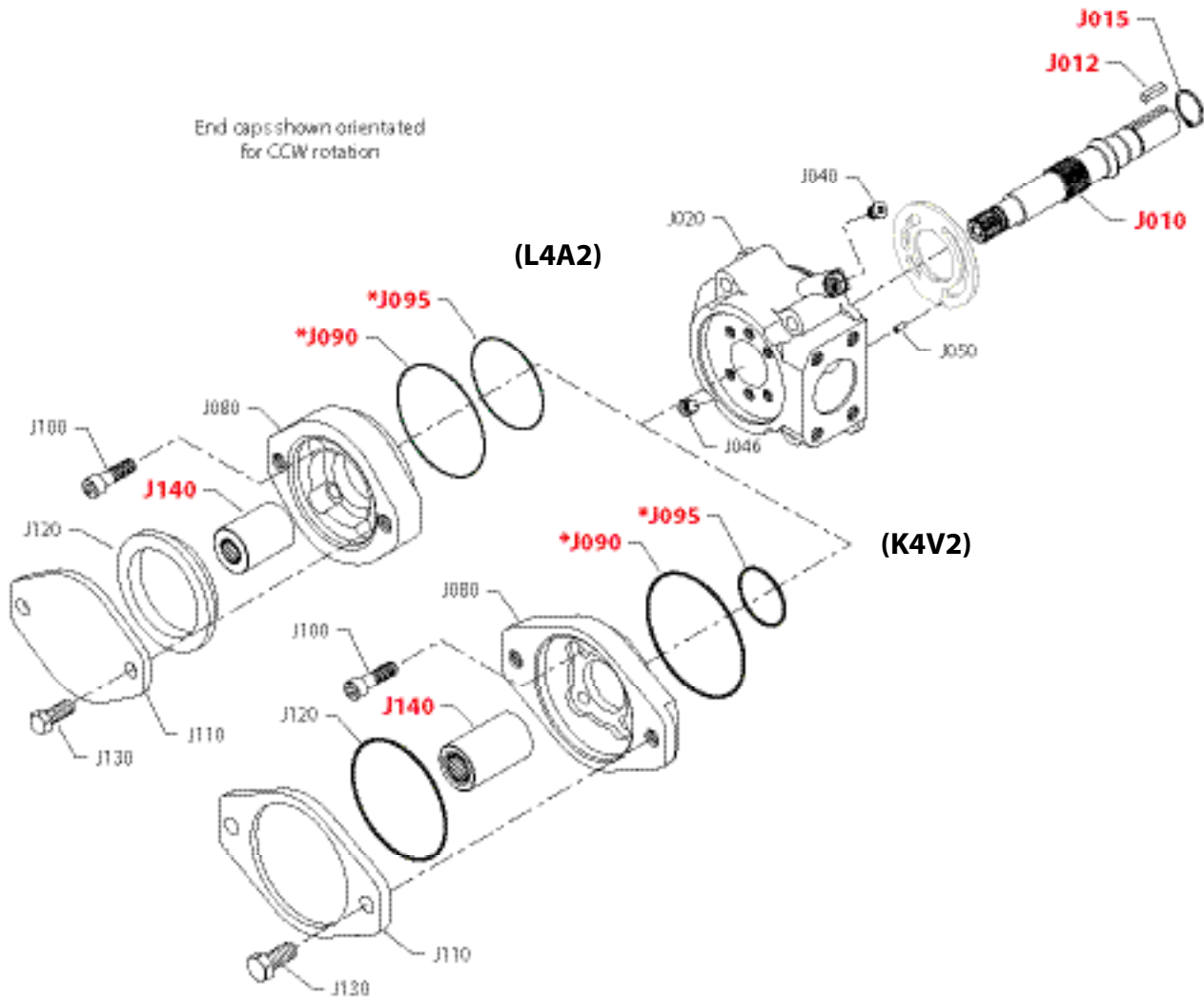



**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
K4R2	J010	97-34		4570159	Shaft, keyed (45*057 & HR*)	1
	"	99-08	00-22	4570324	Shaft, keyed (45*B57)	1
	J012	97-34		5000364	Key	1
	J015	97-34		5000365	Retaining ring	1
	J020	97-34		4570212	End cap, radial ports (SB-1997-008)	1
	J030	97-34		5000386	Screw	4
	J040	97-34		327007 (9005110-4400)	Plug assembly	1
	J046	97-34		327007 (9005110-4400)	Plug assembly	1
	J050	97-34		688622 (9004700-1907)	Pin	1
	J080	97-34		4570179	Running cover	1
	J090	98-25		5000099 (9004100-1550)	O-ring	1
	"	97-34	98-24	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-34		314534 (9004104-0310)	O-ring	1
	J100	97-34		5000489	Screw	4
K4T2	J010	96-44		4570159	Shaft, keyed (45*057 & HR*)	1
	"	99-08	00-22	4570324	Shaft, keyed (45*B57)	1
	J012	96-44		5000364	Key	1
	J015	96-44		5000365	Retaining ring	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-44		5000386	Screw	4
	J040	96-44		327007 (9005110-4400)	Plug assembly	1
	J046	96-44		327007 (9005110-4400)	Plug assembly	1
	J050	96-44		688622 (9004700-1907)	Pin	1
	J080	97-43		4570289	Adapter flange, SAE A (SB-1999-006)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-44	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-44		5000489	Screw	4
	J110	96-44		4460586	Cover plate (SB-1999-006)	1
	J120	96-44		4800482	'A' pad seal (SB-1999-006)	1
	J130	96-44		001925 (9007200-3712)	Screw	2
	J140	96-44		1701186	Coupling, 11-tooth	1



Shaft, auxiliary flange, end cap and housing



E100 352E

\* = included in base motor seal kit Q2 10

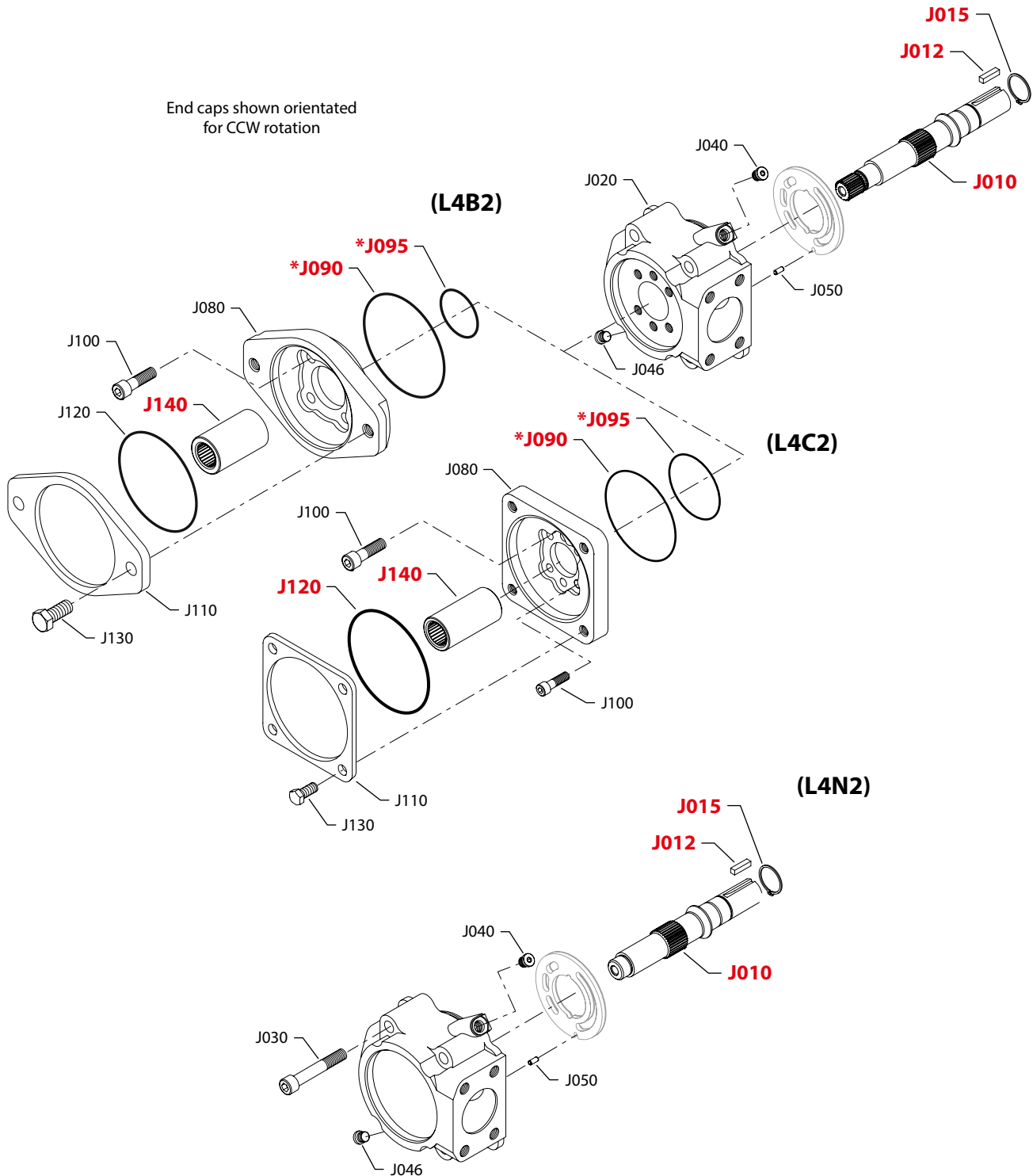
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit	
K4V2	J010	97-43		4570159	Shaft, keyed (45*057 & HR*)	1	
	"	99-08	00-22	4570324	Shaft, keyed (45*B57)	1	
	J012	96-44		5000364	Key	1	
	J015	96-44		5000365	Retaining ring	1	
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1	
	J030	96-44		5000386	Screw	4	
	J040	96-44		327007 (9005110-4400)	Plug assembly	1	
	J046	96-44		327007 (9005110-4400)	Plug assembly	1	
	J050	96-44		688622 (9004700-1907)	Pin	1	
	J080	97-43		4570210	Adapter flange, SAE B (SB-1997-008)	1	
	J090	97-43		5000099 (9004100-1550)	O-ring	1	
	"	96-44	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)		
	J095	97-43		545434 (9004100-0420)	O-ring	1	
	L4A2	J100	96-44		5000489	Screw	4
J110		96-44		4460370	Cover plate	1	
J120		96-44		680892 (9004104-0440)	O-ring	1	
J130		96-44		647248 (9007200-5021)	Screw	2	
J140		96-44		1701188	Coupling, 15-tooth	1	
L4A2		J010	99-49		4570324	Shaft, keyed	1
		J012	99-49		5000364	Key	1
		J015	99-49		5000365	Retaining ring	1
		J020	99-49		4570212	End cap, radial ports	1
		J030	99-49		5000386	Screw	4
		J040	99-49		327007 (9005110-4400)	Plug assembly	1
		J046	99-49		327007 (9005110-4400)	Plug assembly	1
		J050	99-49		688622 (9004700-1907)	Pin	1
		J080	99-49		4570289	Adapter flange, SAE A	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1	
	J095	99-49		545434 (9004100-0420)	O-ring	1	
	J100	99-49		5000489	Screw	4	
	J110	99-49		4460586	Cover plate	1	
	J120	99-49		4800482	'A' pad seal	1	
J130	99-49		001925 (9007200-3712)	Screw	2		
J140	99-49		1701185	Coupling, 9-tooth	1		



Shaft, auxiliary flange, end cap and housing



\* = included in base motor seal kit Q210

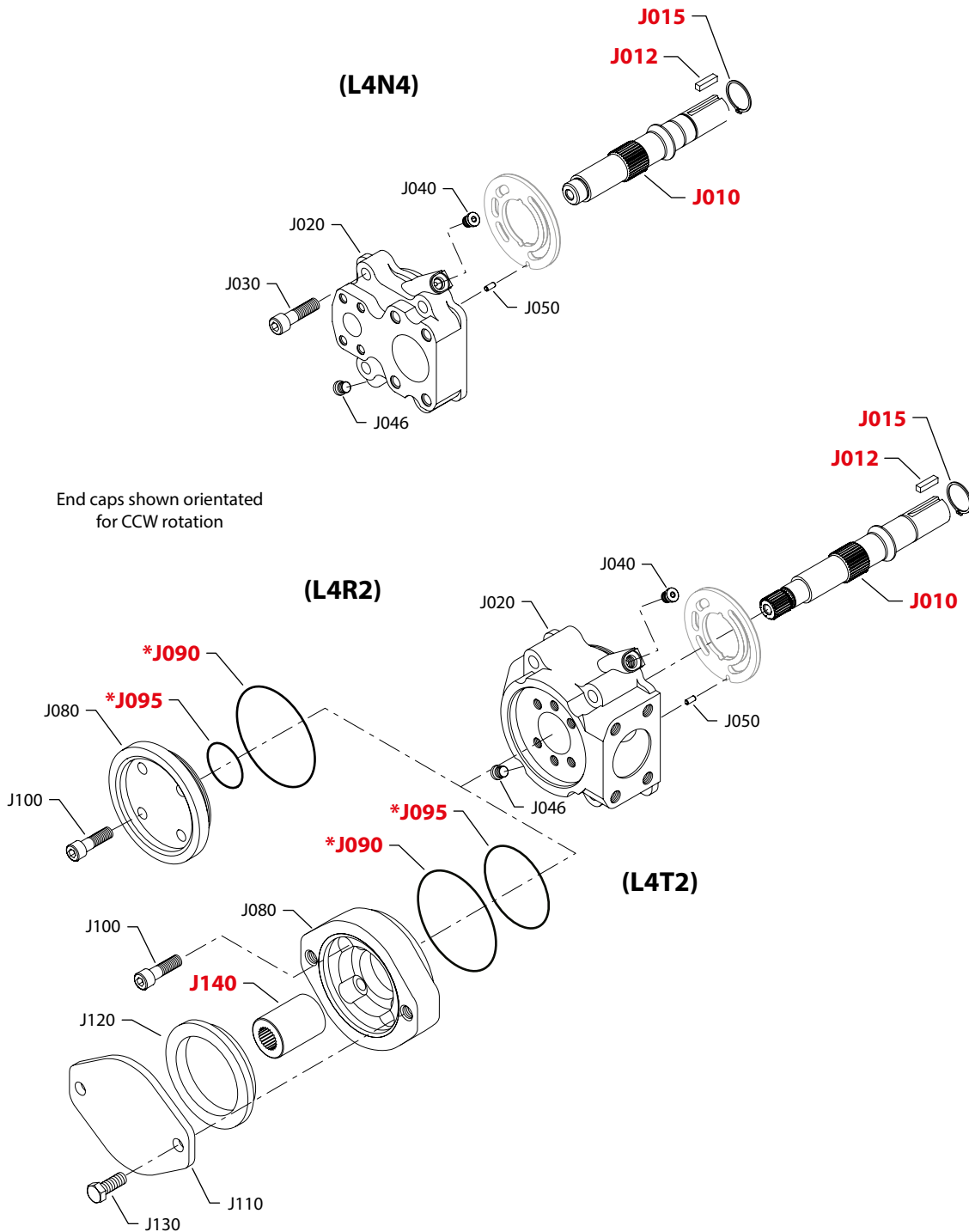
E100 355E  
 Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
L4B2	J010	99-49		4570324	Shaft, keyed	1
	J012	99-49		5000364	Key	1
	J015	99-49		5000365	Retaining ring	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570210	Adapter flange, SAE B	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460370	Cover plate	1
	J120	99-49		680892 (9004104-0440)	O-ring	1
J130	99-49		647248 (9007200-5021)	Screw	2	
J140	99-49		1701187	Coupling, 13-tooth	1	
L4C2	J010	99-49		4570324	Shaft, keyed	1
	J012	99-49		5000364	Key	1
	J015	99-49		5000365	Retaining ring	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		11039356	Adapter flange, SAE C (SB-2008-052 Rev. A)	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	6
	J110	99-49		8800406	Cover plate	1
	J120	99-49		719179 (9004100-0480)	O-ring	1
J130	99-49		647248 (9007200-5021)	Screw	4	
J140	99-49		1701189	Coupling, 14-tooth	1	
L4N2	J010	03-04		4570440	Shaft, keyed	1
	J012	03-04		5000364	Key	1
	J015	03-04		5000365	Retaining ring	1
	J020	03-04		4570172	End cap, radial ports	1
	J030	03-04		5000386	Screw	4
	J040	03-04		327007 (9005110-4400)	Plug assembly	1
	J046	03-04		327007 (9005110-4400)	Plug assembly	1
	J050	03-04		688622 (9004700-1907)	Pin	1



Shaft, auxiliary flange, end cap and housing



\* = included in base motor seal kit Q210

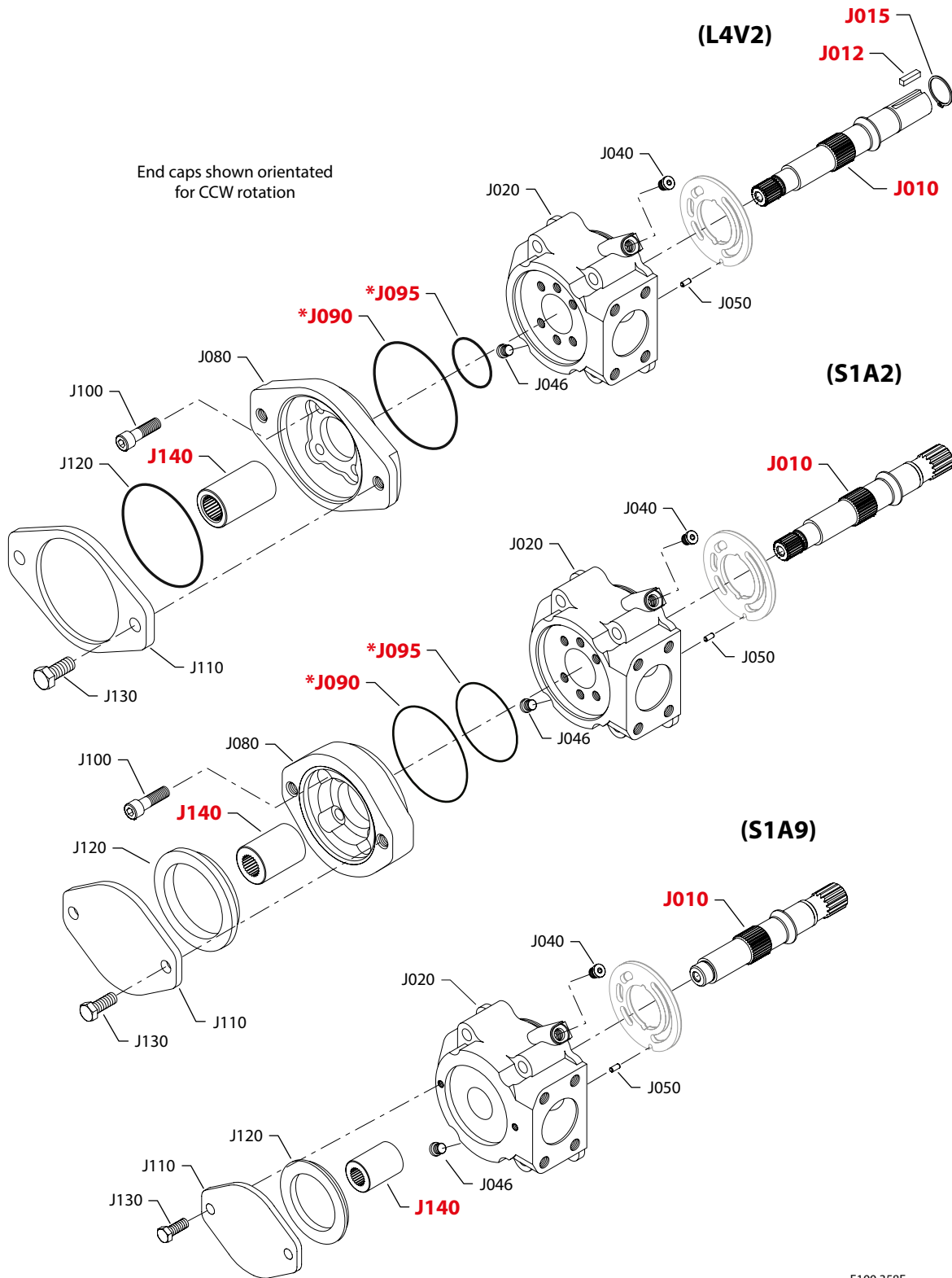
E100 357E  
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
L4N4	J010	96-18		4570440	Shaft, keyed	1
	J012	96-18		5000364	Key	1
	J015	96-18		5000365	Retaining ring	1
	J020	96-18		4570001	End cap, axial ports	1
	J030	96-18		5000181 (9007314-1210)	Screw	4
	J040	96-18		327007 (9005110-4400)	Plug assembly	1
	J046	96-18		327007 (9005110-4400)	Plug assembly	1
	J050	96-18		688622 (9004700-1907)	Pin	1
L4R2	J010	99-49		4570324	Shaft, keyed	1
	J012	99-49		5000364	Key	1
	J015	99-49		5000365	Retaining ring	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570179	Running cover	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		314534 (9004104-0310)	O-ring	1
J100	99-49		5000489	Screw	4	
L4T2	J010	99-49		4570324	Shaft, keyed	1
	J012	99-49		5000364	Key	1
	J015	99-49		5000365	Retaining ring	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570289	Adapter flange, SAE A	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460586	Cover plate	1
	J120	99-49		4800482	'A' pad seal	1
	J130	99-49		001925 (9007200-3712)	Screw	2
	J140	99-49		1701186	Coupling, 11-tooth	1



Shaft, auxiliary flange, end cap and housing



\* = included in base motor seal kit Q210

E100 358E

Enlarged **bold** type item numbers are recommended part to stock for servicing.

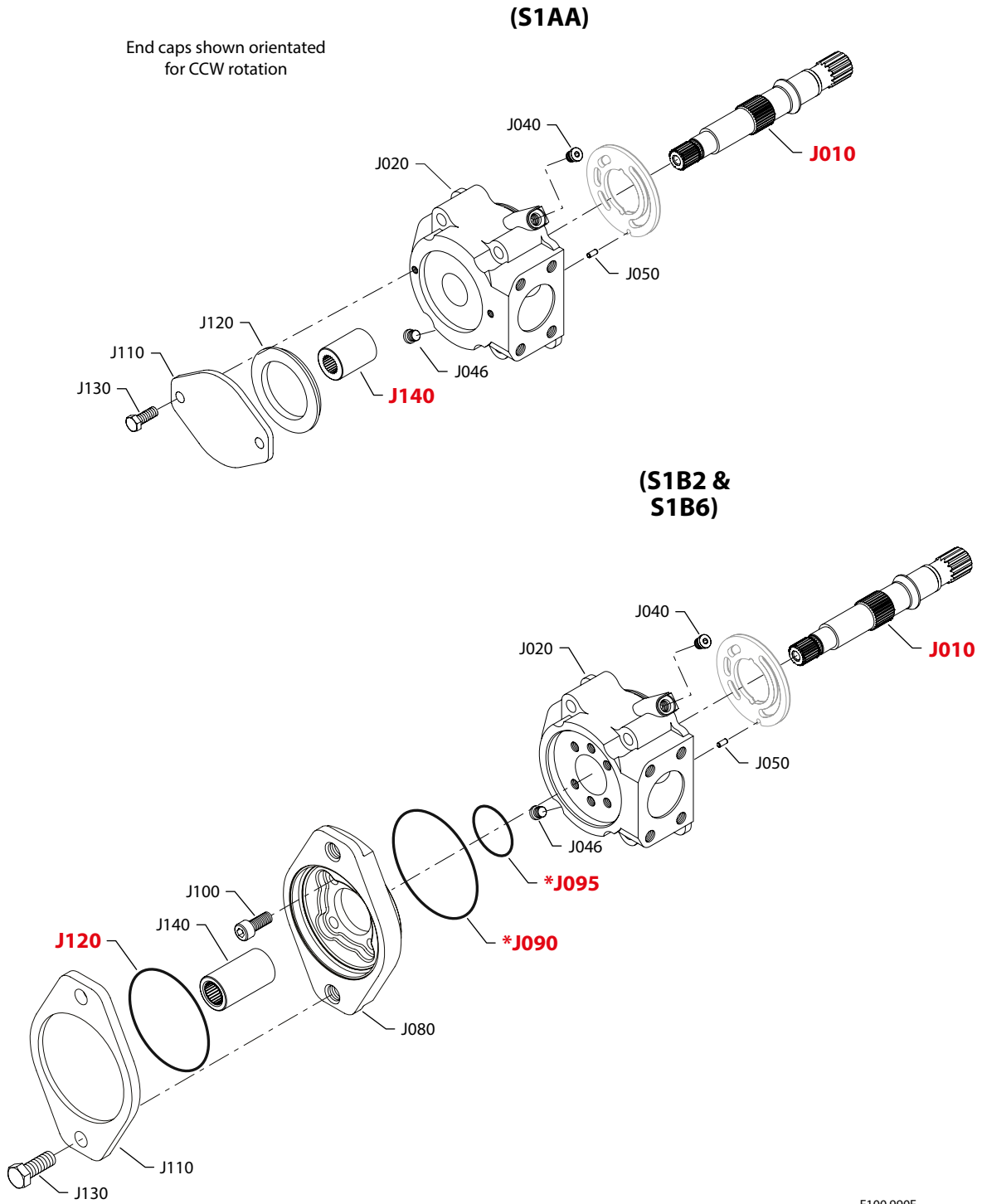



**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
L4V2	J010	99-49		4570324	Shaft, keyed	1
	J012	99-49		5000364	Key	1
	J015	99-49		5000365	Retaining ring	1
	J020	99-49		4570212	End cap, radial ports	1
	J030	99-49		5000386	Screw	4
	J040	99-49		327007 (9005110-4400)	Plug assembly	1
	J046	99-49		327007 (9005110-4400)	Plug assembly	1
	J050	99-49		688622 (9004700-1907)	Pin	1
	J080	99-49		4570210	Adapter flange, SAE B	1
	J090	99-49		5000099 (9004100-1550)	O-ring	1
	J095	99-49		545434 (9004100-0420)	O-ring	1
	J100	99-49		5000489	Screw	4
	J110	99-49		4460370	Cover plate	1
	J120	99-49		680892 (9004104-0440)	O-ring	1
J130	99-49		647248 (9007200-5021)	Screw	2	
J140	99-49		1701188	Coupling, 15-tooth	1	
S1A2	J010	96-18		4570132	Shaft, 14-tooth	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-18		5000386	Screw	4
	J040	96-18		327007 (9005110-4400)	Plug assembly	1
	J046	96-18		327007 (9005110-4400)	Plug assembly	1
	J050	96-18		688622 (9004700-1907)	Pin	1
	J080	97-43		4570289	Adapter flange, SAE A (SB-1999-006)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	J090	96-18	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-18		5000489	Screw	4
	J110	96-18		4460586	Cover plate (SB-1999-006)	1
	J120	96-18		4800482	'A' pad seal (SB-1999-006)	1
	J130	96-18		001925 (9007200-3712)	Screw	2
J140	96-18		1701185	Coupling, 9-tooth	1	
S1A9	J010	99-50		4570132	Shaft, 14-tooth	1
	J020	99-50		4570341	End cap, radial ports	1
	J030	99-50		5000386	Screw	4
	J040	99-50		327007 (9005110-4400)	Plug assembly	1
	J046	99-50		327007 (9005110-4400)	Plug assembly	1
	J050	99-50		688622 (9004700-1907)	Pin	1
	J110	99-50		4460586	Cover plate	1
	J120	99-50		4800482	'A' pad seal	1
	J130	99-50		5000622	Screw	2
	J140	99-50		4570356	Coupling, 9-tooth	1



Shaft, auxiliary flange, end cap and housing



\* = included in base motor seal kit Q210

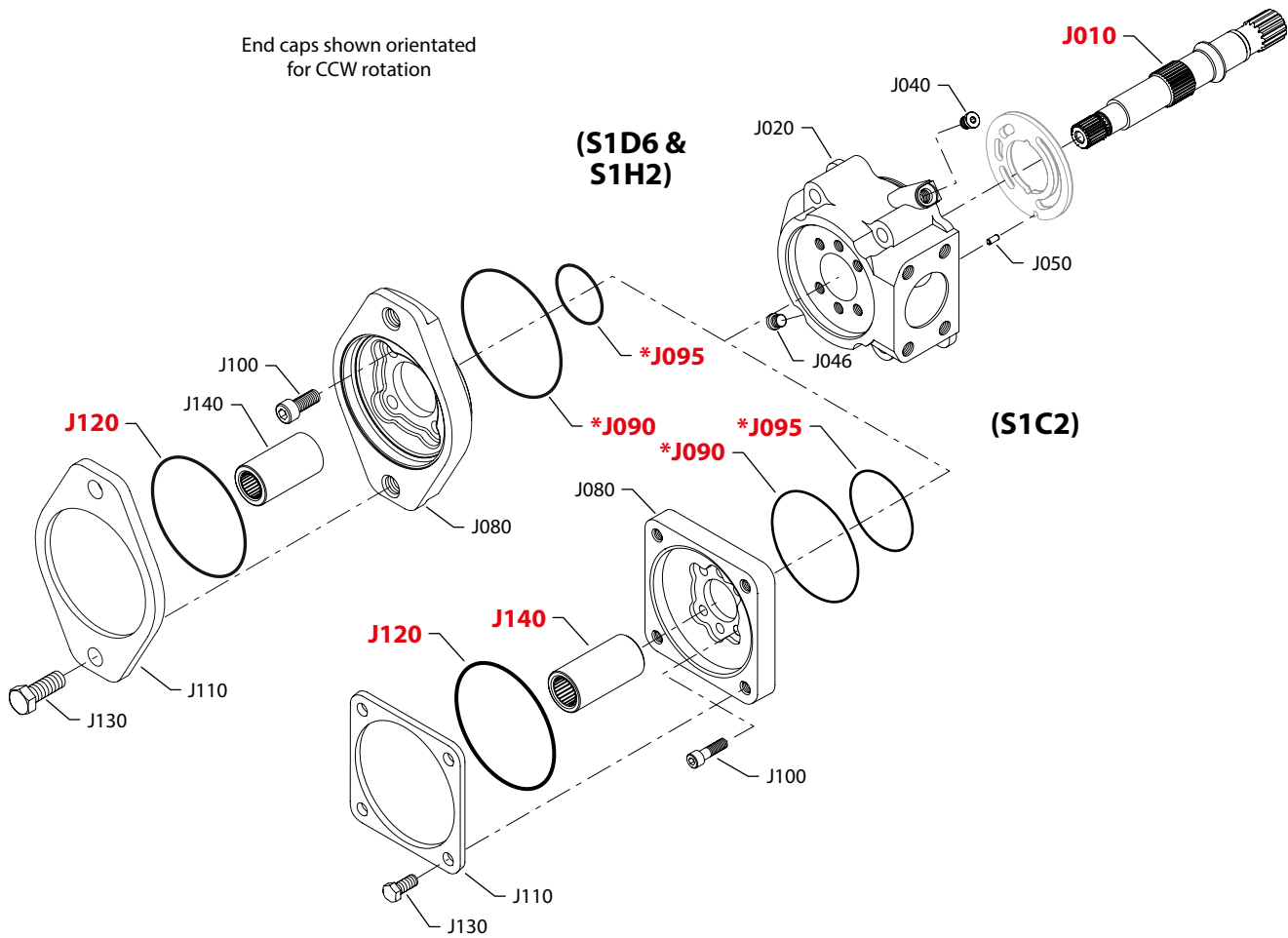
E100 990E  
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
S1AA	J010	01-23		4570132	Shaft, 14-tooth	1
	J020	01-23		4570407	End cap, radial ports	1
	J030	01-23		5000386	Screw	4
	J040	01-23		327007 (9005110-4400)	Plug assembly	1
	J046	01-23		327007 (9005110-4400)	Plug assembly	1
	J050	01-23		688622 (9004700-1907)	Pin	1
	J110	01-23		4460586	Cover plate	1
	J120	01-23		4800482	'A' pad seal	1
	J130	01-23		9007200-3712	Screw	2
	J140	01-23		4570356	Coupling, 9-tooth	1
S1B2	J010	96-18		4570132	Shaft, 14-tooth	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-18		5000386	Screw	4
	J040	96-18		327007 (9005110-4400)	Plug assembly	1
	J046	96-18		327007 (9005110-4400)	Plug assembly	1
	J050	96-18		688622 (9004700-1907)	Pin	1
	J080	97-43		4570210	Adapter flange, SAE B (SB-1997-008)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-18	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-18		5000489	Screw	4
	J110	96-18		4460370	Cover plate	1
	J120	96-18		680892 (9004104-0440)	O-ring	1
	J130	96-18		647248 (9007200-5021)	Screw	2
	J140	96-18		1701187	Coupling, 13-tooth	1
	S1B6	J010	00-08		4570132	Shaft, 14-tooth
J020		00-08		4570383	End cap, metric radial ports	1
J030		00-08		5000386	Screw	4
J040		00-08		327007 (9005110-4400)	Plug assembly	1
J046		00-08		327007 (9005110-4400)	Plug assembly	1
J050		00-08		688622 (9004700-1907)	Pin	1
J080		00-08		4570210	Adapter flange, SAE B	1
J090		00-08		5000099 (9004100-1550)	O-ring	1
J095		00-08		545434 (9004100-0420)	O-ring	1
J100		00-08		5000489	Screw	4
J110		00-08		4460370	Cover plate	1
J120		00-08		680892 (9004104-0440)	O-ring	1
J130		00-08		647248 (9007200-5021)	Screw	2
J140		00-08		17001187	Coupling, 13-tooth	1



Shaft, auxiliary flange, end cap and housing



E100 361E

\* = included in base motor seal kit Q210

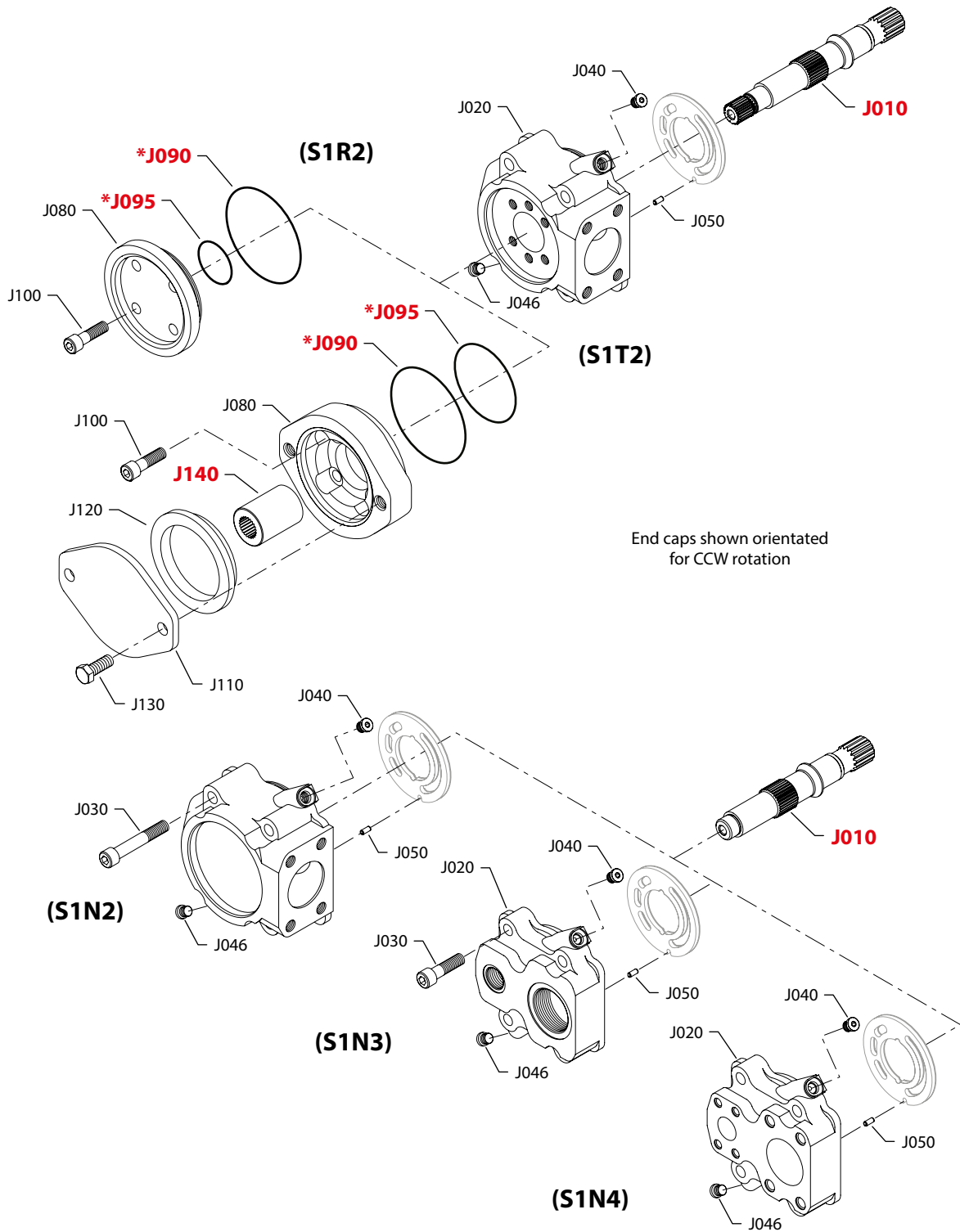
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
S1C2	J010	96-18		4570132	Shaft, 14-tooth spline	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-18		5000386	Screw	4
	J040	96-18		327007 (9005110-4400)	Plug assembly	1
	J046	96-18		327007 (9005110-4400)	Plug assembly	1
	J050	96-18		688622 (9004700-1907)	Pin	1
	J080	97-43		11039356	Adapter flange, SAE C (SB-1999-006 & SB-2008-052 A)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-18	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-18		5000489	Screw	6
	J110	96-18		8800406	Cover plate (SB-1999-006)	1
	J120	96-18		719179 (9004100-0480)	O-ring (SB-1999-006)	1
	J130	96-18		647248 (9007200-5021)	Screw	4
J140	96-18		1701189	Coupling, 14-tooth	1	
S1D6	J010	00-28		4570132	Shaft, 14-tooth	1
	J020	00-28		4570383	End cap, metric radial ports	1
	J030	00-28		5000386	Screw	4
	J040	00-28		327007 (9005110-4400)	Plug assembly	1
	J046	00-28		327007 (9005110-4400)	Plug assembly	1
	J050	00-28		688622 (9004700-1907)	Pin	1
	J080	00-28		4570390	Adapter flange, SAE B, metric threads	1
	J090	00-28		5000099 (9004100-1550)	O-ring	1
	J095	00-28		545434 (9004100-0420)	O-ring	1
	J100	00-28		5000489	Screw	4
	J110	00-28		4460370	Cover plate	1
	J120	00-28		680892 (9004104-0440)	O-ring	1
	J130	00-28		370320	Screw	2
	J140	00-28		1701187	Coupling, 13-tooth	1
S1H2	J010	03-33		4570132	Shaft, 14-tooth	1
	J020	00-28		4570212	End cap, radial ports	1
	J030	03-33		5000386	Screw	4
	J040	03-33		327007 (9005110-4400)	Plug assembly	1
	J046	03-33		327007 (9005110-4400)	Plug assembly	1
	J050	03-33		688622 (9004700-1907)	Pin	1
	J080	03-33		4570210	Adapter flange, SAE B (SB-1997-008)	1
	J090	03-33		5000099 (9004100-1550)	O-ring	1
	J095	03-33		545434 (9004100-0420)	O-ring	1
	J100	03-33		5000489	Screw	4
	J110	03-33		4460370	Cover plate	1
	J120	03-33		680892 (9004104-0440)	O-ring	1
	J130	03-33		647248 (9007200-5021)	Screw	2
	J140	03-33		1701188	Coupling, 15-tooth	1



Shaft, auxiliary flange, end cap and housing



E100 350E

\* = included in base motor seal kit Q210

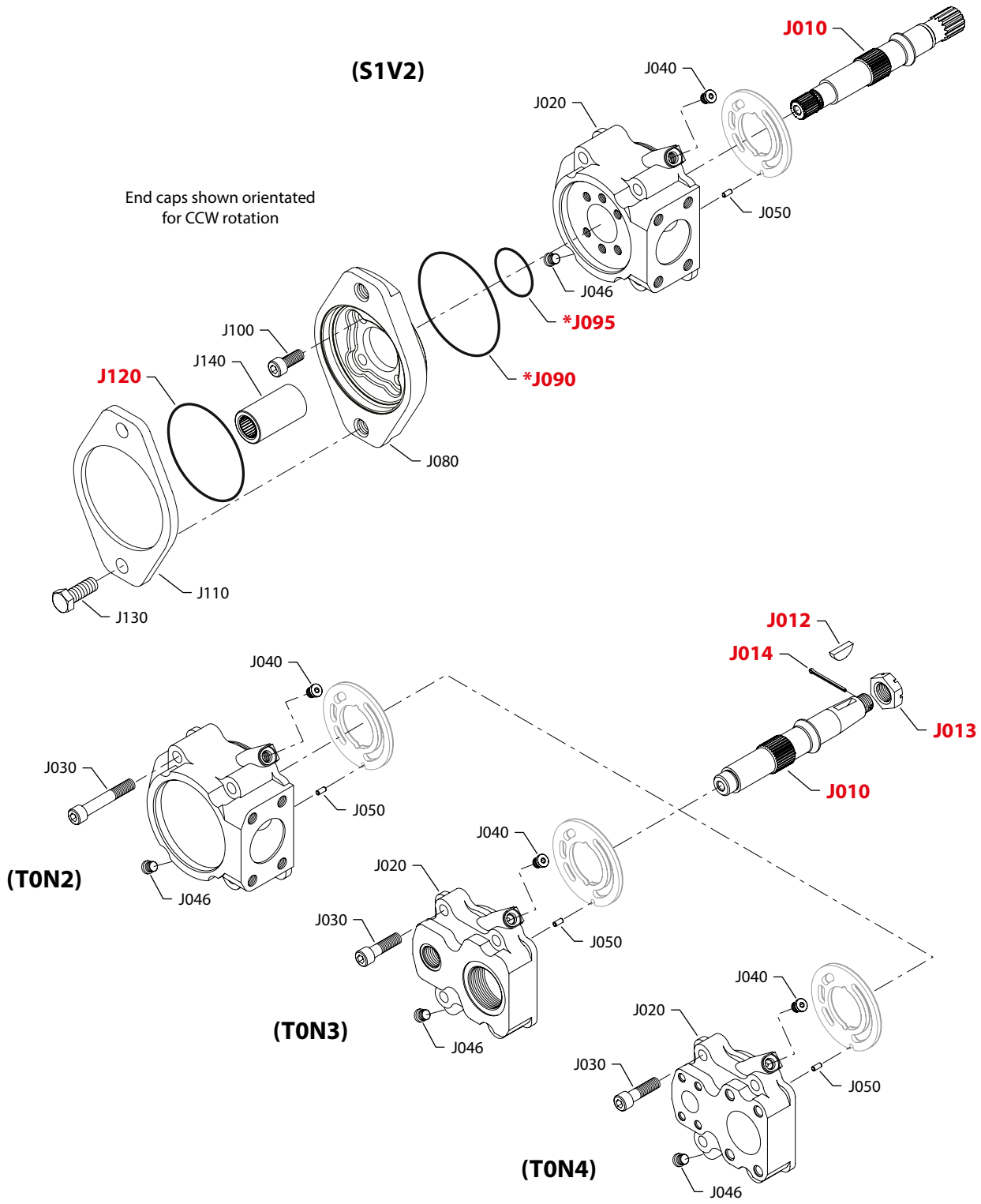
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit	
S1N2	J010	96-18		4570081	Shaft, 14-tooth	1	
	J020	96-18		4570172	End cap, radial ports	1	
	J030	96-18		5000386	Screw	4	
	J040	96-18		327007 (9005110-4400)	Plug assembly	1	
	J046	96-18		327007 (9005110-4400)	Plug assembly	1	
	J050	96-18		688622 (9004700-1907)	Pin	1	
	S1N3	J010	99-07		4570081	Shaft, 14-tooth	1
J020		99-07		4570294	End cap, axial ports	1	
J030		99-07		5000181 (9007314-1210)	Screw	4	
J040		99-07		327007 (9005110-4400)	Plug assembly	1	
J046		99-07		327007 (9005110-4400)	Plug assembly	1	
J050		99-07		688622 (9004700-1907)	Pin	1	
S1N4		J010	96-18		4570081	Shaft, 14-tooth	1
	J020	96-18		4570001	End cap, axial ports	1	
	J030	96-18		5000181 (9007314-1210)	Screw	4	
	J040	96-18		327007 (9005110-4400)	Plug assembly	1	
	J046	96-18		327007 (9005110-4400)	Plug assembly	1	
	J050	96-18		688622 (9004700-1907)	Pin	1	
	S1R2	J010	97-34		4570132	Shaft, 14-tooth	1
J020		97-43		4570212	End cap, radial ports (SB-1997-008)	1	
J030		97-34		5000386	Screw	4	
J040		97-34		327007 (9005110-4400)	Plug assembly	1	
J046		97-34		327007 (9005110-4400)	Plug assembly	1	
J050		97-34		688622 (9004700-1907)	Pin	1	
J080		97-34		4570179	Running cover	1	
J090		98-25		5000099 (9004100-1550)	O-ring	1	
"		97-34	98-24	327627 (9004104-1540)	O-ring (SB-1997-008)	1	
J095		97-34		314534 (9004104-0310)	O-ring	1	
J100		97-34		5000489	Screw	4	
S1T2		J010	96-18		4570132	Shaft, 14-tooth	1
		J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-18		5000386	Screw	4	
	J040	96-18		327007 (9005110-4400)	Plug assembly	1	
	J046	96-18		327007 (9005110-4400)	Plug assembly	1	
	J050	96-18		688622 (9004700-1907)	Pin	1	
	J080	97-43		4570289	Adapter flange, SAE A (SB-1999-006)	1	
	J090	97-43		5000099 (9004100-1550)	O-ring	1	
	"	96-18	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1	
	J095	97-43		545434 (9004100-0420)	O-ring	1	
	J100	96-18		5000489	Screw	4	
	J110	96-18		4460586	Cover plate (SB-1999-006)	1	
	J120	96-18		4800482	'A' pad seal (SB-1999-006)	1	
	J130	96-18		001925 (9007200-3712)	Screw	2	
	J140	96-18		1701186	Coupling, 11-tooth	1	



Shaft, auxiliary flange, end cap and housing



\* = included in base motor seal kit Q210

E100 362E  
Enlarged **bold** type item numbers are recommended part to stock for servicing.



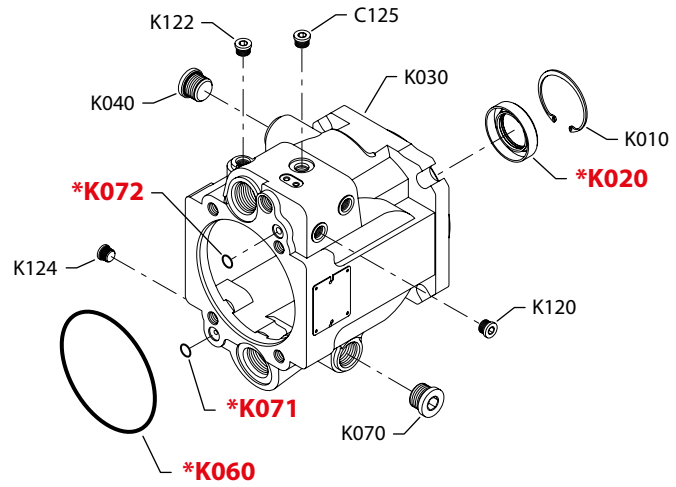

**Shaft, auxiliary flange, end cap and housing**
**Shaft/auxiliary flange/end cap**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
S1V2	J010	96-18		4570132	Shaft, 15-tooth	1
	J020	97-43		4570212	End cap, radial ports (SB-1997-008)	1
	J030	96-18		5000386	Screw	4
	J040	96-18		327007 (9005110-4400)	Plug assembly	1
	J046	96-18		327007 (9005110-4400)	Plug assembly	1
	J050	96-18		688622 (9004700-1907)	Pin	1
	J080	97-43		4570210	Adapter flange, SAE B (SB-1997-008)	1
	J090	97-43		5000099 (9004100-1550)	O-ring	1
	"	96-18	97-42	327627 (9004104-1540)	O-ring (SB-1997-008)	1
	J095	97-43		545434 (9004100-0420)	O-ring	1
	J100	96-18		5000489	Screw	4
	J110	96-18		4460370	Cover plate	1
	J120	96-18		680892 (9004104-0440)	O-ring	1
	J130	96-18		647248 (9007200-5021)	Screw	2
J140	96-18		1701188	Coupling, 15-tooth	1	
TON2	J010	95-46		4570059	Shaft, tapered	1
	J012	95-46		5000362	Key	1
	J013	95-46		5000606	Slotted nut	1
	J014	95-46		716779 (9004600-1230)	Cotter pin	1
	J020	95-46		4570172	End cap, radial ports	1
	J030	95-46		5000386	Screw	4
	J040	95-46		327007 (9005110-4400)	Plug assembly	1
	J046	95-46		327007 (9005110-4400)	Plug assembly	1
	J050	95-46		688622 (9004700-1907)	Pin	1
TON3	J010	99-07		4570059	Shaft, tapered	1
	J012	99-07		5000362	Key	1
	J013	99-07		5000606	Slotted nut	1
	J014	99-07		716779 (9004600-1230)	Cotter pin	1
	J020	99-07		4570294	End cap, axial ports	1
	J030	99-07		5000181 (9007314-1210)	Screw	4
	J040	99-07		327007 (9005110-4400)	Plug assembly	1
	J046	99-07		327007 (9005110-4400)	Plug assembly	1
	J050	99-07		688622 (9004700-1907)	Pin	1
TON4	J010	95-46		4570059	Shaft, tapered	1
	J012	95-46		5000362	Key	1
	J013	95-46		5000606	Slotted nut	1
	J014	95-46		716779 (9004600-1230)	Cotter pin	1
	J020	95-46		4570001	End cap, axial ports	1
	J030	95-46		5000181 (9007314-1210)	Screw	4
	J040	95-46		327007 (9005110-4400)	Plug assembly	1
	J046	95-46		327007 (9005110-4400)	Plug assembly	1
	J050	95-46		688622 (9004700-1907)	Pin	1

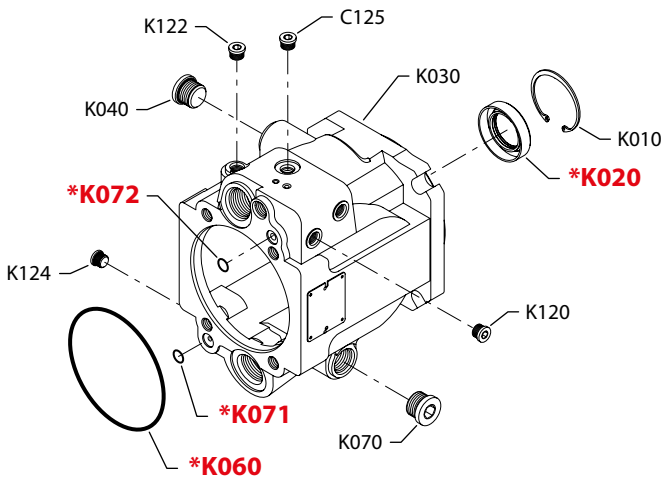


Shaft, auxiliary flange, end cap and housing

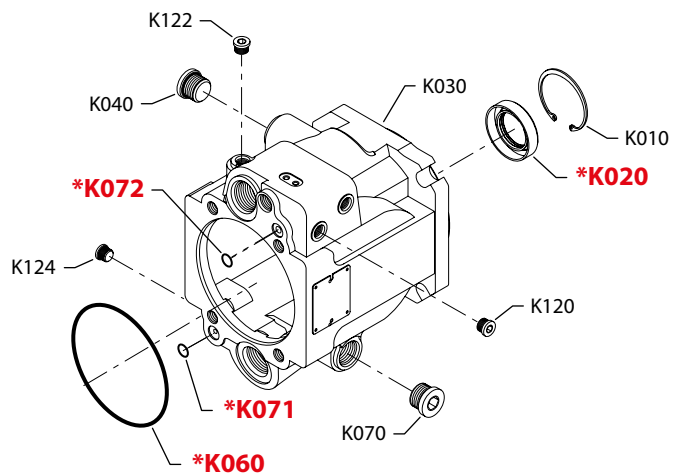
(A1N)



(A3N)



(A4N)



E100 988E

\* = included in base motor seal kit Q210

Enlarged **bold** type item numbers are recommended part to stock for servicing.

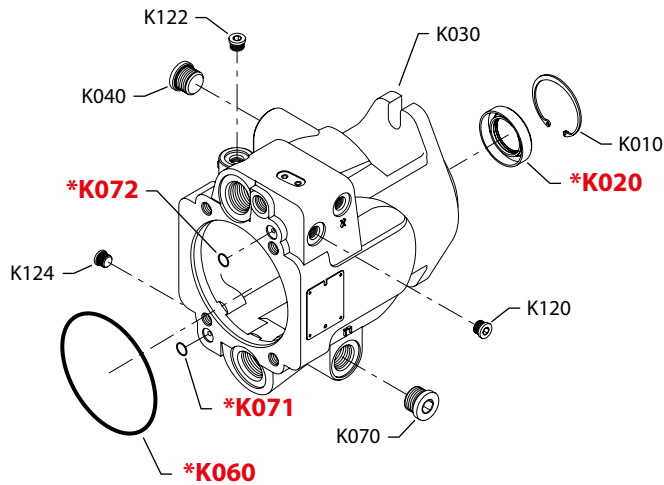

**Shaft, auxiliary flange, end cap and housing**
**Housing/shaft seal**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
A1N	C125	94-34		327007 (9005110-4400)	Plug assembly	1
	K010	94-34		016014 (9006200-0206)	Retaining ring	1
	K020	94-34		5000702	Lip seal (SB-2006-005)	1
	K030	97-12		4570253	Housing assembly, 4 bolt (SB-1997-007)	1
	K040	94-34		315325 (9005110-8700)	Plug assembly	1
	K060	94-34		733295	O-ring (SB-2001-026)	1
	K070	94-34		315325 (9005110-8700)	Plug assembly	1
	K071	94-34		011296 (9004105-0120)	O-ring	1
	K072	94-34		011296 (9004105-0120)	O-ring	1
	K120	94-34		327007 (9005110-4400)	Plug assembly	1
	K122	94-34		327007 (9005110-4400)	Plug assembly	1
	K124	94-34		327007 (9005110-4400)	Plug assembly	1
	A3N	C125	96-12		327007 (9005110-4400)	Plug assembly
K010		96-12		016014 (9006200-0206)	Retaining ring	1
K020		96-12		5000702	Lip seal (SB-2006-005)	1
K030		97-12		4570252	Housing assembly, 2 bolt (SB-1997-007)	1
K040		96-12		315325 (9005110-8700)	Plug assembly	1
K060		96-12		733295	O-ring (SB-2001-026)	1
K070		96-12		315325 (9005110-8700)	Plug assembly	1
K071		96-12		011296 (9004105-0120)	O-ring	1
K072		96-12		011296 (9004105-0120)	O-ring	1
K120		96-12		327007 (9005110-4400)	Plug assembly	1
K122		96-12		327007 (9005110-4400)	Plug assembly	1
K124		96-12		327007 (9005110-4400)	Plug assembly	1
A4N		K010	96-12		016014 (9006200-0206)	Retaining ring
	K020	96-12		5000702	Lip seal (SB-2006-005)	1
	K030	97-12		4570221	Housing assembly, 2 bolt, metric (SB-1997-007)	1
	K040	96-12		5000439	Plug assembly, M22	1
	K060	96-12		733295	O-ring (SB-2001-026)	1
	K070	96-12		5000439	Plug assembly, M22	1
	K071	96-12		011296 (9004105-0120)	O-ring	1
	K072	96-12		011296 (9004105-0120)	O-ring	1
	K120	96-12		327007 (9005110-4400)	Plug assembly	1
	K122	96-12		5000438	Plug assembly, M14	1
	K124	96-12		5000438	Plug assembly, M14	1

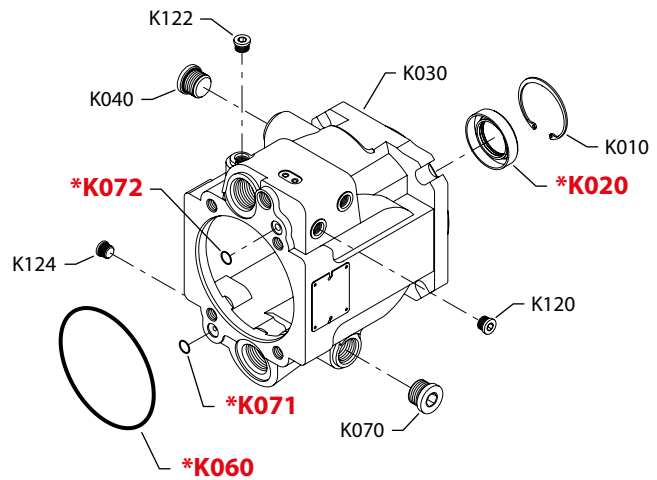


Shaft, auxiliary flange, end cap and housing

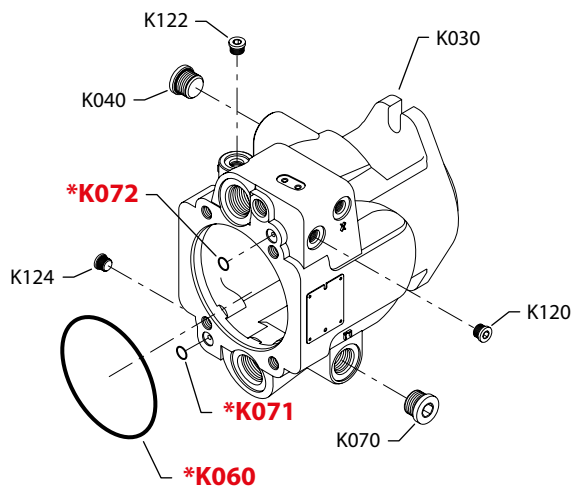
(A5N & A6N)



(A7N)



(C5N)



E100 356E

\* = included in base motor seal kit Q210

Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Shaft, auxiliary flange, end cap and housing**
**Housing/shaft seal**

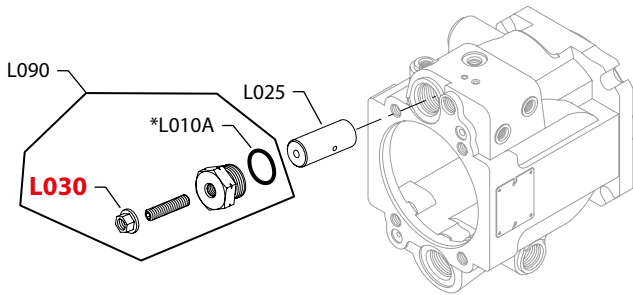
Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
A5N	K010	00-01		016014 (9006200-0206)	Retaining ring	1
	K020	00-01		5000702	Lip seal (SB-2006-005)	1
	K030	00-01		4570260	Housing assembly, 2 bolt	1
	K040	00-01		315325 (9005110-8700)	Plug assembly	1
	K060	00-01		733295	O-ring (SB-2001-026)	1
	K070	00-01		315325 (9005110-8700)	Plug assembly	1
	K071	00-01		011296 (9004105-0120)	O-ring	1
	K072	00-01		011296 (9004105-0120)	O-ring	1
	K120	00-01		327007 (9005110-4400)	Plug assembly	1
	K122	00-01		327007 (9005110-4400)	Plug assembly	1
	K124	00-01		327007 (9005110-4400)	Plug assembly	1
	A6N	K010	99-07		016014 (9006200-0206)	Retaining ring
K020		99-07		5000702	Lip seal (SB-2006-005)	1
K030		99-07		4570320	Housing assembly, 2 bolt	1
K040		99-07		315325 (9005110-8700)	Plug assembly	1
K060		99-07		733295	O-ring (SB-2001-026)	1
K070		99-07		315325 (9005110-8700)	Plug assembly	1
K071		99-07		011296 (9004105-0120)	O-ring	1
K072		99-07		011296 (9004105-0120)	O-ring	1
K120		99-07		327007 (9005110-4400)	Plug assembly	1
K122		99-07		327007 (9005110-4400)	Plug assembly	1
K124		99-07		327007 (9005110-4400)	Plug assembly	1
A7N		K010	99-49		016014 (9006200-0206)	Retaining ring
	K020	99-49		5000702	Lip seal (SB-2006-005)	1
	K030	99-49		4570369	Housing assembly, 4 bolt, metric	1
	K040	99-49		5000439	Plug assembly, M22	1
	K060	99-49		733295	O-ring (SB-2001-026)	1
	K070	99-49		5000439	Plug assembly, M22	1
	K071	99-49		011296 (9004105-0120)	O-ring	1
	K072	99-49		011296 (9004105-0120)	O-ring	1
	K120	99-49		327007 (9005110-4400)	Plug assembly	1
	K122	99-49		5000438	Plug assembly, M14	1
	K124	99-49		5000438	Plug assembly, M14	1
	C5N	K030	00-01		4570260	Housing assembly, 2 bolt
K040		00-01		5000439	Plug assembly, M22	1
K060		00-01		733295	O-ring (SB-2001-026)	1
K070		00-01		5000439	Plug assembly, M22	1
K071		00-01		011296 (9004105-0120)	O-ring	1
K072		00-01		011296 (9004105-0120)	O-ring	1
K120		00-01		327007 (9005110-4400)	Plug assembly	1
K122		00-01		5000438	Plug assembly, M14	1
K124		00-01		5000438	Plug assembly, M14	1



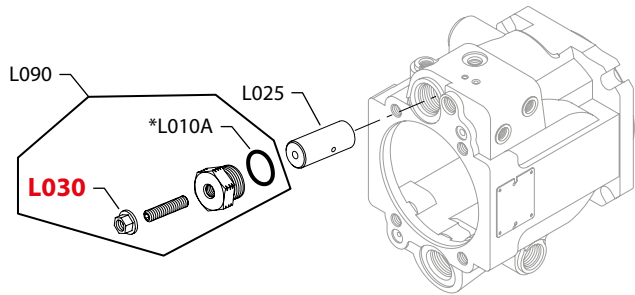
Displacement limiter

Generic housing used to show part location only

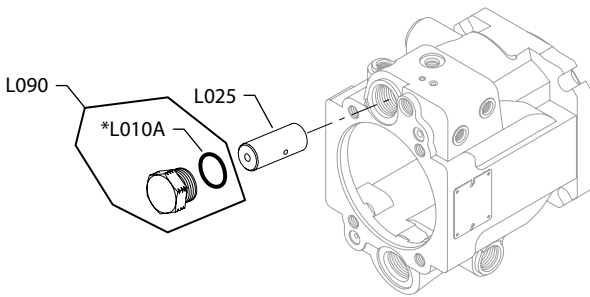
**(AAA & A70-A95)**



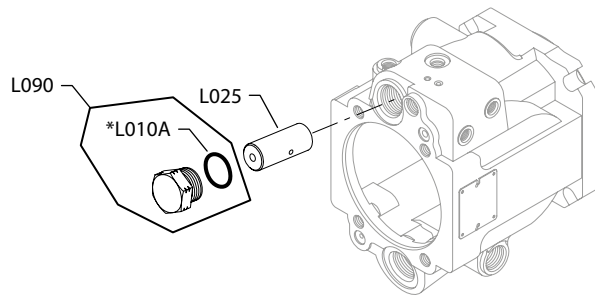
**(DAA & D70-D95)**



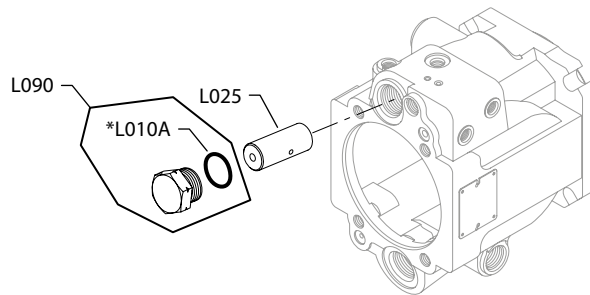
**(DNN)**



**(F03)**



**(F90 & NNN)**



E100 359E

\* = included in base motor seal kit Q210

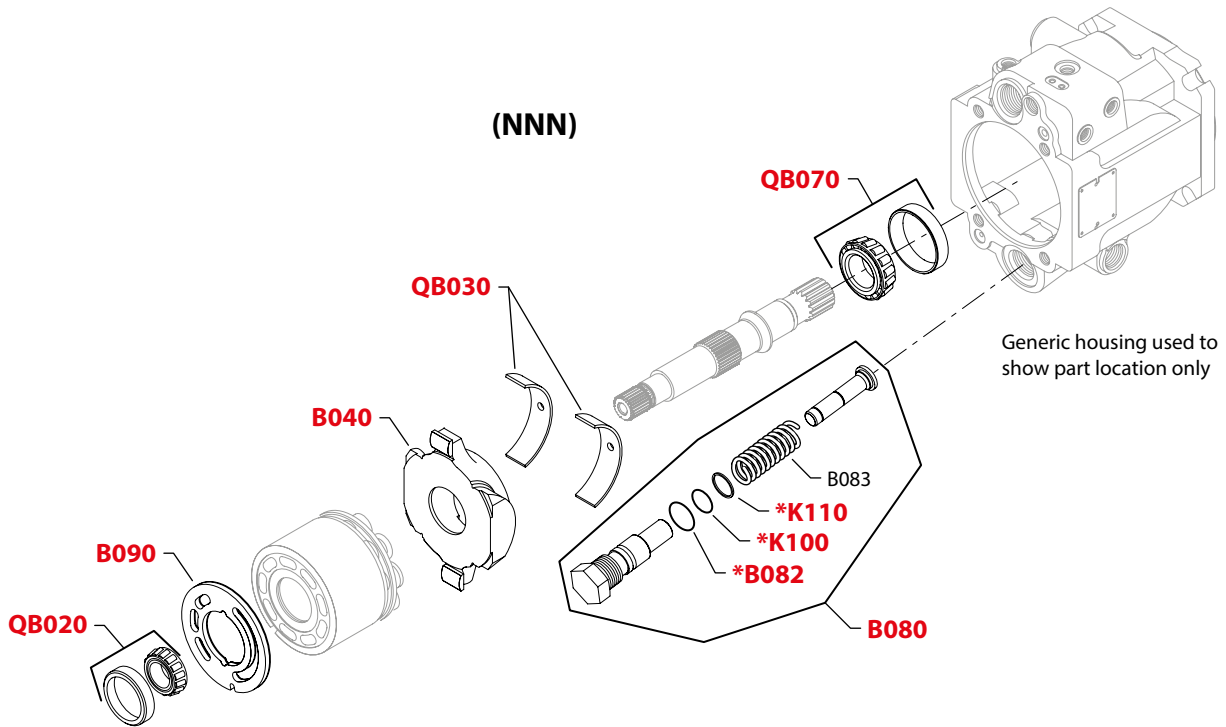
Enlarged **bold** type item numbers are recommended part to stock for servicing.


**Displacement limiter**
**Displacement limiter**

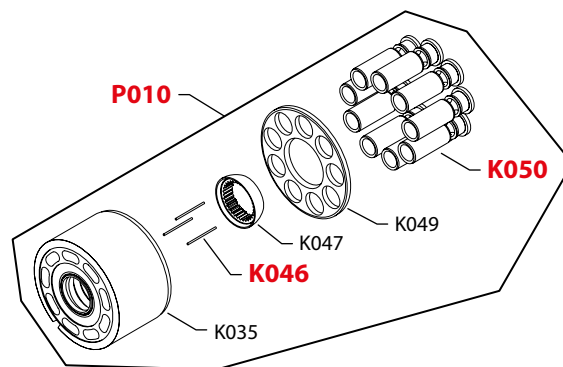
Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
A70-A95	L10A	95-22		9004201-7500	O-ring	1
	L025	97-12		4570215	Servo piston (SB-1997-007)	1
	L030	95-22		076042 (9003509-0012)	Seal nut	1
	L090	95-22		11099072	Displacement limiter kit (SB-2012-020)	1
AAA	L10A	95-22		9004201-7500	O-ring	1
	L025	97-12		4570215	Servo piston (SB-1997-007)	1
	L030	95-22		076042 (9003509-0012)	Seal nut	1
	L090	95-22		11099072	Displacement limiter kit (SB-2012-020)	1
D70-D95	L10A	95-22		9004201-7500	O-ring	1
	L025	97-12		4570215	Servo piston (SB-1997-007)	1
	L030	95-22		076042 (9003509-0012)	Seal nut	1
	L090	95-22		11099073	Displacement limiter kit (SB-2012-020)	1
DAA	L10A	95-22		9004201-7500	O-ring	1
	L025	97-12		4570215	Servo piston (SB-1997-007)	1
	L030	95-22		076042 (9003509-0012)	Seal nut	1
	L090	95-22		11099073	Displacement limiter kit (SB-2012-020)	1
DNN	L10A	95-22		9004201-7500	O-ring	1
	L025	99-49		4570215	Servo piston	1
	L090	99-49		4570347	Plug assembly	1
F03	L10A	95-22		9004201-7500	O-ring	1
	L025	97-12		4570215	Servo piston (SB-1997-007)	1
	L090	97-12		4570229	Plug assembly (SB-1997-007)	1
	"	96-49	97-11	4570194	Plug assembly	1
F90	L10A	00-14	07-13	9004201-7500	O-ring	1
	L025	00-14	07-13	4570215	Servo piston	1
	L090	00-14	07-13	4570227	Plug assembly	1
NNN	L10A	95-22		9004201-7500	O-ring	1
	L025	97-12		4570215	Servo piston (SB-1997-007)	1
	L090	97-12		4570227	Plug assembly (SB-1997-007)	1
	L090	94-34	97-11	093625 (9005100-9000)	Plug assembly	1



Shaft, auxiliary flange, end cap and housing



(057B & 075D)



\* = included in base motor seal kit Q210

E100 360E

Enlarged **bold** type item numbers are recommended part to stock for servicing.




**Shaft, auxiliary flange, end cap and housing**
**Special hardware**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
NNN	B040	94-34		4570446	Swashplate assembly (SB-2002-043)	1
	B080	94-34		4570451	Bias piston kit (SB-2002-036)	1
	B082	94-34		001156 (9004201-7500)	O-ring	1
	B083	94-34		4570016	Spring	1
	B090	94-34		4570109	Valve plate, CCW	1
	B090	94-34		4570108	Valve plate, CW	1
	K100	94-34		544742 (9004105-0190)	O-ring	1
	K110	94-34		5000182	Backup ring	1
	QB020	94-34		4510095	Rear bearing kit	1
	QB070	94-34		4510096	Front bearing kit	1
	QB030	94-34		11079513	Swashplate bearing kit	1

**Displacement**

057B	P010	94-34		4570455	Cylinder block kit, 57 cc (SB-2002-051)	1
	K035	94-34		11089529	Cylinder block assembly, 57 cc	1
	K046	94-34		688598 (9004875-0113)	Holddown pin	3
	K047	94-34		4460180	Slipper guide retainer	1
	K048	94-34		4460028	Slipper holddown pin retainer	1
	K049	94-34		4570387	Slipper retainer (SB-2002-051)	1
	K050	94-34		1700369	Piston assembly, 57 cc (SB-2002-051)	9
075D	P010	99-49		4570456	Cylinder block kit, 75 cc (SB-2002-046)	1
	K035	99-49		11089528	Cylinder block assembly, 75 cc	1
	K046	99-49		688598 (9004875-0113)	Holddown pin	3
	K047	99-49		4460180	Slipper guide retainer	1
	K048	99-49		4460028	Slipper holddown pin retainer	1
	K049	99-49		4570387	Slipper retainer	1
	K050	99-49		4570457	Piston assembly, 75 cc (SB-2001-028, SB-2002-046)	9


**Seal kit**
**Overhaul seal kit**

Order code	Item	Date begin	Date end	Part number	Part name	Qty. per model/kit
Q210				11106337	Overhaul seal kit, S45 H (SB-2011-031)	1
B082	94-34			001156 (9004201-7500)	O-ring, .924 x .116, nitrile, 90D	1
C020	94-34			612291 (9003508-0008)	Seal nut, M8	1
C040	94-34			001131 (9004201-5000)	O-ring, .644 x .087, nitrile, 90D	1
C110	98-21			4570238	Wedge (SB-1998-045)	1
D015	94-34			612291 (9003508-0008)	Seal nut, M8	1
D016	94-34			085043 (9004201-3700)	O-ring, .468 x .078, nitrile, 90D	1
D019	98-21	00-23		4570238	Wedge (SB-1999-050)	1
J090	97-43			5000099 (9004100-1550)	O-ring, 3.987 x .103, nitrile, 70D	1
J095	97-43			314534 (9004104-0310)	O-ring, 1.739 x .070, viton, 75D	1
J095	97-43			545434 (9004100-0420)	O-ring, 3.239 x .070, nitrile, 70D	1
K020	94-34			5000702	Lip seal (SB-2006-005)	1
K060	94-34			063248 (9004104-1560)	O-ring, 4.237 x .103, viton, 75D	1
K071	94-34			011296 (9004105-0120)	O-ring, .364 x .070, viton, 90D	1
K072	94-34			011296 (9004105-0120)	O-ring, .364 x .070, viton, 90D	1
K085	94-34			144725 (9004105-0110)	O-ring, .301 x .070, viton, 90D	1
K090	94-34			5000146 (9006110-0110)	Backup ring	1
K100	94-34			544742 (9004105-0190)	O-ring O-ring, .801 x .070, viton, 90D	1
K110	94-34			5000182	Backup ring	1
L010A	94-34			001156 (9004201-7500)	O-ring, .924 x .116, nitrile, 90D	1
L030	94-34			076042 (9003509-0012)	Seal nut, M12	1


**Service bulletin: SB-1997-007**

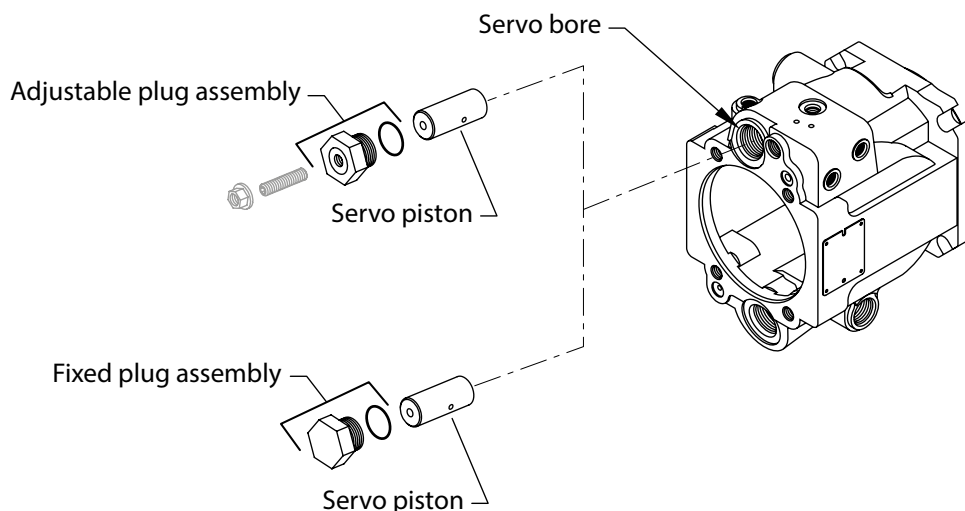
**Products affected** Series 45 H frame open circuit pump

**Subject** Addition of a brass sleeve in the servo bore

**Description** As a product improvement, Sauer-Danfoss is adding a brass sleeve to the servo bore of the Series 45 H frame open circuit pump.

This is a non-interchangeable change. If the housing or servo piston needs to be replaced on a pump built before this change, you **must** use the appropriate new housing, servo piston and plug assembly.

The old housing and servo piston are obsolete. They are no longer available as service parts. The old plug assembly remains available as a genuine service part.



**Models affected** All 4577xxx models

**Serial numbers affected** This change became effective at serial number A-97-12-xxxxx

**Part numbers affected**

Part description	Old part number	New part number	Old part number status
Variable housing "B" flange metric	4570186	4570221	Obsolete
Variable housing "B" flange SAE	4570154	4570220	Obsolete
Variable housing "C" flange SAE	4570130	4570219	Obsolete
Servo piston	4570017	4570215	Obsolete
Plug assembly (fixed 16 deg.)	93625	4570227	Serviceable
Plug assembly (adjustable)	4570129	4570228	Serviceable
Plug assembly (fixed 16.5 deg.)	4570194	4570229	Serviceable

**Parts disposition** ■ Non-Interchangeable



Service bulletin: SB-1997-008

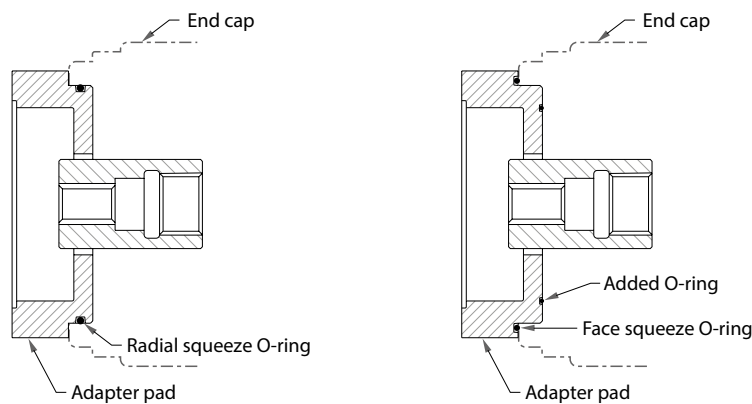
**Products affected** Series 45 H frame 57cc open circuit pump

**Subject** Adapter pad and radial ported end cap change

**Description** As a product improvement, Sauer-Danfoss is enhancing the serviceability of the adapter pad of the Series 45 H frame 57cc pump. The adapter pad O-ring is moved from a radial squeeze to a face squeeze. Also, a second O-ring is added. (See drawing below.)

This change affects the O-ring(s), the adapter pads, and the radial ported end cap. The service kit part numbers have not changed, but the kits have been updated to include the new adapter and new O-rings. The old adapters and radial ported end caps are obsolete and no longer available as a service part.

This change took effect on serial numbers A-97-43-xxxx and newer. This is a non-interchangeable change. To convert a pump to an adapter option on a pre-A-97-43-xxxx pump, also include the new radial ported end cap.



**Models affected** All 4577xxx models equipped with auxiliary pads

**Serial numbers affected** This change became effective at serial number A-97-43-xxxx

**Part numbers affected**

Part description	Old part #	New part #	Interchangeable	Old part #status
"A" flange adapter	4570074	4570209	Yes	Obsolete
"B" flange adapter	4570075	4570210	Yes	Obsolete
"C" flange adapter	4570061	4570211	Yes	Obsolete
Radial ported end cap	4570171	4570212	Yes	Obsolete
Face squeeze O-ring (was radial squeeze)	327627	9004100-1550 (5000099)	No	Serviceable
O-ring (new)	N/A	9004100-0420 (545434)	N/A	N/A
Aux. mounting kit*	4510169	4510169	N/A	No change in part
Aux. mounting kit*	4510170	4510170	N/A	No change in part#
Aux. mounting kit*	4510171	4510171	N/A	No change in part #
Aux. mounting kit*	4510172	4510172	N/A	No change in part #
Aux. mounting kit*	4510173	4510173	N/A	No change in part #

**Parts disposition**

■ Non-Interchangeable - Need both auxiliary mounting kit and radial ported end cap to convert a pump



**Service bulletin: SB-1997-028**

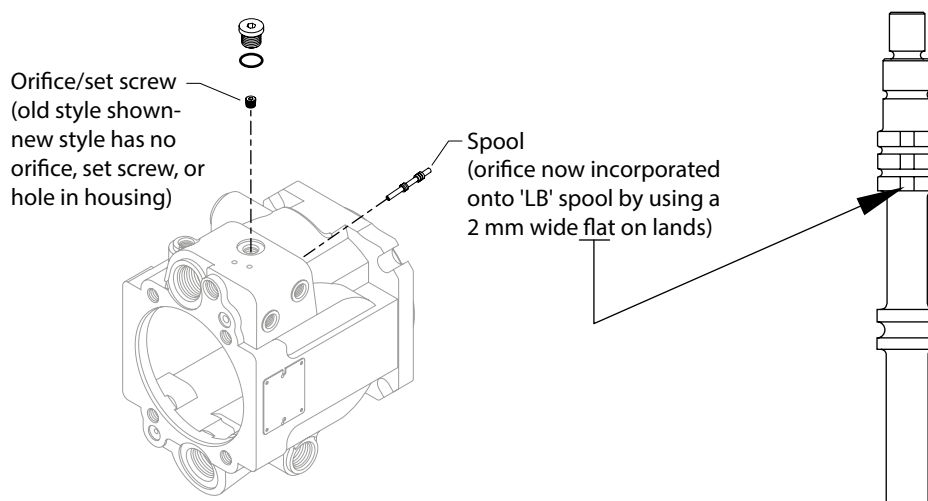
**Products affected** Series 45 H frame 57cc open circuit pump

**Subject** Incorporating new LB control spool

**Description** As a product improvement, Sauer-Danfoss incorporated a change to the design of the LB control option of the Series 45 H frame 57cc open circuit pumps.

The original LB control option included a bleed orifice that was screwed into the housing. This orifice is no longer there. It is now incorporated into the new LB spool as a 2 mm flat on the land (see below). The housing no longer has the hole location for either the LB orifice or the set screw (set screw used with all other options).

This change affects the LB orifice, the set screw, and the housing. The housing is obsolete. It is no longer available as a service part. The other parts are still available for service.



**Models affected** Series 45 H frame 57cc open circuit pumps

**Serial numbers affected** This change became effective at serial number A-98-02-xxxxx and beyond

**Part numbers affected**

Part description	Old part number	New part number	Old part number status
Set screw	092114	none	Serviceable
0.3 mm bleed Orifice	4570094	none	Serviceable
LB spool	4570025	4570245	Serviceable
Housing, 4-bolt, 'C' flange*	4570219	4570253	Obsolete
Housing, 2-bolt, 'B' flange*	4570220	4570252	Obsolete

\* Not saleable item. If you need a new housing, purchase complete pump.

**Parts disposition** ■ Non-Interchangeable



Service bulletin: SB-1997-044

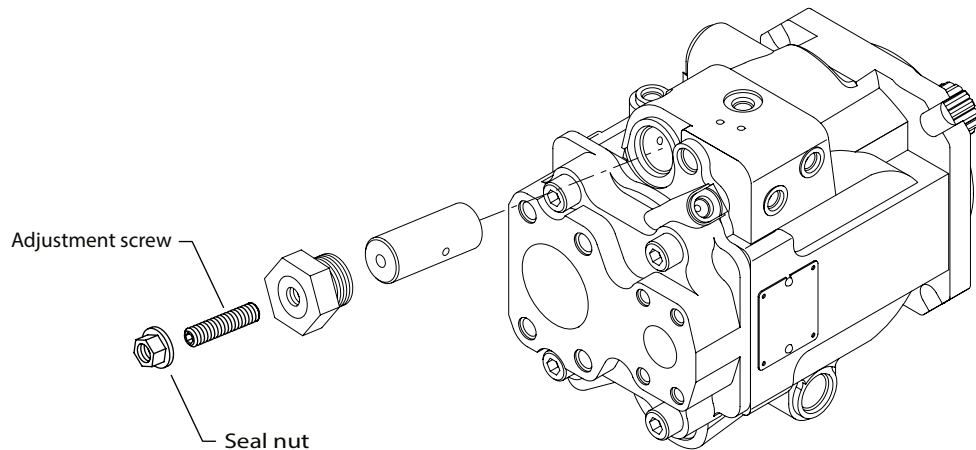
**Products affected** Series 45 H frame 57cc open circuit pump

**Subject** Maximum displacement limiter adjustment screw

**Description** Sauer-Danfoss has changed the design of the maximum displacement adjustment screw used with Series 45 57 cc open circuit pumps. This change only affects those pumps specified with externally adjustable maximum displacement limiters.

The new design incorporates a material change that improves the strength characteristic of the displacement adjusting screw. This change reduces the failure sensitivity of the screw due to overtorque. The torque specification for the seal nut remains unchanged.

A new screw part number has been released to aid in identifying this change. The new screw is completely interchangeable with the previous screw part number. The previous screw is no longer required in servicing the Series 45 pump.



**Models affected** All 4577xxx open circuit pumps equipped with adjustable displacement limiters

**Serial numbers affected** This change became effective at serial number A-97-49-xxxxx and beyond

**Part numbers affected**

Pump	Old screw part number	New screw part number
57 cc	9007712-1215	5000494

■ Interchangeable

**Parts disposition**



**Service bulletin: SB-1998-045**

**Products affected** Series 45 H frame 57cc open circuit pump

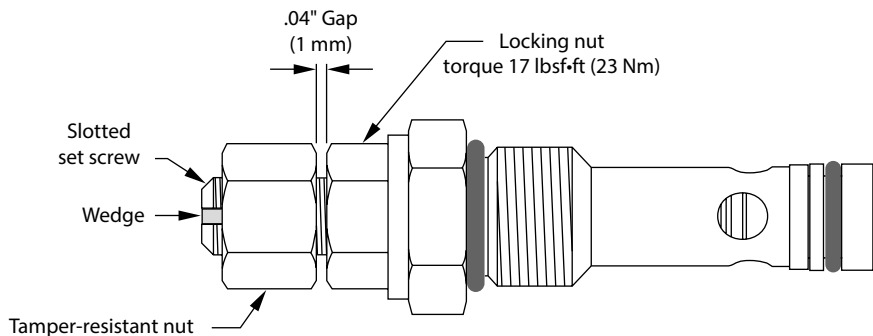
**Subject** PC & LS tamper resistant hardware

**Description** As a product improvement, Sauer-Danfoss is adding tamper-resistant hardware to both the Pressure Compensating (PC) and Load Sensing (LS) adjustment screws. This prevents customers from adjusting the settings too far above factory-set pressures.

All production model numbers and service kit numbers remain the same. The PC and LS control kits numbers are included on the second page, along with the new piece parts: wedge, slotted set screw, and nut.

The new control assemblies may only be adjusted a fixed amount above the factory setting, which is approximately one turn. For the Load Sensing (LS) control, this results in a +19 bar pressure difference. In the Pressure Compensating (PC) control, this could result in a + 89 bar pressure difference.

To install the new tamper resistant hardware on your pump, first set your PC and/or LS setting(s). Then, turn in the tamper-resistant nut until it is 1 mm (.04") above the locking nut (see picture). Secure tamper-resistant nut and drive wedge into slot of set screw until flush. Once obtained, the parts are no longer re-useable.



**Models affected** All 4577xxx open circuit pumps

**Serial numbers affected** This change became effective at serial number A-98-21-xxxxx and beyond

**Part numbers affected**

Item description	Old part number	Replacement part number
PC & LS socket head screw	4570207	-
Slotted set screw	-	4570236
Tamper-resistant nut	-	4570237
Wedge	-	4570238

Note: Service kit part numbers 4510155 (PC), 4510156 (L\*) and 4510097 (PC viton) have been updated to include the new tamper-resistant hardware. The kit part numbers did not change.

**Parts disposition** ■ Interchangeable



Service bulletin: SB-1999-006

**Products affected** Series 45 H frame 57 & 74cc open circuit pump

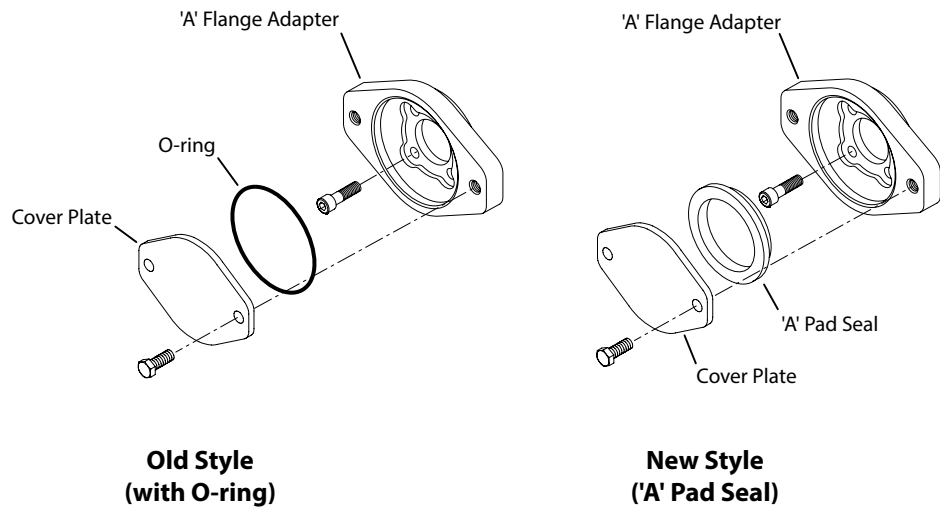
**Subject** 'A' pad auxiliary flange change

**Description** As a product improvement, Sauer-Danfoss has made a change to the 'A' pad adaptor flange of the Series 45 G frame 57 and 74cc open circuit pump. This change improves the sealing capabilities of the flange area.

The current seal for the 'A' pad adapter cover plate is an O-ring. The new style is an 'A' pad seal. See the drawing below for visual differences between old and new.

This change effects three components of the 'A' pad option to be able to fit with the new configuration. These parts are the cover plate, the 'A' flange adapter, and the 'A' pad seal (which was an O-ring style originally). The cover plate and 'A' flange adapter have new part numbers and are not interchangeable with the old style.

This is an interchangeable change only if all three new components are used together. The old adapter flange is obsolete.



**Models affected** All 4577xxx and 4747xxx open circuit pumps

**Serial numbers affected** This change became effective at serial number A-98-21-xxxxx and beyond

**Part numbers affected**

Part description	Old part number	New part number
Cover Plate	9802336	4460586
'A' Flange Adapter	4570209	4570289
O-ring	673533	n/a
'A' Pad Seal	-	4800482

**Parts disposition** ■ Interchangeable





**Service bulletin: SB-1999-050**

**Products affected** Series 45 H frame 57cc open circuit pump

**Subject** PC cartridge valve design change

**Description** As a product improvement, Sauer-Danfoss made a design change to the Pressure Compensating (PC) Cartridge Valve of the Series 45 H frame 57cc open circuit pump.

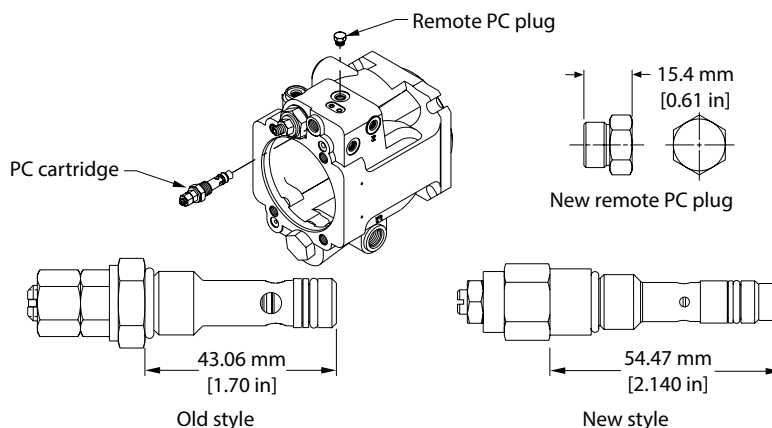
The new valve design eliminates the possibility of air entrapment in the spring chamber. This eliminates the possibility of system pressure instability if air is introduced into the system.

A new kit allows the new style PC cartridge to fit the current style housing. This kit includes the new PC cartridge and a short hex plug for the remote PC port. This allows enough clearance for the new PC cartridge to fit properly. The new PC cartridge will not fit using the old plug. The old PC cartridge is obsolete.

The new design does not have the tamper resistant hardware that the current style has (see SB-9845). The new PC cartridge has the min. and max. stops internally instead of externally. You cannot take this new PC cartridge apart for service.

Installation procedure: Remove the remote PC plug from the pump (3/16" internal hex wrench). Install the new short hex plug (9/16" wrench). Torque this plug to 16 Nm (12 lbf-ft).

After installing the plug, remove the old PC cartridge and install the new PC cartridge. Torque to 37 Nm (27 lbf-ft), using an 11/16" torque wrench. Re-set your pressure compensating setting following the Series 45 Service Manual (BLN-10129) instructions (they do not come pre-set). The new gain for the PC setting is 825 psi/turn.



**Models affected** All 4577xxx open circuit pumps

**Serial numbers affected** This change became effective at serial number A-98-21-xxxxx and beyond

**Part numbers affected**

Part description	Old part number	New part number
PC Cartridge Valve Kit	4510097	4510296*

\* Includes the short hex plug for remote PC port.

**Parts disposition** ■ Interchangeable



**Service Bulletin: SB-2001-026**

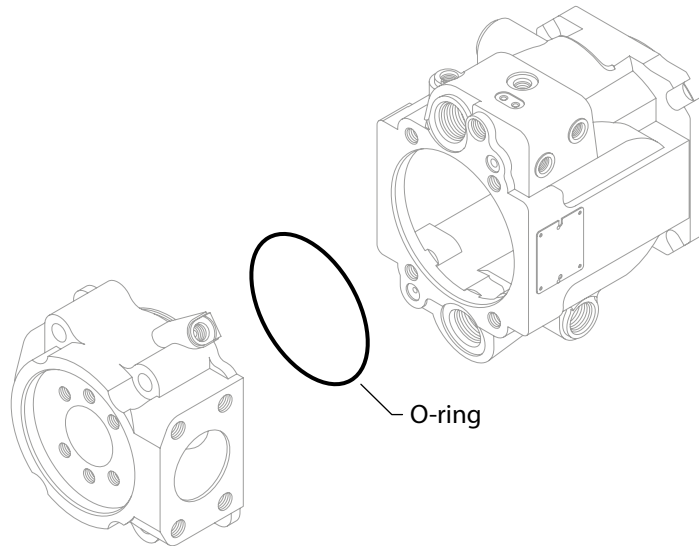
**Products affected** Series 45, H frame open circuit pumps

**Subject** End cap and housing interface O-ring

**Description** As a product improvement, Sauer-Danfoss is changing the O-ring seal between the end cap and housing. The change is to the inside diameter of the O-ring, which changes from 4.237" [107.6 mm] to 3.987" [101.2 mm]. By using an O-ring with a smaller inside diameter, the O-ring stays on the end cap better while assembling the end cap to the housing.

This is an interchangeable change.

The old O-ring is obsolete. It is no longer available as a service part.



**Models affected** All Series 45 H frame open circuit pumps

**Serial numbers affected** This change became effective at serial number A-01-49-xxxxx and beyond

**Part numbers affected**

Item description	Old part number	New part number
End cap O-ring	9004104-1560	733295

**Parts disposition**

- Interchangeable
- Use parts in stock



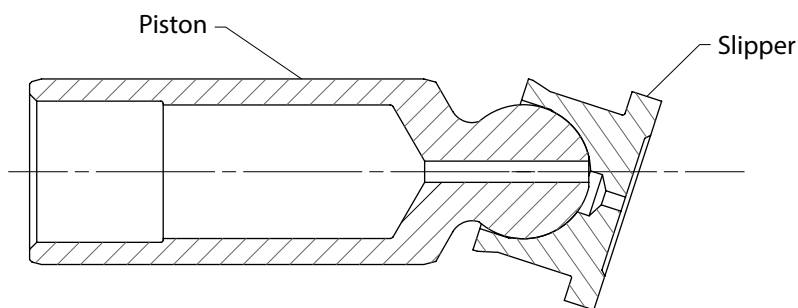
**Service Bulletin: SB-2001-028**

**Products affected** Series 45 H frame open circuit pumps

**Subject** Piston slipper material change

**Description** As a product improvement, Sauer-Danfoss made a design change to the piston slippers of the Series 45 H frame 75cc open circuit pump. The new design change incorporates a material change that improves the strength characteristics of the piston slipper.

A new part number identifies this change. The new piston/slipper assembly is completely interchangeable with the previous piston/slipper assembly. The old part number is obsolete. It is no longer available as a service part. The cylinder block assembly kit part number does not change.



**Models affected** All Series 45 H frame 75cc open circuit pumps

**Serial numbers affected** This change became effective at serial number A-02-04-xxxxx and beyond

**Part numbers affected**

Part description	Old part number	New part number
Piston/slipper assembly	4570340	4570427
Cylinder block kit*	4570344	4570344

\* Includes the short hex plug for remote PC port.

**Parts disposition** ■ Interchangeable


**Service Bulletin: SB-2002-022**

**Products affected** Series 45 H frame open circuit pump

**Subject** Load sense adjusting screw

**Description** As a product improvement, Sauer-Danfoss has made a change to the load sense adjusting screw and spring seat. The new adjusting screw is longer to prevent the load sense springs from bottoming out in the housing. The spring seat hole is now bigger and slides over the end of the adjusting screw.

The new adjusting screw and spring seat are interchangeable only when you replace both parts. The old adjusting screw and spring seat are obsolete. They are no longer available.

**Models affected** All Series 45 H frame open circuit pumps

**Serial numbers affected** This change became effective at serial number A-03-14-xxxxx.

**Part numbers affected**

Item description	Old part number	New part number
Slotted set screw	4570236	4570439
Load sense spring seat	4570026	4570444
PC to PC/LS conversion kit	-	4510382
PC/LS to PC conversion kit	-	4510383

**Parts disposition**

- Interchangeable
- Use parts in stock
- Revise existing part orders



**Service Bulletin: SB-2002-035**

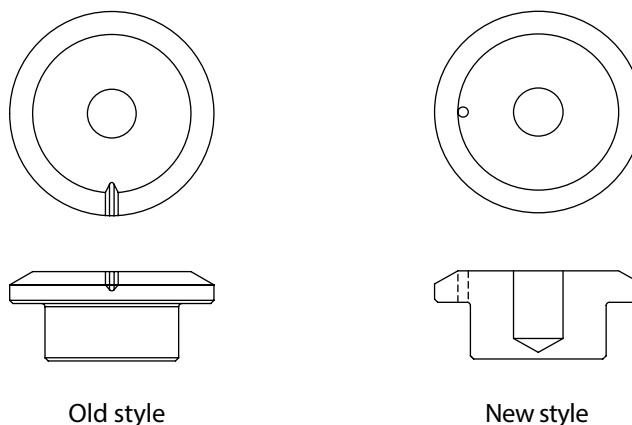
**Products affected** Series 45 H frame open circuit pump

**Subject** Load sense spring seat

**Description** Sauer-Danfoss is changing the manufacturing site from an outside source to a Sauer-Danfoss manufacturing site. Doing this, we are changing the conical land of the spring seat. It changes from a slot cut across the conical land to a small hole drilled through the outer edge of the spring seat.

The slot prevented a hydraulic lock of the control. The drilled hole preforms the same function.

The new spring seat is interchangeable. The old part is obsolete. It is no longer available for service.



**Models affected** All Series 45 H frame open circuit pumps

**Serial numbers affected** This change became effective at serial number A-02-35-xxxxx.

**Part numbers affected**

Old spring seat Part number	New spring seat Part number
4570202	4570250

**Parts disposition**

- Interchangeable
- Use parts in stock



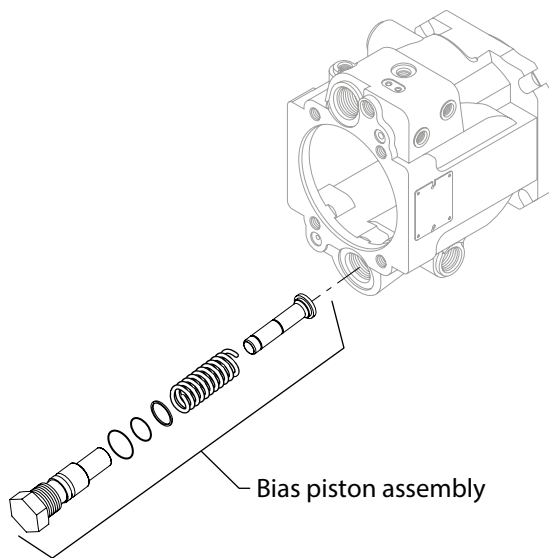
**Service Bulletin: SB-2002-036**

**Products affected** Series 45 H frame open circuit pumps

**Subject** Supplier change of bias piston assembly

**Description** Sauer-Danfoss changed the source of manufacturing of the bias piston assembly for the frame H open circuit pumps. Due to the change in manufacturing source, the part number has been changed for tracking purposes.

The new bias piston assembly is interchangeable with the old bias piston assembly. The old bias piston assembly is obsolete. It is no longer available for service.



**Models affected** All Series 45 H frame open circuit pumps

**Serial numbers affected** This change became effective at serial number A-02-32-xxxxx

**Part numbers affected**

Item description	Old part number	New part number
Bias piston assembly	4570197	4570451

**Parts disposition**

- Interchangeable
- Use parts in stock
- Revise existing part orders


**Service Bulletin: SB-2002-043**

**Products affected**                      Series 45 H frame open circuit pumps

**Subject**                                      Swashplate assembly change

**Description**                              As a product improvement, Sauer-Danfoss made several changes to the swashplate assembly for Series 45, Frame H open circuit pumps. One change increases the life of the swashplate and provides longer life of the pump. The other, by adding pressure lube holes in the running face of the swashplate, increases the response and recovery times of the pump.

This change is interchangeable with the old swashplate assembly. The old swashplate assembly is obsolete. It is no longer available as a service part.

**Models affected**                          All Series 45 H frame open circuit pumps

**Serial numbers affected**                This change became effective at serial number A-02-37-xxxxx.

**Part numbers affected**

Old swashplate assembly	New swashplate assembly
4570404	4570446

**Parts disposition**

- Interchangeable
- Use parts in stock
- Revise existing part orders



**Service Bulletin: SB-2002-046**

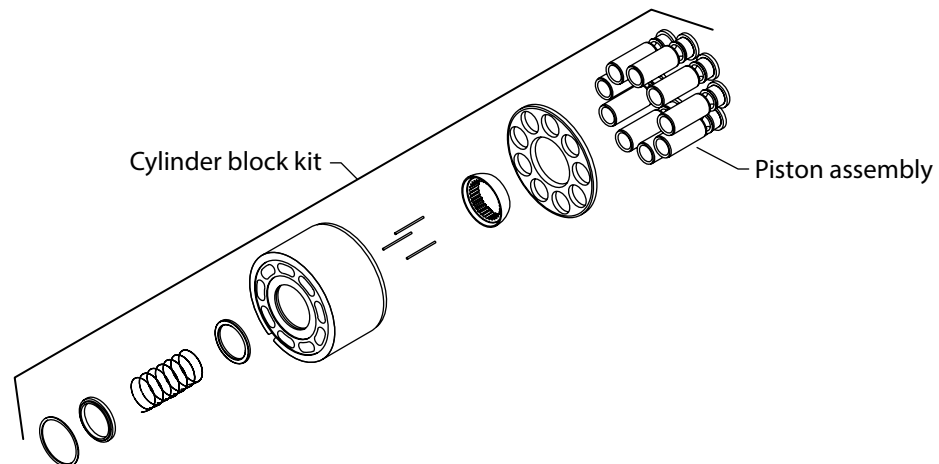
**Products affected** Series 45 H frame, 75cc open circuit pumps

**Subject** Piston diameter change

**Description** Sauer-Danfoss made a change to the piston assembly in the 75cc cylinder block kit. The change to the 75cc piston assembly reduces the diameter of the piston to 21.519 mm [0.8472 inches].

This change decreases the volumetric efficiency of the new cylinder block kit approximately 1% at rated pressure and rate input speed. Mechanical efficiency changes are negligible.

Old cylinder blocks can use new piston assemblies. Old piston assemblies are obsolete. They are no longer available for service. Old cylinder block kits are obsolete. They no longer available for service.



**Models affected** All Series 45 H frame, 75cc open circuit pumps

**Serial numbers affected** This change became effective at serial number A-02-43-xxxxx.

**Part numbers affected**

Item description	Old part number	New part number
Piston assembly, 75cc	4570427	4570457
Cylinder block kit, 75cc	4570344	4570456

- Parts disposition**
- Interchangeable
  - Scrap used parts (pistons)
  - Return new parts for credit (pistons)
  - Order replacement parts
  - Rework parts in stock (Change piston assemblies in cylinder block kits.)
  - Revise existing orders
  - Scrap new parts and apply for credit (Change piston assemblies in cylinder block kits.)





**Service Bulletin: SB-2002-051**

**Products affected** Series 45 H frame, 57cc open circuit pumps

**Subject** Change to the piston slipper assembly and the slipper retainer

**Description** As a product improvement, Sauer-Danfoss is changing the way the slipper attaches to the piston: from a swaging process to a crimping process. This change increases the pullout force and improves endplay of the slipper. The slipper skirt's geometry has changed to accommodate the new crimping process. The holes in the new slipper retainer are now larger to accommodate the new geometry.

If a cylinder block kit's piston assembly needs replacing, replace all nine piston slipper assemblies, and install a new slipper retainer. If a slipper retainer needs replacing, you need to replace all nine piston slipper assemblies and a install a new slipper retainer. Convert the old cylinder block kit assembly to the new cylinder block kit assembly by replacing all nine piston slipper assemblies and the slipper retainer.

The new piston assemblies are interchangeable only when you replace the slipper retainer. The new slipper retainer is interchangeable only when you replace all piston assemblies.

The piston assembly, slipper retainer, and cylinder block kit are obsolete. They are no longer available for service.

**Models affected** All Series 45 H frame, 57cc open circuit pumps

**Serial numbers affected** This change became effective at serial number A-03-09-xxxxx.

**Part numbers affected**

Item description	Old part number	New part number
Piston assembly	4570272	1700369
Cylinder block kit	4570032	4570455
Slipper retainer	4570009	4570387

**Parts disposition**

- Interchangeable - only when replacing piston assemblies and slipper retainer
- Use parts in stock
- Scrap used parts
- Order replacement parts
- Revise existing orders



**Service Bulletin: SB-2004-001**

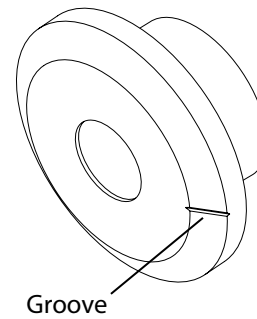
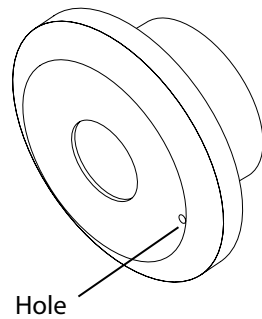
**Products affected** Series 45 H frame open circuit pump

**Subject** Load sense spring guide

**Description** Sauer-Danfoss is changing the design of the load sense spring guide. The drilled hole is removed and returning to the groove across the guide face. In some occasions, the load sense spring could cover the drilled hole and cause a hydraulic lock in the control.

The new spring guide is interchangeable with the old spring guide.

The old spring guide 4740250 is obsolete and no longer available as a spare part.



**Models affected** All Series 45 H frame open circuit pumps

**Serial numbers affected** This change became effective at serial number A-04-03-xxxxx.

**Part numbers affected**

Old spring seat part number	New spring seat part number
4570202	4570250

**Parts disposition** ■ Interchangeable



**Service Bulletin: SB-2006-005**

**Products affected** Series 45 H and J frame open circuit pumps

**Subject** Input shaft lip seal change

**Description** Sauer-Danfoss has made a product improvement to the shaft lip seal. The new shaft lip seal has better sealing capabilities and is easier to assemble into the pump housing.

The new seal is interchangeable with the old seal. The old seal is obsolete and no longer available as a service part.

**Models affected** All Series 45, H and J frame open circuit pumps.

**Serial numbers affected** This change became effective at A-06-15-xxxxx.

**Part numbers affected**

Item description	Old part number	New part number
Shaft lip seal	5000190	5000702

**Parts disposition**

- Interchangeable
- Use parts in stock
- Scrap used parts
- Revise existing orders



**Service Bulletin: SB-2008-052 Rev. A**

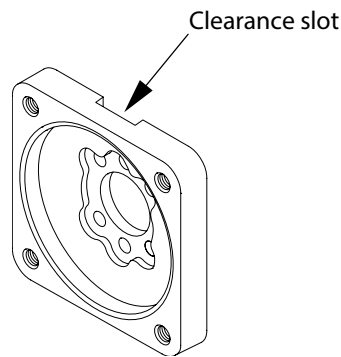
**Products affected** Series 45 G, H and J frame open circuit pumps

**Subject** C auxiliary mounting flange

**Description** As a product improvement, Sauer-Danfoss has changed the “C” auxiliary mounting flange to add clearance for adjusting the displacement limiter when used.

The new auxiliary mounting flange is interchangeable with the old auxiliary mounting flange.

The old “C” auxiliary mounting flange is obsolete and no longer available for service.



**Models affected** All Series 45 open circuit pumps with “C” auxiliary mounting flange.

**Serial numbers affected** This change became effective at serial number A-08-39-xxxxx.

**Part numbers affected**

Item description	Old part number	New part number
Auziliary mounting flange	4570211	11039356

**Parts disposition** ■ Interchangeable


**Service Bulletin: SB-2011-031**

**Products affected** Series 45 frame E, F, G, H, J, K and L open circuit pumps

**Subject** Component changes to the overhaul seal kit

**Description** Sauer-Danfoss is making a change to the overhaul seal kits for the Series 45 open circuit pumps. This change is removing standard plug O-rings and auxiliary pump mounting seals.

The part number has changed for tracking purposes. The old seal kits are obsolete and no longer available for service.

**Models affected** All Series 45, frame E, F, G, H, K and L open circuit pumps

**Serial numbers affected** This change became effective at serial number A-12-01-XXXXX. (1-Jan-2012)

**Part numbers affected**

Description	Old part number	New part number
Overhaul seal kit, S45 E	11034352	11106334
Overhaul seal kit, S45 F	11034341	11106335
Overhaul seal kit, S45 G	11034340	11106336
Overhaul seal kit, S45 H	4510094	11106337
Overhaul seal kit, S45 J	11032927	11103473
Overhaul seal kit, S45 K/L	11034353	11106339

**Parts disposition** ■ Interchangeable


**Service Bulletin: SB-2012-020**

**Products affected** Series 45 E, F, G, H and J frame open circuit pumps

**Subject** Displacement limiter kits

**Description** In an effort to reduce duplication of displacement limiter kits used for service and production, Sauer-Danfoss has obsoleted the service displacement limiter kit part numbers and will use the production displacement limiter kits for service.

The production displacement limiter kits are completely interchangeable with the old service displacement limiter kits.

The service displacement limiter kits are obsolete and no longer available for service.

**Models affected** Series 45 E, F, G, H, and J frame open circuit pumps with displacement limiters.

**Serial numbers** This change became effective at serial number A-12-24-XXXXX. (12-Jun-2012)

**Part numbers affected**

Description	Old part number	New part number
H frame, 57cc	4510168	11099072
H frame, 90cc	4510372	11099073
G frame, 74cc	4510373	11099074
G frame, 90cc	4510374	11099075
E frame	4510439	11099077
F frame	4510488	11099076
J frame	4510488	11099076

**Parts disposition** ■ Interchangeable



**Notes**



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