ProMinent®

Operating Instructions ProMinent® ProMus Series Metering Pumps

ProMusOM_US.indd (ProMus_US_6_5_2012.pdf): Rev 1 - P/N. 7500436

Please enter identity code of the device here

Please completely read through the operating instructions first! Do not discard!
The warranty shall be invalidated by damage caused by operating errors!

ProMinent Fluid Controls, Inc. (USA) 136 Industry Drive, Pittsburgh, PA 15275

Publishing details:

Operating Instructions
ProMinent® ProMus Series Metering Pumps

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Subject to technical modifications
Printed in USA

Contents

Please enter the identity code given on the device label into the grey boxes below.

ProMus1	**Pump Version:**								
		Size 17 liquid end with 3/8"						30C	Size 30 liquid end with 1-1/8" Plunger
	17A	Plunger						40A	Size 40 liquid end with 1-3/4" Plunger
	17B	Size 17 liquid end with 7/16" Plunger							Size 30 liquid end with 5/8"
	30A	Size 30 liquid end with 5/8" Plunger						40B	Size 40 liquid end with 2" Plunger
	30B	Size 30 liquid end with 13/16" Plunger						40C	Size 40 liquid end with 2-1/4" Plunger
		Liquid end material:							
		SS1	316 Stainless steel Single ball check						
		SS2	316 Stainless steel Double ball check (*Needed for applications above 500 psi)						
		SS3	316 St. steel Single inlet, Double outlet (Rcmd. for Flooded suction w/ discharge pressure above 500 psi)						
		PVT	PVDF/PTFE size 17 Double inlet & outlet; sizes 30/40 Single inlet & outlet						
			Connectors:						
			0	NPT BSP					
			1	taper					
			7	MNPT PVDF Standard (PVT LE only)					
				Gear ratio:					
					12.5:1				
				1	56C				
				2	15:1 56C				
				3	30:1 56C				
				4	40:1 56C				
				5	50:1 56C				
				6	12.5:1 IEC (IEC 71 with B5 flange)				
				7	15:1 IEC (IEC 71 with B5 flange)				
				8	30:1 IEC (IEC 71 with B5 flange)				
				9	40:1 IEC (IEC 71 with B5 flange)				
				10	50:1 56C IEC (IEC 71 with B5 flange)				
				11	100:1 (17A 3/8 plunger only) 56C				
					Motor:				
					X	No motor included			
					D	Standard motor (1/2 HP, 115V, single phase, TEFC, NEMA 56C			
						Base:			
						0	Standard Base		
							Stroke Adjustment:		
							1	Manual stroke adjustment	
							7	Explosion proof NEMA 7	
								Internal relief valve:	
								A	3500 psi/size 17
								B	2080 psi/size 17
								C	1230 psi/size 17
								D	640 psi/size 17
								E	300 psi/size 17
								F	2080 psi/size 30
								G	1230 psi/size 30
								H	640 psi/size 30
								I	265 psi/sizes 30 & 40
								J	200 psi/sizes 30 & 40
								K	160 psi (30B, C & 40)
									Hydraulic oil:
									0 Standard
ProMus1	**17A**	**SS1**	**0**	**1**	**X**	**0**	**1**	**A**	**0**

General User Instructions

Please read through the following user instructions! They will enable you to gain the maximum benefit from the operating instructions manual.

The following items are particularly highlighted in the text:

- Enumerated points
- Highlighted points

Operating instructions:

NOTE

Guidelines are intended to make your work easier.

Safety Guidelines:

WARNING

Describes a potentially dangerous situation. If not avoided, could jeopardize life and/or cause serious injury.

CAUTION

Describes a potentially dangerous situation. If not avoided, could result in lesser injuries or damage to property.

IMPORTANT

Describes a potentially damaging situation. If not avoided, could result in damage to property.

In the event of complaint or a request for spare parts, quote the identity code and the serial number, which you will find on the device label. This will enable clear identification of the pump type and material variant.

1. About This Pump

The ProMinent ProMus is a metering pump using a flat, hydraulically actuated teflon diaphragm. A typical pump assembly includes an electric motor, gear case, hydraulic unit, and liquid end. An oil replenishment valve and poppet relief value maintain fluid volume in the hydraulic piston to transfer reciprocating motion to the diaphragm.. A locking stroke adjuster limits piston movement to control flow rates from 0% to 100% in 1% increments for metering fluids into most process systems.

The ProMus achieves different pumping capacities by using 5 different gear ratios and 8 different hydraulic piston diameters. Liquid ends are fabricated with Stainless Steel, Alloy 20, Hastelloy C and PVDF. The diaphragm and dosing head seals are teflon.

2. Safety

Correct Use Of The Pump

- This pump may only be used to meter liquids.
- Operate the pump only within the conditions described in the technical data.
- General restrictions with regard to viscosity limits, chemical resistance and density must be observed (refer to ProMinent® chemical resistance list in the catalog or at www.prominent.com)
- All other applications and modifications are prohibited.
- The pump must not be operated in hazardous areas unless motor, electric stroke control and any other electrical components and wiring comply with the National Electric Code and other applicable codes. Refer to articles 500 through 510 of the National Electric Code for requirements to prevent fire or explosion caused by flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or filings.
- This pump is not suitable for metering gaseous media or solids.
- This pump may be used only within the stated pressure range.
- All users must read and observe this operating instruction manual.
- The pump must be operated by appropriately trained and authorized personnel.

Safety Guidelines:

WARNING

- The pump operates whenever the motor is energized; always take precautions to avoid personal injury or hazards from unexpected startup of the motor.
- Lock out pump motor before performing any maintenance on pump or pump system.
- Lock out the pump motor following a power failure if such interruptions in pump function would create a hazard or cause damage to components.
- Periodically inspect for chemical leaks since this pump and its discharge operate continually under high pressure system leaks may develop over time.
- Always de-pressurize the liquid end before performing any maintenance on the pump or system.
- Always empty and rinse pump liquid end before maintenance activities.
- Always wear appropriate protective equipment with performing pump maintenance.
- Make pump accessible at all times for necessary operating and maintenance activities.

- Periodically inspect the breather vent of the pump. If spillage occurs from this area immediately turn off the pump. Follow maintenance procedures to replace the diaphragm.

- If the diaphragm becomes ruptured then chemical may enter the gearbox and mix with hydraulic oil and spill through the breather vent onto the surroundings. Follow maintenance procedures to replace the diaphragm.

- If the chemical being pumped is corrosive to carbon steel and brass and the diaphragm ruptures then the internals of the pump will be damaged. Remove the pump from service using all appropriate safety precautions and follow maintenance procedures.

Safeguards

- An internal relief valve is part of the hydraulic system. The sole purpose of the relief valve is to protect the driver subassembly from overload in the event of excessive pressure of the pumped fluid. It can never be used to protect the system from overload. An external bypass valve must always be used to protect the system from over pressure.
- The internal relief valve has been adjusted at the factory to 10% greater than the value listed in the ident code. Under normal operating conditions it is not necessary to adjust the internal relief valve. When the adjusting screw is rotated, record the number of turns the screw has been changed from the value set at the factory. Record the number of turns every time the screw is adjusted to be able to revert to factory setting if necessary.

Testing the internal relief valve

- The pump must be running to test the internal relief valve.
- A suitably rated external bypass valve must always be used to protect system from system over pressurization.
- The Promus pump comes with a “Relief/Air Bleed observation port” (see outline drawing).
- When the pump is operating under normal conditions a pulsing “heartbeat” action is observed. A barely perceived net out flow of oil is observed.
- When the pump is operating under upset conditions (internal relief) the properly operating relief valve will bypass large amounts of oil on every pump stroke limiting the pressure that the pump will develop. Oil flow as observed in the observation port will be pulsing in nature. Do not remove the observation port under these circumstances.
- To test the internal relief, slowly increase the system pressure until 10% greater than the value listed in the Ident code. It may not be possible to reach this pressure if the pump is in internal relief. If this condition exists, slowly rotate the adjusting screw clockwise until the set pressure is reached and the pump is still relieving. If the pump is not in relief at the 10% greater than value listed in the Ident code rotate the adjusting screw counterclockwise until the pump goes into relief and the desired set pressure is maintained.

Indicator to Safety Declaration:

WARNING

Only send the equipment for repair or maintenance in a cleaned condition and with the liquid end flushed. However, should any safety precautions be necessary even after careful draining and cleaning of the equipment, the required information must be listed in the Safety Declaration! The Safety Declaration forms part of the inspection/repair contract. Maintenance or repair work will only be carried out if a Safety Declaration - correctly and fully completed by an authorized and qualified member of the Operator's staff - is available.

CAUTION

- It is not permitted to assemble and install ProMinent® pumps using non-ProMinent parts unless approved and recommended by ProMinent. This could lead to damage or injury.
- When metering corrosive liquids, check the resistance of the pump materials (see ProMinent® resistance list in the product catalog).
- The installation, operation and maintenance of ProMinent pumps may be subject to regulations set by state and federal agencies depending upon environmental conditions and the fluid being handled. Consult your safety professional for any special regulations regarding the fluids being handled or environmental conditions.

Sound Intensity Level:

The sound intensity level is < 70 dB

3. Storage, Transport And Unpacking

IMPORTANT

The pump is filled with oil if it is supplied with a liquid end.

Ambient conditions for storage and transport:

Temperature: 14°F to 122°F (-10°C to 50°C)
Air humidity: max. 95 % relative humidity, non-condensing

ProMus weights in Lbs. (Kgs)					
Liquid End	Size	Less Motor & Actuator	With Motor only	With Actuator & Motor	With Actuator only
Metal	17 A & B	49(22.2)	78(38.4)	95(43.1)	66(29.9)
Metal	30 A, B & C	58(26.3)	87(39.5)	104(47.2)	75(34.0)
Metal	40 A, B &C	68(30.8)	97(44.0)	114(51.7)	85(38.6)
Plastic	17 A & B	48(21.7)	77(34.9)	94(42.6)	65(29.5)
Plastic	30 A, B & C	54(24.5)	83(37.6)	100(45.4)	71(32.2)
Plastic	40 A, B &C	60(27.2)	89(40.4)	106(48.4)	77(34.9)

3.1 Storage

- Prepare the pump for storage by flushing all chemicals from the liquid end and replacing the oil breather cap (orange) with the shipping plug (no color specified).
- Store in original shipping container if possible.
- Store pump in upright position in a dry, dust-free environment.

3.2 Transport

- Replace oil breather cap (orange) with shipping plug (no color specified) for transit.
- Transport in original container or container that will keep pump upright.

3.3 Unpacking

- Inspect package before unpacking. If package is found to be damaged, notify shipping company immediately
- After unpacking, mount pump on a secure, level surface.
- Save the shipping plug (no color specified) and shipping container for possible future storage or transit.

4. Functional description

4.1 General Description

The Prominent ProMus is an electric motor (1) driven lost motion metering pump incorporating a hydraulically balanced Teflon (2) diaphragm. The drive case (3) is cast iron incorporating a worm gear set (4) (5 Ratios available) driving a rotating eccentric (5). The locking stroke adjuster (6) varies the flow from 100% to 0% in 1% increments. The hydraulic end transfers the rotating eccentric (5) motion to the diaphragm (7) (three sizes) movement by way of a reciprocating plunger (8) (8 plunger diameters available). The plunger (8) and diaphragm (7) are hydraulically coupled (no mechanical connection). Coupling compliance is precisely controlled by a mechanically actuated replenishment valve (9), which senses diaphragm (7) position to admit coupling fluid as required. The coupling fluid is automatically degassed to maintain accuracy and drive case is protected from overload by a simple acting relief valve (10). The hydraulic end is separated from the fluid end by a Teflon (7) diaphragm completely isolating the pumped fluid from the surroundings. The fluid end (11) is available in Stainless Steel, Alloy 20 Hastelloy C and PVDF. All fluid end seals are Teflon.

4.2 Major Sub Assemblies (Figure 1)

The pump is divided into four major sub assemblies. They are the Power End, the Hydraulic End, the stroke adjuster and the Liquid End. The Stroke Adjuster can be either manual or electric. There are three Hydraulic ends that can mate with the single Driver end. The three Liquid Ends correspond with three diaphragm sizes. The three Liquid ends are designated Size 17, Size 30 and Size 40 to reflect the working diameter of the diaphragms.

4.2.1 The Power End Sub Assembly (Figure 2)

The pump is driven by an electric motor (1). The standard frame size is Nema 56c. An IEC 71 frame is available by specifying a motor adapter (12) and worm that mate with the IEC motor. The motor (1) is close coupled to the worm (4). A hardened steel worm (4) and a bronze worm gear (13) reduce the speed of the motor (1). Five ratios are available. 12.5:1, 15:1, 30:1, 40:1 and 50:1. The stroke speeds are 138/min, 115/min, 58/min, 43/min and 35/min at 1725 RPM and 116/min, 97/min, 48/min, 36/min and 29/min at 1450 RPM. Simple Harmonic motion is generated by way of a rotating eccentric assembly (5). A needle cage and roller assembly allows for the rolling action of the outer race of the eccentric assembly. This rolling action minimizes the both the wear and the heat generated at the Eccentric Assembly (5) Plunger (8) interface. The cast iron drive case (3) serves as a support for the worm, the eccentric assembly and eccentric support shaft. It also doubles as an oil reservoir for the hydraulic end The oil in the reservoir also serves as the lubricant for the gear set and bearings. A suction strainer (14) is part of the drive case (3). It removes particulate before it enters the hydraulic end. A sight tube (15) for observing oil flow from the relief /air bleed valve (16) is also part of the drive case (3).

4.2.2 The Stroke Adjuster Sub Assembly (Figure 2)

The 10-turn stroke adjuster (6) provides for lost motion pump flow control by holding the plunger (8) away from the eccentric assembly (5). It continuously adjusts the pump flow from 0% to 100%. A micrometer dial (17) indicates the % setting in 1% increments. The pump stroke is .787 inches (20 millimeters). The manual stroke adjuster knob is locking by way of a thumbscrew.

An electric actuator is also available accepting 4 to 20 mA control signals for remote flow control. The actuator are close coupled to the pump and do not require an additional base.

4.2.3 The Hydraulic End Sub Assembly (Figure 2)

The hydraulically balanced system is separated from the process fluid by a flat uniform thickness Teflon diaphragm (7). The reciprocating motion of the plunger (8) is transferred to the diaphragm (7) by hydraulic oil. There is no mechanical connection between the diaphragm (7) and the plunger (8). A compression spring (20) provides the force to return the plunger (8) on the suction stroke. There are three subassemblies in the Hydraulic End. The relief/air bleed valve (16), the oil replenishment valve (9) and the oil replenishment check (21).

4.2.3.1 Internal Relief/air Bleed Valve (Figure 2)

An adjustable relief valve is part of the hydraulic system. The sole purpose of the relief valve is to protect the drive subassembly from overload in the event there is excessive pressure of the pumped fluid. A poppet (16) is held against a replaceable seat (22) by a spring (23). The tension in the spring is adjustable by an adjusting screw (24). When the force of the spring is exceeded by the hydraulic pressure acting at the seat area, the poppet (16) lifts allowing oil to escape back to the reservoir. Included in the poppet (16) is an air bleed valve. The purpose of the air bleed valve is to allow entrained air to escape from the hydraulic

oil. The relief/air bleed valve is located at the high point of the hydraulic system. Air that comes out of solution migrates to this high point and is automatically allowed to escape via the air bleed system. The air bleed is comprised of two simple opposing check valves vertically mounted in the poppet. On the pressure stroke the ball travels to the upper seat allowing air and oil to pass during the transit time. As the ball seats the hydraulic system is sealed and pumping action begins. On the suction stroke the ball returns to the lower seat and again seals allowing plunger to return the diaphragm.

4.2.3.2 Oil Replenishment Valve (Figure 2)

The replenishment valve (9) admits oil to the hydraulic system that is lost through the air bleed valve. A precise volume of oil must be maintained to insure pumping accuracy. The valve senses the position of the diaphragm (7) and admits oil when low. The system reaches a state of equilibrium so that a constant volume of oil is maintained.

4.2.3.3 Replenishment Check (Figure 2)

A check valve (21) is required on the inlet to the hydraulic system to prevent back flow from the hydraulic system to the reservoir during the pumping stroke.

4.2.4 The Liquid End Sub Assembly (Figure 2)

The liquid end (11) is available in 316SS, Alloy 20 and Hastelloy C. The design for all metallic material offerings is the same. The Size 17 and Size 30 liquid end is available in double ball (25) as well as single ball (26) configurations. Removable seats are standard on both size 17 and size 30. A PVDF Liquid end is also available

Figure 1

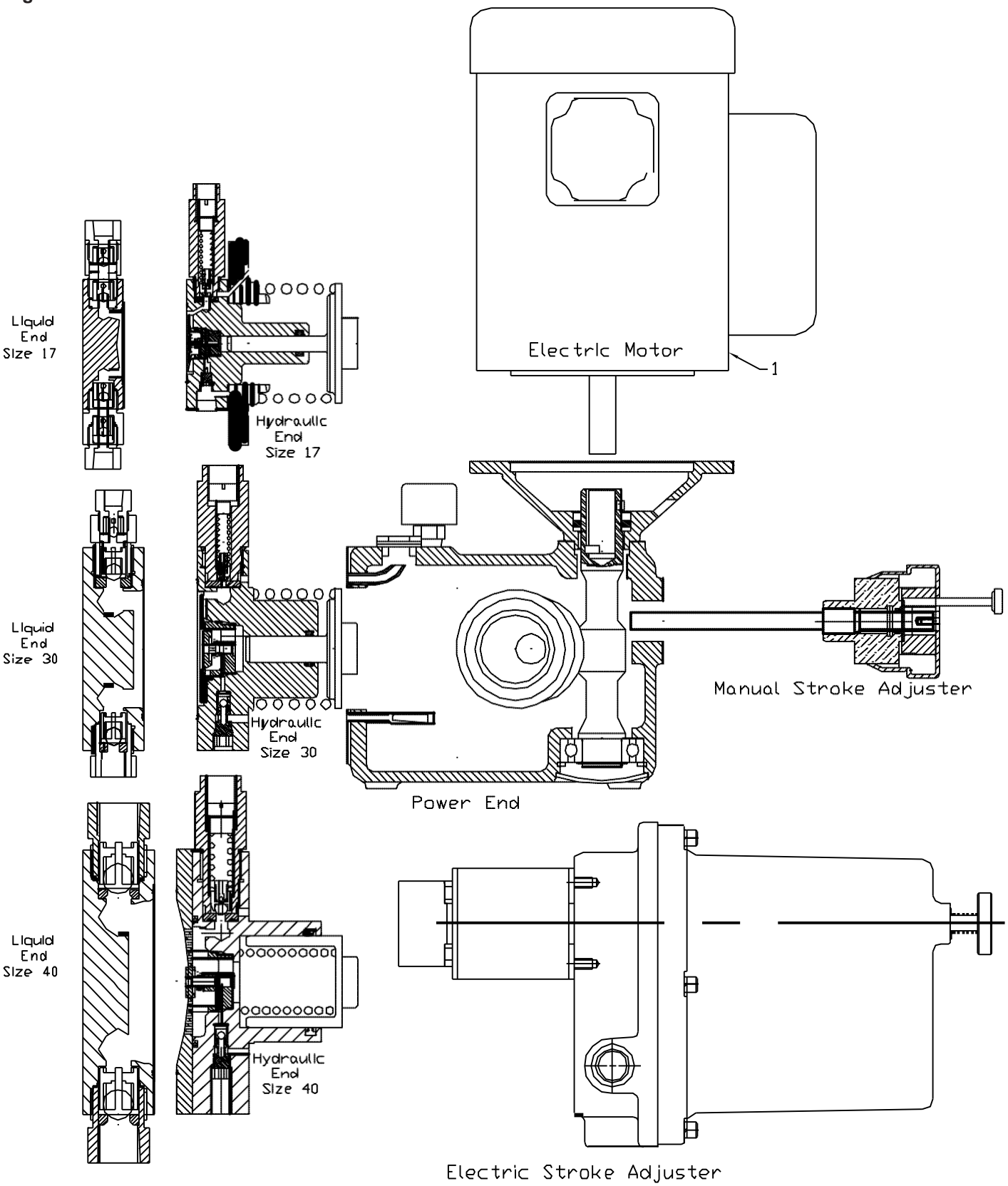
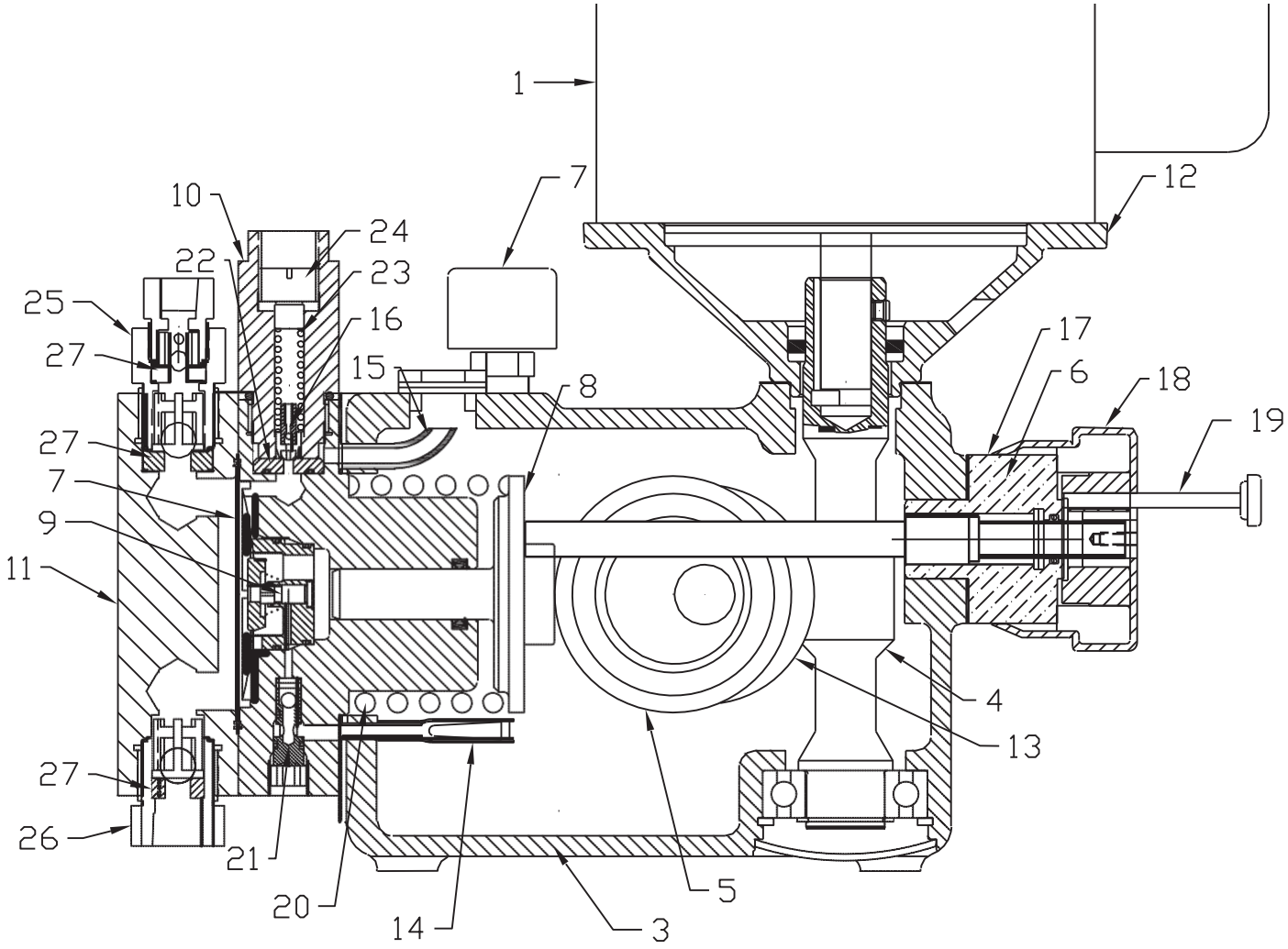
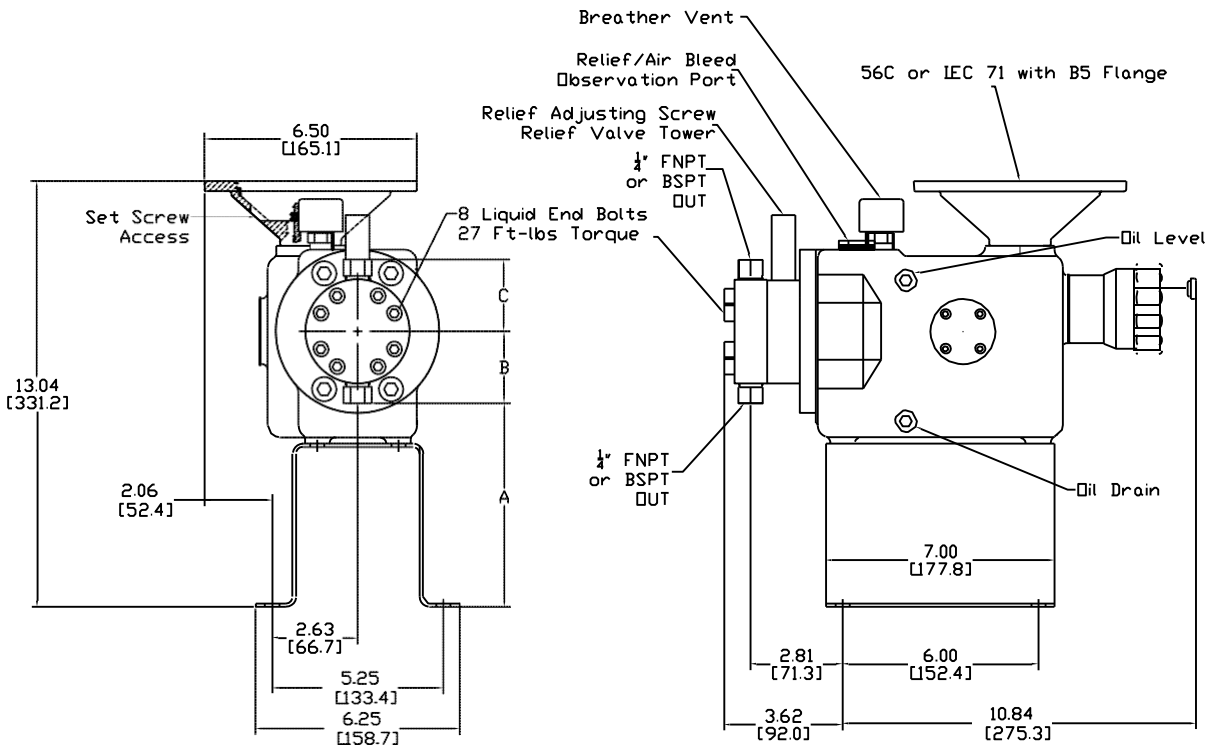

Liquid End Size 17
Hydraulic End Size 17
Electric Motor
1
Liquid End Size 30
Hydraulic End Size 30
Manual Stroke Adjuster
Power End
Liquid End Size 40
Hydraulic End Size 40
Electric Stroke Adjuster

Figure 2



1	Motor	10	Relief Valve	19	Thumb Screw
2	Diaphragm	11	Fluid end	20	Compression Spring
3	Drive case	12	Motor Adapter	21	Replenishment check
4	Worm Gear Set	13	Bronze Gear	22	Seat
5	Eccentric	14	Suction strainer	23	Spring
6	Stroke Adjuster	15	Sight Glass	24	Adjusting Screw
7	Breather Vent	16	Relief/Air Bleed valve	25	Double Ball Valve
8	Plunger	17	Micrometer Dial	26	Single Ball Valve
9	Replenishment Valve	18	Stroke Adjuster Knob	27	Check Valve Seat

Dimensional Drawing / ProMus Size 17 Metal Liquid End



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	17B	A2	2	5.38 [136.5]	3.06 [77.8]	3.06 [77.8]
		HC	3	6.24 [158.4]	2.20 [55.8]	3.06 [77.8]

CUSTOMER

JOB No | PURCHASE ORDER No

TITLE: Outline Promus 17 Less Motor

ENGINEERS SEAL

ProMInent® THE PROMINENT GROUP OF COMPANIES

PITTSBURGH, PA USA WWW.PROMINENT.US

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DRAWN	LLK	SCALE	1:5
CHECKED	BF	DATE	06/01/07

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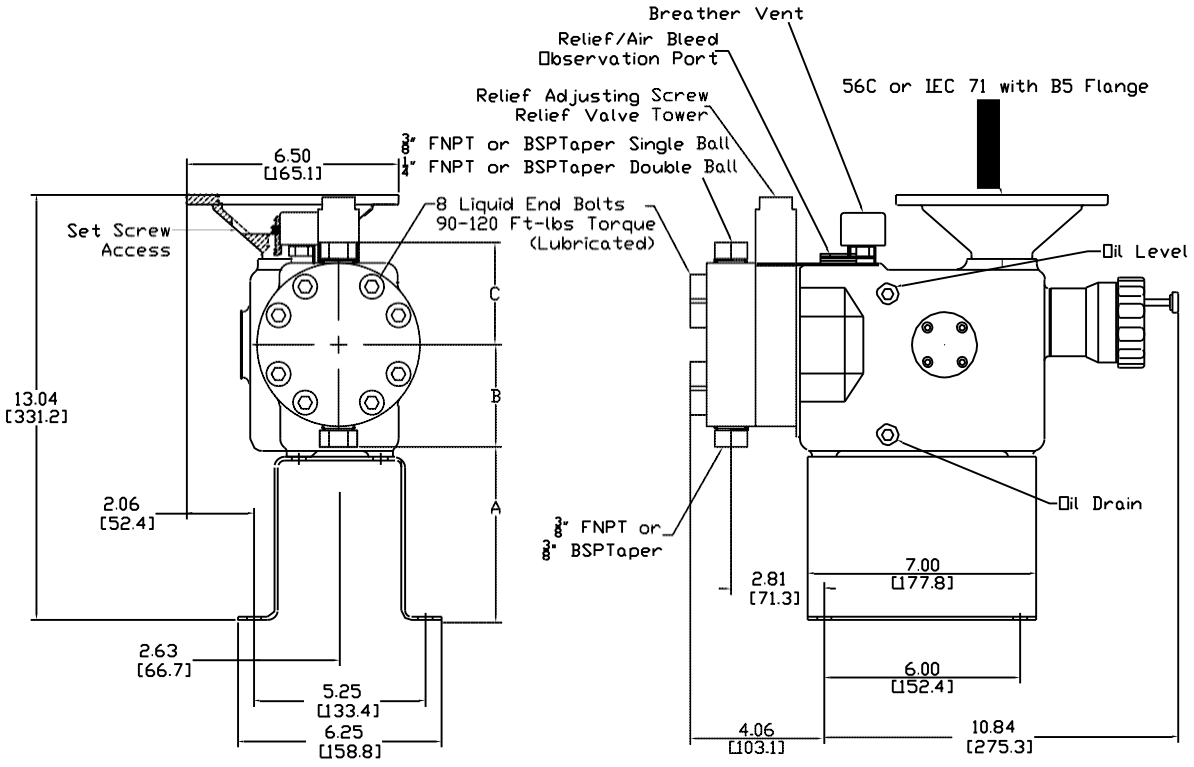
Dimensional Drawing / ProMus Size 30A Metal Liquid End



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	3	5.37 [136.5]	3.13 [79.4]	3.92 [99.6]

CUSTOMER

JOB No | PURCHASE ORDER No

TITLE: Outline Promus 30 5/8 Plunger Less Motor

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DRAWN LLK | SCALE 1:5
CHECKED BF | DATE 06/01/07

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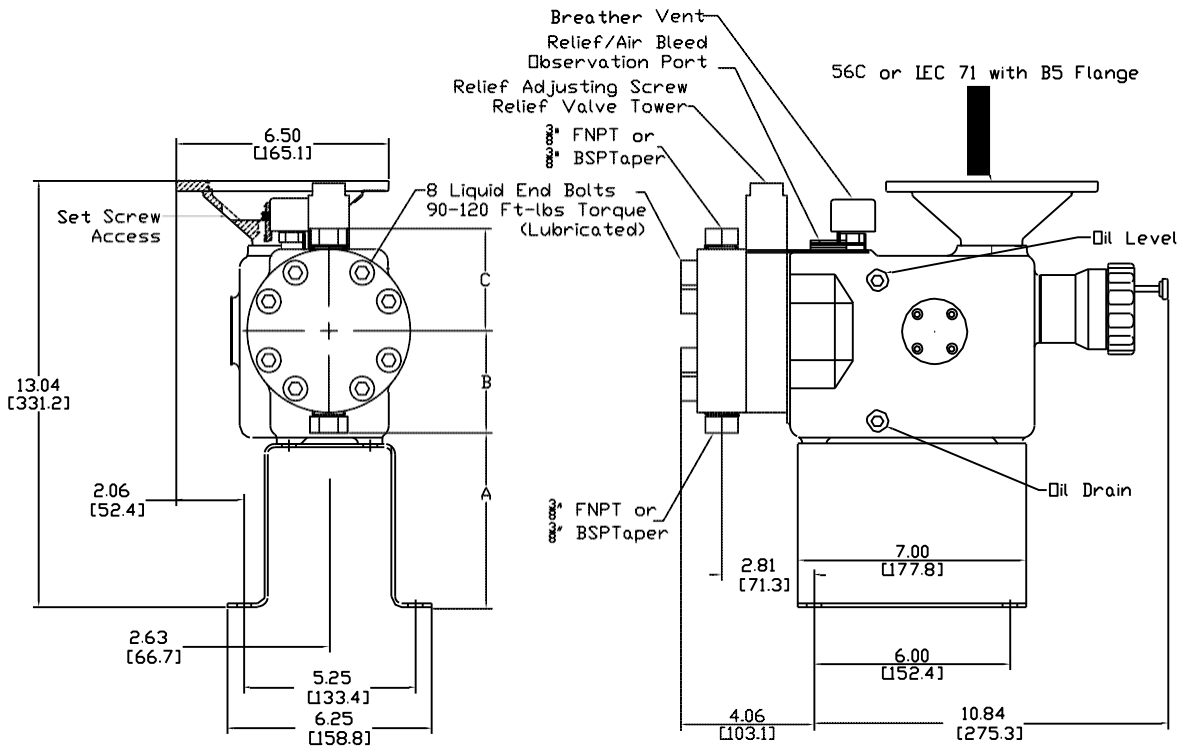
Dimensional Drawing / ProMus Size 30B & C Metal Liquid End



		A	B	C
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30C A2	2	4.11 [104.5]	4.32 [109.8]	4.32 [109.8]
HC	3	5.37 [136.5]	3.13 [79.4]	4.32 [109.8]

Sixth Place in the Ident Code

CUSTOMER

JOB No | PURCHASE ORDER No

TITLE Outline Promus 30 13/16 & 1 1/8 Plunger Less Motor

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CHECKED	BF	DATE	06/01/07

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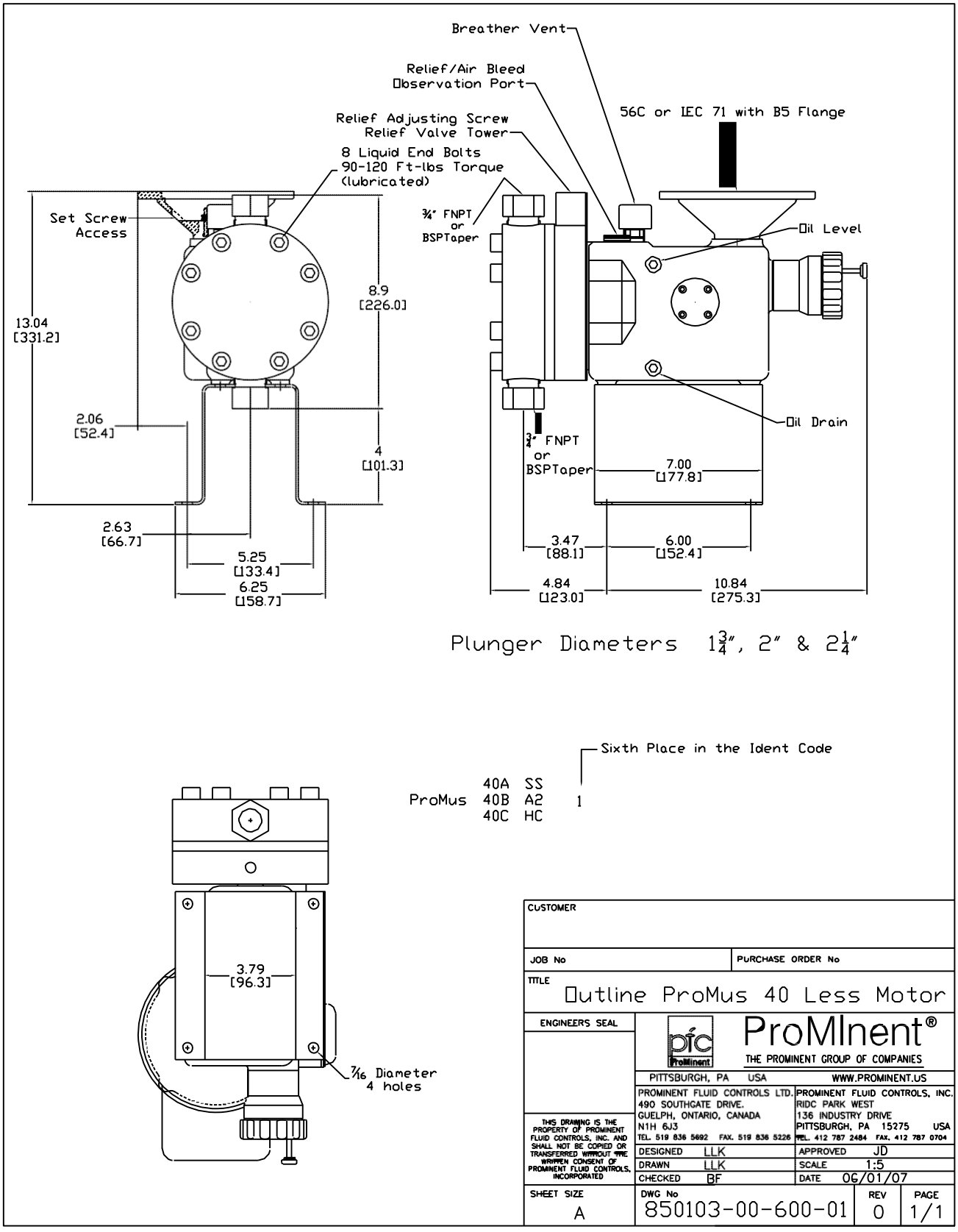
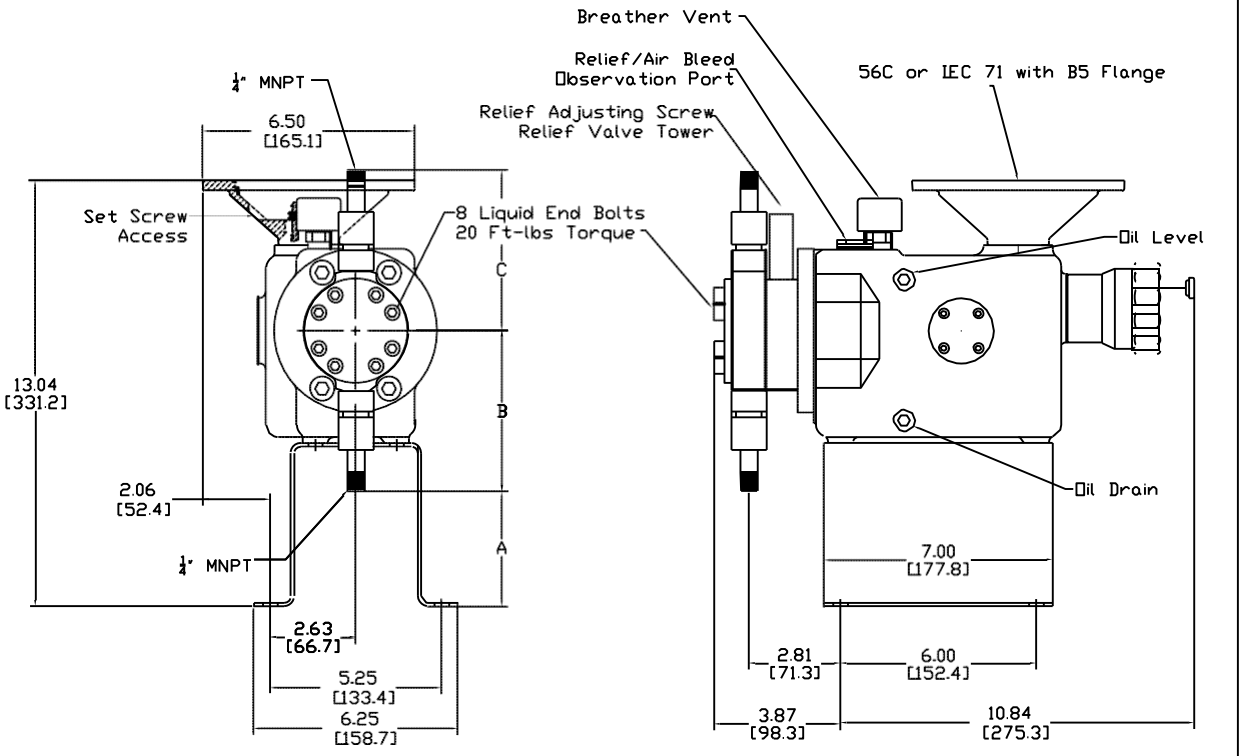
Dimensional Drawing / ProMus Size 40 Metal Liquid End

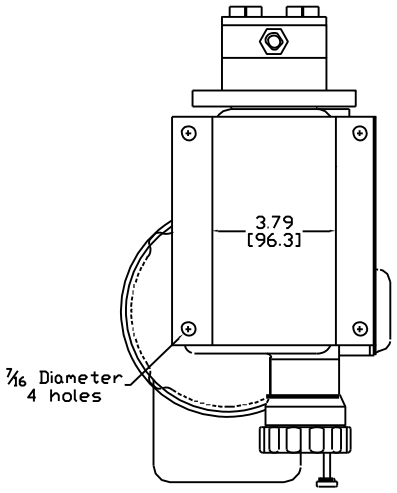


Dimensional Drawing / ProMus Size 17 Plastic Liquid End



Size 17

Plunger Diameters $\frac{3}{8}$" & $\frac{7}{16}$"



				A	B	C
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CUSTOMER

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TITLE: Outline Plastic 17 Less Motor

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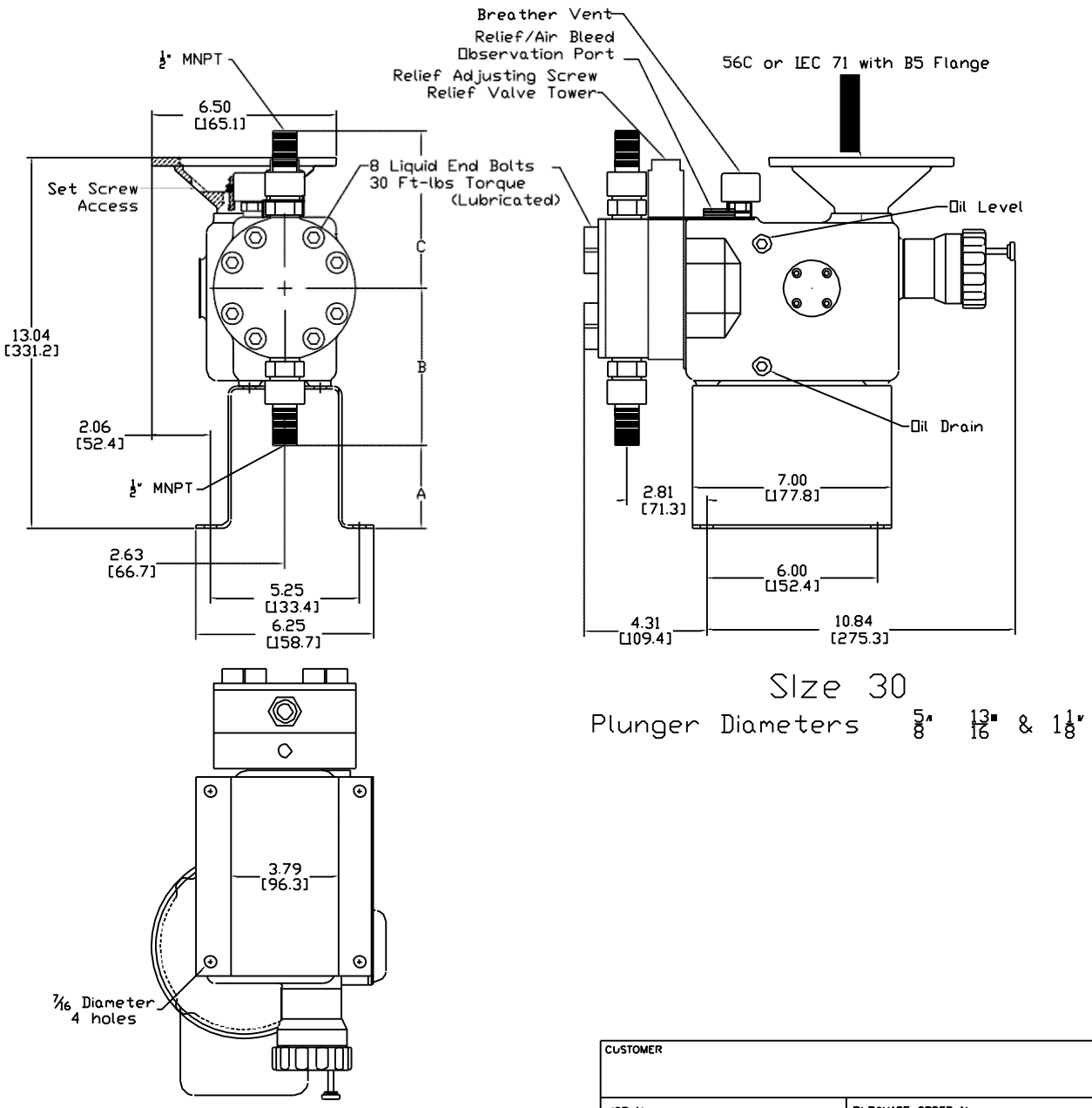
Dimensional Drawing / ProMus Size 30 Plastic Liquid End



ProMus		A	B	C
30A 30B PV 30C	1	2.92 [74.1]	5.52 [140.2]	5.52 [140.2]

Sixth Place in the Ident Code

CUSTOMER

JOB No | PURCHASE ORDER No

TITLE: Outline Plastic 30 5/8, 13/16 & 1 1/8 Plunger Less Motor

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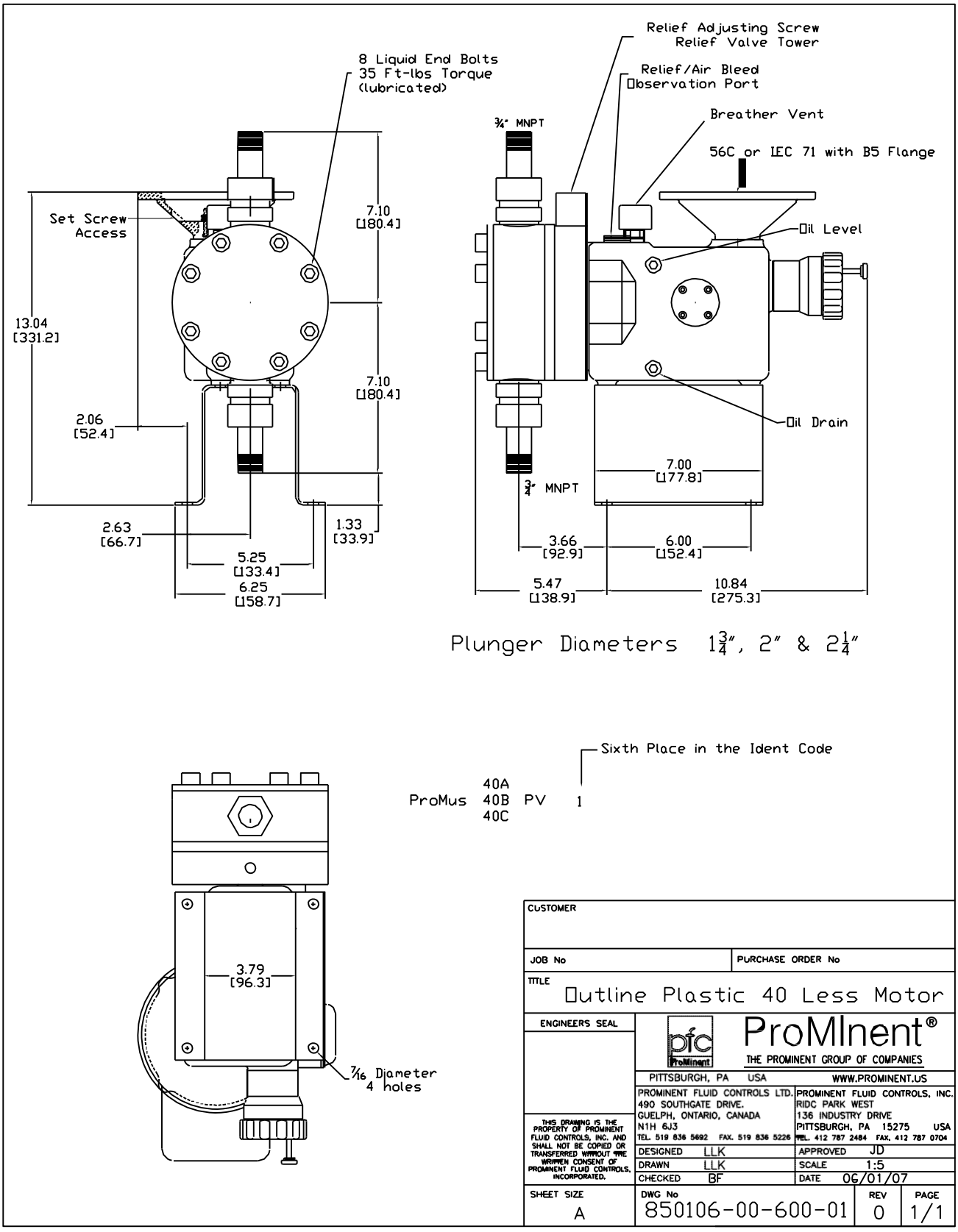
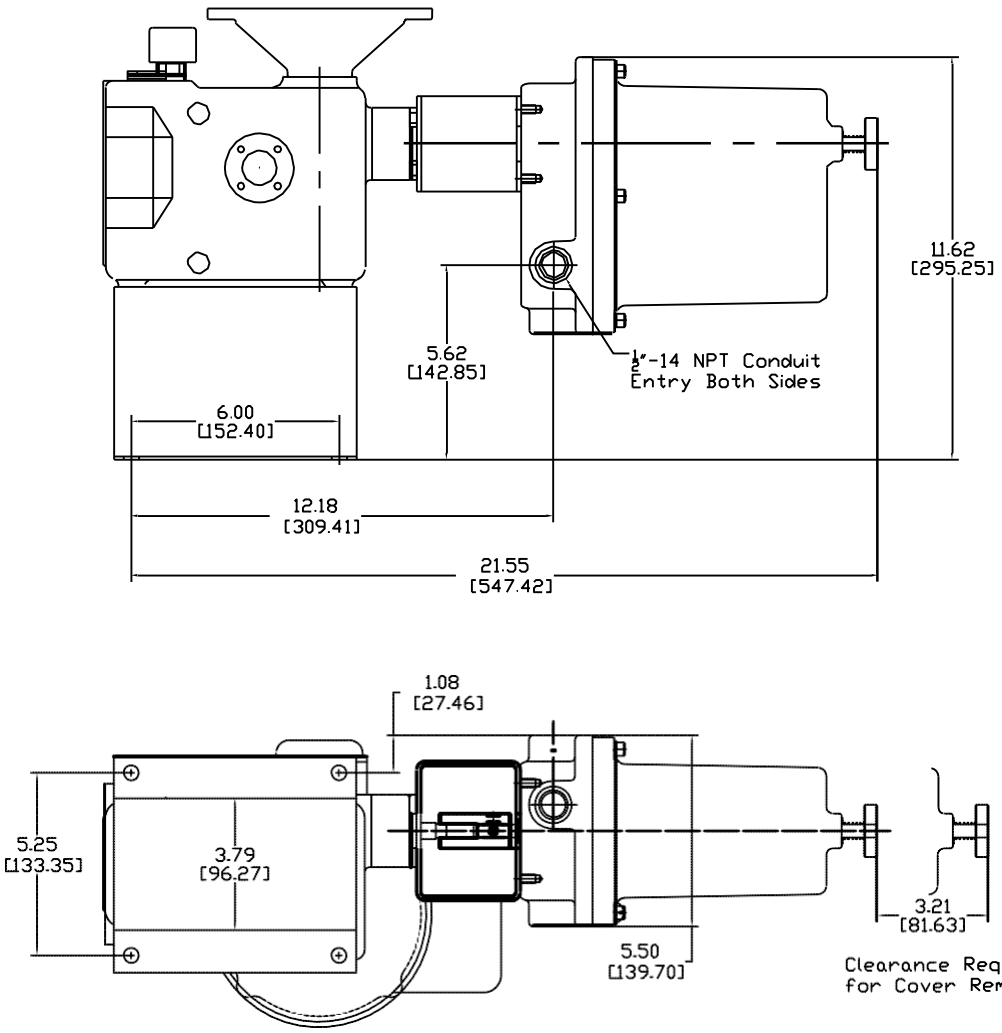
DESIGNED	LLK	APPROVED	JD
DRAWN	LLK	SCALE	1:5
CHECKED	BF	DATE	06/01/07

SHEET SIZE	DWG No	REV	PAGE
A	850105-00-600-01	0	1/1

Dimensional Drawing / ProMus Size 40 Plastic Liquid End



Dimensional Drawing / ProMus Size Electric Actuator



CUSTOMER			
JOB No		PURCHASE ORDER No	
TITLE: Outline ProMus Nema 7 Actuator			
ENGINEERS SEAL	ProMinent® THE PROMINENT GROUP OF COMPANIES		
	PITTSBURGH, PA USA	WWW.PROMINENT.US	
	PROMINENT FLUID CONTROLS LTD. 490 SOUTHGATE DRIVE. GUELPH, ONTARIO, CANADA N1H 6J3 TEL. 519 836 5692 FAX. 519 836 5226	PROMINENT FLUID CONTROLS, INC. RIDC PARK WEST 136 INDUSTRY DRIVE PITTSBURGH, PA 15275 USA TEL. 412 787 2484 FAX. 412 787 0704	
THIS DRAWING IS THE PROPERTY OF PROMINENT FLUID CONTROLS, INC. AND SHALL NOT BE COPIED OR TRANSFERRED WITHOUT THE WRITTEN CONSENT OF PROMINENT FLUID CONTROLS, INCORPORATED.	DESIGNED LLK	APPROVED	
	DRAWN LLK	SCALE 1:5	
	CHECKED	DATE 06/01/07	
SHEET SIZE A	DWG No 850107-00-600-01	REV 0	PAGE 1/1

6. Assembly

The ProMus pump is shipped complete from ProMinent and no assembly is required. A shipping plug must be removed from the oil fill/breather vent hole and replace with the supplied orange breather/ vent. The pump comes filled with oil.

The whole pump must be screwed onto a level and stable surface. For this purpose fasten the pump with four screws (3/8 Inch or M10 Diameter Bolts and washers) through the four holes in the base.

7. Installation

7.1 Installation: Hydraulic

WARNING

- If the pump is to be used with chemicals that are reactive with water, be sure to remove any residue that may remain from factory testing. Feed low-pressure compressed air through the suction valve to purge water from the liquid end.
- For Hazardous locations an external pressure relief valve must be installed downstream from the liquid end to avoid potential hazards caused by blockage in the discharge line. In some environments, heat generated by excessive fluid passing through the internal relief value may cause temperatures of the pump housing to reach high levels.

IMPORTANT

For chemicals with a particle size greater than 0.01 in. (0.3 mm), install a strainer in the suction line.

NOTE

If the metering pump discharges to atmospheric pressure, install a backpressure valve to create a minimum backpressure of approximately 21.8 psi (1.5 bar).

Maximum admissible priming pressure (suction side): 14.5 psi (1 bar).

Viscosity limits maximum 200 mPa-s (200 cP).

7.2 Installation: Electrical

IMPORTANT

Motor

- For safe operation in hazardous environments, all electrical components, including motor, electric stroke control and other devices must be rated for hazardous areas as described in the National Electric Code.
- Articles 500 through 510 of the National Electric Code cover the requirements for electrical equipment and wiring when flammable gases or vapors, flammable liquids, combustible dust, ignitable fibers, or flying may create fire or explosion hazards.
- Connect the motor using the information provided on the motor nameplate. Motor rotation should be counter clockwise looking down on motor (fan end). Also, read and follow additional instructions in manuals provided with the motor.
- For pumps with an electric stroke adjuster, follow any supplemental instructions provided for making electrical connections and operating the unit.

8. Commissioning

IMPORTANT

- Before commissioning the pump, check that the breather/vent has been installed. The pump will not operate correctly unless the breather vent has been installed. A shipping plug is installed in the breather/ vent hole to prevent oil spillage since the pump comes filled with oil. Remove the shipping plug and replace with the breather/ vent supplied.
- Check that pump capabilities are not exceeded when metering highly viscous or dense chemicals.
- Check that liquid end materials are chemically resistant to the metered fluid (see the resistance list on line at www.prominent.us or the latest catalog)
- The pump can not be operated other than in the way described in the “Technical data”
- For chemicals with a particle size greater than 0.01 in (0.3mm), it is imperative that a filter is installed in the suction line.

Venting the Liquid End

Venting the liquid end or suction against pressure:

WARNING

- Always depressurise the suction and discharge tubing before working on the pump!
- Always wear appropriate protective equipment when metering hazardous or unknown liquids!

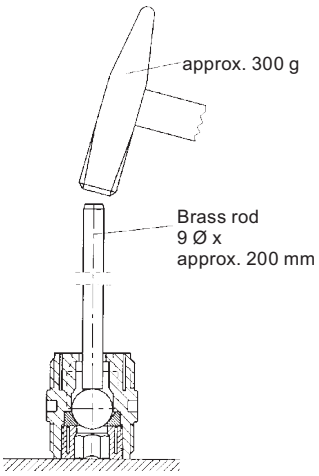


Figure 3

Priming the liquid end

1. Detach the discharge tubing
2. Install a section of transparent tube
3. Run the pump slowly until chemical appears in the transparent tube section
4. Detach the transparent tube
5. Attach the discharge tubing

GUIDELINE on valve installation:

If experiencing priming problems during installation, place the valve on a stable surface and tap the ball seat lightly with a brass rod and an approx. 1/2 lb (250 g) hammer. Prime valves when damp (See fig. 3).

The pump is now ready to operate.

9. Operation

WARNING

Observe the instructions in “Commissioning” section.

IMPORTANT

In the event of an electrical fault there is danger of burns from a hot power end.

- The Pump output can be adjusted using a mechanical or electronic stroke adjuster mounted on the pump.

10. Maintenance

WARNING

- Pumps and peripherals are to be maintained and repaired by trained and authorised personnel only!
- Always depressurise the suction and discharge tubing before working on the pump!
- Always empty and rinse the liquid end before maintenance and repair work, if used with hazardous or unknown materials!
- When working on the liquid end, wear appropriate protective equipment when metering hazardous or unknown liquids!
- Before working on the motor, switch off and protect from unauthorised reconnection!

  If external fan, stroke position motor or speed controller switch off also!

  Check that motor is voltage free!

NOTE

- Keep a set of spare parts in stock for maintenance work on each liquid end.

Maintenance tasks

After Three Months

A shorter maintenance interval may be required for systems under heavy load (e.g. continuous operation, high system pressures, or abrasive media).

- Check torque of the liquid end bolts and re-torque if necessary.

Ident code 17A & 17B	Metal Liquid Ends Only	30 lbf-ft (36 Nm)
Ident Code 30A,30B & 30C	Metal Liquid Ends Only	80 lbf-ft (122-163 Nm)
Ident Code 40A,40B & 40C	Metal Liquid Ends Only	80 lbf-ft (122-163 Nm)
Ident code 17A & 17B	Plastic Liquid Ends Only	20 lbf-ft (27 Nm)
Ident Code 30A,30B & 30C	Plastic Liquid Ends Only	30 lbf-ft (41 Nm)
Ident Code 40A,40B & 40C	Plastic Liquid Ends Only	30 lbf-ft (47 Nm)

- Check discharge and suction valves for chemical leakage
- Check system accessories for correct operation and related connections and fittings for chemical leakage.
- Check the oil level in the pump drive case.
- Check pump feed rate using calibration column if available. Changes in feed rate indicate the need for pump maintenance or system problems.

After Approximately 5000 Operating Hours:

Change the hydraulic oil.

WARNING

- Hot hydraulic oil presents a risk of burning. Avoid contact with draining oil.
- Gear oil: Mobilube 1 SHC 75W-90, or equal
- Oil quantity: 1.5 quart (1.43 liter)

Changing The Hydraulic Oil:

1. Remove the breather vent.
2. Place an oil disposal container under the drain plug.
3. Unscrew the drain plug.
4. Drain the oil from the drive case.
5. Remove the oil level plug
6. Replace the drain plug
7. Refill with oil until the oil overflows the bottom of the oil level hole
8. Replace the oil level plug
9. Replace the breather vent

After Approximately 10,000 Operating Hours:

Change the diaphragm. Useful life of the diaphragm may vary depending upon system backpressure, operating temperatures, stroke length and frequency, and pump chemical characteristics.

IMPORTANT

The diaphragm can never be reused once it is removed from the pump.

TO BE USED ONLY AFTER THE DIAPHRAGM HAS BEEN REMOVED OR CHANGED DURING MAINTENANCE. THIS PROCEDURE DOES NOT APPLY FOR NEW OR FACTORY REBUILT PUMPS.

Changing The Diaphragm:

Change the diaphragm as follows

1. Disconnect the inlet and outlet piping from the pump
2. Remove the breather vent.
3. Place an oil disposal container under the drain plug.
4. Unscrew the drain plug.
5. Drain the oil from the drive case.

6. Place an oil container under the liquid end
7. Loosen the liquid end bolts.
8. Allow the oil to drain from the plunger body.
9. Remove the liquid end.
10. Remove the old diaphragm and discard.
11. Insert the new diaphragm in the counter bore of the liquid end.
12. Reinstall the liquid end taking care that the diaphragm stays in the counter bore
13. Tighten the liquid end bolts to the specified torque.
14. Replace the oil drain plug
15. Refill with oil until the oil just overflows the bottom of the oil level hole.
16. Replace the oil level plug
17. Replace the breather vent

IMPORTANT

The pump must be primed before it is returned to service under system pressure. If the liquid end does not contain media when placed under pressure, damage to the diaphragm may occur.

Priming the hydraulic system

1. Connect suction tubing.
2. Install a section of transparent tubing to the discharge.

   Note: It is recommended to vent the liquid end using process fluid.
3. Remove the adjusting screw counting the number of turns.
4. Record the number of turns to remove the adjusting screw
5. Remove the spring the washer and the relief valve poppet,
6. Turn on the pump and turn the stroke to 50%
7. While the pump is running, slowly add small amounts of hydraulic fluid into the relief tower. You will notice that the air in the system will be discharged on the compression stroke. Once the Hydraulic system is full you will notice that the hydraulic oil will rise and fall in the tower.
8. Turn off the pump.
9. Reinstall the relief poppet the washer the spring and the adjusting screw.
10. Turn the adjusting screw until it just touches the spring and back it off one complete turn.

    Note: This causes the poppet rise and fall, releasing any excess hydraulic oil back to the drive case. If the hydraulic side is over primed this will allow the hydraulic oil to be relieved without rupturing the diaphragm towards the liquid end side. Allow the pump to run for a few minutes.
11. Start the pump
12. Be sure that there is a flow of air of fluid being released from the discharge.
13. After discharge fluid is noticed, turn the adjusting screw clock wise one full turn after it touches the valve spring.
14. Turn the pump off
15. Install the discharge line.
16. Restart the pump

17. Slowly apply back pressure on the process side of the pump until the pump is in full internal relief. (Gushing/Pulsing oil will be visible in the Relief/Air Bleed Observation Port when the pump is in full internal relief)

    Note: Allow the pump to relieve until the air is purged from the hydraulic system.

18. Gradually turn down the adjusting screw counting the number of turns until the recorded value in step 4 above.

19. Slowly increase the pressure until the system pressure is reached.

20. To test the internal relief, slowly increase the system pressure until 10% greater than the value listed in the Ident code. It may not be possible to reach this pressure if the pump is in internal relief. If this condition exists, slowly rotate the adjusting screw clockwise until the set pressure is reached and the pump is still relieving. If the pump is not in relief at the 10% greater than value listed in the Ident code rotate the adjusting screw counterclockwise until the pump goes into relief and the desired set pressure is maintained.

11. Repair

WARNING

- Pumps and peripherals are to be maintained and repaired by trained and authorised personnel only!
- Always depressurise the suction and discharge tubing before working on the pump!
- Always empty and rinse the liquid end before maintenance and repair work, if used with hazardous or unknown materials!
- When working on the liquid end, wear appropriate protective equipment when metering hazardous or unknown liquids!
- Before working on the motor, switch off and protect from unauthorised reconnection!

  If external fan, stroke position motor or speed controller switch off also!

  Check that motor is voltage free!

IMPORTANT

Each time the liquid end is removed and the diaphragm is changed re torque the liquid end bolts in a crosswise fashion to the value listed in Section 10 maintenance tasks

Rebuilding Inlet and outlet Check Valves

Clean and rebuild inlet and outlet check valves one at a time.

Refer to liquid end parts list for diagram and parts for rebuilding check valves (section 14)

- Disassemble valve
- Replace worn parts
- Clean the remaining parts
- Assemble the valve.

12. Troubleshooting

WARNING

- Always wear appropriate protective equipment when working with hazardous chemicals
- Always depressurize the suction and discharge lines before working on the pump.
- Always empty and rinse the liquid end before maintenance and repair work!

Pump Fails To Meter Liquid To Pump Specification Pump Fails To Meter Liquid To Pump Specification

or

Pump Does Not Prime Despite Full Stroke Action And Venting

Cause: Valves dirty or worn
Remedy: Overhaul valves (see "Overhaul valves", see "Repair" section)

Cause: Internal relief valve open (outlet pressure higher than internal relief valve setting)
Remedy: Reduce pressure in external backpressure valve

Cause: Internal relief valve heavily worn as discharge line blocked or constricted
Remedy: Replace external backpressure valve and remove blockage from discharge line

Cause: Hydraulic oil low
Remedy: Add hydraulic oil until oil level has reached inspection port on the side of the pump housing (see "Replace Diaphragm":, "Maintenance" section)

Cause: Electrical connections to motor
Remedy: 1. Verify voltage and frequency
2. Check motor connections

Power End Motor Very Hot

Cause: Discharge line greatly constricted
Remedy: 1. Remove blockage from discharge line
2. Check external backpressure valve

13. Decommissioning And Disposal

Decommissioning

WARNING

- Pumps and peripherals are to be maintained and repaired by trained and authorised personnel only!

- When decommissioning pump, the housing and particularly the liquid end should be cleaned thoroughly to remove all dirt and chemicals!
- Always depressurise the suction and discharge tubing before working on the pump!
- Always empty and rinse the liquid end before maintenance and repair work, if used with hazardous or unknown materials!
- When working on the liquid end, wear appropriate protective equipment when metering hazardous or unknown liquids!
- Before working on the motor, switch off and protect from unauthorised reconnection!
- If external fan, stroke position motor or speed controller present, switch off also!
- Ensure that there is no voltage present at the motor!
- Ensure that pumps cannot be switched on by unauthorised personnel during maintenance work!
- Avoid contact with draining oil since there is a risk of burning by hot hydraulic oil.

Final Decommissioning

- Disconnect pump from power supply
- Rinse the liquid end with a suitable cleaning agent, clean thoroughly if used with hazardous materials
- Drain off hydraulic oil!

Temporary Decommissioning

Additionally:

- Place valve covers on valves
- Place the pump on a pallet if possible
- Cover the pump with a tarpaulin (allow ventilation!).

Store the pump in a dry enclosed area at:

Storage temperature: 14°F to 122°F (-10°C to 50°C)

Air humidity: max. 95 %, non-condensing

Disposal

IMPORTANT

Observe all current local, state/provincial and federal directives that apply to disposal of pumps, pump components, and waste products. Give particular attention to waste oils and electronic materials.

14. Technical Data

Priming Lift

The priming lift is 5 ft (1.5 m). *(Determined for 68*°F (*20ºC) water with liquid end and suction line empty and clean moistened valves).* Flooded suction recommended for 100:1 (3/8 plunger only).

Suction Lift

The suction lift is 7.5 ft (2.3m) *(Determined for 68*°F (*20ºC) water with liquid end and suction line filled and a suction line with adequate cross section).* Flooded suction recommended for 100:1 (3/8 plunger only).

Priming Pressure

The maximum allowable priming pressure is 14.5 psi (1 bar)

Internal Hydraulic Pressure Relief Valve

The internal relief valve is set to 10% over the pressures listed in the following chart.

Pump Accuracy

Steady state flow accuracy is +/- 1% over a turndown ratio of 10:1

The flow repeatability is +/- 3% over the specified turn down ratio.

Deviation from linearity does not exceed +/- 3% of the rated flow over the specified turn down ratio

Viscosity

Viscosity limit without valve 200 mPa-s (200 cP)

Liquid End Materials of Construction

Material	Liquid End	Suct./Dis.	Seals/ball seat	Valve Balls
SS	316 SS	316 SS	PTFE/SS	stainless steel
A2	alloy 20	alloy 20	PTFE/A2	alloy 20
HC	hastelloy C	hastelloy C	PTFE/HC	hastelloy C
PVT	PVDF	PVDF	PTFE/PVDF	ceramic

Hydraulic Oil

Type	Mobilube SHC 75w-90
Quantity	1.5 quarts (1.42 liters)

Ambient Conditions

Storage temperature	14°F - 122°F (-10°C to 50°C)
Ambient temperature	14°F - 104°F (-10°C to 40°C)
Air humidity	max. 95% relative humidity, non-condensing

Maximum metering chemical temperatures for the liquid end depend upon material type:

	PVT	SS, A2 & HC
Long term at max. back pressure	150°F (65°C)	194°F (90°C)
Short term at max. 30 psi (2 bar) 15 Min.	212°F (100°C)	248°F (120°C)

Environmental

Permissible air humidity 95% non- condensing

Chemical Resistance

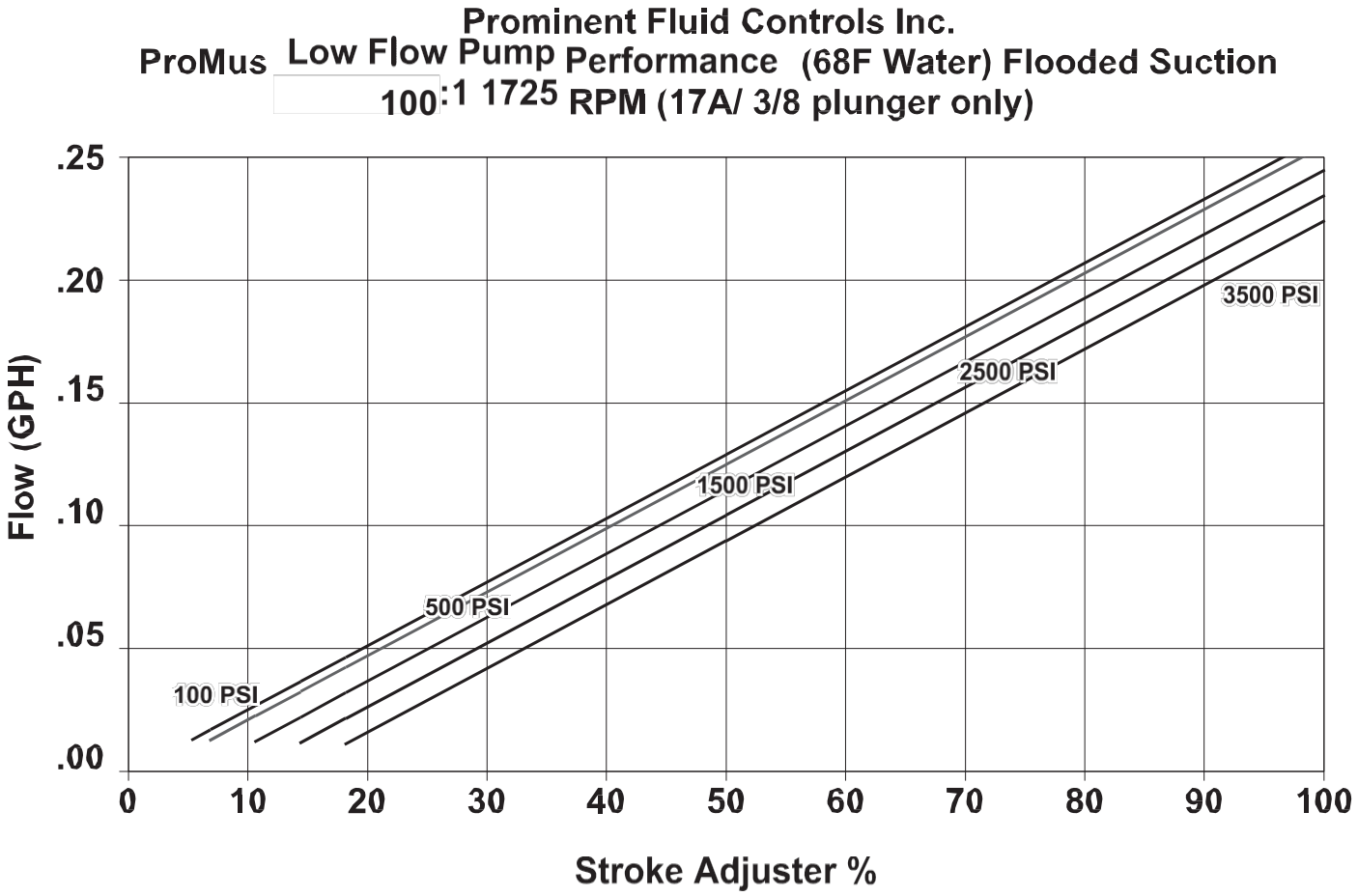
See our latest product catalog or www.prominent.us.

14.1 Capacity Data

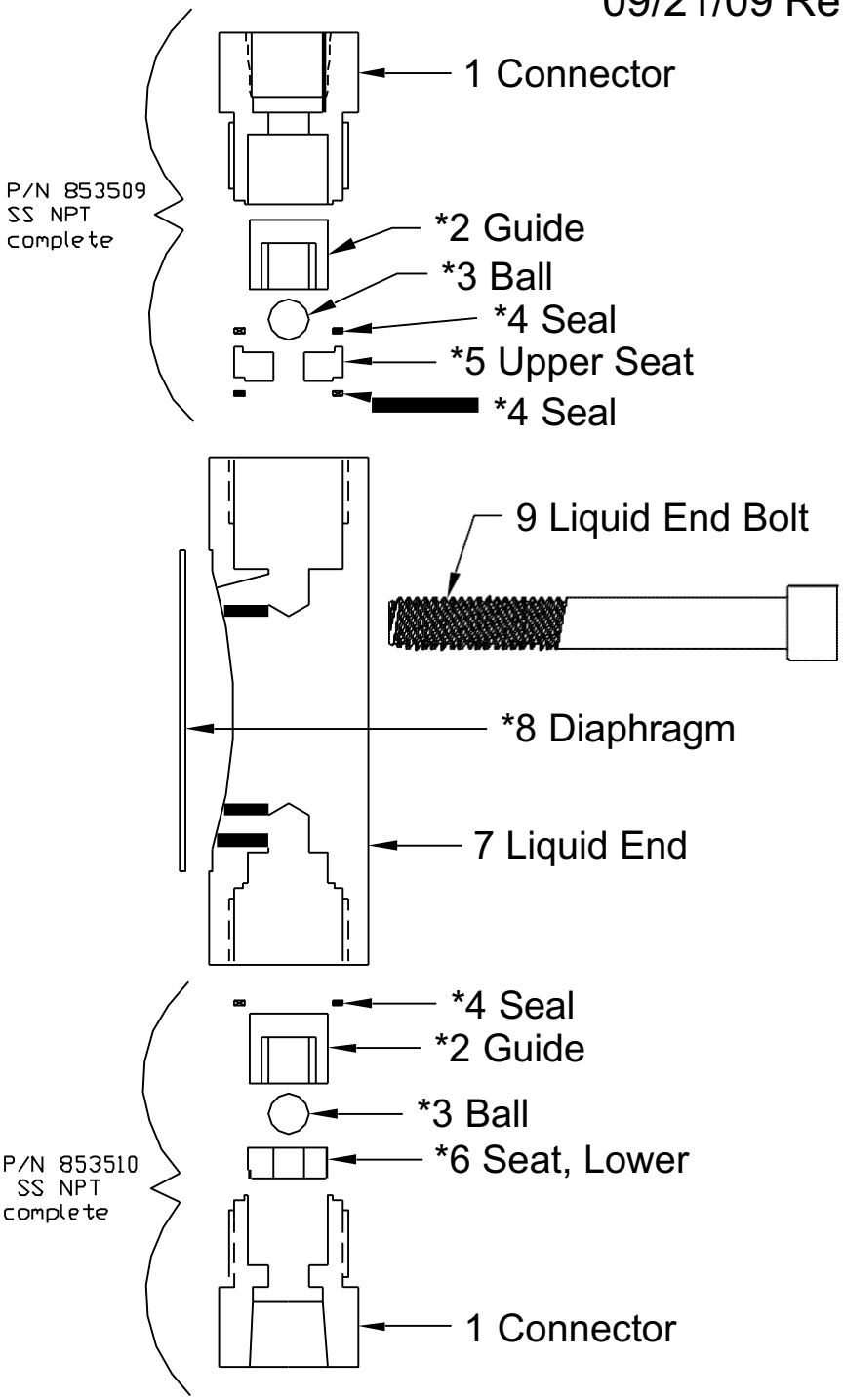
		At 60 Hz (1750 rpm)				Capacity at Max. Backpressure		Gear Ratio	Max. Stroke Rate	At 50 Hz (1458 rpm) Capacity at Max. Backpressure				Typical suct./dis. Connection	
		psig	Bar	psig	Bar	U.S.			Stroke/	U.S	Stroke/	Max.		FNPT/ BSP	MNPT/ BSP
Plunger	(in.)	(PVDF)	(PVDF)	(metal)	(metal)	GPH	(l/h)		min.	GPH	(l/h)	min	Bar	(metal)	(PVDF)
Size 17	3/8"	230	16	3500	241	0.2	(0.87)	100	18	-	-	-	-	-	-
	3/8"	230	16	3500	241	0.61	(2.3)	50	35	-	-	-	-	-	-
	3/8"	230	16	3500	241	0.76	(2.8)	40	43	0.63	2.45	36	241	1/4	1/4
	3/8"	230	16	3500	241	1.02	(3.8)	30	58	0.85	3.29	48	241	1/4	1/4
	3/8"	230	16	3500	241	2.03	(7.6)	15	115	1.69	6.56	96	241	1/4	1/4
	3/8"	230	16	3500	241	2.44	(9.2)	12.5	138	2.03	7.88	115	241	1/4	1/4
	7/16"	230	16	3500	241	0.83	(3.1)	50	35	-	-	-	-	-	-
	7/16"	230	16	3500	241	1.04	(3.9)	40	43	0.87	3.36	36	241	1/4	1/4
	7/16"	230	16	3500	241	1.38	(5.2)	30	58	1.15	4.46	48	241	1/4	1/4
	7/16"	230	16	3500	241	2.77	(10.4)	15	115	2.31	8.94	96	241	1/4	1/4
	7/16"	230	16	3500	241	3.32	(12.5)	12.5	138	2.77	10.72	115	241	1/4	1/4
Size 30	5/8"	230	16	2080	143	1.8	(6.8)	50	35	-	-	-	-	-	-
	5/8"	230	16	2080	143	2.2	(8.5)	40	43	1.87	7.26	36	143	1/4	1/2
	5/8"	230	16	2080	143	3.0	(11.3)	30	58	2.50	9.68	48	143	1/4	1/2
	5/8"	230	16	2080	143	6.0	(22.7)	15	115	5.00	19.37	96	143	1/4	1/2
	5/8"	230	16	2080	143	7.2	(27.2)	12.5	138	6.00	23.24	115	143	1/4	1/2
	13/16"	230	16	1230	85	3.0	(11.5)	50	35	-	-	-	-	-	-
	13/16"	230	16	1230	85	3.8	(14.3)	40	43	3.17	12.27	36	85	3/8	1/2
	13/16"	230	16	1230	85	5.1	(19.1)	30	58	4.22	16.37	48	85	3/8	1/2
	13/16"	230	16	1230	85	10.1	(38.2)	15	115	8.45	32.73	96	85	3/8	1/2
	13/16"	230	16	1230	85	12.2	(46.1)	12.5	138	10.14	39.28	115	85	3/8	1/2
	1-1/8"	230	16	640	44	6.3	(24.0)	50	35	-	-	-	-	-	-
	1-1/8"	230	16	640	44	7.9	(30.0)	40	43	6.61	25.61	36	44	3/8	1/2
	1-1/8"	230	16	640	44	10.6	(40.1)	30	58	8.81	34.14	48	44	3/8	1/2
	1-1/8"	230	16	640	44	21.1	(79.8)	15	115	17.62	68.29	96	44	3/8	1/2
	1-1/8"	230	16	640	44	25.4	(96.1)	12.5	138	21.15	81.95	115	44	3/8	1/2
Size 40	1-3/4"	230	16	265	18	15.4	(58.2)	50	35	-	-	-	-	-	-
	1-3/4"	230	16	265	18	19.2	(72.6)	40	43	15.99	61.97	36	18	3/4	3/4
	1-3/4"	230	16	265	18	25.6	(96.9)	30	58	21.32	82.62	48	18	3/4	3/4
	1-3/4"	230	16	265	18	51.2	(193.8)	15	115	42.64	165.24	96	18	3/4	3/4
	1-3/4"	230	16	265	18	61.4	(232.4)	12.5	138	51.17	198.29	115	18	3/4	3/4
	2"	200	14	200	14	20.1	(76.0)	50	35	-	-	-	-	-	-
	2"	200	14	200	14	25.1	(95.0)	40	43	20.89	80.94	36	14	3/4	3/4
	2"	200	14	200	14	33.4	(126.4)	30	58	27.85	107.91	48	14	3/4	3/4
	2"	200	14	200	14	66.8	(252.8)	15	115	55.70	215.83	96	14	3/4	3/4
	2"	200	14	200	14	80.2	(303.5)	12.5	138	66.84	258.99	115	14	3/4	3/4
	2-1/4"	160	11	160	11	25.4	(96.1)	50	35	-	-	-	-	-	-
	2-1/4"	160	11	160	11	31.7	(119.9)	40	43	26.43	102.43	36	11	3/4	3/4
	2-1/4"	160	11	160	11	42.3	(160.1)	30	58	35.25	136.58	48	11	3/4	3/4
	2-1/4"	160	11	160	11	84.6	(327.8)	15	115	70.49	273.16	96	11	3/4	3/4
	2-1/4"	160	11	160	11	101.5	(384.2)	12.5	138	84.59	327.79	115	11	3/4	3/4

- not available for 50 Hz operation

14.2 Capacity Data: ProMus Low Flow Pumps only



Liquid End Parts 17 Single Ball (Metallic)
ProMus117XXX1X.....
09/21/09 Rev 01



		ProMus117X	
	Qty	SS10	SS11
1	2	853202	853214
*2	2	853208	853208
*3	2	853211	853211
*4	3	853209	853209
*5	1	853203	853203
*6	1	853204	853204
7	1	853200	853200
*8	1	853210	853210
9	8	853215	853215
Spare Parts Kit (*)		853502	853505

Includes Asterisked (*) Items

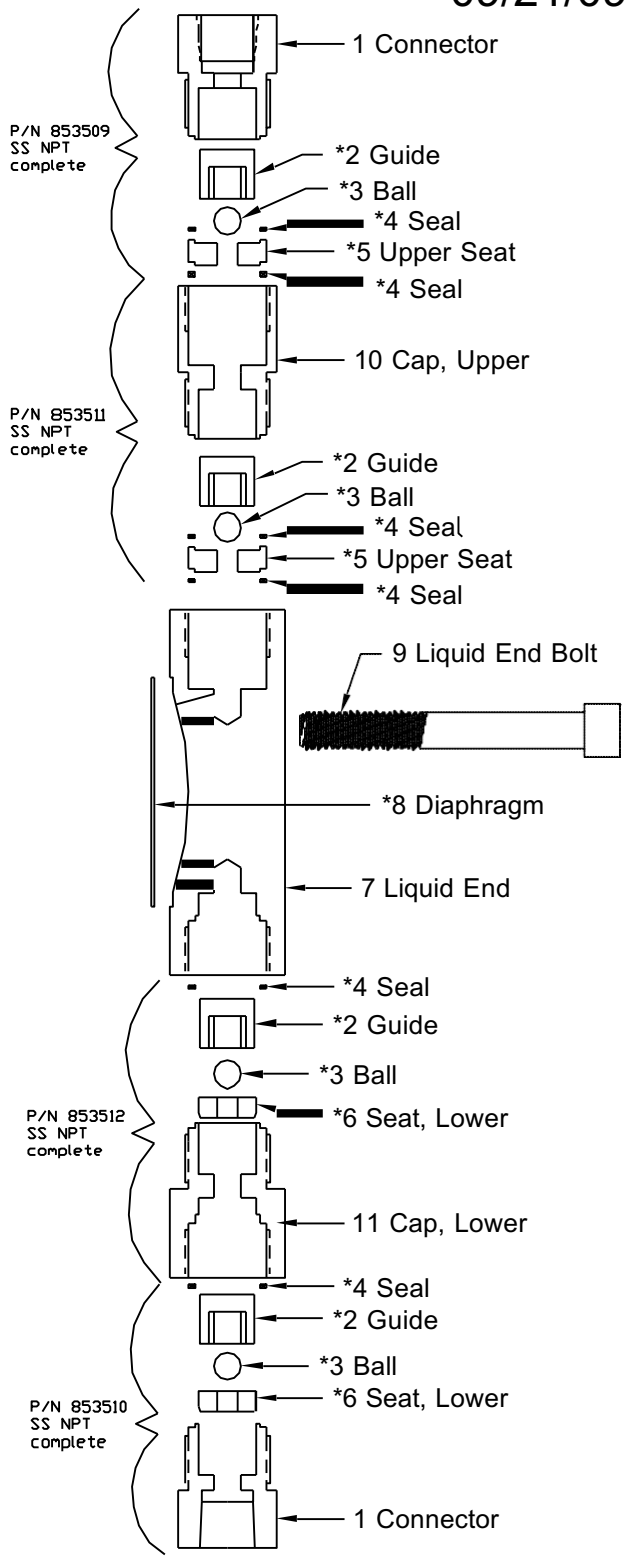
		ProMus117X	
	Qty	A210	A211
1	2	853301	853309
*2	2	853306	853306
*3	2	853307	853307
*4	3	853209	853209
*5	1	853302	853302
*6	1	853303	853303
7	1	853300	853300
*8	1	853210	853210
9	8	853215	853215
Spare Parts Kit (*)		853585	853585

Includes Asterisked (*) Items

		ProMus117X	
	Qty	HC10	HC11
1	2	853401	853409
*2	2	853406	853406
*3	2	853407	853407
*4	3	853209	853209
*5	1	853402	853402
*6	1	853403	853403
7	1	853400	853400
*8	1	853210	853210
9	8	853215	853215
Spare Parts Kit (*)		853665	853665

Includes Asterisked (*) Items

Liquid End Parts 17 Double Ball In & Out (Metallic)
ProMus117XXX2X.....
09/21/09 Rev 01



		ProMus117X	
	Qty	SS20	SS21
1	2	853202	853214
*2	4	853208	853208
*3	4	853211	853211
*4	6	853209	853209
*5	2	853203	853203
*6	2	853204	853204
7	1	853200	853200
*8	1	853210	853210
9	8	853215	853215
10	1	853206	853206
11	1	853207	853207
Spare Parts Kit (*)		853503	853503

Includes Asterisked (*) Items

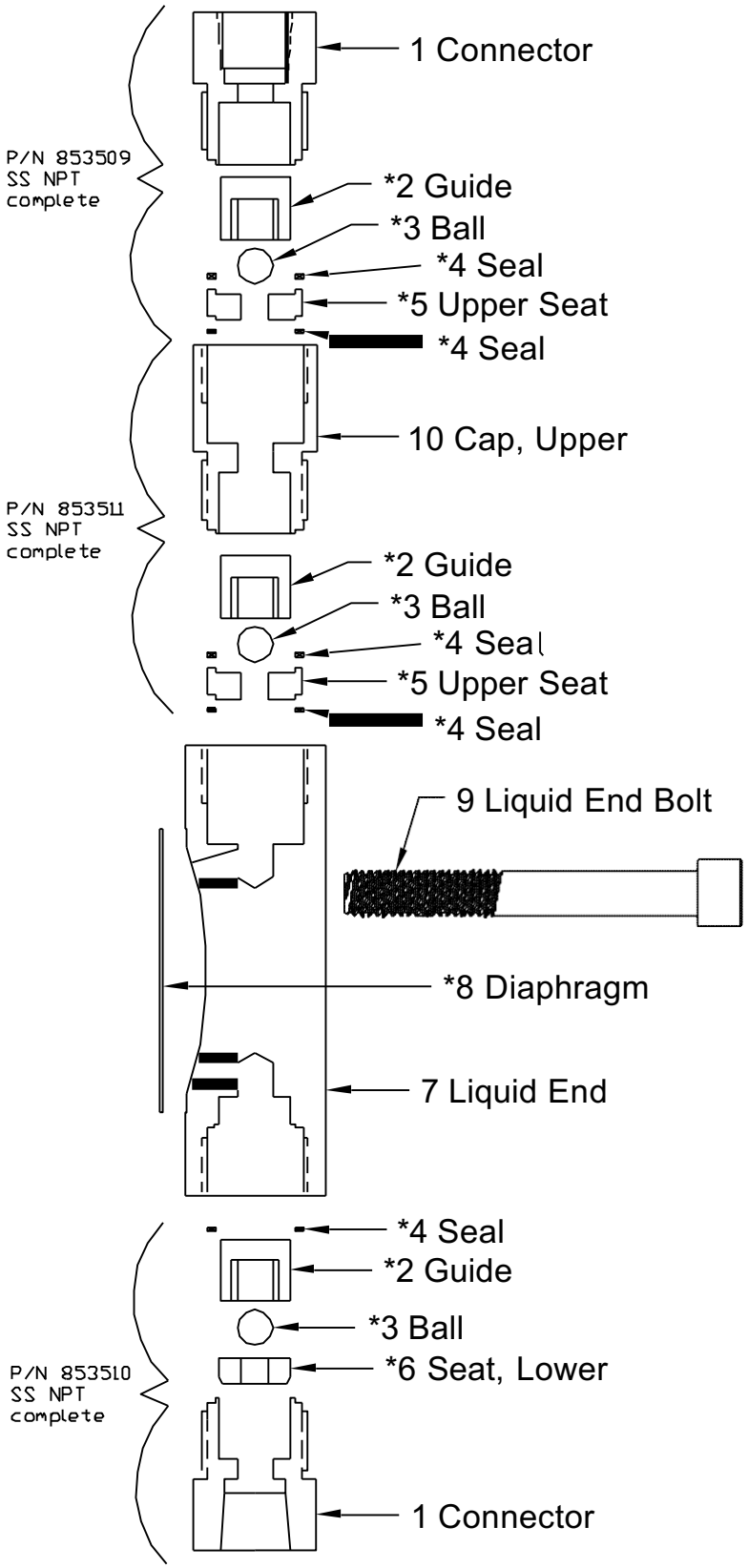
		ProMus117X	
	Qty	A220	A221
1	2	853301	853309
*2	4	853306	853306
*3	4	853307	853307
*4	6	853209	853209
*5	2	853302	853302
*6	2	853303	853303
7	1	853300	853300
*8	1	853210	853210
9	8	853215	853215
10	1	853304	853304
11	1	853305	853305
Spare Parts Kit (*)		853583	853583

Includes Asterisked (*) Items

		ProMus117X	
	Qty	HC20	HC21
1	2	853401	853409
*2	4	853406	853406
*3	4	853407	853407
*4	6	853209	853209
*5	2	853402	853402
*6	2	853403	853403
7	1	853400	853400
*8	1	853210	853210
9	8	853215	853215
10	1	853404	853404
11	1	853405	853405
Spare Parts Kit (*)		853663	853663

Includes Asterisked (*) Items

Liquid End Parts 17 Single Ball In & Double Out (Metallic)
ProMus117XXX3X.....
09/21/09 R01



		ProMus117X	
	Qty	SS30	SS31
1	2	853202	853214
*2	3	853208	853208
*3	3	853211	853211
*4	5	853209	853209
*5	2	853203	853203
*6	1	853204	853204
7	1	853200	853200
*8	1	853210	853210
9	8	853215	853215
10	1	853206	853206
Spare Parts Kit (*)		853505	853505

Includes Asterisked (*) Items

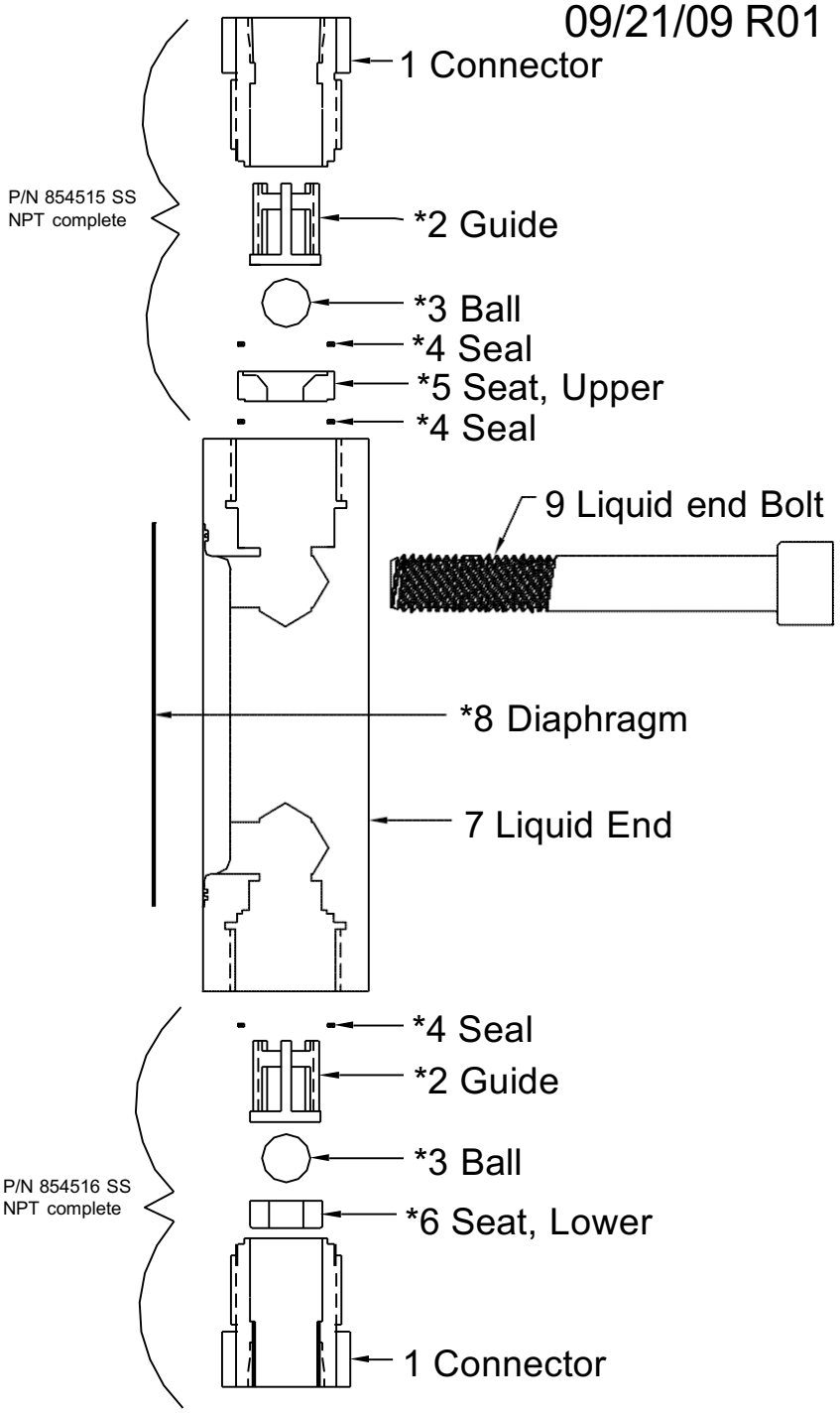
		ProMus117X	
	Qty	A230	A231
1	2	853301	853309
*2	3	853306	853306
*3	3	853307	853307
*4	5	853209	853209
*5	2	853302	853302
*6	1	853303	853303
7	1	853300	853300
*8	1	853210	853210
9	8	853215	853215
10	1	853304	853304
Spare Parts Kit (*)		853585	853585

Includes Asterisked (*) Items

		ProMus117X	
	Qty	HC30	HC31
1	2	853401	853409
*2	3	853406	853406
*3	3	853407	853407
*4	5	853209	853209
*5	2	853402	853402
*6	1	853403	853403
7	1	853400	853400
*8	1	853210	853210
9	8	853215	853215
10	1	853404	853404
Spare Parts Kit (*)		853665	853665

Includes Asterisked (*) Items

Liquid End Parts 30 X Single Ball In & Out (Metallic)
ProMus130XXX1X.....
09/21/09 R01



		ProMus130X	
	Qty	SS10	SS11
1	2	854209	854214
*2	2	854205	854205
*3	2	404243	404243
*4	3	854210	854210
*5	1	854207	854207
*6	1	854208	854208
7	1	854203	854203
*8	1	854201	854201
9	8	854215	854215
Spare Parts Kit (*)		854501	854501

Includes Asterisked (*) Items

		ProMus130X	
	Qty	A210	A211
1	2	854305	854309
*2	2	854301	854301
*3	2	854302	854302
*4	3	854210	854210
*5	1	854303	854303
*6	1	854304	854304
7	1	854300	854300
*8	1	854201	854201
9	8	854215	854215
Spare Parts Kit (*)		854601	854601

Includes Asterisked (*) Items

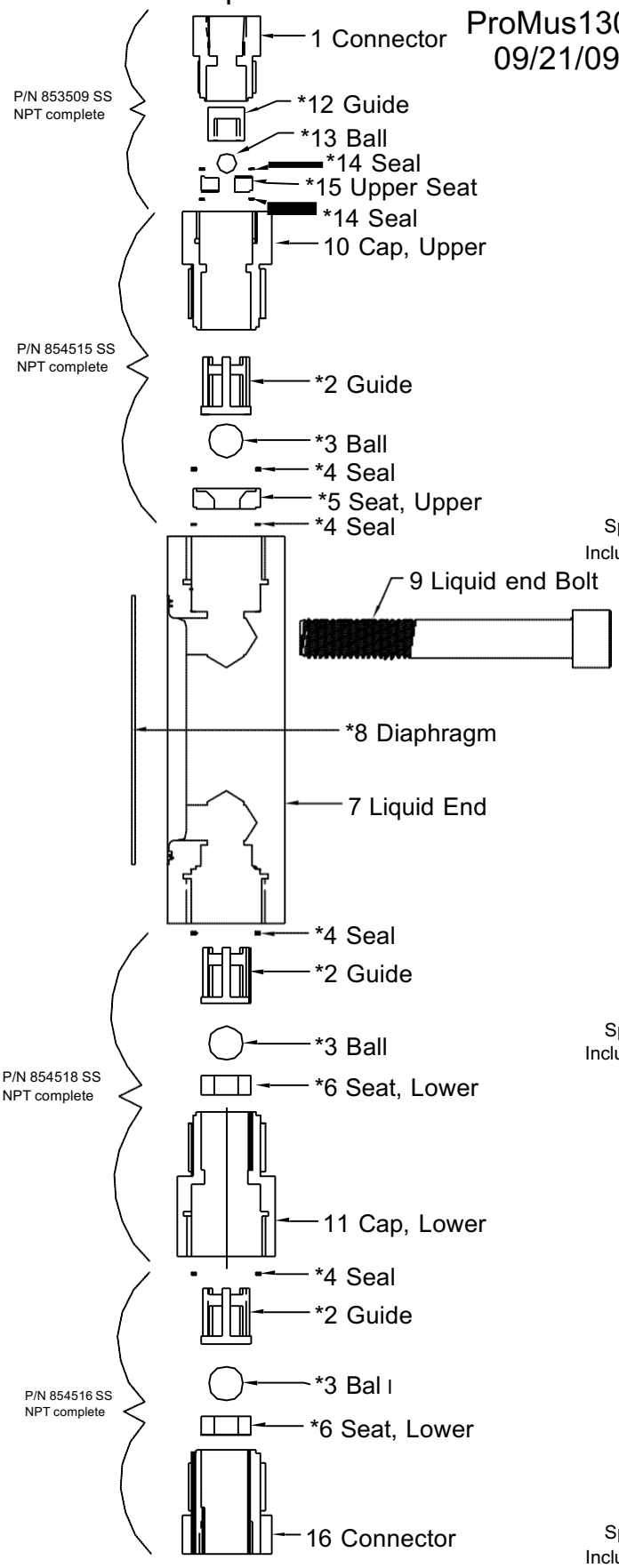
		ProMus130X	
	Qty	HC10	HC11
1	2	854405	854409
*2	2	854401	854401
*3	2	854402	854402
*4	3	854210	854210
*5	1	854403	854403
*6	1	854404	854404
7	1	854400	854400
*8	1	854201	854201
9	8	854215	854215
Spare Parts Kit (*)		854801	854801

Includes Asterisked (*) Items

Liquid End Parts 30A Double Ball In & Out (Metallic)

ProMus130AXX2X.....

09/21/09 R01



		ProMus130A	
	Qty.	SS20	SS21
1	1	853202	854214
*2	3	854205	854205
*3	3	404243	404243
*4	4	854210	854210
*5	1	854207	854207
*6	2	854208	854208
7	1	854203	854203
*8	1	854201	854201
9	8	854215	854215
10	1	854211	854211
11	1	854213	854213
*12	1	853208	853208
*13	1	853211	853211
*14	2	853209	853209
*15	1	853203	853203
16	1	854209	854209
Spare Parts Kit (*)		854509	854509

Included Asterisked(*) Items

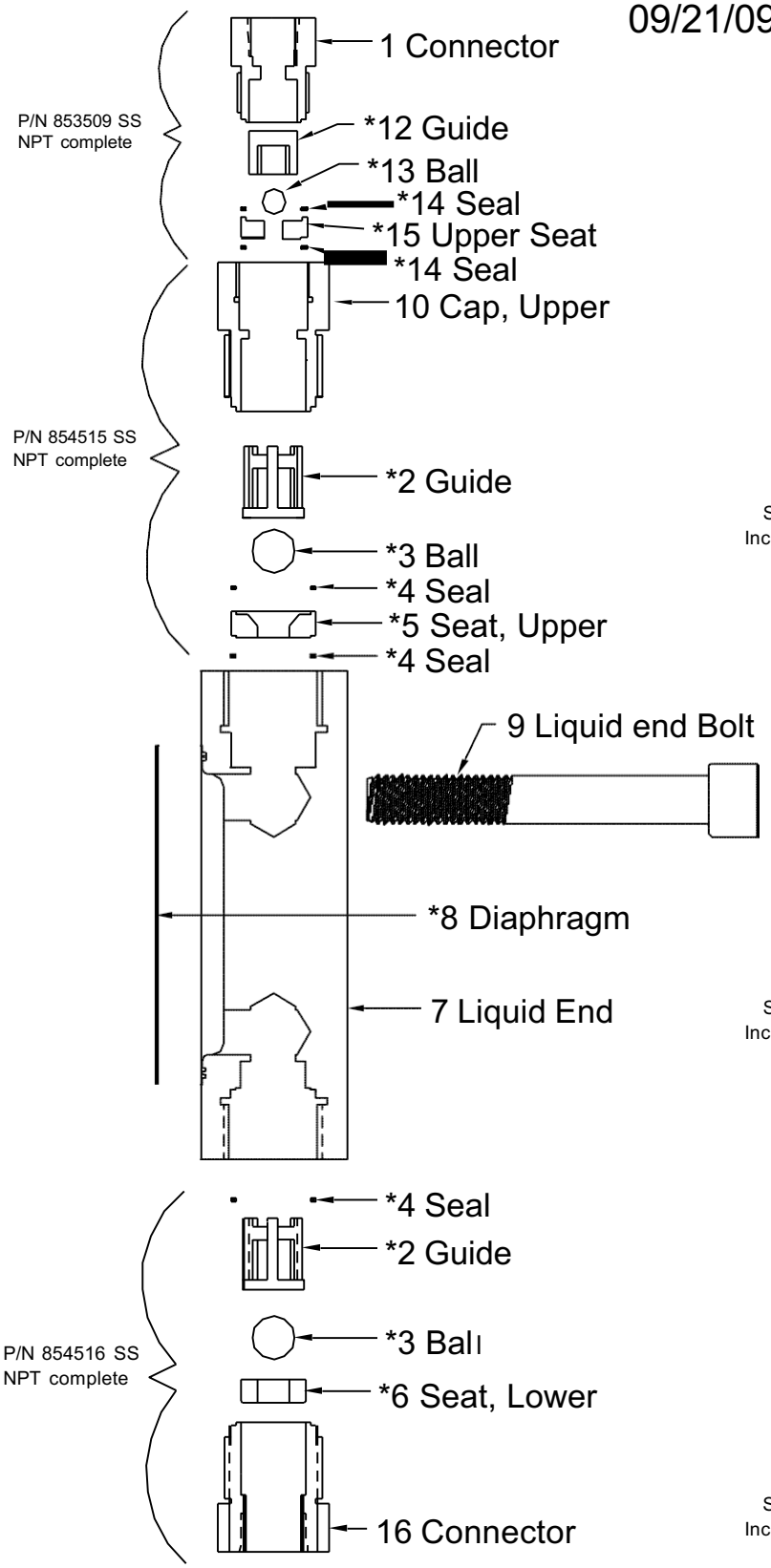
		ProMus130A	
	Qty.	A220	A221
1	1	853501	853309
*2	3	854301	854301
*3	3	854302	854302
*4	4	854210	854210
*5	1	854303	854303
*6	2	854304	854304
7	1	854300	854300
*8	1	854201	854201
9	8	854215	854215
10	1	854306	854306
11	1	854308	854308
*12	1	853306	853306
*13	1	853307	853307
*14	2	853209	853209
*15	1	853203	853203
16	1	854305	854309
Spare Parts Kit (*)		854609	854609

Included Asterisked(*) Items

		ProMus130A	
	Qty.	HC20	HC21
1	1	853404	853409
*2	3	854401	854401
*3	3	854402	854402
*4	4	854210	854210
*5	1	854403	854403
*6	2	854404	854404
7	1	854400	854400
*8	1	854201	854201
9	8	854215	854215
10	1	854406	854406
11	1	854408	854408
*12	1	853406	853406
*13	1	853407	853407
*14	2	853209	853209
*15	1	853402	853402
16	1	854405	854409
Spare Parts Kit (*)		854809	854809

Included Asterisked(*) Items

Liquid End Parts 30A Single Ball In & Double Out (Metallic)
ProMus130AXX3X.....
09/21/09 R01



		ProMus130A	
	Qty.	SS30	SS31
1	1	853202	854214
*2	2	854205	854205
*3	2	404243	404243
*4	3	854210	854210
*5	1	854207	854207
*6	1	854208	854208
7	1	854203	854203
*8	1	854201	854201
9	8	854215	854215
10	1	854211	854211
*12	1	853208	853208
*13	1	853211	853211
*14	2	853209	853209
*15	1	853203	853203
16	1	854209	854209
Spare Parts Kit (*)		854505	854505

Included Asterisked(*) Items

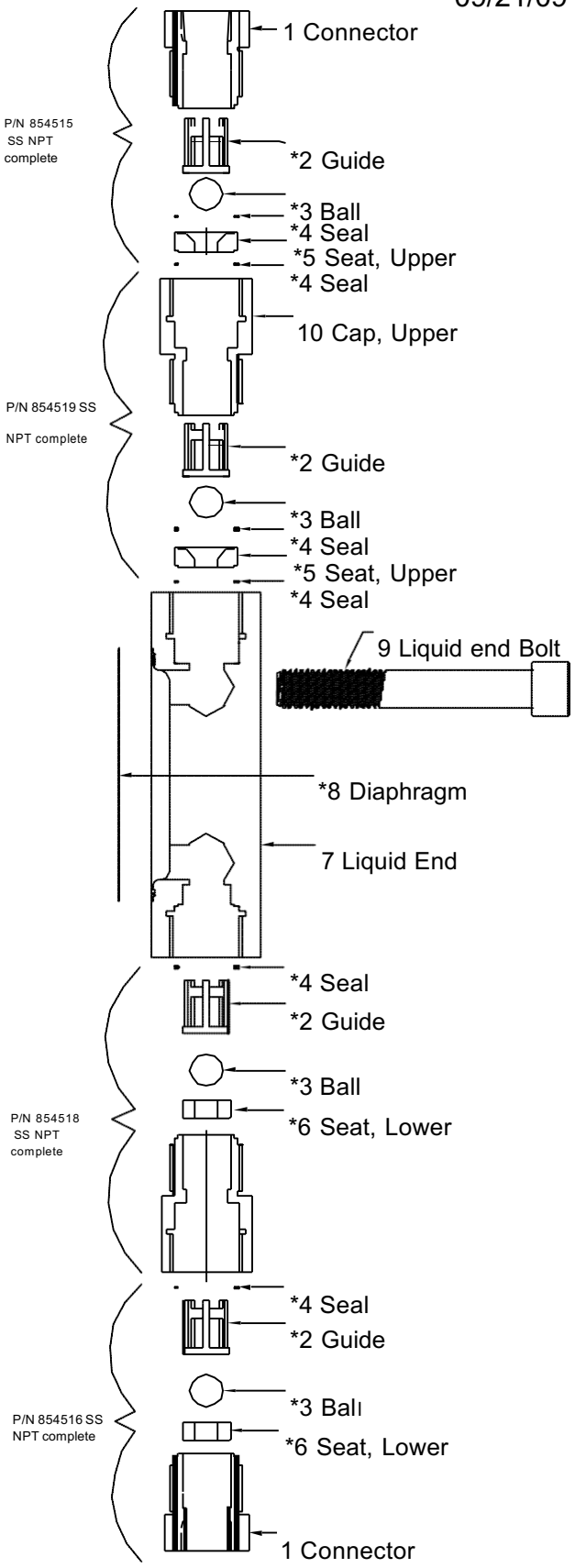
		ProMus130A	
	Qty.	A230	A231
1	1	853501	853309
*2	2	854301	854301
*3	2	854302	854302
*4	3	854210	854210
*5	1	854303	854303
*6	1	854304	854304
7	1	854300	854300
*8	1	854201	854201
9	8	854215	854215
10	1	854306	854306
*12	1	853306	853306
*13	1	853307	853307
*14	2	853209	853209
*15	1	853203	853203
16	1	854305	854309
Spare Parts Kit (*)		854605	854605

Included Asterisked(*) Items

		ProMus130A	
	Qty.	HC30	HC31
1	1	853404	853409
*2	2	854401	854401
*3	2	854402	854402
*4	3	854210	854210
*5	1	854403	854403
*6	1	854404	854404
7	1	854400	854400
*8	1	854201	854201
9	8	854215	854215
10	1	854406	854406
11			
*12	1	853406	853406
*13	1	853407	853407
*14	2	853209	853209
*15	1	853402	853402
16	1	854405	854409
Spare Parts Kit (*)		854805	854805

Included Asterisked(*) Items

Liquid End Parts (30 B or C) Double Ball In & Out (Metallic)
ProMus1(30 B or C)XX2X.....
09/21/09 R01



	Qty	ProMus1(30B or C) SS20	SS21
*2	4	854205	854205
*3	4	404243	404243
*4	6	854210	854210
*5	2	854207	854207
*6	2	854208	854208
7	1	854203	854203
*8	1	854201	854201
9	8	854215	854215
10	1	854212	854212
11	1	854213	854213
Spare Parts Kit (*)		854503	854503

Includes Asterisked (*) Items

	Qty	ProMus1(30B or C) A220	A221
1	2	854305	854309
*2	4	854301	854301
*3	4	854302	854302
*4	6	854210	854210
*5	2	854303	854303
*6	2	854304	854304
7	1	854300	854300
*8	1	854201	854201
9	8	854215	854215
10	1	854307	854307
11	1	854308	854308
Spare Parts Kit (*)		854603	854603

Includes Asterisked (*) Items

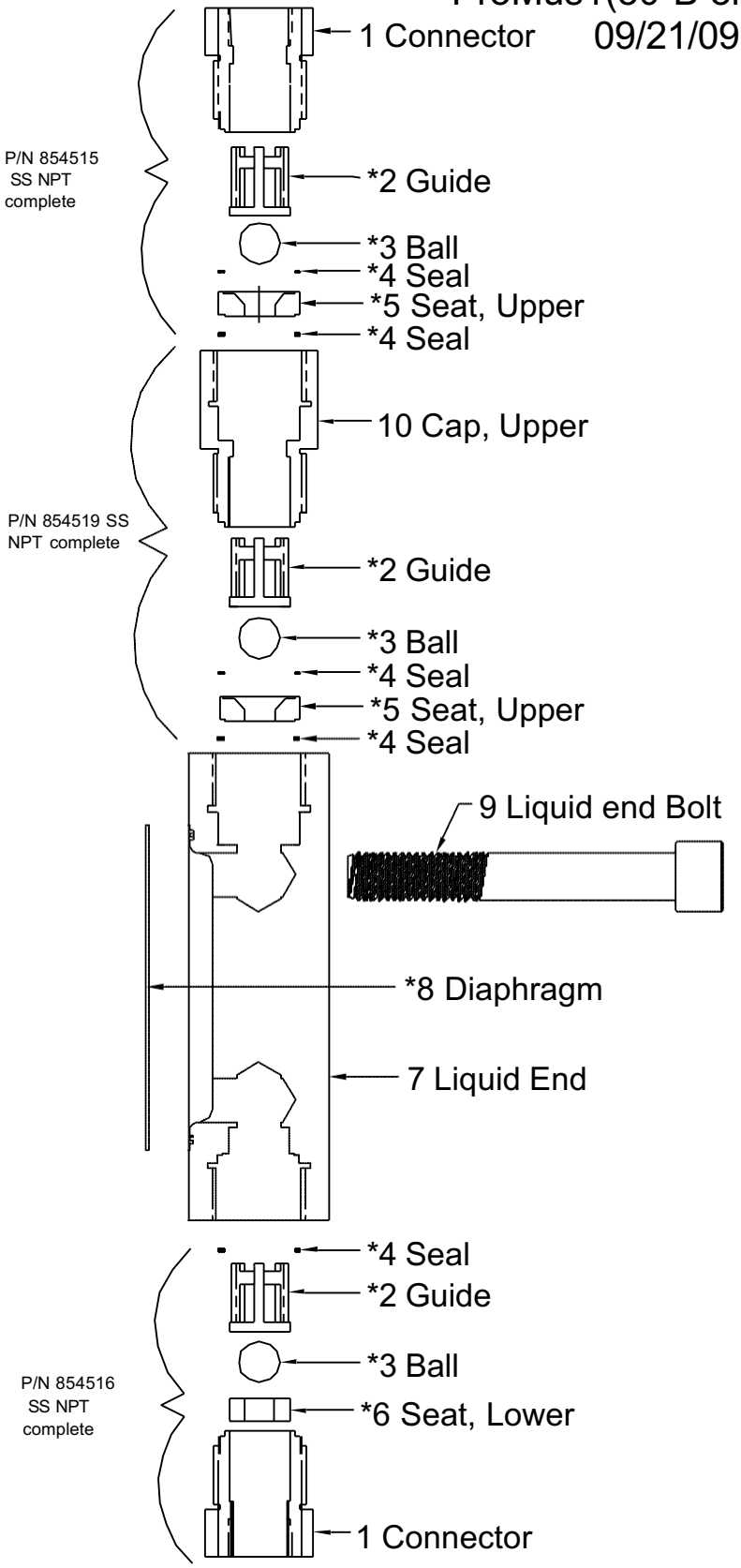
	Qty	ProMus1(30B or C) HC20	HC21
1	2	854405	854409
*2	4	854401	854401
*3	4	854402	854402
*4	6	854210	854210
*5	2	854403	854403
*6	2	854404	854404
7	1	854400	854400
*8	1	854201	854201
9	8	854215	854215
10	1	854407	854407
11	1	854408	854408
Spare Parts Kit (*)		854803	854803

Includes Asterisked (*) Items

Liquid End Parts (30 B or C) Single Ball In & Double Out (Metallic)

ProMus1(30 B or C)XX3X.....

09/21/09 R01



		ProMus1(30B or C)	
	Qty	SS30	SS31
1	2	854209	854214
*2	3	854205	854205
*3	3	404243	404243
*4	5	854210	854210
*5	2	854207	854207
*6	1	854208	854208
7	1	854203	854203
*8	1	854201	854201
9	8	854215	854215
10	1	854212	854212
Spare Parts Kit (*)		854507	854507

Includes Asterisked (*) Items

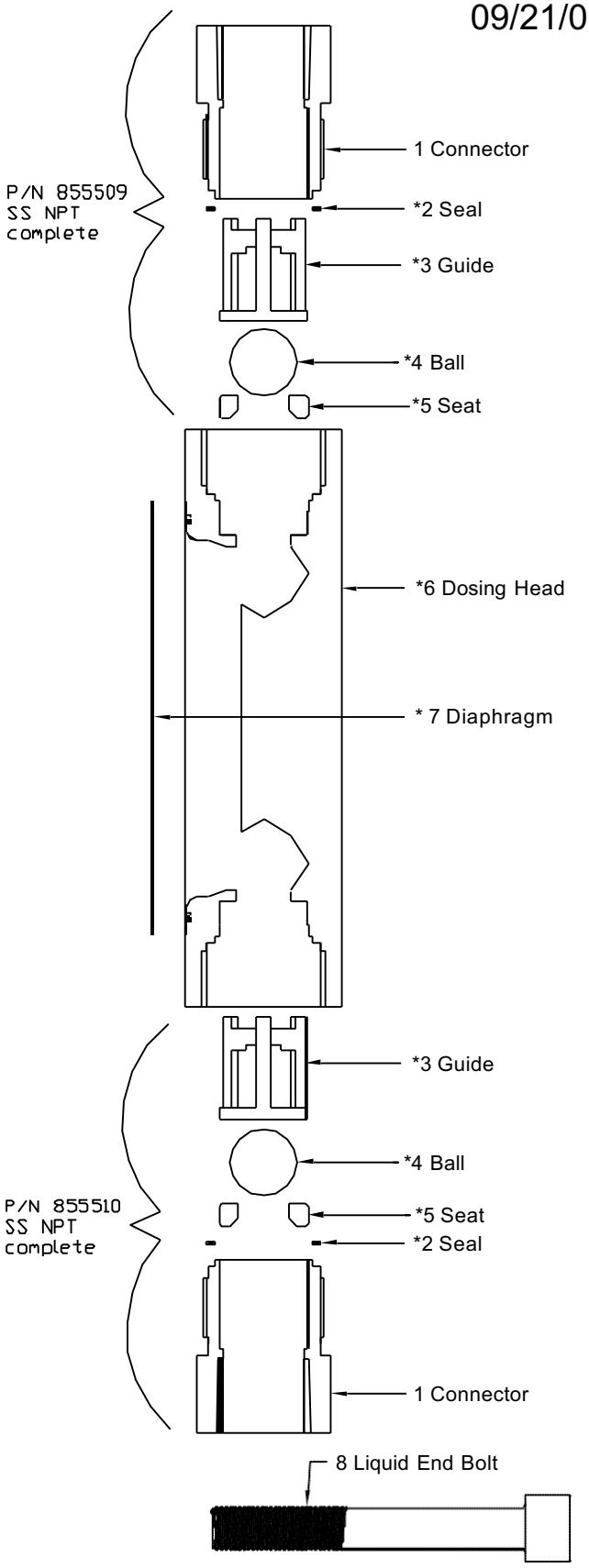
		ProMus1(30B or C)	
	Qty	A230	A231
1	2	854305	854309
*2	3	854301	854301
*3	3	854302	854302
*4	5	854210	854210
*5	2	854303	854303
*6	1	854304	854304
7	1	854300	854300
*8	1	854201	854201
9	8	854215	854215
10	1	854308	854307
Spare Parts Kit (*)		854607	854607

Includes Asterisked (*) Items

		ProMus1(30B or C)	
	Qty	HC30	HC31
1	2	854405	854409
*2	3	854401	854401
*3	3	854402	854402
*4	5	854210	854210
*5	2	854403	854403
*6	1	854404	854404
7	1	854400	854400
*8	1	854201	854201
9	8	854215	854215
10	1	854408	854407
Spare Parts Kit (*)		854807	854807

Includes Asterisked (*) Items

Liquid End Parts 40 Single Ball (Metallic)
ProMus140XXX1X.....
09/21/09 Rev 01



		ProMus140X	
	Qty	SS10	SS11
1	2	855205	855209
*2	2	855207	855207
*3	2	855208	855208
*4	2	855204	855204
*5	2	855206	855206
6	1	855200	855200
*7	1	855201	855201
8	8	855212	855212
Spare Parts Kit (*)		855501	855501

Includes Asterisked (*) Items

		ProMus140X	
	Qty	A210	A211
1	2	855302	855305
*2	2	855207	855207
*3	2	855304	855304
*4	2	855301	855301
*5	2	855303	855303
6	1	855300	855300
*7	1	855201	855201
8	8	855212	855212
Spare Parts Kit (*)		855504	855504

Includes Asterisked (*) Items

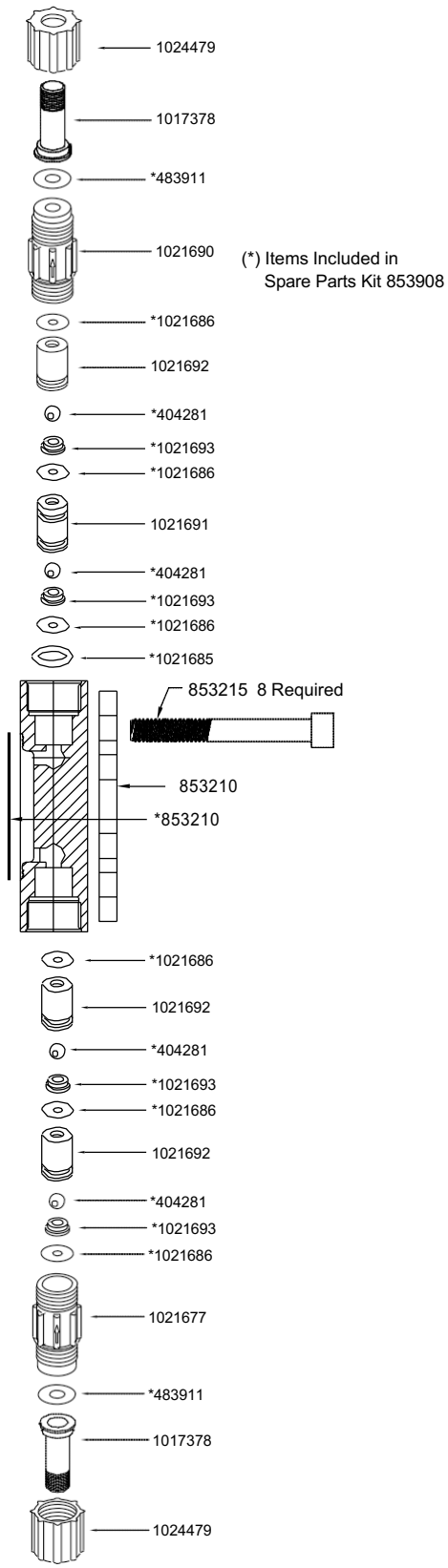
		ProMus140X	
	Qty	HC10	HC11
1	2	855402	855405
*2	2	855207	855207
*3	2	855404	855404
*4	2	855401	855401
*5	2	855403	855403
6	1	855400	855400
*7	1	855201	855201
8	8	855212	855212
Spare Parts Kit (*)		855507	855507

Includes Asterisked (*) Items

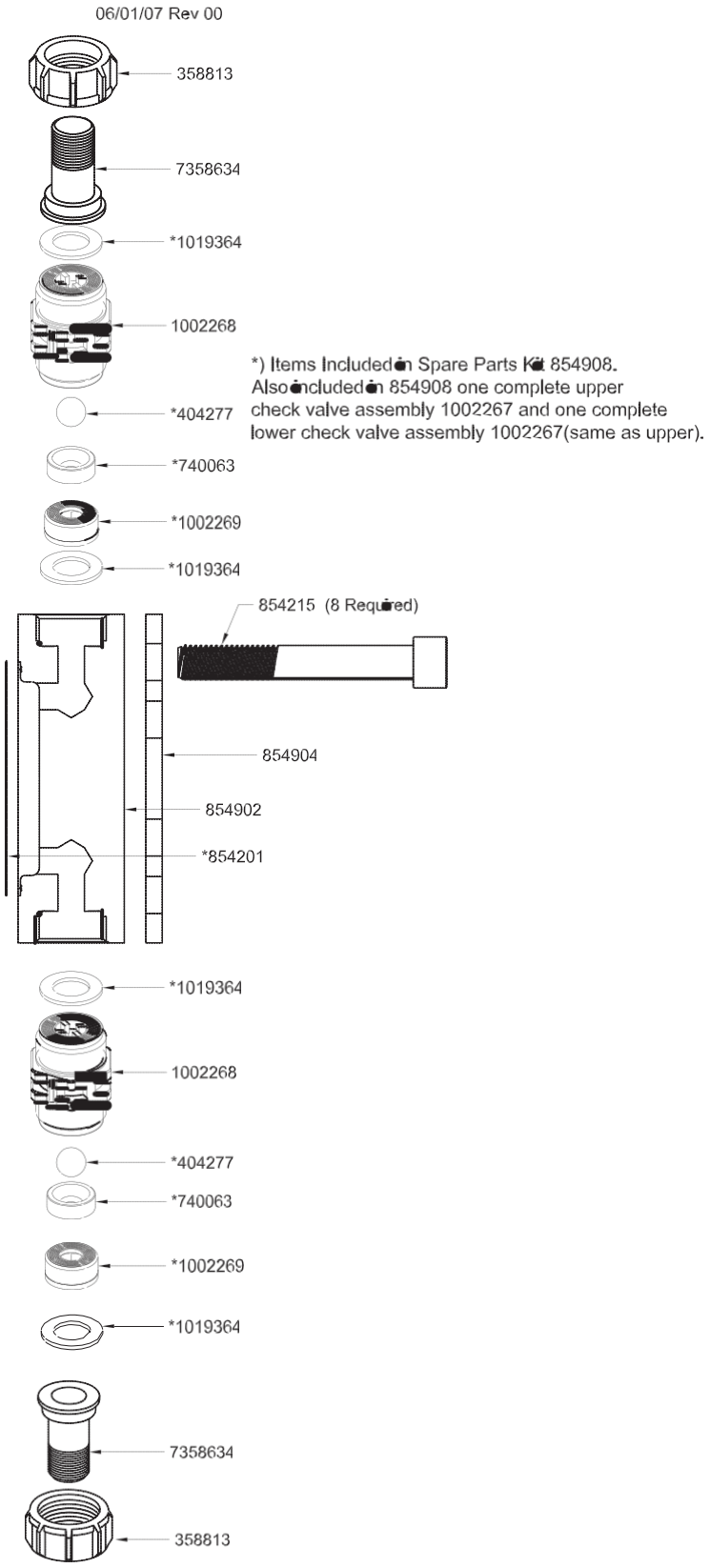
06/01/07 Rev 0

Liquid End Parts 17 Double Ball (In & Out) (PVDF)
ProMus 117X PVT0 _ _ _

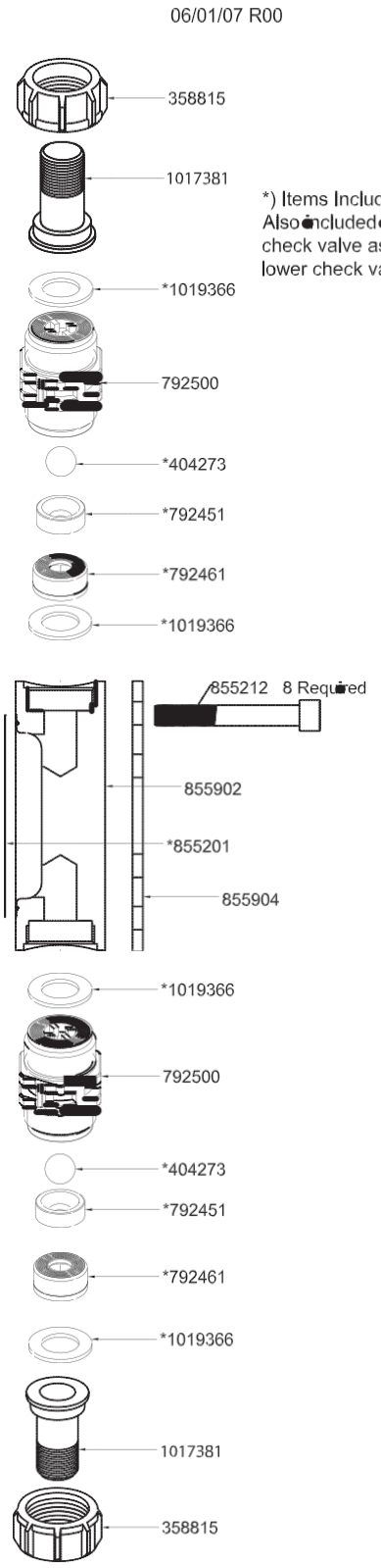
06/01/07 R00



Liquid End Parts 30 Single Ball In & Out (PVT)
ProMus 130 PVTO _ _ _



Liquid End Parts 40 Single Ball In & Out (PVT)
ProMus 140 PVTO _ _ _



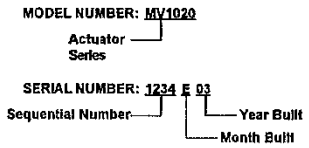
*) Items Included in Spare Parts Kit 855908. Also included in 855908 one complete upper check valve assembly 792518 and one complete lower check valve assembly 792518 (same as upper).

BOM	Description	Extended Description
851763	Drive case 56C Rebuild Kit	Rebuild Kit Drive case 56c
851764	Drive case IEC Rebuild Kit	Rebuild Kit Drive case IEC
852751	Rebuild Kit Manual Stroke Adjuster	Rebuild Kit Manual Stroke Adjuster
852753	Nema 7 Electric Stroke Adjuster Reb/Kit	Rebuild Kit, Electric Stroke Adjuster Nema 7
853755	Sz 17 Hydraulics 3/8 Plunger Rebuild Kit	Rebuild Kit Size 17 Hydraulics 3/8 Plunger
853756	Sz 17 Hydraulics 7/16 Plunger Rebuild Kit	Rebuild Kit Size 17 Hydraulics 7/16 Plunger
854756	Sz 30 Hydraulics 5/8 Plunger Rebuild Kit	Rebuild Kit Size 30 Hydraulics 5/8 Plunger
854757	Sz 30 Hydraulics 13/16 Plunger Rebuild Kit	Rebuild Kit Size 30 Hydraulics 13/16 Plunger
854758	Sz 30 Hydraulics 1 1/8 Plunger Rebuild Kit	Rebuild Kit Size 30 Hydraulics 1 1/8 Plunger
855754	Sz 40 Hydraulics 1 3/4 Plunger Rebuild Kit	Rebuild Kit Size 40 Hydraulics 1 3/4 Plunger
855755	Sz 40 Hydraulics 2 Plunger Rebuild Kit	Rebuild Kit Size 40 Hydraulics 2 Plunger
855756	Sz 40 Hydraulics 2 1/4 Plunger Rebuild Kit	Rebuild Kit Size 40 Hydraulics 2 1/4 Plunger
853502	SP-Kit LE 17 SS	Rebuild Kit Liquid End Size 17 Single Ball 316SS
853503	SP-Kit LE 17 SS Dbl I/O	Rebuild Kit Liquid End Size 17 Double Ball 316SS
853505	SP-Kit LE 17 SS Dbl Out	Rebuild Kit Liquid End Size 17 Double Ball 316SS Out Only
853582	SP-Kit LE 17 A2	Rebuild Kit Liquid End Size 17 Single Ball Alloy 20
853583	SP-Kit LE 17 A2 Dbl I/O	Rebuild Kit, Liquid End, Size 17, Double Ball Alloy 20
853585	SP-Kit LE 17 A2 Dbl Out	Rebuild Kit, Liquid End, Size 17, Double Ball, Out Only, Alloy 20
853662	SP-Kit LE 17 HC	Rebuild Kit, Liquid End, Size 17, Single Ball, Hastelloy C-276
853663	SP-Kit LE 17 HC Dbl I/O	Rebuild Kit, Liquid End, Size 17, Double Ball, Hastelloy C-276
853665	SP-Kit LE 17 HC Dbl Out	Rebuild Liquid End Kit Size 17 Double Ball Out Only Hastelloy C-276
853908	SP-Kit LE 17 PVT	Rebuild Kit Size 17 Liquid End Double Ball PVT
854501	SP-Kit LE 30 SS	Rebuild Kit Liquid End Size 30 Single Ball 316SS
854503	SP-Kit LE 30 SS Dbl I/O	Rebuild Kit, Liquid End, Size 30, Double Ball 30/30 In & Out, 316SS
854505	SP-Kit LE 30 SS Dbl O 30/17	Rebuild Kit, Liquid End, Size 30, Double Ball, 30/17, Out Only, 316SS
854507	SP-Kit LE 30 SS Dbl O 30/30	Rebuild Kit, Liquid End, Size 30, Double Ball, Out Only, 316SS
854509	SP-Kit LE 30 SS Dbl O 30/17	Rebuild Kit, Liq End 30 Dbl Ball In&Out 30/17 316SS
854601	SP-Kit LE 30 A2	Rebuild Kit, Liquid End Size 30, Single Ball Alloy 20
854603	SP-Kit LE 30 A2 Dbl I/O	Rebuild Kit, Liq End 30 Dbl Ball In&Out 30/30 Alloy 20
854605	SP-Kit LE 30 A2 Dbl O 30/17	Rebuild Kit, Liq End 30 Dbl Ball Out Only 30/17 Alloy 20
854607	SP-Kit LE 30 A2 Dbl O 30/30	Rebuild Kit, Liq End 30 Dbl Ball Out Only 30/30 Alloy 20
854609	SP-Kit LE 30 A2 Dbl O 30/17	Rebuild Kit, Liq End 30 Dbl Ball In&Out 30/17 Alloy 20
854801	SP-Kit LE 30 HC	Rebuild Kit, Liquid End Size 30, Single Ball Hastelloy C-276
854803	SP-Kit LE 30 HC Dbl I/O	Rebuild Kit, Liq End 30 Dbl Ball In&Out 30/30 Hastelloy C-276
854805	SP-Kit LE 30 HC Dbl O 30/17	Rebuild Kit, Liq End 30 Dbl Ball Out Only 30/17 Hastelloy C-276
854807	SP-Kit LE 30 HC Dbl O 30/30	Rebuild Kit, Liq End 30 Dbl Ball Out Only 30/30 Hastelloy C-276
854809	SP-Kit LE 30 HC Dbl O 30/17	Rebuild Kit, Liq End 30 Dbl Ball In&Out 30/17 Hastelloy C-276
854908	SP-Kit LE 30 PVT	Rebuild Kit Size 30 Liquid End Single Ball PVT
855501	SP-Kit LE 40 SS	Rebuild Kit Size 40 Liquid End Single Ball 316SS
855504	SP-Kit LE 40 A2	Rebuild Kit Size 40 Liquid End Single Ball Alloy 20
855507	SP-Kit LE 40 HC	Rebuild Kit Size 40 Liquid End Single Ball Hastelloy C-276
855908	SP-Kit LE 40 PVT	Rebuild Kit Size 40 Liquid End Single Ball PVT

15. General Specifications for Electric Stroke Positioner

IDENTIFICATION LABEL

An identification label is attached to each actuator cover. When ordering parts, requesting information or service assistance, provide all of the label information.



GENERAL ACTUATOR DESCRIPTION

The 1000 Series are full-featured actuators with the capability to accept analog control signals. The design provides smooth, highly accurate positioning, with positive position-lock when not in motion. These rugged actuators may be mounted in any position and will withstand the most adverse environmental conditions.

A stepper motor produces torque, which is transmitted to the output shaft through a gear or drive screw arrangement. This allows the low torque, high speed motor output to be converted to high torque, low speed for actuator output shaft motion. The built-in servo drive amplifier controls the stepper motor's speed and direction. It also controls actuator end limits, motor torque, deadband and 4-20 mA transmitter.

• *Signal Conversion Module Option.* This option is used to accept up to four actuator open collector limit switch inputs and convert them to four form C relay output contacts. The module is furnished in one enclosure, for close-coupled mounting to the actuator.

• *Gearbox Option. (SM-1020 only)* The gearbox is factory installed to the SM-1020 output shaft to increase torque output.

• *Battery Backup Option. (4-20 mA only)* This external option provides battery backup power to the actuator along with a generated 4-20 mA command signal. When AC power is lost, the potentiometer adjustable command signal positions the actuator. After completing the positioning cycle, the battery unit enters a power conserving cycle to extend available power. When AC power is restored, the circuitry resets to automatic control. There is enough reserve power to position the actuator multiple times without a charge period. A fully discharged battery will take 12-16 hours to recharge. A battery OK, open transistor, low-level logic output signal is provided to indicate when battery voltage has fallen below operating levels.

• *Incremental Control Option.* This option allows switched AC or DC line power to position the actuator.

ABBREVIATIONS USED IN THIS MANUAL

A or Amps	Ampere
ac	Alternating Current
° C	Degrees Celsius
CW	Clockwise
CCW	Counterclockwise
dc	Direct Current
° F	Degrees Fahrenheit
G	Earth Ground
Hz	Hertz
kg	Kilogram
L	Line (power supply)
lbs	Pounds
lbf.	Lbs. Force
LVDT	Linear Variable Differential Transformer
mA	Milliamp
mfd	Microfarad
mm	Millimeters
N	Newton (force)
NEMA	National Electrical Manufacturing Assoc.
Nm	Newton Meter
NPT	National Pipe Thread
Ph	Phase
PL	Position Limit Switch
P/N	Part Number
RPM	Revolutions per Minute
SEC	Second
TL	Thrust Limit Switch
Vac	Volts ac
Vdc	Volts dc
VR	Variable Resistance
W	Watt

WARRANTY INFORMATION

Warranty: Subject to the following, Jordan expressly warrants the products manufactured by it as meeting the applicable Jordan product specifications and that such products are free from defects in material and workmanship for a period of one (1) year from the date of delivery. The foregoing is the sole and exclusive warranty made by Jordan with respect to the products. Jordan makes no other warranties, either express or implied (including, without limitation, warranties as to merchantability or fitness for a particular purpose). The purchaser retains responsibility for the application and functional adequacy of the offering. See Jordan's General Conditions of Sale - Product, for complete warranty information.

15. General Specifications for Electric Stroke Positioner

Standard Line Voltage: 120/240 Vac, ±10%, 50/60 Hz (Slide switch select). *Supply voltage fluctuations up to 10% of the nominal volatge*

Optional Line Voltage:
SM-1015, MV-1010, VA-1010 - 24-36 Vdc
SM-1020, LA-1020, MV-1020, VA-1020 - 12-36 Vdc
SM-1020, LA-1020, MV-1020, VA-1020 - 24-36 Vdc

Power: SM-1015, LA-1010, MV-1005, MV-1010, VA-1010 - *18VA*
SM-1020, LA-1020, MV-1020, VA-1020 - *36VA*

Command Signal Inputs:
4-20 mA, 4-12 mA, 12-20 mA
0-5 Vdc
0-10 Vdc
Incremental contact closures

Position Feedback Signal: Isolated 4-20 mA, loop powered with 12-36 Vdc external power supply

Field Wiring Terminations: Plugable terminal block, wire size range 26-14 AWG

Command Signal Monitor: (current command only) The 1000 series loss-of-signal circuitry monitors the command signal input. If the command signal drops below 3.2 mA or above 20.7 mA, the actuator will either lock in place or run to a preset position (user selectable).

Limit Signals:
Internal: Part of servo control
External: Open transistor low level logic outputs, adjustable over stroke range. Rating: 40 Vdc at 40 mA maximum. For customer use, not part of servo control.

Current Limit: Automatic adjusting of the motor current limit (internal to servo control).

Speed/Force: See speed/force curves.

Output Shaft Motion: All models can go either direction on an increasing command signal. This is determined by the ZERO and SPAN settings.

Rotation: SM models without gearbox: 90° to 2 turns or 2 to 20 turns. Infinitely adjustable within range.

SM models with gearbox: 30° to 153° or 150° to 4.25 turns. Infinitely adjustable within range.

Stroke: LA models: 0.75 - 18 in. (19 - 457 mm)
MV models: 0.09 - 1.38 in. (2.4 - 35 mm)
VA models: 0.34 - 1.5 in. (9 - 38 mm)
All models infinitely adjustable within range.

Weight: (Not including devices mounted to actuator)
SM-1015: 12 lbs. (5.4 kg)
SM-1020: 16 lbs. (7.3 kg)
SM-1020 with gearbox: 19 lbs. (8.6 kg)
LA-1020: 16 lbs. (7.3 kg)
MV-1005: 12 lbs. (5.4 kg)
MV-1010: 12 lbs. (5.4 kg)
MV-1020: 16 lbs. (7.3 kg)
VA-1010: 20 lbs. (9.1 kg)
VA-1020: 24 lbs. (10.9 kg)

Conduit Entry: 1/2 NPT

Handwheel: Push to engage, spring return on release. ***(Not available with MV-1005)***

Temperature Limits: -40° F to 150° F (-40° C to 65° C)

Humidity: 50% maximum at 104° F (40° C)

Altitude: Up to 3,280 ft. (1000 m) above mean sea level

Pollution Degree: 2

Installation Category: II

Enclosure: Explosion-proof for Class I, Division 1, Groups C and D. Type 4 (IP65), indoor or outdoor

Duty Cycle: Unrestricted modulating duty. (Cont. duty)

Position Accuracy: 1% of full range

Deadband: Factory preset to 1%. Field adjustable.

16. Declaration of Conformity:

EC Declaration of Conformity

We,

ProMinent Fluid Controls, Inc.
136 Industry Drive
Pittsburgh USA, PA 15275

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.
Any modification to the product not approved by us will invalidate this declaration.

Product description :	Metering pump, Series ProMus
Product type :	PROMUS XXXXXXXXXXXXXX
Serial number :	see type identification plate on device
Relevant EC regulations :	EC - machine regulation (98/37/EEC) EC - low voltage regulation (73/23/EEC) EC - EMC - regulation (89/336/EEC subsequently 93/68/EEC)
Harmonised standards used, in particular :	DIN EN ISO 12100-1/2, DIN EN 809, DIN EN 563, DIN EN 982 DIN EN 60034-5/7/18, DIN EN 60335-1, DIN EN 60335-2-41 DIN EN 60204-1, DIN EN 61000-6-2/4, DIN EN 61000-6-1/3 DIN EN 55014-1/2, DIN EN 60034-1
National standards and other technical specifications used, in particular :	
Date/manufacturer´s signature :	October 20, 2006
The undersigned :	Michael J. Weber, General Manager

Operating Instructions

ProMinent®

ProMus SERIES

Metering Pumps

ProMinent Fluid Controls, Inc. (USA) 136 Industry Drive, Pittsburgh, PA 15275

ProMinent®