# Operating Instructions ProMinent® ProMus Series Metering Pumps

ProMusOM_EU.indd (ProMus_EU_05_13_2007.pdf): Rev #2 - pn. 7760000

Please enter identity code of the device here

Two sets of operating instructions are required for the safe and correct operation of ProMinent® ProMus metering pumps:
This product-specific ProMus operating instructions manual and the “General operating instructions ProMinent® motor-driven metering pumps and hydraulic accessories”. Each is valid only when used in conjunction with the other.

**Please completely read through these 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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## Product Identification / Identity Code

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

**Series: PROMUS1**

**Pump version:**

| | |
|---|---|
| 17A | Size 17 liquid end with 3/8" Plunger |
| 17B | Size 17 liquid end with 7/16" Plunger |
| 30A | Size 30 liquid end with 5/8" Plunger |
| 30B | Size 30 liquid end with 13/16" Plunger |
| 30C | Size 30 liquid end with 1-1/8" Plunger |
| 40A | Size 40 liquid end with 1-3/4" Plunger |
| 40B | Size 40 liquid end with 2" 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 (Recommended for Flooded suction w/ discharge pressure above 500 psi) |
| HC1 | Hastelloy C Single ball check |
| HC2 | Hastelloy C Double ball check |
| HC3 | Hastelloy C Single inlet, double outlet (Recommended for Flooded suction with discharge pressure above 500 psi) |
| A21 | Alloy 20 single ball check |
| A22 | Alloy 20 Double ball check |
| A23 | Alloy 20 Single inlet, double outlet (Recommended for Flooded suction with discharge pressure above 500 psi) |
| PVT | PVDF/PTFE size 17 double inlet & outlet; sizes 30/40 single inlet & outlet |

**Connectors:**

| | |
|---|---|
| 0 | Standard (In accordance with technical data) |
| 1 | BSP taper |
| 7 | MNPT PVDF Standard (PVT LE Only) |

**Gear ratio:**

| | |
|---|---|
| 01 | 12.5:1 56C |
| 02 | 15:1 56C |
| 03 | 30:1 56C |
| 04 | 40:1 56C |
| 05 | 50:1 56C |
| 06 | 12.5:1 IEC (IEC 71 with B5 flange) |
| 07 | 15:1 IEC (IEC 71 with B5 flange) |
| 08 | 30:1 IEC (IEC 71 with B5 flange) |
| 09 | 40:1 IEC (IEC 71 with B5 flange) |
| 11 | 100:1 (17A/ 3/8 plunger only) 56C |

**Motor:**

| | |
|---|---|
| X | No motor included |
| D | 1/2 HP TEFC Standard Motor |

**Base:**

| | |
|---|---|
| 0 | Standard |

**Stroke adjustment:**

| | |
|---|---|
| 1 | Manual stroke adjustment |
| 7 | Stroke position motor |

**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 |

## 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.

Observe also the instructions in the “General operating instructions manual for ProMinent® motor-driven metering pumps and hydraulic accessories”

# 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 (catalogue or www.prominent.com)).
- All other applications and modifications are prohibited.
- This pump may never be operated in an explosion threatened workplace.
- The pump may never be operated with combustible liquids.
- 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 instructions manual.
- All users must read and observe “General Operating Instructions for ProMinent® Metering Pumps and Hydraulic Accessories” on assembly, installation and maintenance.
- The pump must be operated by appropriately trained and authorized personnel.

## Safety Guidelines:

### WARNING

- The pump starts to operate as soon as it is connected to the mains. Ensure that hazardous chemicals cannot leak out.
- The pump cannot be switched off. In the event of power failure, detach the power cable from the power supply.
- Detach the power cable from the power supply before working on the pump.
- Always depressurize the liquid end before working on the pump.
- The internal relief valve is only designed to protect the motor and the gears from inadmissible positive pressure created by the pump.
- The internal relief valve may not be used to bypass a metering stoppage while the pump is running. It is a safety component.
- The internal relief valve may not be used to protect the system. It cannot protect the system.
- Always empty and rinse the liquid end before working on the pump, if used with hazardous or unknown materials.
- When working on the liquid end, wear appropriate protective equipment when metering hazardous or unknown liquids.
- Pumps must be accessible at all times for operating and maintenance purposes. Do not restrict or block access.

- Do not return pumps to ProMinent which have been used for radioactive chemicals.
- Periodically inspect the breather vent of the pump. If spillage occurs from this area immediately turn off the pump. Spillage from this area is usually an indication of a ruptured diaphragm. (Spillage from this area could also be the result of overfilling of the hydraulic oil if the oil level plug is not removed when oil is added). If the diaphragm is ruptured, the chemical being pumped and the hydraulic oil will mix. Some hydraulic oil will be introduced to the chemical being pumped and delivered to the final destination of the pumped chemical. Likewise pumped chemical will slowly enter the gearbox and mix with the hydraulic oil. If the pump continues to run the level of the oil/pumped chemical will slowly rise in the gearbox. If the pump is not turned off, this mixture will exit the breather vent and spill on the surroundings. If the chemical being pumped is corrosive to carbon steel and brass, the internals of the pump will be damaged. Remove the pump from service using all appropriate safety precautions outlined in this manual. Inspect and clean the pump replacing the ruptured diaphragm if the pump internals are not damaged using the procedure outlined in the maintenance section of this manual.

## 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. If or 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.

## 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 non upset 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 gushing and 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 authorised and qualified member of the Operator's staff - is available. A copy of the form is included in the "General operating instructions for ProMinent motor-driven dosing pumps and hydraulic accessories" or can be downloaded at www.prominent.com .

## 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 catalogue).
- Observe applicable national directives during installation/Safety Guidelines

### Sound Intensity Level:

The sound intensity level is < 70 dB (A) in accordance with DIN EN 12639 (noise measurement of liquid pumps)

# 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: -10 °C to 50 °C
Air humidity: max. 95 % relative humidity, non-condensing

**Promus weights in Kgs.**

| Liquid End | Size | Less Motor & Actuator | With Motor only | With Actuator & Motor | With Actuator only |
|---|---|---|---|---|---|
| Metal | 17A&B | 22.2 | 35.4 | 43.1 | 29.9 |
| Metal | 30A,B&C | 26.3 | 39.5 | 47.2 | 34 |
| Metal | 40A,B&C | 30.8 | 44 | 51.7 | 38.6 |
| Plastic | 17A&B | 21.7 | 34.9 | 42.6 | 29.5 |
| Plastic | 30A,B&C | 24.5 | 37.6 | 45.4 | 32.2 |
| Plastic | 40A,B&C | 27.2 | 40.4 | 48.1 | 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 Hydraulic Ends correspond with three diaphragm sizes. The three Hydraulic ends are designated Size 17, Size 30 and Size 40 to reflect the working diameter of the diaphragms. There are three Liquid End Assemblies corresponding to the three Hydraulic Systems Size 17, Size 30, and Size 40.

### 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 20 millimeters. The manual stroke adjuster knob is locking by way if 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 driver subassembly from overload in the event of 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 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**

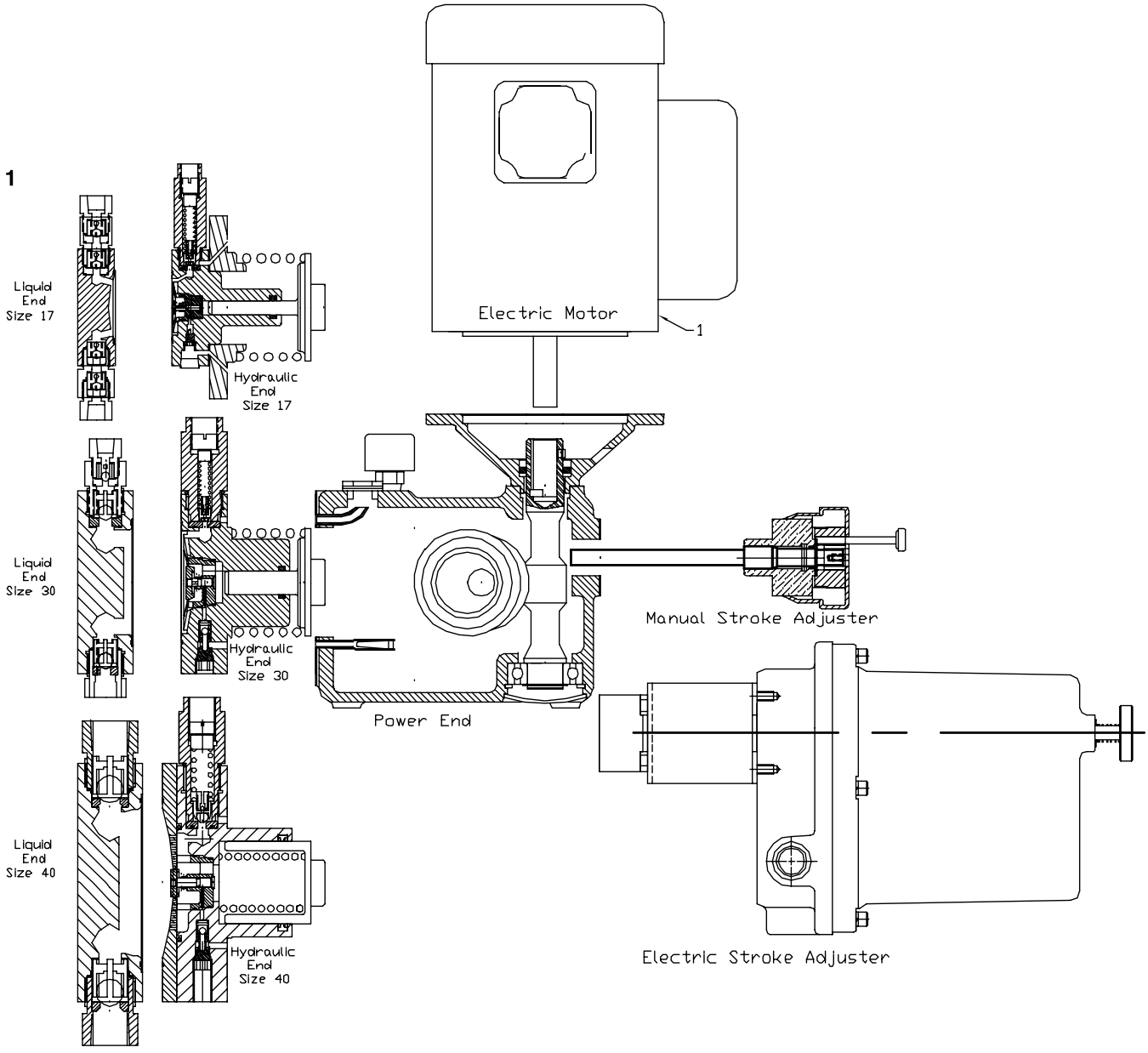
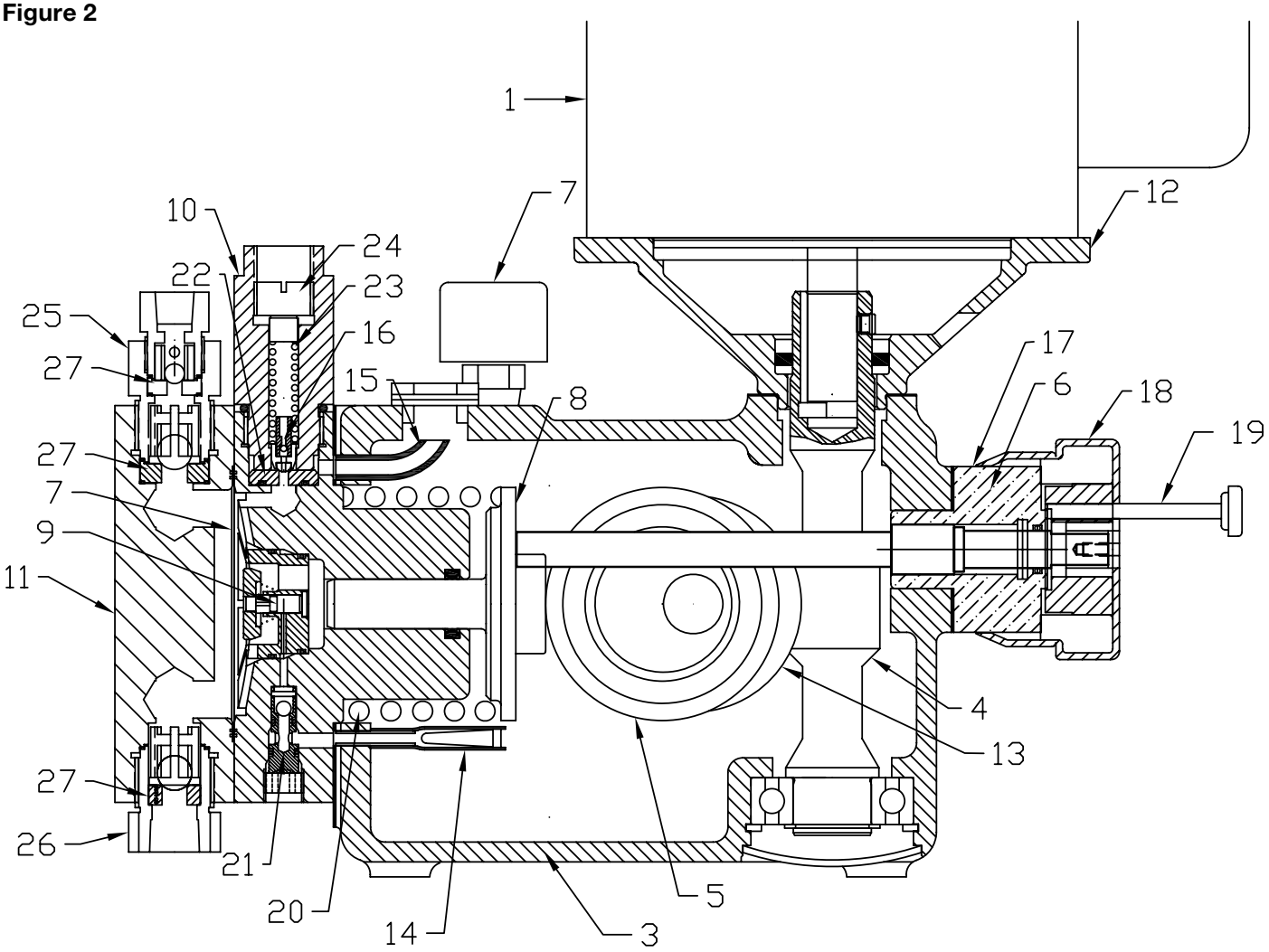
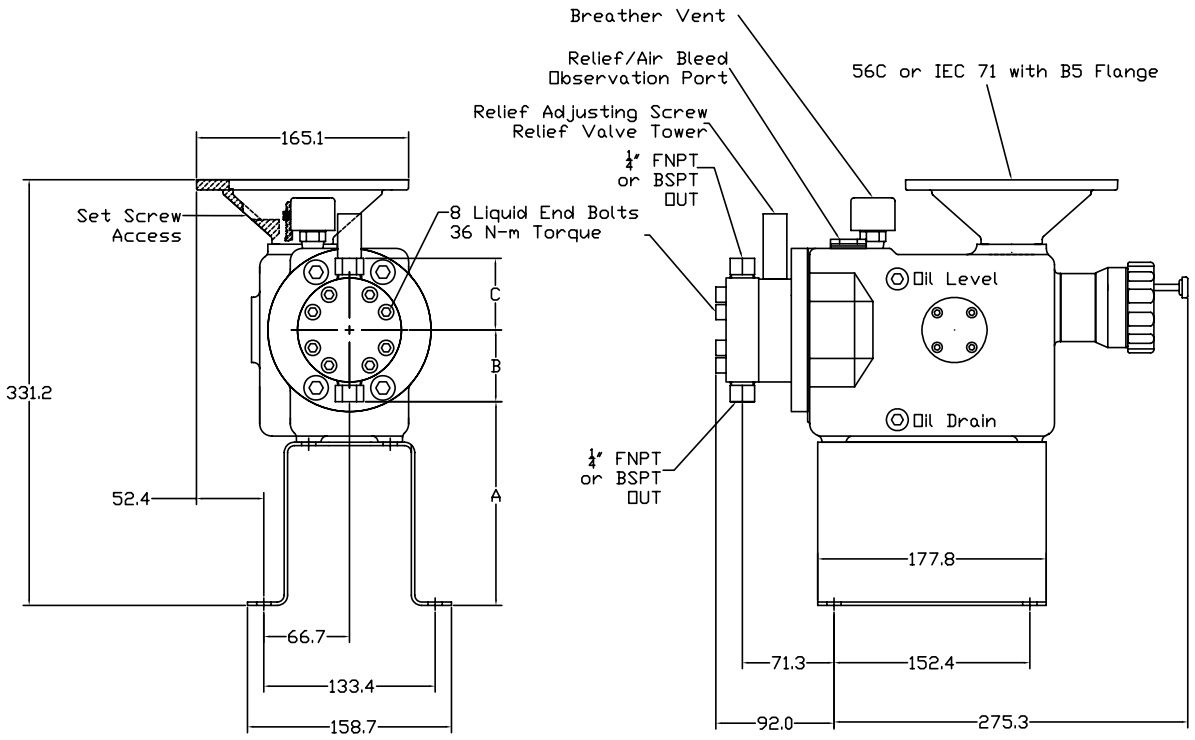

Liquid End Size 17
Hydraulic End Size 17
Electric Motor
1
Liquid End Size 30
Hydraulic End Size 30
Manual Stroke Adjuster
Power End
Liquid End Size 40
Hydraulic End Size 40
Electric Stroke Adjuster

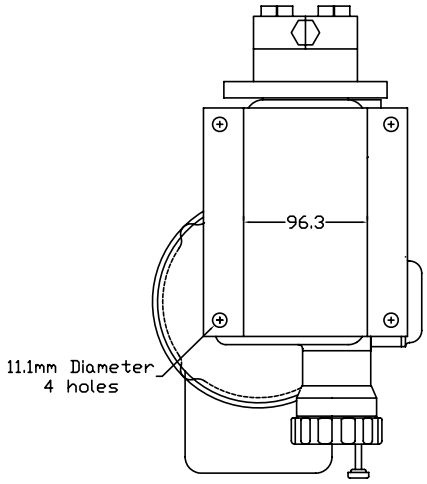
**Figure 2**




| | | | | | |
|---|---|---|---|---|---|
| 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



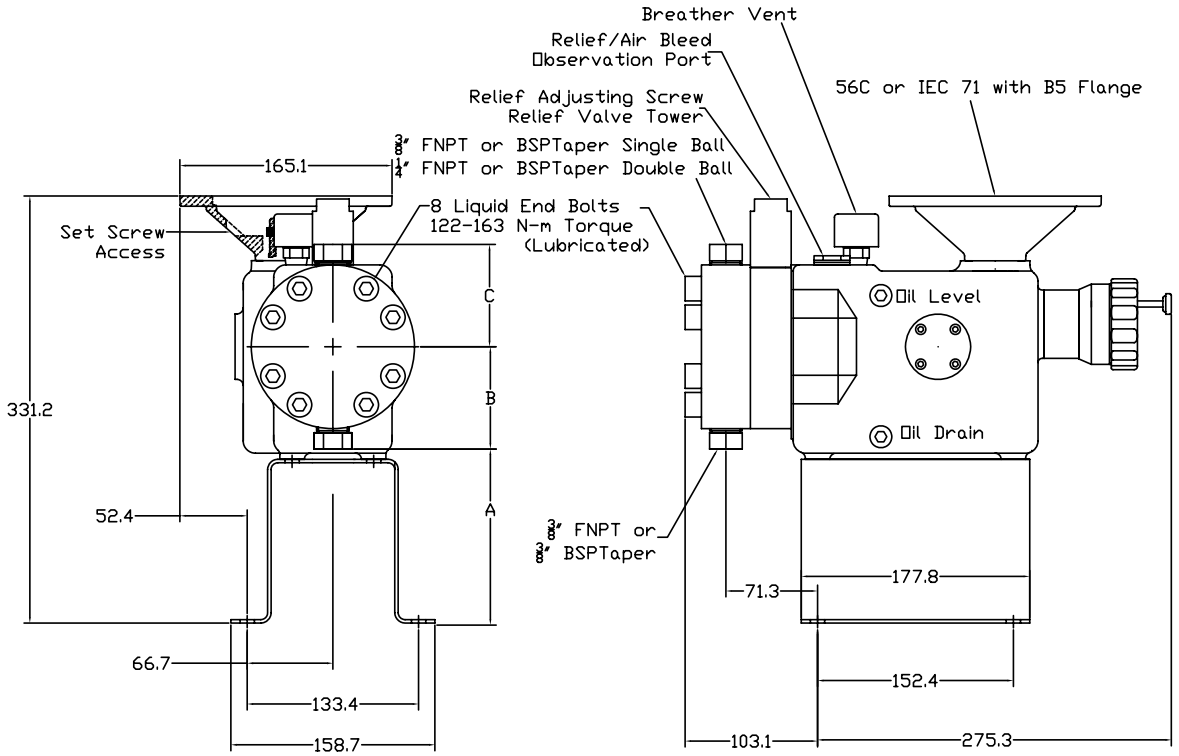

Unless otherwise noted all dimensions are in Millimeters

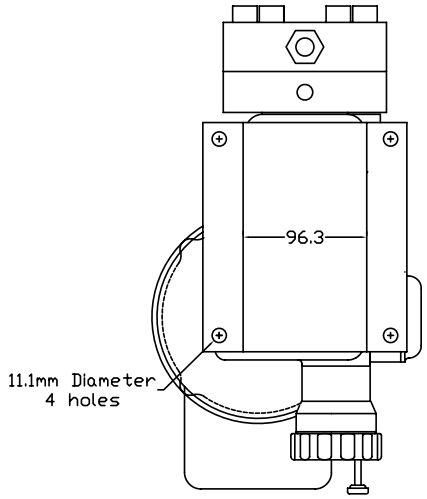
Sixth Place in the Ident Code

| | | | A | B | C |
|---|---|---|---|---|---|
| ProMus | 17A<br>17B | SS<br>A2<br>HC | | | |
| | | 1 | 158.4 | 55.8 | 55.8 |
| | | 2 | 136.5 | 77.8 | 77.8 |
| | | 3 | 158.4 | 55.8 | 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 | |
| | PROMINENT FLUID CONTROLS LTD.<br>490 SOUTHGATE DRIVE.<br>GUELPH, ONTARIO, CANADA<br>N1H 6J3<br>TEL. 519 836 5692 FAX. 519 836 5226 | PROMINENT FLUID CONTROLS, INC.<br>RIDC PARK WEST<br>136 INDUSTRY DRIVE<br>PITTSBURGH, PA 15275 USA<br>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 JD | |
| | DRAWN LLK | SCALE 1:5 | |
| | CHECKED BF | DATE 06/01/07 | |
| SHEET SIZE A | DWG No 850100M-00-600-01 | REV 0 | PAGE 1/1 |

## Dimensional Drawing / ProMus Size 30A Metal Liquid End




Unless otherwise noted all dimensions are in Millimeters

Sixth Place in the Ident Code

| ProMus 30A | | A | B | C |
|---|---|---|---|---|
| SS / A2 / HC | 1 | 136.5 | 79.4 | 79.4 |
| | 2 | 104.5 | 109.8 | 99.6 |
| | 3 | 136.5 | 79.4 | 99.6 |

| | | | |
|---|---|---|---|
| CUSTOMER | | | |
| JOB No | | PURCHASE ORDER No | |
| TITLE | Outline Promus 30 5/8 Plunger Less Motor | | |
| ENGINEERS SEAL | ProMinent® THE PROMINENT GROUP OF COMPANIES | | |
| | PITTSBURGH, PA USA | WWW.PROMINENT.US | |
| | PROMINENT FLUID CONTROLS LTD.<br>490 SOUTHGATE DRIVE.<br>GUELPH, ONTARIO, CANADA<br>N1H 6J3<br>TEL. 519 836 5692 FAX. 519 836 5226 | PROMINENT FLUID CONTROLS, INC.<br>RIDC PARK WEST<br>136 INDUSTRY DRIVE<br>PITTSBURGH, PA 15275 USA<br>TEL. 412 787 2484 FAX. 412 787 0704 | |
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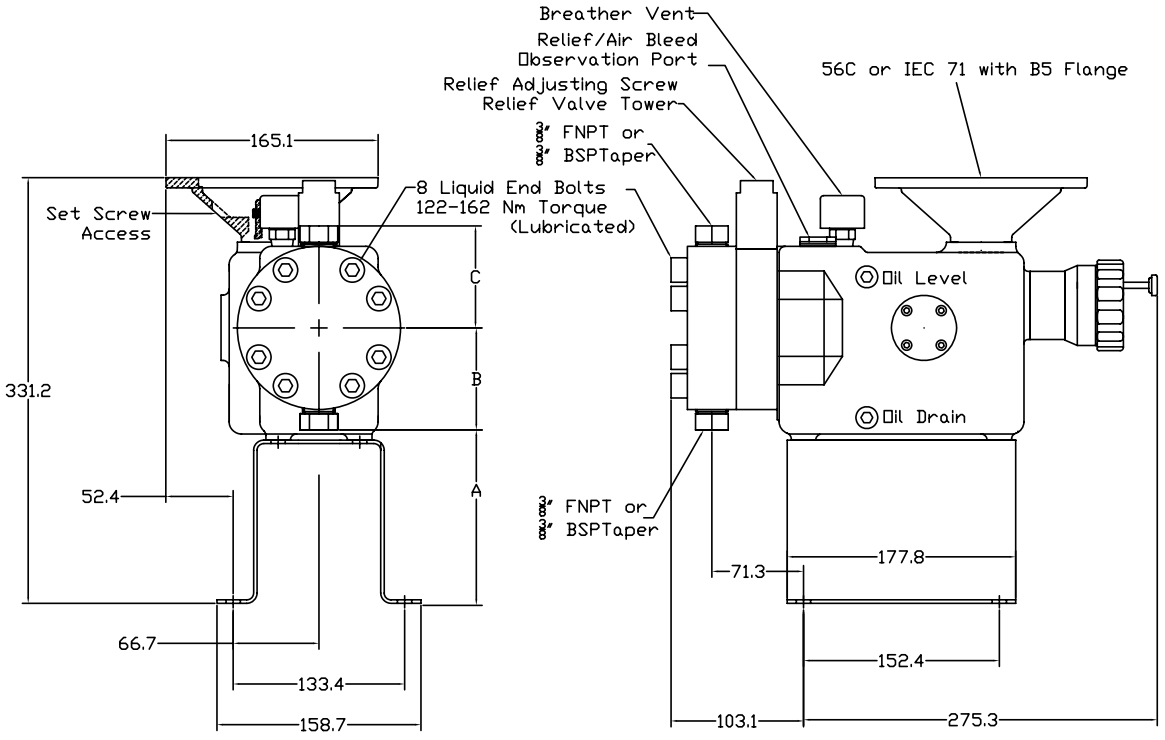
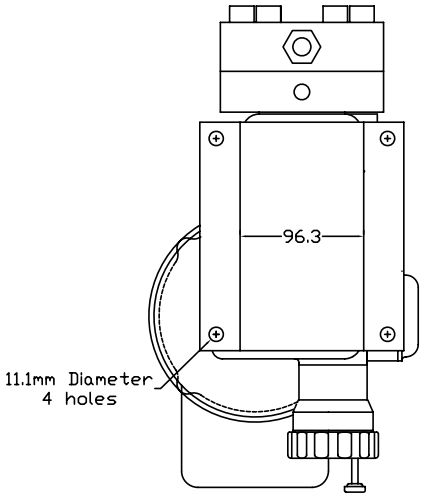
| | DRAWN LLK | SCALE 1:5 | |
| | CHECKED BF | DATE 06/01/07 | |
| SHEET SIZE A | DWG No 850101M-00-600-01 | REV 0 | PAGE 1/1 |

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




Unless otherwise noted all dimensions are in Millimeters

| ProMus | | | A | B | C |
|---|---|---|---|---|---|
| | 30B | SS | 136.5 | 79.4 | 79.4 |
| | 30C | A2 | 104.5 | 109.8 | 109.8 |
| | | HC | 136.5 | 79.4 | 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

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

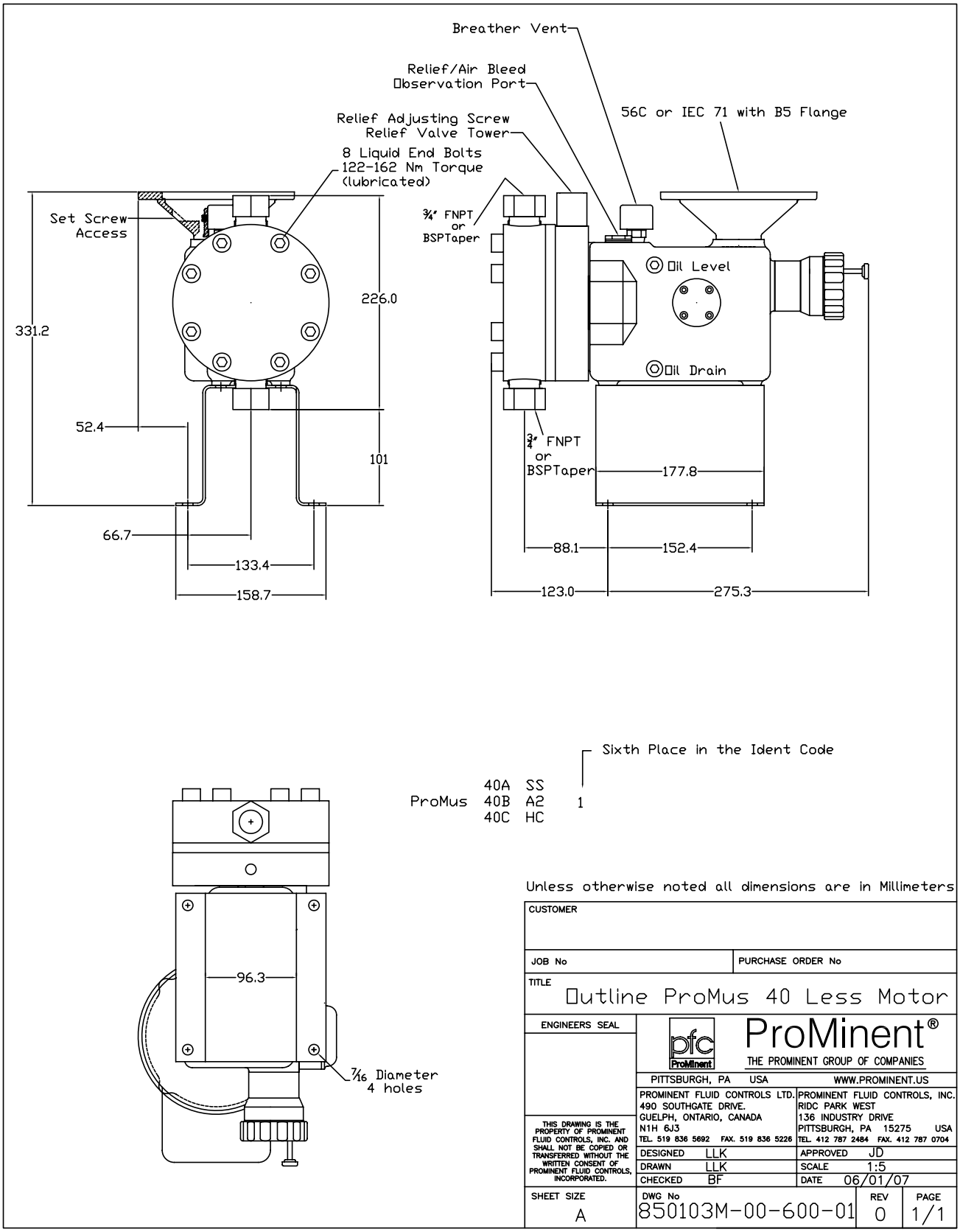
PROMINENT FLUID CONTROLS, INC.
RIDC PARK WEST
136 INDUSTRY DRIVE
PITTSBURGH, PA 15275 USA
TEL. 412 787 2484 FAX. 412 787 0704



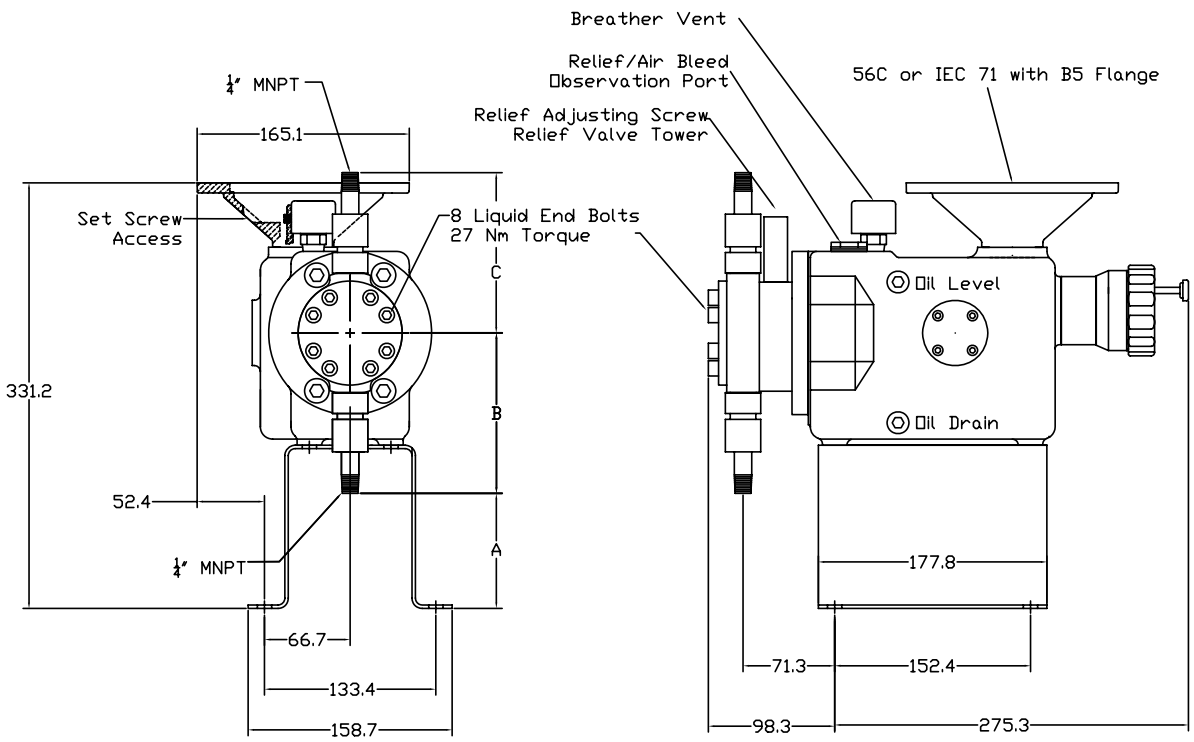
| | | | |
|---|---|---|---|
| DESIGNED | LLK | APPROVED | JD |
| DRAWN | LLK | SCALE | 1:5 |
| CHECKED | BF | DATE | 06/01/07 |

| SHEET SIZE | DWG No | REV | PAGE |
|---|---|---|---|
| A | 850102M-00-600-01 | 0 | 1/1 |

## Dimensional Drawing / ProMus Size 40 Metal Liquid End

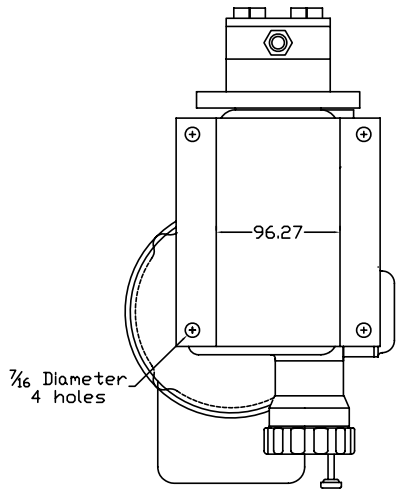


## Dimensional Drawing / ProMus Size 17 Plastic Liquid End




Size 17

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




| | | | A | B | C |
|---|---|---|---|---|---|
| ProMus | 17A 17B | PV | T | 89.6 | 124.8 | 124.8 |

Unless otherwise noted all dimensions are in Millimeters

| | |
|---|---|
| CUSTOMER | |
| JOB No | PURCHASE ORDER No |
| TITLE | Outline Plastic 17 Less Motor |
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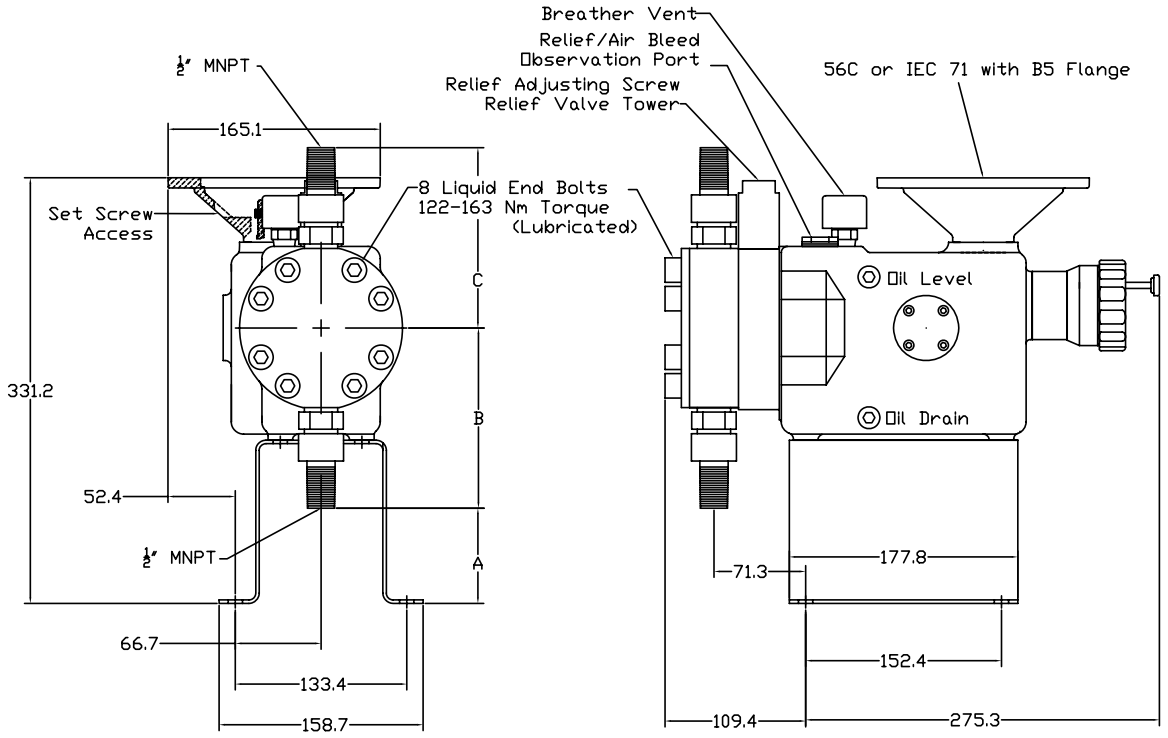
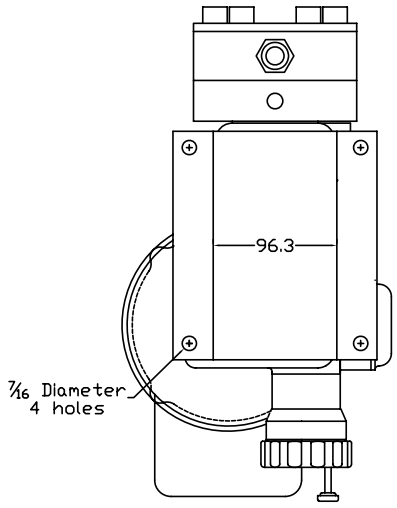
| | DRAWN LLK — SCALE 1:5 |
| | CHECKED BF — DATE 06/01/07 |
| SHEET SIZE A | DWG No 850104M-00-600-01 — REV 0 — PAGE 1/1 |

## Dimensional Drawing / ProMus Size 30 Plastic Liquid End




Size 30

Plunger Diameters $\frac{5}{8}$" $\frac{13}{16}$" & $1\frac{1}{8}$"




Unless otherwise noted all dimensions are in Millimeters

| ProMus | | | A | B | C |
|---|---|---|---|---|---|
| | 30A<br>30B<br>30C | PV | T | 74.1 | 140.2 | 140.2 |

CUSTOMER

JOB No | PURCHASE ORDER No

TITLE: Outline Plastic 30 $\frac{5}{8}$, $\frac{13}{16}$ & $1\frac{1}{8}$ Plunger Less Motor

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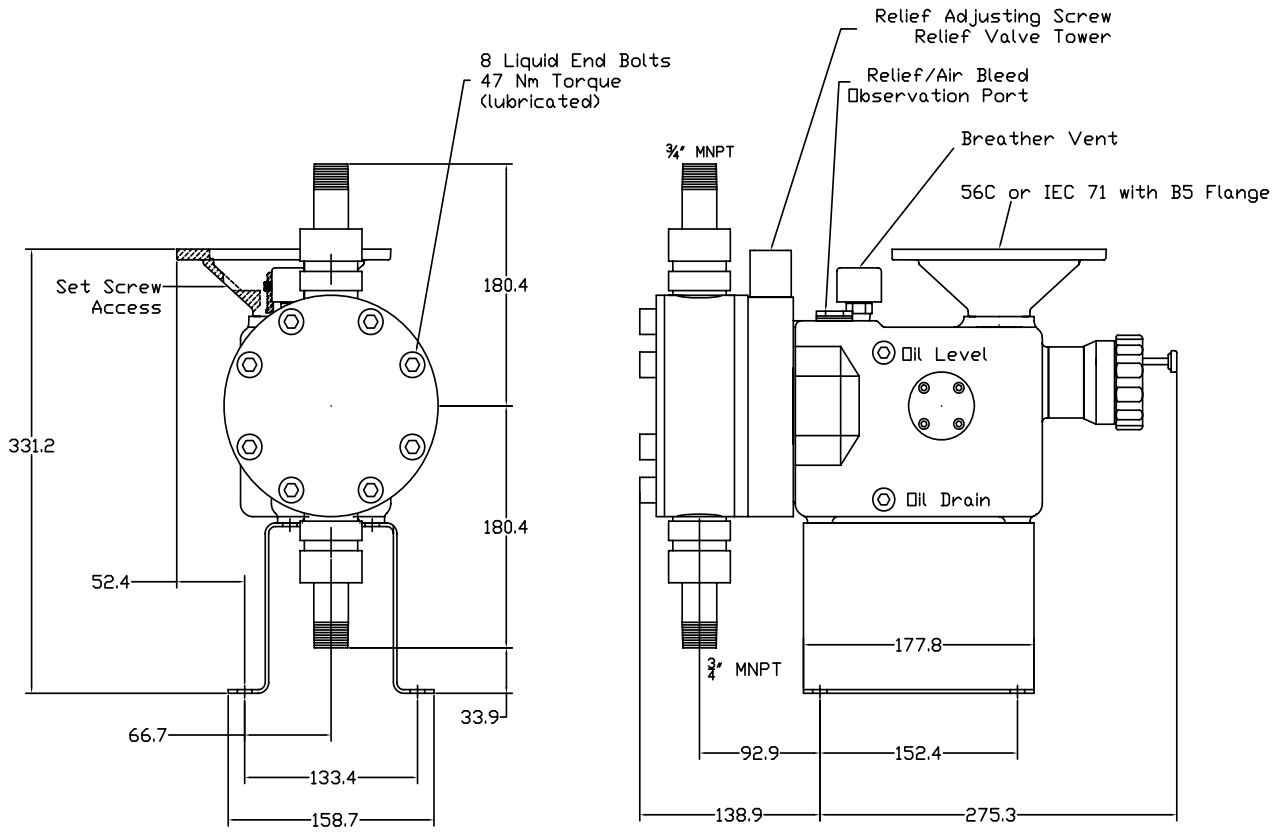
TEL. 412 787 2484 FAX. 412 787 0704

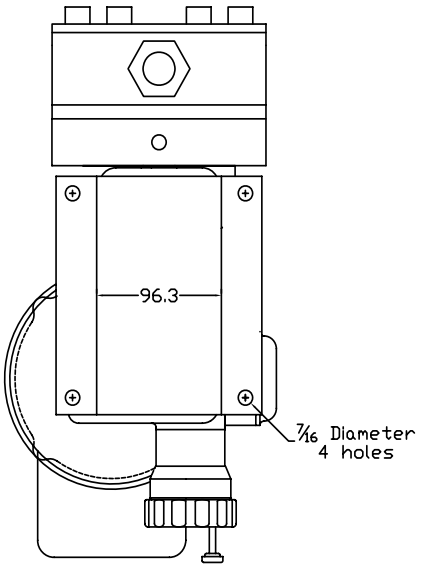


| | | | |
|---|---|---|---|
| DESIGNED | LLK | APPROVED | JD |
| DRAWN | LLK | SCALE | 1:5 |
| CHECKED | BF | DATE | 06/01/07 |

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

## Dimensional Drawing / ProMus Size 40 Plastic Liquid End




40A
ProMus 40B PVT
40C

Unless otherwise noted all dimensions are in Millimeters

| | | |
|---|---|---|
| CUSTOMER | | |
| JOB No | PURCHASE ORDER No | |
| TITLE: Outline Plastic 40 Less Motor | | |
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| | PROMINENT FLUID CONTROLS LTD.<br>490 SOUTHGATE DRIVE.<br>GUELPH, ONTARIO, CANADA<br>N1H 6J3<br>TEL. 519 836 5692 FAX. 519 836 5226 | PROMINENT FLUID CONTROLS, INC.<br>RIDC PARK WEST<br>136 INDUSTRY DRIVE<br>PITTSBURGH, PA 15275 USA<br>TEL. 412 787 2484 FAX. 412 787 0704 |
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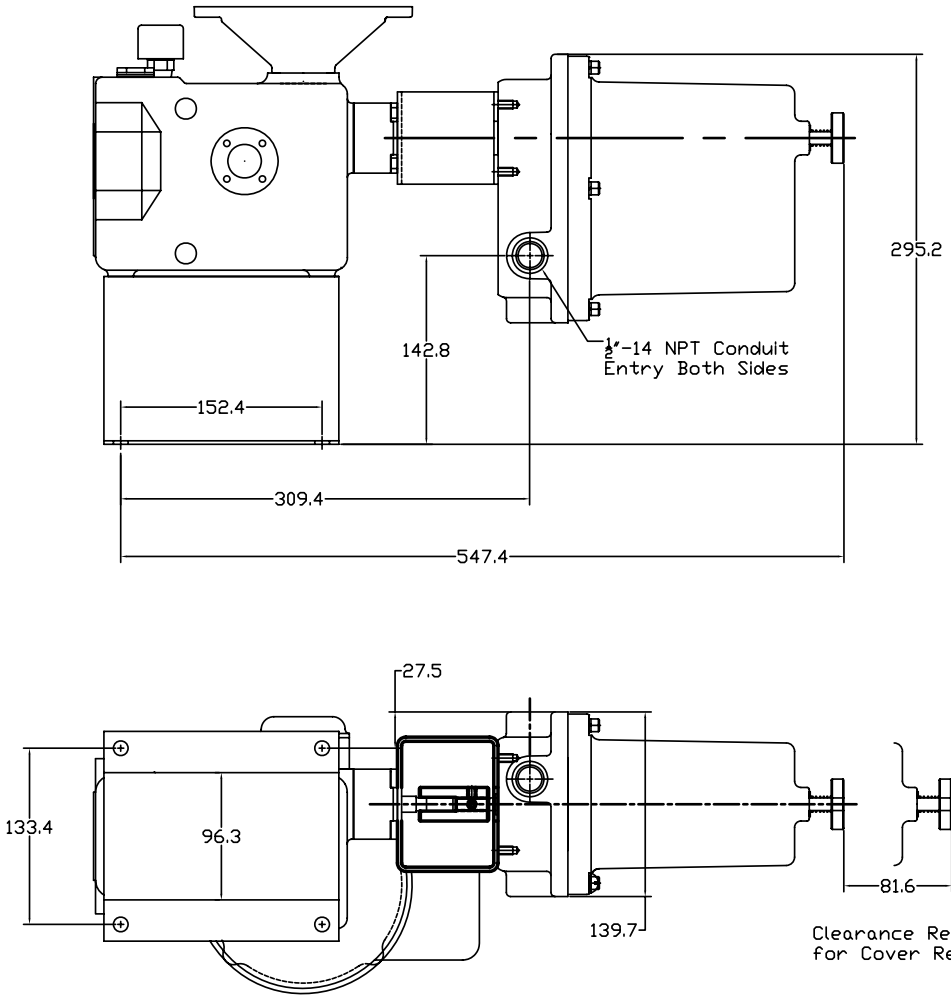
| | DRAWN LLK | SCALE 1:5 |
| | CHECKED BF | DATE 06/01/07 |
| SHEET SIZE A | DWG No 850106M-00-600-01 | REV 0 / PAGE 1/1 |

## Dimensional Drawing / ProMus Size Electric Actuator




Unless otherwise noted all dimensions are in Millimeters

| | |
|---|---|
| CUSTOMER | |
| JOB No | PURCHASE ORDER No |
| TITLE: Outline ProMus Electric Actuator | |
| ENGINEERS SEAL | ProMinent® THE PROMINENT GROUP OF COMPANIES |
| | PITTSBURGH, PA USA — WWW.PFC-AMER.COM |
| | PROMINENT FLUID CONTROLS LTD. 490 SOUTHGATE DRIVE. GUELPH, ONTARIO, CANADA N1H 6J3 TEL. 519 836 5692 FAX. 519 836 5226 |
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| | DRAWN LLK — SCALE 1:5 |
| | CHECKED BF — DATE 06/01/07 |
| SHEET SIZE A | DWG No 850107M-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 (M10 and washers) through the four holes in the base.

# 7. Installation

**WARNING**

Observe the guidelines "General operating instructions for ProMinent metering pumps and hydraulic accessories", found in the operating instructions manual.

## 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.

**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 1.5 bar.

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

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

## 7.2 Installation: Electrical

**IMPORTANT**

### Motor

- Read the "General Operating Instructions ProMinent Motor-Driven Metering Pumps and Hydraulic Accessories" which accompanies this manual.
- 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 0.3mm, 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!

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. 300 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.
- The pump output can also be adjusted by stroke frequency. If the pump is supplied with a variable speed motor. If such is the case, follow the manufacturer’s instructions for the motor drive.

## 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!

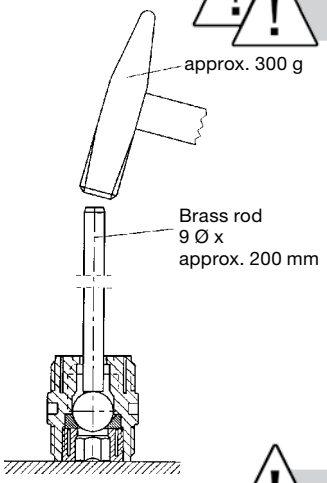



**Figure 3**

**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 | 36 Nm |
| Ident Code 30A,30B & 30C | Metal Liquid Ends Only | 122-163 Nm (lubricated) |
| Ident Code 40A,40B & 40C | Metal Liquid Ends Only | 122-163 Nm (lubricated) |
| Ident code 17A & 17B | Plastic Liquid Ends Only | 27 Nm |
| Ident Code 30A,30B & 30C | Plastic Liquid Ends Only | 41 Nm |

Ident Code 40A,40B & 40C Plastic Liquid Ends Only 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 ProMinent part #1005823
- Oil quantity: 1.42 l

### 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

## 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: -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 1.5 m. *(Determined for 20 °C water with liquid end and suction line empty and clean moistened valves.)*

## Suction Lift

The suction lift is 2.3m *(Determined for 20 °C water with liquid end and suction line filled and a suction line with adequate cross section.)*

## Priming Pressure

The maximum allowable priming pressure is 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 Prominent Part Number 1005823

Quantity 1.42 l

## Ambient Conditions

| | |
|---|---|
| Storage temperature | -10 °C to 50 °C |
| Ambient temperature | -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 | 65 °C | 90 °C |
| Short term at max. 2 bar (15 mm) | 100 °C | 120 °C |

## Environmental

Permissible air humidity 95% non- condensing

## Chemical Resistance

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

## 14.1 Capacity Data: Metallic Liquid Ends Only

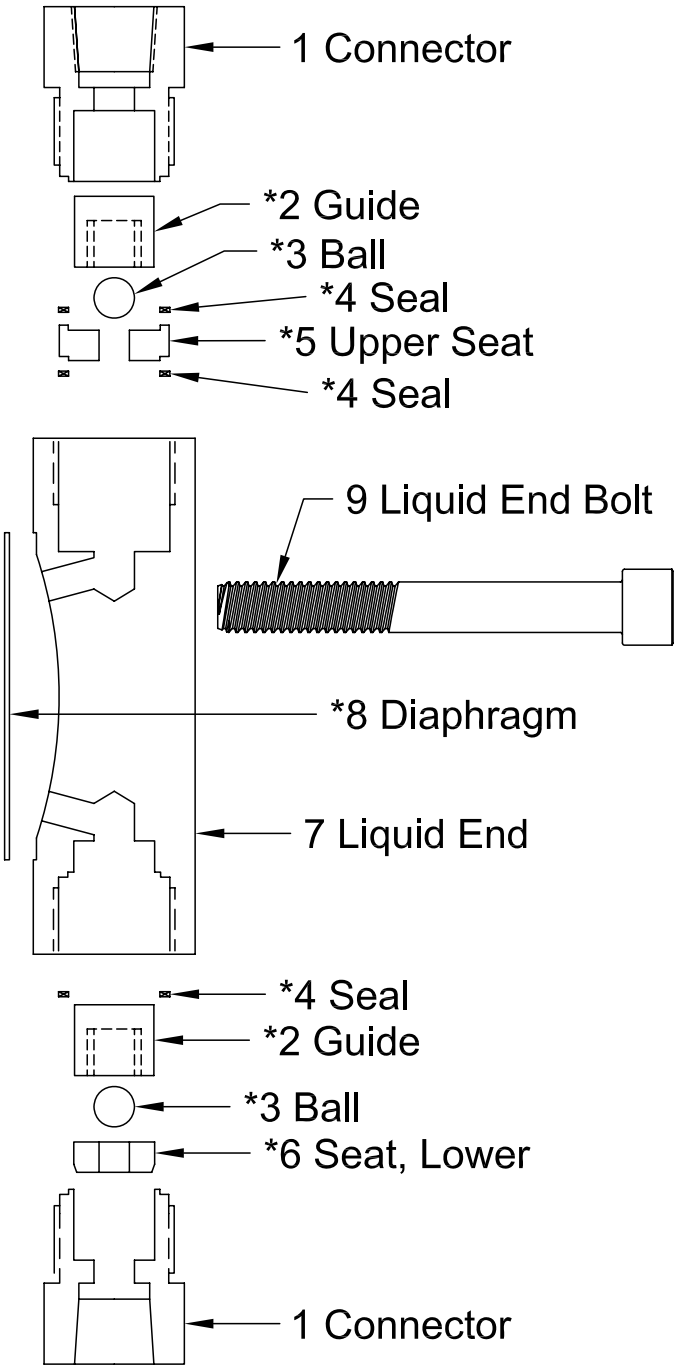
| | At 60 Hz (1750rpm) Capacity at Max. Backpressure | | | Gear Ratio | Max Stroke Rate | At 50 Hz (1458 rpm) Capacity at Max. Backpressure | | | | Typical suct./dis. Connection |
|---|---|---|---|---|---|---|---|---|---|---|
| Plunger (in.) | psig | U.S. GPH | l/h | | Stroke/ min | U.S. GPH | l/h | Stroke/ min | Max bar | FNPT |
| 3/8” Plunger | 3500 | 0.61 | 2.3 | 50 | 35 | * | * | * | * | |
| 3/8” Plunger | 3500 | 0.76 | 2.8 | 40 | 43 | 0.63 | 2.45 | 36 | 241 | 1/4 |
| 3/8” Plunger | 3500 | 1.02 | 3.8 | 30 | 58 | 0.85 | 3.29 | 48 | 241 | 1/4 |
| 3/8” Plunger | 3500 | 2.03 | 7.6 | 15 | 115 | 1.69 | 6.56 | 96 | 241 | 1/4 |
| 3/8” Plunger | 3500 | 2.44 | 9.2 | 12.5 | 138 | 2.03 | 7.88 | 115 | 241 | 1/4 |
| 7/16” Plunger | 3500 | 0.83 | 3.1 | 50 | 35 | * | * | * | * | |
| 7/16” Plunger | 3500 | 1.04 | 3.9 | 40 | 43 | 0.87 | 3.36 | 36 | 241 | 1/4 |
| 7/16” Plunger | 3500 | 1.38 | 5.2 | 30 | 58 | 1.15 | 4.46 | 48 | 241 | 1/4 |
| 7/16” Plunger | 3500 | 2.77 | 10.4 | 15 | 115 | 2.31 | 8.94 | 96 | 241 | 1/4 |
| 7/16” Plunger | 3500 | 3.32 | 12.5 | 12.5 | 138 | 2.77 | 10.72 | 115 | 241 | 1/4 |
| 5/8” Plunger | 2080 | 1.8 | 6.8 | 50 | 35 | * | * | * | * | |
| 5/8” Plunger | 2080 | 2.25 | 8.5 | 40 | 43 | 1.87 | 7.26 | 36 | 143 | 3/8* |
| 5/8” Plunger | 2080 | 3 | 11.3 | 30 | 58 | 2.5 | 9.68 | 48 | 143 | 3/8* |
| 5/8” Plunger | 2080 | 6 | 22.7 | 15 | 115 | 5 | 19.37 | 96 | 143 | 3/8* |
| 5/8” Plunger | 2080 | 7.2 | 27.2 | 12.5 | 138 | 6 | 23.24 | 115 | 143 | 3/8* |
| 13/16” Plunger | 1230 | 3.04 | 11.5 | 50 | 35 | * | * | * | * | |
| 13/16” Plunger | 1230 | 3.8 | 14.3 | 40 | 43 | 3.17 | 12.27 | 36 | 85 | 3/8 |
| 13/16” Plunger | 1230 | 5.07 | 19.1 | 30 | 58 | 4.22 | 16.37 | 48 | 85 | 3/8 |
| 13/16” Plunger | 1230 | 10.1 | 38.2 | 15 | 115 | 8.45 | 32.73 | 96 | 85 | 3/8 |
| 13/16” Plunger | 1230 | 12.2 | 46.1 | 12.5 | 138 | 10.14 | 39.28 | 115 | 85 | 3/8 |
| 1-1/8” Plunger | 640 | 6.34 | 24 | 50 | 35 | * | * | * | * | 3/8 |
| 1-1/8” Plunger | 640 | 7.93 | 30 | 40 | 43 | 6.61 | 25.61 | 36 | 44 | 3/8 |
| 1-1/8” Plunger | 640 | 10.6 | 40.1 | 30 | 58 | 8.81 | 34.14 | 48 | 44 | 3/8 |
| 1-1/8” Plunger | 640 | 21.1 | 79.8 | 15 | 115 | 17.62 | 68.29 | 96 | 44 | 3/8 |
| 1-1/8” Plunger | 640 | 25.4 | 96.1 | 12.5 | 138 | 21.15 | 81.95 | 115 | 44 | 3/8 |
| 1-3/4” Plunger | 265 | 15.4 | 58.2 | 50 | 35 | * | * | * | * | |
| 1-3/4” Plunger | 265 | 19.2 | 72.6 | 40 | 43 | 15.99 | 61.97 | 36 | 18 | 3/4 |
| 1-3/4” Plunger | 265 | 25.6 | 96.9 | 30 | 58 | 21.32 | 82.62 | 48 | 18 | 3/4 |
| 1-3/4” Plunger | 265 | 51.2 | 193.8 | 15 | 115 | 42.64 | 165.24 | 96 | 18 | 3/4 |
| 1-3/4” Plunger | 265 | 61.4 | 232.4 | 12.5 | 138 | 51.17 | 198.29 | 115 | 18 | 3/4 |
| 2” Plunger | 200 | 20.1 | 76 | 50 | 35 | * | * | * | * | |
| 2” Plunger | 200 | 25.1 | 95 | 40 | 43 | 20.89 | 80.94 | 36 | 14 | 3/4 |
| 2” Plunger | 200 | 33.4 | 126.4 | 30 | 58 | 27.85 | 107.91 | 48 | 14 | 3/4 |
| 2” Plunger | 200 | 66.8 | 252.8 | 15 | 115 | 55.7 | 215.83 | 96 | 14 | 3/4 |
| 2” Plunger | 200 | 80.2 | 303.5 | 12.5 | 138 | 66.84 | 258.99 | 115 | 14 | 3/4 |
| 2-1/4” Plunger | 160 | 25.4 | 96.1 | 50 | 35 | * | * | * | * | |
| 2-1/4” Plunger | 160 | 31.7 | 119.9 | 40 | 43 | 26.43 | 102.43 | 36 | 11 | 3/4 |
| 2-1/4” Plunger | 160 | 42.3 | 160.1 | 30 | 58 | 35.25 | 136.58 | 48 | 11 | 3/4 |
| 2-1/4” Plunger | 160 | 84.6 | 327.8 | 15 | 115 | 70.49 | 273.16 | 96 | 11 | 3/4 |
| 2-1/4” Plunger | 160 | 101.5 | 384.2 | 12.5 | 138 | 84.59 | 327.79 | 115 | 11 | 3/4 |

* When double ball check valves are specified the outlet is 1/4 & the inlet is 3/8.

## 14.2 Capacity Data: Plastic Liquid Ends Only

| | At 60 Hz (1750rpm) Capacity at Max. Backpressure | | | Gear Ratio | Max Stroke Rate | At 50 Hz (1458 rpm) Capacity at Max. Backpressure | | | | Typical suct./dis. Connection |
|---|---|---|---|---|---|---|---|---|---|---|
| Plunger (in.) | psig | U.S. GPH | l/h | | Stroke/ min | U.S. GPH | l/h | Stroke/ min | Max bar | MNPT |
| 3/8” Plunger | 232 | 0.61 | 2.3 | 50 | 35 | * | * | * | * | |
| 3/8” Plunger | 232 | 0.76 | 2.8 | 40 | 43 | 0.63 | 2.45 | 36 | 16 | 1/4 |
| 3/8” Plunger | 232 | 1.02 | 3.8 | 30 | 58 | 0.85 | 3.29 | 48 | 16 | 1/4 |
| 3/8” Plunger | 232 | 2.03 | 7.6 | 15 | 115 | 1.69 | 6.56 | 96 | 16 | 1/4 |
| 3/8” Plunger | 232 | 2.44 | 9.2 | 12.5 | 138 | 2.03 | 7.88 | 115 | 16 | 1/4 |
| 7/16” Plunger | 232 | 0.83 | 3.1 | 50 | 35 | * | * | * | * | |
| 7/16” Plunger | 232 | 1.04 | 3.9 | 40 | 43 | 0.87 | 3.36 | 36 | 16 | 1/4 |
| 7/16” Plunger | 232 | 1.38 | 5.2 | 30 | 58 | 1.15 | 4.46 | 48 | 16 | 1/4 |
| 7/16” Plunger | 232 | 2.77 | 10.4 | 15 | 115 | 2.31 | 8.94 | 96 | 16 | 1/4 |
| 7/16” Plunger | 232 | 3.32 | 12.5 | 12.5 | 138 | 2.77 | 10.72 | 115 | 16 | 1/4 |
| 5/8” Plunger | 232 | 1.8 | 6.8 | 50 | 35 | * | * | * | * | |
| 5/8” Plunger | 232 | 2.25 | 8.5 | 40 | 43 | 1.87 | 7.26 | 36 | 16 | 1/2 |
| 5/8” Plunger | 232 | 3 | 11.3 | 30 | 58 | 2.5 | 9.68 | 48 | 16 | 1/2 |
| 5/8” Plunger | 232 | 6 | 22.7 | 15 | 115 | 5 | 19.37 | 96 | 16 | 1/2 |
| 5/8” Plunger | 232 | 7.2 | 27.2 | 12.5 | 138 | 6 | 23.24 | 115 | 16 | 1/2 |
| 13/16” Plunger | 232 | 3.04 | 11.5 | 50 | 35 | * | * | * | * | |
| 13/16” Plunger | 232 | 3.8 | 14.3 | 40 | 43 | 3.17 | 12.27 | 36 | 16 | 1/2 |
| 13/16” Plunger | 232 | 5.07 | 19.1 | 30 | 58 | 4.22 | 16.37 | 48 | 16 | 1/2 |
| 13/16” Plunger | 232 | 10.1 | 38.2 | 15 | 115 | 8.45 | 32.73 | 96 | 16 | 1/2 |
| 13/16” Plunger | 232 | 12.2 | 46.1 | 12.5 | 138 | 10.14 | 39.28 | 115 | 16 | 1/2 |
| 1-1/8” Plunger | 232 | 6.34 | 24 | 50 | 35 | * | * | * | * | 1/2 |
| 1-1/8” Plunger | 232 | 7.93 | 30 | 40 | 43 | 6.61 | 25.61 | 36 | 16 | 1/2 |
| 1-1/8” Plunger | 232 | 10.6 | 40.1 | 30 | 58 | 8.81 | 34.14 | 48 | 16 | 1/2 |
| 1-1/8” Plunger | 232 | 21.1 | 79.8 | 15 | 115 | 17.62 | 68.29 | 96 | 16 | 1/2 |
| 1-1/8” Plunger | 232 | 25.4 | 96.1 | 12.5 | 138 | 21.15 | 81.95 | 115 | 16 | 1/2 |
| 1-3/4” Plunger | 232 | 15.4 | 58.2 | 50 | 35 | * | * | * | * | |
| 1-3/4” Plunger | 232 | 19.2 | 72.6 | 40 | 43 | 15.99 | 61.97 | 36 | 16 | 3/4 |
| 1-3/4” Plunger | 232 | 25.6 | 96.9 | 30 | 58 | 21.32 | 82.62 | 48 | 16 | 3/4 |
| 1-3/4” Plunger | 232 | 51.2 | 193.8 | 15 | 115 | 42.64 | 165.24 | 96 | 16 | 3/4 |
| 1-3/4” Plunger | 232 | 61.4 | 232.4 | 12.5 | 138 | 51.17 | 198.29 | 115 | 16 | 3/4 |
| 2” Plunger | 200 | 20.1 | 76 | 50 | 35 | * | * | * | * | |
| 2” Plunger | 200 | 25.1 | 95 | 40 | 43 | 20.89 | 80.94 | 36 | 14 | 3/4 |
| 2” Plunger | 200 | 33.4 | 126.4 | 30 | 58 | 27.85 | 107.91 | 48 | 14 | 3/4 |
| 2” Plunger | 200 | 66.8 | 252.8 | 15 | 115 | 55.7 | 215.83 | 96 | 14 | 3/4 |
| 2” Plunger | 200 | 80.2 | 303.5 | 12.5 | 138 | 66.84 | 258.99 | 115 | 14 | 3/4 |
| 2-1/4” Plunger | 160 | 25.4 | 96.1 | 50 | 35 | * | * | * | * | |
| 2-1/4” Plunger | 160 | 31.7 | 119.9 | 40 | 43 | 26.43 | 102.43 | 36 | 11 | 3/4 |
| 2-1/4” Plunger | 160 | 42.3 | 160.1 | 30 | 58 | 35.25 | 136.58 | 48 | 11 | 3/4 |
| 2-1/4” Plunger | 160 | 84.6 | 327.8 | 15 | 115 | 70.49 | 273.16 | 96 | 11 | 3/4 |
| 2-1/4” Plunger | 160 | 101.5 | 384.2 | 12.5 | 138 | 84.59 | 327.79 | 115 | 11 | 3/4 |

# Liquid End Parts 17 Single Ball (Metallic)
# ProMus117XXX1X.....
# 06/01/07 Rev 00




| | | ProMus117X | |
|---|---|---|---|
| | Qty | SS10 | SS11 |
| 1 | 2 | 853202 | 853202 |
| *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

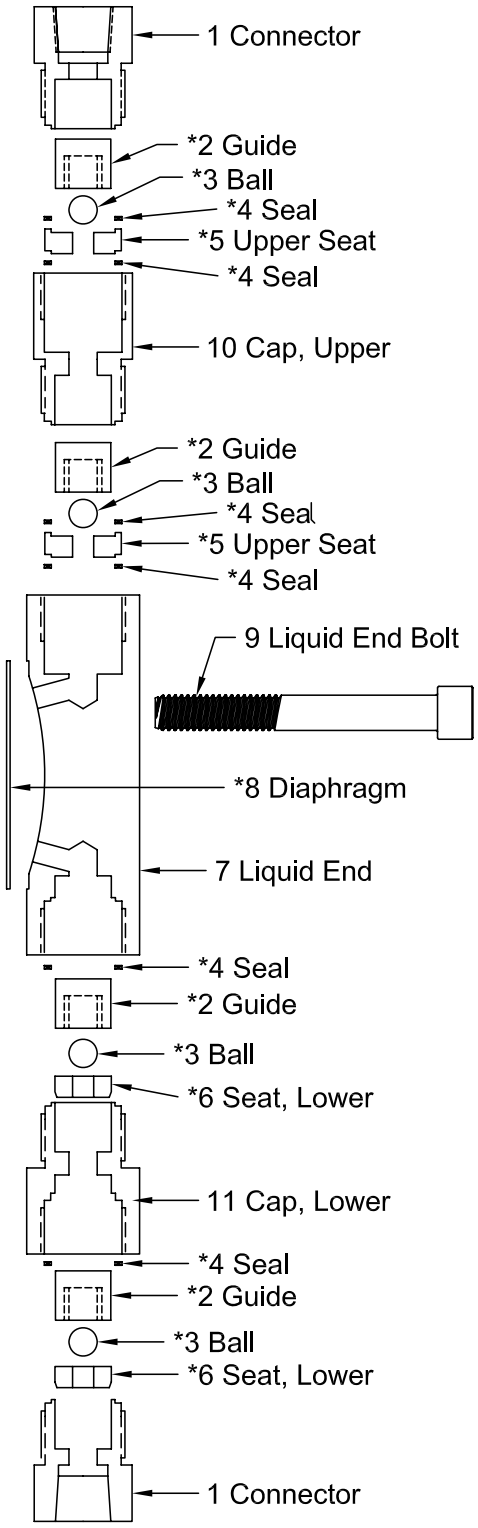
| | | ProMus117X | |
|---|---|---|---|
| | Qty | A210 | A211 |
| 1 | 2 | 853301 | 853309 |
| *2 | 2 | 853306 | 853306 |
| *3 | 2 | 853307 | 853307 |
| *4 | 3 | 853209 | 853209 |
| *5 | 1 | 853302 | 853302 |
| *6 | 1 | 853303 | 853303 |
| 7 | 1 | 853300 | 853300 |
| *8 | 1 | 853210 | 853210 |
| 9 | 8 | 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.....
# 06/01/07 Rev 00




| | | ProMus117X | |
|---|---|---|---|
| | Qty | SS20 | SS21 |
| 1 | 2 | 853202 | 853202 |
| *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

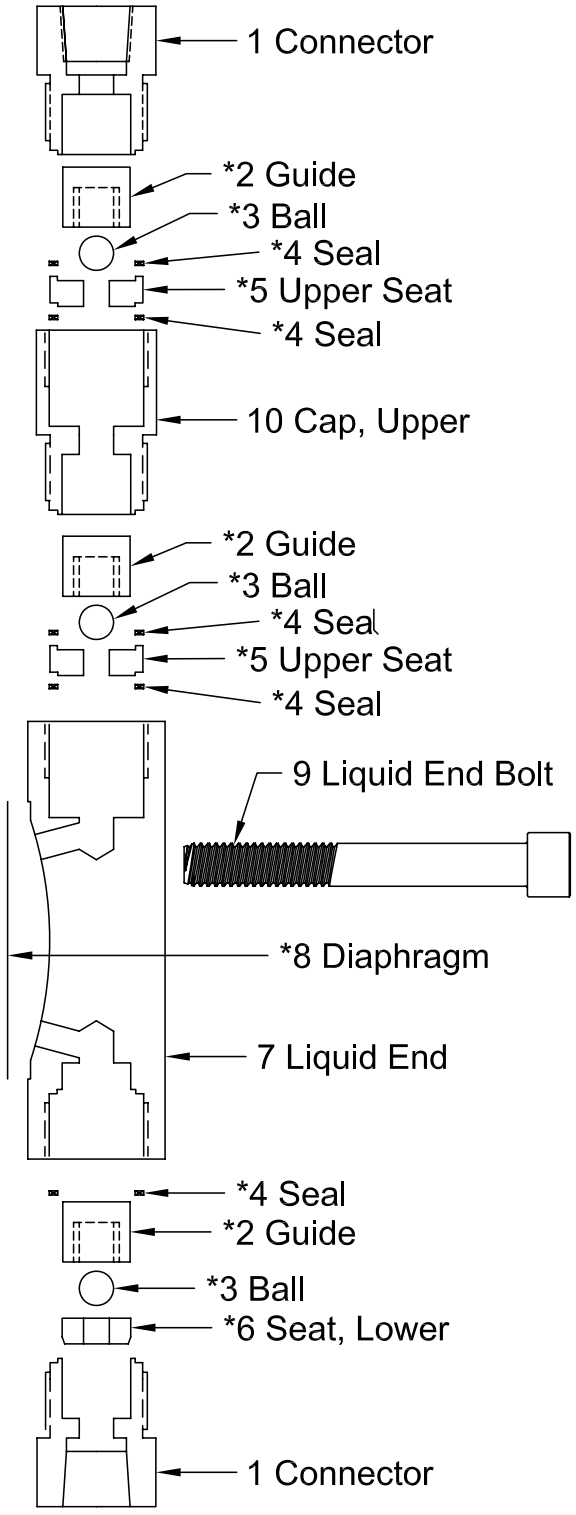
| | | ProMus117X | |
|---|---|---|---|
| | Qty | A220 | A221 |
| 1 | 2 | 853301 | 853309 |
| *2 | 4 | 853306 | 853306 |
| *3 | 4 | 853307 | 853307 |
| *4 | 6 | 853209 | 853209 |
| *5 | 2 | 853302 | 853302 |
| *6 | 2 | 853303 | 853303 |
| 7 | 1 | 853300 | 853300 |
| *8 | 1 | 853210 | 853210 |
| 9 | 8 | 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.....
## 06/01/07 R00




| | | ProMus117X | |
|---|---|---|---|
| | Qty | SS30 | SS31 |
| 1 | 2 | 853202 | 853202 |
| *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

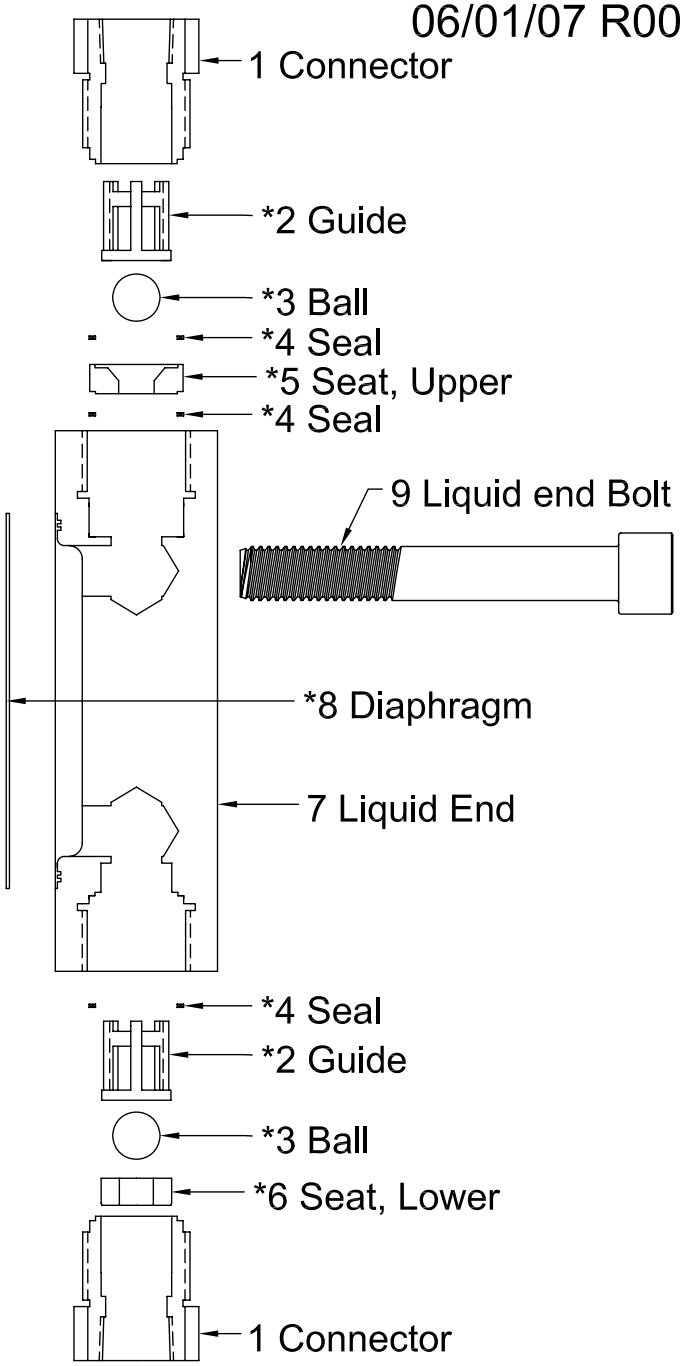
| | | ProMus117X | |
|---|---|---|---|
| | Qty | A230 | A231 |
| 1 | 2 | 853301 | 853309 |
| *2 | 3 | 853306 | 853306 |
| *3 | 3 | 853307 | 853307 |
| *4 | 5 | 853209 | 853209 |
| *5 | 2 | 853302 | 853302 |
| *6 | 1 | 853303 | 853303 |
| 7 | 1 | 853300 | 853300 |
| *8 | 1 | 853210 | 853210 |
| 9 | 8 | 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.....
# 06/01/07 R00




| | | 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

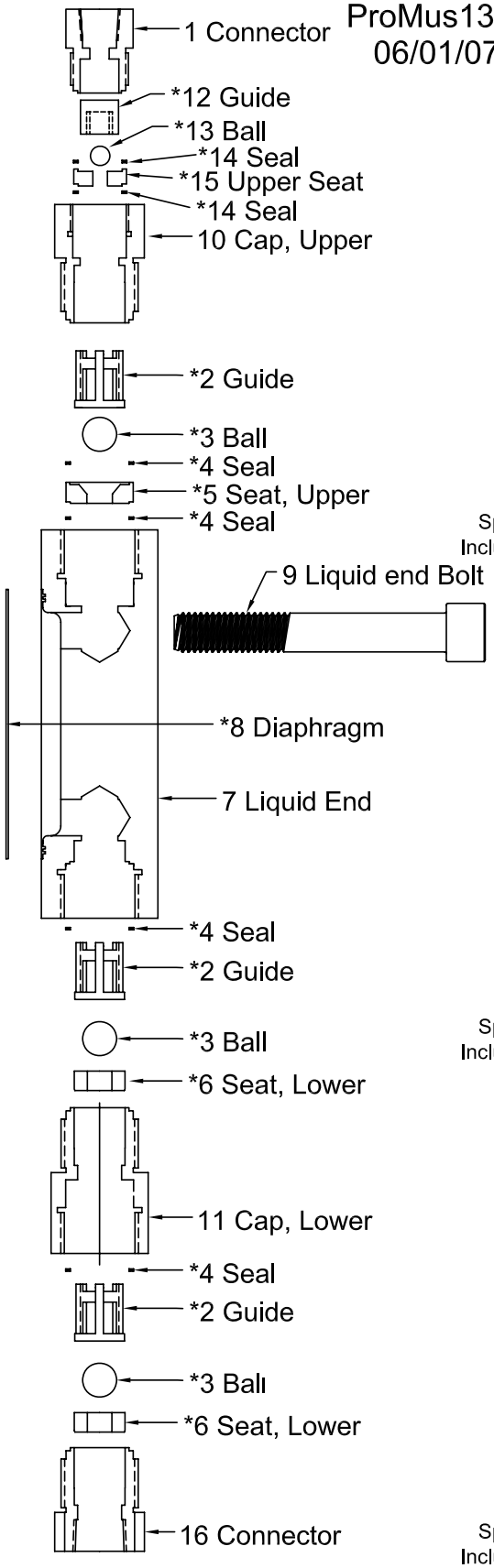
| | | ProMus130X | |
|---|---|---|---|
| | Qty | HC10 | HC11 |
| 1 | 2 | 854405 | 854409 |
| *2 | 2 | 854401 | 854401 |
| *3 | 2 | 854402 | 854402 |
| *4 | 3 | 854210 | 854210 |
| *5 | 1 | 854403 | 854403 |
| *6 | 1 | 854404 | 854404 |
| 7 | 1 | 854400 | 854400 |
| *8 | 1 | 854201 | 854201 |
| 9 | 8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

Includes Asterisked (*) Items

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

ProMus130AXX2X.....

06/01/07 R00




| | Qty. | ProMus130A SS20 | ProMus130A 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 | 854212 | 854212 |
| 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

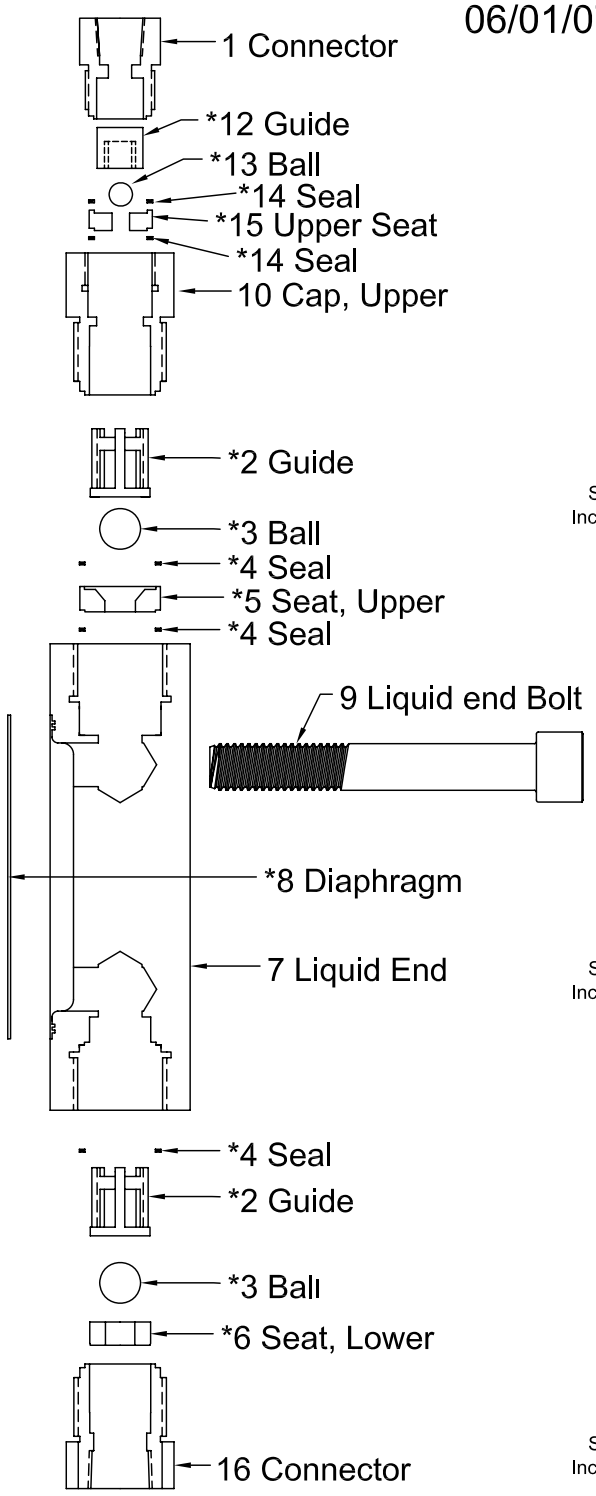
| | Qty. | ProMus130A A220 | ProMus130A A221 |
|---|---|---|---|
| 1 | 1 | 853501 | 853309 |
| *2 | 3 | 854301 | 854301 |
| *3 | 3 | 854302 | 854302 |
| *4 | 4 | 854210 | 854210 |
| *5 | 1 | 854303 | 854303 |
| *6 | 2 | 854304 | 854304 |
| 7 | 1 | 854300 | 854300 |
| *8 | 1 | 854201 | 854201 |
| 9 | 8 | 854215 | 854215 |
| 10 | 1 | 854308 | 854308 |
| 11 | 1 | 854307 | 854307 |
| *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

| | Qty. | ProMus130A HC20 | ProMus130A 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 | 854408 | 854408 |
| 11 | 1 | 854407 | 854407 |
| *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.....
## 06/01/07 R00




| | | 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 | 854212 | 854212 |
| 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 (*) | | 854505 | 854505 |

Included Asterisked(*) Items

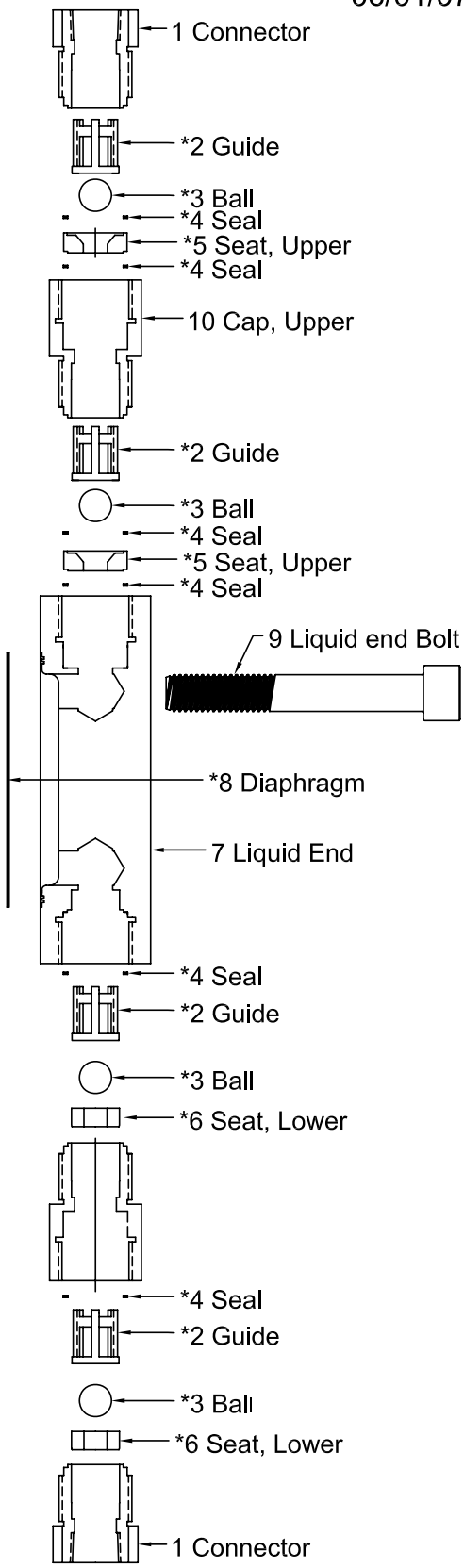
| | | ProMus130A | |
|---|---|---|---|
| | Qty. | A230 | A231 |
| 1 | 1 | 853501 | 853309 |
| *2 | 2 | 854301 | 854301 |
| *3 | 2 | 854302 | 854302 |
| *4 | 3 | 854210 | 854210 |
| *5 | 1 | 854303 | 854303 |
| *6 | 1 | 854304 | 854304 |
| 7 | 1 | 854300 | 854300 |
| *8 | 1 | 854201 | 854201 |
| 9 | 8 | 854215 | 854215 |
| 10 | 1 | 854308 | 854308 |
| 11 | 1 | 854307 | 854307 |
| *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 | 854408 | 854408 |
| 11 | 1 | 854407 | 854407 |
| *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.....
## 06/01/07 R00




| | | ProMus1(30B or C) | |
|---|---|---|---|
| | Qty | SS20 | SS21 |
| 1 | 2 | 854209 | 854214 |
| *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

| | | ProMus1(30B or C) | |
|---|---|---|---|
| | Qty | 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 | 854308 | 854308 |
| 11 | 1 | 854307 | 854307 |
| Spare Parts Kit (*) | | 854603 | 854603 |

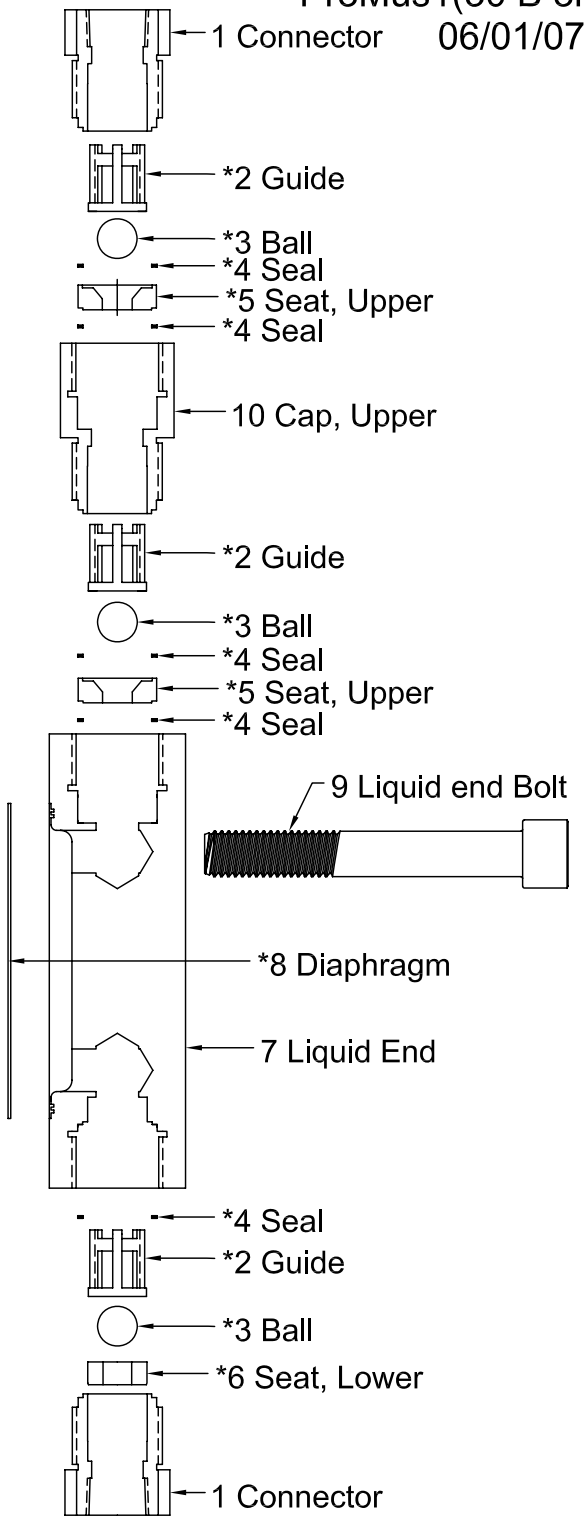
Includes Asterisked (*) Items

| | | ProMus1(30B or C) | |
|---|---|---|---|
| | Qty | 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 | 854408 | 854408 |
| 11 | 1 | 854407 | 854407 |
| 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.....




| | | 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

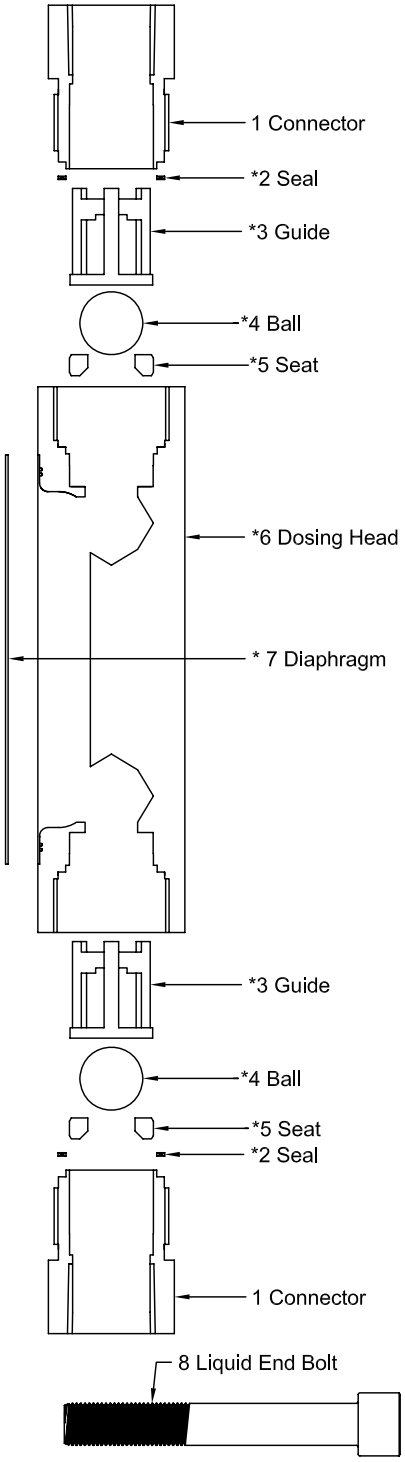
| | | ProMus1(30B or C) | |
|---|---|---|---|
| | Qty | A230 | A231 |
| 1 | 2 | 854305 | 854309 |
| *2 | 3 | 854301 | 854301 |
| *3 | 3 | 854302 | 854302 |
| *4 | 5 | 854210 | 854210 |
| *5 | 2 | 854303 | 854303 |
| *6 | 1 | 854304 | 854304 |
| 7 | 1 | 854300 | 854300 |
| *8 | 1 | 854201 | 854201 |
| 9 | 8 | 854215 | 854215 |
| 10 | 1 | 854308 | 854308 |
| 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 | 854408 |
| Spare Parts Kit (*) | | 854807 | 854807 |

Includes Asterisked (*) Items

# Liquid End Parts 40 Single Ball (Metallic)
## ProMus140XXX1X.....
## 06/01/07 R00




| | | 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 |

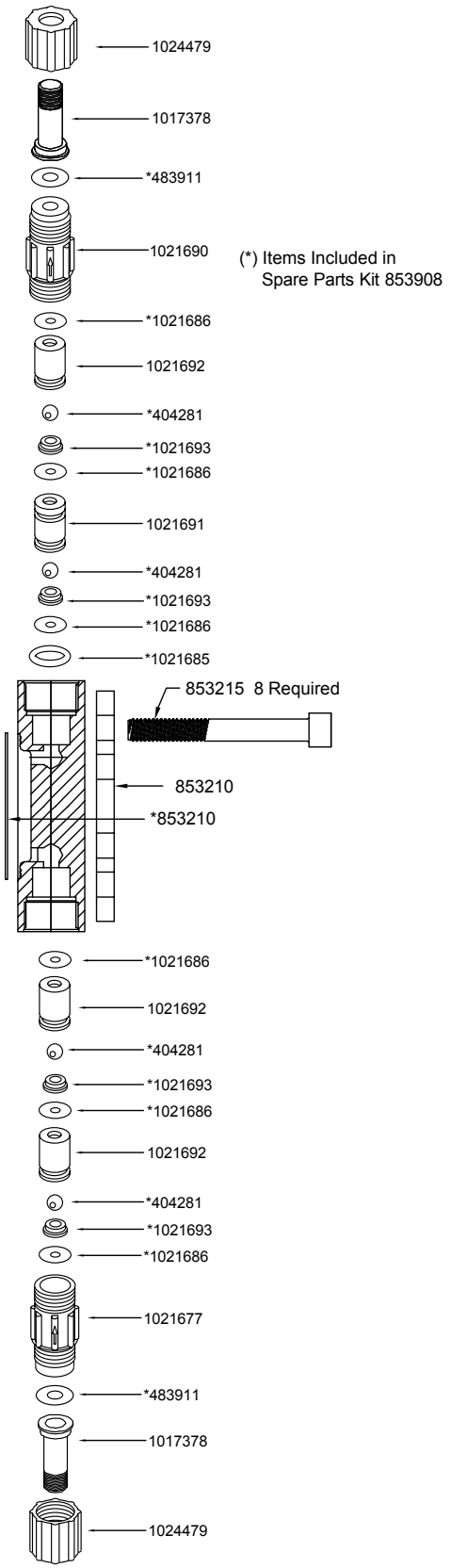
Includes Asterisked (*) Items

| | | 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 |

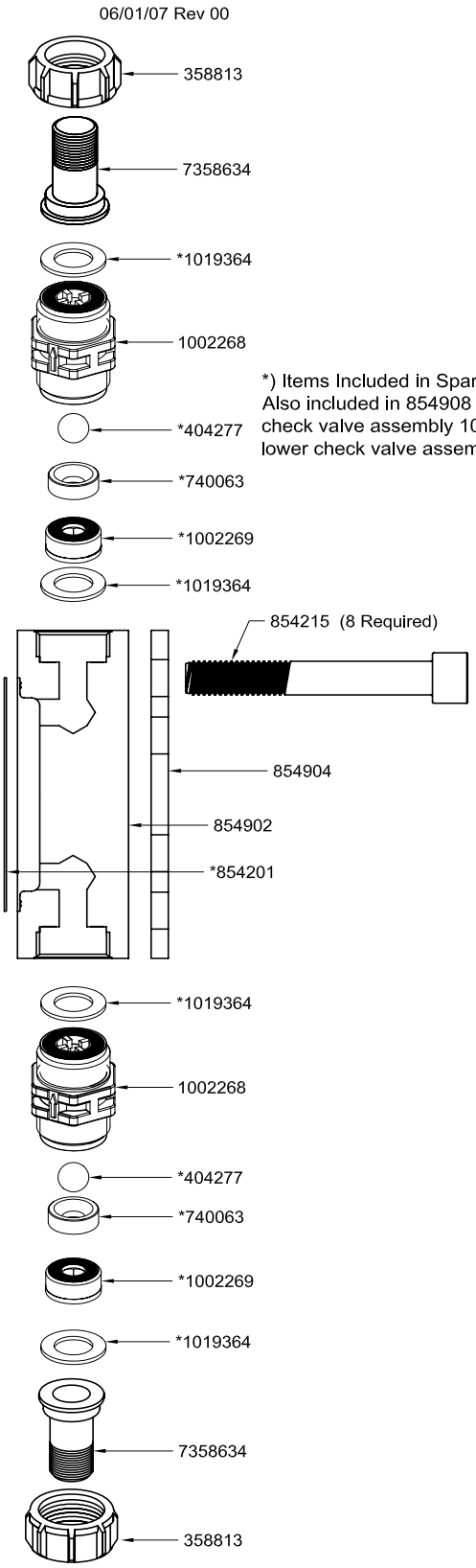
Includes Asterisked (*) Items

# Liquid End Parts 17 Double Ball (In & Out) (PVDF)

06/01/07 R00



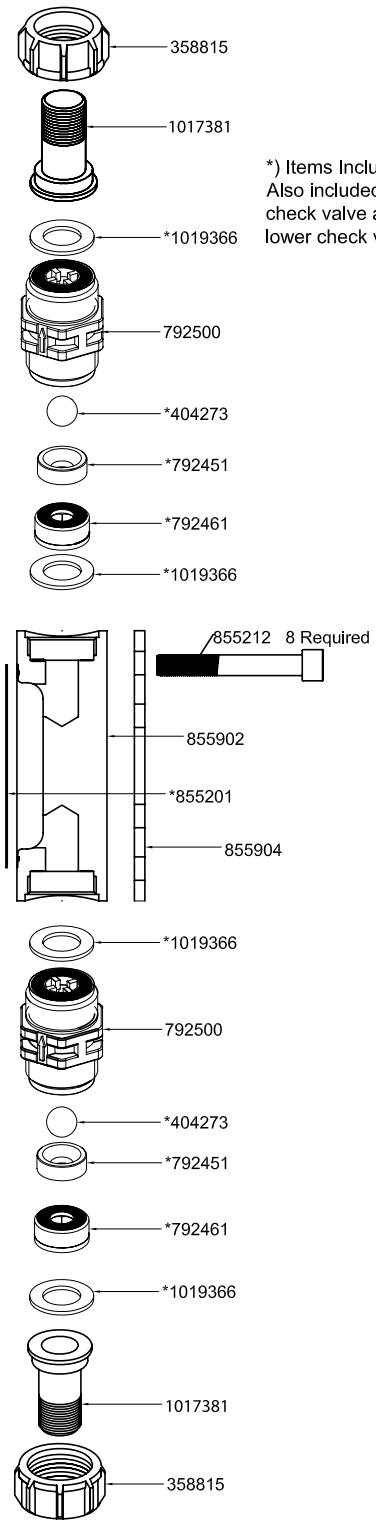
# Liquid End Parts 30 Single Ball In & Out (PVT)




*) Items Included in Spare Parts Kit 854908.
Also included in 854908 one complete upper check valve assembly 1002267 and one complete lower check valve assembly 1002267(same as upper).

# Liquid End Parts 40 Single Ball In & Out (PVT)

06/01/07 R00



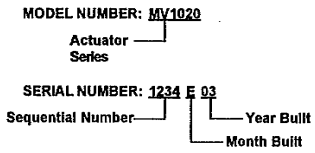

*) Items Included in Spare Parts Kit 855908.
Also included in 855908 one complete upper check valve assembly 792518 and one complete lower check valve assembly 792518 (same as upper).

| 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)***<br>***EC - low voltage regulation (73/23/EEC)***<br>***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***<br>***DIN EN 60034-5/7/18, DIN EN 60335-1, DIN EN 60335-2-41***<br>***DIN EN 60204-1, DIN EN 61000-6-2/4, DIN EN 61000-6-1/3***<br>***DIN EN 55014-1/2, DIN EN 60034-1*** |
| National standards and other technical specifications used, in particular : | |
| Date/manufacturer´s signature : |  |
| 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®