aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

P1/PD Series – 60cc, 75cc, 100cc, 140cc
Medium Duty Axial Piston Pumps

Variable Displacement – Service Information
Bulletin HY28-2668-01/SVC/P1LG
Effective: May 01, 2009

Parker

ENGINEERING YOUR SUCCESS.

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⚠ WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

OFFER OF SALE

The items described in this document are hereby offered for sale by Parker-Hannifin Corporation, its subsidiaries or its authorized distributor. This offer and its accepteance are governed by the provisions stated in the detailed "Offer of Sale" elsewhere in this document.

Description
• variable displacement, axial piston pump for open circuit applications
• medium pressure, continuous operation at pressures up to 280 bar
• high drive speed capabilities for mobile applications
• quiet and efficient control capability
• numerous control options

Benefits
• compact overall package size
• quiet operation
• low flow ripple to further reduce noise
• elastomer seals that eliminate gaskets and external leakage
• high operating efficiency for lower power consumption and reduced heat generation
• simple hydraulic controls with “no-leak” adjustments
• SAE and ISO standard mounting flanges and ports
• long life, tapered-roller shaft bearings
• long life, low friction, hydrostatically balanced cam bearings
• full power through-drive capability
• end or side inlet and outlet ports
• case drain ports for horizontal or vertical, shaft-up mounting
• optional minimum and maximum displacement adjustments
• optional case-to-inlet check valve to extend shaft seal life
• easy to service

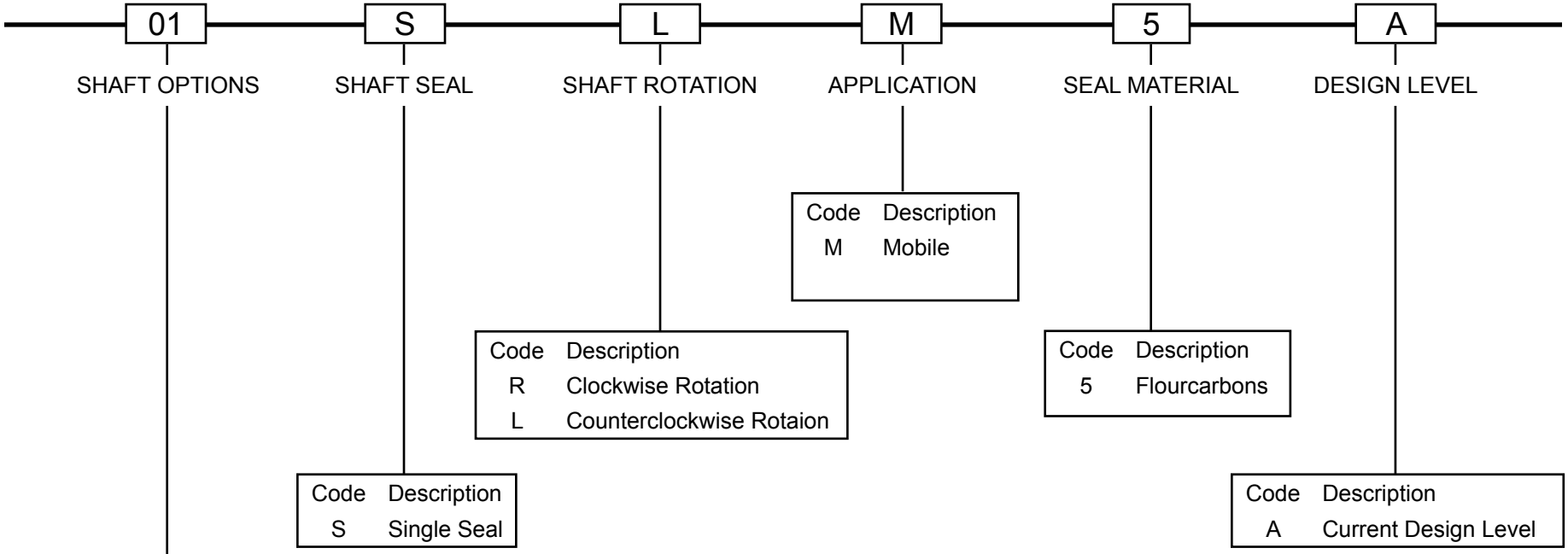
P1 — PUMP SERIES
060 — DISPLACEMENT
P — TYPE
S — MOUNTING AND PORTS

Code	Series
P1	Mobile
PD	Industrial

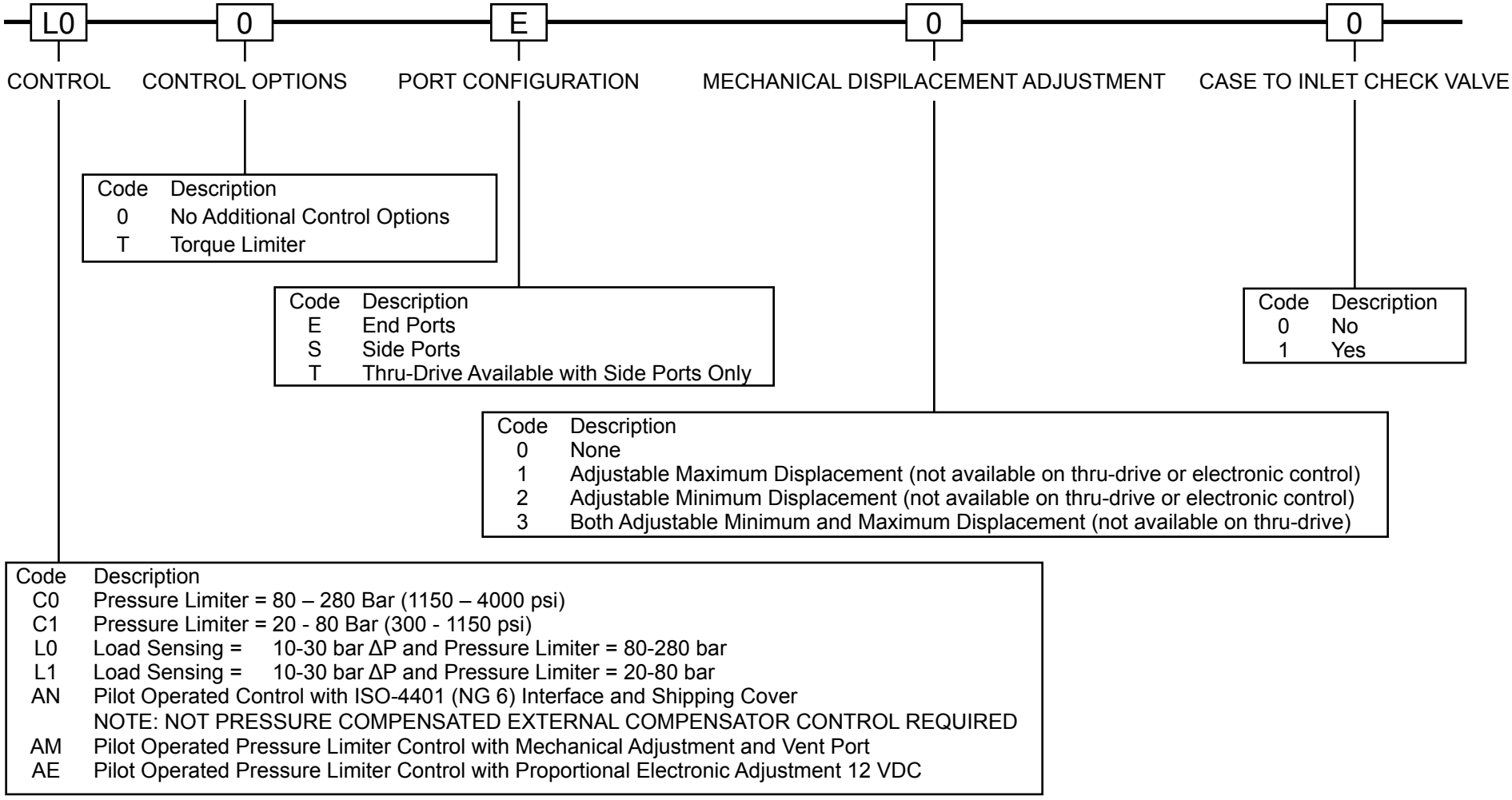
Code	Description
060	66cc/rev (3.66 in³/rev)
075	75cc/rev (4.58 in³/rev)
100	100cc/rev (6.41 in³/rev)
140	140cc/rev (6.41 in³/rev)

Code	Description
P	Open Circuit Single Side of center
X	Open Circuit, Over Center (E control only)

Code		Mounting and ports	060	075	100	140
S	SAE PILOT SAE PORTS	SAE pilot	127-4 (C) 5.00 inch pilot			152-4 (D) 6.00 inch pilot
		Inlet SAE J518	SAE-32 code 61		SAE-40 code 61	
		Outlet SAE J518	SAE-16 code 61		SAE-20 code 62	
		D1, D2, D3 SAE J514	SAE-10 ORB	SAE-12 ORB		SAE-16 ORB
		X, BG SAE J514	SAE-4 ORB			
A	SAE PILOT METRIC PORTS BSPP DRAIN	SAE pilot	127-4 (C) 5.00 inch pilot			152-4 (D) 6.00 inch pilot
		Metric Inlet ISO 6162-1	50mm DN 51		63mm DN 64	
		Metric Outlet	25mm DN 25 ISO 6162-1		32mm DN 32 ISO 6162-2	
		D1, D2, D3 BSPP	G1/2”	G3/4”		G1”
		X, BG BSPP	G1/4”			
M	ISO PILOT METRIC PORTS METRIC DRAIN	ISO pilot	125B4 25 mm pilot		180B4 180 mm pilot	
		Inlet Metric ISO 6162-1	50mm DN 51		63mm DN 64	
		Outlet Metric	25mm DN 25 ISO 6162-1		32mm DN 32 ISO 6162-2	
		D1, D2, D3 ISO 6149-1	M22 x 1.5 ISO 6149-1	M27 x 2.0 ISO 6149-1		M33 x 2.0 ISO 6149-1
		X, BG ISO 6149-1	M12 x 1.5			
B	ISO PILOT METRIC PORTS BSPP DRAIN	ISO pilot	125B4 125 mm pilot			180B4 180 mm pilot
		Inlet Metric ISO 6162-1	50mm DN 51		63mm DN 64	
		Outlet Metric	25mm DN 25 ISO 6162-1		32mm DN 32 ISO 6162-2	
		D1, D2, D3 BSPP	G1/2”	G3/4”		G1”
		X, BG BSPP	G1/4”			
C	SAE PILOT SAE PORTS	SAE pilot	127-2 (C) 5.00 inch pilot		N/A for 100 and 140	
		Inlet SAE J518	SAE-32 code 61			
		Outlet SAE J518	SAE-16 code 61			
		D1, D2, D3 SAE J514	SAE-10 ORB	SAE-12 ORB		
		X, BG SAE J514	SAE-4 ORB			
D	SAE PILOT METRIC PORTS BSPP DRAIN	SAE pilot	127-2 (C) 5.00 inch pilot			
		Metric Inlet ISO 6162-1	50mm DN 51			
		Metric Outlet	25mm DN 25 ISO 6162-1			
		D1, D2, D3 BSPP	G1/2”	G3/4”		
		X, BG BSPP	G1/4”			
E	ISO PILOT METRIC PORTS METRIC	ISO pilot	125B2 25 mm pilot			
		Inlet Metric ISO 6162-1	50mm DN 51			
		Outlet Metric	25mm DN 25 ISO 6162-1			
		D1, D2, D3 ISO 6149-1	M22 x 1.5 ISO 6149-1	M27 x 2.0 ISO 6149-1		
		X, BG ISO 6149-1	M12 x 1.5			
F	ISO PILOT METRIC PORTS BSPP DRAIN	ISO pilot	125B4 125 mm pilot			
		Inlet Metric ISO 6162-1	50mm DN 51			
		Outlet Metric	25mm DN 25 ISO 6162-1			
		D1, D2, D3 BSPP	G1/2”	G3/4”		
		X, BG BSPP	G1/4”			



Code	Shaft Type	060	075	100	140
01	SAE J744 Spline	32-4 (C) 14 tooth 12/24 pitch x 1.25 inch dia		38-4 (C-C) 17 tooth 12/24 pitch x 1.50 inch dia.	44-4 (D) 13 tooth 8/16 pitch x 1.75 in. dia
02	SAE Key	32-1(C) 1.25 inch dia. x 1.875 inch long		38-1 (C-C) 1.50 inch dia. x 2.125 inch long	44-1 (D) 1.75 inch dia x 2.625 inch long
03	ISO 3019-2 / DIN 5840 Spline	14T mod 2 - 32 mm dia x 36 mm long		18T mod 2 - 40 mm dia x 55 mm long	24T mod 2- 50 mm dia x 55 mm long
04	ISO 3019-2 Key	E32N 32 dia. x 68 long		E40N 40 dia. x 92 long	E50N 50 dia x 92 long
05	SAE Key	Not Available	Thru Drive only 32-1(C) 1.25 inch dia. x 3.00 in long	Not Available	44-1 (D) 1.75 in dia x 3.625 inch long
06	SAE J744 Spline	Not Available		Torque Limited 32-4 (C) 14 tooth 12/24 pitch 1.25 in dia. x 1.875 in long	Not Available
07	SAE J744 Spline Without undercut	Not Available	Thru Drive only 32-4 (C) 14 tooth 12/24 pitch 1.25 inch dia	Thru Drive only 38-4 (C-C) 17 tooth 12/24 pitch 1.50 inch dia.	Not Available



Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

0 — THRU DRIVE MOUNTING PAD AND COUPLING

NOTE:
Thru Drive Couplings are available in Spline configuration only.

00 — PAINT

Code	Description
00	No Paint
PB	Black Paint

00 — SPECIAL FEATURES

Code	Description
00	No Paint
PB	Black Paint

Code	060	075	100	140
0	Valid for End or Side Ported Pumps Only, Block 13 E or S			
A	Mount: ANSI 82-2 (SAE A) 3.25 inch pilot Coupling: ANSI 16-4 (SAE A) 9 tooth, 16/32 DP, 0.625 inch diameter			
H	Mount: ANSI 82-2 (SAE A) 3.25 inch pilot Coupling: ANSI 19-4 (SAE --) 11 tooth, 16/32 DP, 0.688 inch diameter			
B	Mount: ANSI 101-2 (SAE B) 4.00 inch pilot Coupling: ANSI 22-4 (SAE B) 13 tooth, 16/32 DP, 0.875 inch diameter			
Q	Mount: ANSI 101-2 (SAE B) 4.00 inch pilot Coupling: ANSI 25-4 (SAE B-B) 15 tooth, 16/32 DP, 1.00 inch diameter			
C	Mount: ANSI127-4 (SAE C) 5.00 inch pilot Coupling: ANSI 32-4 (SAE C) 14 tooth, 12/24 DP, 1.25 inch diameter			
N	Not Available		Mount: ANSI127-4 (SAE C) 5.00 inch pilot Coupling: ANSI 38-4 (SAE C-C) 17 Tooth 12/24 DP, 1.50 in dia.	
D	Not Available			Mount: ANSI 152-4 (SAE D) 6.00 inch diameter pilot Coupling: ANSI 44-4 (SAE D&E) 13 tooth, 8/16 DP, 1.75 inch dia.
R	Mount: ISO 80A2 80 mm pilot Coupling: K20N 14 tooth, Mod 2, 20 mm diameter			
S	Mount: ISO 100A2 100 mm pilot Coupling: K20N 14 tooth, Mod 2, 20 mm diameter			
T	Mount: ISO 100A2 100 mm pilot Coupling: K25N 18 tooth, mod 2, 25 mm diameter			
V	Mount: ISO 125B4 125 mm pilot Coupling: K32N 14 tooth, mod 2, 32 mm diameter			
W	Not Available		Mount: ISO 125B4 125 mm pilot Coupling: K40N 18 tooth, Mod 2, 40 mm diameter	
X	Not Available			Mount: ISO 180B4 180 mm pilot Coupling: K50N 24 tooth mod 2, 50 mm dia.

Startup Procedure for New Installations

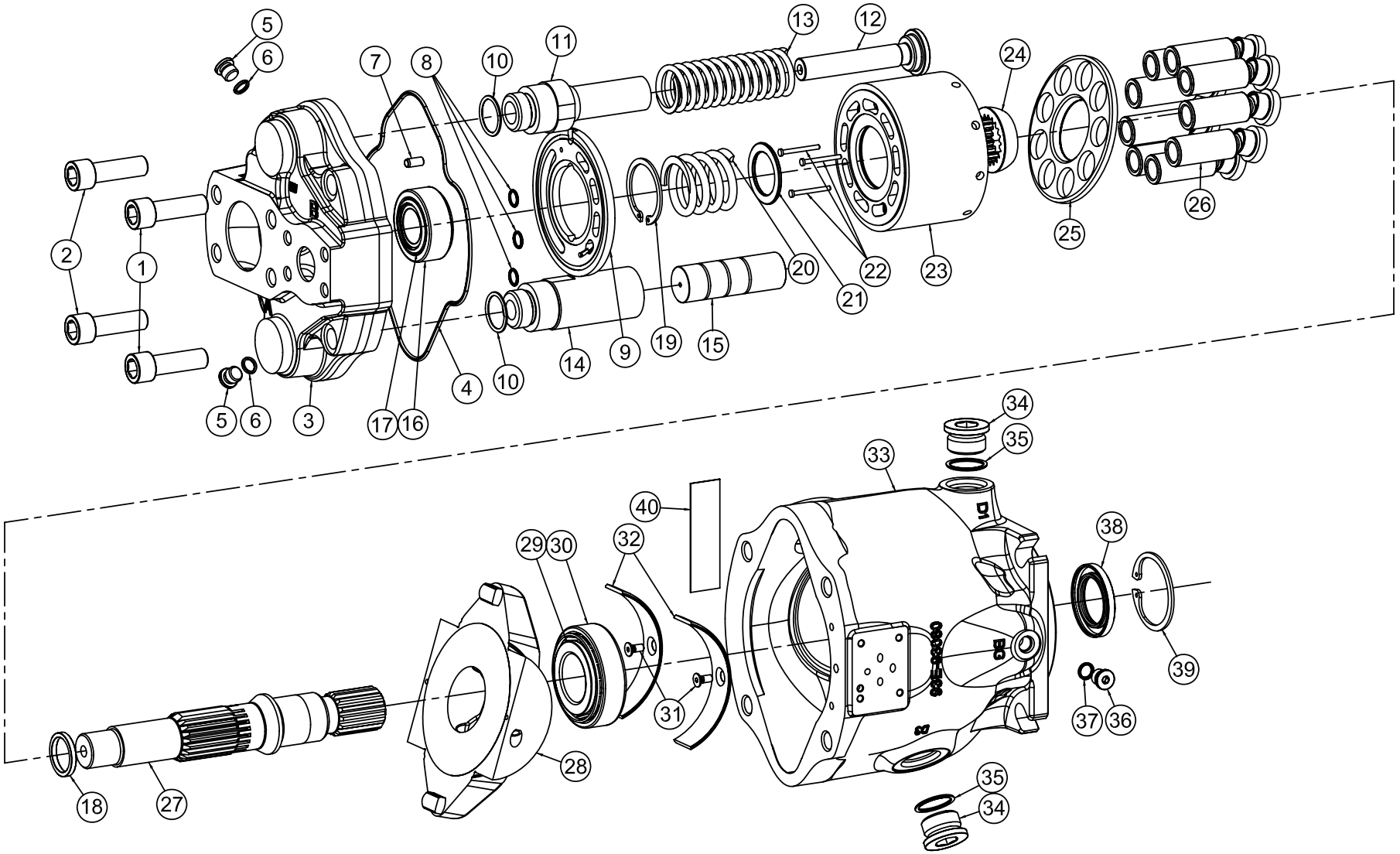
- Read and understand the instruction manual.
- Identify components and their function.
- Visually inspect components and lines for possible damage.
- Insure that all necessary ports are properly connected.
- Check reservoir for cleanliness. Drain and clean as required.
- Check fluid level and fill as required with filtered fluid to a minimum ISO cleanliness level of 18/14.
- Fill pump case with clean oil prior to starting.
- If pump is mounted vertically with the shaft up, bleed the air out the D1 drain port located near the mounting flange.
- Check alignment of drive.
- Check oil cooler and activate it, if included in circuit. Check fluid temperature.
- Reduce pressure settings of compensator and relief valve. Make sure accurate pressure readings can be made at appropriate places.
- If solenoids in system, check for actuation.
- Jog the pump drive. Check for proper shaft rotation. Make sure pump fills properly.
- Start the pump drive.
- Bleed system of air. Recheck fluid level.
- Cycle unloaded machine at low pressure and observe actuation (at low speed, if possible).
- Increase pressure settings gradually in steps. Check for leaks in all lines especially in pump and motor inlet lines.
- Make correct pressure adjustments.
- Gradually increase speed. Be alert for trouble as indicated by changes in sounds, system shocks, and air in fluid.
- Equipment is operational.

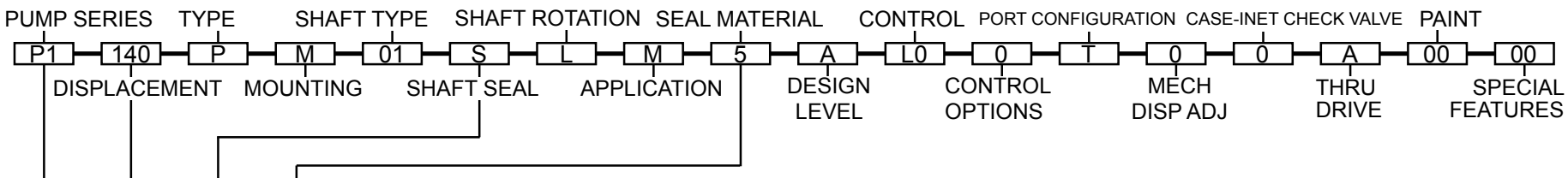
Typical Ajustment Ranges and Initial Settings unless customer specified at time of order.

Function	Adjustment range	Adjustment value	Recommended or Initial Setting
Load sense pressure	8 - 35 bar (116 - 500 psi)	28 bar (410 psi) per turn	24 bar (350 psi)
Pressure compensator High pressure	80 - 280 bar (1160 - 4060 psi)	40 bar (580 psi) per turn	Factory supplied at minimum
Pressure compensator Low pressure	20 - 80 bar (290 -1160 psi)	18.6 bar (260 psi) per turn	Factory supplied at minimum
Maximum volume stop	100 - 50%	Approximately 6% per turn	100 %
Minimum volume stop	0 - 25%	Approximately 4% per turn	0%
Differential pressure	37 bar (540 psi)	Adjustment not recommended	FACTORY SET DO NOT ADJUST

Effect of trouble	Possible cause	Fault which needs remedy
noisy pump	air in fluid	leak in inlet line
		low fluid level
		turbulent fluid
		return lines above fluid level
		gas leak from accumulator
		excessive pressure drop in the inlet line from a pressurized reservoir
		inlet line strainer acting as air trap
	cavitation in rotating group	fluid too cold
		fluid too viscous
		fluid too heavy
		shaft speed too high
		inlet line too small
		inlet strainer too small
		inlet strainer dirty
		operating altitude too high
		inlet pressure too low
	misaligned shaft	faulty installation
		distortion in mounting
		axial interference
		faulty coupling
		excessive overhung loads
	mechanical fault in pump	piston and shoe looseness or failure
		bearing failure
		incorrect port plate rotation
		eroded or worn parts in the displacement control

Effect of trouble	Possible cause	Fault which needs remedy
erosion on barrel ports and port plate	air in fluid	see noisy pump above
	cavitation	see noisy pump above
high wear in pump	excessive loads	reduce pressure settings
		reduce speeds
	contaminant particles in fluid	improper filter maintenance
		filters too coarse
		introduction of dirty fluid to system
		reservoir openings
		improper reservoir breather
		improper line replacement
	improper fluid	fluid too thin or thick for operating temperature range
		breakdown of fluid with time/temperature effects
		incorrect additives in new fluid
		destruction of additive effectiveness with chemical aging
	improper repair	incorrect parts
		incorrect procedures, dimensions, finishes
	unwanted water in fluid	Condensation
		faulty breather/strainer
		heat exchanger leakage
		faulty clean-up practice
		water in makeup fluid





			Seal Kit Part No	Description
060	S	4	S2E-18697-4K	S-4 Seal kit
		5	S2E-18697-5K	S-5 Seal kit
075		4	S2E-18004-4K	S-4 Seal kit
		5	S2E-18004-5K	S-5 Seal Kit
100		4	S2E-18460-4K	S-4 Seal kit
		5	S2E-18460-5K	S-5 Seal Kit
140		4	S2E-18158-4K	S-4 Seal kit
		5	S2E-18158-5K	S-5 Seal Kit

P1	Mobile
PD	Industrial

Seal kits contain the following items:			
Item	Qty	Description	Location
4	1	O-ring, port block	Main pump
6	2	O-ring, boss plug	
8	3	O-Ring, Teflon	
10	2	O-ring, guide	
35	2	SAE O-ring, drain plug	
	2	BSPP Seal, drain plug	
	2	Metric O-ring, drain plug	
37	1	O-ring, gauge port	
	2	BSPP Seal, drain plug	
	2	Metric O-ring, drain plug	
38	1	Shaft seal	
48	2	O-ring Volume stop	Min/Max Volume stop
49	2	Back-up Ring	
50	2	O-ring, volume stop rod	

Compensator Seals		
Qty	Description	Where used/item #/qty
2	O-ring, piston	{C*/#7/1} {L*/#7&#15/2} {R*/#8/1}
1	Backup ring, piston	{L*/#14/1} {R*/#9/1}
1	O-ring, spring cap	{C*/#8/1} {L*/#8/1} {R*/#10/1}
5	O-ring, SAE #2	{C*/#14/1} {L*/#23/5} {R*/#16/1}
4	O-ring, Teflon	{C*/#17/4} {L*/#25/4} {R*/NS/4}
1	O-ring, Teflon	{C*/#19/1} {L*/NA/0} {R*/NS/1}
1	O-ring, LS cap	{C*/NA/0} {L*/#13/1} {R*/NA/0}

NOTE: Seal kits contain all the seals required for any pump configuration.

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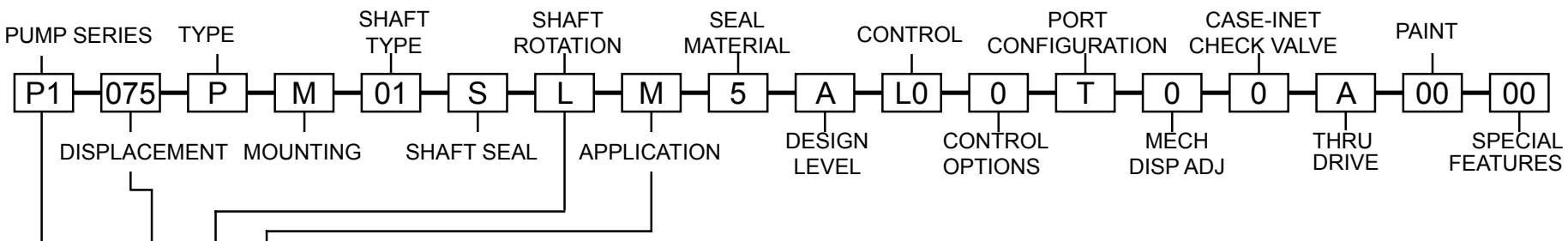
Hydraulic Pump Division
Marysville, Ohio USA



				QTY	Description Rotating Group
060	R	M	S2E-10698-0K	1	CW Standard port plate
		R	S2E-18700-0K		CW Low ripple port plate
	L	M	S2E-18699-0K		CCW Standard port plate
		R	S2E-18701-0K		CCW Low ripple port plate
075	R	M	S2E-18032-0K		CW Standard port plate
		R	S2E-18434-0K		CW Low ripple port plate
	L	M	S2E-18033-0K		CCW Standard port plate
		R	S2E-18484-0K		CCW Low ripple port plate
100	R	M	S2E-18485-0K		CW Standard port plate
		R	S2E-18487-0K		CW Low ripple port plate
	L	M	S2E-18486-0K		CCW Standard port plate
		R	S2E-18488-0K		CCW Low ripple port plate
140	R	M	S2E-18489-0K		CW Standard port plate
		R	S2E-18491-0K		CW Low ripple port plate
	L	M	S2E-18490-0K		CCW Standard port plate
		R	S2E-18492-0K		CCW Low ripple port plate

Repair Kits contain the following components:		
Item	Qty	Description
9	1	Port plate
19	1	Retaining ring, internal
20	1	Barrel hold down spring
21	1	Barrel hold down washer
22	3	Barrel hold down pin
23	1	Barrel
24	1	Spherical washer
25	1	Retainer plate
26	9	Piston and shoe assembly
31	2	Cam bearing retainer orifice screw
32	2	Cam bearing

P1	Mobile
PD	Industrial

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

P1 — PUMP SERIES
060 — DISPLACEMENT
P — TYPE

	Item no.	060 Part #	QTY	Description
P1/PD-060	1	361-13250-0	2	Socket head cap screw
	2	361-13250-0	2	Socket head cap screw
	5	488-35061-0	2	ORB plug
	7	324-30014-0	1	Port plate pin
	8	605-10770-0	3	O-ring, Teflon
	12	03E-94053-0	1	Bias piston
	16	230-82237-0	1	Tapered roller bearing cup
	17	230-82238-0	1	Tapered roller bearing cone
	18	03E-93180-0	1	Bearing shim 3.28 mm (0.1291 in)
		03E-93566-0		Bearing shim 3.36 mm (0.1323 in)
		03E-93567-0		Bearing shim 3.44 mm (0.1354 in)
		03E-93568-0		Bearing shim 3.52 mm (0.1386 in)
		03E-93569-0		Bearing shim 3.60 mm (0.1417 in)
		03E-93570-0		Bearing shim 3.68 mm (0.1449 in)
		03E-93571-0		Bearing shim 3.76 mm (0.1480 in)
		03E-93572-0		Bearing shim 3.84 mm (0.1512 in)
		03E-93573-0		Bearing shim 3.92 mm (0.1539 in)
		03E-93574-0		Bearing shim 4.00 mm (0.1575 in)
		03E-93575-0		Bearing shim 4.08 mm (0.1606 in)
		03E-93576-0		Bearing shim 4.16 mm (0.1638 in)
	19	356-65152-0	1	Retaining ring, internal

	Item no.	060 Part #	QTY	Description
P	11	03E-94054-0	1	Bias guide, Single Side of Center
	13	03E-94055-0	1	Bias spring, Single Side of Center
	14	03E-94052-0	1	Control guide, Single Side of Center
	15	03E-94051-0	1	Control piston, Single Side of Center

	Item no.	060 Part #	QTY	Description
P1/PD-060	20	03E-94049-0	1	Barrel hold down spring
	21	03E-94050-0	1	Barrel hold down washer
	22	03E-94048-0	3	Barrel hold down pin
	23	03E-94036-0	1	Barrel
	24	03E-94047-0	1	Spherical washer
	25	03E-94046-0	1	Retainer plate
	26	S2E-18296-0	9	Piston and shoe assembly
	28	S2E-18411-0	1	Cam
	29	230-82236-0	1	Tapered roller bearing cone
	30	230-82235-0	1	Tapered roller bearing cup
	31	03E-93763-0	2	Bearing retainer orifice screw
	32	03E-94057-0	2	Cam bearing
	39	356-65146-0	1	Retaining ring, internal
	40	03E-93762-0	1	Nameplate

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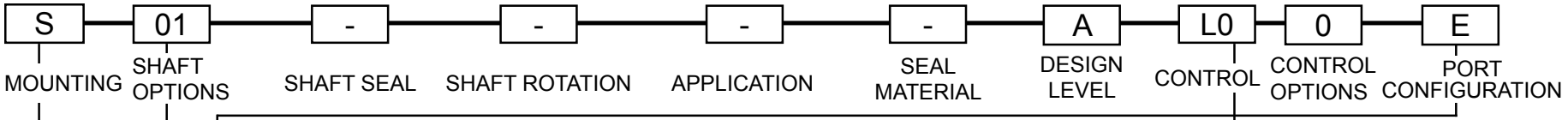

		Item no.	060 Part #	QTY	Description
01	E/S	27	03E-94032-0	1	01 Drive shaft, SAE spline, no rear drive
	T		03E-94033-0		01 Drive shaft, SAE spline, with rear drive
02	E/S		03E-94034-0		02 Drive shaft, SAE keyed, no rear drive
	T		03E-94035-0		02 Drive shaft, SAE keyed, with rear drive
03	E/S		03E-94770-0		03 Drive shaft, ISO spline, no rear drive
	T		03E-94769-0		03 Drive shaft, ISO spline, with rear drive
04	E/S		03E-94768-0		04 Drive shaft, ISO keyed, no rear drive
	T		03E-94767-0		04 Drive shaft, ISO keyed, with rear drive

	Item no.	060 Part #	QTY	Description
A/B	34	447-01056-2	2	Plug, BSPP
	36	447-01053-2	1	Plug, BSPP
M	34	447-01065-5	2	Plug, ISO Metric
	36	447-01061-5	1	Plug, ISO Metric
S	34	488-35014-0	2	Plug, SAE ORB
	36	488-35061-0	1	Plug, SAE ORB

		Item no.	060 Part #	QTY	Description
A	C/L/R	33		1	Pump housing SAE-BSPP Pressure control
	E				Pump housing SAE-BSPP Electronic control
B	C/L/R				Pump housing ISO-BSPP Pressure control
	E				Pump housing ISO-BSPP Electronic control
M	C/L/R				Pump housing ISO-Metric Pressure control
	E				Pump housing ISO-Metric Electronic control
S	C/L/R		03E-94022-0		Pump housing SAE-SAE Pressure control
	E		03E-94222-0		Pump housing SAE-SAE Electronic control

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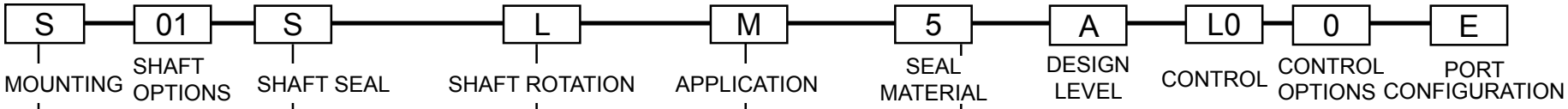


		Item no.	060 Part #	QTY	Description
L	M	9	03E-94041-0	1	Port plate, CCW Standard
	R		N/A		Port plate, CCW Low Ripple
R	M		03E-94040-0		Port plate, CW Standard
	R		N/A		Port plate, CW Low Ripple

	Item no.	060 Part #	QTY	Description
5	4	675-00164-0	1	O-ring, port block
	6	695-00904-0	2	O-ring, boss plug
	10	695-00912-0	2	O-ring, guide

		Item no.	060 Part #	QTY	Description
S	5	38	620-82118-5	1	Shaft seal

		Item no.	060 Part #	QTY	Description
A/B	5	35	605-10064-5	2	Seal, BSPP
		37	605-10061-5	1	Seal, BSPP
M		35	N/A	1	Seal, ISO Metric
		37	N/A	2	Seal, ISO Metric
S		35	695-0910-0	1	Seal, SAE ORB
		37	695-0904-0	2	Seal, SAE ORB

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

P1 — PUMP SERIES
075 — DISPLACEMENT
P — TYPE

	Item no.	075 Part #	QTY	Description
P1/PD-075	1	361-13270-0	2	Socket head cap screw
	2	361-13250-0	2	Socket head cap screw
	5	488-35061-0	2	ORB plug
	7	324-30014-0	1	Port plate pin
	8	605-10070-0	3	O-ring, Teflon
	12	03E-94149-0	1	Bias piston
	16	230-82237-0	1	Tapered roller bearing cup
	17	230-82238-0	1	Tapered roller bearing cone
	18	03E-93180-0	1	Bearing shim 3.28 mm (0.1291 in)
		03E-93566-0		Bearing shim 3.36 mm (0.1323 in)
		03E-93567-0		Bearing shim 3.44 mm (0.1354 in)
		03E-93568-0		Bearing shim 3.52 mm (0.1386 in)
		03E-93569-0		Bearing shim 3.60 mm (0.1417 in)
		03E-93570-0		Bearing shim 3.68 mm (0.1449 in)
		03E-93571-0		Bearing shim 3.76 mm (0.1480 in)
		03E-93572-0		Bearing shim 3.84 mm (0.1512 in)
		03E-93573-0		Bearing shim 3.92 mm (0.1539 in)
		03E-93574-0		Bearing shim 4.00 mm (0.1575 in)
		03E-93575-0		Bearing shim 4.08 mm (0.1606 in)
		03E-93576-0		Bearing shim 4.16 mm (0.1638 in)
	19	356-65144-0	1	Retaining ring, internal

	Item no.	075 Part #	QTY	Description
P	11	03E-93150-0	1	Bias guide, Single Side of Center
		03E-94498-0		Bias guide, Over Center
	13	03E-93151-0	1	Bias spring, Single Side of Center
		03E-94499-0		Bias spring, Over Center
	14	03E-93148-0	1	Control guide, Single Side of Center
		03E-94608-0		Control guide, Over Center
	15	03E-93147-0	1	Control piston, Single Side of Center

	Item no.	075 Part #	QTY	Description
P1/PD-075	20	03E-93145-0	1	Barrel hold down spring
	21	03E-93146-0	1	Barrel hold down washer
	22	03E-93263-0	3	Barrel hold down pin
	23	03E-93129-0	1	Barrel
	24	03E-93142-0	1	Spherical washer
	25	03E-93139-0	1	Retainer plate
	26	S2E-17003-0	9	Piston and shoe assembly
	28	S2E-17443-0	1	Cam
	29	230-82236-0	1	Tapered roller bearing cone
	30	230-82235-0	1	Tapered roller bearing cup
	31	03E-93763-0	2	Bearing retainer orifice screw
	32	03E-93950-0	2	Cam bearing
	39	356-65146-0	1	Retaining ring, internal
	40	03E-93762-0	1	Nameplate

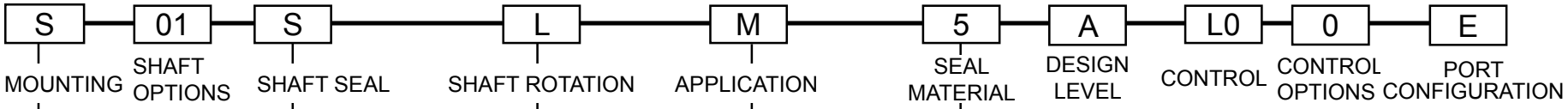
S	01	-	-	-	-	A	L0	0	E
MOUNTING	SHAFT OPTIONS	SHAFT SEAL	SHAFT ROTATION	APPLICATION	SEAL MATERIAL	DESIGN LEVEL	CONTROL	CONTROL OPTIONS	PORT CONFIGURATION

		Item no.	075 Part #	QTY	Description
01	E/S	27	03E-93999	1	01 Drive shaft, SAE spline, no rear drive
	T		03E-94000		01 Drive shaft, SAE spline, with rear drive
02	E/S		03E-94001		02 Drive shaft, SAE keyed, no rear drive
	T		03E-94002		02 Drive shaft, SAE keyed, with rear drive
03	E/S		03E-93122		03 Drive shaft, ISO spline, no rear drive
	T		03E-93123		03 Drive shaft, ISO spline, with rear drive
04	E/S		03E-94003		04 Drive shaft, ISO keyed, no rear drive
	T		03E-93127		04 Drive shaft, ISO keyed, with rear drive
05	E/S		03E-95005-0		05 Drive Shaft, SAE keyed, Extended, no rear drive
	T		03E-94317		05 Drive Shaft, SAE keyed, Extended, with rear drive
07	E/S		N/A		07 Drive Shaft, SAE splined, no undercut, no rear drive
	T		03E-94630		07 Drive Shaft, SAE splined, no undercut, with rear drive

	Item no.	075 Part #	QTY	Description
A/B	34	447-01056-2	2	Plug, BSPP
	36	447-01053-2	1	Plug, BSPP
M	34	447-01065-5	2	Plug, ISO Metric
	36	447-01061-5	1	Plug, ISO Metric
S	34	488-35014-0	2	Plug, SAE ORB
	36	488-35061-0	1	Plug, SAE ORB

		Item no.	075 Part #	QTY	Description
A	C/L/R	33	03E-94136-0	1	Pump housing SAE-BSPP Pressure control
	E		03E-94207-0		Pump housing SAE-BSPP Electronic control
B	C/L/R		03E-93894-0		Pump housing ISO-BSPP Pressure control
	E				Pump housing ISO-BSPP Electronic control
M	C/L/R		03E-93082-0		Pump housing ISO-Metric Pressure control
	E				Pump housing ISO-Metric Electronic control
S	C/L/R		03E-93081-0		Pump housing SAE-SAE Pressure control
	E		03E-93084-0		Pump housing SAE-SAE Electronic control

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA



		Item no.	075 Part #	QTY	Description
L	M	9	03E-93172-0	1	Port plate, CCW Standard
	R		03E-94214-0		Port plate, CCW Low Ripple
R	M		03E-93171-0		Port plate, CW Standard
	R		03E-94479-0		Port plate, CW Low Ripple

	Item no.	075 Part #	QTY	Description
5	4	675-00165-0	1	O-ring, port block
	6	695-00904-0	2	O-ring, boss plug
	10	695-00912-0	2	O-ring, guide

		Item no.	075 Part #	QTY	Description
S	5	38	620-82118-5	1	Shaft seal

		Item no.	075 Part #	QTY	Description
A/B	5	35	605-10064-5	2	Seal, BSPP
		37	605-10061-5	1	Seal, BSPP
M		35	N/A	1	Seal, ISO Metric
		37	N/A	2	Seal, ISO Metric
S		35	695-0910-0	1	Seal, SAE ORB
		37	695-0904-0	2	Seal, SAE ORB

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

P1 — PUMP SERIES
100 — DISPLACEMENT
P — TYPE

	Item no.	100 Part #	QTY	Description
P1/PD-100	1	361-14290-0	2	Socket head cap screw
	2	361-14290-0	2	Socket head cap screw
	5	488-35061-0	2	ORB plug
	7	324-30014-0	1	Port plate pin
	8	605-10070-0	3	O-ring, Teflon
	12	03E-93799-0	1	Bias piston
	16	230-82244-0	1	Tapered roller bearing cup & cone
	17	N/A		part of item 16
	18	03E-94148-0	1	Bearing shim 3.28 mm (0.1291 in)
		03E-94149-0		Bearing shim 3.36 mm (0.1323 in)
		03E-94150-0		Bearing shim 3.44 mm (0.1354 in)
		03E-94151-0		Bearing shim 3.52 mm (0.1386 in)
		03E-94152-0		Bearing shim 3.60 mm (0.1417 in)
		03E-94153-0		Bearing shim 3.68 mm (0.1449 in)
		03E-94154-0		Bearing shim 3.76 mm (0.1480 in)
		03E-94155-0		Bearing shim 3.84 mm (0.1512 in)
		03E-94156-0		Bearing shim 3.92 mm (0.1539 in)
		03E-94157-0		Bearing shim 4.00 mm (0.1575 in)
		03E-94158-0		Bearing shim 4.08 mm (0.1606 in)
		03E-93864-0		Bearing shim 4.16 mm (0.1638 in)
	19	356-65146-0	1	Retaining ring, internal

	Item no.	100 Part #	QTY	Description
P	11	03E-93800-0	1	Bias guide, Single Side of Center
		03E-94827-0		Bias guide, Over Center
	13	03E-93801-0	1	Bias spring, Single Side of Center
		03E-94829-0		Bias spring, Over Center
	14	03E-93798-0	1	Control guide, Single Side of Center
		03E-94828-0		Control guide, Over Center
	15	03E-93799-0	1	Control piston, Single Side of Center

	Item no.	100 Part #	QTY	Description
P1/PD-100	20	03E-93795-0	1	Barrel hold down spring
	21	03E-93796-0	1	Barrel hold down washer
	22	03E-93845-0	3	Barrel hold down pin
	23	03E-93783-0	1	Barrel
	24	03E-93794-0	1	Spherical washer
	25	03E-93793-0	1	Retainer plate
	26	S2E-17912-0	9	Piston and shoe assembly
	28	S2E-17961-0	1	Cam
	29	230-82245-0	1	Tapered roller bearing cone & cup
	30	N/A		Part of Item 29
	31	03E-93763-0	2	Bearing retainer orifice screw
	32	03E-93952-0	2	Cam bearing
	39	356-65147-0	1	Retaining ring, internal
	40	03E-93762-0	1	Nameplate

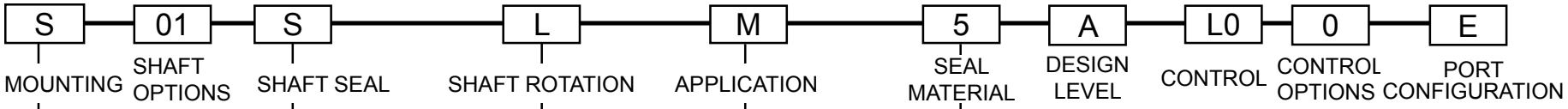
S	01	-	-	-	-	A	L0	0	E
MOUNTING	SHAFT OPTIONS	SHAFT SEAL	SHAFT ROTATION	APPLICATION	SEAL MATERIAL	DESIGN LEVEL	CONTROL	CONTROL OPTIONS	PORT CONFIGURATION

		Item no.	100 Part #	QTY	Description
01	E/S	27	03E-93779	1	01 Drive shaft, SAE spline, no rear drive
	T		03E-93780		01 Drive shaft, SAE spline, with rear drive
02	E/S		03E-93781		02 Drive shaft, SAE keyed, no rear drive
	T		03E-93782		02 Drive shaft, SAE keyed, with rear drive
03	E/S		03E-94663		03 Drive shaft, ISO spline, no rear drive
	T		03E-94664		03 Drive shaft, ISO spline, with rear drive
04	E/S		03E-94006		04 Drive shaft, ISO keyed, no rear drive
	T		03E-94007		04 Drive shaft, ISO keyed, with rear drive
05	E/S		N/A		05 Drive Shaft, SAE keyed, Extended, no rear drive
	T		N/A		05 Drive Shaft, SAE keyed, Extended, with rear drive
06	E/S		03E-94500		06 Drive Shaft, SAE splined, no rear drive, SAE C (100CC pump only)
	T		03E-94462		06 Drive Shaft, SAE splined, with rear drive, SAE C (100CC pump only)
07	E/S		N/A		07 Drive Shaft, SAE splined, no undercut, no rear drive
	T		03E-94629		07 Drive Shaft, SAE splined, no undercut, with rear drive

	Item no.	100 Part #	QTY	Description
A/B	34	447-01056-0	2	Plug, BSPP
	36	447-01053-0	1	Plug, BSPP
M	34	447-01065-5	2	Plug, ISO Metric
	36	447-01061-5	1	Plug, ISO Metric
S	34	488-35014-0	2	Plug, SAE ORB
	36	488-35061-0	1	Plug, SAE ORB

		Item no.	100 Part #	QTY	Description
A	C/L/R	33	03E-94530-0	1	Pump housing SAE-BSPP Pressure control
	E				Pump housing SAE-BSPP Electronic control
B	C/L/R		03E-94531-0		Pump housing ISO-BSPP Pressure control
	E				Pump housing ISO-BSPP Electronic control
M	C/L/R		03E-94659-0		Pump housing ISO-Metric Pressure control
	E				Pump housing ISO-Metric Electronic control
S	C/L/R		03E-94769-0		Pump housing SAE-SAE Pressure control
	E		03E-94194-0		Pump housing SAE-SAE Electronic control

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA



		Item no.	075 Part #	QTY	Description
L	M	9	03E-93788-0	1	Port plate, CCW Standard
	R		03E-94669-0		Port plate, CCW Low Ripple
R	M		03E-93787-0		Port plate, CW Standard
	R		03E-94479-0		Port plate, CW Low Ripple

	Item no.	075 Part #	QTY	Description
5	4	675-00169-0	1	O-ring, port block
	6	695-00904-0	2	O-ring, boss plug
	10	695-00914-0	2	O-ring, guide

		Item no.	075 Part #	QTY	Description
S	5	38	620-82121-5	1	Shaft seal

		Item no.	075 Part #	QTY	Description
A/B	5	35	605-10064-5	2	Seal, BSPP
		37	605-10061-5	1	Seal, BSPP
M		35	N/A	1	Seal, ISO Metric
		37	N/A	2	Seal, ISO Metric
S		35	695-0912-0	1	Seal, SAE ORB
		37	695-0904-0	2	Seal, SAE ORB

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

P1 — PUMP SERIES
140 — DISPLACEMENT
P — TYPE

NOTE 1: Bias piston for minimum volue stop on page 24

	Item no.	140 Part #	QTY	Description
P1/PD-140	1	361-15270-0	2	Socket head cap screw
	2	361-15270-0	2	Socket head cap screw
	5	488-35061-0	2	ORB plug
	7	324-30014-0	1	Port plate pin
	8	605-10070-0	3	O-ring, Teflon
	12	Note 1	1	Bias piston
	16	230-82239-0	1	Tapered roller bearing cup & cone
	17	N/A		part of item 16
	18	03E-93260-0	1	Bearing shim 3.28 mm (0.1291 in)
		03E-93970-0		Bearing shim 3.36 mm (0.1323 in)
		03E-93971-0		Bearing shim 3.44 mm (0.1354 in)
		03E-93972-0		Bearing shim 3.52 mm (0.1386 in)
		03E-93973-0		Bearing shim 3.60 mm (0.1417 in)
		03E-93974-0		Bearing shim 3.68 mm (0.1449 in)
		03E-93975-0		Bearing shim 3.76 mm (0.1480 in)
		03E-93976-0		Bearing shim 3.84 mm (0.1512 in)
		03E-93977-0		Bearing shim 3.92 mm (0.1539 in)
		03E-93978-0		Bearing shim 4.00 mm (0.1575 in)
		03E-93979-0		Bearing shim 4.08 mm (0.1606 in)
		03E-93980-0		Bearing shim 4.16 mm (0.1638 in)
	19	356-65147-0	1	Retaining ring, internal

	Item no.	140 Part #	QTY	Description
P	11	03E-93248-0	1	Bias guide, Single Side of Center
		03E-94743-0		Bias guide, Over Center
	13	03E-93963-0	1	Bias spring, Single Side of Center
		03E-94752-0		Bias spring, Over Center
	14	03E-93246-0	1	Control guide
	15	03E-93245-0	1	Control piston, Single Side of Center
		03E-94751-0		Control piston, Over Center

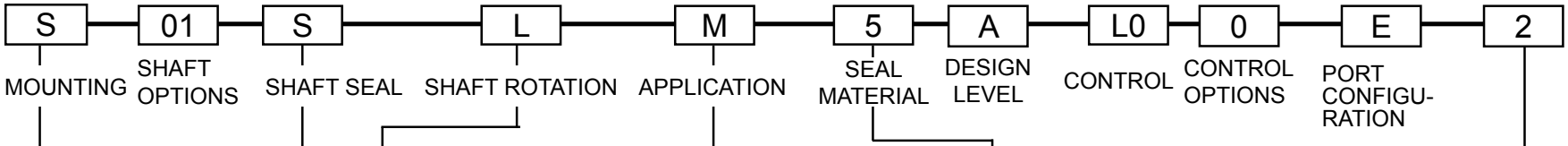
	Item no.	140 Part #	QTY	Description
P1/PD-140	20	03E-93959-0	1	Barrel hold down spring
	21	03E-93244-0	1	Barrel hold down washer
	22	03E-93267-0	3	Barrel hold down pin
	23	03E-93242-0	1	Barrel
	24	03E-93241-0	1	Spherical washer
	25	03E-93240-0	1	Retainer plate
	26	S2E-17323-0	9	Piston and shoe assembly
	28	S2E-17957-0	1	Cam
	29	230-82241-0	1	Tapered roller bearing cone & cup
	30	N/A		part of 29
	31	03E-93763-0	2	Bearing retainer orifice screw
	32	03E-93953-0	2	Cam bearing
	39	356-65148-0	1	Retaining ring, internal
	40	03E-93762-0	1	Nameplate

S	01	-	-	-	-	A	L0	0	E
MOUNTING	SHAFT OPTIONS	SHAFT SEAL	SHAFT ROTATION	APPLICATION	SEAL MATERIAL	DESIGN LEVEL	CONTROL	CONTROL OPTIONS	PORT CONFIGURATION

		Item no.	140 Part #	QTY	Description
01	E/S	27	03E-93227-0	1	01 Drive shaft, SAE spline, no rear drive
	T		03E-93228-0		01 Drive shaft, SAE spline, with rear drive
02	E/S		03E-93231-0		02 Drive shaft, SAE keyed, no rear drive
	T		03E-93232-0		02 Drive shaft, SAE keyed, with rear drive
03	E/S		03E-93229-0		03 Drive shaft, ISO spline, no rear drive
	T		03E-93230-0		03 Drive shaft, ISO spline, with rear drive
04	E/S		03E-93233-0		04 Drive shaft, ISO keyed, no rear drive
	T		03E-93234-0		04 Drive shaft, ISO keyed, with rear drive
05	E/S		03E-94099-0		05 Drive Shaft, SAE keyed, Extended, no rear drive
	T		N/A		05 Drive Shaft, SAE keyed, Extended, with rear drive

	Item no.	140 Part #	QTY	Description
A/B	34	477-01068-2	2	Plug, BSPP
	36	477-01053-2	1	Plug, BSPP
M	34	477-01066-5	2	Plug, ISO Metric
	36	477-01061-5	1	Plug, ISO Metric
S	34	488-35024-0	2	Plug, SAE ORB
	36	695-00904-0	1	Plug, SAE ORB

		Item no.	140 Part #	QTY	Description
A	C/L/R	33	03E-93964-0	1	Pump housing SAE-BSPP Pressure control
	E				Pump housing SAE-BSPP Electronic control
B	C/L/R				Pump housing ISO-BSPP Pressure control
	E				Pump housing ISO-BSPP Electronic control
M	C/L/R		03E-93184-0		Pump housing ISO-Metric Pressure control
	E				Pump housing ISO-Metric Electronic control
S	C/L/R		03E-93183-0		Pump housing SAE-SAE Pressure control
	E		03E-94094-0		Pump housing SAE-SAE Electronic control



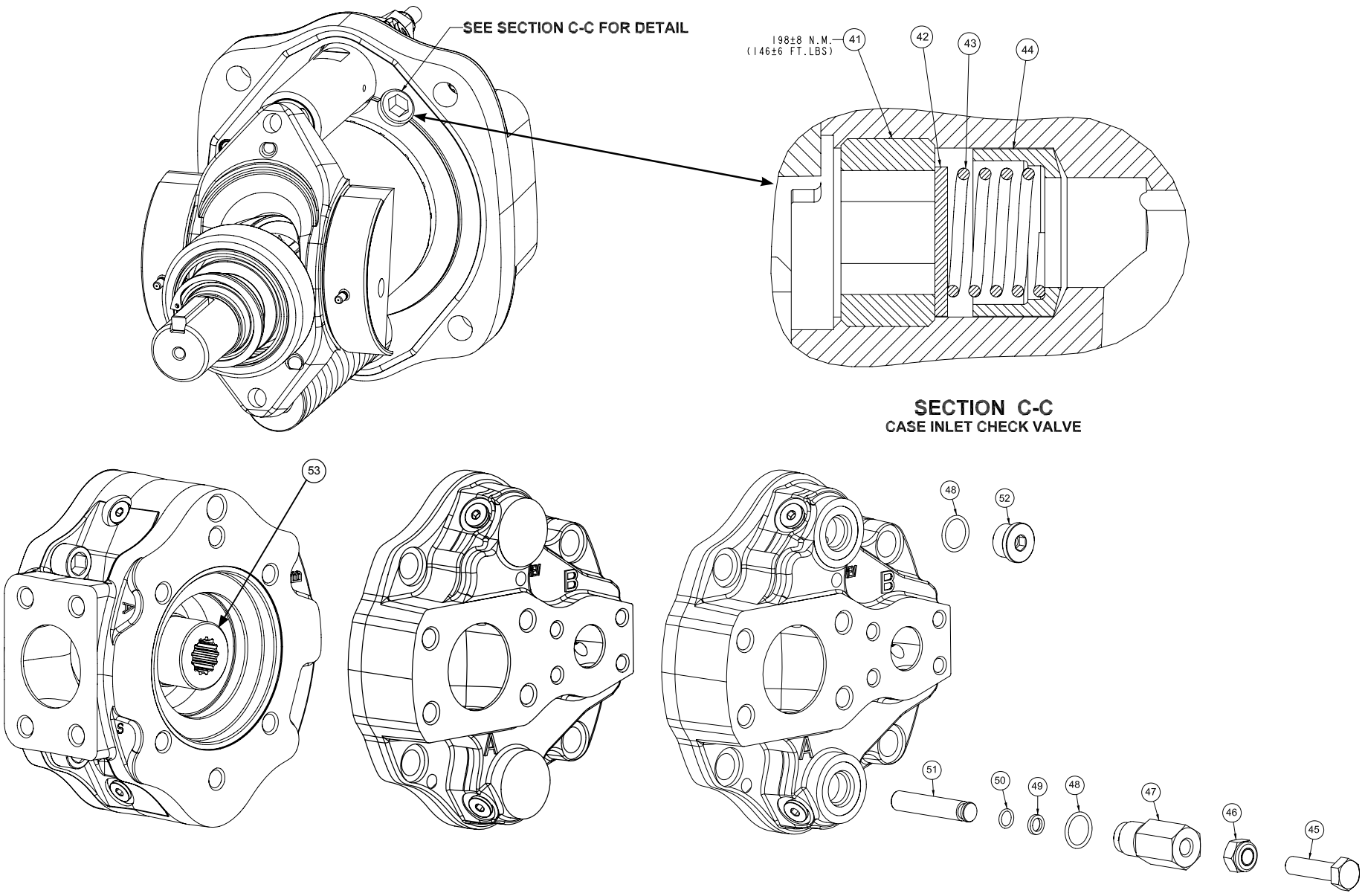
		Item no.	075 Part #	QTY	Description
L	M	9	03E-93255-0	1	Port plate, CCW Standard
	R				Port plate, CCW Low Ripple
R	M		03E-93254-0		Port plate, CW Standard
	R				Port plate, CW Low Ripple

	Item no.	140 Part #	QTY	Description
0	14	03E-93247-0	1	Bias Piston No Min. Volume Stop
1				
2		03E-94658-0		Bias Piston With Min. Volume Stop
3				

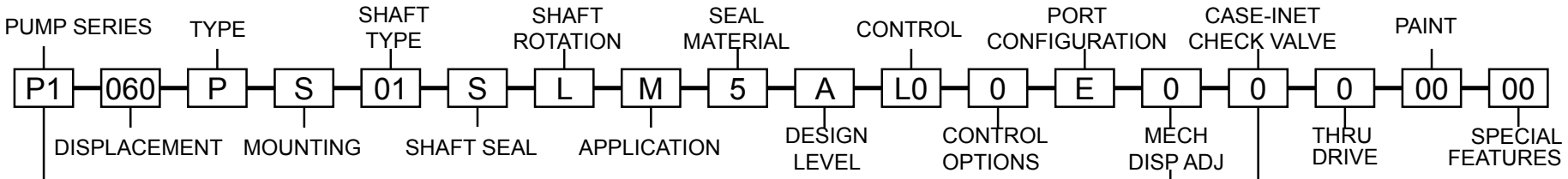
		Item no.	075 Part #	QTY	Description
S	5	38	620-82121-5	1	Shaft seal

		Item no.	075 Part #	QTY	Description
A/B	5	35	605-10064-5	1	Seal, BSPP
		37	605-10061-5		Seal, BSPP
M		35	N/A		Seal, ISO Metric
		37	N/A		Seal, ISO Metric
S		35	695-0916-0		Seal, SAE ORB
		37	695-0904-0		Seal, SAE ORB

	Item no.	075 Part #	QTY	Description
5	4	675-00173-0	1	O-ring, port block
	6	695-00904-0	2	O-ring, boss plug
	10	695-00916-0	2	O-ring, guide



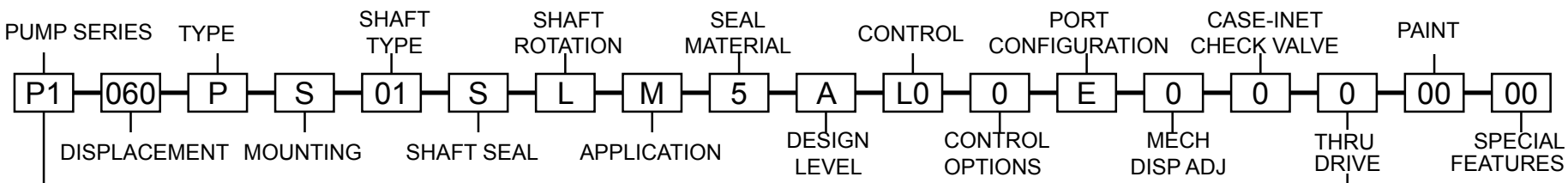
Main Pump Case to Inlet Check Valve and Volume Stop Bill of Materials



P1	Mobile
PD	Industrial

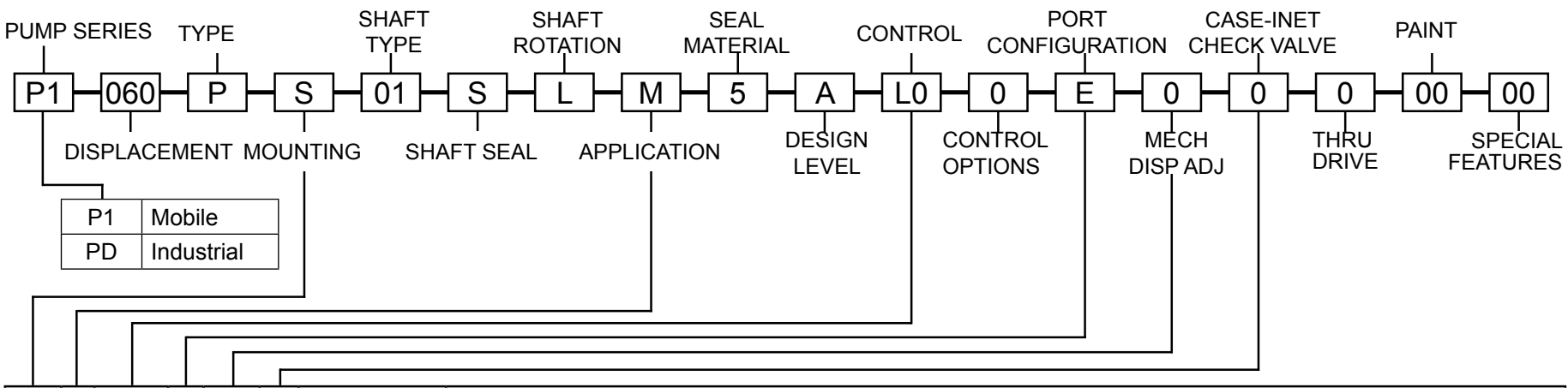
Type	QTY	Item no.	KIT S2E-18987-5K 060 Part #	KIT S2E-18987-5K 075 Part #	KIT S2E-18988-5K 100 Part #	KIT S2E-18988-5K 140 Part #	Description
1	1	45	311-50009-0		311-50011-0		Adjusting screw
2	2						
1	1	46	334-00011-0				Adjusting screw locknut
2	2						
1	1	47	03E-93181-0				Volume stop plug
2	2						
1	2	48	695-00908-0				O-ring, volume stop plug
2	2						
1	1	49	618-15023-0				Back-up ring, volume stop plug
2	2						
1	1	50	695-00011-0				O-ring, volume stop rod
2	2						
1	1	51	03E-93262-0				Volume stop rod
2	2						
1	1	52	488-35018-0				Plug
2	0						

	Item No.	Part No.	QTY	Description
1	41	314-10000-0	1	Hollow set screw
1	42	03E-93931-0	1	Check valve poppet
1	43	03E-93987-0	1	Spring
1	44	03E-93988-0	1	Check valve stop

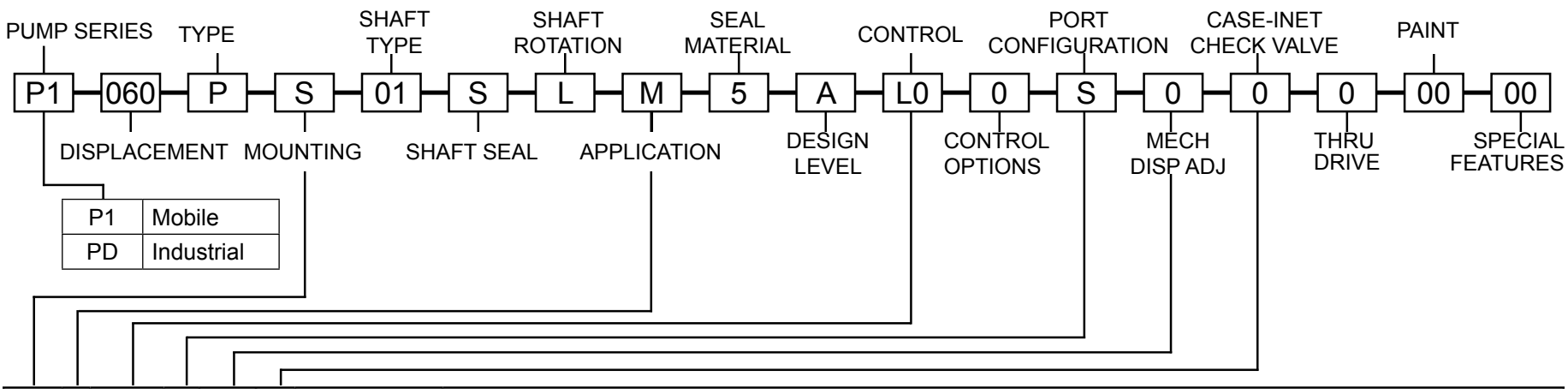


P1	Mobile
PD	Industrial

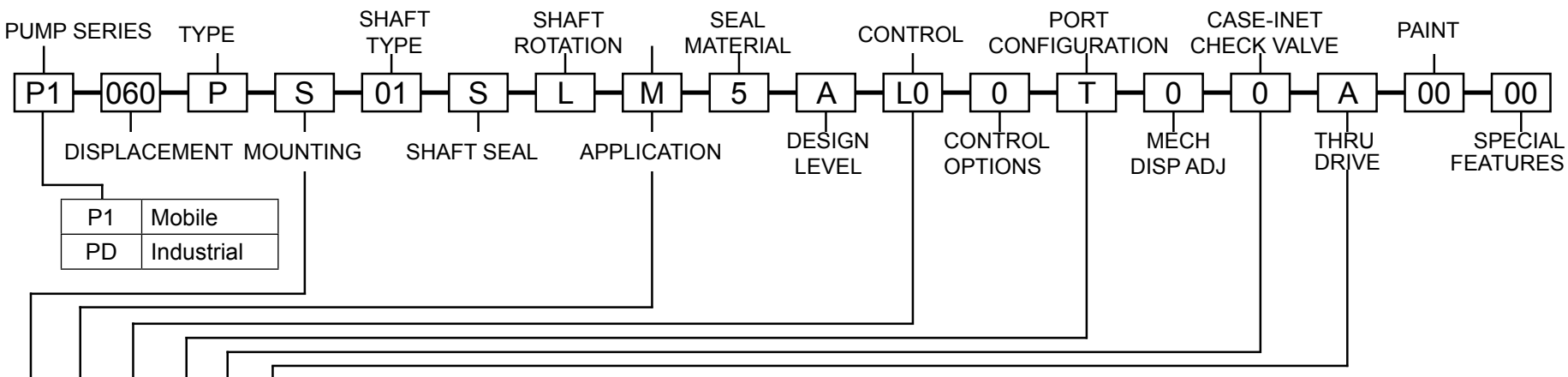
Type	QTY	Item no.	060 Part #	075 Part #	100 Part #	140 Part #	Description
A	1	53	03E-93278-0		03E-94274-0	03E-93947-0	Coupling
B			03E-93277-0		03E-94273-0	03E-93946-0	
C			03E-93276-0		03E-94271-0	03E-93944-0	
D			N/A			03E-93942-0	
H			03E-93724-0		03E-94657-0		
N			N/A		03E--94270-0	03E-93943-0	
Q			03E-93279-0		03E-94272-0	03E-93945-0	
K20N	18080		03E-94160-0				
K20N	150120		618-15023-0				
K25N	150100		03E-94161-0				
V	1		03E-94162-0		03E-94661-0	03E-94667-0	
W			N/A		03E-94662-0	03E-94666-0	
X			N/A			03E-93274-0	



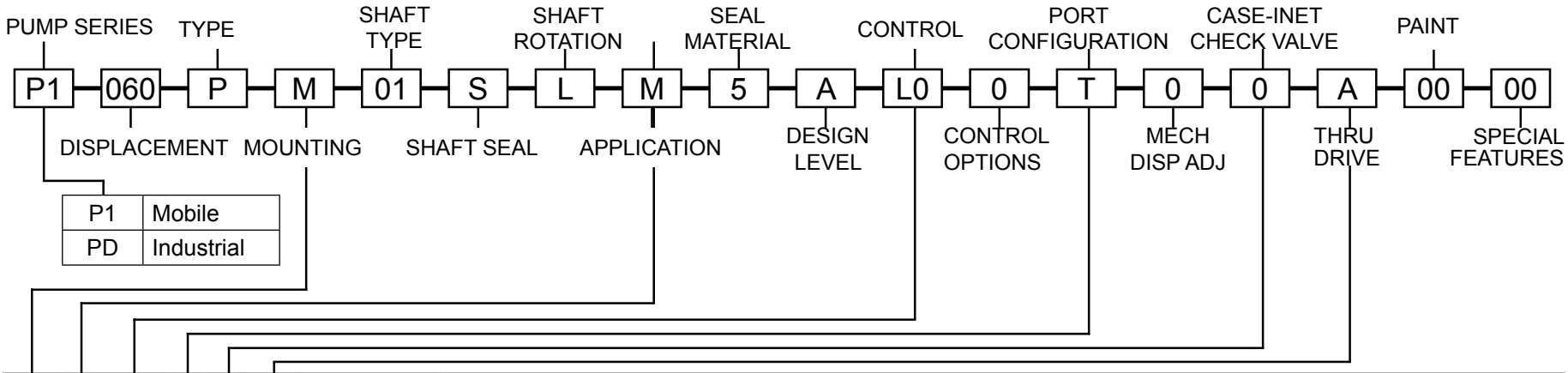
4	8	11	13	14	15	060 part no.	Description
S	M	C-L-R	E	0	0	03E-94027-0	SAE Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-94771-0	SAE Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94751-0	SAE Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94741-0	SAE Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-94932-0	Metric Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-94930-0	Metric Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94773-0	Metric Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94931-0	Metric Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve



4	8	11	13	14	15	060 part no.	Description
S	M	C-L-R	S	0	0	03E-94031-0	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-94772-0	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94758-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94749-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-94924-0	Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-95149-0	Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94774-0	Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve

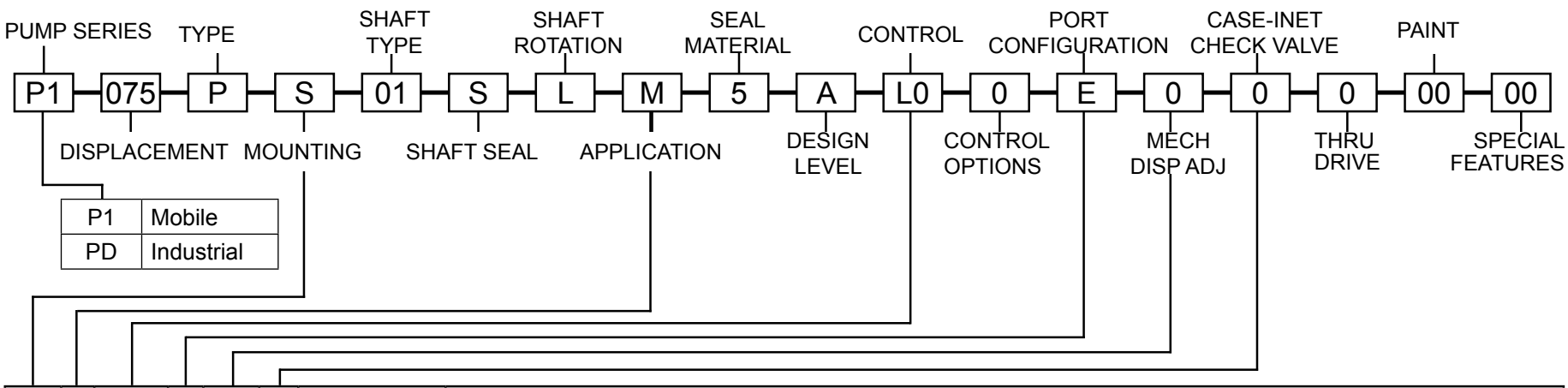


4	8	11	13	15	16	060 part no.	Description
S	M	C-L-R	T	0	A-H	03E-94707-0	SAE Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q	03E-94708-0	SAE Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C	03E-94029-0	SAE Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				1	A-H		SAE Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q	03E-94863-0	SAE Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C	03E-94759-0	SAE Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
	R			0	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C		SAE Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				V	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C		SAE Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve

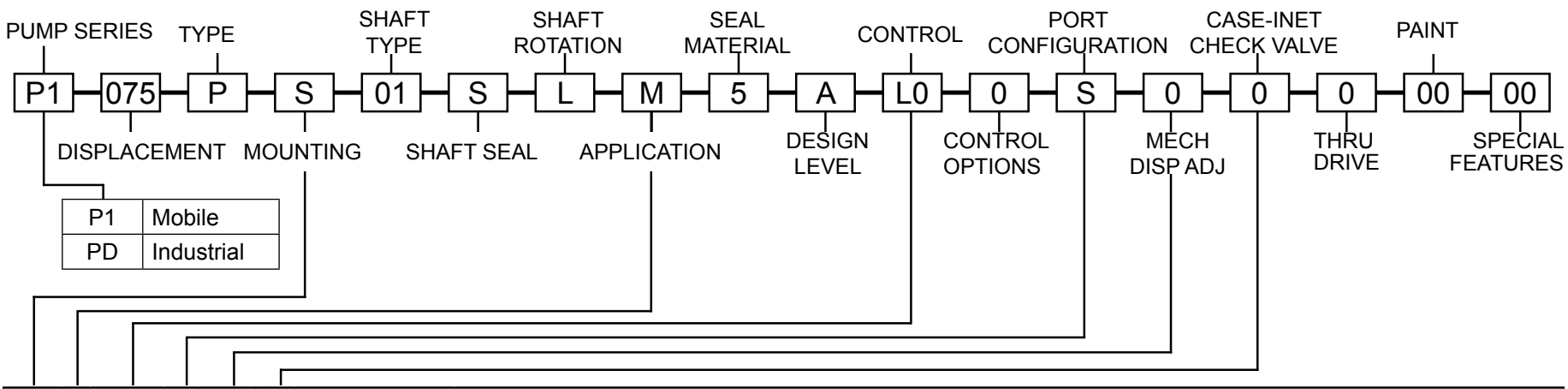


P1	Mobile
PD	Industrial

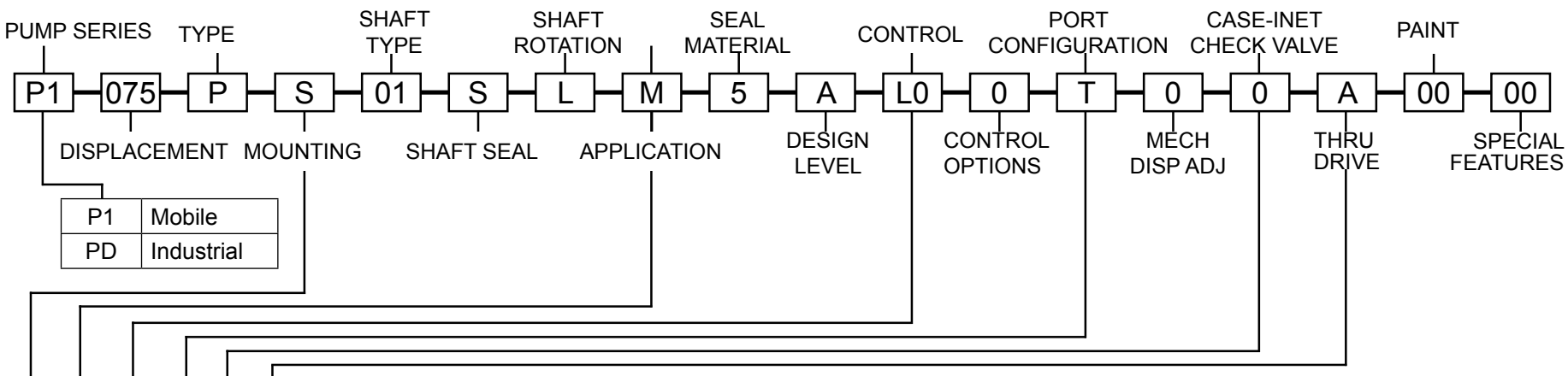
4	8	11	13	15	16	060 part no.	Description
ABM	M	C-L-R	T	0	A-H		Metric Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q	03E-94873-0	Metric Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C	03E-94932-0	Metric Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V		Metric Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				1	A-H		Metric Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q	03E-94873-0	Metric Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C		Metric Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		Metric Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
	R			0	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C		Metric Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				V	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C		Metric Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve



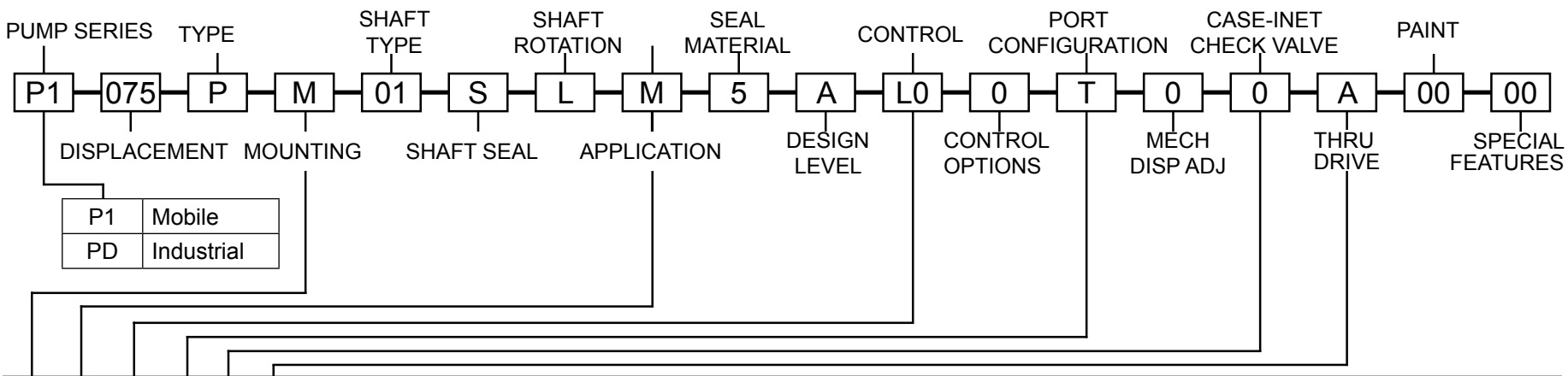
4	8	11	13	14	15	075 part no.	Description
S	M	C-L-R	E	0	0	03E-93090-0	SAE Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-93094-0	SAE Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93092-0	SAE Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94191-0	SAE Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-93091	Metric Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93093-0	Metric Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-93119-0	Metric Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve



4	8	11	13	14	15	075 part no.	Description
S	M	C-L-R	S	0	0	03E-941440-03	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-93116-0	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93114-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-93118-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0	03E-94476-0	SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94915-0	SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94755-0	SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-93113-0	Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93115-0	Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve

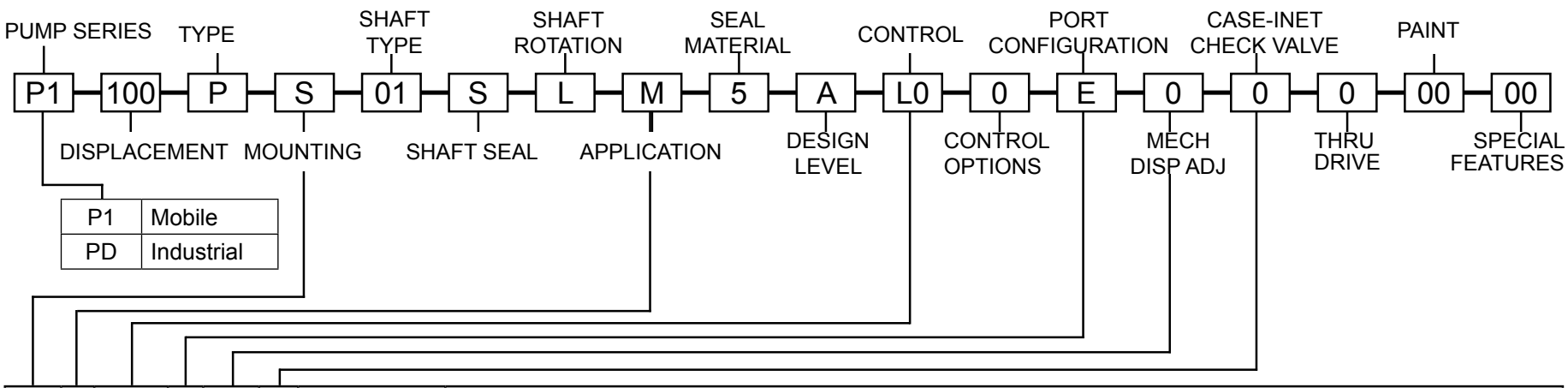


4	8	11	13	15	16	075 part no.	Description
S	M	C-L-R	T	0	A-H	03E-93099-0	SAE Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q	03E-93100-0	SAE Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C	03E-93101-0	SAE Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				1	A-H	03E-93105-0	SAE Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q	03E-93106-0	SAE Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C	03E-93107-0	SAE Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
	R			0	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C		SAE Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				V	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C		SAE Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve

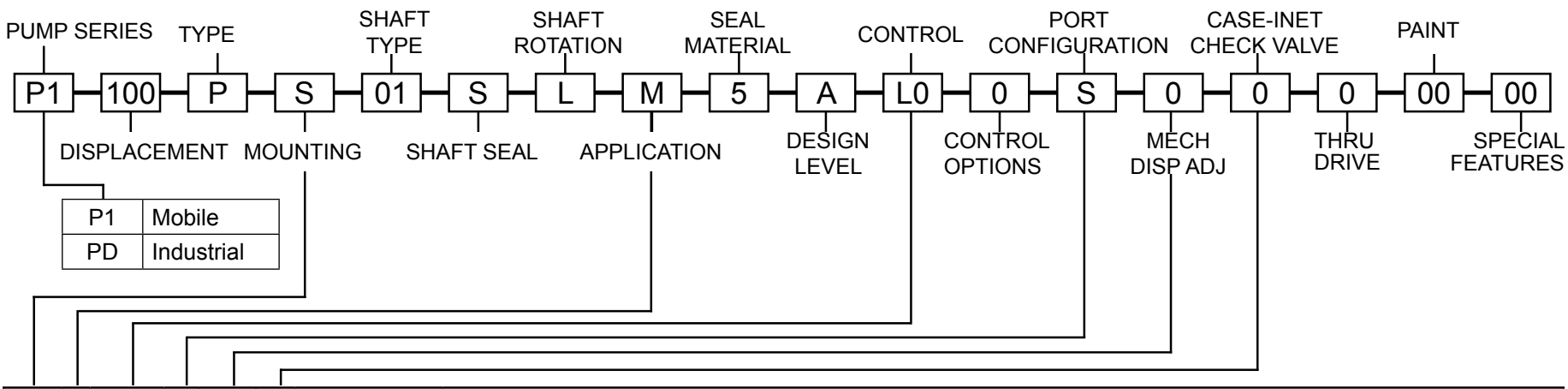


P1	Mobile
PD	Industrial

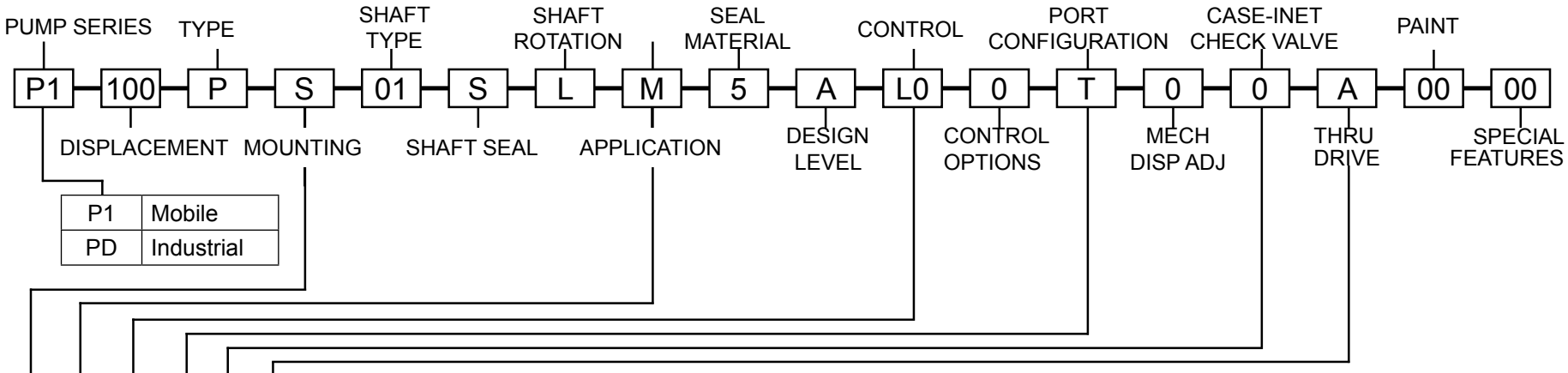
4	8	11	13	15	16	075 part no.	Description
ABM	M	C-L-R	T	0	A-H	03E-94723-0	Metric Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q	03E-94137-0	Metric Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve 03E-94869-0
					C	03E-94318-0	Metric Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V	03E-93104-0	Metric Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				1	A-H		Metric Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		Metric Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C		Metric Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		Metric Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
	R			0	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C		Metric Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				V	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C		Metric Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve



4	8	11	13	14	15	100 part no.	Description
S	M	C-L-R	E	0	0	03E-93774-0	SAE Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94316-0	SAE Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-94685-0	Metric Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-94533-0	Metric Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94616-0	Metric Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve

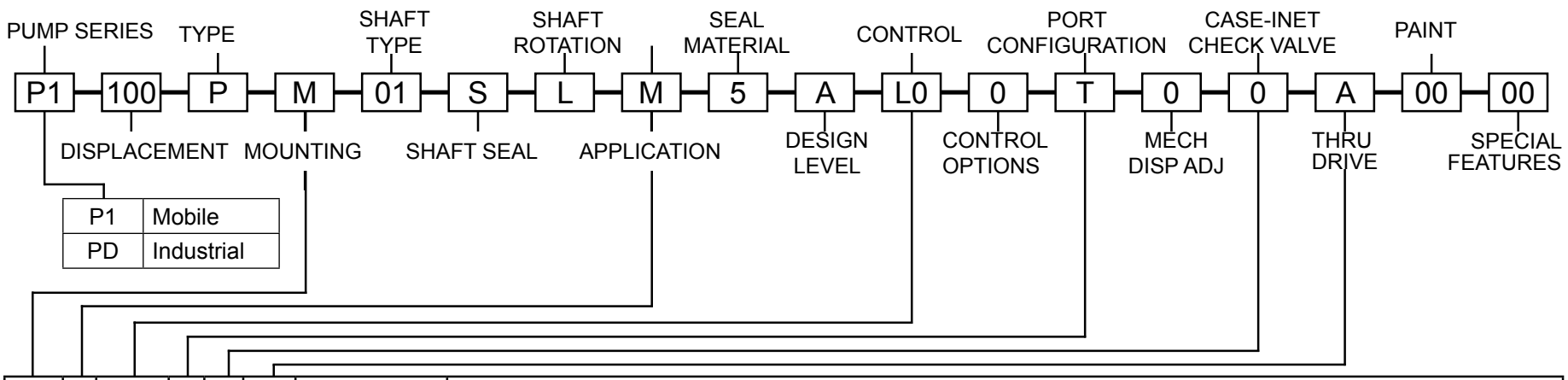


4	8	11	13	14	15	100 part no.	Description
S	M	C-L-R	S	0	0	03E-93778-0	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-94860-0	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94293-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94320-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0	03E-94679-0	SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-94622-0	Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-94861-0	Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-94636-0	Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94862-0	Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve

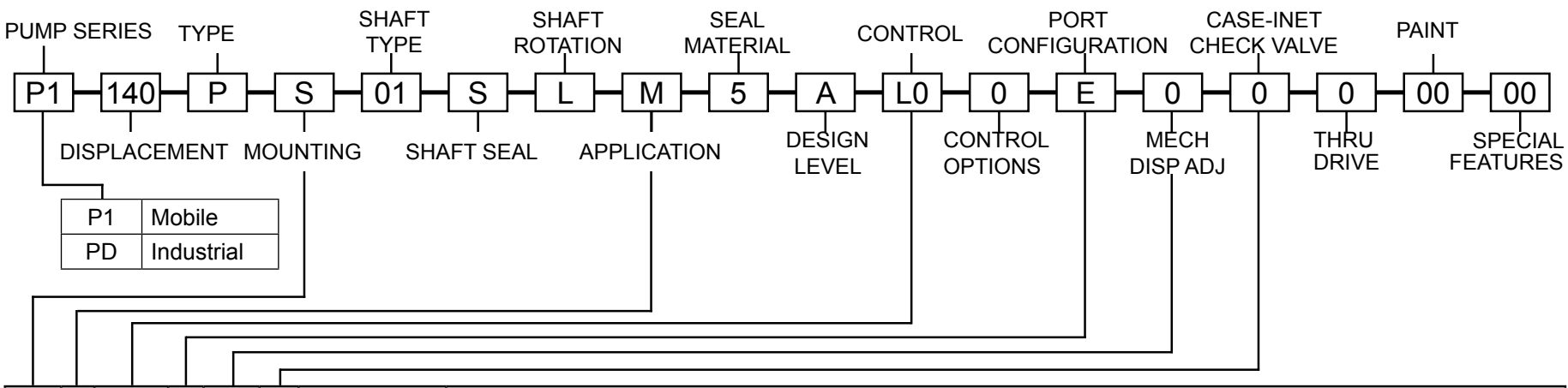


P1	Mobile
PD	Industrial

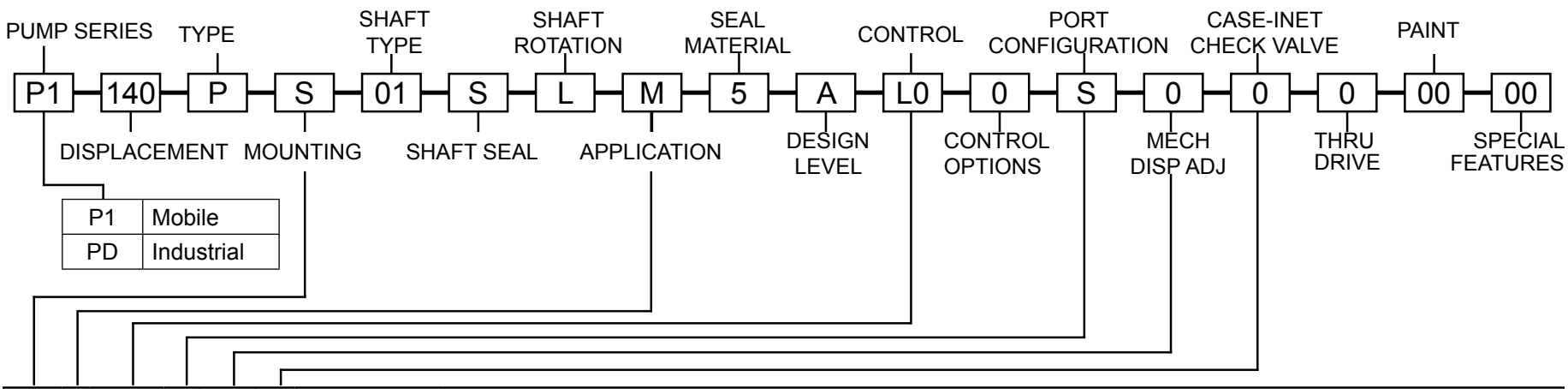
4	8	11	13	15	16	100 part no.	Description
S	M	C-L-R	T	0	A-H	03E-94463-0	SAE Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q	03E-94461-0	SAE Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N	03E-93776-0	SAE Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				1	A-H		SAE Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q	03E-94926-0	SAE Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C-N	03E-94637-0	SAE Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
	R			0	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N		SAE Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				V	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C		SAE Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve



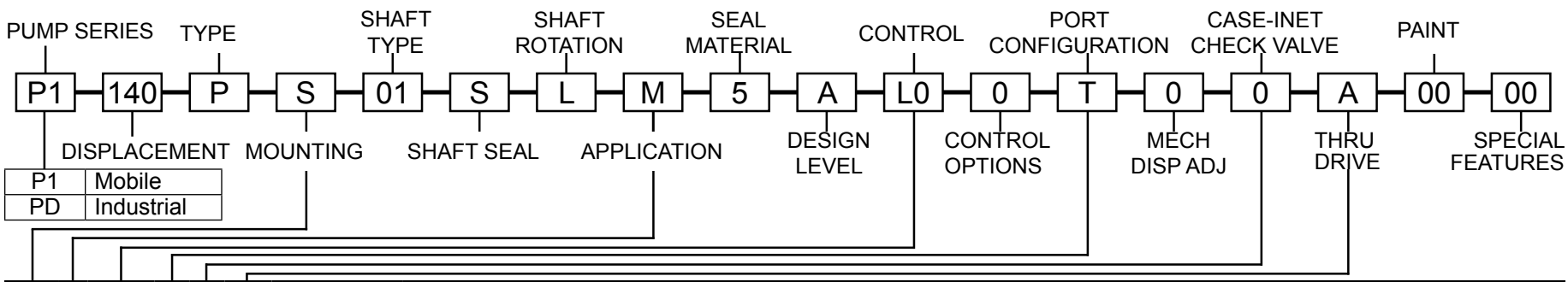
4	8	11	13	15	16	100 part no.	Description
ABM	M	C-L-R	T	0	A-H	03E-94725-0	Metric Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		Metric Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N	03E-93776-0N	Metric Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve 03E-94997-0 Tool
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W	03E-94660-0	Metric Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				1	A-H		Metric Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		Metric Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C-N		Metric Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		Metric Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
	R			0	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N		Metric Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
				V	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C-N		Metric Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve



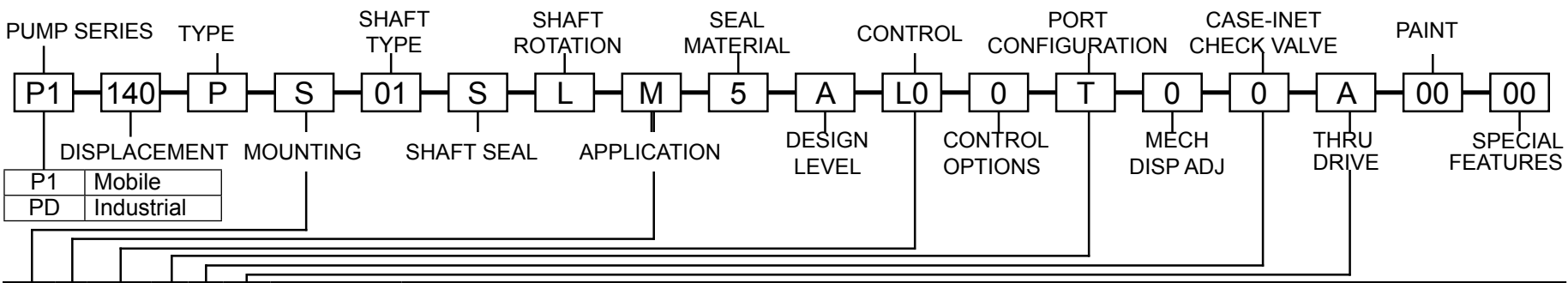
4	8	11	13	14	15	140 part no.	Description
S	M	C-L-R	E	0	0	03E-93192-0	SAE Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-93201-0	SAE Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93199-0	SAE Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-93203-0	SAE Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-94817-0	SAE Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-93198-0	Metric Ports, Standard, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-93202-0	Metric Ports, Standard, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93200-0	Metric Ports, Standard, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-93204-0	Metric Ports, Standard, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, End Ported, with displacement control, with Case to Inlet Check Valve



4	8	11	13	14	15	140 part no.	Description
S	M	C-L-R	S	0	0	03E-93219-0	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1	03E-93223-0	SAE Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93221-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-93225-0	SAE Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0	03E-94681-0	SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		SAE Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
ABM	M			0	0	03E-93220-0	Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Standard, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0	03E-93222-0	Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1	03E-95018-0	Metric Ports, Standard, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve
	R			0	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, No displacement control, with Case to Inlet Check Valve
				1-2	0		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, No Case to Inlet Check Valve
					1		Metric Ports, Low Ripple, Pressure Control, Side Ported, with displacement control, with Case to Inlet Check Valve



4	8	11	13	15	16	140 part no.	Description
S	M	C-L-R	T	0	A-H	03E-94147-0	SAE Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q	03E-93206-0	SAE Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N	03E-93207-0	SAE Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					D	03E-93208-0	SAE Ports, Standard, Pressure Control, SAE D pad, No Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
					X		SAE Ports, Standard, Pressure Control, ISO 180B4 pad, No Case to Inlet Check Valve
				1	A-H	03E-93212-0	SAE Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q	03E-94756-0	SAE Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C-N		SAE Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					D	03E-93214-0	SAE Ports, Standard, Pressure Control, SAE D pad, with Case to Inlet Check Valve
					R		SAE Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		SAE Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
					X		SAE Ports, Standard, Pressure Control, ISO 180B4 pad, with Case to Inlet Check Valve
	R			0	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N		SAE Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					D		SAE Ports, Low Ripple, Pressure Control, SAE D pad, No Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
					X		SAE Ports, Low Ripple, Pressure Control, ISO 180B4 pad, No Case to Inlet Check Valve
				1	A-H		SAE Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		SAE Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C-N		SAE Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					D		SAE Ports, Low Ripple, Pressure Control, SAE D pad, with Case to Inlet Check Valve
					R		SAE Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		SAE Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		SAE Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
					X		SAE Ports, Low Ripple, Pressure Control, ISO 180B4 pad, with Case to Inlet Check Valve



4	8	11	13	15	16	140 part no.	Description
ABM	M	C-L-R	T	0	A-H		Metric Ports, Standard, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q	03E-94258-0	Metric Ports, Standard, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N	03E-94259-0	Metric Ports, Standard, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					D		Metric Ports, Standard, Pressure Control, SAE D pad, No Case to Inlet Check Valve
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W	03E-93210-0	Metric Ports, Standard, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
					X	03E-93211-0	Metric Ports, Standard, Pressure Control, ISO 180B4 pad, No Case to Inlet Check Valve
				1	A-H		Metric Ports, Standard, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q	03E-94917-0	Metric Ports, Standard, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C-N		Metric Ports, Standard, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					D		Metric Ports, Standard, Pressure Control, SAE D pad, with Case to Inlet Check Valve
					R		Metric Ports, Standard, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Standard, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		Metric Ports, Standard, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
					X		Metric Ports, Standard, Pressure Control, ISO 180B4 pad, with Case to Inlet Check Valve
	R			0	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, No Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, No Case to Inlet Check Valve
					C-N		Metric Ports, Low Ripple, Pressure Control, SAE C pad, No Case to Inlet Check Valve
					D		Metric Ports, Low Ripple, Pressure Control, SAE D pad, No Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, No Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, No Case to Inlet Check Valve
					V-W		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, No Case to Inlet Check Valve
					X		Metric Ports, Low Ripple, Pressure Control, ISO 180B4 pad, No Case to Inlet Check Valve
				1	A-H		Metric Ports, Low Ripple, Pressure Control, SAE A pad, with Case to Inlet Check Valve
					B-Q		Metric Ports, Low Ripple, Pressure Control, SAE B pad, with Case to Inlet Check Valve
					C-N		Metric Ports, Low Ripple, Pressure Control, SAE C pad, with Case to Inlet Check Valve
					D		Metric Ports, Low Ripple, Pressure Control, SAE D pad, with Case to Inlet Check Valve
					R		Metric Ports, Low Ripple, Pressure Control, ISO 80A2 pad, with Case to Inlet Check Valve
					S-T		Metric Ports, Low Ripple, Pressure Control, ISO 100A2 pad, with Case to Inlet Check Valve
					V-W		Metric Ports, Low Ripple, Pressure Control, ISO 125B4 pad, with Case to Inlet Check Valve
					X		Metric Ports, Low Ripple, Pressure Control, ISO 180B4 pad, with Case to Inlet Check Valve

DISASSEMBLY NOTES:

A. Pump disassembly for inspection should be limited to the following cases:
a) Malfunction or oil leakage resulting from damage or wear and tear.
b) Trouble-shooting procedures previously listed do not solve the problem.

Caution: Spring assemblies in the pump are normally set under high compression and bodily injury may occur if caution is not taken during disassembly.

B. For rotation change or shaft conversion, disassembly should be done only as far as necessary to complete conversion.

C. Disassembly and reassembly should be performed in a clean environment.

D. It is usually not necessary to replace spring (20) fitted in cylinder barrel. Do not replace the spring unless absolutely necessary.

E. After disassembly, the internal parts should be coated with a film of clean oil and protected from dirt and moisture.

F. It is recommended that the length of the protruding portion of the compensator adjusting screws, be measured and noted, as this information will prove useful during assembly.

G. Care must be taken to avoid dropping, damaging or contaminating the machined parts and the control valve.

H. For complete overhaul, all o-rings and seals should be discarded and replaced.

Figure 1 Pump Data Tag

1. Identify the pump from information on the data tag. Figure 1
2. Drain fluid from housing. Fluid drained from pump should be disposed of properly.
3. Mount pump in fixture to prevent movement while removing main housing bolts
4. Remove bolts holding the compensator assembly on the pump housing. Additional fluid may drain out of the passages when the compensator is removed. Set compensator aside for later disassembly and inspection
5. Remove the bolts attaching the port block to the main housing.
6. Carefully remove the port block. Use caution to avoid dropping the port plate. Note the location of the bias spring - piston assembly and the control piston assembly. The control piston, bias piston and bias spring may remain in pump when port block is removed. Remove and discard the three white Teflon seals on the port block. These seals should be replaced each time the pump is disassembled.
7. Remove the control piston and the bias piston - spring assembly.

NOTE: For rotation change only do not disassemble further, proceed to step 16.

8. Remove the tapered roller bearing cone and shim from the end of the shaft.
9. Position the pump horizontally and remove the rotating group. Avoid separating the pistons from the barrel if possible. This will assist in identifying damage between an individual piston and bore during component inspection.
10. Remove the drive shaft.
NOTE : For shaft change only, no further disassembly is required. Proceed to assembly procedure step 5.

11. Remove the cam by rotating it 90 degrees and carefully extracting it from the pump housing. Note the large pocket under the cam fits on the pressure control side of the pump housing (same side as the three seals on the housing flange). Figure 2
12. Remove the front tapered roller bearing cone.
13. If there is excessive wear or damage, remove the tapered roller bearing cup from the bottom of the housing.
14. If completing a seal change or complete overhaul, turn the housing over and remove the snap ring and shaft seal from the housing. Note: do not reuse the shaft seal.
15. If there is excessive wear on the port block bearing cup, cone, or both; remove the tapered roller bearing cup from the port block.
16. If complete overhaul or rotation change, remove control piston and bias piston guides. The control piston and bias piston guides are installed with anerobic thread lock. Place the port block wih piston guides in oven at 163 Degrees C (325 degrees F)
    NOTE: To prevent annealing of heat treated surfaces: DO NOT USE A TORCH TO HEAT PISTON GUIDES.

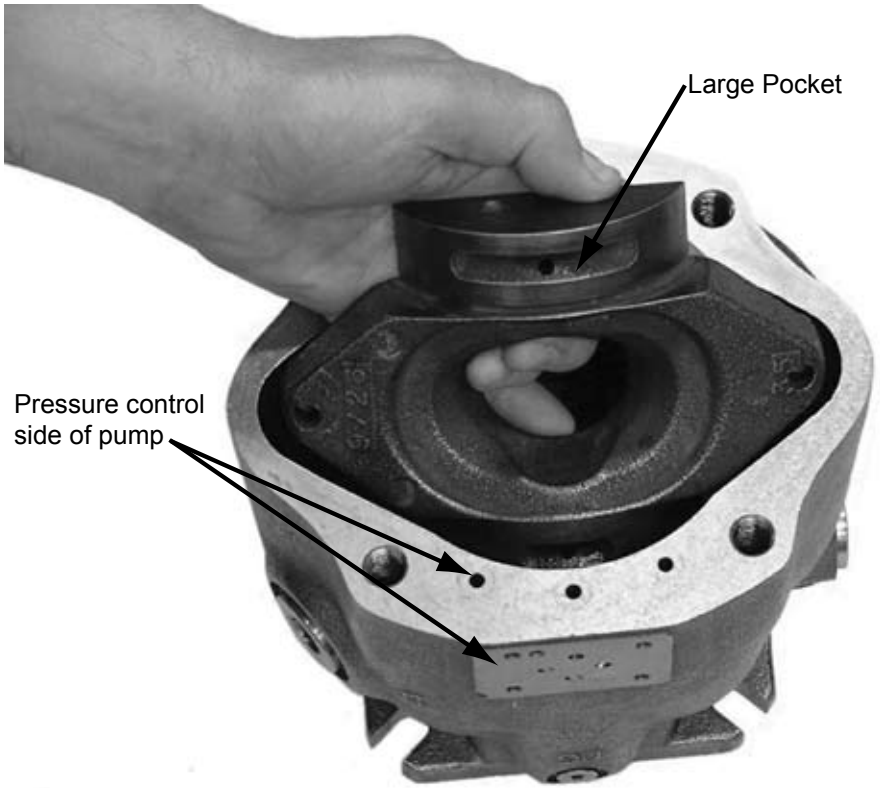


CHART 1 REWORK LIMITS						
Item Number	Component	Part number				Tolerances
		060	075	100	140	
13	Bias spring	03E-94055-0	03E-93151-0 141.5 mm (5.57 in.)	03E-93801-0 174.6 mm (6.87 in.)	03E-93963-0 212.3 mm (8.36 in.)	Free height: ± 0.51mm (± 0.020 in.)
20	Barrel hold down spring	03E-94049-0	03E-93145-0 63.7 mm (2.50 in.)	03E-93795-0 72.2 mm (2.84 in.)	03E-93959-0 68.6 mm (2.70 in.)	Free height: ± 0.51 mm (± 0.020 in.)
23	Barrel	03E-94036-0	03E-93129-0	03E-93783-0	03E-93242-0	Measure piston bore diameters in 3 places at the top, middle, and bottom. The measurements should not vary by not more than 0.010 mm (0.0004 in.) Maximum material to be removed when lapping is 0.0051 mm (0.0002 in.)
26	Piston and shoe assembly Sold in sets only	03E-94036-0 Maximum end play 0.10 mm (0.004 in.) Minimum shoe flange thickness 5.91 mm (0.233 in.)	S2E-17003-0 Maximum end play 0.10 mm (0.004 in.) Minimum shoe flange thickness 5.91 mm (0.233 in.)	S2E-17912-0 Maximum end play 0.13 mm (0.005 in.) Minimum shoe flange thickness 6.41 mm (0.252 in.)	S2E-17323-0 Maximum end play 0.13 mm (0.005 in.) Minimum shoe flange thickness 6.41 mm (0.252 in.)	Measure piston outside diamter in 3 places at the top, middle, and bottom. The measurements should not vary by more than 0.0102 mm (0.0004 in) End play between piston and shoe should not exceed values shown. Total material allowed to be removed from shoe face when lapping is 0.076mm (0.003 in)

Carefully clean and dry all parts prior to inspection.

Refer to chart 1 for dimensional information regarding allowable tolerances.

1. Examine piston diameters for scratches or gouges. If any piston is severely damaged, note which piston bore it came out of. Extra attention should be given to that bore in step 2. Check end play of piston shoe assembly. Check the bottom surface of the shoes for damage. The shoe surface should be square and flat. Measure the thickness of the shoe. Shoes may be lapped as a set if the thickness is within allowable limits. Confirm shoe thickness after lapping to insure it is still within limits.
2. Examine bores in cylinder for scratches Check diameter of bores in 4 different locations, including near the bottom of the barrel where the piston does not travel. If the dimensions vary by more than 0.0102 mm (0.0004 in.) or any dimension exceeds the allowable limit, the barrel needs to be replaced. Examine the barrel face for scratches and gouges. The barrel can be reworked if dimensions are with specifications listed in chart 1.
3. The port plate can be lapped lightly if the face is only lightly scratched, otherwise it should be replaced.
4. Examine the retainer plate in the area of contact with the piston shoes. Any marks beyond light polishing indicate that replacement is necessary. Check the surface of the spherical area of the retainer plate and the spherical guide ball. Inspect the back surface of the spherical guide ball where the load pins make contact. If indentations are present replace the guide ball.
5. Examine cam on top and bottom surface. If scratches or gouges appear to penetrate the surface treatment, the cam must be replaced.
6. The cam bearings cannot be reworked and should be replaced if worn through the Teflon surface.
7. Both the bias piston and the compensator piston should move freely in their respective bores. The pistons and bores should be free of scratches or gouges.
8. The seal area of the drive shaft should be smooth and not have marks due to seal wear. The bearing surfaces should not have any indication of the bearing cone spinning on the shaft. Keyed shafts should be inspected for signs of brinelling and damage to the key area. Splined shafts may have a contact wear pattern but should not show excessive wear on the spline area.

For major overhauls, all plugs should be removed, and the seals replaced. Prior to assembly, all parts should be thoroughly cleaned. Assembly should be performed in a clean work environment.

Do not use bearing grease during installation. Grease does not dissolve in hydraulic oil and may plug orifices or filters in the system. Clean petroleum jelly is preferred to lubricate o-rings and seals, and to adhere parts for assembly.

NOTE: For fluids other than petroleum based hydraulic oil, insure that petroleum jelly is compatible with the fluid. If not compatible, another product should be used instead.

Inspect all bearing surfaces and seal areas to insure that they are free from nicks, dings, scratches, and rust

1. Using installation tool T2, press the front bearing cup into the bottom of the housing. Make sure the cup is seated firmly against the bottom of the housing.
2. Turn housing over. Using installation tool T1, press the shaft seal in the seal bore. Install the snap ring into the groove in the seal housing bore.
3. Using installation tool T5, press the rear bearing cup into the port block. Insure that the cup is seated firmly against the bottom of the housing.
4. Install the front bearing cone and shaft into the housing.
5. Install the rear bearing cone on the shaft.
6. Install the port block onto the housing using housing bolts and tighten to 27 ± 1.3 Nm (20 ± 1 ft. lb.).
7. Position the pump so shaft end is up.
8. Lay a parallel bar on the pump pilot.
9. Press down on the shaft and rotate it 3-5 times then measure the height of the shaft end to the parallel bar using dial calipers or a dial indicator.
10. Grasp the shaft and pull it up and rotate it 3-5 times. Measure the height of the shaft end to the parallel bar. Note: if the shaft slips or falls, the steps must be repeated to get an accurate measurement. Figure 3

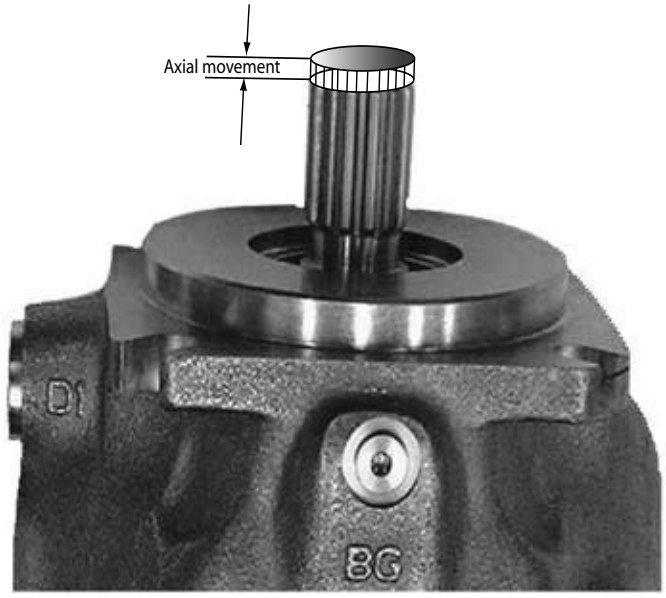


Figure 3

11. Subtract the larger from the smaller to get the differential gap.
12. Repeat the procedure three times. Once recorded, take the average of the three measurements.
13. With the average, use chart 2 to determine the correct shim to install in the pump.
14. Rebuild the pump with the shaft bearings, and selected shim. Check end play, then disassemble port block and continue with pump assembly.
15. If barrel hold down spring was removed during disassembly process, install three pins to slots in barrel spline. Petroleum jelly can be used to hold pins in place while installing remaining parts. Place barrel on fixture with pin side down. Install backup washer and hold down spring. Compress spring in press and install snap ring.

Caution: Make sure snap ring is properly seated in the groove prior to removing the barel from the press.

CHART 2 Shim Thicknes Selection						
Measured differential		Shim thickness	Part Number			
minimum	maximum		060	075	100	140
3.30mm (0.130 in)	3.36 mm (0.132 in)	3.28 mm (0.1291 in)	03E-93180-0	03E-93180-0	03E-94148-0	03E-93260-0
3.37 mm (0.133 in)	3.44 mm (0.135 in)	3.36 mm (0.1323 in)	03E-93566-0	03E-93566-0	03E-94149-0	03E-93970-0
3.45 mm (0.136 in)	3.51 mm (0.138 in)	3.44 mm (0.1354 in)	03E-93567-0	03E-93567-0	03E-94150-0	03E-93971-0
3.52 mm (0.139 in)	3.62 mm (0.142 in)	3.52 mm (0.1386 in)	03E-93568-0	03E-93568-0	03E-94151-0	03E-93972-0
3.63 mm (0.143 in)	3.70 mm (0.145 in)	3.60 mm (0.1417 in)	03E-93569-0	03E-93569-0	03E-94152-0	03E-93973-0
3.71 mm (0.146 in)	3.77 mm (0.148 in)	3.68 mm (0.1449 in)	03E-93570-0	03E-93570-0	03E-94153-0	03E-93974-0
3.78 mm (0.149 in)	3.85 mm (0.151 in)	3.76 mm (0.1480 in)	03E-93571-0	03E-93571-0	03E-94154-0	03E-93975-0
3.86 mm (0.152 in)	3.92 mm (0.154 in)	3.84 mm (0.1512 in)	03E-93572-0	03E-93572-0	03E-94155-0	03E-93976-0
3.93 mm (0.155 in)	4.00 mm (0.157 in)	3.92 mm (0.1539 in)	03E-93573-0	03E-93573-0	03E-94156-0	03E-93977-0
4.01 mm (0.158 in)	4.10 mm (0.161 in)	4.00 mm (0.1575 in)	03E-93574-0	03E-93574-0	03E-94157-0	03E-93978-0
4.11 mm (0.162 in)	4.18 mm (0.164 in)	4.08 mm (0.1606 in)	03E-93575-0	03E-93575-0	03E-94158-0	03E-93979-0
4.19 mm (0.165 in)	4.25 mm (0.167 in)	4.16 mm (0.1638 in)	03E-93576-0	03E-93576-0	03E-93864-0	03E-97980-0

16. Apply a light film of oil into the piston bores. Lightly lubricate the spherical surface of the guide ball. Install the nine pistons into the bores in the hold down plate. Install the spherical guide ball into the hold down plate. While holding the guide ball against the hold down plate, install the pistons into the barrel.
17. Install the locating pin on the port block face.
18. Apply Loctite Primer 7469 to the guide threads and allow to dry. Install unlubricated o-rings on the control guide and bias guide. Apply Loctite 272 to the guide threads. For left hand rotation the bias guide is installed nearest to the dowel pin (figure 4A.) For right hand rotation the control guide is installed nearest to the dowel pin (figure 4B.) Torque the control and bias guides as specified in Chart 3.
19. Apply light oil film to control piston and install it in the control guide bore. **NOTE: The 140 size has a lubrication hole in the piston. Confirm that the hole is facing the port block**. The control guide has nonsymmetrical lubrication grooves The end with the closest grooves must be installed towards the port block.
20. Apply light oil film to the bias piston. Install the bias spring and the bias piston in the bias piston guide bore.
21. Apply a light layer of petroleum jelly to the back surface of the port plate. Install the port plate on the port block, lining up the slot on the port plate with the locating pin.
22. Install the large o-ring in the groove on the pump housing. Install the three white Teflon o-rings in the pressure communication ports on the pump housing.

Chart 3	
Pump	Control and bias guide torque
060	142 ± 6.5 N-m (105 ± 5 ft-lbs).
075	142 ± 6.5 N-m (105 ± 5 ft-lbs).
100	184 ± 8 N-m (136 ± 6 ft-lbs)
140	203 ± 8 N-m (170 ± 6 ft-lbs)

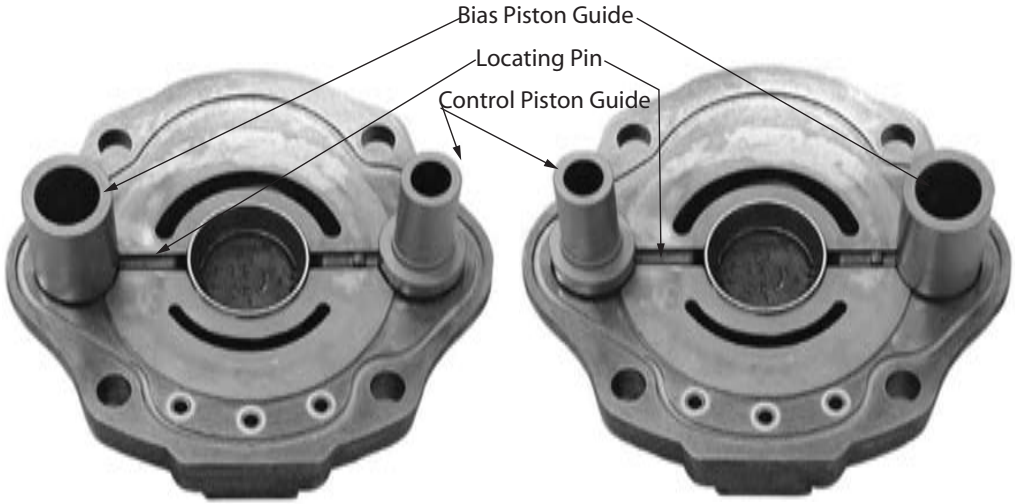
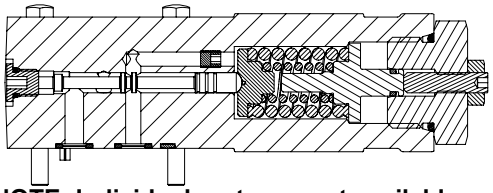


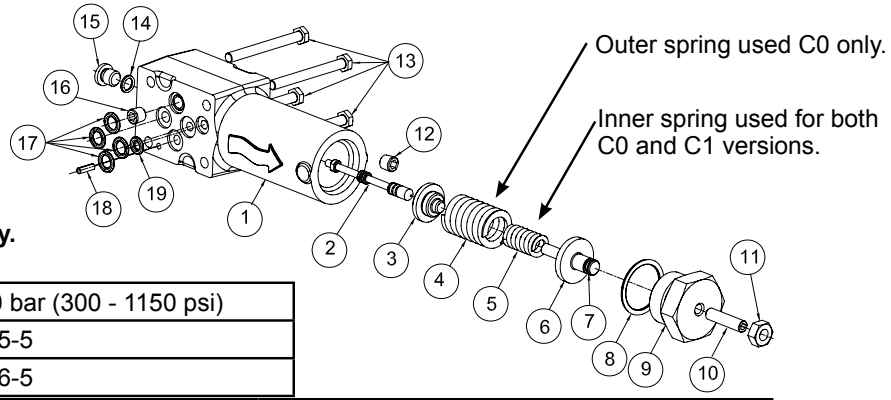
Figure 4A
Port block with Left Hand configuration

Figure 4B
Port Block with Right Hand configuration

23. Install the cam bearings in the cradle area of the housing. The chamfer on the back of the bearing must face the outer wall of the housing. Use Loctite Primer Grade “T” or other suitable primer on screws and mating threads in housing. Apply Loctite #242 (use sparingly) to screw threads and install orifice screws to hold bearings in place. Torque screws to 3.4 ± 0.25 Nm (33 ± 3 in-lb).
24. Place thin film of clean oil on cam bearing surfaces. Install cam in housing. The cam must be tilted to permit entry into the housing. (Figure 2) NOTE: The large pocket on the bottom surface of the cam must be on the same side as the three pressure communication holes on the main housing. Pump rotation does not affect the assembly of the cam.
25. Install the drive shaft into the pump housing. Position pump horizontally. Install the rotating group over the pump shaft. Rotate the barrel to insure that it is seated against the cam. Insure that the pump shaft is seated properly in the front bearing.
26. Install bearing spacer as determined from the chart (see step 11.) Install the rear bearing on the drive shaft.
27. Confirm that compensator rotation, port plate rotation, control and bias piston location indicate same direction of rotation.
28. Carefully install the assembled port block on the pump housing. Press the port block to compress the bias spring and install housing bolts. Tighten the bolts in a cross pattern to insure the port block does not get cocked on the housing. When port block is seated on the housing, torque bolts in a cross pattern as specified in chart 4.
29. Install o-ring seals and assembled compensator on side of pump housing. Pump rotation is indicated by arrow on compensator housing. Torque bolts to 5 ± 0.25 Nm (45 ± 3 in-lb).

Chart 4	
Pump	Housing bolt torque
060	135.6 ± 5 Nm (100 ± 4 ft-lbs)
075	135.6 ± 5 Nm (100 ± 4 ft-lbs)
100	229 ± 7 Nm (170 ± 5 ft-lbs).
140	278 ± 7 Nm (205 ± 5 ft-lbs).





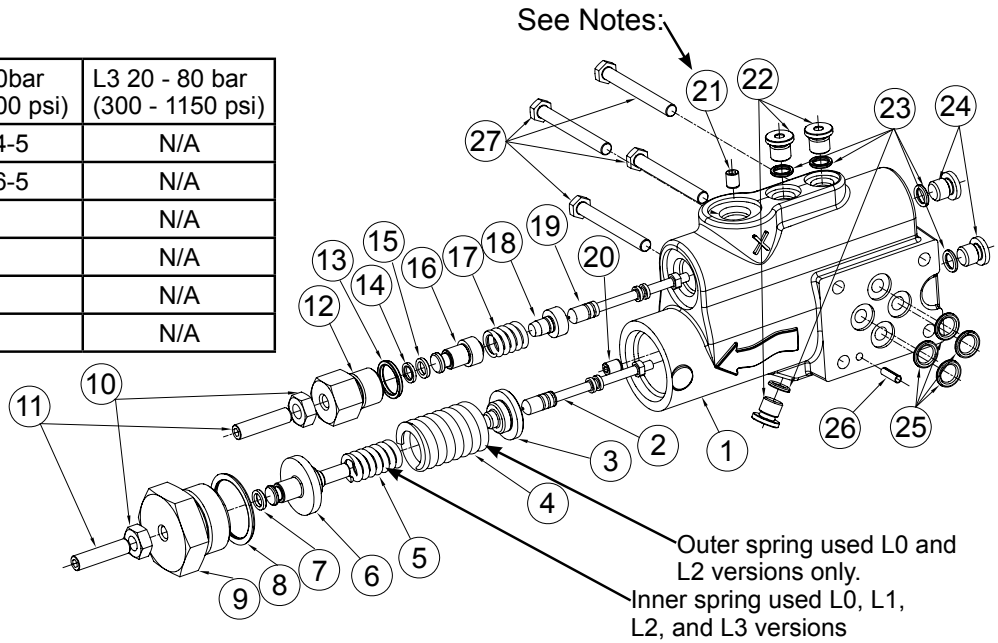
NOTE: Individual parts are not available.
The compensator is sold as a complete assembly only.
Compensator Repair Part Number

Rotation	C0 80 - 280bar (1150 - 4000 psi)	C1 20 - 80 bar (300 - 1150 psi)
CW	S2E-17904-5	S2E-18285-5
CCW	S2E-17905-5	S2E-18286-5

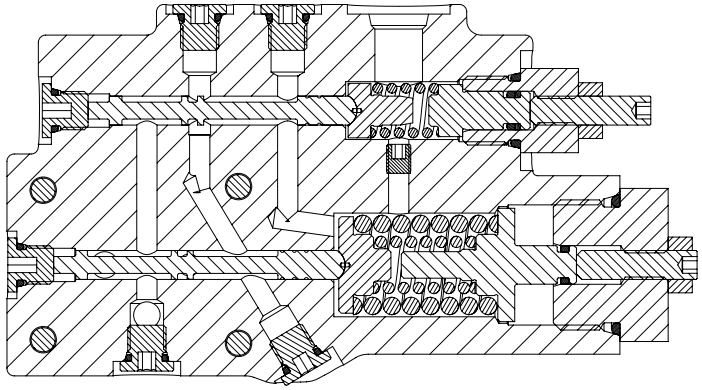
Item no.	Quantity	Part Number	Description	NOTES / Tightening Torque
1	1	03E-93695	Compensator body CW rotation	
		03E-93696	Compensator body CCW rotation	
2	1	03E-93156	Spool	
3	1	03E-93165	Spring seat	
4	1	03E-93158	Outer spring	C0 versions only
5	1	03E-93159	Inner spring	
6	1	03E-93164	Spring seat & piston	
7	1	675-00009	Seal piston o-ring	
8	1	695-00912	Spring cap o-ring	
9	1	03E-93173	Spring cap	115 ± 7 N-m (85 ± 5 ft-lbs)
10	1	311-50003	Adjusting screw	
11	1	340-00056	Adjusting screw locknut	7.9 ± 0.8 N-m (70 ±7 **in-lbs**)
12	1	311-50006	Socket set screw	(Loctite 242) 3.4 ± 0.4 N-m (30 ± 3 **in-lbs**)
13	4	363-10025	Hex mounting screw	5.0 ± 0.3 N-m (45 ± 3 **in-lbs**)
14	1	695-00902	SAE #2 o-ring	
15	1	03E-93163	Hardened SAE #2 o-ring boss plug	4.0 ± 0.6 N-m (35 ± 5 **in-lbs**)
16	1	03E-93270	Orifice plug	(Loctite 242) 3.4 ± 0.4 N-m (30 ± 3 **in-lbs**)
17	4	605-10069	Teflon O-ring	
18	1	325-36002	Roll pin	
19	1	605-10058-5	Teflon O-ring	

NOTE: Individual parts are not available.
The compensator is sold as a complete assembly only.
Compensator Repair Part Number

Port	Rotation	L0 80 - 280bar (1150 - 4000 psi)	L1 20 - 80 bar (300 - 1150 psi)	L2 80 - 280bar (1150 - 4000 psi)	L3 20 - 80 bar (300 - 1150 psi)
SAE	CW	S2E-17823-5	S2E-18245-5	S2E-18584-5	N/A
	CCW	S2E-17824-5	S2E-18244-5	S2E-18586-5	N/A
ISO	CW	S2E-17939-5	N/A	N/A	N/A
	CCW	S2E-17938-5	N/A	N/A	N/A
BSPP	CW	S2E-17937-5	N/A	N/A	N/A
	CCW	S2E-17936-5	N/A	N/A	N/A

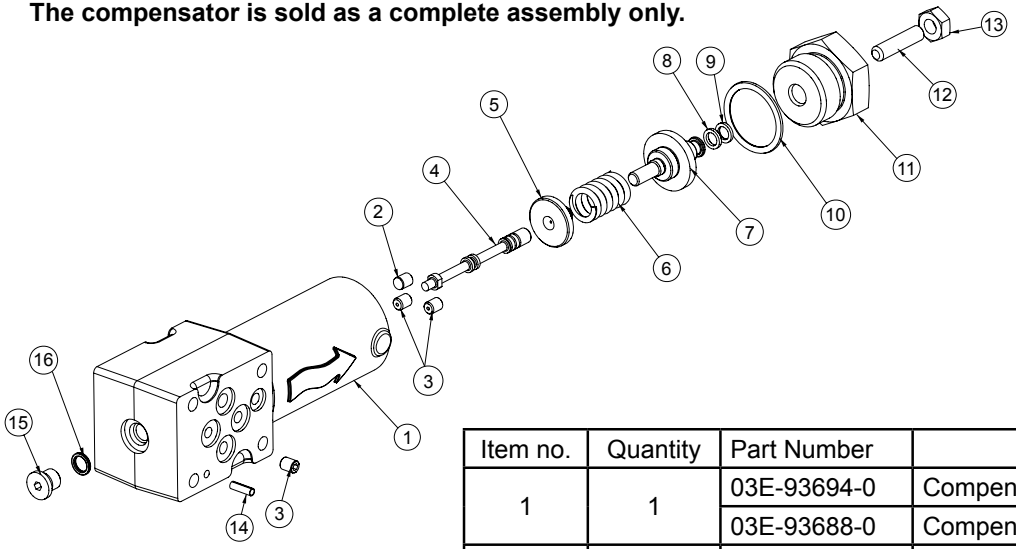


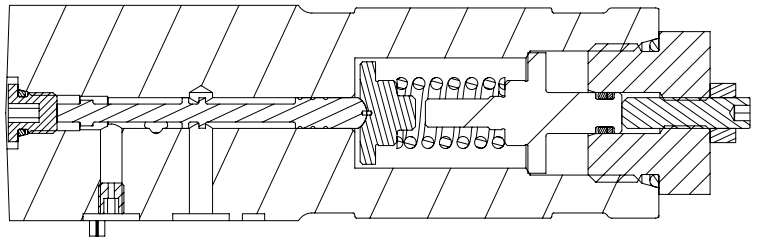
Item no.	Quantity	Part Number	Description	NOTES / Tightening Torque
1	1	03E-93155	SAE Compensator body CW rotation	
		03E-93154	SAE Compensator body CCW rotation	
			ISO Compensator body CW rotation	
			ISO Compensator body CCW rotation	
			BSPP Compensator body CW rotation	
			BSPP Compensator body CCW rotation	
2	1	03E-93156	Main Compensator Spool	
3	1	03E-93165	Main Compensator Spring Seat	
4	1	03E-93158	Main Compensator Outer spring	L0 & L2 versions only
5	1	03E-93159	Main Compensator Inner spring	
6	1	03E-93164	Main Compensator Spring seat & piston	
7	2	675-00009-0	Compensator Seal piston o-ring	



8	1	695-00912-0	Main Compensator Spring cap o-ring		
9	1	03E-93173-0	Main Compensator Spring cap	115 ± 7 N-m (85 ± 5 ft-lbs)	
10	2	311-50003-0	Adjusting screw		
11	2	340-00056-0	Adjusting screw locknut	7.9 ± 0.8 N-m (70 ±7 **in-lbs**)	
12	1	695-00906-0	Load Sense Compensator Spring cap	36.5 ± 1.5 N-m (27 ± 1 ft-lbs)	
13	1	695-00906-0	Load Sense Compensator Spring cap oring		
14	1	618-15022-0	Load Sense Compensator Piston backup ring		
15	1	675-00009-0	Load Sense Compensator Piston Oring		
16	1	03E-94142-0	Load Sense Compensator Seal Piston		
17	1	03E-94141-0	Load sense compensator spring		
18	1	03E-94143-0	Load sense compensator spring seat		
19	1	03E-93157-0	Load sense compensator spool		
20	1	311-50006-0	Socket set screw	(Loctite 242) 3.4 ± 0.4 N-m (30 ± 3 **in-lbs**)	
21	1	311-50006-0	Socket set screw	L0 and L1 versions	(Loctite 242) 3.4 ± 0.4 N-m (30 ± 3 **in-lbs**)
		03E-93269-0	Orifice	L2 and L3 versions	
22	3	488-35046-0	SAE #2 o-ring boss plug	4.0 ± 0.6 N-m (35 ± 5 **in-lbs**)	
23	5	695-00902-0	SAE #2 o-ring		
24	2	03E-93163-0	Hardened SAE #2 o-ring boss plug	4.0 ± 0.6 N-m (35 ± 5 **in-lbs**)	
25	4	605-10069-0	Teflon O-ring		
26	1	325-36002-0	Roll pin		
27	4	363-10025-0	Hex mounting screw	5.0 ± 0.3 N-m (45 ± 3 **in-lbs**)	

NOTE: Individual parts are not available.
The compensator is sold as a complete assembly only.

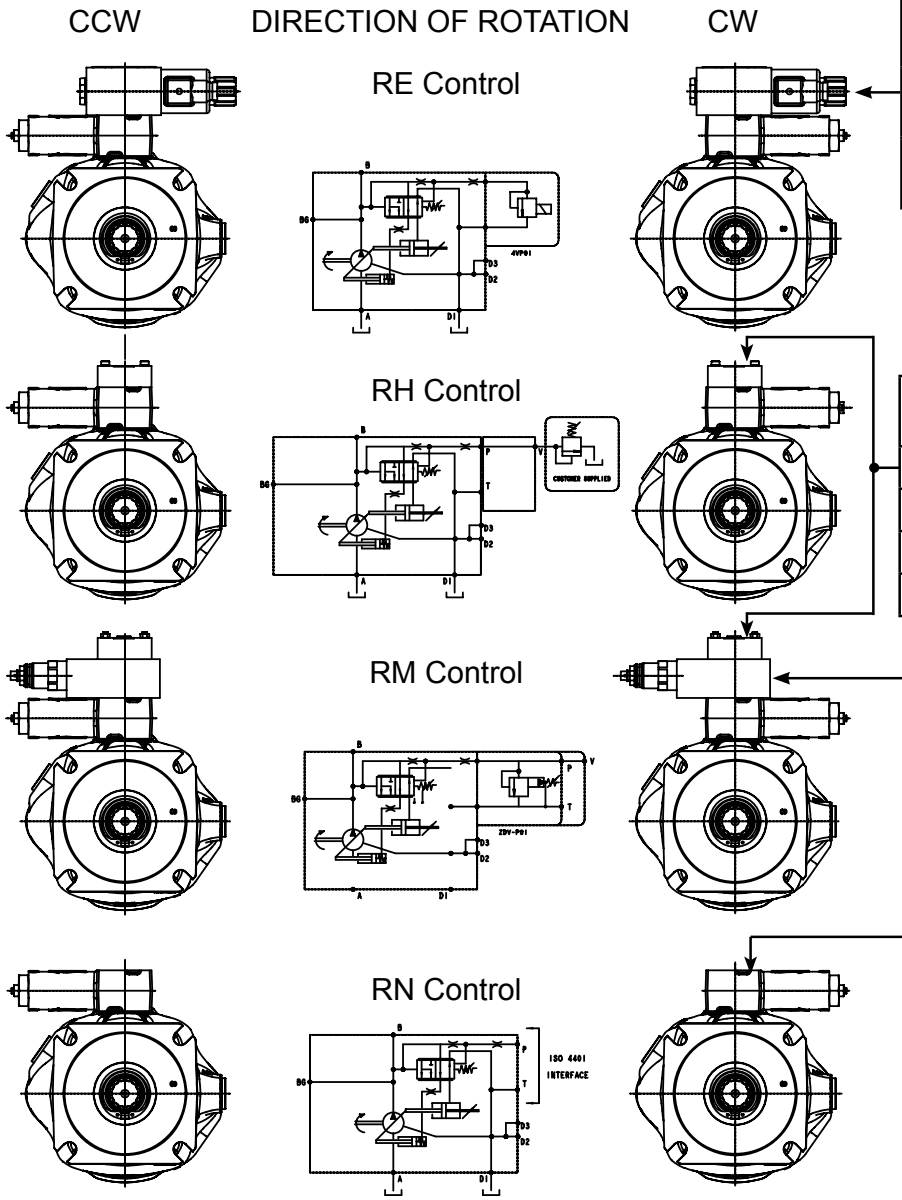




Compensator Repair Part Number

Rotation	Compensator part number
CW	S2E-17958-5
CCW	S2E-17924-5

Item no.	Quantity	Part Number	Description	NOTES / Tightening Torque
1	1	03E-93694-0	Compensator body CW rotation	
		03E-93688-0	Compensator body CCW rotation	
2	1	311-50006-0	Socket set screw	Locktite 242 - 3.4 ± 0.4 N-m (30 ± 3 **in-lbs**)
3	3	03E-93270-0	Orifice Plug	Locktite 242 - 3.4 ± 0.4 N-m (30 ± 3 **in-lbs**)
4	1	03E-93156-0	Spool	
5	1	03E-93165-0	Spring seat	
6	1	03E-94203-0	Bias spring	
7	1	03E-94202-0	Spring seat and seal piston	
8	1	679-00009-0	Seal piston o-ring	
9	1	618-15022-0	Seal piston back-up ring	
10	1	695-00912-0	Spring cap o-ring	
11	1	03E-94227-0	Spring cap	115 ± 7 N-m (85 ± 5 ft-lbs)
12	1	311-50003-0	Adjusting screw	
13	1	340-00056-0	Adjusting screw locknut	7.9 ± 0.8 N-m (70 ±7 **in-lbs**)
14	1	325-36002-0	Roll pin	
15	1	03E-93163-0	Hardened SAE #2 o-ring boss plug	4.0 ± 0.6 N-m (35 ± 5 **in-lbs)**
16	1	695-00902-0	SAE #2 o-ring	



Part no	Qty	Description	Mounting bolts	Qty
S26-58322-G	1	12 VDC Proportional pressure control	361-07313-8	4
S26-58322-H		24 VDC Proportional pressure control		

P1 — 060 — P — S

PUMP SERIES — DISPLACEMENT — TYPE — MOUNTING AND PORTS

	Part no	Qty	Description	Mounting bolts	Qty
S	449-00013-0	1	Cover SAE port	361-07313-8	4
AB	492-15528-0	1	Adapter BSPP-SAE		
M	492-15527-0	1	Adapter Metric-SAE		
	695-00904-0	1	O-ring, adapter boss		

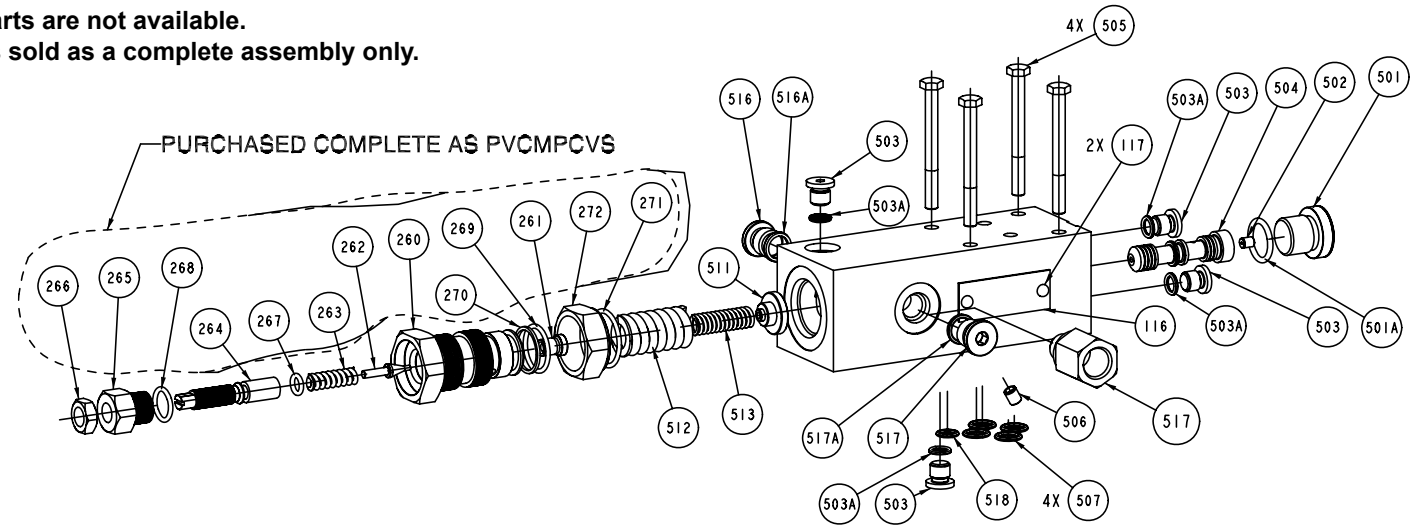
098-91202-0	1	Manual pressure control		
		Nuts	340-00061-0	4
		Threaded Rod	03E-94727-0	4

036-63796-0	1	Shipping Cover	363-10025-0	4

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

"A" Compensator exploded view and parts list

NOTE: Individual parts are not available.
The compensator is sold as a complete assembly only.



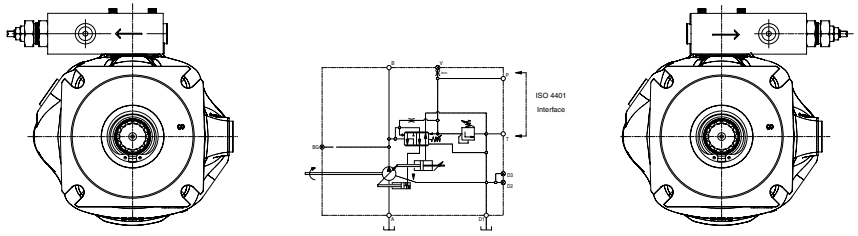
Compensator Repair Part Number

Rotation	Compensator part number
CW	
CCW	

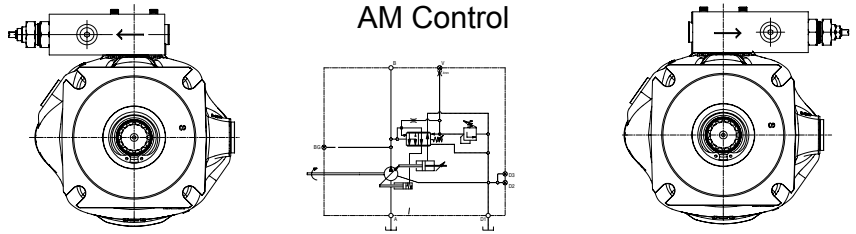
Item no.	Quantity	Part Number	Description	NOTES / Tightening Torque
			Compensator body CW rotation	
			Compensator body CCW rotation	
			Socket set screw	
			Orifice Plug	
			Spool	
			Spring seat	
			Bias spring	
			Spring seat and seal piston	
			Seal piston o-ring	
			Seal piston back-up ring	
			Spring cap o-ring	
			Spring cap	
			Adjusting screw	
			Adjusting screw locknut	
			Roll pin	
			Hardened SAE #2 o-ring boss plug	
			SAE #2 o-ring	

CCW DIRECTION OF ROTATION CW

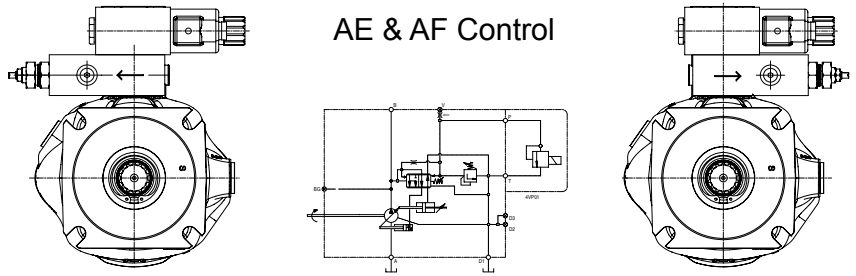
AN Control



AM Control



AE & AF Control



Part no	Qty	Description	Mounting bolts	Qty
		12 VDC Proportional pressure control		
		24 VDC Proportional pressure control		

P1 — 060 — P — S

PUMP SERIES DISPLACEMENT TYPE MOUNTING AND PORTS

	Part no	Qty	Description	Mounting bolts	Qty
			Cover SAE port		
			Adapter BSPP-SAE		
			Adapter Metric-SAE		
			O-ring, adapter boss		
			Manual pressure control		
			Nuts		
			Threaded Rod		
			Shipping Cover		

NOTES:
Access plugs on end of compensator spool bores are hardened plugs. Do not interchange with other plugs in the control.

For rotation change, the complete compensator assembly will need to be replaced.

Compensator Disassembly:

1. Measure and record the extension of the two pressure adjusting screws.
2. Carefully remove the main compensator spring cap. Remove the two springs. Remove the seal piston and spring seat. Remove the o-ring boss access plug on the opposite side of the compensator. Remove the compensator spool. NOTE: the compensator spool and inner spring are not interchangeable with the load sense compensator spool and spring.
3. For “L” series compensators: Carefully remove the load sense compensator spring cap with spring seat/seal piston. Remove the spring. Remove the spring seat. Remove the o-ring boss access plug on the opposite side of the compensator. Remove the load sense compensator spool. NOTE: the load sense compensator spool and spring are not interchangeable with the main compensator spool and inner spring of the main compensator.
4. Remove all SAE o-ring boss access plugs.

Compensator Inspection:

NOTE: The compensator is supplied as an assembly. Individual parts are not available. If there is significant damage to any of the parts, the complete compensator will need to be replaced.

1. Inspect the main compensator spool and the load sense spool for scratches or other damage.
2. Inspect the springs for proper free extension length (see chart).
3. Inspect the spool bores for damage. Apply a light oil film on the appropriate spool and check its fit in the bore. The spool should fit snugly in housing and not have any radial play.

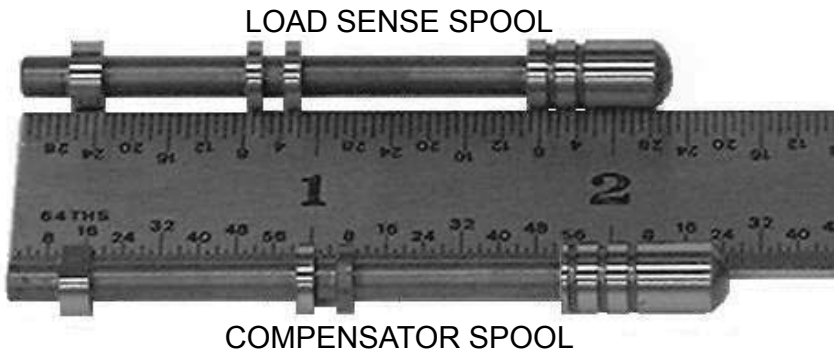
CHART 2 COMPENSATOR SPRING FREE LENGTH

	Item Number	Component	Part number	Tolerances
C*/L*		Main compensator spring - inner	03E-93159-0	Free height: 25.9±0.5mm (1.020±0.020 in.)
C0/L0/L2		Main compensator spring - outer	03E-93158-0	Free height: 39±0.7mm (1.535±0.028 in.)
L*		Load Sense spring	03E-93825-0	Free height: 14±0.4mm (0.551±0.016 in.)
R*		Bias spring	03E-94203-0	

Compensator Assembly:

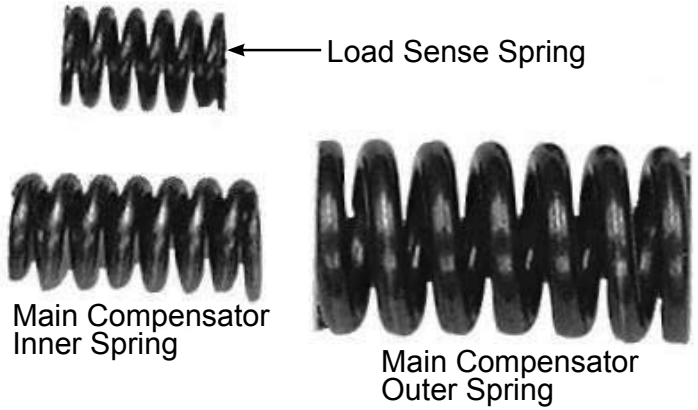
NOTE: Carefully clean and dry all parts prior to assembly. Use caution to insure that spools and other parts are not damaged during cleaning process. Use clean oil to lubricate seals and spools for easier assembly.

1. Remove and discard all o-rings. Install new o-rings on SAE boss plugs and seal pistons.
2. Apply a light film of oil to the o-ring on the main compensator seal piston. Install the main compensator seal piston in the main compensator spring cap.
3. Place inner compensator spring on seal piston. If used, install the outer compensator spring over the inner spring on the seal piston. Position the spring seat over the springs. Insert this assembly into the main compensator housing bore. Torque the main compensator spring cap to 169-183 Nm (125-135 ft.-lb.).
4. Apply a light film of oil on the main compensator spool (the longer of the 2 spools). Insert the spool into the spool bore opposite the main compensator spring assembly in the compensator body. The rounded end of the spool should be installed first so it will contact the spring seat. Install a new o-ring on the hardened SAE boss fitting and place it into the port. Torque fitting to 4 ± 0.5 Nm (37 ± 5 in-lb).



NOTE: These steps apply to “L” series (Load Sense Compensators), disregard for “C” or “R” series Compensators

5. Apply a light film of oil to the o-ring on the load sense seal piston. Install the load sense compensator seal piston seat in the load sense spring cap. Install the load sense spring over the seal piston. Position the spring seat over the spring. Install this assembly into the load sense bore of the compensator housing. Torque the load sense spring cap to 35-38 Nm (26-28 ft. lb.).
6. Apply a light film of oil to the load sense compensator spool (the shorter of the 2 spools). Insert the spool into the spool bore opposite the load sense spring assembly. The spool should be installed with the rounded end in first so it will contact the load sense spring seat. Install a new o-ring on the hardened SAE boss fitting and place it into the port. Torque fitting to 4 ± 0.5 Nm (37 ± 5 in-lb).
7. Install o-rings on remaining SAE boss fittings and install into housing. Torque SAE-2 fittings to 4 ± 0.5 Nm (37 ± 5 in-lb).



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9/91-P

Bulletin ####-####-##/NA,EU Effective: 5-09

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