

**ENCORE[®] 700
DIAPHRAGM
METERING PUMP**

BOOK NO. IM 440.400CA UA ISSUE C

ENCORE® 700 METERING PUMP

EQUIPMENT SERIAL NO. _____

DATE OF START-UP _____

START-UP BY _____

Prompt service available from nationwide authorized service contractors.

ORDERING INFORMATION

In order for us to fill your order immediately and correctly, please order material by description and part number, as shown in this book. Also, please specify the serial number of the equipment on which the parts will be installed.

WARRANTY

Seller warrants for a period of one year after shipment that the equipment or material of its manufacture is free from defects in workmanship and materials. Corrosion or other decomposition by chemical action is specifically excluded as a defect covered hereunder, except this exclusion shall not apply to chlorination equipment. Seller does not warrant (a) damage caused by use of the items for purposes other than those for which they were designed, (b) damage caused by unauthorized attachments or modifications, (c) products subject to any abuse, misuse, negligence or accident, (d) products where parts not made, supplied, or approved by Seller are used and in the sole judgement of the Seller such use affects the products' performance, stability or reliability, and (e) products that have been altered or repaired in a manner in which, in the sole judgement of Seller, affects the products' performance, stability or reliability. **SELLER MAKES NO OTHER WARRANTY OF ANY KIND, AND THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS OF THE MATERIAL OR EQUIPMENT FOR ANY PARTICULAR PURPOSE EVEN IF THAT PURPOSE IS KNOWN TO SELLER.** If Buyer discovers a defect in material or workmanship, it must promptly notify Seller in writing; Seller reserves the right to require the return of such defective parts to Seller, transportation charges prepaid, to verify such defect before this warranty is applicable. In no event shall such notification be received by Seller later than 13 months after the date of shipment. No action for breach of warranty shall be brought more than 15 months after the date of shipment of the equipment or material.

LIMITATION OF BUYER'S REMEDIES. The **EXCLUSIVE REMEDY** for any breach of warranty is the replacement f.o.b. shipping point of the defective part or parts of the material or equipment. Any equipment or material repaired or replaced under warranty shall carry the balance of the original warranty period, or a minimum of three months. Seller shall not be liable for any liquidated, special, incidental or consequential damages, including without limitation, loss of profits, loss of savings or revenue, loss of use of the material or equipment or any associated material or equipment, the cost of substitute material or equipment, claims of third parties, damage to property, or goodwill, whether based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory; provided, however, that such limitation shall not apply to claims for personal injury.

Statements and instructions set forth herein are based upon the best information and practices known to U.S. Filter/Wallace & Tiernan, Inc., but it should not be assumed that every acceptable safety procedure is contained herein. Of necessity this company cannot guarantee that actions in accordance with such statements and instructions will result in the complete elimination of hazards and it assumes no liability for accidents that may occur.

The logo for US Filter, featuring the letters "US" in a bold, sans-serif font, followed by the word "Filter" in a stylized, italicized font with horizontal lines through the letters.

WALLACE & TIERNAN PRODUCTS
1901 West Garden Road, Vineland, NJ 08360

INTRODUCTION

This book provides installation, operating, and maintenance instructions for the U.S. Filter/Wallace & Tiernan (USF/W&T) Encore® 700 Diaphragm Metering Pumps, here-in-after referred to as the “pump” or “metering pump”. The pump provides accurate metering and transfer of a wide variety of chemicals. It is available in six head sizes, three gear ratios, direct and pulley drive configurations, and a single or double simplex configuration. A non-loss-of motion stroke adjustment is used to vary the stroke for a smoother pumping action. Non-loss-motion is achieved through the use of a variable eccentric mechanism. Stroke adjustment is accomplished either manually or with an optional electric stroke length positioner.

An optional Silicon Control Rectifier (SCR) controls drive motor speed variations through a signal received from an external source.

When an electric stroke length positioner and/or variable speed drive is used with the pump, a separate instruction manual for each will be furnished.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK. WHEN DEALING WITH HAZARDOUS MATERIAL IT IS THE RESPONSIBILITY OF THE EQUIPMENT USER TO OBTAIN AND FOLLOW ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER. AVOID CONTACTING ELECTRICALLY HOT METER POSTS AND CIRCUIT BOARD COMPONENTS WHILE MAKING METER ADJUSTMENTS.

NOTE: When submitting correspondence always specify model and serial number of apparatus.

ENCORE® 700 METERING PUMP

Table of Contents

Very Important Safety Precautions	SP-1,-2,-3
Preventive Maintenance Schedule and Record of Performance	1.010-13
Notes on Protective Equipment and Clothing	1.010-6
Protect Your Equipment Investment	1.010-5
Regional Offices	1.010-1
Technical Data	Section 1
Installation	Section 2
Operation	Section 3
Service	Section 4
Illustrations	Section 5
Preventive Maintenance Kits and Spare Parts List	Section 6

VERY IMPORTANT SAFETY PRECAUTIONS

This page, titled “Very Important Safety Precautions” provides, in brief, information of urgent importance relative to safety, installation, operation, and maintenance of this equipment.

WARNING

TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, OBSERVE THE FOLLOWING:

THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK.

WHEN HAZARDOUS CHEMICALS ARE BEING PUMPED, AND/OR ELEVATED PRESSURE/TEMPERATURES ARE ENCOUNTERED, RIGID PIPE IS RECOMMENDED. WHEN WORKING WITH RIGID PIPING COMPONENTS, LATERAL AND TORSIONAL FORCES IN THE METERING PUMP SUCTION AND DISCHARGE FITTINGS MUST BE AVOIDED. THESE FORCES CAN LEAD TO COMPONENT FAILURE, WHICH COULD RELEASE HAZARDOUS CHEMICALS THAT COULD PRESENT A PERSONAL HAZARD AS WELL AS AN ENVIRONMENTAL HAZARD. IN RARE CASES, THESE FORCES CANNOT BE ELIMINATED THROUGH THE APPLICATION OF PROPER PIPING PRACTICES AND/OR PIPING SUPPORT SYSTEMS. IN THESE CASES USF/W&T SHOULD BE CONSULTED TO AID IN THE SELECTION OF AN APPROPRIATE FLEXIBLE CONNECTOR.

DUE TO THE SINUSOIDAL FLUID DELIVERY CHARACTERISTICS OF A RECIPROCATING METERING PUMP, ADDITIONAL PRESSURE IS CREATED IN THE SUCTION AND DISCHARGE LINE TO OVERCOME THE INERTIA OF THE FLUID AT REST IN THE LINES. INERTIAL PRESSURE ENCOUNTERED IN THE LINES IS A FUNCTION OF SEVERAL FACTORS (LINE SIZE AND LENGTH, VISCOSITY OF THE FLUID, STROKING SPEED, FLUID DELIVERY RATE, ETC.). THE SUCTION AND DISCHARGE LINES MUST BE SIZED TO THE PRESSURE SURGES DEVELOPED IN THE LINES. INERTIAL PRESSURE SURGE CAN CREATE STRESSES IN THE PIPING THAT COULD LEAD TO COMPONENT FAILURE. IF THE PULSING EFFECTS OF THIS PHENOMENON CANNOT BE CONTROLLED BY PROPER LINE SIZING, THEN ENGINEERING CONTROLS SUCH AS VENTED RISERS, PULSATION DAMPENERS, OR HEADBOXES CAN BE EMPLOYED TO MINIMIZE THE STRESSES PRODUCED IN THE PIPING SYSTEM CAUSED BY THE PRESSURE SURGES. IT IS IMPORTANT TO NOTE THAT THESE ENGINEERING CONTROLS REQUIRE PERIODIC MAINTENANCE. ADDITIONALLY, THE OPERATORS AND SERVICE PERSONNEL OF THIS EQUIPMENT MUST HAVE A WORKING UNDERSTANDING OF THE ENGINEERED CONTROL DEVICES FUNCTION, AND THE CONSEQUENCES OF MISAPPLICATION AND/OR INADEQUATE MAINTENANCE.

IT IS THE RESPONSIBILITY OF THE OWNER TO ENSURE THAT THE INSTALLATION, OPERATION, AND MAINTENANCE OF THIS EQUIPMENT AND ITS ASSOCIATED COMPONENTS ARE IN COMPLIANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.

VERY IMPORTANT SAFETY PRECAUTIONS (CONT'D)

AVOID CONTACTING ELECTRICALLY HOT METER POSTS AND CIRCUIT BOARD COMPONENTS WHILE MAKING METER ADJUSTMENTS.

WHEN DEALING WITH HAZARDOUS MATERIALS, IT IS THE RESPONSIBILITY OF THE EQUIPMENT USER TO OBTAIN AND FOLLOW ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER.

CONSULT YOUR USE/W&T REPRESENTATIVE IF THE PUMP IS TO BE USED UNDER CONDITIONS OTHER THAN ORIGINALLY SPECIFIED AND IF THERE IS ANY QUESTION REGARDING THE SIZE OF THE DISCHARGE LINE.

USE RIGID PIPE WHEN HAZARDOUS CHEMICALS ARE PUMPED AND/OR ELEVATED PRESSURE/TEMPERATURES ARE ENCOUNTERED.

USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY. CONSULT YOUR CHEMICAL SUPPLIER FOR INSTRUCTIONS IN THE PREPARATION OF SOLUTIONS AND THE HANDLING OF CHEMICALS. OBSERVE ALL RECOMMENDED SAFETY PRECAUTIONS.

DO NOT SPILL SOLUTION. IF ANY SOLUTION IS SPILLED, DILUTE OR WASH AWAY WITH WATER IMMEDIATELY OR FOLLOW SUPPLIERS INSTRUCTIONS FOR HAZARDOUS MATERIALS.

AVOID BEING SPRAYED WITH LIQUID UNDER PRESSURE. PRIOR TO DISASSEMBLY OF PIPE CONNECTIONS REFER TO SERVICE SECTION FOR DETAILED INSTRUCTIONS ON RELIEVING PRESSURE AND DRAINING. ALLOW SYSTEM TO DRAIN FULLY BEFORE ATTEMPTING TO DISASSEMBLE PIPING AND REMOVING VALVES AND/OR HEAD.

SINCE THE STORAGE AND HANDLING OF SODIUM CHLORITE PRESENTS VERY SPECIFIC HAZARDS, THE USER MUST SEEK THE ADVICE OF HIS SUPPLIER WITH REFERENCE TO STORAGE FACILITIES, HANDLING PRECAUTIONS AND HEALTH HAZARDS.

SODIUM CHLORITE, WHEN FINELY DIVIDED IN THE PRESENCE OF ORGANIC COMPOUNDS, IS A POSSIBLE FIRE HAZARD. FOR THIS REASON, EXTREME CARE MUST BE EXERCISED TO PREVENT SOLUTIONS FROM DRYING OUT IN THE THREADED PORTIONS OF THE PUMP BODY AND RELATED PARTS. OBSERVE CAREFULLY THE MANUFACTURER/SUPPLIERS RECOMMENDED SAFETY PROCEDURES AND THE HANDLING AND STORAGE PROCEDURES IN THIS BOOK.

WHEN SERVICING HEADS AND/OR VALVES, FOLLOW PROCEDURES IN THE SERVICE SECTION FOR DISASSEMBLY.

USE EXTREME CARE TO AVOID CONTACT BECAUSE LIQUID IS PRESENT BETWEEN DISCHARGE DRAIN VALVE AND UNION ELBOW. FLUSH SPILLED LIQUID IMMEDIATELY.

VERY IMPORTANT SAFETY PRECAUTIONS (CONT'D)

USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY. WHEN USING HAZARDOUS MATERIAL, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER. USE APPROPRIATE PROTECTIVE CLOTHING AND EYE PROTECTION WHEN HANDLING HAZARDOUS MATERIAL.

USE EXTREME CARE TO AVOID CONTACT WITH LIQUID PRESENT IN HEAD. ALLOW SUCTION VALVE TO FALL INTO SUITABLE CONTAINER AND CATCH LIQUID.

TURN POWER OFF BEFORE SERVICING.

DO NOT RUN THE PUMP WITH THE BELT GUARD REMOVED.

USE ONLY USF/W&T LISTED PARTS EXCEPT FOR COMMERCIALLY AVAILABLE PARTS WHICH ARE IDENTIFIED BY COMPLETE DESCRIPTION ON PARTS LIST. THE USE OF UNLISTED PARTS CAN RESULT IN EQUIPMENT MALFUNCTIONS HAVING HAZARDOUS CONSEQUENCES.

THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THE INSTRUCTION BOOK.

DO NOT DISCARD THIS INSTRUCTION BOOK UPON COMPLETION OF INSTALLATION. INFORMATION PROVIDED IS ESSENTIAL FOR PROPER & SAFE OPERATION AND MAINTENANCE.

ADDITIONAL OR REPLACEMENT COPIES OF THIS INSTRUCTION BOOK ARE AVAILABLE FROM:

USFILTER'S WALLACE & TIERNAN PRODUCTS
1901 W. GARDEN ROAD
VINELAND, NJ 08360
PHONE: (856) 507-9000
FAX: (856) 507-4125

NOTE

Minor part number changes may be incorporated into USF/W&T products from time to time that are not immediately reflected in the instruction book. If such a change has apparently been made in our equipment and does not appear to be reflected in your instruction book, contact your local USF/W&T Sales Office for information.

Please include the equipment serial number in all correspondence. It is essential for effective communication and proper equipment identification.

ENCORE® 700 METERING PUMP

PREVENTIVE MAINTENANCE SCHEDULE AND RECORD OF PERFORMANCE

This equipment should receive preventive maintenance on a one (1) year cycle.* It is recommended that the following table be used to plan, schedule, and record this important work.

Date of Installation	
----------------------	--

Serial No.	Pin No.

Preventive Maintenance Log	
Schedule Date	Date Performed

***NOTE:** This is the recommended cycle. Your local operating conditions may call for more frequent preventive maintenance.



PROTECT YOUR EQUIPMENT INVESTMENT

MINIMIZE DOWNTIME

**ORDER A PREVENTIVE MAINTENANCE KIT NOW ...
KEEP ONE ON HAND**





NOTES ON PROTECTIVE EQUIPMENT AND CLOTHING

The following Warning appears in several locations in this book. It is general in nature due to the variety of hazardous liquids this equipment is capable of handling.

WARNING: WHEN DEALING WITH HAZARDOUS MATERIAL, IT IS THE RESPONSIBILITY OF THE EQUIPMENT USER TO OBTAIN AND FOLLOW ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER.

It is good general practice to make use of protective equipment when handling any hazardous material.

IT IS RECOMMENDED THAT SUCH PROTECTIVE EQUIPMENT BE USED BY ALL PERSONS SERVICING THIS PUMP, ASSOCIATED PIPING, TUBING, VALVES, AND ACCESSORIES, WHEN THE EQUIPMENT IS HANDLING ANY HAZARDOUS MATERIAL.

1. Goggles, flexible fitting, hooded ventilation (per ANSI Z87.1)	
2. Face Shield (per ANSI Z87.1)	
3. Chemical Apron	
4. Chemical Gloves	

NOTE: (1) ANSI Z87.1 “practice for occupational.....eye and face protection” recommends goggles (#1 above) as the “preferred protection” when handling chemicals that present a hazard from splash, acid burns or fumes; for severe exposure, a face shield (#2 above) over the goggles is recommended.

(2) An eye flushing fountain and a deluge-type shower may be recommended or required by insurance carriers or governmental safety agencies, which should be consulted for specific requirements.

ENCORE® 700 METERING PUMP



PROTECT YOUR EQUIPMENT INVESTMENT

MINIMIZE DOWNTIME

**ORDER A PREVENTIVE MAINTENANCE KIT NOW ...
KEEP ONE ON HAND**

Quality Equipment	+	Preventive Maintenance	=	Dependable Operation Minimum Downtime
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There's no question about it.

Equipment that is properly maintained is dependable equipment.
It will give optimum performance with minimum unscheduled downtime.

USFilter's Wallace & Tiernan Products manufactures quality equipment designed for performance and reliability. Each product is carefully tested and inspected before shipment to ensure that it meets our high standards.

Our equipment is engineered for easy maintenance. To ensure maximum service life and minimize unscheduled repairs, we recommend a program of regular preventive maintenance, as described in the Service section of this book. To support this program, we developed standard parts kits. These kits can also be used for minor emergency repairs to minimize downtime.

We recommend that these kits be available in your stock at all times. When the complete kit or any of its parts are used, the kit should be replaced immediately.

Preventive maintenance kits may be ordered directly from the company that supplied your equipment, or they may be ordered directly from USFilter's Wallace & Tiernan Products. For ordering numbers, refer to the parts list at the rear of this book or contact USF/W&T Technical Services and have serial number/pin number available.

REGIONAL OFFICES**INSTALLATION, OPERATION, MAINTENANCE, AND SERVICE INFORMATION**

Direct any questions concerning this equipment that are not answered in the instruction book to the Reseller from whom the equipment was purchased. If the equipment was purchased directly from USFilter's Wallace & Tiernan Products (USF/W&T), contact the office indicated below.

UNITED STATES

1901 West Garden Road
Vineland, NJ 08360
TEL: (856) 507-9000
FAX: (856) 507-4125

CANADA

If the equipment was purchased directly from USF/W&T Canada, contact the nearest office indicated below.

ONTARIO

250 Royal Crest Court
Markham, Ontario
L3R3S1
(905) 944-2800

QUEBEC

243 Blvd. Brien
Bureau 210
Repentigny, Quebec
(514) 582-4266

MEXICO

If the equipment was purchased directly from USF/W&T de Mexico, contact the office indicated below.

Via Jose López Portillo No. 321
Col. Sta. Ma. Cuauhtepc, Tultitlan
Edo. México 54900
TEL: +52 55 2159 2976 / +52 55 2159 2989
FAX: +52 55 2159 2985



ENCORE[®] 700 METERING PUMP





ENCORE[®] 700 METERING PUMP



SECTION 1 - TECHNICAL DATA

List of Contents

	PARA./DWG. NO.
Technical Data	1.1
Material Identification/Composition	1.2
Pump Capacity	1.3
Pump Compatibility	1.4
Illustrations	
Chemical Compatibility of Metering Pumps -	
Performance	440.050.190.010A-F

1.1 Technical Data

The overall technical characteristics of the Encore 700 Series Metering Pumps are listed in Table 1.1.

1.2 Material Identification/Composition

The chemical composition of materials used in the manufacture of the metering pump are listed in Table 1.2.

1.3 Pump Capacity

The pump capacity for the direct and pulley drive configurations are listed in Table 1.3.

1.4 Pump Compatibility

The compatibility of the metering pump with various liquid materials are listed on Dwg. 440.050.190.010A-F, located at the end of this section. The table identifies the various materials that can enter and come into contact with component materials in the wetted end of the pump and their effects on pump performance.

ENCORE® 700 METERING PUMP

Table 1.1 - Encore 700 Series Metering Pump - Technical Data

Pump Type	Non-Loss-Motion, Mechanical Diaphragm Metering pump. Simplex and double simplex capabilities.
Diaphragm Type	Teflon-faced single piece mechanical diaphragm. Six sizes: 1-3/8", 2", 3", 4", 5", and 6-1/2".
Service	Metering of mild to very corrosive chemicals; polyelectrolytes and slurries
Drive Unit	Directly coupled or Pulley coupled motor. Three stroking speeds 36, 72, 144 spm. Four step pulley coupled motor provides 4:1 turn down for each speed-36, 72, 144 spm. Refer to Table 1-3 for additional information.
Variable Speed	AC and DC speed control available
Capacity Range	Up to 317 gph with single head. Up to 634 gph with double simplex. Refer to Table 1-3 for additional information.
Pressure Range	Up to 175 psi. Refer to Table 1-3 for additional information.
Stroke Length	10 turn stroke control. Adjustable over 10:1 range.
Accuracy	± 2% full scale over 10:1 range under constant suction and discharge conditions
Suction Lift	Up to 10 feet water lift
Motor Voltage	115/230 Vac, 50/60 Hz
Ambient Temperature Limits	35 to 125°F (2 to 52°C)
Process Fluid Temperature Limits	125°F (52°C) max; 180°F (83°C) for Kynar liquid ends
Viscosity Limits for Polyelectrolytes	5000 centipoise @ 144 strokes per minute (SPM)
Viscosity Limits for Slurries	Hydrated Lime: Up to 3.8 lbs/gallon of water Activated Carbon: Up to 1.1 lbs/gallon of water Diatomaceous Earth: Up to 1.7 lbs/gallon of water (36 SPM minimum)
Lubrication	Food-grade synthetic oil, SAE90, USF/W&T part no. AAB5499
Weight	110 lbs (average)

ENCORE® 700 METERING PUMP

Table 1.2 - Encore 700 Series Metering Pump – Material Identification/Composition

COMMON TERM	COMPOSITION
Ceramic	99% aluminum oxide.
Hypalon*	A chlorosulphonated polyethylene.
Kynar** (PVDF)	Polyvinylidene fluoride.
PVC	Polyvinyl chloride.
Stainless 316	AISI 316 - Cr 16-18% Ni 10-14%, C 0.08%, Mn 2% Si 1%, P 0.045%, S 0.03% Mo 2-3%
TFE	Fluorocarbon resin of tetrafluoroethylene polymer.
Viton*	Copolymer of vinylidene fluoride and perfluoropropylene or hexafluoropropylene.
*Trade names of E.I. DuPont de Nemours & Co., Inc. **Trade name of Atochem North American, Inc.	

Table 1.3 -Encore 700 Series Metering Pump – Capacity Specification

	Direct Drive						*	Pulley Drive						Maximum Discharge Pressure						Connection		
	60 Hz 1725 RPM			50 Hz 1450 RPM				60 Hz 1725 RPM			50 Hz 1450 RPM			psi			bar					
Diaphragm Size	Stroke Frequency	Capacity		Stroke Frequency	Capacity		Pulley	Stroke Frequency	Capacity		Stroke Frequency	Capacity		Motor Horsepower @1725 RPM			Motor Kilowatts @1450 RPM			Cartridge Valves	Threaded Valves	
inches	strokes/min	gph	lph	strokes/min	gph	lph	Step	strokes/min	gph	lph	strokes/min	gph	lph	Induction (Variable Speed)			Induction (Variable Speed)					
1-3/8	36	1.3	4.7	30	1.0	3.9	4	9	0.3	1.2	8	0.3	1.0	175			12			1/2" NPT	3/8 O.D. HOSE	
							3	18	0.6	2.4	15	0.5	2.0									
							2	27	0.9	3.5	23	0.8	3.0									
							1	36	1.3	4.7	30	1.0	3.9									
	72	2.5	9.5	60	2.1	7.9	4	18	0.6	2.4	15	0.5	2.0	175			12					or
							3	36	1.3	4.7	30	1.0	3.9									
							2	54	1.9	7.1	45	1.6	5.9									
							1	72	2.5	9.5	60	2.1	7.9									
	144	5.0	18.9	120	4.2	15.8	4	36	1.3	4.7	30	1.0	3.9	175			12					or
							3	72	2.5	9.5	60	2.1	7.9									
							2	108	3.8	14.2	90	3.1	11.8									
							1	144	5.0	18.9	120	4.2	15.8									
				144	5.0	18.9	4				36	1.3	4.7				12					R 1/2"
							3				72	2.5	9.5									
							2				108	3.8	14.2									
							1				144	5.0	18.9									
2	36	6.0	22.7	30	5.0	18.9	4	9	1.5	5.7	8	1.3	4.7	175			12			1/2" NPT	1/2" O.D. HOSE	
							3	18	3.0	11.4	15	2.5	9.5									
							2	27	4.5	17.0	23	3.8	14.2									
							1	36	6.0	22.7	30	5.0	18.9									
	72	12.0	45.4	60	10.0	37.9	4	18	3.0	11.4	15	2.5	9.5	175			12					or
							3	36	6.0	22.7	30	5.0	18.9									
							2	54	9.0	34.1	45	7.5	28.4									
							1	72	12.0	45.4	60	10.0	37.9									
	144	24.0	90.8	120	20.0	75.7	4	36	6.0	22.7	30	5.0	18.9	175			12					or
							3	72	12.0	45.4	60	10.0	37.9									
							2	108	18.0	68.1	90	15.0	56.8									
							1	144	24.0	90.8	120	20.0	75.7									
				144	24.0	90.8	4				36	6.0	22.7				12					R 1/2"
							3				72	12.0	45.4									
							2				108	18.0	68.1									
							1				144	24.0	90.8									

NOTE: *Pulley Step 1 is the top position of the belt.

Table 1.3 - Encore 700 Series Metering Pump – Capacity Specification (Cont'd)

	Direct Drive						*	Pulley Drive						Maximum Discharge Pressure						Connection	
	60 Hz 1725 RPM			50 Hz 1450 RPM				60 Hz 1725 RPM			50 Hz 1450 RPM			psi			bar				
Diaphragm Size	Stroke Frequency	Capacity		Stroke Frequency	Capacity		Pulley	Stroke Frequency	Capacity		Stroke Frequency	Capacity		Motor Horsepower @1725 RPM Induction (Variable Speed)			Motor Kilowatts @1450 RPM Induction (Variable Speed)			Cartridge Valves	Threaded Valves
inches	strokes/min	gph	lph	strokes/min	gph	lph	Step	strokes/min	gph	lph	strokes/min	gph	lph	1/4 (1/2)	1/2 (3/4)	3/4 (1)	0.18 (0.37)	0.37 (0.55)	0.55 (0.75)		
3	36	11.3	42.6	30	9.4	35.5	4	9	2.8	10.6	8	2.3	8.9	150			10			1/2" NPT	----
							3	18	5.6	21.3	15	4.7	17.7								
							2	27	8.4	31.9	23	7.0	26.6								
							1	36	11.3	42.6	30	9.4	35.5								
	72	22.5	85.2	60	18.8	71.0	4	18	5.6	21.3	15	4.7	17.7	100	150		8	10		or	
							3	36	11.3	42.6	30	9.4	35.5								
							2	54	16.9	63.9	45	14.1	53.2								
							1	72	22.5	85.2	60	18.8	71.0								
	144	45.0	170.3	120	37.5	141.9	4	36	11.3	42.6	30	9.4	35.5	50	120	150	4	8	10	or	
							3	72	22.5	85.2	60	18.8	71.0								
							2	108	33.8	127.7	90	28.1	106.5								
							1	144	45.0	170.3	120	37.5	141.9								
				144	45.0	170.3	4				36	11.3	42.6				4	8	10	R 1/2"	
							3				72	22.5	85.2								
							2				108	33.8	127.7								
							1				144	45.0	170.3								
4	36	19.3	72.9	30	16.0	60.7	4	9	4.8	18.2	8	4.0	15.2	130			9			3/4" NPT	----
							3	18	9.6	36.4	15	8.0	30.4								
							2	27	14.4	54.6	23	12.0	45.5								
							1	36	19.3	72.9	30	16.0	60.7								
	72	38.5	145.7	60	32.1	121.4	4	18	9.6	36.4	15	8.0	30.4	75	130		6	9		or	
							3	36	19.3	72.9	30	16.0	60.7								
							2	54	28.9	109.3	45	24.1	91.1								
							1	72	38.5	145.7	60	32.1	121.4								
	144	77.0	291.4	120	64.2	242.9	4	36	19.3	72.9	30	16.0	60.7	30	75	130	2	6	9	or	
							3	72	38.5	145.7	60	32.1	121.4								
							2	108	57.8	218.6	90	48.1	182.2								
							1	144	77.0	291.4	120	64.2	242.9								
				144	77.0	291.4	4				36	19.3	72.9				2.5	5	9	R 3/4"	
							3				72	38.5	145.7								
							2				108	57.8	218.6								
							1				144	77.0	291.4								

NOTE: *Pulley Step 1 is the top position of the belt.

Table 1.3 - Encore 700 Series Metering Pump – Capacity Specification (Cont'd)

	Direct Drive						*	Pulley Drive						Maximum Discharge Pressure						Connection		
	60 Hz 1725 RPM			50 Hz 1450 RPM				60 Hz 1725 RPM			50 Hz 1450 RPM			psi			bar					
Diaphragm Size	Stroke Frequency	Capacity		Stroke Frequency	Capacity		Pulley	Stroke Frequency	Capacity		Stroke Frequency	Capacity		Motor Horsepower @1725 RPM Induction (Variable Speed)			Motor Kilowatts @1450 RPM Induction (Variable Speed)			Cartridge Valves	Threaded Valves	
inches	strokes/min	gph	lph	strokes/min	gph	lph	Step	strokes/min	gph	lph	strokes/min	gph	lph	1/4 (1/2)	1/2 (3/4)	3/4 (1)	0.18 (0.37)	0.37 (0.55)	0.55 (0.75)			
5	36	45.0	170.3	30	37.5	141.9	4	9	11.3	42.6	8	9.4	35.5	75			5			1" NPT	----	
							3	18	22.5	85.2	15	18.8	71.0									
							2	27	33.8	127.7	23	28.1	106.5									
							1	36	45.0	170.3	30	37.5	141.9									
	72	90.0	340.7	60	75.0	283.9	4	18	22.5	85.2	15	18.8	71.0	40	75		3	5				
							3	36	45.0	170.3	30	37.5	141.9									
							2	54	67.5	255.5	45	56.3	212.9									
							1	72	90.0	340.7	60	75.0	283.9									
	144	180.0	681.3	120	150.0	567.8	4	36	45.0	170.3	30	37.5	141.9	20	40	75	1.5	3.0	5			
							3	72	90.0	340.7	60	75.0	283.9									
							2	108	135.0	511.0	90	112.5	425.8									
							1	144	180.0	681.3	120	150.0	567.8									
				144	180.0	681.3	4				36	45.0	170.3				1.5	3	5			
							3				72	90.0	340.7									
							2				108	135.0	511.0									
							1				144	180.0	681.3									
6-1/2	36	79	299	30	66	249	4	9	19.8	75	8	17.6	67	45			3			1-1/2" NPT		----
							3	18	39.5	150	15	33	125									
							2	27	59	225	23	51	192									
							1	36	79	299	30	66	250									
	72	158	598	60	132	498	4	18	39.5	150	15	33	125	25	45		1.7	3				
							3	36	79	299	30	66	250									
							2	54	118.8	450	45	99	375									
							1	72	158	598	60	132	500									
	144	317	1200	120	164	1000	4	36	79	299	30	66	250	15	25	45	1	1.7	3			
							3	72	158	598	60	132	500									
							2	108	237.7	900	90	198	750									
							1	144	317	1200	120	264	1000									
				144	317	1200	4				36	79	299				1	1.7	3			
							3				72	158	598									
							2				108	237.7	900									
							1				144	317	1200									

NOTE: *Pulley Step 1 is the top position of the belt.

ENCORE® 700 METERING PUMP

LIQUID	REF. NO.	316 S.S.	HYPALON	VITON	PVC	TFE	KYNAR 150°F	CERAMIC
ACETALDEHYDE	57	A	C	C	C	A	C	A
ACETATE SOLVENTS	57	A	C	C	C	A	A	A
ACETIC ACID, CRUDE	57	A	C	C	C	A	A	A
ACETIC ACID, PURE	57	A	C	C	C	A	A	A
ACETIC ACID (10%)	3	A	B	C	A	A	A	A
ACETIC ACID (80%)	57	B	C	C	C	A	A	A
ACETIC ANHYDRIDE		B	A	C	C	A	C	A
ACETONE		A	C	C	C	A	C	A
ACETYLENE		A	B	A	A	A	A	N
ACRYLONITRILE	58	A	C	C	A	N	A	N
ALUMINUM CHLORIDE	5	B	A	A	A	A	A	A
ALUMINUM HYDROXIDE	6	A	A	A	A	A	A	N
ALUMINUM NITRATE		A	B	C	A	A	A	A
ALUMINUM SULFATE	3	A	A	A	A	A	A	A
ALUMS		B	A	C	A	A	A	A
AMINES		A	C	C	A	A	N	N
AMINES (FILMINE) B		A	C	C	A	A	N	N
AMMONIA ANHYDROUS (LIQ.)		A	B	C	A	A	C	A
AMMONIA SOLUTIONS		A	B	B	A	A	A	N
AMMONIUM CARBONATE		A	A	A	A	A	A	A
AMMONIUM CHLORIDE	7	B	A	A	A	A	A	N
AMMONIUM DIPHOSPHATE	9	A	A	A	A	A	A	A
AMMONIUM HYDROXIDE	8	A	A	A	A	A	A	A
AMMONIUM MONOPHOSPHATE	9	A	A	A	A	A	A	A
AMMONIUM NITRATE		A	A	A	A	A	A	A
AMMONIUM SULFATE	10	A	A	A	A	A	A	A
AMMONIUM SULFIDE		A	A	A	A	A	A	A
AMMONIUM TRIPHOSPHATE	9	A	A	A	A	A	A	A
AMYL ACETATE	58	A	C	C	C	A	A	A
AMYL ALCOHOL	11,12	A	A	A	B	A	A	A
AMYL CHLORIDE		A	C	C	C	A	A	A
ANILINE	13	A	C	A	C	A	B	A
ANILINE DYES		A	B	B	C	A	N	A
ARSENIC ACID	14	B	C	A	A	A	A	N
BARIUM CARBONATE	15	B	A	A	A	A	A	A
BARIUM CHLORIDE		A	B	A	A	A	A	A
BARIUM HYDROXIDE	14,5	A	B	A	A	A	A	N
BARIUM SULFATE		A	A	A	A	A	A	A
BARIUM SULFIDE		B	A	A	A	A	A	A
BEER		A	A	A	A	A	A	A
BEET SUGAR LIQUORS		A	C	A	A	A	A	A
BENZALDEHYDE		A	C	C	C	A	B	A
BENZENE OR BENZOL	13,14	A	C	B	C	A	B	A
BENZOIC ACID		A	C	A	A	A	A	A
BLACK SULFATE LIQUOR	57	A	B	A	A	A	A	A
BORAX (SEE SODIUM BORATE)		-	-	-	-	-	-	-
BORIC ACID	16	A	A	A	A	A	A	A
BUTANE		A	A	B	A	A	A	A
BUTADIENE		A	B	B	A	A	A	A
BUTYL ACETATE		A	C	N	B	A	C	N

WARNING: WHEN DEALING WITH HAZARDOUS MATERIALS, IN ALL CASES THE HAZARDOUS MATERIAL SUPPLIERS OR MANUFACTURERS' RECOMMENDATIONS FOR SAFETY PROCEDURES MUST BE OBTAINED AND FOLLOWED.

CHEMICAL COMPATIBILITY OF METERING PUMPS - PERFORMANCE

440.050.190.010A

ISSUE 0 8-95

ENCORE® 700 METERING PUMP

LIQUID	REF. NO.	316 S.S.	HYPALON	VITON	PVC	TFE	KYNAR 150°F	CERAMIC
BUTYL ALCOHOL	17	A	A	A	A	A	A	A
BUTYRIC ACID	14	A	A	B	B	A	A	A
CALCIUM BISULFITE		A	A	A	A	A	A	A
CALCIUM CARBONATE	15	A	A	A	A	A	A	B
CALCIUM CHLORATE		A	A	A	A	A	A	A
CALCIUM CHLORIDE	18	B	A	A	A	A	A	A
CALCIUM HYDROXIDE	15	A	A	A	A	A	A	C
CALCIUM HYPOCHLORITE		C	A	A	A	A	A	B
CALCIUM NITRATE		A	A	A	A	A	A	A
CALCIUM SULFATE		A	A	A	A	A	A	N
CANE SUGAR LIQUORS	14	A	C	B	N	A	A	A
CARBOLIC ACID (PHENOL)	11,14,57	A	C	A	A	A	A	A
CARBON BISULFIDE		A	C	A	A	N	N	N
CARBONIC ACID	14,57	A	A	A	A	A	A	N
CARBON TETRACHLORIDE	13,3	A	C	A	C	A	A	A
CHLORACETIC ACID		C	C	C	A	A	C	A
CHLOROBENZENE (DRY)		A	C	A	C	A	A	A
CHLOROFORM		A	C	A	C	A	A	A
CHLORSULPHONIC ACID		B	C	C	A	A	C	A
CHROMIC ACID	19,58	A	A	A	A	A	A	A
CITRIC ACID	20	A	A	A	A	A	A	A
COPPER ACETATE		A	C	C	A	A	A	N
COPPER CHLORIDE	5	C	B	A	A	A	A	A
COPPER CYANIDE	3	A	A	A	A	A	A	N
COPPER NITRATE	3	A	A	A	A	A	A	A
COPPER SULFATE	21	A	A	A	A	A	A	A
CREOSOTE	3	A	C	A	C	A	A	A
CRESYLIC ACID (50%)		A	C	A	A	A	A	N
CYCLOHEXANE		A	C	A	C	A	A	A
DETERGENT		N	A	A	A	A	N	A
DIETHYLAMINE	57	A	C	C	C	N	A	A
DIETHYLENE GLYCOL		A	A	A	A	A	N	A
DOWTHERMS		A	C	A	C	N	N	N
ETHERS (ETHYL)		A	C	B	C	A	B	A
ETHYL ACETATE		A	C	C	C	A	C	A
ETHYL ALCOHOL	12	A	A	A	A	A	A	A
ETHYL CHLORIDE		A	C	A	C	A	A	A
ETHYLENE CHLORIDE	22	A	C	B	C	A	A	N
ETHYLENE GLYCOL	12	A	A	A	A	A	A	A
ETHYL MERCAPTAN		A	C	N	N	N	N	N
ETHYLENE OXIDE		A	C	C	C	A	C	A
FATTY ACIDS	14	A	C	A	A	A	A	A
FERRIC CHLORIDE	6	C	A	A	A	A	A	A
FERRIC NITRATE		A	A	A	A	A	A	A
FERRIC SULFATE	24	B	A	A	A	A	A	A
FERROUS CHLORIDE		C	A	A	A	A	A	A
FERROUS SULFATE	14	B	A	A	A	A	A	A
FILTER AID	15	A	A	A	C	A	A	A
FLUOSILICIC ACID	6,25,26	B	A	A	A	A	A	C
FORMALDEHYDE		A	A	C	A	A	A	A
FORMIC ACID	3,58	A	A	B	B	A	A	A
FRUIT JUICES		A	C	A	A	A	A	A
FURFURAL	57	A	C	C	C	A	A	A
GALLIC ACID (5%)		A	C	A	A	A	B	A
GASOLINE		A	C	A	A	A	A	A

CHEMICAL COMPATIBILITY OF METERING PUMPS - PERFORMANCE

440.050.190.010B

ISSUE 0 8-95

ENCORE® 700 METERING PUMP

LIQUID	REF. NO.	316 S.S.	HYPALON	VITON	PVC	TFE	KYNAR 150°F	CERAMIC
GLUCOSE		A	A	A	A	A	A	A
GLYCEROL (GLYCERIN)	6,11,27	A	A	A	A	A	A	A
HEPTANE, HEXANE		A	A	A	C	A	A	A
HYDRAZINE (35%)	28	A	B	C	N	N	A	B
HYDROBROMIC ACID	29	C	A	A	A	A	A	A
HYDROCHLORIC ACID (37%)	5,30	C	A	A	A	A	A	A
HYDROCYANIC ACID		A	A	A	A	A	A	A
HYDROFLUORIC ACID	6,26,25	C	A	A	A	A	A	C
HYDROFLUOSILICIC ACID	6,25,26,57	B	A	A	A	A	A	C
HYDROGEN PEROXIDE	31,59	B	A	A	A	A	A	A
HYDROGEN SULFIDE	11,3	A	A	A	A	A	A	A
INKS	19	A	A	A	A	A	N	N
IODINE SOLUTION		C	B	A	C	A	A	A
KEROSENE		A	C	A	A	A	A	A
LACTIC ACID	32,57	A	A	A	A	A	A	A
LEAD ACETATE		A	C	C	A	A	A	A
LIME SLURRIES	15	A	A	A	A	A	A	N
LINSEED OIL		A	A	A	A	A	A	A
MAGNESIUM CARBONATE		A	A	A	A	A	A	A
MAGNESIUM CHLORIDE	6,34	C	A	A	A	A	A	A
MAGNESIUM HYDROXIDE	6,15	A	A	A	A	A	A	N
MAGNESIUM NITRATE		A	A	A	A	A	A	A
MAGNESIUM SULFATE	14,5	A	A	A	A	A	A	A
MALEIC ACID (DILUTE)	5,14	A	C	A	A	A	A	A
MALIC ACID	14	A	B	A	A	A	A	A
MELAMINE RESINS		A	C	N	A	A	N	A
MERCURIC CHLORIDE	5	C	A	A	A	A	A	A
MERCURIC CYANIDE		A	A	A	A	A	A	N
MERCURY		A	A	A	A	A	A	A
METHYL ACETATE	57	A	C	C	N	A	A	N
METHYL ACETONE		A	C	C	C	N	N	N
METHYL ALCOHOL	35	A	A	B	A	A	A	A
METHYLAMINE		A	C	C	N	N	C	N
METHYL BROMIDE		A	C	A	C	N	A	N
METHYL CELLOSOLVE		A	C	C	N	A	A	A
METHYL CHLORIDE (LIQ.)		A	C	C	C	A	A	A
METHYLETHYL KETONE		A	C	C	C	A	C	A
METHYLENE CHLORIDE	36,14	A	C	B	C	A	C	A
MOLASSES		A	A	A	A	A	A	N
MONOCHLORACETIC ACID		C	N	N	A	A	A	A
MORPHOLINE	57	A	C	C	A	A	A	A
NAPHTHA	13	A	C	A	A	A	A	A
NAPHTHALENE	11	A	C	A	C	A	A	A
NICKEL CHLORIDE		A	A	A	A	A	A	A
NICKEL NITRATE	14	A	A	A	A	A	A	A
NICKEL SULFATE	14	A	A	A	A	A	A	A
NICOTINIC ACID		A	C	A	A	N	A	A
NITRIC ACID (10%)	60	A	A	A	A	A	A	A
NITRIC ACID (70%) TO 100°F	60	B	C	B	A	A	A	A
NITROBENZENE		A	C	C	C	A	B	A
OILS, ANIMAL		A	C	A	A	A	A	A
OIL, COTTONSEED	11,58	A	A	A	A	A	A	A
OILS, FUEL	37,14	A	A	A	A	A	A	A
OLEIC ACID	3	A	C	C	A	A	A	A
OLEUM (20-25%)		A	C	B	C	A	C	A

CHEMICAL COMPATIBILITY OF METERING PUMPS - PERFORMANCE

440.050.190.010C

ISSUE 0 8-95

ENCORE® 700 METERING PUMP

LIQUID	REF. NO.	316 S.S.	HYPALON	VITON	PVC	TFE	KYNAR 150°F	CERAMIC
OXALIC ACID	3	B	A	A	A	A	A	A
PALMITIC ACID		A	C	A	A	A	A	N
PERCHLORIC ACID (10%)		C	B	N	B	N	A	N
PERCHLOROETHYLENE (DRY)	11	A	C	A	C	N	A	N
PHENOL (CARBOLIC ACID)	11	A	C	A	A	A	A	A
PHOSPHORIC ACID	6,11,39	A	A	A	A	A	A	A
PHOSPHORUS TRICHLORIDE	57	N	C	A	C	A	A	A
PICRIC ACID		A	A	A	C	N	A	N
POTASSIUM BICARBONATE		A	A	A	A	N	A	A
POTASSIUM BROMATE		N	N	N	A	N	A	N
POTASSIUM BROMIDE	40	A	A	A	A	A	A	A
POTASSIUM CARBONATE		A	A	A	A	A	A	A
POTASSIUM CHLORATE		A	A	A	A	A	A	A
POTASSIUM CHLORIDE		5,41	B	A	A	A	A	A
POTASSIUM CHROMATE		A	A	A	A	A	A	N
POTASSIUM CYANIDE	42	A	A	A	A	A	A	N
POTASSIUM DIPHOSPHATE		A	N	A	A	N	N	N
POTASSIUM HYDROXIDE		A	A	C	A	A	A	C
POTASSIUM MONOPHOSPHATE		A	A	A	A	N	N	N
POTASSIUM NITRATE		A	A	A	A	A	A	A
POTASSIUM PERMANGANATE	5,43	A	A	A	A	A	A	A
POTASSIUM SULFATE	41,5	A	A	A	A	A	A	N
POTASSIUM SULFIDE		A	N	A	A	A	A	A
POTASSIUM SULFITE		A	B	A	A	N	N	N
POTASSIUM TETRABORATE		N	N	N	A	N	N	N
PROPANE (LIQ.)		A	A	B	A	A	A	A
PROPYL ALCOHOL	12,58	A	A	A	B	A	A	N
PROPYLENE GLYCOL		A	A	A	C	A	A	A
RESINS & ROSINS		A	N	A	N	N	N	N
SEA WATER		B	A	A	A	A	A	A
SILVER NITRATE		A	A	A	A	A	A	A
SOAP SOLUTIONS (STEARATES)	6,57	A	A	A	A	A	A	A
SODIUM ACETATE		A	C	A	A	A	A	A
SODIUM ALUMINATE 27Be		A	A	A	B	A	A	A
SODIUM BICARBONATE		A	A	A	A	A	A	A
SODIUM BISULFATE (TO 100°F)		A	A	A	A	A	A	A
SODIUM BISULFITE (TO 100°F)	14	A	A	A	A	A	A	A
SODIUM BORATE		A	A	A	A	A	A	N
SODIUM CARBONATE		44	A	A	A	A	A	A
SODIUM CHLORATE		14	A	A	A	A	A	A
SODIUM CHLORIDE		3	B	A	A	A	A	A
SODIUM CHLORITE (TO 20%)	45	C	N	N	C	N	A	A
SODIUM CHROMATE		A	N	A	A	A	A	N
SODIUM CYANIDE		A	A	A	A	A	A	A
SODIUM DI- OR TRIPHOSPHATE		A	A	A	A	A	A	A
SODIUM FLUORIDE		25,46	B	A	A	A	A	C
SODIUM HYDROXIDE 20%	5,3,6	A	A	C	A	A	A	C
SODIUM HYDROXIDE 50%	5,3,6	A	A	C	A	A	A	C
SODIUM HYPOCHLORITE	30,13,47	C	A	B	A	A	A	N
SODIUM MONOPHOSPHATE	48	A	A	A	A	A	A	A
SODIUM NITRATE		A	A	A	A	A	A	A
SODIUM PERBORATE		A	B	A	B	A	N	N
SODIUM PEROXIDE		6	A	A	B	A	A	A
SODIUM POLYPHOSPHATE		A	B	A	A	A	A	A
SODIUM SILICATE		49	A	A	B	A	A	A

CHEMICAL COMPATIBILITY OF METERING PUMPS - PERFORMANCE

440.050.190.010D

ISSUE 0 8-95

ENCORE® 700 METERING PUMP

LIQUID	REF. NO.	316 S.S.	HYPALON	VITON	PVC	TFE	KYNAR 150°F	CERAMIC
SODIUM SULFATE	50	A	A	A	A	A	A	A
SODIUM SULFIDE	1,48	A	A	A	B	A	A	N
SODIUM SULFITE	44	A	A	A	A	A	A	A
SODIUM THIOSULFATE (HYPO)	51	B	A	A	B	A	A	A
STARCH		A	A	A	A	A	N	A
STEARIC ACID	37	A	B	A	A	A	A	A
SUGAR SOLUTIONS	14	A	B	N	A	A	A	A
SULFUR CHLORIDE	57	C	A	A	N	A	A	A
SULFUR MOLTEN		A	C	A	A	A	A	A
SULFURIC ACID (0-40%)	5	C	A	A	A	A	A	A
SULFURIC ACID (40-95%)	5,58	C	A	A	A	A	A	A
SULFURIC ACID (95-100%)	58	A	B	A	A	A	A	A
SULFUROUS ACID		B	A	A	A	A	A	A
TANNIC ACID	52	A	A	A	A	A	N	A
TARTARIC ACID	6,44	A	A	A	A	A	A	A
TITANIUM DIOXIDE		A	A	A	B	A	N	N
TOLUOL & TOLUENE	36	A	C	A	C	A	B	A
TRICHLORETHYLENE	57	A	C	A	C	A	A	A
TURPENTINE	13	A	C	A	A	A	A	A
UREA FORMALDEHYDE		A	N	N	N	A	A	A
VARNISH & SOLVENTS	14	A	C	A	N	A	N	A
VINEGAR		A	A	N	A	A	N	A
VINYL ACETATE		A	C	C	C	A	A	A
WATER, DEIONIZED		A	A	A	A	A	A	A
WATER, SALT		B	A	A	A	A	N	A
WHISKEY AND WINES	58	A	A	A	A	A	A	A
XYLENE OR XYLOL	13	A	C	A	C	A	A	A
ZINC CHLORIDE	6,53	C	A	A	A	A	A	A
ZINC HYDROSULFITE		B	N	A	A	A	N	N
ZINC SULFATE		A	A	A	A	A	A	A

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY AND/OR DAMAGE TO EQUIPMENT WHEN DEALING WITH ANY CHEMICAL, IT IS THE RESPONSIBILITY OF THE EQUIPMENT USER TO OBTAIN AND FOLLOW THE SAFETY PRECAUTIONS OF THE MANUFACTURER OF THE CHEMICAL.

RATING KEY

A	ACCEPTABLE
B	SATISFACTORY WHERE MINOR ATTACK IS ACCEPTABLE
C	SHOULD NOT BE USED
N	INFORMATION LACKING

UNLESS OTHERWISE NOTED, CONCENTRATION OF AQUEOUS SOLUTIONS ARE SATURATED. ALL RATINGS ARE AT ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED.

CHEMICAL COMPATIBILITY OF METERING PUMPS - PERFORMANCE

440.050.190.010E

ISSUE 0 8-95

ENCORE® 700 METERING PUMP

- | | |
|---|---|
| 1. WARNING: DRIED RESIDUE OF SPILLED SOLUTIONS IS EXPLOSIVE. | 29. PVC TO 125°F, 48% |
| 3. SS TO 180°F | 30. HYPALON TO 130°F |
| 5. PVC TO 125°F | 31. PVC TO 100°F, 50%, SS TO 100°F, 50% |
| 6. HYPALON TO 180°F | 32. PVC TO 70°F, 10%, SS TO 70°F, 10% |
| 7. SS TO 125°F 10%, PVC TO 125°F | 34. SS TO 70°F, 5%, PVC 125°F SAT |
| 8. PVC TO 125°F, 29%, SS TO 180°F, 29% | 35. PVC TO 100°F, SS TO 70°F |
| 9. SS TO 70°F, 5% | 36. VITON TO 100°F |
| 10. PVC TO 105°F, 40%, SS TO 180°F SAT | 37. HYPALON TO 150°F |
| 11. VITON TO 180°F | 38. SS TO 70°F, 10% |
| 12. PVC TO 100°F PURE | 39. PVC TO 125°F, 80%, SS TO 70°F, 80% |
| 13. VITON TO 158°F | 40. PVC TO 100°F, SAT, SS TO 180°F, 50% |
| 14. SS TO 140°F | 41. SS TO 180°F, 5% |
| 15. USE SLURRY VALVES | 42. PVC TO 70°F, 50% OR TO 125°F, 30%, SS TO 180°F, 50% |
| 16. PVC TO 105°F, SS TO 180°F | 43. SS TO 140°F, 10% |
| 17. PVC TO 100°F, SS TO 100°F | 44. SS TO 180°F, 50% |
| 18. SS TO 70°F DILUTE, PVC TO 125°F | 45. PVC TO 105°F |
| 19. PVC TO 100°F, 50%, SS TO 70°F, 5% | 46. PVC TO 125°F, 4%, SS TO 70°F, 5% |
| 20. PVC TO 100°F, 25%, SS TO 180°F, 50% | 47. PVC TO 125°F, 15%, SS TO 70°F, 5% |
| 21. PVC TO 100°F, SS TO 160°F | 48. SS TO 125°F |
| 22. VITON TO 120°F | 49. PVC TO 125°F, 41 Be, SS TO 140°F, 41 Be |
| 24. PVC TO 125°F, 36%, SS TO 180°F 10% | 50. PVC TO 125°F, 30% |
| 25. FLUORIDATION REQUIRES AN ANTI-SYPHON PUMP INSTALLATION CONSULT LOCAL REGULATIONS FOR DETAILS. | 51. PVC TO 125°F, 50%, SS TO 70°F, 50% |
| 26. PVC TO 30% | 52. PVC TO 100°F, 10%, SS TO 150°F |
| 27. PVC TO 125°F, 50%, SS TO 70°F, 5% | 53. PVC TO 100°F, SS TO 180°F, 70% |
| 28. MAY CAUSE SURFACE PITTING TO SS | 57. KYNAR TO 70°F |
| | 58. KYNAR TO 120°F |
| | 59. KYNAR TO 120°F, 30% |
| | 60. KYNAR TO 100°F |

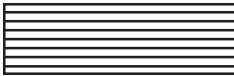
Statements and suggestions set forth herein are based upon the best information and practices known to USF/W&T. However, it should not be assumed either that information is complete on the subjects covered or that all possible circumstances, safety measures, precautions, etc., have been included. These statements and suggestions are not intended to reflect state, municipal, or insurance requirements or national safety codes; where applicable, those sources should be consulted directly. Moreover, since the conditions of use are beyond its control, USF/W&T makes no guarantee of results and assumes no liability in connection with the information contained herein.

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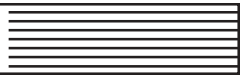
CHEMICAL COMPATIBILITY OF METERING PUMPS - PERFORMANCE

440.050.190.010F

ISSUE 0 8-95



ENCORE[®] 700 METERING PUMP



SECTION 2 - INSTALLATION

List of Contents

	PARA./DWG.NO.
General Information	2.1
Unpacking	2.2
Mounting the Pump	2.3
Pipe Line Diameter	2.4
Tubing	2.5
Installation	2.6
Illustrations	
Typical Installation	
Simplex Manual Arrangement	440.400.110.010
Double Simplex Manual Arrangement	440.400.110.020
Suction Lift	440.400.110.030
Flooded Suction	440.400.110.040
Flooded Suction & Vent Riser	440.400.110.050
Installation Wiring	440.400.130.010

2.1 General Information

To provide satisfactory service, the metering pump must be installed in accordance with the instructions that follow. Operational difficulties, lack of accuracy, and possible damage to the pump mechanism may occur if these instructions are not followed properly.

2.2 Unpacking

When the pump is unpacked, check all items against the packing list to make sure that no parts are discarded with the packaging material. Whenever possible, unpack the equipment at the installation site.

2.3 Mounting the Pump

Pump location is important to the operation of the pump. Select a place that is dry and that provides a level base for the pump. Allow work space around the pump for inspection, adjustments, and servicing (refer to Dwg. 440.400.110.010 or 440.400.110.020). Be sure it is near a power supply and located where the discharge line may be conveniently run to the point of application. The pump may be installed with a flooded suction arrangement (refer to Dwg. 440.400.110.040). A carefully considered and correct installation will help provide satisfactory performance.

When installing the equipment, proceed as follows:

- a. Select the appropriate dimension and/or installation drawing to be sure the location selected will meet all requirements. Refer to Dwg. 440.400.110.010, 020, 030, and 040.
- b. Mount the pump on the bench, shelf, or level pad on which it will be located.
- c. Connect to a power supply matching the characteristics specified on the motor nameplate and in accordance with local electrical code requirements. Sufficient flexibility must be provided in the connection to permit adjustments. Be sure to provide a shut-off switch in the power supply.

NOTE: Field wiring must conform to local electrical codes.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT CONSULT YOUR USF/W&T REPRESENTATIVE IF THE PUMP IS TO BE USED UNDER CONDITIONS OTHER THAN ORIGINALLY SPECIFIED AND IF

THERE IS ANY QUESTION REGARDING THE SIZE OF THE DISCHARGE LINE.

- d. If a pulsation dampener is required to reduce pressure peaks, install it in the discharge line. Refer to Dwgs. 440.400.110.010, 020, 030, and 040. The dampener will minimize vibrations and reduce wear due to long lines and/or high stroking speeds.

NOTE: Take care not to drip pipe primer or cement into valves. This could damage ball checks and seats.

- e. Connect rigid pipe or tubing to the suction connection on the pump and run a line without traps to the bottom of the solution container. Install a strainer.

2.4 Pipe Line Diameter

To determine the proper diameter of the suction and discharge lines, take the following into consideration:

- Cavitation
- Overloading (elbow, valves, tees, etc.)

To avoid cavitation for shorter runs of pipe (less than 10 feet), use pipe with a diameter at least equal to the valve connection. To avoid cavitation for longer runs of pipe (greater than 10 feet), use pipe with a diameter at least one size larger than the valve connection.

The following formula can be used to compute the fluid velocity in meters/second:

$$\text{Velocity} = \frac{\{\text{Discharge (Q)} \times 0.35\}}{d^2}$$

where Q = feed rate in liters/hour
d = inside diameter of pipe in mm

Select an appropriate pipe diameter that keeps the velocity in the suction line from exceeding 0.2 meters/second.

2.5 Tubing

For safety and best results when tubing is to be used, select the appropriate size and material according to the pressure and temperature limits detailed in Table 2.1.

ENCORE® 700 METERING PUMP

Table 2.1 - Pressure/Temperature Ratings for Suction and Discharge Tubing

HEAD	TUBE SIZE	MATERIAL	Maximum Working Pressure (psi) at			
			60°F	73°F	100°F	120°F
1-3/8"	1/4" x 3/8"	Polyethylene	100	100	90	70
2"	3/8" X 1/2"	Polyethylene	100	90	70	53

NOTE: Tubing connection is available on 1-3/8" and 2" heads only.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY WHEN HAZARDOUS CHEMICALS ARE PUMPED AND/OR ELEVATED PRESSURE/TEMPERATURES ARE ENCOUNTERED, USE RIGID PIPE.

2.6 Installation

The Typical Installation drawings (Dwgs. 440.400.110.010, .020, .030, and .040) and the associated wiring diagram (Dwg. 440.400.130.010) for the various pump configurations are located at the end of this section.

NOTE: Some chemicals (such as sodium hypochlorite) emit gas and could cause "air binding." Follow installation Dwg. 440.400.110.050 and consult publication TA1055-A for additional tips.

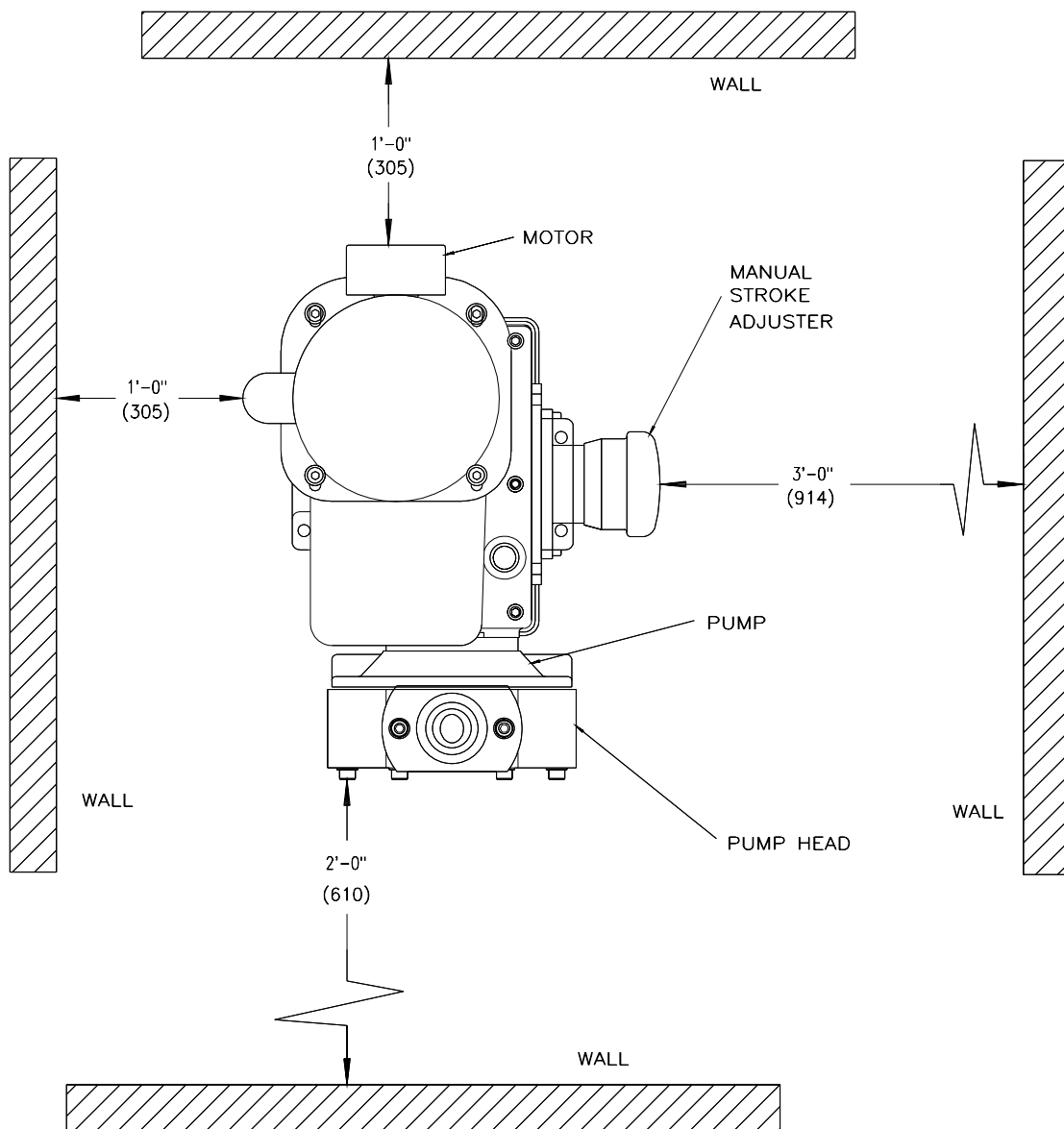
Avoid operating problems by preventing the following:

- Unnecessary restrictions in piping
- Thin-walled hose, which may collapse due to a small cross-sectional area during suction stroke, thereby causing both a high pressure drop and velocity
- Difficult to vent bends in the line, where air may be trapped, impairing the accuracy of feed rate

If a storage container is used, the suction line should be connected above the container's bottom to avoid any deposits on the bottom that can enter the suction line. Such deposits may damage the pump valves and impair the function of the pump.

If the liquid to be pumped contains undissolved particles, install an adequately dimensioned strainer (preferably one size larger than the pipe diameter) in the suction line.

ENCORE® 700 METERING PUMP



NOTES: () INDICATES DIMENSIONS IN MILLIMETERS.

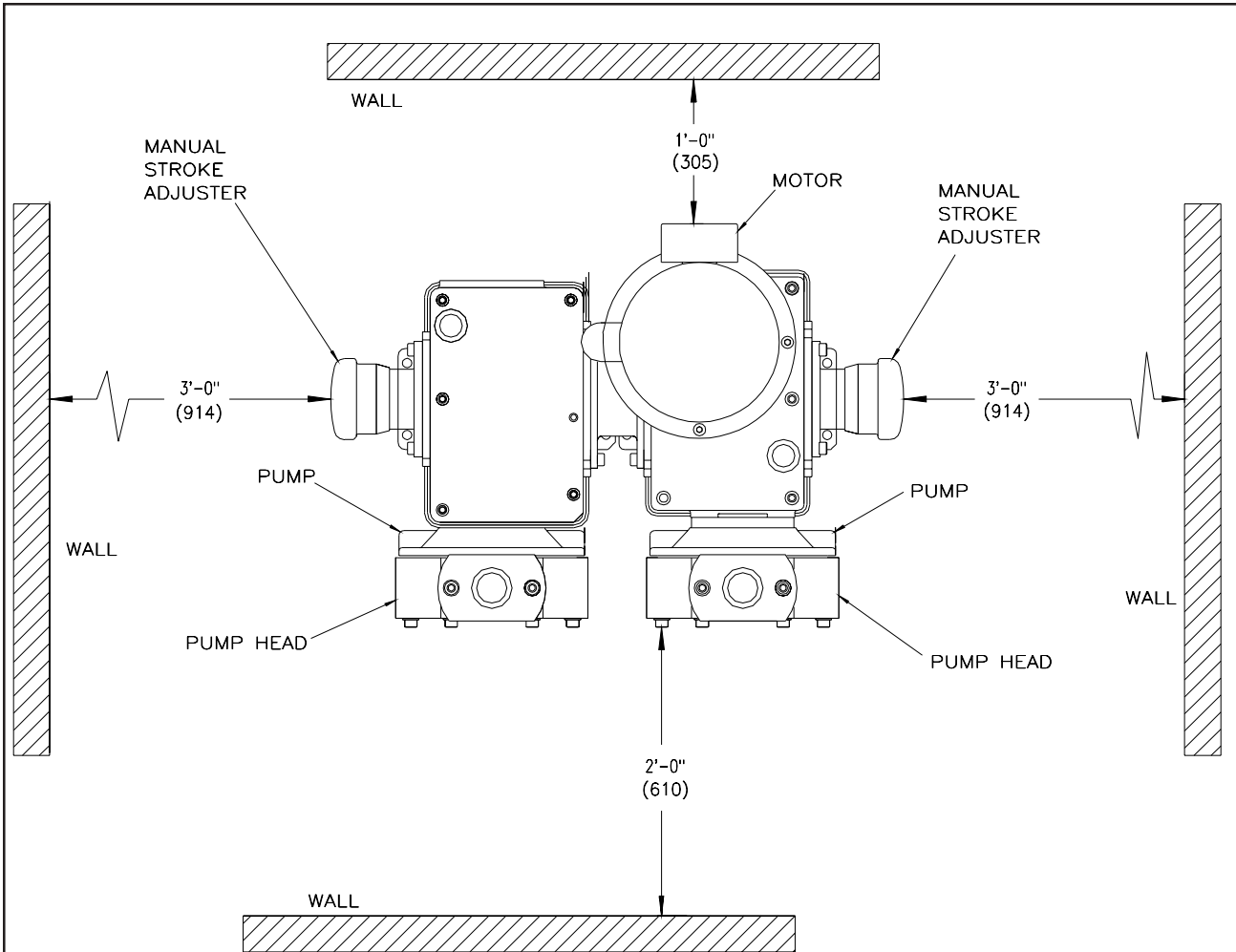
RECOMMENDED MINIMUM HEIGHT FROM FLOOR TO VALVE CONNECTIONS SHOULD BE 12" (305).

SIMPLEX MANUAL ARRANGEMENT - SPACE RECOMMENDATIONS

440.400.110.010

ISSUE 2 2-98

ENCORE® 700 METERING PUMP



NOTES: () INDICATES DIMENSIONS IN MILLIMETERS.

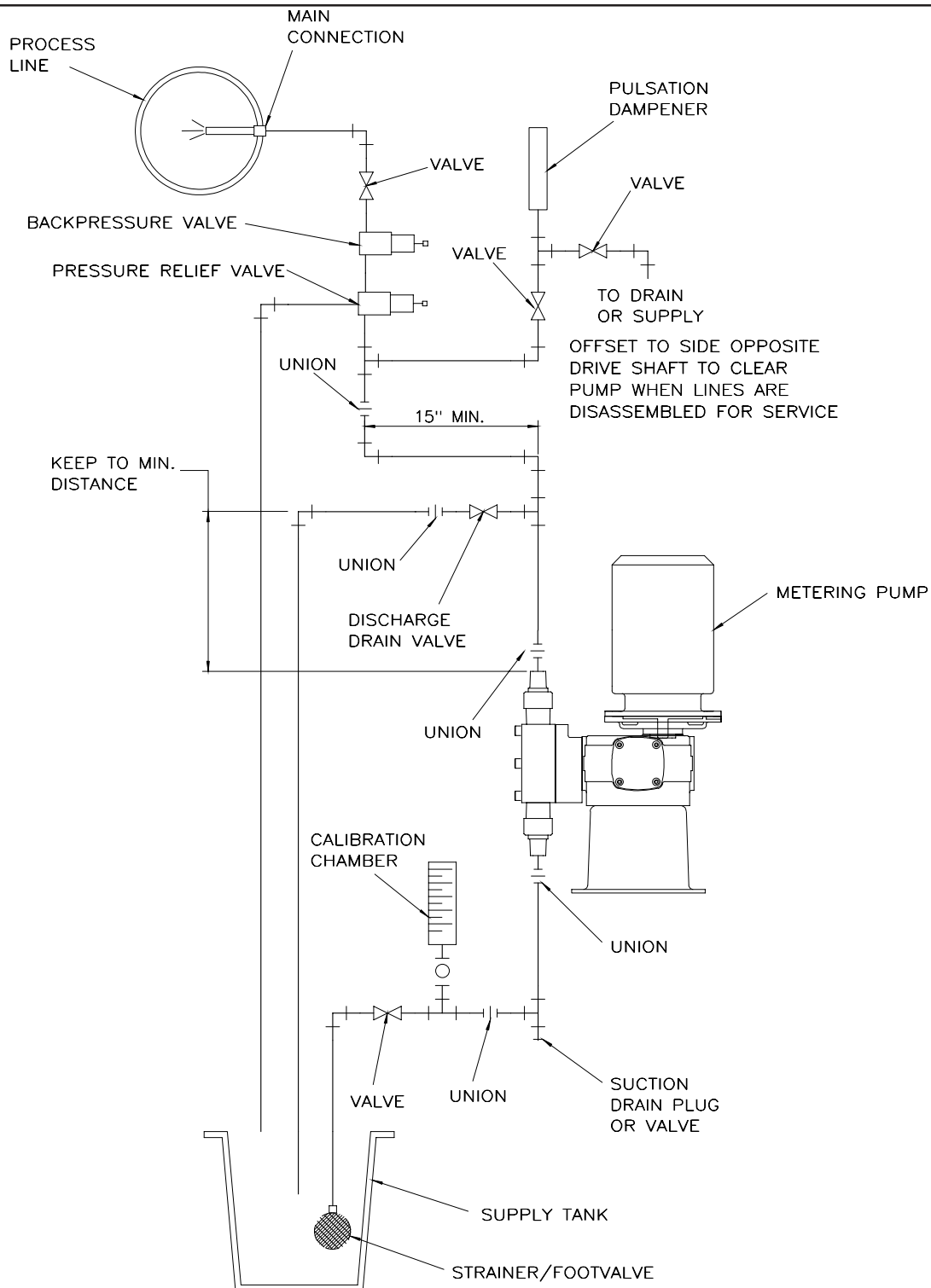
RECOMMENDED MINIMUM HEIGHT FROM FLOOR TO VALVE CONNECTIONS SHOULD BE 12" (305).

DOUBLE SIMPLEX MANUAL ARRANGEMENT - SPACE RECOMMENDATIONS

440.400.110.020

ISSUE 2 2-98

ENCORE® 700 METERING PUMP



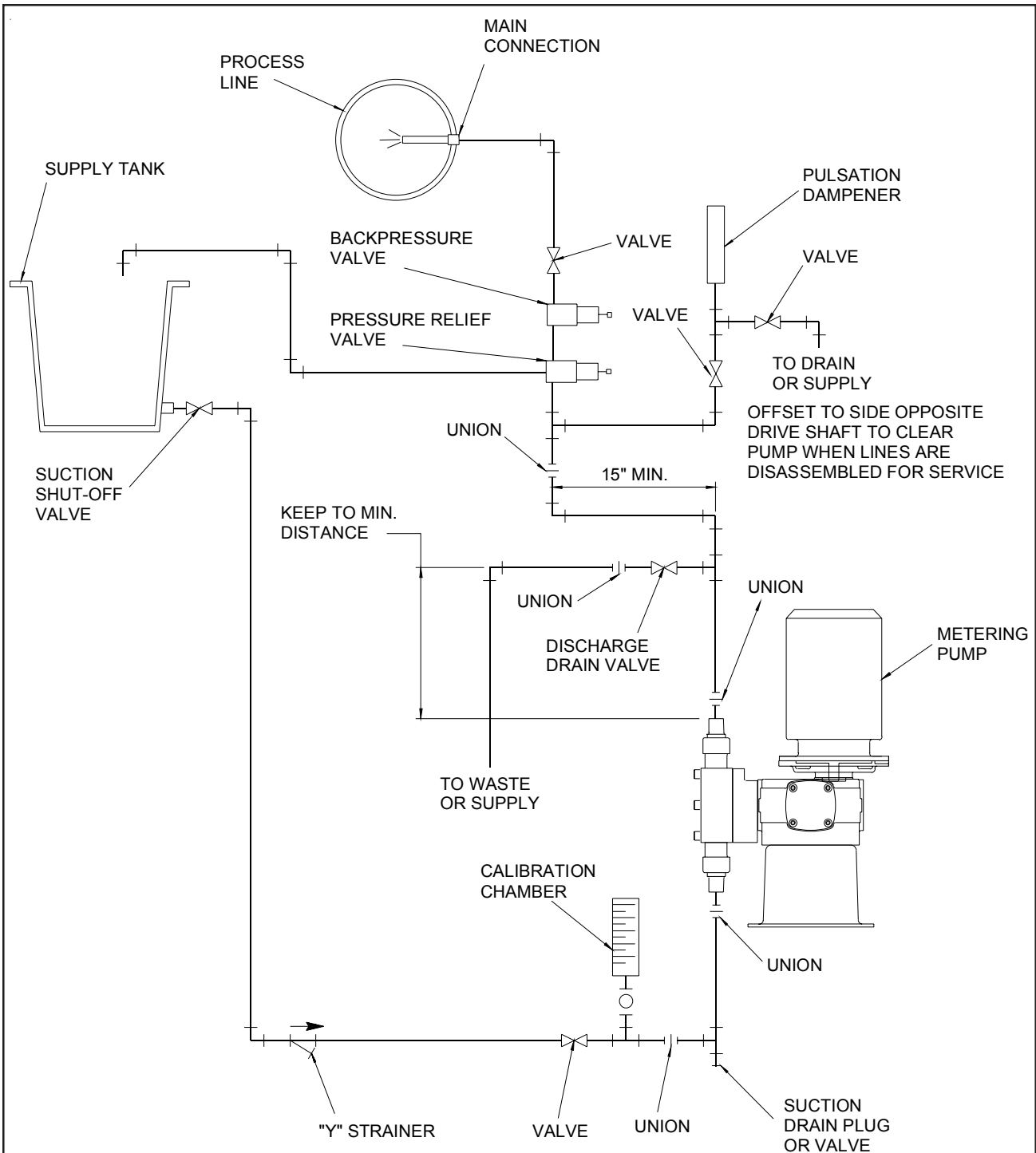
WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, WHEN HAZARDOUS CHEMICALS ARE PUMPED AND/OR ELEVATED TEMPERATURES/PRESSURES ARE ENCOUNTERED, USE RIGID PIPE.

METERING PUMPS - TYPICAL INSTALLATION
- Suction Lift

440.400.110.030

ISSUE 1 2-98

ENCORE® 700 METERING PUMP



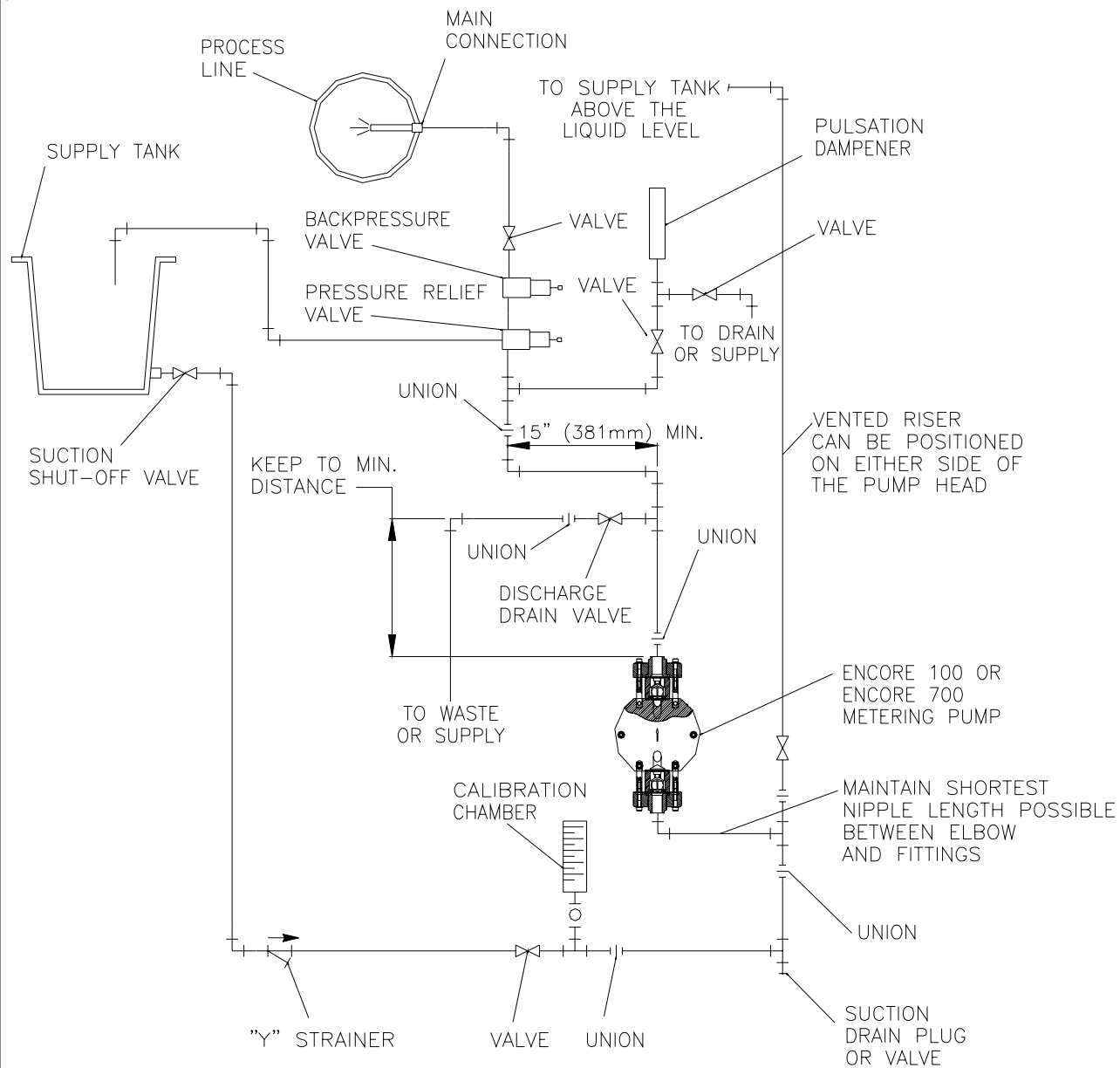
WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, WHEN HAZARDOUS CHEMICALS ARE PUMPED AND/OR ELEVATED TEMPERATURES/PRESSURES ARE ENCOUNTERED, USE RIGID PIPE.

METERING PUMPS - TYPICAL INSTALLATION
- Flooded Suction

440.400.110.040

ISSUE 1 2-98

ENCORE® 700 METERING PUMP



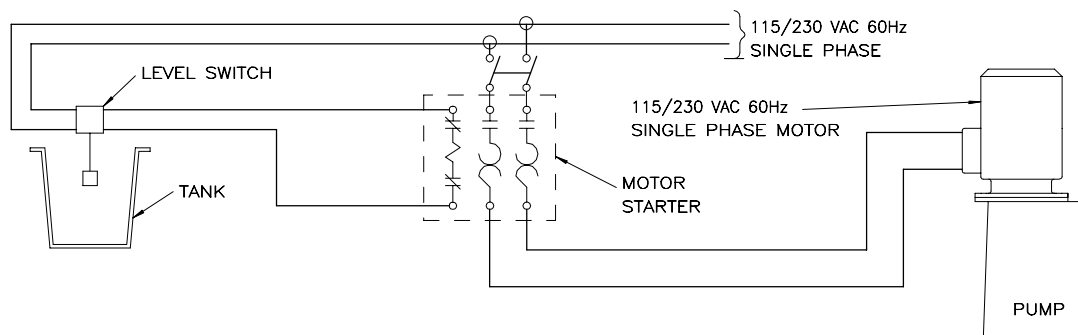
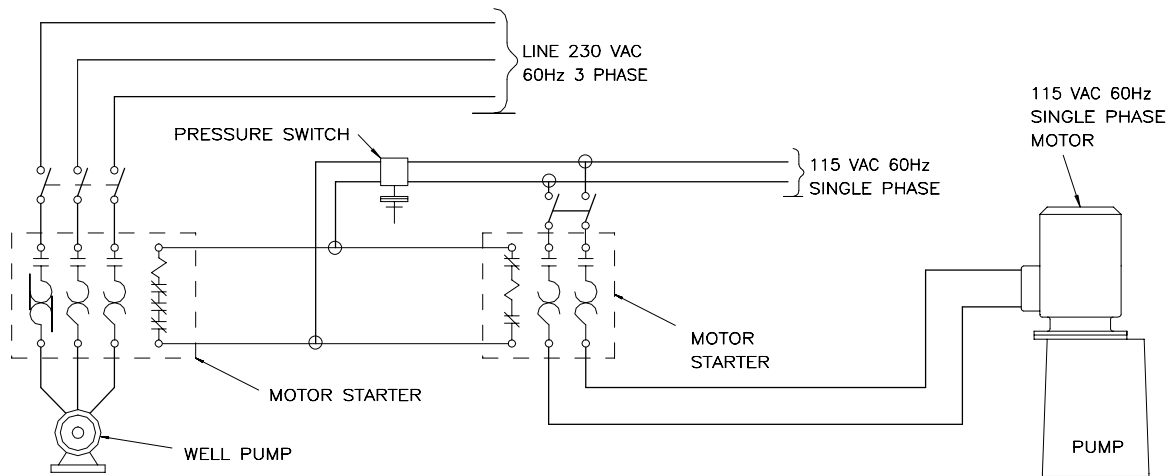
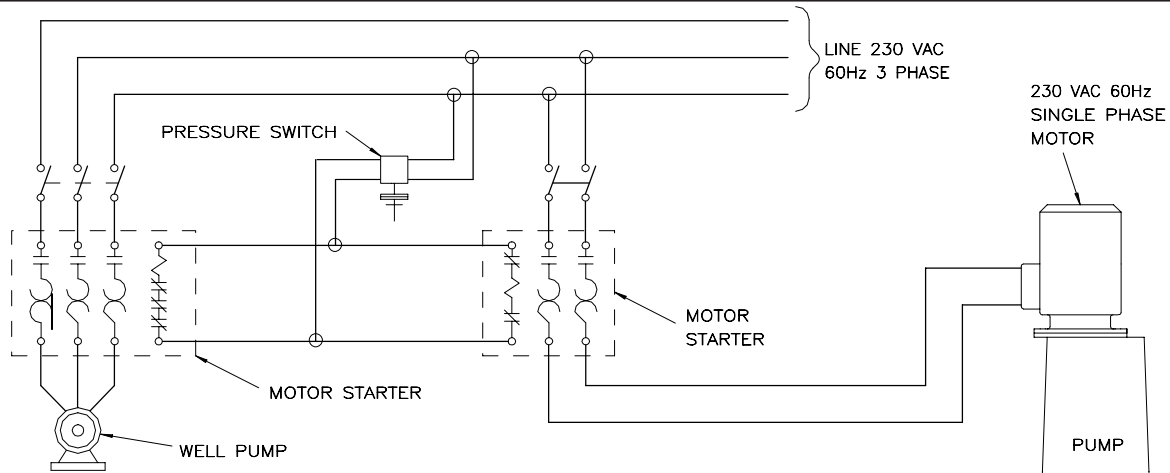
WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, WHEN HAZARDOUS CHEMICALS ARE PUMPED AND/OR ELEVATED TEMPERATURES/PRESSURES ARE ENCOUNTERED, USE RIGID PIPE.

METERING PUMPS - TYPICAL INSTALLATION
- Flooded Suction & Vent Riser

440.400.110.050

ISSUE 0 10-01

ENCORE® 700 METERING PUMP



NOTES: ——— FIELD WIRING (NOT BY U.S. FILTER/W&T) MUST CONFORM TO LOCAL ELECTRICAL CODES.
ALL VOLTAGES SHOULD BE 50/60 HZ

METERING PUMPS - INSTALLATION WIRING
- For Intermittent Start-Stop Operation

440.400.130.010

ISSUE 2 2-98

SECTION 3 - OPERATION

List of Contents

	PARA. NO.
Preparation for Operation	3.1
Starting and Stopping the Pump	3.2
Intermittent Start-Stop Operation	3.3
Adjustment of Feed Rate	3.4
Frequency of the Pump Stroke	3.4.1
Length of the Pump Stroke	3.4.2
Strength of the Solution	3.4.3
Calibrating the Pump	3.5
Theory of Operation	3.6
Pump Drive Mechanism	3.6.1
Speed Reducer	3.6.2
Stroke Control Mechanism	3.6.3
Liquid Ends	3.6.4

3.1 Preparation for Operation



- a. Fill the solution container with solution.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL. CONSULT YOUR CHEMICAL SUPPLIER FOR INSTRUCTIONS IN THE PREPARATION OF SOLUTIONS AND THE HANDLING OF CHEMICALS.

NOTE: Unless otherwise indicated, drawings referenced in this section are located in Section 5.

- b. Remove the breather cap (26, Dwg. 440.400.001.020A) located on the top of the gearbox. Remove the oil level check plug (36, Dwg. 440.400.000.010B) located on the right side of gearbox when facing the liquid end. Add approximately two liters of oil (USF/W&T part number AAA5499 or equivalent) through the breather cap hole until it flows from the oil level check hole. Replace the oil level check hole plug and the breather cap.



CAUTION: To avoid possible severe damage to the pump mechanism, do not run the pump without filling the gearbox with oil, as specified above. The oil level must be up to the oil check hole.

- c. Refer to Table 1.3 (in Section 1) to identify the belt location on the pulley to obtain the desired feed rate. Pumps delivered from the factory will have the belt located on the first step (top step of the pulley), which is the maximum speed setting. Install the belt guard before operating the equipment.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, DO NOT RUN THE PUMP WITH THE BELT GUARD REMOVED.

- d. Start the motor and operate the pump at a stroke setting of 100% of the scale until it is primed and ready for operation. The pump is designed to self-prime under a no backpressure condition; however, if difficulty is encountered in priming, check that the suction valve is not adhering to the suction valve seat. Refer to Section 4 - Service if the pump does not prime.

3.2 Starting and Stopping the Pump

3.3 Intermittent Start-Stop Operation (Refer to Dwg. 440.400.130.010 In Section 2)

Intermittent start-stop operation, also called semi-automatic operation, is simply the starting and stopping of the treatment (pump) in synchronism with an intermittent flow. This is accomplished by interrupting the electric current to stop the pump. The usual example calls for treating the discharge from a pumping system that starts and stops in response to predetermined variations in elevation or pressure of the liquid being treated.

3.4 Adjustment of Feed Rate

The feed rate of the pump is governed by the frequency of the pump stroke, the length of the pump stroke, and the strength of the solution to be fed.

3.4.1 Frequency of the Pump Stroke

The frequency of the pump stroke is determined by the gear ratio of the speed reducer. Available speeds for the Encore 700 are listed in Table 3.1:

Table 3.1 - Pump Gear Ratios and Speeds

Available Gear Ratios	Number of Strokes at 1725 rpm, 60 Hz
12:1	144 spm
24:1	72 spm
48:1	36 spm

If the pump is a pulley drive arrangement, each stroking speed can be further turned down. Refer to Table 1.3 (in Section 1) for further details on stroking speeds. If the pump is equipped with a variable speed drive, refer to the applicable instruction manual.

3.4.2 Length of the Pump Stroke



CAUTION: To avoid equipment damage, do not force the stroke control above 100% or below the 0% position. If it is hard to turn, have the pump operating and then turn the stroke control knob.

- Manual Positioning: Pump stroke length is adjusted by turning the stroke control knob (47, Dwg. 440.400.000.010B). Percent stroke length is shown on the micrometer scale, which consists of a linear scale and a circular scale. Ten turns of the knob covers 0 to 100% of

the stroke length. Numbers on the scale represent percent stroke. Each full turn of the knob will result in a 10% change of the stroke length. Each graduation on the circular scale on the knob is equal to 0.25%.

- Automatic Positioning: Pump can be equipped with an electric stroke positioner. If applicable, refer to the separate instruction manual provided with the equipment.

3.4.3 Strength of the Solution

Appropriate dilution of the solution will modify the concentration and, therefore, the feed rate. This will increase or decrease the amount of solution to be pumped per unit time. Adjusting the solution concentration can match the feed rate with the pump's capabilities and enhance the metering repeatability.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL. CONSULT YOUR CHEMICAL SUPPLIER FOR INSTRUCTIONS IN THE PREPARATION OF SOLUTIONS AND THE HANDLING OF CHEMICALS.

3.5 Calibrating the Pump

Perform calibration on the suction side of the pump against actual back pressure, so that piping will not have to be disturbed nor the pumping process interrupted. Refer to Dwgs. 440.400.110.030 and 440.400.110.040.

To calibrate the pump, proceed as follows:

- a. Close the chamber valve of the calibration chamber and fill the chamber to the top.
- b. With the pump running, close the in-line valve upstream of the chamber and, at the same time, open the chamber valve.
- c. Using a stopwatch, note the length of time required to drop the calibration chamber contents from the uppermost graduated line to a suitable graduated line lower on the chamber. Open the in-line valve and close the chamber valve to prevent air from being sucked into the suction line and interrupting the pumping cycle.
- d. Divide the quantity withdrawn from the chamber in cc by the elapsed time in minutes to obtain the pump rate in cc/minute.

$$(\text{cc / minute}) \times 0.38 = \text{gallons per day (gpd)}$$

or

$$(\text{cc / minute}) \times 1.44 = \text{liters per day}$$

3.6 Theory of Operation

The theory of operation for the Encore 700 Mechanical Diaphragm Metering Pump is addressed by discussing the operation and interrelationships of the following assemblies:

- Pump Drive Mechanism
- Speed Reducer
- Stroke Control Mechanism
- Liquid Ends (including head, valves, and connections)

The Encore 700 metering pump is comprised of a liquid end and a pump drive mechanism. The stroke length can be varied either manually or with an optional electric stroke positioner. The pump is driven by an electric motor that can be coupled either directly to the worm shaft (refer to Dwg. 440.400.001.010A) or indirectly by a pulley drive arrangement (refer to Dwg. 440.400.001.020A). The pulley drive arrangement provides a wide range of stroking speeds with the same gear ratio and, therefore, a wide range of capacities. A double simplex arrangement is also available (refer to Dwg. 440.400.000.020A).

3.6.1 Pump Drive Mechanism (Refer to Dwg. 440.400.000.010B)

The pump drive mechanism is contained within the gearbox. The motor rotates the worm wheel through the worm shaft. Worm wheel is coupled to the variable eccentric non-loss-motion mechanism, which rotates along with it, converting the rotational motion into the reciprocating motion of the crosshead (27) through a connecting rod (31). The crosshead provides a link between the connecting rod and the liquid end. Stroke length of the pump can be changed from 0 to 100 % by turning the stroke control knob (47).

3.6.2 Speed Reducer (Refer to Dwgs. 440.400.000.010A)

The pump stroking speed is obtained through gear ratios, which provide 36 spm, 72 spm, and 144 spm. Each stroking speed is available in a pulley drive configuration or a direct drive configuration. The four-step pulley combination provides additional stroking speed with each gear ratio.

3.6.3 Stroke Control Mechanism (Refer to Dwg. 440.400.000.010B)

The stroke control mechanism consists of a triangular knob (47) secured to the bearing carrier (22), which is bolted to the eccentric shaft (45) and turns on threads through a double row bearing (19) inside the stroke control housing (25). The stroke control housing has a linear scale showing 0 to 100%. This scale indicates the percent stroke length of the pump. Combination of a linear scale (0 to 100%) on the stroke control housing and a circular scale (0 to 10) provides an accurate micrometer-type setting of the stroke, with a resolution of 0.25%.

3.6.4 Liquid Ends

NOTE: Refer to the List of Contents for Section 5 - Illustrations to identify the applicable drawings.

The Encore 700 metering pump offers six different sizes of liquid ends to provide a wide range of capacities and pressures. The simplex arrangement has a capacity up to 317 gph and pressure up to 175 psi. Teflon-faced diaphragms are used as pumping diaphragms to provide metering accuracy as well as chemical compatibility. Six sizes of Teflon-faced diaphragms are available: 1-3/8", 2", 3", 4", 5", and 6-1/2". A variable eccentric mechanism is mechanically connected to the Teflon-faced diaphragm by a crosshead. A secondary seal mounted on the crosshead isolates the gearbox from the liquid end. Table 1.3 (in Section 1) provides further details on capacity and pressure capabilities for each liquid end. Cartridge valves are used on all the liquid ends to provide ease of service and field maintenance. Threaded valves are available on 1-3/8" and 2" heads only. Clear valve housings assist in checking the valve performance, providing built-in sight flow indication (except for the 6-1/2" head).

SECTION 4 - SERVICE

List Of Contents

	PARA./DWG. NO.
General	4.1
Periodic Cleaning	4.2
Cleaning Pumping Head Parts	4.2.1
Cleaning Clogged Solution Tube	4.2.2
Periodic Preventive Maintenance	4.3
Gearbox Lubrication	4.3.1
Priming Troubles or Loss of Suction	4.3.2
Hazardous Properties of Sodium Chlorite	4.3.3
Cleaning the Pump	4.3.4
Inspection	4.3.5
Corrective Maintenance	4.4
Removing Pump From Service and Disassembling	
Valves, Head, and Diaphragms	4.4.1
Draining System of Hazardous Material	4.4.2
Removing Suction and Discharge Valves	4.4.3
Removing the Diaphragm	4.4.4
Valve and Diaphragm Replacement	4.4.5
Disassembly of Complete Pump	4.4.6
Troubleshooting	4.5
Warning Summary Page	1 Page
Illustrations	
Automatic Slurry Flushing System – Service	440.400.150.010



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE FROM BEING SPRAYED WITH LIQUID UNDER PRESSURE, PRIOR TO DISASSEMBLY OF PIPE CONNECTIONS, REFER TO DETAILED INSTRUCTIONS ON RELIEVING PRESSURE AND DRAINING.

4.1 General

Routine maintenance of the metering pump consists of two operations:

- Periodic cleaning: To remove contaminants and deposits formed on parts in contact with the solution.
- Periodic preventive maintenance: To disassemble, inspect, clean, and replace recommended parts.

Corrective maintenance is performed (as required, at unscheduled intervals) to correct a discrepant operating or non-operating condition. A troubleshooting table (refer to Table 4.3) lists possible fault conditions and corrective actions as a guide for service personnel.

4.2 Periodic Cleaning

4.2.1 Cleaning Pumping Head Parts

If difficulty is encountered in pumping the solution where hard water is known to have been used in the preparation of the solution, remove the pumping head parts for cleaning (refer to paragraph 4.3.4). The effects of hard water are indicated by a white coating on all parts in contact with the solution. This coating is most easily removed by soaking the parts in 5% hydrochloric acid, commonly obtainable in drug stores. The commercial grade of hydrochloric acid—known as muriatic acid—is also suitable for this purpose. Where the above condition is known to exist, pump the acid solution through the pump head for approximately five minutes as a periodic preventive maintenance procedure.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL. CONSULT YOUR CHEMICAL SUPPLIER FOR INSTRUCTIONS IN THE PREPARATION OF SOLUTIONS AND THE HANDLING OF CHEMICALS.

4.2.2 Cleaning Clogged Solution Tube

Where solution joins water being treated and that water contains considerable hardness, there may be a deposit formed inside the solution tube at the point of application. In time, this can completely plug this tube and the deposit must be removed. The best method is by dissolving the deposit as described in paragraph 4.2.1. Where this condition is known to exist, clean the solution tube as a part of routine maintenance.

4.3 Periodic Preventive Maintenance

To minimize unscheduled shut down and ensure maximum service life, perform periodic maintenance at specified intervals while the equipment is in satisfactory condition. Table 4.1 lists the intervals, maintenance operation, and the preventive maintenance kits required. Before starting the work, ensure that the appropriate preventive maintenance kits are in stock. Refer to Section 6 - Preventive Maintenance Kits and Spare Parts List for the appropriate maintenance kit.

NOTE: Although all parts are designed for long service life, it is recommended that routine maintenance be performed to safeguard against unexpected downtime.

Table 4.1 - Scheduled Maintenance Index

INTERVAL	MAINTENANCE OPERATION	PREVENTIVE MAINTENANCE KIT
Annually	Replace PTFE diaphragm, PTFE disc (between diaphragm and back-up ring), and crosshead bellow seal.	Diaphragm Maintenance Kit
	Replace valve sets, which include the seat, ball, retainer/guide, and O-rings.	Valve Kit (Double ball valves: 2 kits required)
	Lubricate (refer to paragraph 4.3.1).	Food-grade synthetic oil AAB5499 (2 liters)
	Replace belt.	APS4857
Six Months	For slurry application or other abrasive chemical, replace valve sets every six months.	Valve Kit (Double ball valves: 2 kits required)

4.3.1 Gearbox Lubrication (Refer to Dwg. 440.400.000.010)

The gearbox is filled with approximately two liters of SAE 90 food-grade synthetic oil (USF/W&T Part No. AAA5499). This lubricant must be replaced every three years to realize optimum performance of the mechanism. The first oil change is recommended after six months of operation. If mineral oil (SAE 85W90 gear oil) is used, change the oil every year of operation, with the first oil change after three months of operation.

NOTE: Do not mix synthetic oil with mineral oil.

To drain and replace the gearbox oil, perform the following steps:

- a. Remove the oil drain plug (33) located at the bottom of the side wall of the gearbox (toward the stroke control knob). Catch the oil with an appropriate container.
- b. Let the oil drain completely and flush the gearbox using suitable detergents.
- c. Apply Teflon tape to the oil drain plug and install it to the gearbox.
- d. Remove the breather cap (44) located at the top of the gearbox cover and the oil check plug (36) located at the center of the gearbox side wall (toward the stroke control knob)
- e. Fill the gearbox with oil (AAA5499) until the oil flows out of the oil check hole.
- f. Apply Teflon tape to the oil check plug; thread and tighten.
- g. Install the breather cap.

4.3.2 Priming Troubles or Loss of Suction

Difficulties in priming are usually encountered when there is an air leak in the suction line or when the valves are obstructed. Air leaks in the suction line may be due to a loose valve, O-ring damage, cracked tubing, or leaking joints in the pipe thread connections. Obstruction on the valves may be caused by foreign material or by deposits on the pumping head parts.

Where liquid is withdrawn from containers that are replaced when they are empty, or if the level in a fixed tank occasionally falls below the suction line inlet, air will be introduced into the pump. If the pump is

discharging against atmospheric pressure (or only slightly above), the pump may be expected to reprime itself if the liquid supply is replenished and it is operated briefly at full stroke. If discharging against greater pressures, the pump will not reprime itself due to compression and re-expansion of the air trapped in the pump head.

If the system is installed in accordance with Dwgs. 440.400.110.030 or 440.400.110.040 (located in Section 2 – Installation) using a backpressure valve and/or pressure relief valve, the discharge drain valve may be opened to allow the pump to prime against atmospheric pressure. Once primed, close the discharge drain valve to resume normal operation.

If no backpressure and/or pressure relief valve are used, repriming is greatly simplified if a three-way valve is installed in the discharge line close to the pump outlet. This valve normally passes the pump output to the downstream tubing or pipe. When repriming is desired, the valve is turned to divert the pump output back to the liquid container, the downstream pressure is blocked off, and the pump operates at atmospheric discharge pressure. When a flow of liquid is observed returning to the source container, the pump is reprimed. The three-way valve is then turned back to its normal position and pump delivery can continue.

If an appropriate three-way valve is unavailable, the same result can be achieved by using two conventional shut-off valves. One is placed in the discharge line and other on the side opening of a tee located immediately upstream of the line valve.

4.3.3 Hazardous Properties of Sodium Chlorite (NaClO_2)



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, AS THE STORAGE AND HANDLING OF SODIUM CHLORITE PRESENTS VERY SPECIFIC HAZARDS, THE USER MUST SEEK THE ADVICE OF THE CHEMICAL SUPPLIER WITH REFERENCE TO STORAGE FACILITIES, HANDLING PRECAUTIONS, AND HEALTH HAZARDS.

Sodium chlorite is a dry, flaked salt that, because of its powerful oxidizing nature, is shipped in steel drums bearing a DOT “yellow” label classification. It is stable when sealed or in solution, but is very combustible in the presence of organic material. For this reason do not allow the solution to dry out on floors. Mop up the solution with technical sulfite solution.

Technical sodium chlorite is a white, flaked salt with a density of approximately 56 lbs per cubic foot. It is a very powerful oxidizing agent.

Sodium chlorite in contact with acid will react with rapid evolution of chlorine dioxide gas. When heated above 347°F, sodium chlorite will decompose rapidly, liberating oxygen with the evolution of sufficient heat to make the decomposition self-sustaining. If this decomposition is confined, as in closed containers, the effect is explosive. Therefore, it must be protected at all times from exposure to heat.

Sodium chlorite dissolves easily in water at ordinary temperatures to form a cloudy, white solution. This solution is chemically stable under ordinary conditions of temperature and pressure.

When received in loose flake form in metal containers, sodium chlorite will stand considerable rough handling. In scooping or weighing out the material, avoid contact with eyes, skin, mucous membranes, and clothing. Wash contaminated clothing quickly and thoroughly with water to avoid fire.

The danger lies in the fact that sodium chlorite in contact with or mixed with organic substances, such as clothing, cloth gloves, cotton waste, sawdust, mops, brooms, etc., becomes extremely sensitive to any agent, such as heat, friction, or impact, and these exposed organic substances will ignite readily when any of these are applied accidentally or otherwise. The finer the sodium chlorite is sub-divided, as is the case when sodium chlorite solution is left to evaporate and the more intimately it is mixed with the organic substance, the more sensitive to heat it becomes. Although, in practice, spontaneous ignition of such mixture is unlikely, it is theoretically possible for such a reaction to occur. Therefore, extreme care must be used to prevent sodium chlorite flakes or sodium solution from coming in contact with combustible material, especially fibrous or finely divided material.

4.3.4 Cleaning the Pump - Sodium Chlorite Applications - Special Precautions



WARNING: SODIUM CHLORITE, WHEN FINELY DIVIDED IN THE PRESENCE OF ORGANIC COMPOUNDS, IS A POSSIBLE FIRE HAZARD. FOR THIS REASON, EXTREME CARE MUST BE EXERCISED TO PREVENT SOLUTIONS FROM DRYING OUT IN THE THREADED PORTIONS OF THE PUMP BODY AND RELATED PARTS. OBSERVE CAREFULLY THE MANUFACTURER/SUPPLIER'S RECOMMENDED SAFETY PROCEDURES AND THE HANDLING AND STORAGE PROCEDURES IN THIS MANUAL.

Perform pump cleaning procedures in accordance with the following steps. When procedures require pump disassembly, refer to paragraph

4.4.1 - Removing Pump From Service. Refer to Dwg. 440.400.150.010 as a guide during this procedure.

- a. Transfer the suction line to a container of water and pump water until all the sodium chlorite in the pump and discharge lines has been replaced by water.
- b. Place a container under the pump head, then remove the suction line.
- c. Shut-off the discharge line valve.
- d. Relieve the pressure and drain the discharge line between the pump and the discharge line shut-off valve.
- e. Remove the pump head. Flush away any spilled solution not caught in the container with ample quantities of water.
- f. Immerse the pump head, valves, and lines that were removed in luke-warm water for two minutes.
- g. Unscrew the threaded parts under water.
- h. Rinse all the parts in fresh water before reassembly.
- i. Use water to prime the pump, then transfer the suction line to the sodium chlorite solution container.

4.3.5 Inspection

After the disassembled parts are cleaned and prior to reassembly perform the following procedure:

- a. Check for physical damage of removed parts (chipped, cracked, damaged threads, etc.). Replace damaged parts.
- b. Discard and replace all removed O-rings, seals, and gaskets.
- c. Check diaphragms for chafing or cracking. Replace damaged diaphragms.

4.4 Corrective Maintenance



WARNING: TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY WHEN SERVICING

HEADS AND/OR VALVES, FOLLOW THE PROCEDURES IN THIS SECTION FOR DISASSEMBLY.



WARNING: USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY. WHEN HANDLING HAZARDOUS MATERIAL, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE MATERIAL MANUFACTURER/SUPPLIER.



CAUTION: To prevent possible equipment damage, the solution must never be allowed to freeze in the pump. If freezing conditions are present when pump is shut off, drain pump head and all solution lines.

Corrective maintenance is performed as required to correct a discrepant operating or non-operating condition. A troubleshooting table is provided to guide service personnel in diagnosing and correcting most common troubles.

Routine maintenance procedures include the elimination of solution leaks when they are found, to avoid corrosion damage. Flush away spilled solution with water and wipe the parts clean and dry.

Maintain gasketed joints in good condition. Keep an adequate supply of gaskets and O-rings available so that repair of leaks can be accomplished without delay. It is a good practice to discard used gaskets and O-rings, replacing them with new material each time a joint is broken.

4.4.1 Removing Pump From Service and Disassembling Valves, Head, and Diaphragms



WARNING: USE EXTREME CARE TO AVOID CONTACT WITH THE MATERIAL AND POSSIBLE SEVERE PERSONAL INJURY WHEN USING HAZARDOUS MATERIAL. OBSERVE ALL SAFETY PRECAUTIONS APPROPRIATE PROTECTIVE CLOTHING AND EYE PROTECTION WHEN HANDLING HAZARDOUS MATERIAL.

Procedures for the assembly and disassembly of parts for pump corrective maintenance are referenced in the following paragraphs.

4.4.2 Draining System of Hazardous Material



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY FROM BEING SPRAYED BY LIQUID UNDER PRESSURE, ALLOW THE SYSTEM TO DRAIN FULLY BEFORE ATTEMPT-

ING TO DISASSEMBLE PIPING AND REMOVING VALVES AND/OR HEAD.

- a. Disconnect power from the pump.
- b. Close the discharge shutoff valve.
- c. For flooded suction, close the suction shutoff valve to prevent the backflow of liquid when suction lines are opened. (Refer to Dwg. 440.400.110.040 in Section 2.)
- d. Open the suction drain valve and drain the suction line of liquid.
- e. Open the discharge drain valve to relieve pressure and drain the discharge line.
- f. Open the bypass valve in the pressure relief valve.
- g. If a pulsation dampener is used, close off its valve when pressure has reached zero.

4.4.3 Removing Suction and Discharge Valves



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH LIQUID PRESENT IN THE HEAD. ALLOW THE SUCTION VALVE TO FALL INTO A SUITABLE CONTAINER AND CATCH THE LIQUID.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, USE EXTREME CARE TO AVOID CONTACT WITH THE LIQUID PRESENT BETWEEN THE DISCHARGE DRAIN VALVE AND THE UNIT BELOW. FLUSH ANY SPILLED LIQUID IMMEDIATELY.

- Cartridge Type Valve (refer to the Cartridge Liquid End parts drawings in Section 5):
 - a. Loosen the two screws located on the clamping block.
 - b. Slide the clamping block up.
 - c. Pull the valve cartridge out.
 - d. Slide the seat out of the cartridge to remove the ball.

NOTE: On the 1-3/8", 2", 3", 4", and 5" heads, the solution valve, guide, and retainer are molded as one piece. Slurry valves and spring-loaded polymer valves have a separate guide assembled inside the clear PVC retainer. On the 6.5" head, the retainer is machined and is opaque.

- Threaded Type Valve (refer to the Threaded Type parts drawings in Section 5):
 - a. Unscrew the valves from the head.
 - b. Remove the seats and guides.
 - c. Flush and clean the valves.

4.4.4 Removing the Diaphragm

- a. Remove the suction and discharge valves as described in paragraph 4.4.3.
- b. Remove the head screws, washers, and the pump head.
- c. Unscrew the diaphragm assembly by rotating it counterclockwise.

4.4.5 Valve and Diaphragm Replacement

NOTE: The 1-3/8", 2", 3", and 4" diaphragms utilize a circular back-up ring screwed on the diaphragm insert. When replacing the diaphragm, unscrew the back-up ring for reuse. A Teflon disc is inserted between the diaphragm and the back-up ring. A new Teflon disc must be used every time a new diaphragm is installed. For specific part numbers on the diaphragm, back-up ring, and Teflon disc, refer to the Spare Parts List in Section 6.

All O-rings must be lightly lubricated with silicone grease before assembly.

The assembly procedure for the cartridge or the threaded valves is the reverse of the disassembly procedures described in paragraph 4.4.3. Refer to Table 4.2 under head size for the corresponding torque to tighten the clamping bolts for the cartridge valves.

Refer to Dwg. 440.050.001.030 for the 1-3/8" Diaphragm and Dwg. 440.050.001.040 for the 2" Diaphragm. Use the 2" Diaphragm drawing as reference for all other sizes.

- a. After the removal of the diaphragm assembly, as described in paragraph 4.4.4, the bellow clamp (4) can be removed. On the 1-3/8" Diaphragm, the bellow clamp (3) is secured by a nut (4). The diaphragm spacer (5), if used, can also be removed
- b. Remove four screws (3) and slide out the adapter (1). On 1-3/8" Diaphragm, four long head bolts secure the adapter (1). Watch for the O-ring between the adapter and the gearbox.
- c. Pry off the old bellow seal (2) from the adapter and scrape the old sealant from around the counterbore.
- d. Clean the adapter thoroughly of oil with appropriate solvent, specially the counterbore where the bellow seal will be glued.
- e. Apply a 1/16" bead of RTV sealant along the corner of the counterbore.
- f. Install the new bellow seal carefully and avoid smearing any RTV on the folded surface of the bellow seal. Wipe off any excess RTV inside and outside of the bellow seal.
- g. Set aside, face up, and let the RTV sealant cure for a minimum of three hours before continuing the assembly. **Recommended time for RTV sealant to cure before filling the gearbox with oil is 12 hours.**

NOTE: Adapters with bellow seals already glued and ready for assembly to the pump are available. See Table 6.2 (in Section 6) for kit number.

- h. Clean the bellow clamp and remove any sharp edges along the area that makes contact with the bellow seal. Do the same to the plunger.
- i. Apply silicone grease to the O-ring and position it into the gearbox.
- j. Hold and centralize the plunger while inserting the adapter. Ensure that it fits freely into the gearbox.
- k. Tighten the four bolts diagonally. On the 1-3/8" Diaphragm, temporarily secure the adapter in position.
- l. Lubricate the bellow clamp and install it into the plunger, pressing lightly against the bellow seal. On the 1-3/8" Diaphragm, tighten the nut against the bellow clamp.

- m. Install the diaphragm spacer, if used, and thread the diaphragm assembly to the plunger against the bellow clamp. Rotate the pump input shaft to extend the diaphragm for a better grip.
- n. Turn the pump shaft until the diaphragm outer diameter is sitting flat, without strain, against the spacer.
- o. Assemble the remaining parts in the reverse order in which they were disassembled.

Table 4.2 - Recommended Torque Values

HEAD SIZE	RECOMMENDED TORQUE	
	HEAD SCREWS	CARTRIDGE VALVE CLAMPING
1-3/8"	45 to 60 in-lbs	20 to 25 in-lbs
2"	45 to 60 in-lbs	
3"	60 to 70 in-lbs	
4"	60 to 70 in-lbs	
5"	60 to 90 in-lbs	
6-1/2"	60 to 90 in-lbs	

4.4.6 Disassembly of Complete Pump



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, TURN POWER OFF BEFORE SERVICING.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY FROM BEING SPRAYED BY LIQUID UNDER PRESSURE, ALLOW SYSTEM TO DRAIN FULLY BEFORE ATTEMPTING TO DISASSEMBLE PIPING AND REMOVING VALVES OR HEADS.

The procedures below describe a simplex arrangement with manual stroke control.

All O-rings must be lightly lubricated with silicone grease before assembly.

Under normal operating conditions, disassembly of the gearbox is not required. Should disassembly be necessary, proceed as follows:

- Gearbox Cover Removal (refer to Dwg. 440.400.001.010A or Dwg. 440.400.001.020A)
 - a. Remove the liquid end, which includes the valves, head, and diaphragm, as described paragraph 4.4.2.
 - b. For a direct drive, refer to Dwg. 440.400.001.010A. Remove the electric motor and set aside. Do not remove the coupling flange unless it is to be replaced. Remove the motor support (5), loosen the set screws, and remove the coupling flange. Proceed to step d.
 - c. For a pulley drive, refer to Dwg. 440.400.001.020A. Remove the belt guard (10), loosen the belt (9), and remove the electric motor. The pulley (2) need not be removed from the motor shaft unless it is being replaced. Loosen the set screws (8) on the worm shaft pulley (7) and pull out the pulley.
 - d. Unscrew all of the M8 screws that secure the cover (1, Dwg. 440.400.001.010A, or 22, Dwg. 440.400.001.020A) and pry it open with a suitable screwdriver. The complete mechanism is now exposed.

NOTE: Two slots are provided for this purpose, one in the front and one in the back. Silicone RTV is used as a seal and it requires a gentle tap to break the seal. Note the locations of the special washer and all the screws.

- Worm Shaft and Worm Wheel Removal (refer to Dwg. 440.400.000.010A&B)
 - a. Remove the gearbox cover, as described in step a, above.
 - b. Drain the gearbox oil.
 - c. Remove the worm shaft assembly (51) by pulling it up.

NOTE: Two bearings (6) and (7) and a shim combination (12-15) come out with the assembly.

- d. Set the knob (47) to zero.
- e. Remove the gear access flange (2) by unscrewing the four M8 screws (3).

- f. Slide the worm wheel (50) and the drive bushing assembly (4) out through the flange opening.

NOTE: Mark the relative position of the drive bushing (4) and sheave (46) so that they can be reassembled at the same position.

- g. On a bench, remove the taper roller bearing (30) from the drive bushing (4).
- h. Unscrew the five M6 screws (10) and remove the worm wheel (50).
- Worm Shaft and Worm Wheel Replacement (refer to Dwg. 440.400.000.010A)
 - a. Apply Blue Loctite thread locker (11) to the five M6 screws (10). Replace the worm wheel (50) and secure with screws (10).
 - b. Reverse the remaining procedures for replacement of the worm shaft and the worm wheel.
- Eccentric Assembly, Taper Roller Bearings, Connecting Rod, Stroke Control Housing, and Knob Removal (refer to Dwg. 440.400.000.010A&B)
 - a. Follow steps a through d of the procedure for worm shaft and worm wheel removal, above.
 - b. Remove the stroke control knob (47) by loosening the three set screws (48) just enough to slide the knob out. Do not screw all the way out, just flush with the surface of the knob.

NOTE: If the pump is equipped with an electric stroke positioner, refer to the applicable instruction manual.

NOTE: The set screws (48) are coated with Nylok™ to seal. If set screws were removed or are leaking, replace with a new one.

- c. With a 6mm Allen wrench, remove one M8 screw (21) from the eccentric shaft (45), which is accessible through the carrier bearing (22) end opening. Hold the worm wheel (50) to keep the eccentric assembly from turning.

NOTE: If the pump is equipped with detent stroke mechanism, proceed to step e, if not, proceed to step d.

NOTE: Pumps with an Electric Stroke Positioner do not have detent stroke mechanism.

- d. Turn the carrier bearing (22) counterclockwise until it comes all the way out, then proceed to step i.
- e. Refer to Dwg. 440.400.000.030 for the next three steps f, g, and h.
- f. Turn the carrier bearing (22) until the two detent pawls (52) are visible.
- g. Hold the two detent pawls, they are pre-loaded with springs (53), and continue to turn the carrier bearing counterclockwise until the two detent pawls are free.
- h. Carefully release and remove the two pawls and two springs and set aside. The carrier bearing can now be unscrewed completely out.

NOTE: The bearing (19) and the flat washer (20) need not be removed unless they are being replaced. A special wrench is needed to loosen or tighten the adjuster bearing (23) (AAA3731).

- i. Unscrew the four M8 screws (49) and remove the stroke control housing (25).
- j. Unscrew the pre-load nut (17).
- k. Unscrew the four M8 screws (3) and remove the gear access flange (2).
- l. Slide out the worm wheel (50) and the drive bushing assembly (4).
- m. Holding the connecting rod assembly, slide the eccentric assembly out of the gearbox.
- Eccentric Assembly, Taper Roller Bearings, Connecting Rod, Stroke Control Housing, and Knob Replacement (refer to Dwg. 440.400.000.010B)

Reverse the removal procedures for the replacement of the item mentioned above, however, the following additional procedures must be adhered to:

- a. Tighten the pre-load nut (17) just enough to eliminate axial movement of the eccentric assembly in step j, above. The eccentric shaft (45) must slide in and out without any binding.

NOTE: If the pump is equipped with detent stroke mechanism, proceed to step b, if not, proceed to step e.

NOTE: Pumps with an Electric Stroke Positioner do not have detent stroke mechanism.

- b. Refer to Dwg. 440.400.000.030 for the next two steps, c and d.
- c. Screw the carrier bearing (22) to the stroke adjust housing (25) up to the edge of the two holes for the detent pawls (52). Position the two holes so that they are horizontal.
- d. Lubricate and install the spring, followed by the pawl, into the holes and hold them in position. Continue to turn clockwise to secure the pawls.
- e. Continue to turn the carrier bearing (22) clockwise until it stops. The bearing (19) must be against the eccentric shaft (45) shoulder before tightening the screw (21) in step c, above.
- f. Set the stroke position to approximately zero by turning the carrier bearing (22) counterclockwise until it stops. Then rotate the carrier bearing one turn clockwise.
- g. Place a dial indicator with a magnetic base on top of the gearbox. Set the indicator shaft to indicate the eccentricity of the sheave (46), as shown in Figure 4-1.

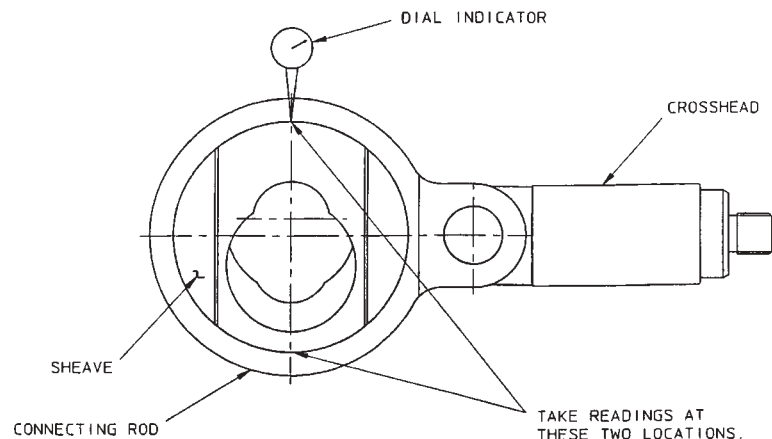


Figure 4-1. Eccentric Shaft Alignment

- h. Rotate the eccentric shaft assembly (45) and take the indicator reading at two locations, 180° apart, and along the eccentric travel of the sheave.
- i. Both readings must be the same. If the readings are different, turn the carrier bearing clockwise or counterclockwise until a point is found where the readings are the same.
- j. If the pump is equipped with detent stroke mechanism, turn the carrier bearing clockwise to the nearest detent.

NOTE: Do not disturb this set position until the knob is secured at zero scale indication.

- k. Apply silicone grease to the O-ring and install it in the groove in the stroke control housing.



CAUTION: The carrier bearing must not be disturbed while performing the next four steps.

- l. Start the three M6 screws, with Nylok™ patch, in the knob.
- m. Position the knob (47) over the stroke control housing with the zero graduation on the knob lined up with the center line of the stroke control housing scale, as shown in Figure 4-2.

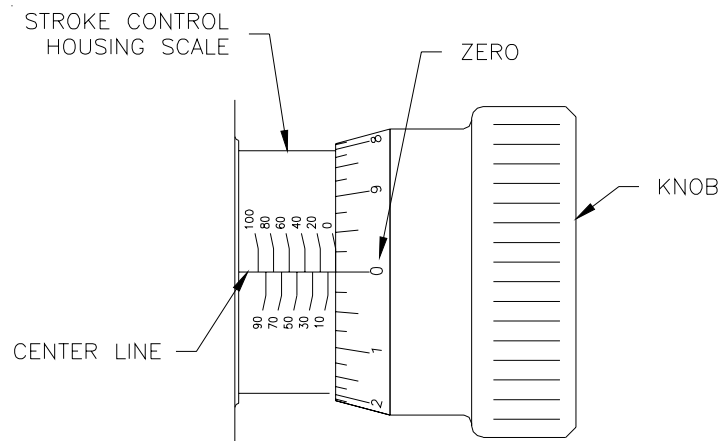


Figure 4-2. Stroke Control Alignment

- n. Push the knob past the O-ring for manual position (quad-ring for automatic position) until the front edge of the knob is in line with the zero percent line on the stroke control housing scale.

- o. Slide the knob, if necessary, to align the scales as shown in Figure 4-2. Tighten the three M6 set screws equally. Make sure the set screws that are used have a Nylok™ patch on the threads to prevent oil leakage.

NOTE: All O-rings must be lightly lubricated with silicone grease before assembly.

- Gearbox Cover Installation for Direct Drive (refer to Dwg. 440.400.001.010A)
 - a. Position lower taper roller bearing to worm shaft and install to the gearbox.
 - b. Install shims and taper roller bearing.
 - c. Temporarily install the cover, tightening the four bolts closest to the worm shaft that threads to the gearbox.
 - d. Check that end play is within .005". If not, select proper shims.
 - e. Remove the cover and apply grease to the top bearing.
 - f. Apply 1/8" bead of RTV around the top lip of the gearbox.
 - g. Install the cover and tighten all bolts.
 - h. Install one coupling flange to the worm shaft, tighten the two set screws.
 - i. Mount the motor support and secure with four M8 screws (longer screws to the outside, shorter screws to the inside).
 - j. Position the rubber coupling to the coupling flange.
 - k. Measure the distance from the top surface of the motor support to the top surface of the rubber coupling ("A" dimension) and add to this dimension the depth of the groove ("B" dimension). This groove is where the rubber coupling engages. Record this dimension ("A" + "B"). See Figure 4-3.

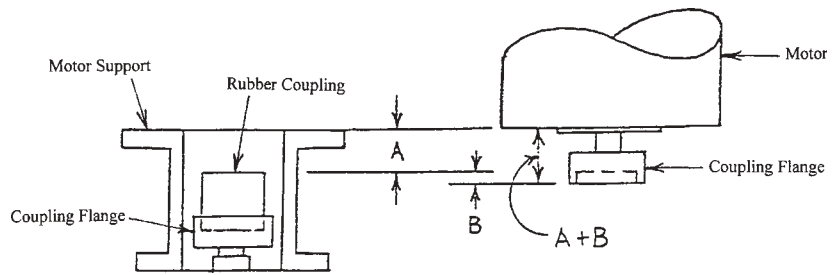


Figure 4.3 - Rubber Coupling Engagement

1. Position the other coupling flange to the motor shaft facing outward.
 - m. Locate the front face of the flange from the face of the motor according to the dimension ("A" + "B"), recorded above. Tighten the two set screws.
 - n. Carefully lower the motor to the motor support. It will drop into place once the coupling is engaged. A little twist of the motor while lowering it will help to engage the coupling.
 - o. Tighten the motor mounting bolts.
- Gearbox Cover Installation for Pulley Drive (refer to Dwg. 440.400.001.020A)
 - a. Position lower taper roller bearing to the worm shaft and install to the gearbox.
 - b. Install the shims and taper roller bearing.
 - c. Temporarily install the cover, tightening the four bolts closest to the worm shaft that threads to the gearbox.
 - d. Check that end play is within .005". If not, select proper shims.
 - e. Remove the cover and apply grease to the top bearing.
 - f. Apply 1/8" bead of RTV around the top lip of the gearbox.
 - g. Install the cover and tighten all bolts.
 - h. Install the bigger pulley, smaller step on top, to the worm shaft all the way against the shoulder, and tighten the two set screws.

- i. Thread the three stand-offs tight against the shoulder to the gear-box cover.
- j. Mount the stand-off plate to the three stand-offs and secure with the three M8 flat head screws.

NOTE: There must be an electrical continuity between the stand-offs and the stand-off plate. Scratch off the paint under one of the bolt heads if necessary.

- k. Place the belt around the front pulley.
- l. Install the slide plate to the motor front face.

NOTE: The orientation of the motor junction box to the pump is established here. Electrical continuity between the motor and the slide plate is necessary.

- m. Install the smaller pulley to the motor shaft and snug the set screw.
- n. Position the motor assembly to the stand-off plate with the adjustment screw to the back of the pump.
- o. Secure the slide plate to the stand-off plate with four M8 screws, flat washers, and lock washers. Do not tighten screws.
- p. Position the belt on the top step of the pulley.
- q. Adjust the belt tension by tightening the adjusting screw at the back of the slide plate, tighten the jam nut. Tighten the four M8 screws.

NOTE: The proper adjustment of the belt tension is when it stops “flapping” while the motor is running. Electrical continuity between the slide plate and the stand-off plate is necessary.

- r. Loosen the set screw (3mm allen wrench) on the motor pulley just enough so it will not drop.
- s. With reference to Figure 4-4, adjust the motor pulley so that there is a .005"/.010" gap between the belt edge and the pulley surface on the worm shaft.

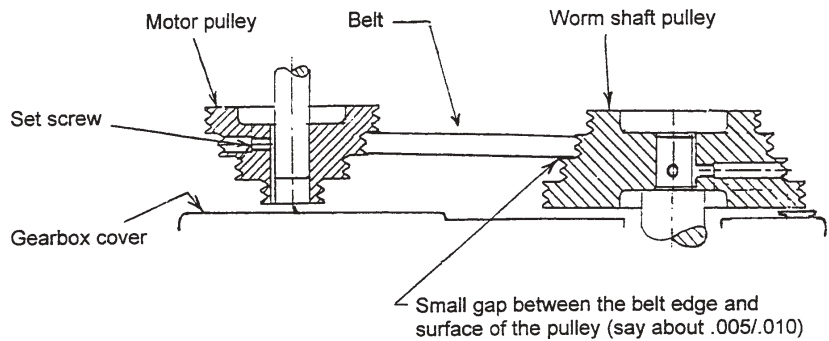


Figure 4.4 - Motor Pulley Adjustment

- t. Install the rear belt guard to the pump followed by the front belt guard and screw the two side screws. Make sure that the front belt guard catches the shoulder washer in front of the pump.
- u. Screw the two cap screws that hold the rear belt guard and slightly push the front belt guard against the shoulder washer and tighten the two cap screws.

4.5 Troubleshooting

Troubleshooting of the Encore 700 Series Metering Pump consists of procedures and instructions for repair and/or replacement of subassemblies and components.

The troubleshooting procedures are limited to fault isolation to a defective item. Potential problems that could be at fault and recommendations for corrective action are listed in Table 4.3. Procedures are based on potential fault conditions that may occur under normal pump operation.

Table 4.3 - Troubleshooting

FAULT CONDITION	POSSIBLE CAUSE	CORRECTIVE ACTION
NO FEED RATE OR INSUFFICIENT FEED RATE.	Zero or insufficient stroke length.	Adjust to proper stroke length.
	Ball valves on suction or discharge side do not close tightly.	Replace balls in valves. Remove possible deposits in valves or pump head. Replace pump head.
	Gas in suction line or pump head.	Check for cavitation and, if necessary, use a suction line with a larger inside diameter. Dilute the liquid (sodium hypochlorite).
	Air in suction line or pump head.	Bleed the suction line and pump head.
	Supply tank is empty.	Fill supply tank.
	Shut-off valves in suction or discharge lines are closed.	Open valves.
	Strainer is clogged.	Clean strainer.
	Damaged drive mechanism.	Check mechanism and replace defective parts.
NO FEED RATE ON POINT OF APPLICATION, THOUGH PUMP IS PUMPING.	Pressure relief valve is defective or misadjusted, so that the liquid flows back into the supply tank.	Adjust pressure relief valve to proper relief pressure.
LIQUID IS EMERGING FROM PUMP HEAD NEAR THE DIAPHRAGM.	Broken diaphragm or broken crosshead oil seal.	Replace diaphragm, or replace oil seal.
PUMP IS PUMPING ERRATICALLY OR FEED RATE IS INACCURATE.	No backpressure.	Install backpressure valve into the discharge line.
EXTREMELY NOISY OR HOT GEAR BOX.	Insufficient lubrication or defective bearing(s).	Check oil level through oil check hole, if required, replace bearing(s).
	Incorrect worm shaft end play.	Add or remove shims to achieve proper clearance.
MOTOR WILL NOT RUN.	Power off or fuse is blown	Turn on the power. Replace the fuse after correcting the cause.
MOTOR IS HOT, BUT STARTS WHEN COOL.	Overload protector has opened.	Check supply voltage. Check excessive pressure at point of application. Check binding pump mechanism.
BELT IS NOISY.	Worn belt. Pulley misaligned. Pulley out of round; wobbly.	Replace belt. Adjust tension by the tensioning screw. Align pulley per procedure found on pages 46-47, steps q through u.

WARNING LABELS AND TAGS

The following warning labels and tags are attached to the equipment:

AAA3769: THIS EQUIPMENT MAY HANDLE HAZARDOUS MATERIALS WHICH CAN CAUSE SEVERE PERSONAL INJURY. OBSERVE THE FOLLOWING:

THIS EQUIPMENT MUST BE INSTALLED, OPERATED, SERVICED BY TRAINED QUALIFIED PERSONNEL, WHO ARE THOROUGHLY FAMILIAR WITH THE CONTENTS OF THE INSTRUCTION BOOK.

TURN OFF POWER BEFORE SERVICING TO AVOID ELECTRICAL SHOCK.

USE RIGID PIPE WHEN PUMPING THE HAZARDOUS MATERIALS OR AT HIGH FLUID TEMPERATURE OR AT HIGH DISCHARGE PRESSURES.

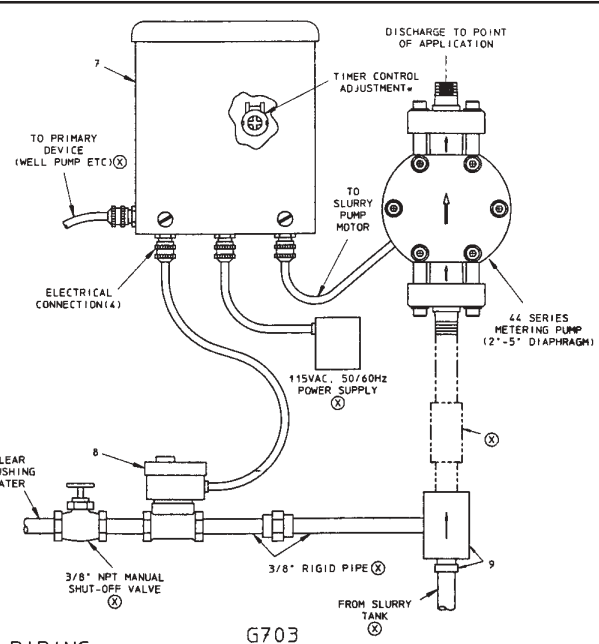
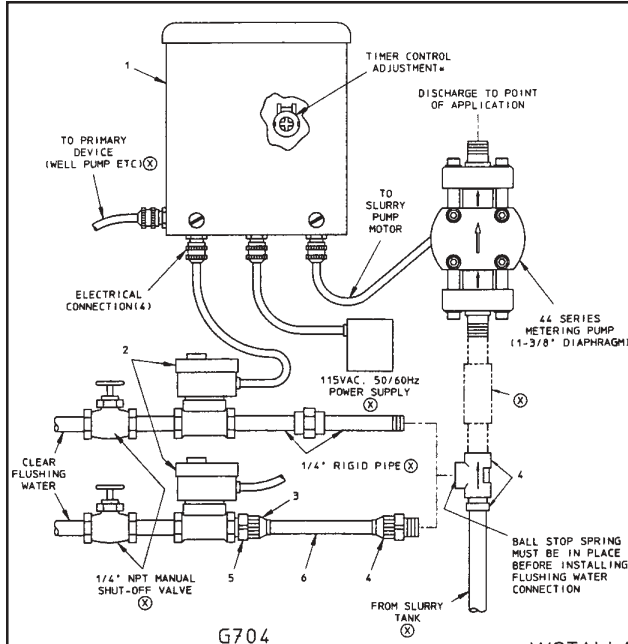
REFER TO THE SAFETY PRECAUTIONS OF THE SUPPLIER OF THE HAZARDOUS MATERIAL AND THE EQUIPMENT INSTRUCTION BOOK FOR FURTHER IMPORTANT DETAILS AND PRECAUTIONS.

USE APPROPRIATE PROTECTIVE CLOTHING AND EYE PROTECTION, AS RECOMMENDED BY THE CHEMICAL MANUFACTURER.

AAA3759: TO PREVENT POSSIBLE SEVERE PERSONAL INJURY DUE TO BEING SPRAYED WITH HAZARDOUS LIQUID UNDER PRESSURE DO NOT DISCONNECT DISCHARGE TUBE/PIPE/MAIN CONNECTION WITHOUT FIRST RELIEVING PRESSURE AND DRAINING DISCHARGE LINE. SEE INSTRUCTION BOOK FOR DETAILED GUIDANCE.

AEK3676: TO AVOID POSSIBLE SEVERE PERSONAL INJURY FROM CONTACT WITH MOVING PARTS REPLACE GUARD AFTER SERVICING EQUIPMENT.

ENCORE® 700 METERING PUMP



INSTALLATION PIPING

NOTE: SUFFICIENT FLUSHING WATER PRESSURE IS REQUIRED TO OPERATE FLUSHING SYSTEM. IF FLUSHING WATER SUPPLY PRESSURE IS LOW, PUMP MUST BE OPERATED NEAR MAXIMUM STROKE LENGTH AND MOTOR SPEED TO ENSURE SUFFICIENT PRESSURE IN PUMP HEAD.

⊗ NOT FURNISHED BY W&T.

G704 (1-3/8" DIAPHRAGM)

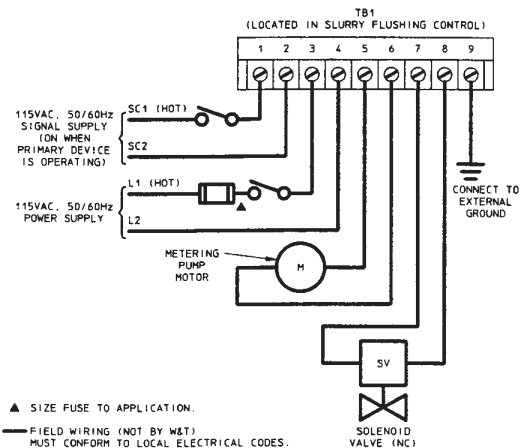
KEY NO.	PART NO.	QTY.	DESCRIPTION
1	U23906	1	FLUSHING CONTROL UNIT (SEE DWG. 440.300.002.010)
2	U21834	1	1/4" NPT SOLENOID VALVE (INC)
3	P39234	1	UNION NUT (3/8" OD TUBING)
4	U23830	1	FLUSHING CONNECTION (1/4" NPT) (SEE DWG. 440.050.050.070)
5	U39233	1	HALF UNION (1/4" NPT TO 3/8" OD TUBING)
6	RP684818	SFT	POLYETHYLENE TUBING (1/4" ID X 3/8" OD)

G703 (2"-5" DIAPHRAGM)

KEY NO.	PART NO.	QTY.	DESCRIPTION
7	U23906	1	FLUSHING CONTROL UNIT (SEE DWG. 440.300.002.010)
8	U20743	1	3/8" NPT SOLENOID VALVE (INC)
9	U23829	1	FLUSHING CONNECTION (1" NPT) (SEE DWG. 440.050.050.065)

* OPERATION: 1) THE AUTOMATIC FLUSHING SYSTEM, UPON RECEIPT OF AN OFF SIGNAL FROM THE PRIMARY DEVICE, WILL CONTINUE TO OPERATE THE PUMP AND ENERGIZE THE SOLENOID VALVE FOR THE DURATION OF THE FLUSHING CYCLE.

2) TO ADJUST THE FLUSH CYCLE TIME, USE A SMALL SCREWDRIVER INSERTED INTO THE SLOT OF THE TIMER CONTROL. FULL COUNTERCLOCKWISE FOR ZERO TIME TO FULL CLOCKWISE FOR A MAXIMUM PERIOD OF APPROXIMATELY 120 SECONDS. FLUSHING CYCLE SHOULD BE LONG ENOUGH TO ENSURE PURGING OF THE SLURRY FROM VALVES AND HEAD.



INSTALLATION WIRING

AUTOMATIC SLURRY FLUSHING SYSTEM - SERVICE

440.400.150.010

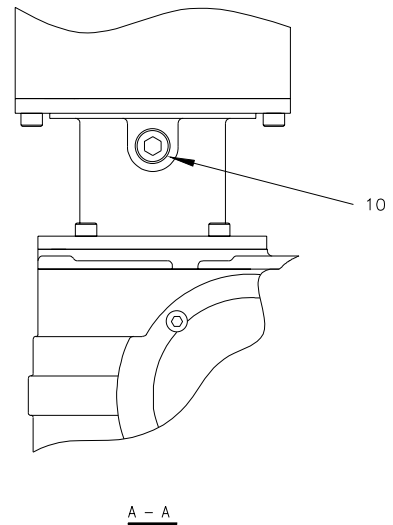
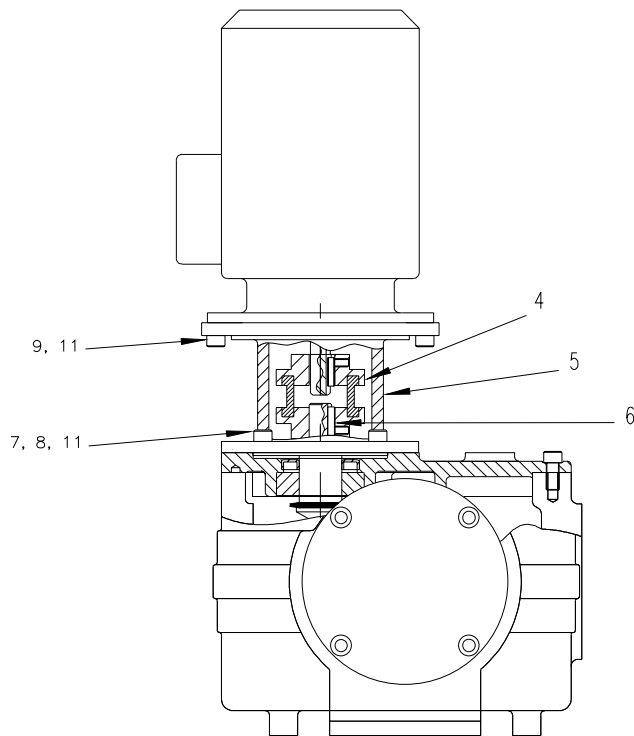
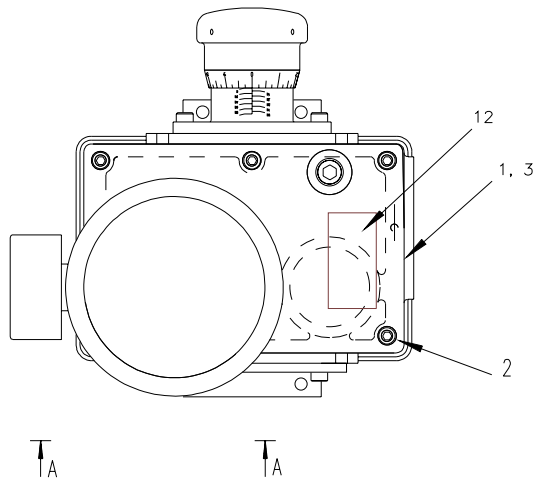
ISSUE 0 6-96

SECTION 5 - ILLUSTRATIONS

List of Contents

	DRAWING NO.
Parts	
AIC3021 Direct Drive	440.400.001.010A&B
AKG3009 Pulley Drive	440.400.001.020A&B
ANM4784 Pump - Simplex Gearbox	
Assembly	440.400.000.010A-D
AAA1445 Pump - Double Simplex Gearbox	
Assembly	440.400.000.020A-D
AAB5792 Detent Stroke Adjustment Kit	440.400.000.030
1-3/8" Cartridge Liquid End	440.050.010.010A-C
1-3/8" Threaded Liquid End	440.050.010.020A&B
1-3/8" Liquid End Adapter	440.400.001.030
2" Cartridge Liquid End	440.050.010.030A-C
2" Threaded Liquid End	440.050.010.040A&B
2" Liquid End Adapter	440.400.001.040
3" Liquid End	440.400.010.010A-C
3" Liquid End Adapter	440.400.001.050
4" Liquid End	440.400.010.020A-C
4" Liquid End Adapter	440.400.001.060
5" Liquid End	440.400.010.030A-C
5" Liquid End Adapter	440.400.001.070
6-1/2" Cartridge Liquid End	440.400.010.040A-D
6-1/2" Liquid End Adapter	440.400.001.080

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST, SEE DWG. 44.400.001.010B.

AIC3021 DIRECT DRIVE - PARTS

440.400.001.010A

ISSUE 2 8-01

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
■ 1	ARQ5712	1	COVER, SIMPLEX, DIRECT DRIVE
■ 2	AXS3656	4	SCR. CAP, M8 x 20, SOCK. HD., 316SS
■ 3	AXQ3743	A/R	ADHESIVE, GE SILCONE RTV
● 4	AAA9542	1	COUPLING, SURE-FLEX, .625"/.625", 56C
● 5	AAA9554	1	SUPPORT, MOTOR. 56C
● 6	AQC3464	1	KEY, 3/16 SQ. x 3/4" LG
● 7	ARE3591	2	SCR. CAP, M8 x 40 LG, SOCK. HD., 316SS
● 8	AXS3656	2	SCR. CAP, M8 x 20 LG, SOCK. HD., 316SS
● 9	AAA6564	4	BOLT, SOCK HD., 3/8"-16 x 1" LG
● 10	AHS4653	1	PLUG, SOCKET, SCREW, R1/2, 316SS
● 11	AAA1035	A/R	ANTI-SEIZE NI LUBE 771
▲ 12	AAA1902	1	LABEL, NAMEPLATE, ENCORE 700

NOTE: ● PART OF AAA9602.
 ■ PART OF API3492.
 ▲ PART OF AOO4751.

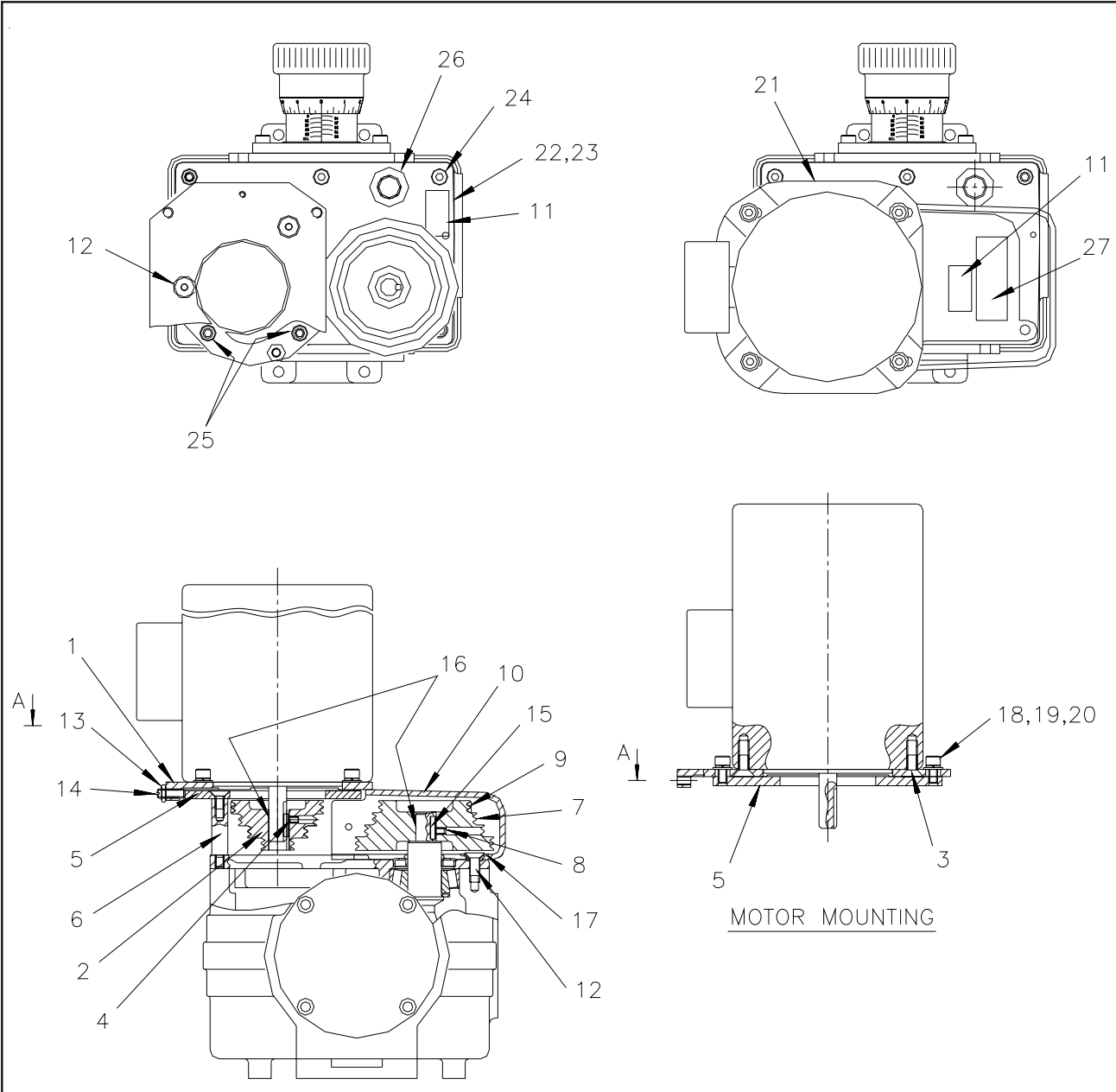
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

AIC3021 DIRECT DRIVE - PARTS LIST

440.400.001.010B

ISSUE 2 10-01

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST, SEE DWG. 44.400.001.020B.

AKG3009 PULLEY DRIVE - PARTS

440.400.001.020A

ISSUE 2 8-01

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
■ 1	AJA5596	1	SLIDE PLATE, MOTOR 56C
■ 2	APS3182	1	PULLEY, MOTOR 56C, DOUBLE GROOVE
■ 3	AXS3532	4	SCREW, 3/8-16 x 1/2", FLAT HEAD CAP
■ 4	AAB2979	2	SCREW, SET M6 x 12, SOCK. HD.
● 5	ALI3168	1	STAND OFF PLATE
● 6	AIC5131	3	STAND OFF, PULLEY DRIVE
● 7	AIC4746	1	WORM PULLEY, DOUBLE GROOVE
● 8	AAB2979	1	SCREW, SET M6 x 12 LG
● 9	APS4857	1	JOINT BELT, POLYFLEX
● 10	AIC4085	1	BELT GUARD
● 11	AEK3676	2	LABEL, WARNING GUARD
● 12	AQA3480	4	SCR. FLAT HD., M8 x 20, SOCK., 316SS
● 13	AUK3630	1	JAM NUT, HEX, M8, 316SS
● 14	AAA3708	1	SCREW, SET M8 x 25, SLOTTED, 316SS
● 15	AQC3464	1	KEY, 3/16 SQ. x 1/2" LG
● 16	AAA1035	A/R	ANTI-SEIZE NI LUBRICANT
● 17	AMK5576	1	WASHER, SHOULDER, GUARD
● 18	AXS3577	4	CAP SCR., M8 x 16, SOCK. HD., 316SS
● 19	AWO5392	4	WASHER, FLAT, M8, 316SS
● 20	AXQ3226	4	LOCK WASHER, HELICAL, M8, 316SS
● 21	ATI3486	2	CAP SCR., M6 x 12, SOCL. HD., 316SS
● 22	ANI5724	1	COVER, SIMPLEX PULLEY DRIVE
● 23	AXQ3743	A/R	ADHESIVE, GE SILICONE, RTV
● 24	AXS3656	3	CAP SCR., M8 x 20, SOCK. HD., 316SS
● 25	AXS3583	2	CAP SCR., M8 x 25, SOCK. HD., 316SS
● 26	APP5655	1	BREATHING CAP
▲ 27	AAA1902	1	NAMEPLATE, ENCORE 700

NOTE: ● PART OF APQ4791.
 ■ PART OF AOO4859.
 ▲ PART OF AOO4751.

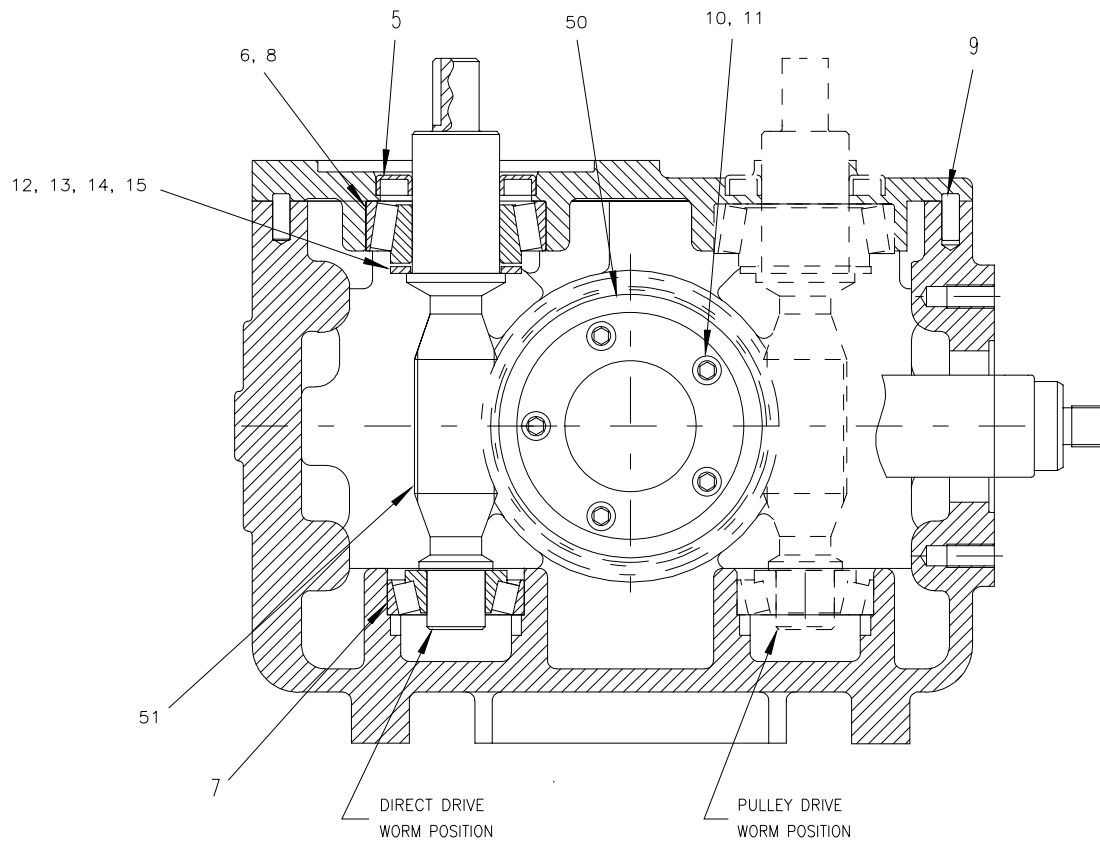
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

AKG3009 PULLEY DRIVE - PARTS LIST

440.400.001.020B

ISSUE 2 10-01

ENCORE® 700 METERING PUMP



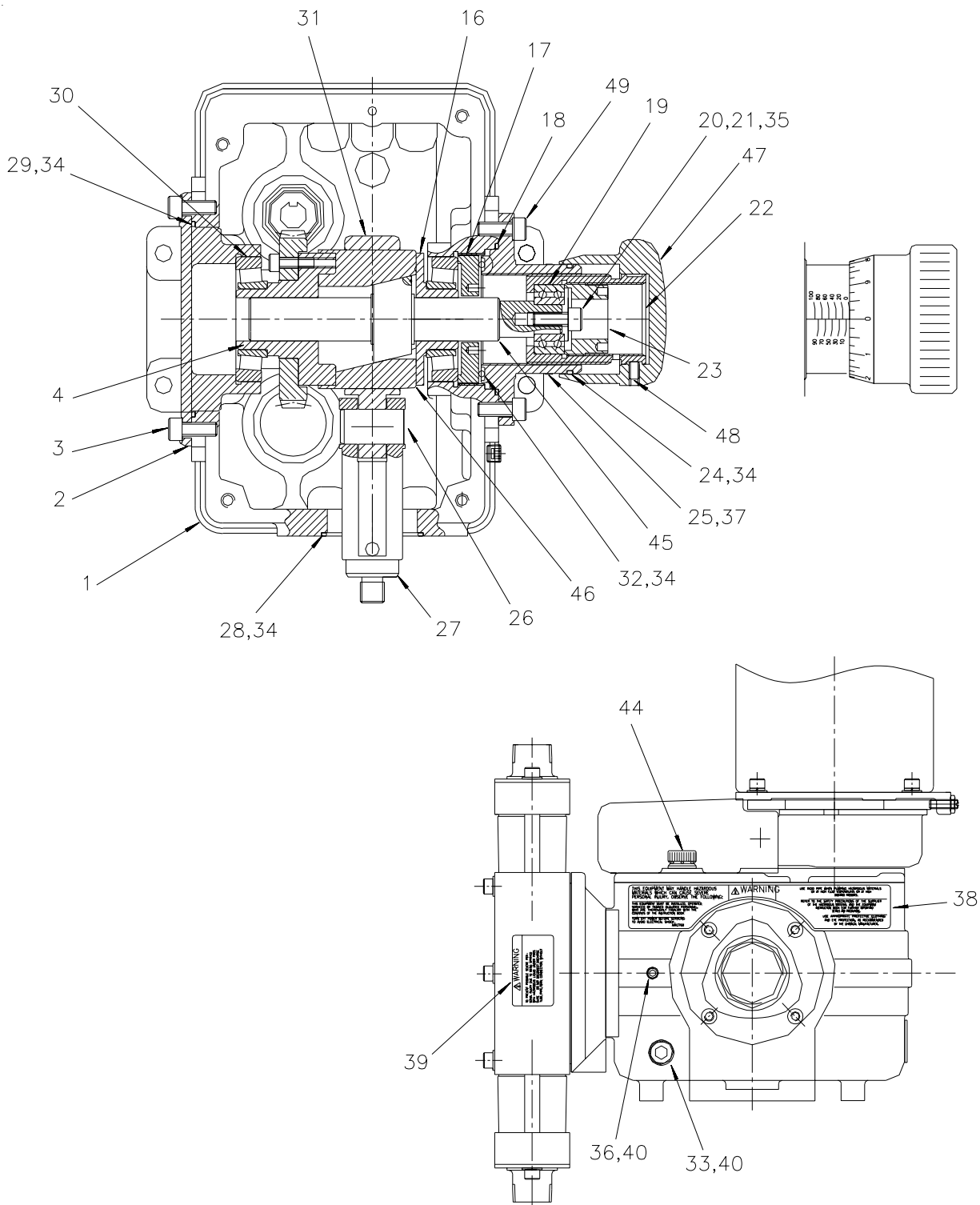
NOTE: FOR PARTS LIST SEE DWG. 440.400.000.010C&D.

ANM4784 ENCORE 700 METERING PUMP - PARTS
Simplex Gearbox Assembly

440.400.000.010A

ISSUE 2 2-98

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST SEE DWGS. 440.400.000.010C&D.

ANM4784 ENCORE 700 METERING PUMP - PARTS LIST
Simplex Gearbox Assembly

440.400.000.010B

ISSUE 3 7-01

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
■ 1	APQ5142	1	GEARBOX, SIMPLEX
■ 2	AKC5702	1	FLANGE, GEAR ACCESS, SIMPLEX
■ 3	AXS3656	4	CAP SCR., M8 x 20, SOCK. HD., 316SS
■ 4	ANM4788	1	BUSHING DRIVE, SIMPLEX, LMAD
■ 5	ALB193	1	OIL SEAL, 30 x 55 x 7, BUNA-N
■ 6	AIC4251	1	BEARING, TPRL, 30 x 62 x 21.25MM
■ 7	AMG3448	1	BEARING, TPRL, 20 x 47 x 15.25MM
■ 8	AHS4651	0	GREASE, SUNAPLEX, #992EP
■ 9	ATB247	2	PIN, DOWEL, 6 x 16, M6, HARDENED
■ 10	AUK3561	5	CAP SCR., M6 x 20, SOCK. HD. 316SS
■ 11	AQC3041	0	"LOCKTITE" SEALANT, TL-242
■ 12	AAA1373	1	SHIM (.79MM THK.) WORMSHAFT
■ 13	AAA1370	1	SHIM (2.3MM THK.) WORMSHAFT
■ 14	AAA1376	1	SHIM (3.18MM THK.) WORMSHAFT
■ 15	AAA1388	2	SHIM (.13MM THK.) WORMSHAFT
● 16	AIC4878	1	BUSHING, TAIL, LMAD
● 17	AKG5547	1	NUT, PRELOAD
● 18	ALE4774	1	O-RING, #152, BUNA-N
● 19	ARQ3426	5	BEARING, ANG, 17 x 40 x 17.5MM
● 20	AVM3239	1	WASHER, OVERSIZED OD, M8
● 21	AXS3656	1	CAP SCR., M8 x 20, SOCK. HD., 316SS
● 22	AIC4016	1	CARRIER, BEARING STR. ADJ.
● 23	AJE5116	1	ADJUSTER, BEARING
● 24	AAA9644	1	O-RING, 58MM x 3MM, BUNA-N
	OR		
	AQO4757		O-RING #141 (BUNA-N) WITH DETENT STROKE MECHANISM
● 25	AKG4860	1	HOUSING, STROKE ADJ., LMAD
● 26	ASG3256	1	DOWEL PIN, 20 x 40MM, M8, HARDENED
● 27	AJE4035	1	CROSSHEAD, DIAPHRAGM
● 28	ARQ4767	1	O-RING, #138, BUNA-N
● 29	AJA4780	1	O-RING, #156, BUNA-N
● 30	AMG3442	2	BEARING, TPRL., 35 x 72 x 18.25MM
● 31	ARQ5679	1	CONROD, SPLEX, DPLEX (MACH.)
● 32	AKG4976	1	O-RING, #332, BUNA-N
● 33	AHS4653	1	PLUG, R1/2, SOCKET HEAD
● 34	AAA3791	0	SILICONE GREASE, LIGHT
● 35	AQC3041	0	"LOCKTITE" SEALANT, TL-242
● 36	AAC4634	1	PLUG, SOCKET, SCREW R1/8, 316SS
● 37	AOO4043	1	LABEL, STR. ADJ., LMAD
● 38	AAA3769	1	WARNING LABEL, GEARBOX
● 39	AAA3759	1	WARNING LABEL, LIQUID END
● 40	E942	0	TAPE, THREAD SEALANT
● 41	AAA3726	1	LABEL, DATA PLATE, LMAD
● 42	AAA2499	1	LABEL, ASSEMBLED IN MEXICO
● 43	AAA1902	1	LABEL, NAMEPLATE, ENCORE 700
● 44	APP5655	1	BREATHING CAP

NOTE: ● PART OF AOO4751 ■ PART OF AJE4758 ◆ PART OF ANM4767
○ PART OF AAA9593 □ PART OF AAA9596 ❖ PART OF APQ4775
▼ PART OF AAAA9599 ▲ PART OF AIC3164 ⤵ PART OF AAA9590

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

ANM4784 ENCORE 700 METERING PUMP - PARTS LIST
Simplex Gearbox Assembly

440.400.000.010C

ISSUE 2 2-98

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
45	◆ APS4845 - OR -	1	SHAFT, ECCENTRIC, 4.8MM STROKE (1-3/8" & 2" SIZES ONLY)
46	❖ ALI4852 ◆ AIA4800 - OR -	1 1	SHAFT, ECCENTRIC, 9.6MM STROKE SHEAVE, 4.8MM STROKE, LMAD (1-3/8" & 2" SIZES ONLY)
	❖ AIA4795	1	SHEAVE, 9.6MM STROKE, LMAD
▲ 47	ANI4750	1	KNOB, STR., ADJ., LMAD (MACH)
▲ 48	AAA2382	3	SCR., SET, M6 x 10, FLAT, SKT., NYL., 316
▲ 49	AXS3656	4	CAP SCR., M8 x 20, SOCK. HD., 316SS
50	▶ ASS3183 - OR -	1	GEAR WORM, RATIO 10 (142 SPM @ 50Hz)
	○ AOK3192 - OR -	1	GEAR, WORM, RATIO 12 (144 SPM)
	□ ARQ3199 - OR -	1	GEAR, WORM, RATIO 24 (72 SPM)
	▼ AKC3205	1	GEAR, WORM, RATIO 48 (36 SPM)
51	▶ AAA9530 - OR -	1	WORM, SHAFT, RATIO 10 (142 SPM @ 50Hz)
	○ AAA9533 - OR -	1	WORM, SHAFT, RATIO 12
	□ AAA9536 - OR -	1	WORM, SHAFT, RATIO 24
	▼ AAA9539	1	WORM, SHAFT, RATIO 48

NOTE:

●	PART OF AOO4751	■	PART OF AJE4758	◆	PART OF ANM4767
○	PART OF AAA9593	□	PART OF AAA9596	❖	PART OF APQ4775
▼	PART OF AAAA9599	▲	PART OF AIC3164	▶	PART OF AAA9590

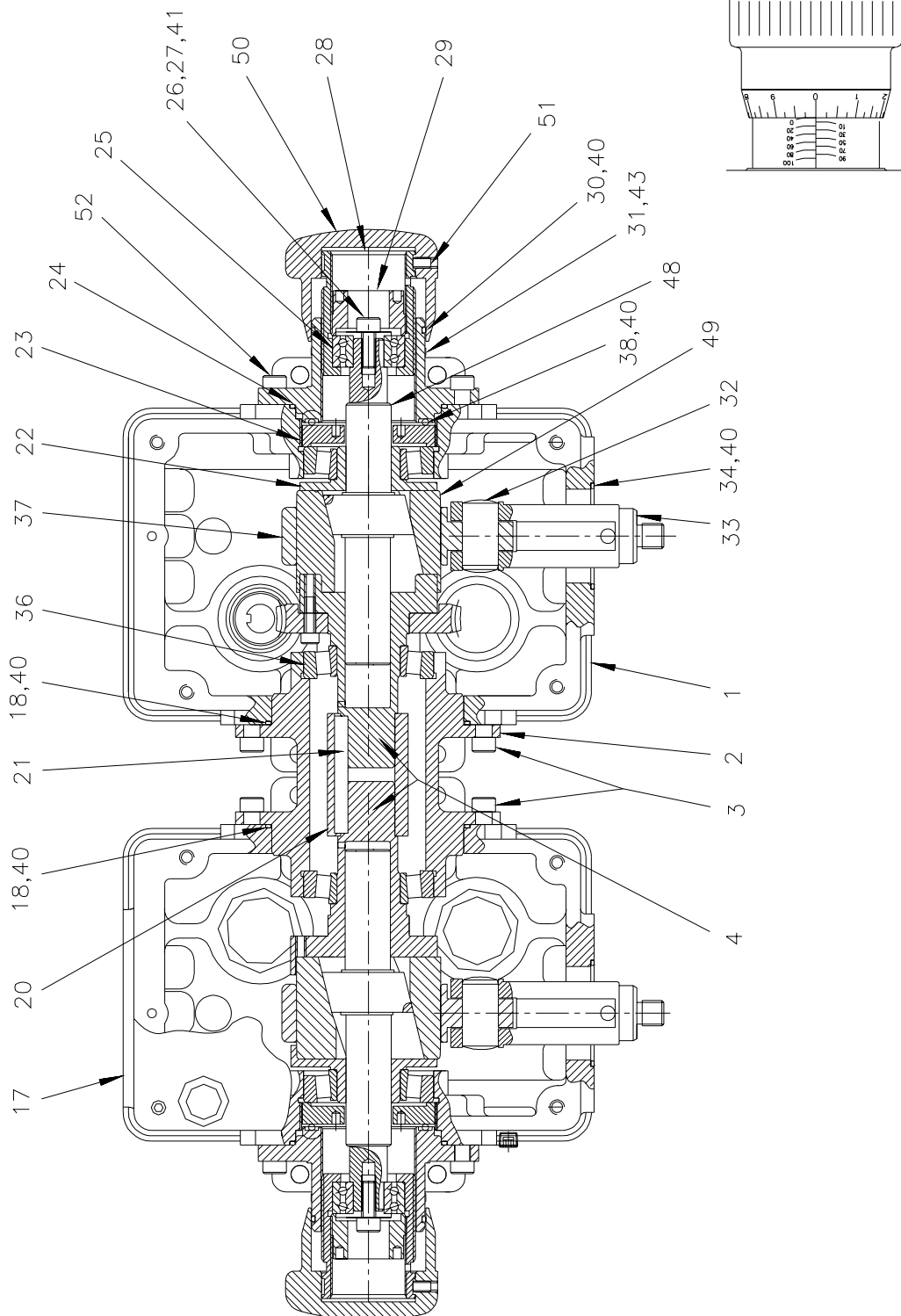
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

ANM4784 ENCORE 700 METERING PUMP - PARTS LIST
Simplex Gearbox Assembly

440.400.000.010D

ISSUE 3 10-01

ENCORE® 700 METERING PUMP



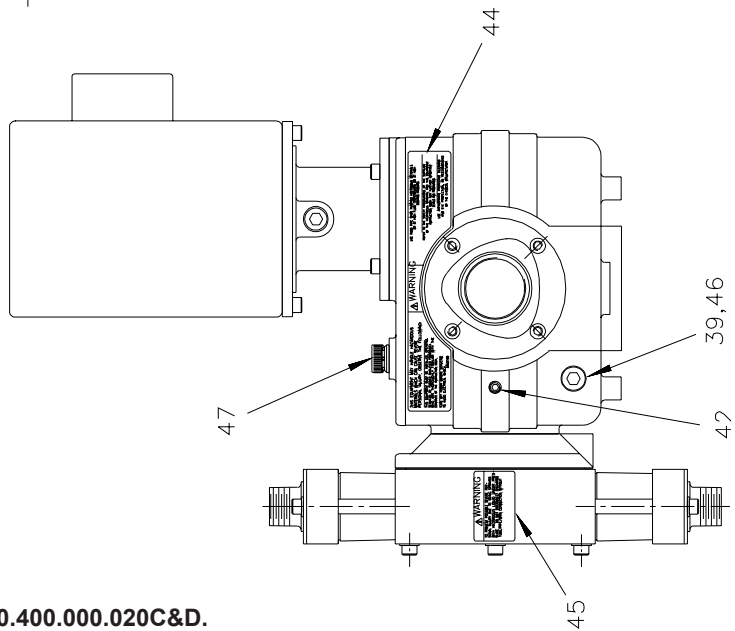
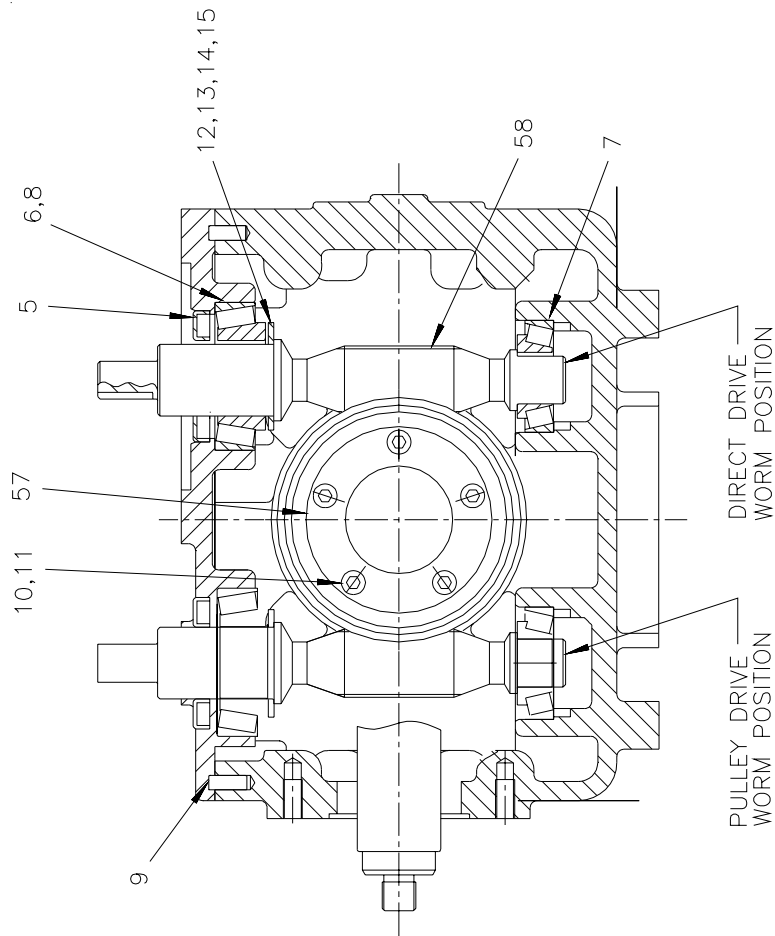
NOTE: FOR PARTS LIST SEE DWGS. 440.400.000.020C&D.

AAA1445 ENCORE 700 METERING PUMP - PARTS
Double Simplex Gearbox Assembly

440.400.000.020A

ISSUE 3 7-01

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST SEE DWGS. 440.400.000.020C&D.

AAA1445 ENCORE 700 METERING PUMP - PARTS
Double Simplex Gearbox Assembly

440.400.000.020B

ISSUE 3 7-01

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
■ 1	APQ5142	1	GEARBOX, SIMPLEX
■ 2	AJA5697	1	CONNECTION, DSPLEX
■ 3	AXS3656	8	CAP SCR., M8 x 20, SOCK. HD., 316SS
■ 4	AKG4783	2	BUSHING DRIVE, DSPLEX
■ 5	ALI3193	1	OIL SEAL 30 x 55 x 7. BUNA
■ 6	AIC4251	1	BEARING, TPRL, 30 x 62 x 21.25 MM
■ 7	AMG3448	1	BEARING, TPRL, 20 x 47 x 15.25 MM
8	AHS4651	0	GREASE, SUNAPLEX, #992 EP
■ 9	ATI3247	2	DOWEL PIN, 6x 16, M6
10	AQC3041	0	"LOCKTITE" SEALANT, TL-242
■ 11	AUK3561	5	SCR. CAP, M6 x 20, SOCK. HD., 316SS
■ 12	AAA1373	1	SHIM (.79 MM THICK)
■ 13	AAA1370	1	SHIM (2.3 MM THICK)
■ 14	AAA1376	1	SHIM (3.18 MM THICK)
■ 15	AAA1388	2	SHIM (.13 MM THICK)
■ 17	ALI5148	1	GEARBOX, DOUBLE SIMPLEX
● 18	AJA4780	2	O-RING (156) BUNA-N
■ 20	AMK4076	1	COUPLING, RIGID, DSPLEX
■ 21	ATI3361	1	KEY, 8 x 7/63
● 22	AIC4878	2	TAIL BUSHING
● 23	AKG5547	2	PRELOAD NUT
● 24	ALE4774	2	O-RING (152) BUNA-N
● 25	ARQ3426	2	BEARING, ANGK, 17 x 40 x 17.5
● 26	AVM3239	2	WASHER, OVERSIZED OD, M8
● 27	AXS3656	2	CAP SCR., M8x20, SOCK. HD., 316SS
● 28	AIC4016	2	CARRIER, BEARING
● 29	AJE5116	2	ADJUSTER, BEARING
● 30	AAA9644	2	O-RING 58 MM x 3 MM, BUNA-N
	OR		
	AQO4757	2	O-RING (141) BUNA-N
● 31	AKG4860	2	HOUSING
● 32	ASG3256	2	DOWEL PIN 20 x 40 (MM) M6
● 33	AJE4035	2	CROSSHEAD, DIAPHRAGM
● 34	ARQ4767	2	O-RING (138) BUNA-N
● 36	AMG3442	4	BEARING, TPRL, 35 x 72 x 18.25
● 37	ARQ5679	2	CONROD
● 38	AKG4976	2	O-RING (332) BUNA-N
● 39	AHS4653	2	PLUG, R1/2 SOCKET HEAD

NOTES: ■ PART OF AAA4385
● PART OF AOO4751

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

AAA1445 ENCORE 700 METERING PUMP - PARTS LIST
Double Simplex Gearbox Assembly

440.400.000.020C

ISSUE 3 7-01

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
40	AAA3797	0	SILICONE GREASE, LIGHT
● 42	AAC4634	2	PLUG, SOCKET, SCREW R1/8, 316SS
● 43	AOO4043	2	LABEL, STR. ADJ.
● 44	AAA3769	2	WARNING LABEL
● 45	AAA3759	2	WARNING LABEL
▯ 47	APP5655	2	BREATHER, CAP
48	◆ APS4845	2*	ECCENTRIC SHAFT , 4.8 MM STROKE
	OR		
	❖ ALI4852	2*	ECCENTRIC SHAFT, 9.6 MM STROKE
49	◆ AIA4800	2*	SHEAVE, 4.8 MM STROKE
	OR		
	❖ AIA4795	2*	SHEAVE, 9.6 MM STROKE
▲ 50	ANI4750	2	KNOB
▲ 51	AAA2382	6	SET SCR., M6 x 10, FLAT, SKT., NYL., 316
▲ 52	AXS3656	8	CAP SCR., M8 x 20, SOCK. HD., 316SS
57	ASS3183	1	WORM GEAR, RATIO 10 (142 SPM @ 50Hz)
	OR		
	○ AOK3192	1	WORM GEAR, RATIO 12
	OR		
	□ ARQ3199	1	WORM GEAR, RATIO 24
	OR		
	▼ AKC3205	1	WORM GEAR, RATIO 48
58	AAA9530	1	WORM SHAFT, RATIO 10, 56C
	OR		
	○ AAA9533	1	WORM SHAFT, RATIO 12, 56C
	OR		
	□ AAA9536	1	WORM SHAFT, RATIO 24, 56C
	OR		
	▼ AAA9539	1	WORM SHAFT, RATIO 48, 56C

NOTES: ■ PART OF AAA4385 ▲ PART OF AIC3164 ○ PART OF AOO4394
● PART OF AOO4751 ◆ PART OF ANM4767 □ PART OF AJE4411
▯ PART OF AAA4394 ❖ PART OF APQ4775 ▼ PART OF APS4684

* TWO REQUIRED; MAY BE A COMBINATION OF ONE 4.8 MM STROKE AND ONE 9.6 MM STROKE. 1-3/8" AND 2" HEADS REQUIRE A 4.8 MM STROKE. 3", 4", 5", AND 6-1/2" HEADS REQUIRE A 9.6 MM STROKE. ECCENTRIC SHAFT AND SHEAVE MUST HAVE THE SAME STROKE.

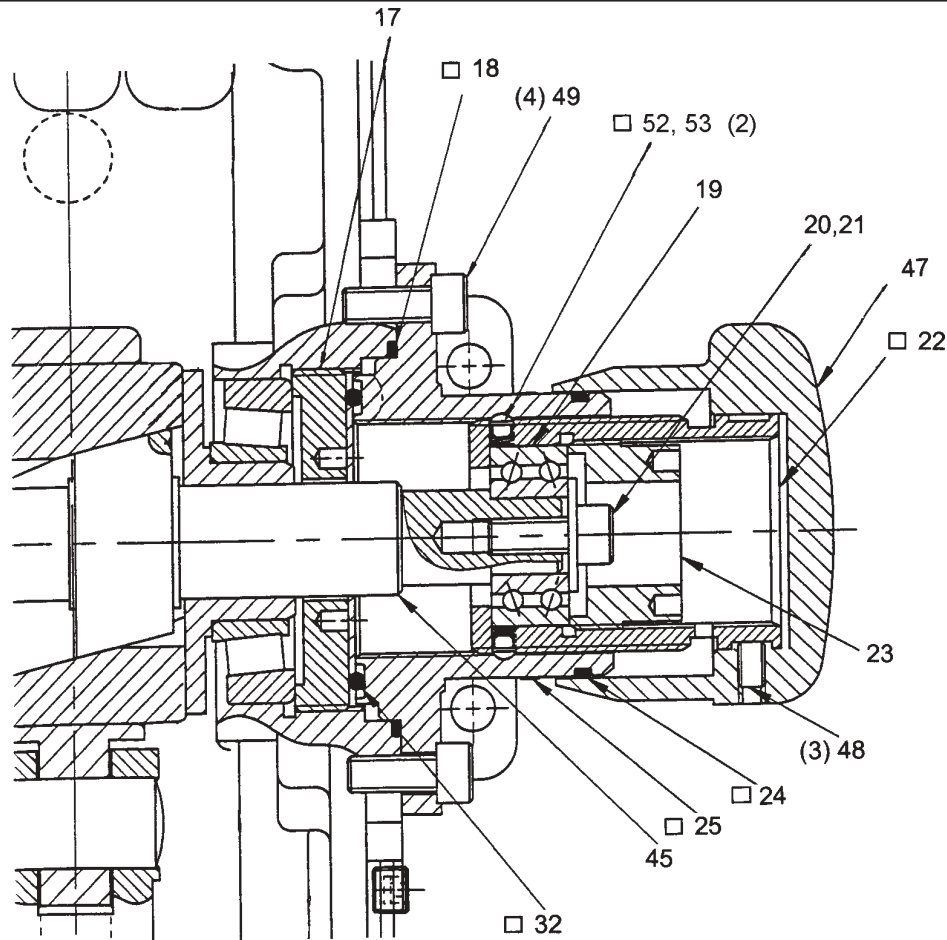
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

AAA1445 ENCORE 700 METERING PUMP - PARTS LIST
Double Simplex Gearbox Assembly

440.400.000.020D

ISSUE 3 10-01

ENCORE® 700 METERING PUMP



KEY NO.	PART NO.	QTY.	DESCRIPTION
17	AKG5547	1	NUT, PRELOAD
□ 18	ALE4774	1	O-RING (#152) BUNA-N
19	ARQ3426	1	BEARING, 17 x 40 x 17.5 mm
20	AVM3239	1	WASHER, OVERSIZED OD, M8
21	AXS3656	1	CAP SCR. M8 x 20, SOC. HD.
□ 22	AIC4016	1	CARRIER BEARING, STR. ADJ.
23	AJE5116	1	ADJUSTER, BEARING
□ 24	AQO4757	1	O-RING (#141) BUNA-N
□ 25	AAB5783	1	HOUSING, STR. ADJ., LABELED
□ 32	AKG4976	1	O-RING (#332) BUNA-N
45	ALI4852	1	ECCENTRIC SHAFT, 9.6 mm STROKE
	OR		
	APS4845	1	ECCENTRIC SHAFT, 4.8 mm STROKE
47	ANI4750	1	KNOB
48	AAA2382	3	SET SCR. M6 x 10, "NYLOK"
49	AXS3656	4	CAP SCR. M8 x 20, SOC. HD.
□ 52	AAB5789	2	PAWL, DETENT
□ 53	AAB5786	2	SPRING, DETENT

NOTE: □ INDICATES PARTS FURNISHED IN KIT.

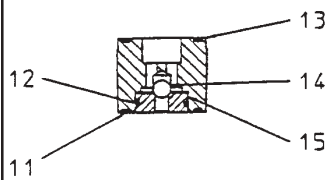
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

AAB5792 DETENT STROKE ADJUSTMENT KIT - PARTS
Common to Simplex and Double Simplex

440.400.000.030

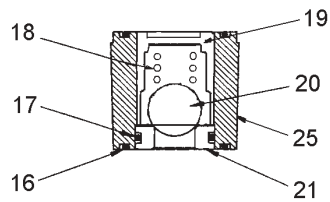
ISSUE 0 7-01

ENCORE® 700 METERING PUMP



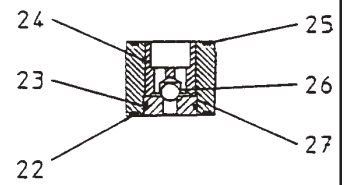
SOLUTION VALVE
BALL SIZE: .250"

DETAIL A



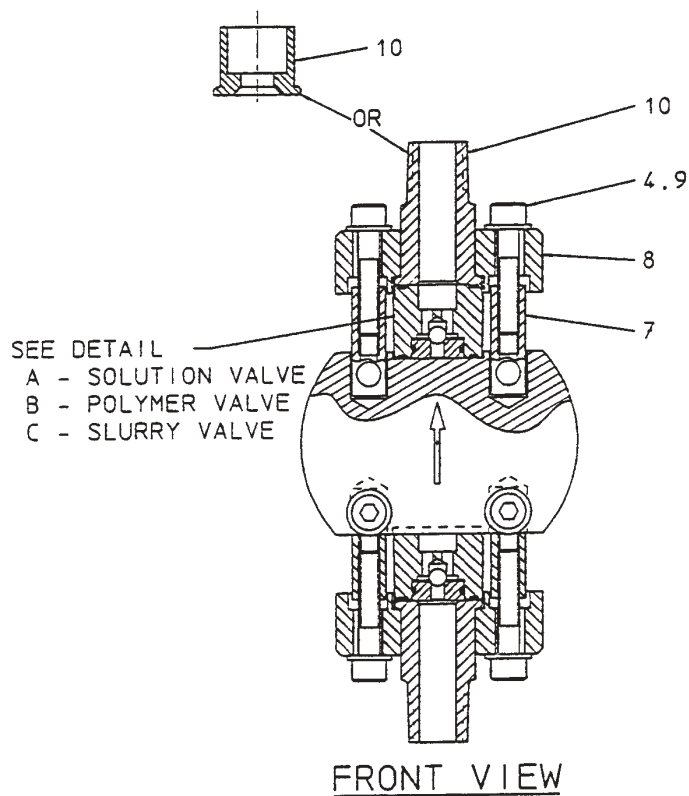
POLYMER VALVE
BALL SIZE: .500"

DETAIL B

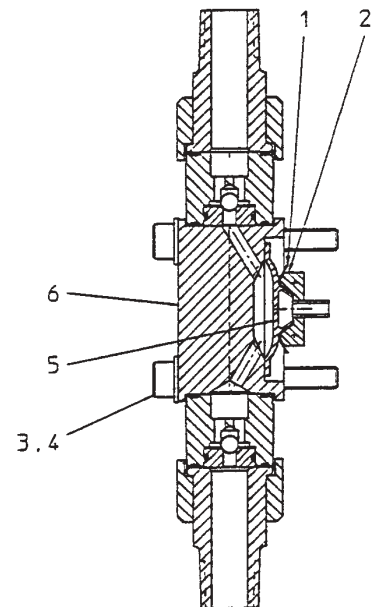


SLURRY VALVE
BALL SIZE: .250"

DETAIL C



FRONT VIEW



SIDE VIEW

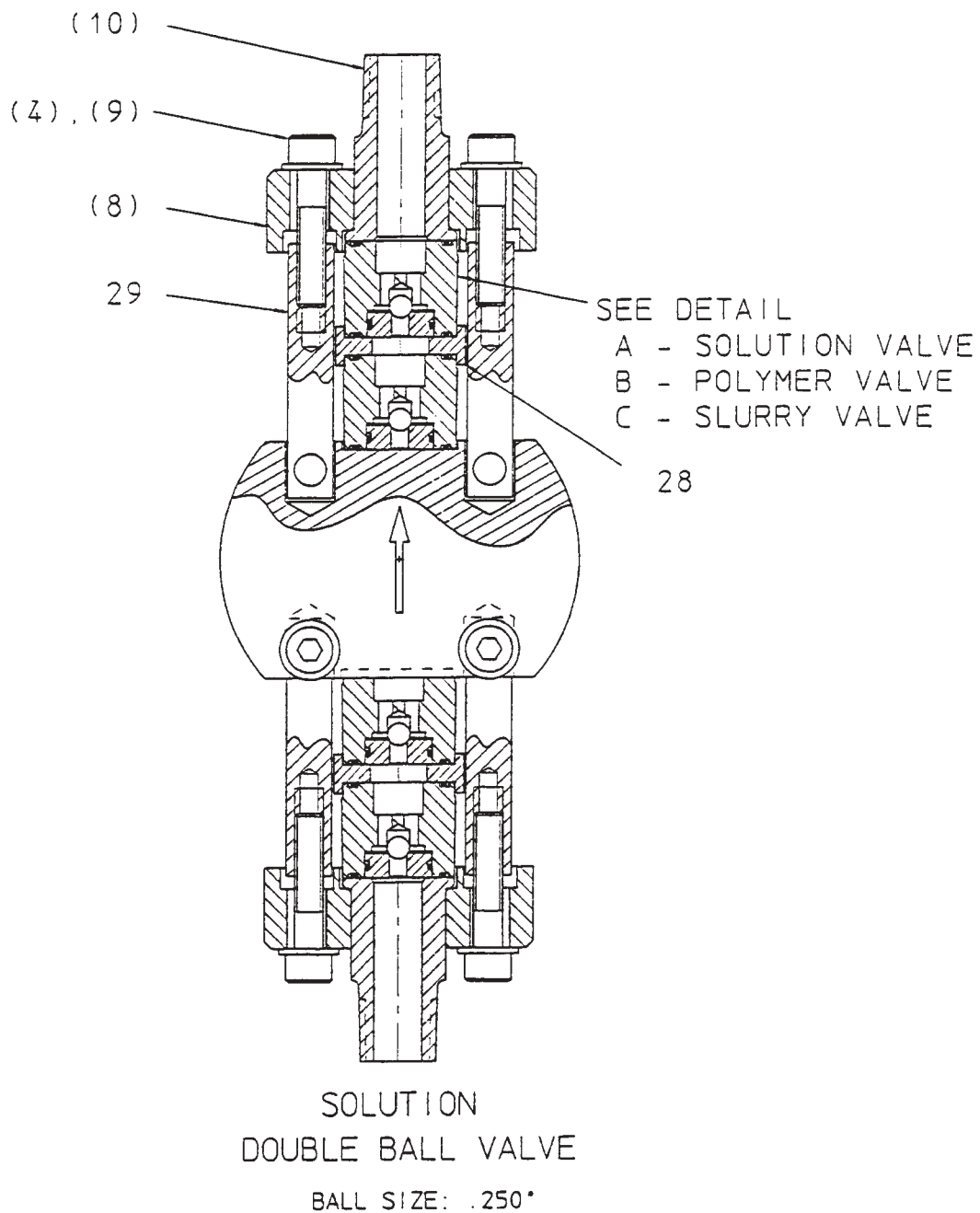
NOTE: FOR PARTS LIST SEE DWG. 440.050.010.010C.

1-3/8" CARTRIDGE LIQUID END - PARTS

440.050.010.010A

ISSUE 1 8-01

ENCORE® 700 METERING PUMP



NOTE: () INDICATES REFERENCED PARTS.

1-3/8" CARTRIDGE LIQUID END - PARTS

440.050.010.010B

ISSUE 0 6-95

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
1	AKG5103	1	DISC, BACKING, 1.375" DIAPHRAGM
2	AL5124	1	RING, BACKUP, 1.375" DIAPHRAGM
3	AQA3639	4	SCREW, CAP, M8 x 100, SOCK. HD., 316SS
4	AWO5392	8	WASHER, FLAT M8, 316SS
5	AQO4074	1	DIAPHRAGM, 1.375"
6	APS4346	1	HEAD, 1.375" DIAPHRAGM, PVC
	OR		
	AIC4339	1	HEAD, 1.375" DIAPHRAGM, KYNAR
7	APS5528	4	EYENUT, VALVE, SB, 1.375" & 2" HEAD
8	AMK5551	2	CLAMP, 1.375" & 2" HEAD
9	ARE3591	4	SCREW, CAP, M8 & 40, SOC. HD. 316SS
10	AL4883	2	CONN., M, 1.375" & 2" HEAD, 1/2" NPT, PVC
	OR		
	AL4896	2	CONN., M, 1.375" & 2" HEAD, 1/2" NPT, KYNAR
	OR		
	AOO4969	2	CONN., SOCK. 1.375" & 2" HEAD, 1/2" PIPE, PVC
11	AMK5913	4	O-RING (022) VITON, 25.12 ID x 1.78 MM
	OR		
	AIA5772	4	O-RING (022) HYPALON, 25.12 ID x 1.78 MM
12	AMK5919	2	O-RING (016) VITON, 15.60 ID x 1.78 MM
	OR		
	AMK5705	2	O-RING (016) HYPALON, 15.60 ID x 1.78 MM
13	AIA5148	2	GUIDE, RET, .250" BALL, PVC MOLD.
	OR		
	AOO5141	2	GUIDE, RET, .250" BALL, KYNAR MOLD.
14	AFM5842	2	BALL, .250" 316SS
	OR		
	AHQ5882	2	BALL, .250" TEFLON
	OR		
	ACG3695	2	BALL, .250" CERAMIC
15	APQ5049	2	SEAT, .250" BALL 316SS
	OR		
	AJE5015	2	SEAT, .250" BALL PVC
	OR		
	ANM5023	2	SEAT, .250" BALL KYNAR
16	AMK5913	4	O-RING (022) VITON, 25.121 ID x 1.78 MM
17	AMK5919	2	O-RING (016) VITON, 15.60 ID x 1.78 MM
18	AOO4265	2	SPRING, .500" BALL
19	AAB9599	2	GUIDE, POLYMER, .500" BALL, PVC
20	AAA5905	2	BALL, .500" TEFLON
21	ANM4382	2	SEAT, .500" BALL, PVC
22	AIA5772	4	O-RING (022) HYPALON, 25.121 ID x 1.78 MM
23	AMK5705	2	O-RING (016) HYPALON, 15.60 ID x 1.78 MM
24	AMK5077	2	GUIDE, SLURRY, .250" BALL, LIFT 1.5MM SST
25	APS4995	2	RETAINER, PVC
26	AFM3749	2	BALL, .250" POLYURETHANE
27	AOO5055	2	SEAT, .250" CERAMIC
28	APS4954	2	ADAPTER, .250" & .500" BALL, PVC
	OR		
	AJE4961	2	ADAPTER, V, .250" & .500" BALL, KYNAR
29	APQ5533	4	EYENUT, VALVE, DB, 1.375" & 2" HEAD

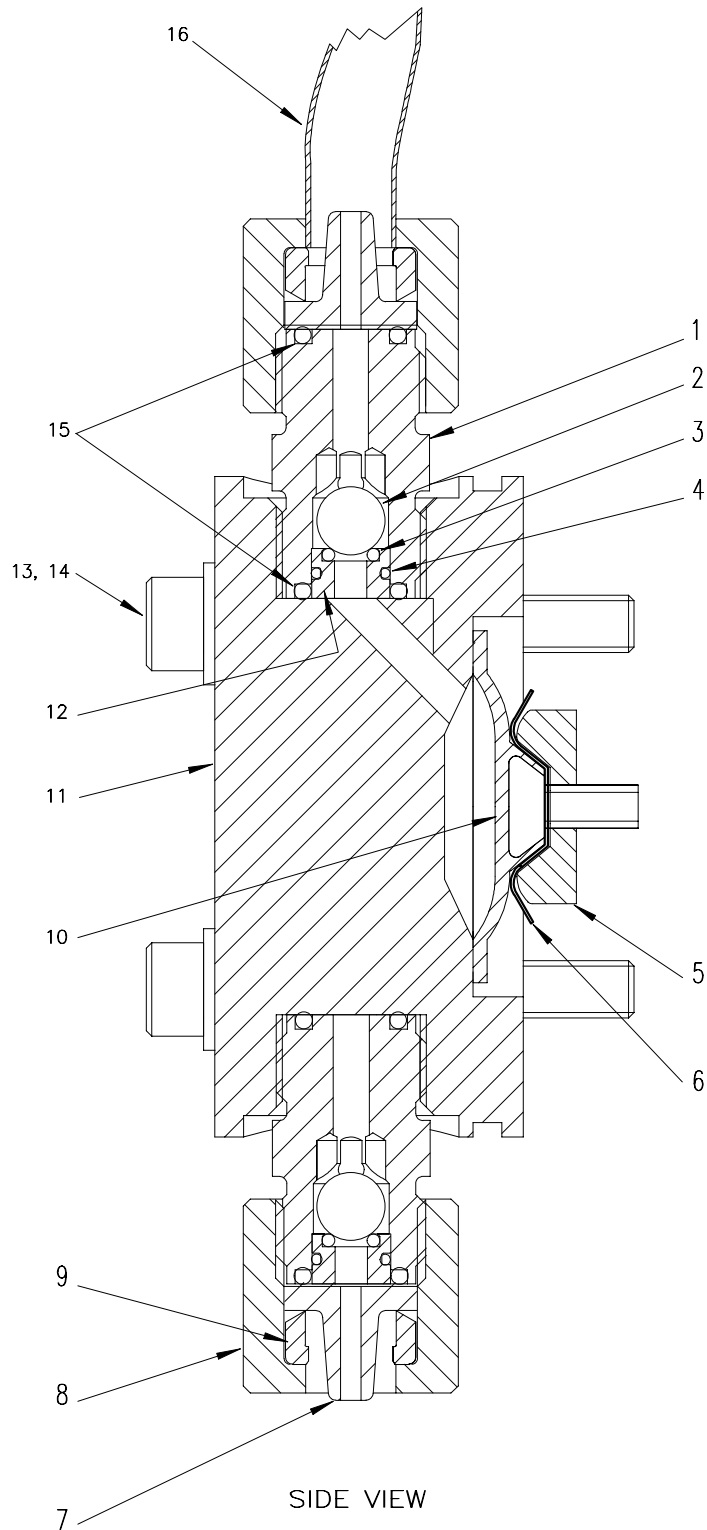
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

1-3/8" CARTRIDGE LIQUID END - PARTS LIST

440.050.010.010C

ISSUE 3 8-01

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST SEE DWG. 440.050.010.020B.

1-3/8" THREADED LIQUID END - PARTS

440.050.010.020A

ISSUE 1 2-98

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
■ 1	ALI 3455	2	HOUSING
■ 2	AMS 3988	2	BALL, .375", GLASS
■ 3	AIA 3596	2	O-RING (008) VITON, 4.47 x 1.78 MM
■ 4	APQ 3916	2	O-RING, VITON, 8 x 1.5 MM
● 5	ALI 5124	1	RING, BACKUP, 1.375" DIAPHRAGM
● 6	AKG 5103	1	DISC, BACKING, 1.375" DIAPHRAGM
○ 7	AKG 3480	2	NIPPLE, .37" OD TUBE
○ 8	AAA 1229	2	NUT, .37" OD TUBE
○ 9	AJE 3496	2	HOLDER, .37" OD TUBE
▲ 10	AQO 4074	1	DIAPHRAGM 1.375", TEFLON FACED
▲ 11	APS 3127	1	HEAD
■ 12	AJE 3464	2	SEAT
● □ 13	AWO 5392	4	WASHER, FLAT M8
14	● ARE 3624 OR □ AQA 3639	4 4	SCREW, M8 x 60 SOCK. HD. CAP (ENCORE 100) SCREW, M8 x 60 SOCK. HD. CAP (ENCORE 700)
■ 15	AKG 3575	4	O-RING, VITON, 11.3 x 2.4 MM
* 16	RP 684464	As required	TUBING, .37" OD x .25" ID, POLYETHYLENE

*AVAILABLE AS AN ACCESSORY. NOT PART OF STANDARD PUMP PACKAGE.

NOTE: ● PART OF AOO 3615.
 ■ PART OF APS 3628.
 ○ PART OF AAA 1187.
 ▲ PART OF AAA 1097.
 □ PART OF AAA 4334.

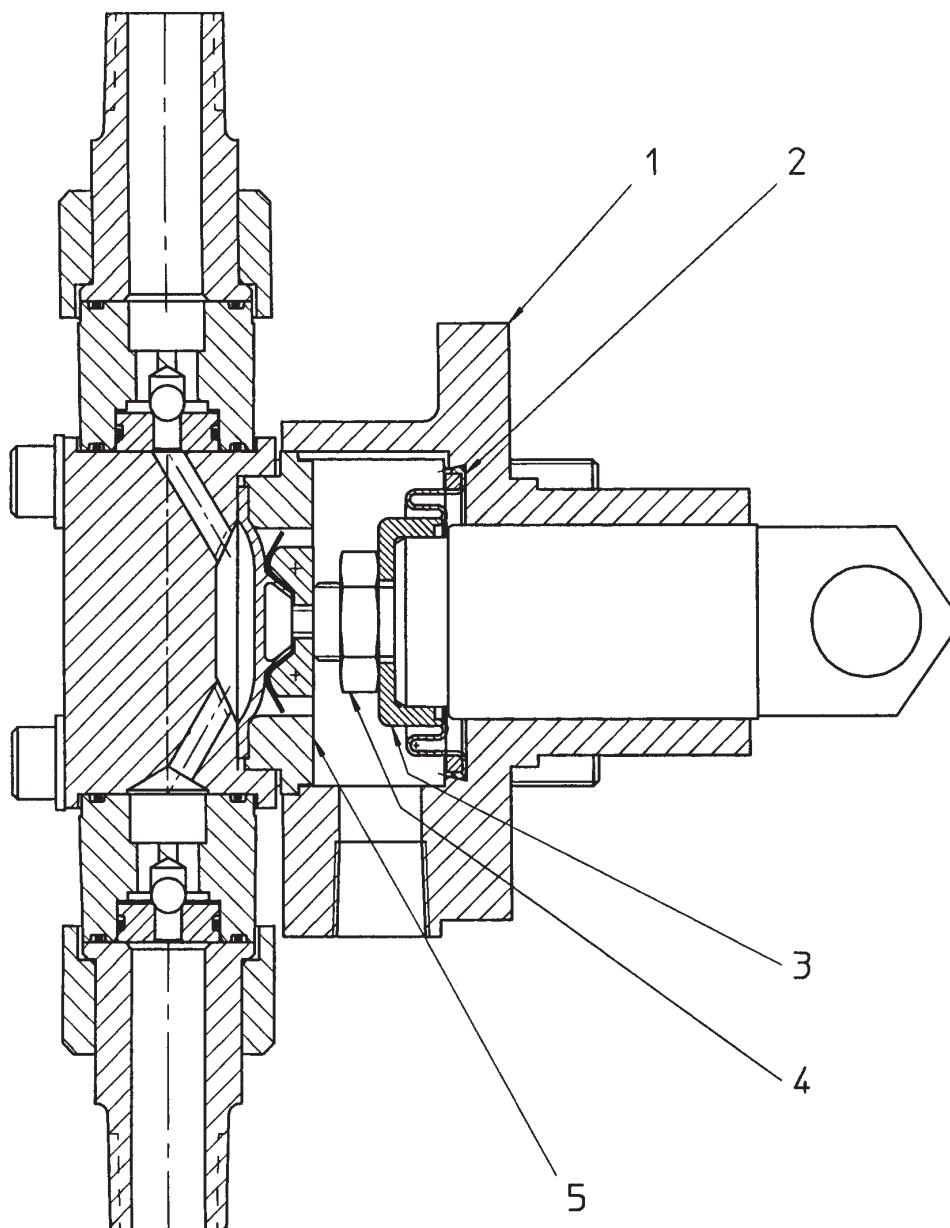
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

1-3/8" THREADED LIQUID END - PARTS LIST

440.050.010.020B

ISSUE 3 10-01

ENCORE® 700 METERING PUMP



KEY NO.	PART NO.	QTY.	DESCRIPTION
● 1	ALE4874	1	ADAPTER, 1.375" DIAPHRAGM
● 2	AAB7205	1	SEAL, BELLOW, CROSSHEAD
● 3	AJA5915	1	CLAMP, DIAPHRAGM, BELLOW
● 4	AMK4863	1	NUT, M14 x 1
● 5	AIA5111	1	SPACER, 1.375" DIAPHRAGM

NOTE: ● PART OF APQ4097.

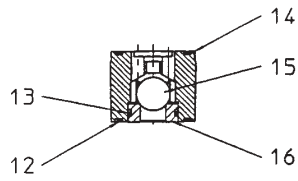
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

1-3/8" LIQUID END ADAPTER - PARTS

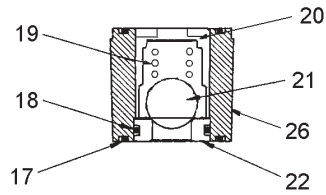
440.400.001.030

ISSUE 1 7-01

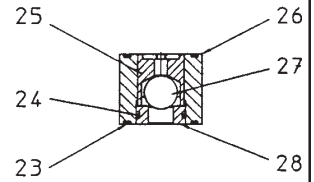
ENCORE® 700 METERING PUMP



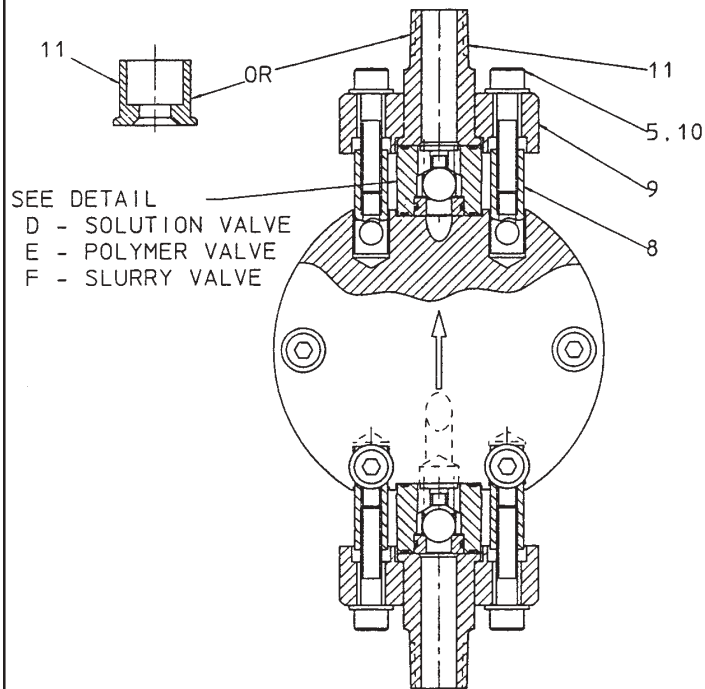
SOLUTION VALVE
BALL SIZE: 0.5"
DETAIL D



POLYMER VALVE
BALL SIZE: 0.5"
DETAIL E

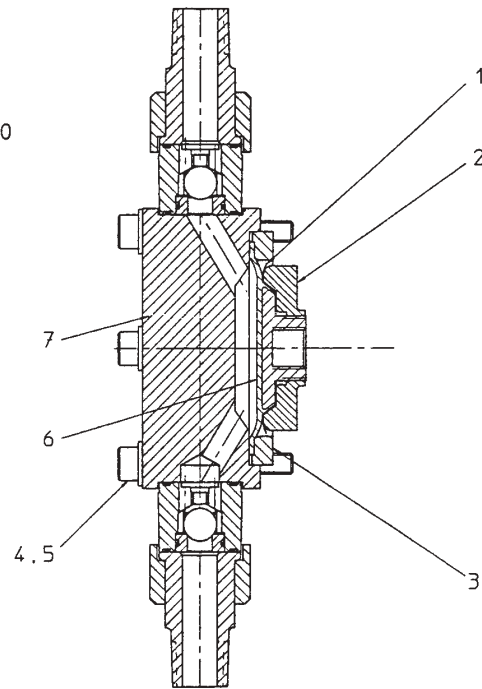


SLURRY VALVE
BALL SIZE: 0.5"
DETAIL F



SEE DETAIL
D - SOLUTION VALVE
E - POLYMER VALVE
F - SLURRY VALVE

FRONT VIEW



SIDE VIEW

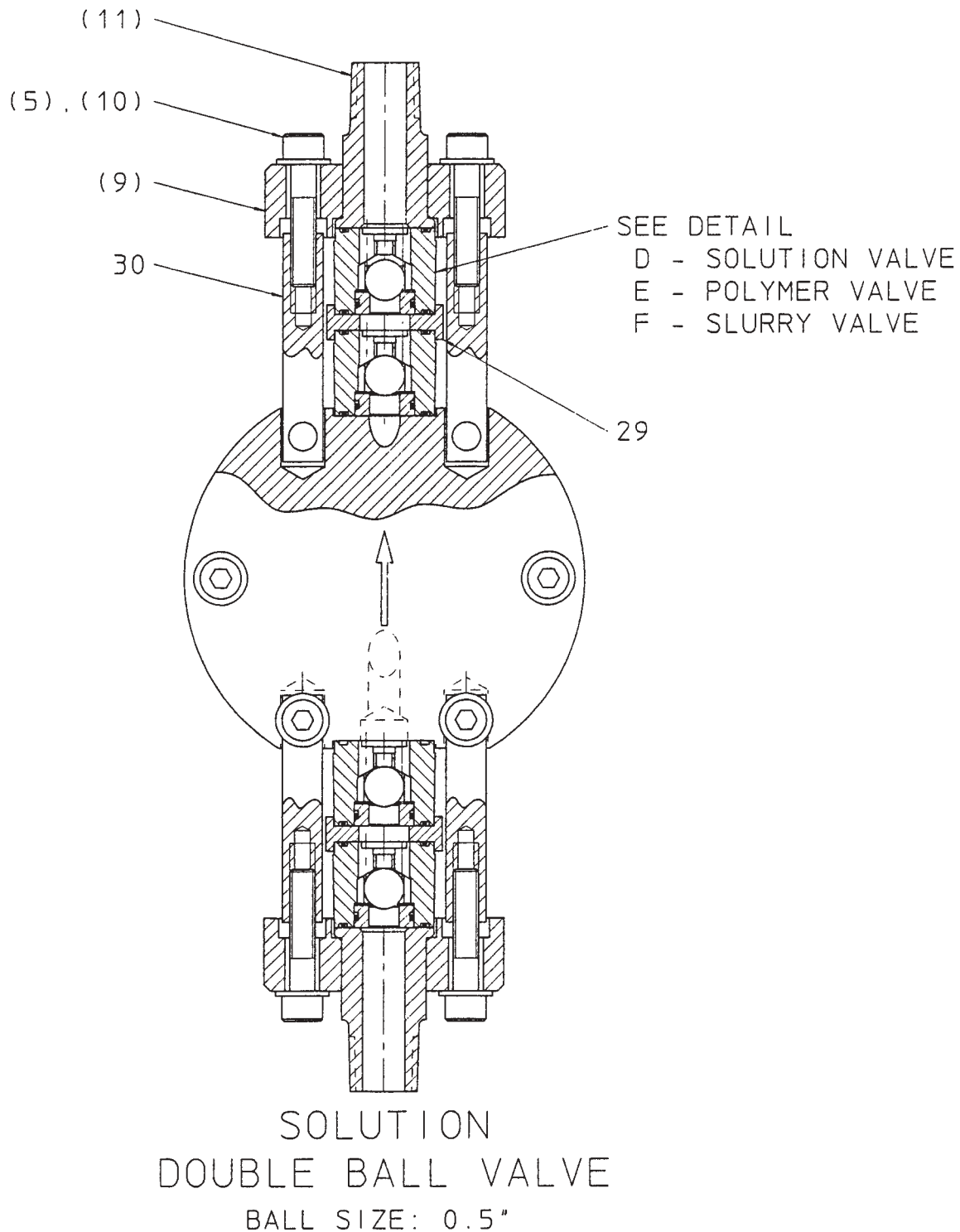
NOTE: FOR PARTS LIST SEE DWG. 440.050.010.030C.

2" CARTRIDGE LIQUID END - PARTS

440.050.010.030A

ISSUE 1 8-01

ENCORE® 700 METERING PUMP



NOTE: () INDICATES REFERENCED PARTS.

2" CARTRIDGE LIQUID END - PARTS

440.050.010.030B

ISSUE 0 6-95

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
1	AAA3323	1	DISC, BACKING, 2" DIAPHRAGM
2	AJE4030	1	RING, BACKUP, 2" DIAPHRAGM
3	AIC5296	1	SPACER, 2" DIAPHRAGM
4	ARE3624	6	SCREW, CAP, M8 x 60, SOCK. HD, 316SS
5	AWO5392	10	WASHER, FLAT M8, 316SS
6	AMG4773	1	DIAPHRAGM, 2"
7	AOO5277	1	HEAD, 2" DIAPHRAGM, PVC
	OR		
	APQ5281	1	HEAD, 2" DIAPHRAGM, KYNAR
8	APS5528	4	EYENUT, VALVE, SB, 1.375" & 2" HEAD
9	AMK5551	2	CLAMP, 1.375" & 2" HEAD
10	ARE3591	4	SCREW, M8 & 40, SOCK. HD. 316SS
11	AL4883	2	CONN., M, 1.375" & 2" HEAD, 1/2" NPT, PVC
	OR		
	AL4896	2	CONN., M, 1.375" & 2" HEAD, 1/2" NPT, KYNAR
	OR		
	AOO4969	2	CONN., SOCK. 1.375" & 2" HEAD, 1/2" PIPE, PVC
12	AIA5772	4	O-RING (022) HYPALON, 25.12 ID x 1.78 MM
	OR		
	AMK5913	4	O-RING (022) VITON, 25.12 ID x 1.78 MM
13	AMK5705	2	O-RING (016) HYPALON, 15.60 ID x 1.78 MMO
	OR		
	AMK5919	2	O-RING (016) VITON, 15.60 ID x 1.78 MM
14	AKG5133	2	GUIDE, RETAINER, .500" BALL, PVC
	OR		
	AOO5050	2	GUIDE, RETAINER, .500" BALL, KYNAR
15	ABE5824	2	BALL, .500" 316SS
	OR		
	AAA5905	2	BALL, .500" TEFLON
	OR		
	AAC3580	2	BALL, .500" CERAMIC
16	AIC4369	2	SEAT, .500" BALL 316SS
	OR		
	ANM4382	2	SEAT, .500" BALL PVC
	OR		
	AIC4376	2	SEAT, .500" BALL KYNAR
17	AMK5913	4	O-RING (022) VITON, 25.121 ID x 1.78 MM
18	AMK5919	2	O-RING (016) VITON, 15.60 ID x 1.78 MM
19	AOO4265	2	SPRING, .50" BALL
20	AAB9599	2	GUIDE, POLYMER, .500" BALL, PVC
21	AAA5905	2	BALL, .500" TEFLON
22	ANM4382	2	SEAT, .500" BALL, PVC
23	AIA5772	4	O-RING (022) HYPALON, 25.121 ID x 1.78 MM
24	AMK5705	2	O-RING (016) HYPALON, 15.60 ID x 1.78 MM
25	AIA5317	2	GUIDE, SLURRY, .500" BALL, 316SS
26	APS4995	2	RETAINER, PVC
27	AEK5764	2	BALL, .500" POLYURETHANE
28	AMK4354	2	SEAT, .500" BALL CERAMIC
29	APS4954	2	ADAPTER, .250" & .500" BALL, PVC
	OR		
	AJE4961	2	ADAPTER, V, .250" & .500" BALL, KYNAR
30	APQ5533	4	EYENUT, VALVE, DB, 1.375" & 2" HEAD

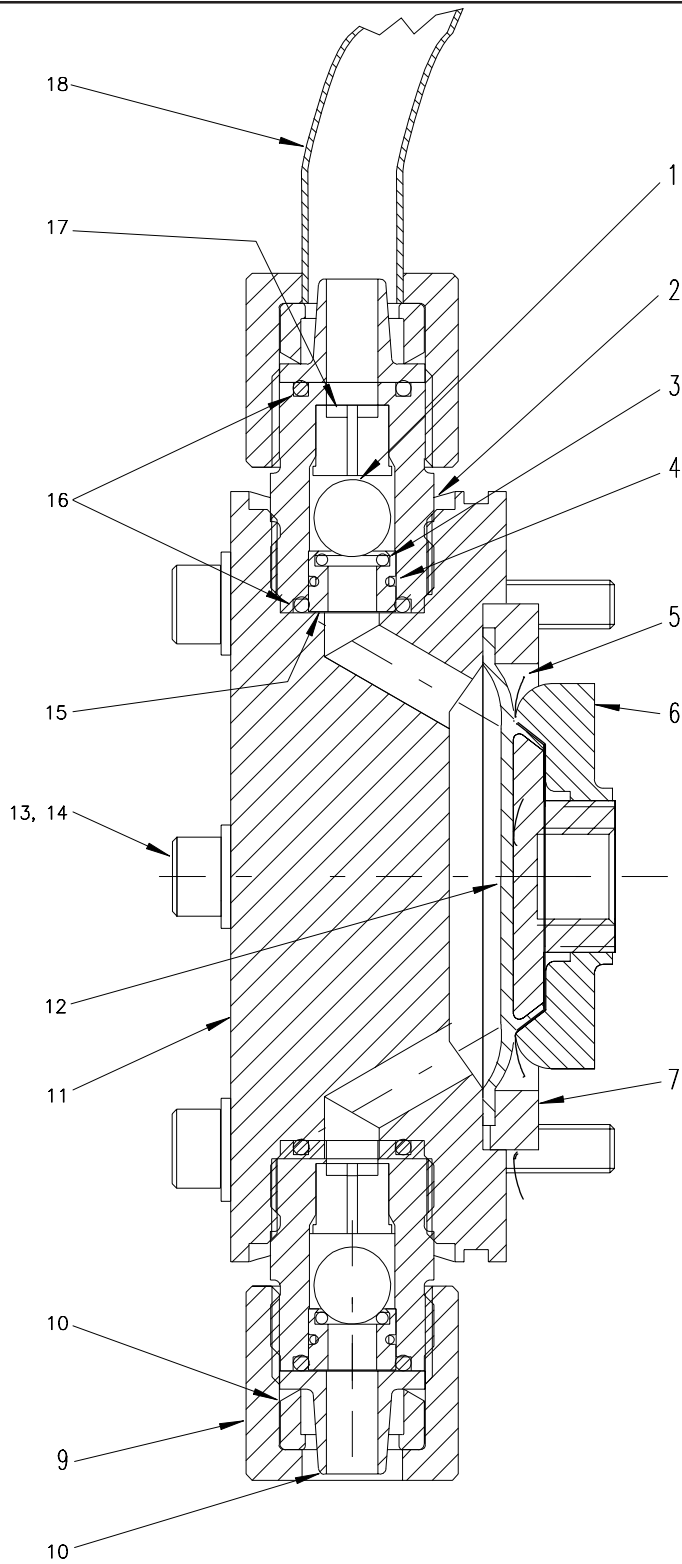
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

2" CARTRIDGE LIQUID END - PARTS LIST

440.050.010.030C

ISSUE 3 8-01

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST SEE DWG. 440.050.010.040B.

2" THREADED LIQUID END - PARTS

440.050.010.040A

ISSUE 1 2-98

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
■ 1	AHQ 4025	2	BALL, .500", GLASS
■ 2	AMK 3450	2	HOUSING
■ 3	ANM 3591	2	O-RING, VITON, 8 x 2 MM
■ 4	ALI 3911	2	O-RING, VITON, 11 x 1.5 MM
● 5	AAA 3323	1	DISC, BACKING, 2" DIAPHRAGM
● 6	AJE 4030	1	RING, BACKUP, 2" DIAPHRAGM
● 7	AIC 5296	1	SPACER, 2" DIAPHRAGM
○ 8	AAA 1490	2	NIPPLE, .50" OD TUBE
○ 9	AKG 3500	2	NUT, 16MM OD TUBE
○ 10	AAA 1496	2	HOLDER, .50" OD TUBE
▲ 11	AMK 3122	1	HEAD
▲ 12	AMG 4773	1	DIAPHRAGM, 2" TEFLON FACED
13	● AAA 1044	6	SCREW, CAP, M8 x 65 SOCK. HD., 316SS (ENCORE 100)
	OR		
	□ AVM 3618	6	SCREW, CAP, M8 x 60 SOCK. HD., 316SS (ENCORE 700)
● □ 14	AWO 5392	6	WASHER, FLAT M8, 316SS
■ 15	AMK 3460	2	SEAT
■ 16	APQ 3604	4	O-RING (113) VITON, 13.94 x 2.62 MM
■ 17	AAA 4331	2	BALL STOP
* 18	RP 684820	As required	TUBING, 1/2" OD x 3/8" ID, POLYETHYLENE

*AVAILABLE AS AN ACCESSORY. NOT PART OF STANDARD PUMP PACKAGE.

NOTE: ● PART OF AOO 3609.
 ■ PART OF AOO 3623.
 ○ PART OF AAA 1505.
 ▲ PART OF AAA 1499.
 □ PART OF AAA 4337.

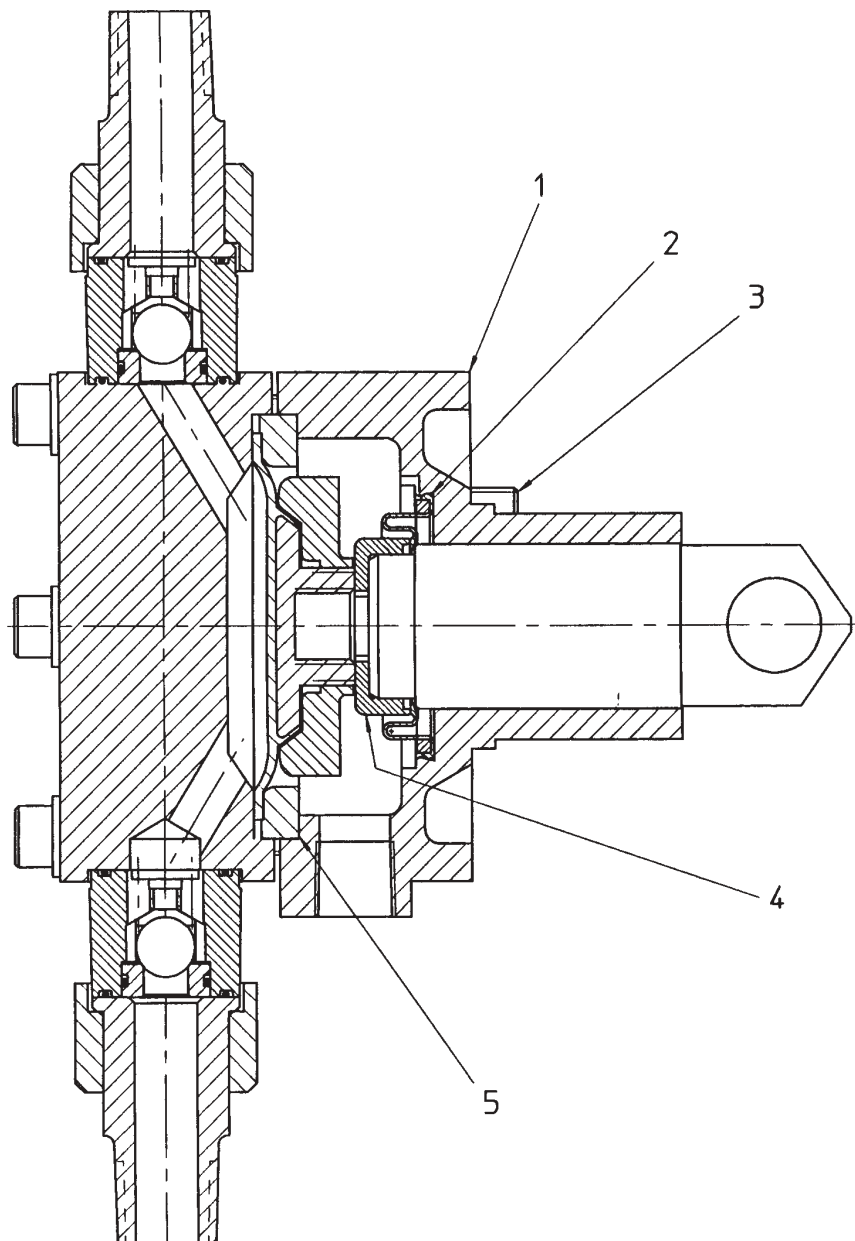
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

2" THREADED LIQUID END - PARTS LIST

440.050.010.040B

ISSUE 3 10-01

ENCORE® 700 METERING PUMP



KEY NO.	PART NO.	QTY.	DESCRIPTION
● 1	AQO5451	1	ADAPTER, 2" DIAPHRAGM
● 2	AAB7205	1	SEAL, BELLOW, CROSSHEAD
● 3	AXS3583	4	SCREW, CAP, M8 x 25, SOCK. HD., 316SS
● 4	AJA5915	1	CLAMP, DIAPHRAGM, BELLOW
● 5	AIC5296	1	SPACER, 2" DIAPHRAGM

NOTE: ● PART OF APQ4101.

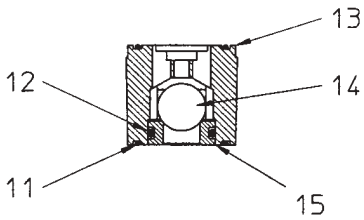
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

2" LIQUID END ADAPTER - PARTS

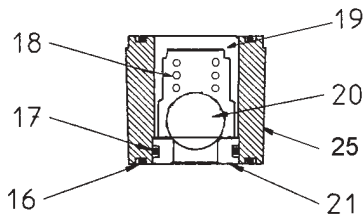
440.400.001.040

ISSUE 1 7-01

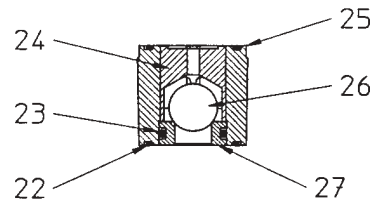
ENCORE® 700 METERING PUMP



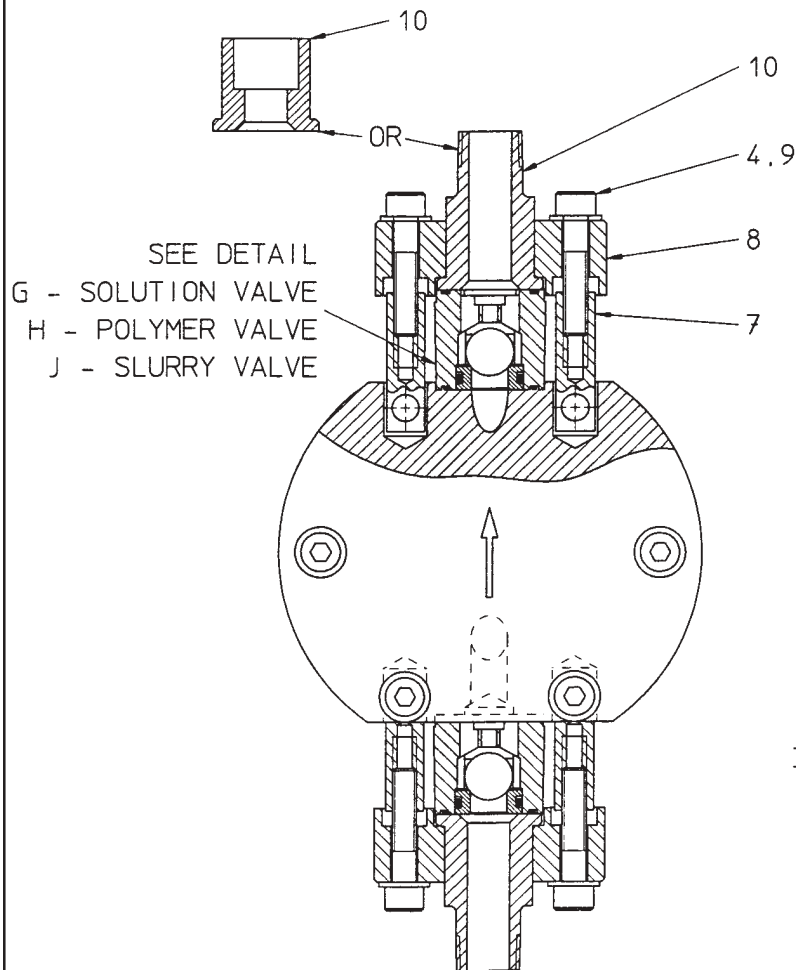
SOLUTION VALVE
BALL SIZE: .625"
DETAIL G



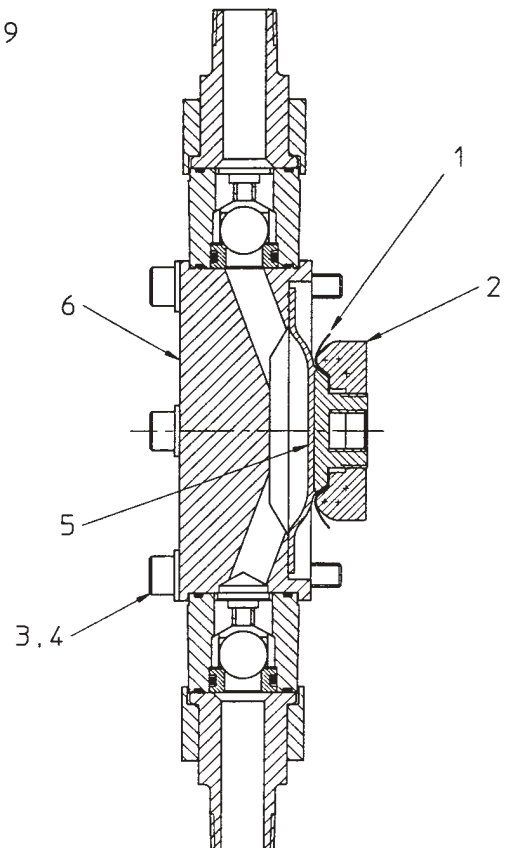
POLYMER VALVE
BALL SIZE: .625"
DETAIL H



SLURRY VALVE
BALL SIZE: .625"
DETAIL J



FRONT VIEW



SIDE VIEW

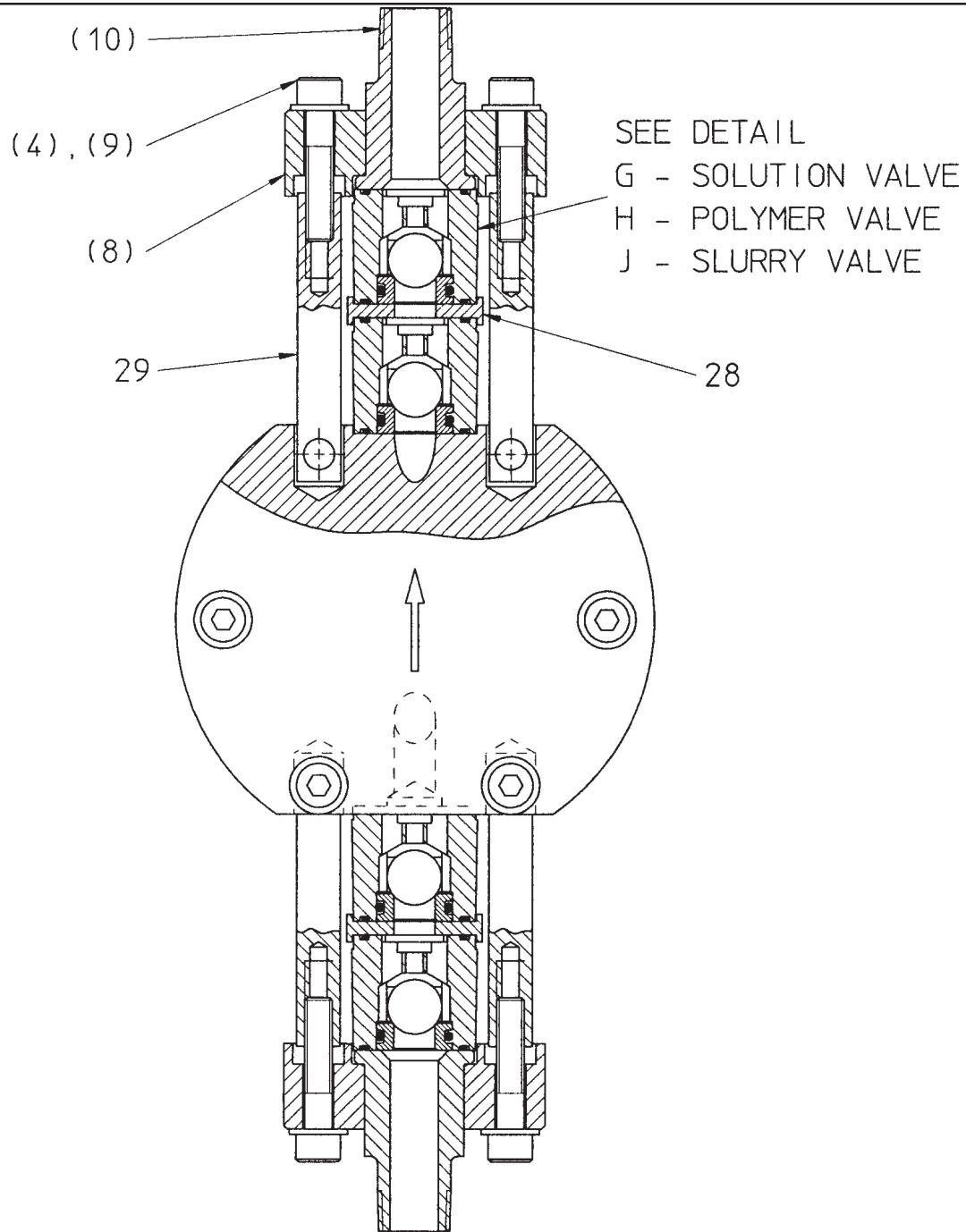
NOTE: FOR PARTS LIST SEE DWG. 440.400.010.010C.

3" LIQUID END - PARTS

440.400.010.010A

ISSUE 2 8-01

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST SEE DWG. 440.400.010.010C.

3" LIQUID END - PARTS

440.400.010.010B

ISSUE 1 6-96

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
1	AAA3320	1	DISC, BACKING
2	APP4035	1	RING, BACKUP
3	AVM3599	6	CAP SCREW, M8 x 70, SOCK. HD, 316SS
4	AWO5392	10	WASHER, FLAT M8, 316SS
5	AQO5748	1	3" DIAPHRAGM
6	ALI5254	1	HEAD, PVC
	OR		
	APQ5268	1	HEAD, KYNAR
7	APQ5538	4	EYENUT, VALVE, SB
8	AIC5568	2	CLAMP
9	ARE3591	4	CAP SCREW, M8 & 40, SOCK. HD. 316SS
10	AIA4133	2	CONN., M, 1/2" NPT, PVC
	OR		
	ANM4255	2	CONN., M, 1/2" NPT, KYNAR
	OR		
	AMK4974	2	CONN., SOCK. 1/2" PIPE, PVC
11	AJE5881	4	O-RING (024) HYPALON, 28.3 ID x 1.78MM
	OR		
	AOO5871	4	O-RING (024) VITON, 28.3 ID x 1.78MM
12	AOO5683	2	O-RING (115) HYPALON, 17.12 ID x 2.62 MM
	OR		
	APQ5924	2	O-RING (115) VITON, 17.12 ID x 2.62 MM
13	AMK5020	2	GUIDE, RETAINER, .625" BALL, PVC
	OR		
	AOO5014	2	GUIDE, RETAINER, .625" BALL, KYNAR
14	AFM5802	2	BALL, .625" 316SS
	OR		
	AEK5860	2	BALL, .625" TEFLON
	OR		
	AAC3514	2	BALL, .625" CERAMIC
15	ANM4397	2	SEAT, .625" BALL 316SS
	OR		
	AIC4409	2	SEAT, .625" BALL PVC
	OR		
	AIA4403	2	SEAT, .625" BALL KYNAR
16	AOO5871	4	O-RING (024) VITON, 28.3 ID x 1.78MM
17	APQ5924	2	O-RING (115) VITON, 17.12 ID x 2.62 MM
18	ANM4215	2	SPRING, .625" BALL
19	AAB9602	2	GUIDE, POLYMER, .625" BALL, PVC
20	AEK5860	2	BALL, .625" PVC
21	AIC4409	2	SEAT, .625" BALL, PVC
22	AJE5881	4	O-RING (024) HYPALON, 28.3 ID x 1.78MM
23	AOO5683	2	O-RING (115) HYPALON, 17.12 ID x 2.62 MM
24	ALI5332	2	GUIDE, SLURRY, .625" BALL, 316SS
25	AIC4989	2	RETAINER, .625" BALL, PVC
26	AEK5786	2	BALL, .625" POLYURETHANE
27	AKG4390	2	SEAT, .625" BALL CERAMIC
28	APS4943	2	ADAPTER, V, .625" BALL, PVC
	OR		
	APQ4948	2	ADAPTER, V, .625" BALL, KYNAR
29	APQ5542	4	EYENUT, VALVE, DB

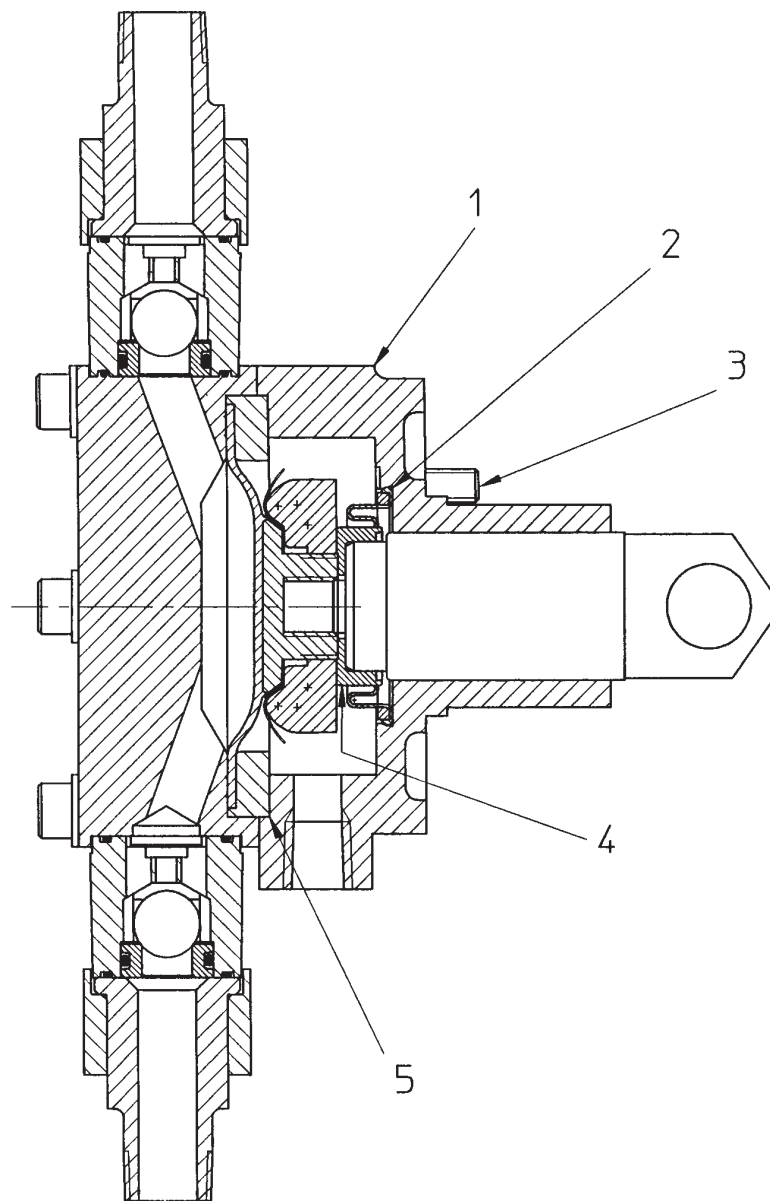
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

3" LIQUID END - PARTS LIST

440.400.010.010C

ISSUE 2 7-01

ENCORE® 700 METERING PUMP



KEY NO.	PART NO.	QTY.	DESCRIPTION
● 1	APM5645	1	ADAPTER, 3" DIAPHRAGM
● 2	AAB7205	1	SEAL, BELLOW, CROSSHEAD
● 3	AXS3583	4	SCREW, CAP, M8 x 25, SOCK. HD., 316SS
● 4	AJA5915	1	CLAMP, DIAPHRAGM, BELLOW
● 5	AJE5301	1	SPACER, 3" DIAPHRAGM

NOTE: ● PART OF APS4105.

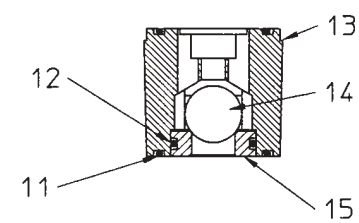
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

3" LIQUID END ADAPTER - PARTS

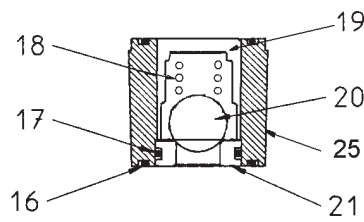
440.400.001.050

ISSUE 1 7-01

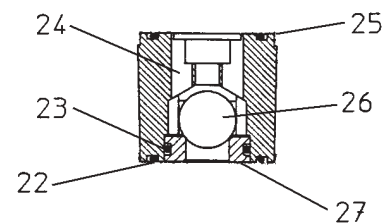
ENCORE® 700 METERING PUMP



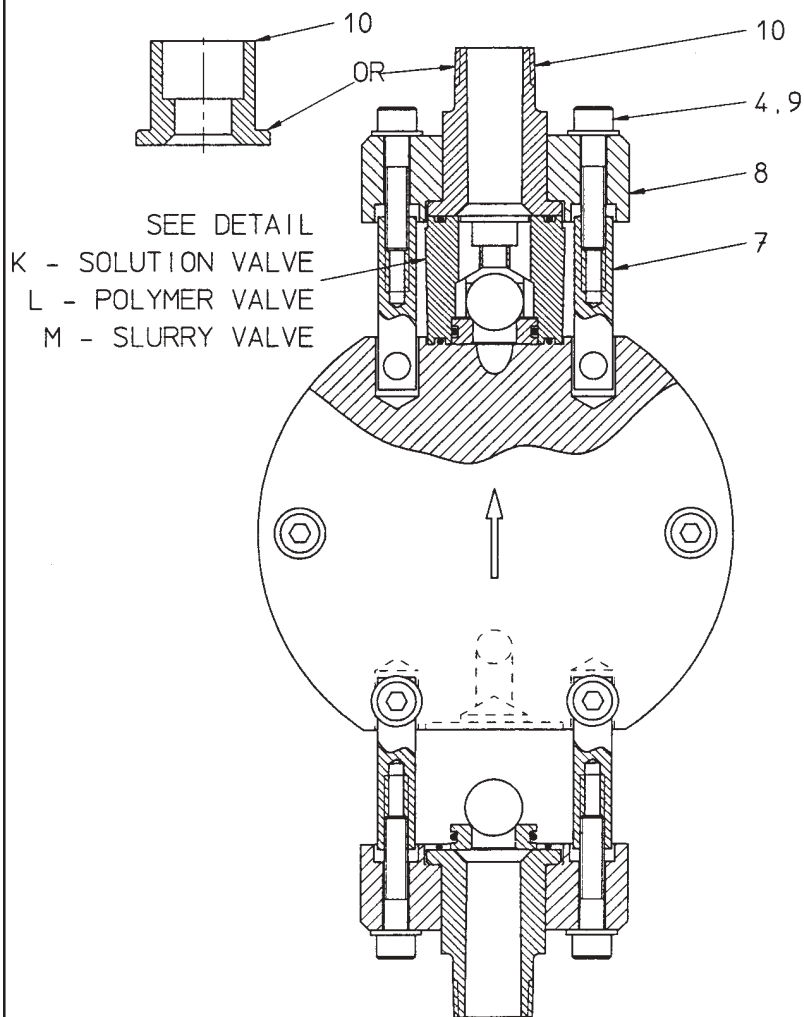
SOLUTION VALVE
BALL SIZE .75"
DETAIL K



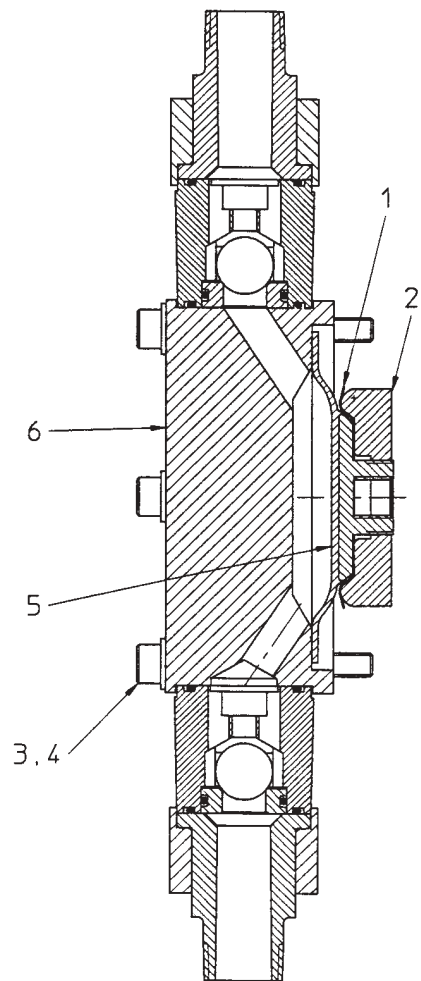
POLYMER VALVE
BALL SIZE .75"
DETAIL L



SLURRY VALVE
BALL SIZE .75"
DETAIL M



FRONT VIEW



SIDE VIEW

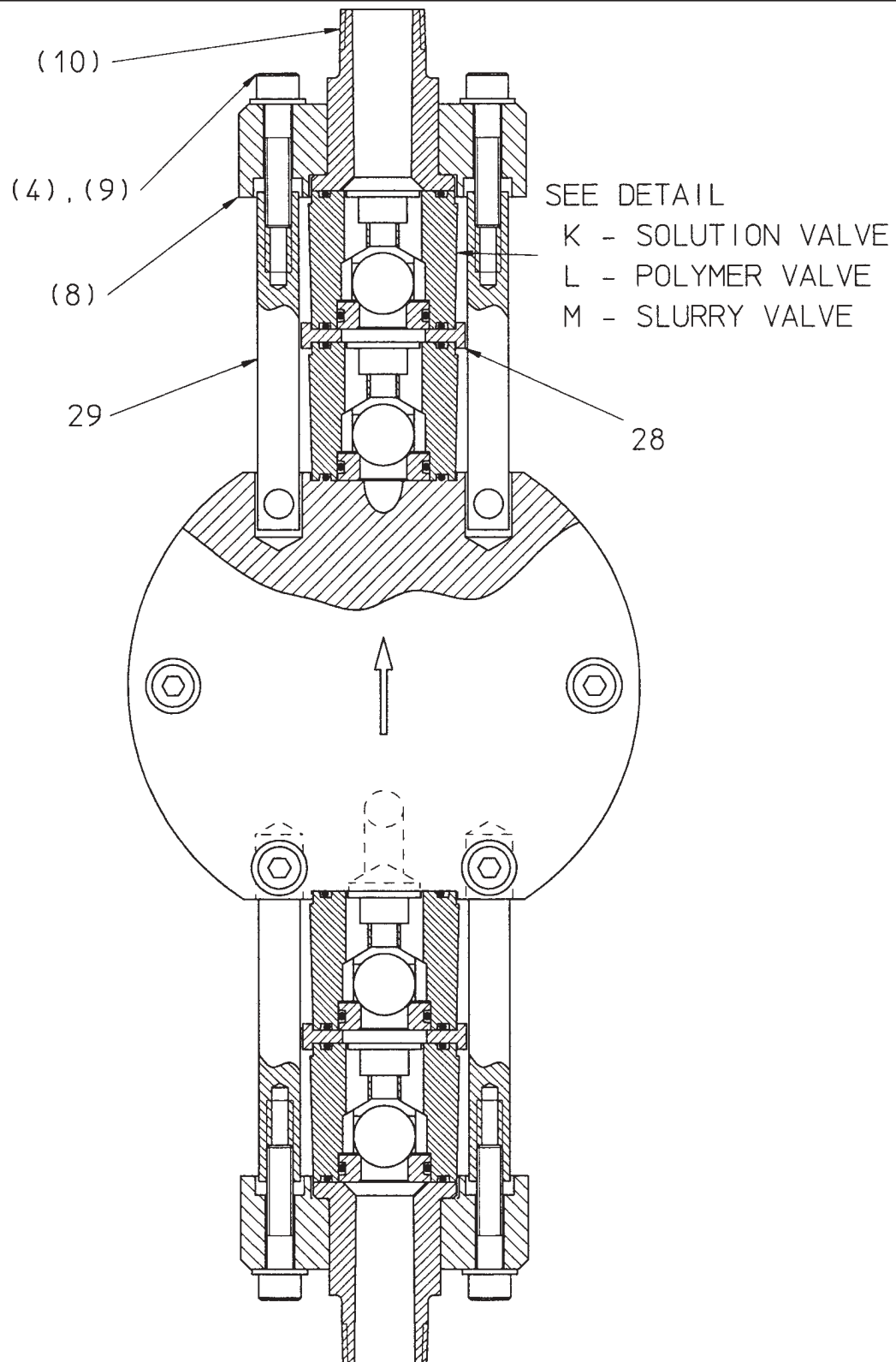
NOTE: FOR PARTS LIST SEE DWG. 440.400.010.020C.

4" LIQUID END - PARTS

440.400.010.020A

ISSUE 2 8-01

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NOTE: FOR PARTS LIST SEE DWG. 440.400.010.020C.

4" LIQUID END - PARTS

440.400.010.020B

ISSUE 1 6-96

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
1	AJE4048	1	DISC, BACKING
2	ALJ4039	1	RING, BACKUP
3	ARE3624	6	CAP SCREW, M8 x 70, SOCK. HD, 316SS
4	AWO5392	10	WASHER, FLAT M8, 316SS
5	ARQ5736	1	4" DIAPHRAGM
6	APQ5186	1	HEAD, PVC
	OR		
	ANM5205	1	HEAD, KYNAR
7	AJE5494	4	EYENUT, VALVE
8	AIA5558	2	CLAMP
9	ARE3591	4	CAP SCREW, M8 & 40, SOCK. HD. 316SS
10	AIC4106	2	CONN., M, 3/4" NPT, PVC
	OR		
	AIA4119	2	CONN., M, 3/4" NPT, KYNAR
	OR		
	APQ4991	2	CONN., SOCK. 3/4" PIPE, PVC
11	ALI5643	4	O-RING (126) HYPALON, 34.59 ID x 2.62MM
	OR		
	AMK5934	4	O-RING (126) VITON, 34.59 ID x 2.62MM
12	AMK5655	2	O-RING (119) HYPALON, 23.47 ID x 2.62 MM
	OR		
	AMK5929	2	O-RING (119) VITON, 23.47 ID x 2.62 MM
13	AIC5037	2	GUIDE, RETAINER, .75" BALL, PVC
	OR		
	AOO5029	2	GUIDE, RETAINER, .75" BALL, KYNAR
14	AHQ3932	2	BALL, .75" 316SS
	OR		
	ACG3819	2	BALL, .75" TEFLON
	OR		
	AAA3656	2	BALL, .75" CERAMIC
15	APQ4708	2	SEAT, .75" BALL 316SS
	OR		
	APS4721	2	SEAT, .75" BALL PVC
	OR		
	AIA4715	2	SEAT, .75" BALL KYNAR
16	AMK5934	4	O-RING (126) VITON, 34.59 ID x 2.62MM
17	AMK5929	2	O-RING (119) VITON, 23.47 ID x 2.62 MM
18	AAB9218	2	SPRING, .75" BALL
19	AAB9221	2	GUIDE, POLYMER, .75" BALL, PVC
20	ACG3819	2	BALL, .75" PVC
21	APS4721	2	SEAT, .75" BALL, PVC
22	ALI5643	4	O-RING (126) HYPALON, 34.59 ID x 2.62MM
23	AMK5655	2	O-RING (119) HYPALON, 23.47 ID x 2.62 MM
24	APQ5338	2	GUIDE, SLURRY, .75" BALL, 316SS
25	ANM4983	2	RETAINER, .75" BALL, PVC
26	AFM3860	2	BALL, .75" POLYURETHANE
27	AMK4698	2	SEAT, .75" BALL CERAMIC
28	AKG4927	2	ADAPTER, V, .75" BALL, PVC
	OR		
	AKG4933	2	ADAPTER, V, .75" BALL, KYNAR
29	AIA5499	4	EYENUT, VALVE, DB

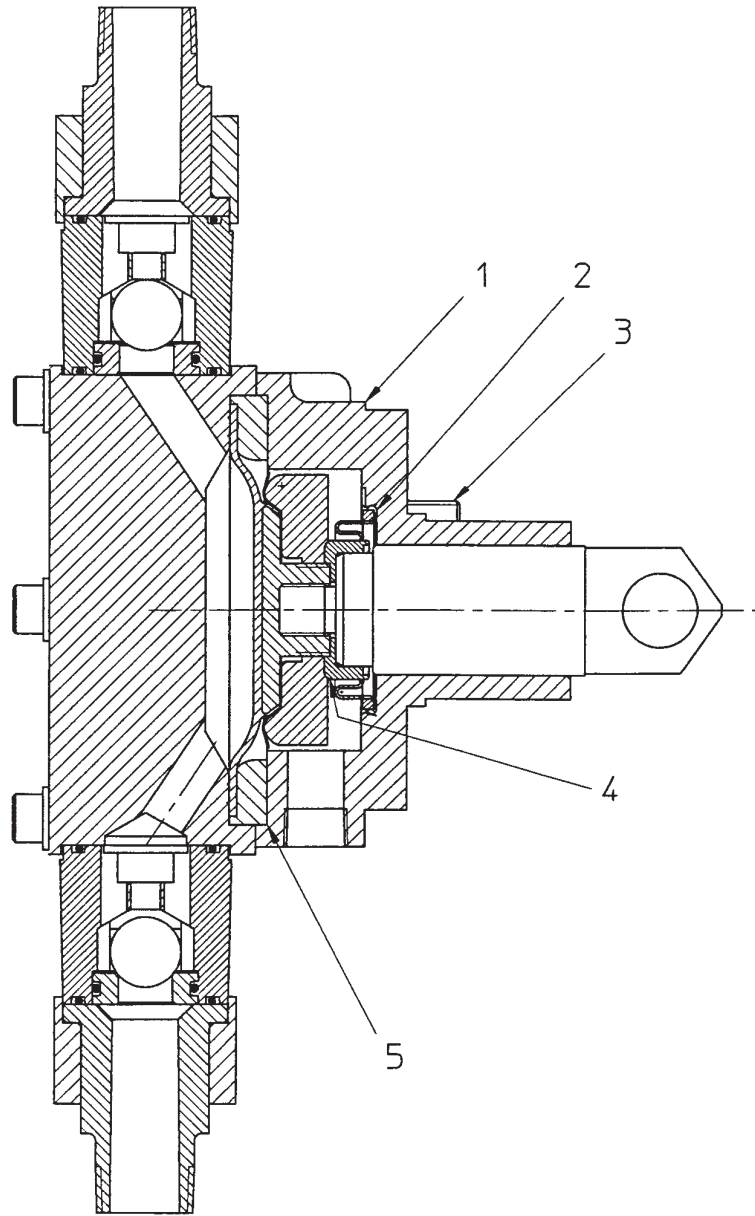
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

4" LIQUID END - PARTS LIST

440.400.010.020C

ISSUE 3 7-01

ENCORE® 700 METERING PUMP



KEY NO.	PART NO.	QTY.	DESCRIPTION
● 1	AKC5653	1	ADAPTER
● 2	AAB7205	1	SEAL, BELLOW, CROSSHEAD
● 3	AXS3583	4	CAP SCREW, M8 x 25, SOCK. HD., 316SS
● 4	AJA5915	1	CLAMP
● 5	AJE5306	1	SPACER

NOTE: ● PART OF APS4110.

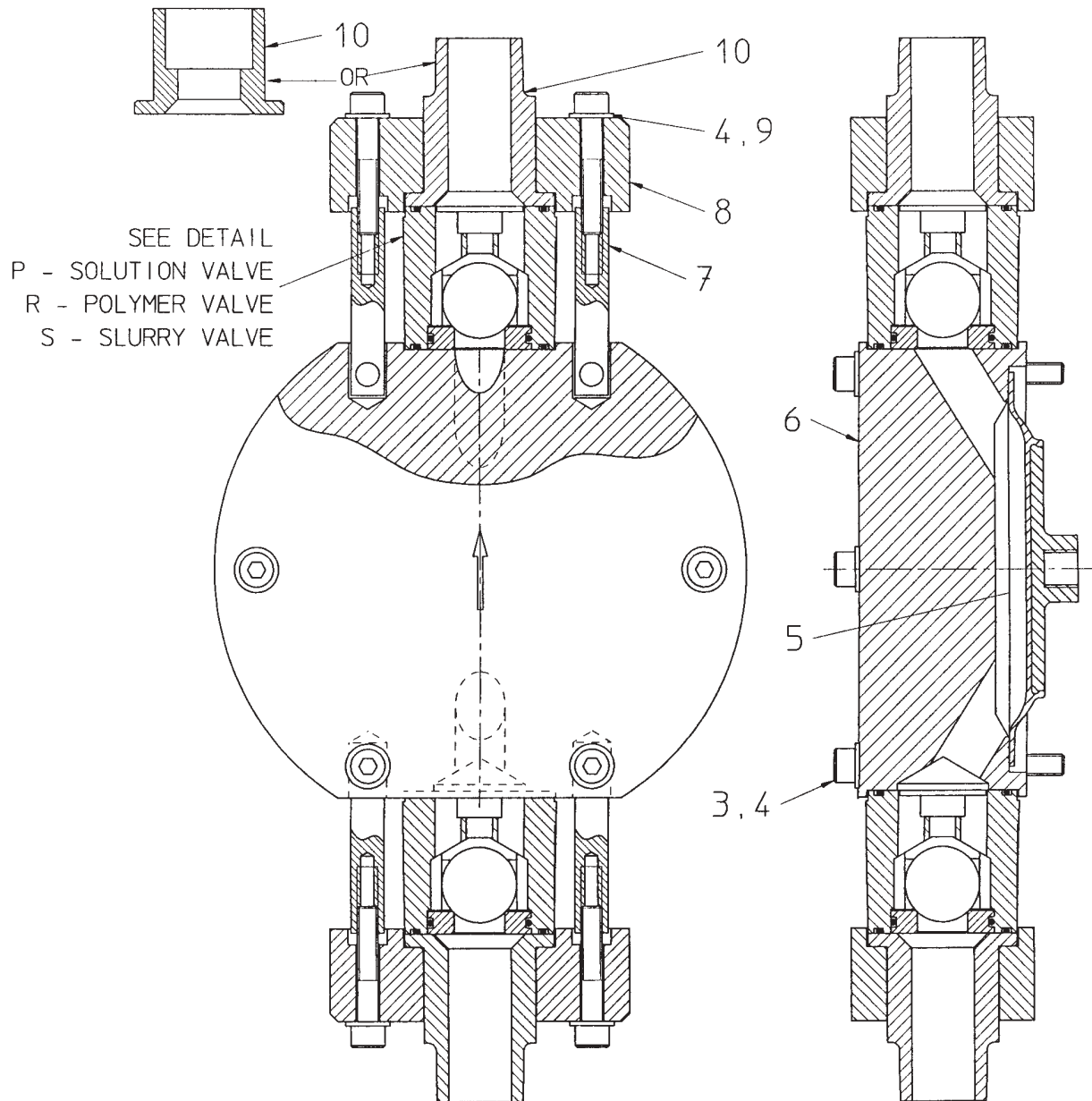
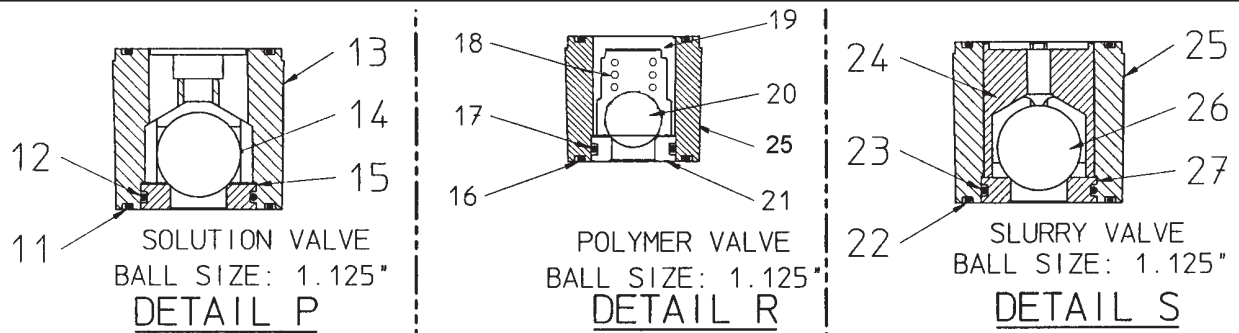
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

4" LIQUID END ADAPTER - PARTS

440.400.001.060

ISSUE 2 7-01

ENCORE® 700 METERING PUMP



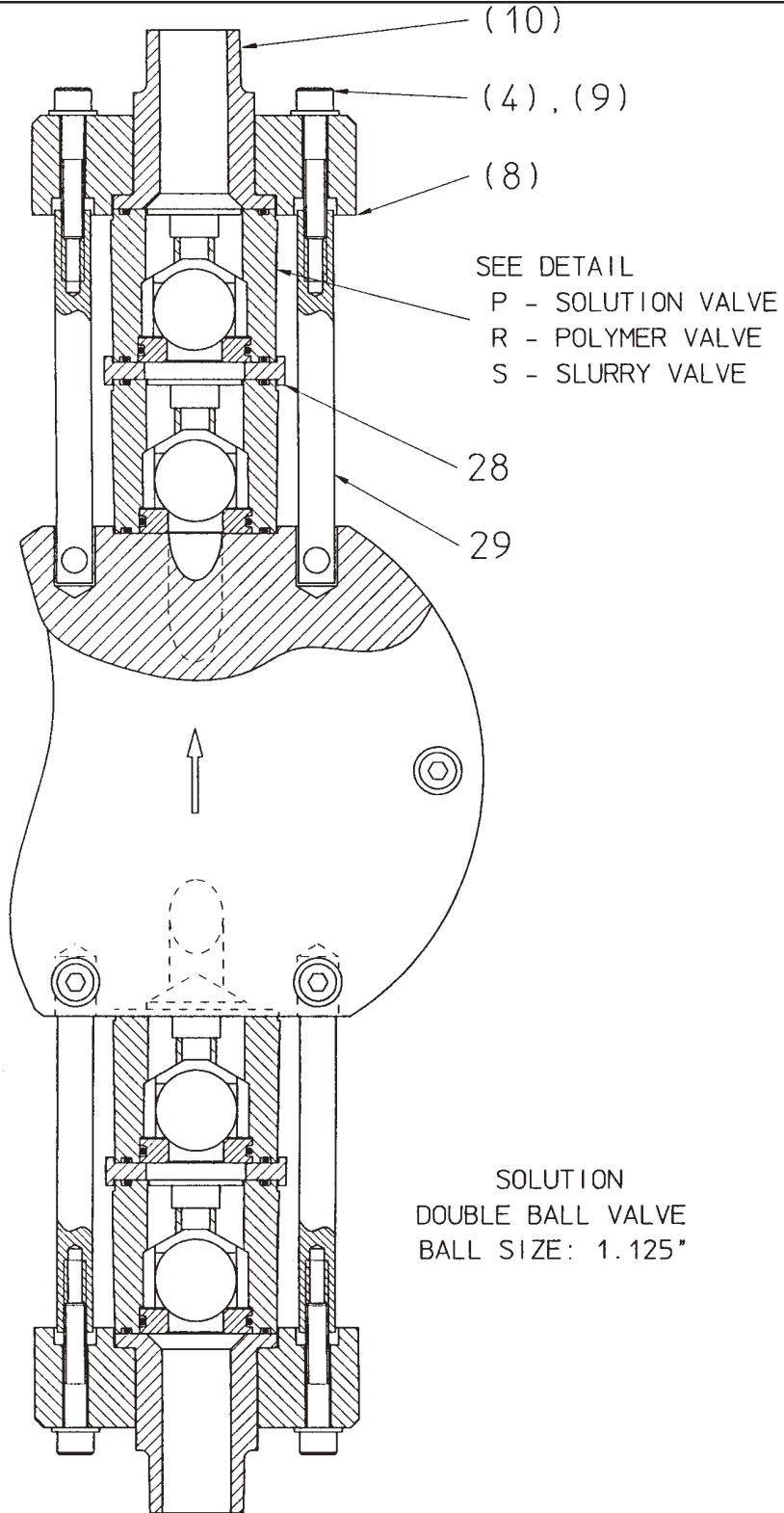
NOTE: FOR PARTS LIST SEE DWG. 440.400.010.030C.

5" LIQUID END - PARTS

440.400.010.030A

ISSUE 2 8-01

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST SEE DWG. 440.400.010.030C.

5" LIQUID END - PARTS

440.400.010.030B

ISSUE 1 6-96

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
3	ASG3633	6	CAP SCREW, M8 x 80, SOCK. HD., 316SS
4	AWO5392	10	WASHER, FLAT, M8, 316SS
5	APM5758	1	5" DIAPHRAGM
6	AL5285	1	HEAD, PVC
	OR		
	AMK5290	1	HEAD, KYNAR
7	AOO5518	4	EYENUT, VALVE, SB
8	AIA5573	2	CLAMP
9	AAA2028	4	CAP SCREW, M8 x 45, SOCK. HD., 316SS
10	AJE4298	2	CONN., M, 1" NPT, PVC
	OR		
	AOO4311	2	CONN., M, 1" NPT, KYNAR
	OR		
	AMK4997	2	CONN., SOCK., 1" PIPE, PVC
11	AMK3876	4	O-RING (134) HYPALON, 47.29 ID x 2.62 MM
	OR		
	AJE3882	4	O-RING (134) VITON, 47.29 ID x 2.62 MM
12	AL5643	2	O-RING (126) HYPALON, 34.59 ID x 2.62 MM
	OR		
	AMK5934	2	O-RING (126) VITON, 34.59 ID x 2.62 MM
13	AKG5002	2	GUIDE, RETAINER, 1.125" BALL, PVC
	OR		
	AIA5008	2	GUIDE, RETAINER, 1.125" BALL, KYNAR
14	ABE3904	2	BALL, 1.125", 316SS
	OR		
	ABE3796	2	BALL, 1.125", TEFLON
	OR		
	AEK3629	2	BALL, 1.125", CERAMIC
15	AIC4733	2	SEAT, 1.125" BALL, 316SS
	OR		
	AIC3361	2	SEAT, 1.125" BALL, PVC
	OR		
	ANM3369	2	SEAT, 1.125" BALL, KYNAR
16	AJE3882	4	O-RING (134) VITON, 47.29 ID x 2.62 MM
17	AMK5934	2	O-RING (126) VITON, 34.59 ID x 2.62 MM
18	AL4222	2	SPRING, 1.125" BALL
19	AAB5987	2	GUIDE, POLYMER, 1.125" BALL, PVC
20	ABE3796	2	BALL, 1.125", TEFLON
21	AIC3361	2	SEAT, 1.125" BALL, PVC
22	AMK3876	4	O-RING (134) HYPALON, 47.29 ID x 2.62 MM
23	AL5643	2	O-RING (126) HYPALON, 34.59 ID x 2.62 MM
24	AOO5311	2	GUIDE, SLURRY, 1.125" BALL, 316SS
25	APS4977	2	RETAINER, 1.125" BALL, PVC
26	ABE3839	2	BALL, 1.125", POLYURETHANE
27	AOO4728	2	SEAT, 1.125" BALL, CERAMIC
28	APQ4909	2	ADAPTER, V, 1.125" BALL, PVC
	OR		
	ANM4915	2	ADAPTER, V, 1.125" BALL, KYNAR
29	AIC5522	4	EYENUT, VALVE, DB

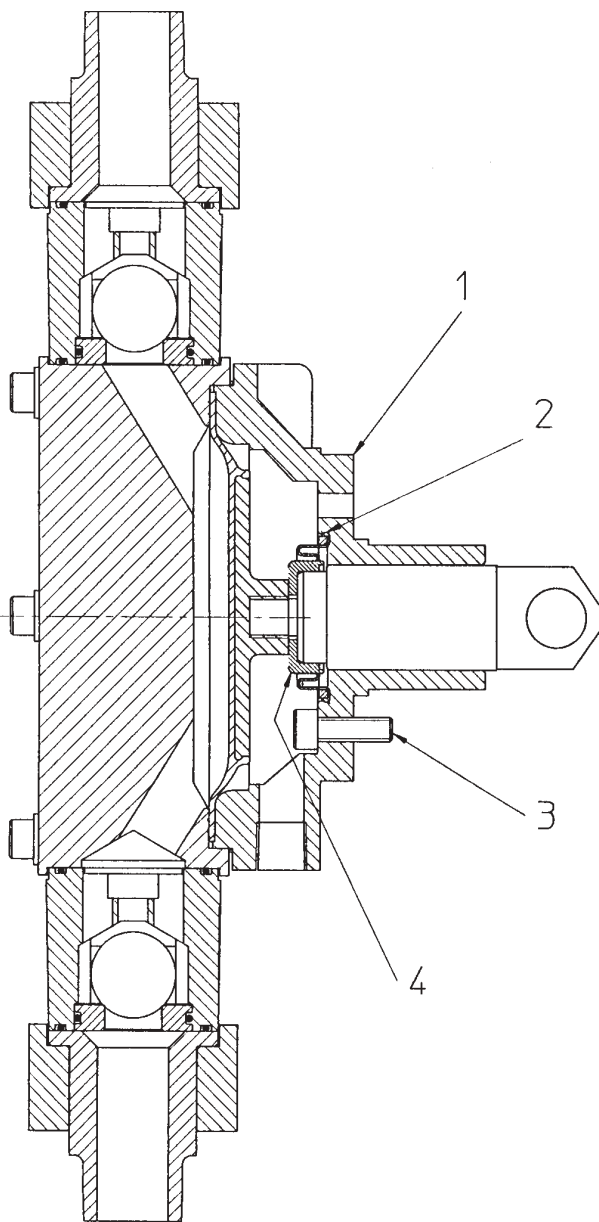
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

5" LIQUID END - PARTS LIST

440.400.010.030C

ISSUE 1 7-01

ENCORE® 700 METERING PUMP



KEY NO.	PART NO.	QTY.	DESCRIPTION
● 1	AJA5631	1	ADAPTER, 5" DIAPHRAGM
● 2	AAB7205	1	SEAL, BELLOW, CROSSHEAD
● 3	AXS3583	4	SCREW, CAP, M8 x 25, SOCK. HD., 316SS
● 4	AJA5915	1	CLAMP, DIAPHRAGM, BELLOW

NOTE: ● PART OF ANM4120.

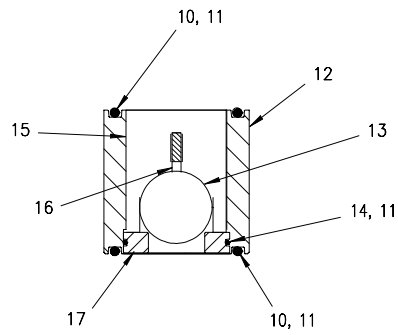
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

5" LIQUID END ADAPTER - PARTS

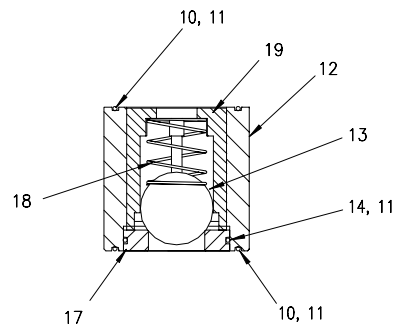
440.400.001.070

ISSUE 0 6-96

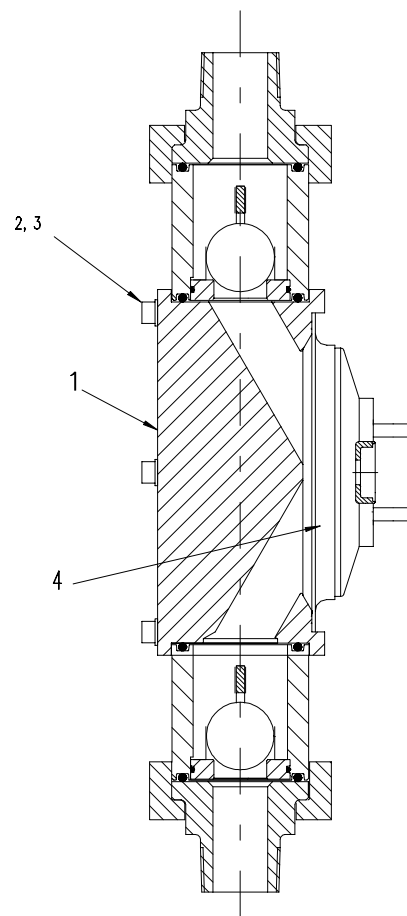
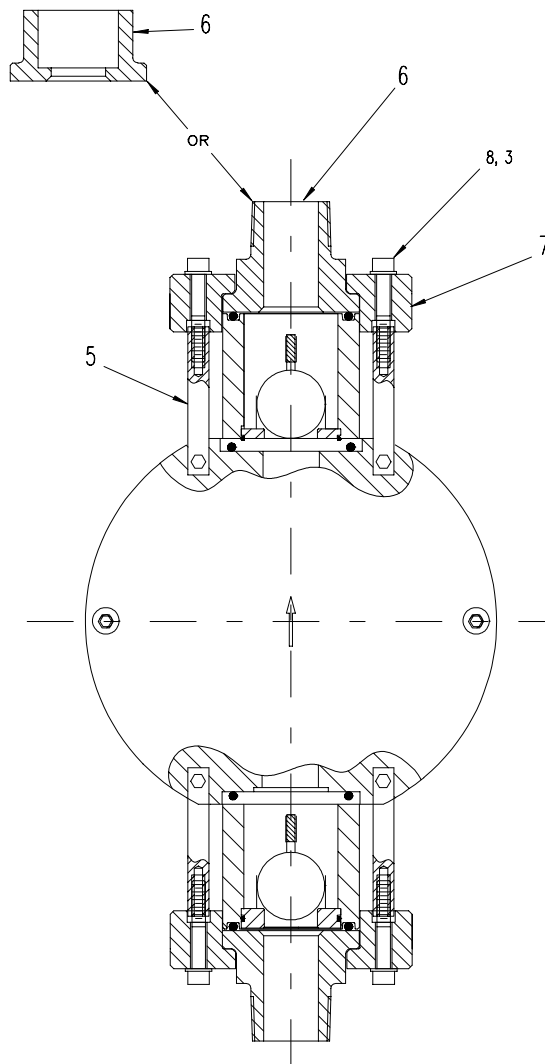
ENCORE® 700 METERING PUMP



SOLUTION & SLURRY VALVE
DETAIL T



POLYMER VALVE
DETAIL U



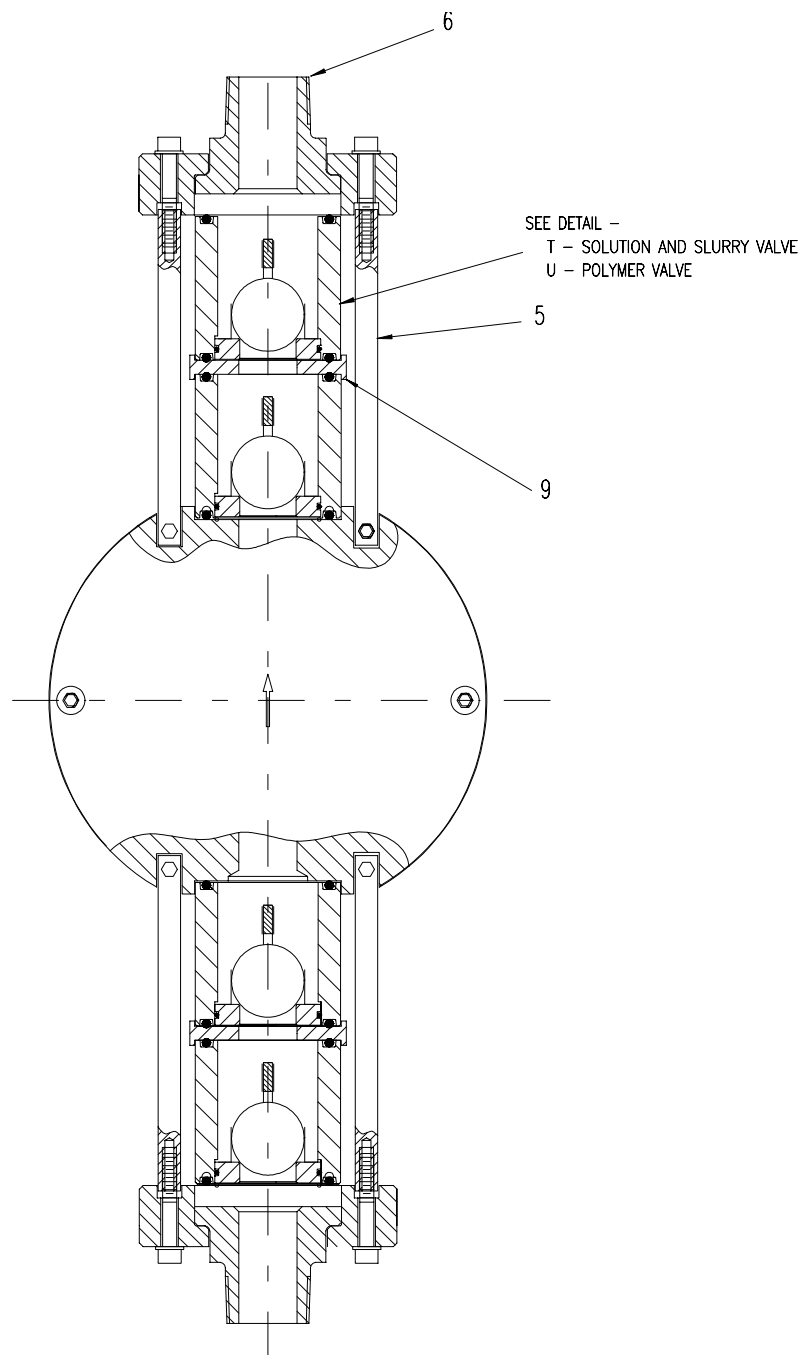
NOTE: FOR PARTS LIST SEE DWGS. 440.400.010.040C&D.

6-1/2" LIQUID END - PARTS

440.400.010.040A

ISSUE 0 9-98

ENCORE® 700 METERING PUMP



NOTE: FOR PARTS LIST SEE DWGS. 440.400.010.040C&D.

6-1/2" LIQUID END - PARTS

440.400.010.040B

ISSUE 0 9-98

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
1	AAA9089 OR AAA9116	1	HEAD, PVC
2	AAA5283	6	HEAD, KYNAR
3	AWO5392	10	SCREW, CAP M8 x 120, SOCK. HEAD, 316SS
4	AAA9077	1	FLAT WASHER, M8, 316SS
5	AAA9383 OR AAA9380	4	DIAPHRAGM, 6.5" TEFLON FACED
6	AIC3543 OR ALI3579 OR AJE3531 OR APQ3649 OR APQ3666 OR AJE3640 OR AKG3698	2	EYE NUT, SINGLE BALL
7	AAA9377 OR AAA9410 OR AAA9413	2	EYE NUT, DOUBLE BALL
8	AVM3599	2	1-1/2" NPT CONNECTION, PVC
9	APQ3953 OR ANM3962 OR AKG3946	2	1-1/2" NPT CONNECTION, KYNAR
10	AIC5182 OR AKG5710	2	1-1/2" NPT CONNECTION, SS
11	AAA3797	2	R1-1/2" CONNECTION, PVC
12	AJE3930 OR ALI3938 OR ANM3922	2	R1-1/2" CONNECTION, KYNAR
		2	R1-1/2" CONNECTION, SS
		2	1-1/2" SOCKET CONNECTION, PVC
		2	CLAMP, PVC
		2	CLAMP, KYNAR
		2	CLAMP, SS
		4	SCREW, CAP M8 x 55, SOCK. HEAD, 316SS
		2	DOUBLE VALVE ADAPTER, 1.625" BALL, PVC
		2	DOUBLE VALVE ADAPTER, 1.625" BALL, KYNAR
		2	DOUBLE VALVE ADAPTER, 1.625" BALL, SS
		4	#147 O-RING, 67.95ID x 2.62MM, HYPALON
		4	#147 O-RING, 67.95ID x 2.62MM, VITON
		A/R	LIGHT SILICONE GREASE
		2	RETAINER, PVC
		2	RETAINER, KYNAR
		2	RETAINER, SS

■ PART OF AAA9407

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

6-1/2" LIQUID END - PARTS LIST

440.400.010.040C

ISSUE 0 9-98

ENCORE® 700 METERING PUMP

KEY NO.	PART NO.	QTY.	DESCRIPTION
13	ACG5578	2	BALL, 1.625", SS
	OR		
	AAA5536	2	BALL, 1.625", TEFLON
	OR		
14	AAC5452	2	BALL, 1.625", CERAMIC
	OR		
	ABE5509	2	BALL, 1.625", POLYURETHANE
	ANM5190	2	#139 O-RING, 55.25ID x 2.62MM, HYPALON
15	OR		
	ANM5700	2	#139 O-RING, 55.25ID x 2.62MM, VITON
	APS4334	2	TOP GUIDE, PVC
	OR		
16	AJE4330	2	TOP GUIDE, KYNAR
	OR		
	AIC4326	2	TOP GUIDE, SS
	AKG4322	2	BOTTOM GUIDE, PVC
17	OR		
	AJE4318	2	BOTTOM GUIDE, KYNAR
	OR		
	AOO4315	2	BOTTOM GUIDE, SS
18	AL4362	2	SEAT, SS
	OR		
	APQ4371	2	SEAT, PVC
	OR		
19	AIC4366	2	SEAT, KYNAR
	OR		
	AOO4357	2	SEAT, CERAMIC
	AL4260	2	SPRING, COMP., COB., 1.34OD x .06W x 1.68
	AMK3904	2	GUIDE, PVC POLYMER

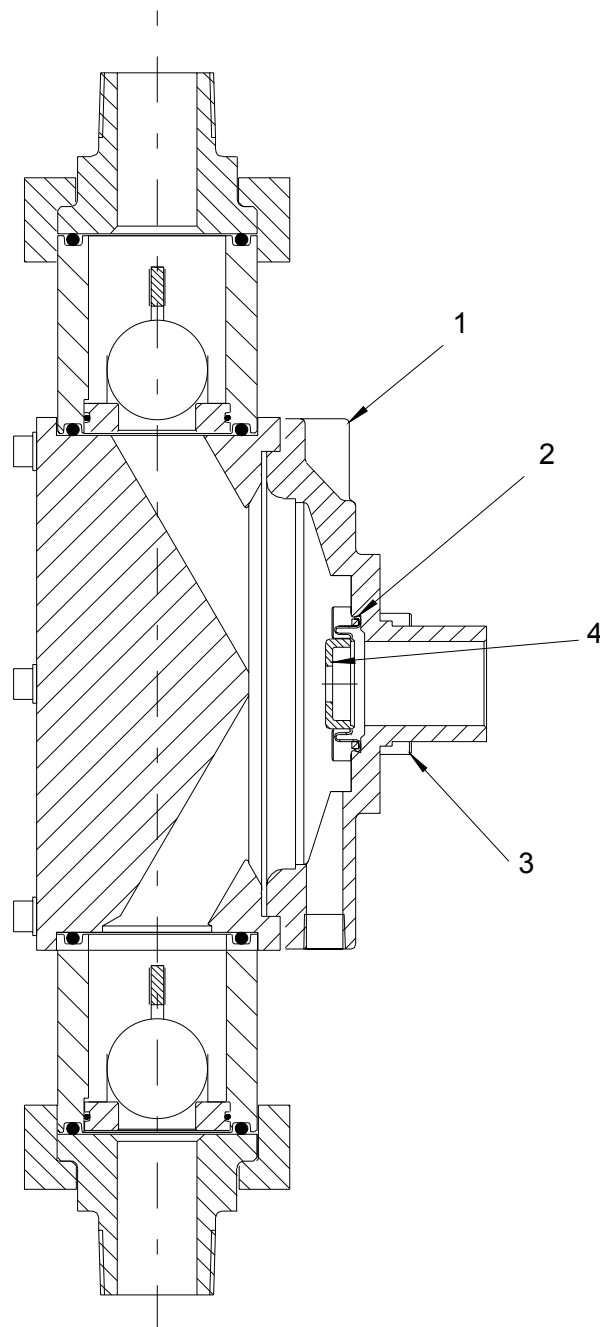
WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

6-1/2" LIQUID END - PARTS LIST

440.400.010.040D

ISSUE 0 9-98

ENCORE® 700 METERING PUMP



KEY NO.	PART NO.	QTY.	DESCRIPTION
1	AAA9098	1	ADAPTER, 6.5" DIAPHRAGM, MACH.
2	AAB7205	1	SEAL, BELLOW, CROSSHEAD
3	AXS3583	4	SCREW CAP., M8 x 24, SOCK. HD., 316SS
4	AJA5915	1	CLAMP, DIAPHRAGM, BELLOW

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

6-1/2" LIQUID END ADAPTER - PARTS

440.400.001.080

ISSUE 1 10-01



ENCORE[®] 700 METERING PUMP



SECTION 6 - PREVENTIVE MAINTENANCE KITS AND SPARE PARTS LIST

List of Contents

TABLE NO.

Spares for Encore 700	6.1
1-3/8" Maintenance Kit, Cartridge Valves	6.1.1
1-3/8" Maintenance Kit, Threaded Valves	6.1.2
2" Maintenance Kit, Cartridge Valves	6.1.3
2" Maintenance Kit, Threaded Valves	6.1.4
3" Maintenance Kit, Cartridge Valves	6.1.5
4" Maintenance Kit, Cartridge Valves	6.1.6
5" Maintenance Kit, Cartridge Valves	6.1.7
6-1/2" Maintenance Kit, Cartridge Valves	6.1.8
Adapter and Bellow Seal Kit	6.2
Electric Motors	6.3

ENCORE® 700 METERING PUMP

Table 6.1 - Spares For Encore 700

DESCRIPTION	USED ON	PART NUMBER
Diaphragm Maintenance Kit (includes one crosshead bellow seal)	1-3/8" Head	AAA1136
	2" Head	AAA1118
	3" Head	AAA1121
	4" Head	AAA1124
	5" Head	AAA1127
	6-1/2" Head	AAA9515
Valve Kit §	1-3/8" Head	Refer to Tables 6.1.1 and 6.1.2.
	2" Head	Refer to Tables 6.1.3 and 6.1.4.
	3" Head	Refer to Table 6.1.5.
	4" Head	Refer to Table 6.1.6.
	5" Head	Refer to Table 6.1.7.
	6-1/2" Head	Refer to Table 6.1.8.
Diaphragm Backup Ring	1-3/8" Diaphragm	ALI5124
	2" Diaphragm	AJE4030
	3" Diaphragm	APP4035
	4" Diaphragm	ALJ4039
Head, PVC (Cartridge Valves)	1-3/8" Diaphragm	APS4346
	2" Diaphragm	AOO5277
	3" Diaphragm	ALI5254
	4" Diaphragm	APQ5186
	5" Diaphragm	ALI5285
	6-1/2" Head	AAA9089
Head, PVC (Threaded Valves)	1-3/8" Diaphragm	APS3127
	2" Diaphragm	AMK3122
Head, Kynar (Cartridge Valves)	1-3/8" Diaphragm	AIC4339
	2" Diaphragm	APQ5281
	3" Diaphragm	APQ5268
	4" Diaphragm	ANM5205
	5" Diaphragm	AMK5290
	6-1/2" Diaphragm	AAA9116
Oil Seal (Worm Shaft)	Common to all gearboxes.	ALI3193
Belt	Common to all pulley driven gearboxes.	APS4857
Food-Grade Synthetic Oil SAE 90 (2 liters required)	Gearbox	AAA5499 (order quantity = 2)

NOTE: § Each valve kit consists of two valve sets, one for suction and one for discharge. For double ball valves, order a quantity of two kits per head.

ENCORE® 700 METERING PUMP

Table 6.1.1 - 1-3/8" Maintenance Kit, Cartridge Valves

1-3/8"	Guide Retainer Material	Guide Material	Seat Material	Ball Material	Spring Material	O-Ring Material	Qty. §	Part Number
Solution	PVC	---	316SS	316SS	---	Hypalon	1	APS4297
	PVC	---	316SS	316SS	---	Viton	1	AJE4302
	PVC	---	PVC	PTFE	---	Hypalon	1	API4307
	PVC	---	PVC	PTFE	---	Viton	1	ALI4333
	PVC	---	PVC	Ceramic	---	Hypalon	1	ANM4337
	PVC	---	PVC	Ceramic	---	Viton	1	APS4341
	PVDF	---	316SS	316SS	---	Hypalon	1	AIC4345
	PVDF	---	316SS	316SS	---	Viton	1	ANM4352
	PVDF	---	PVDF	PTFE	---	Hypalon	1	AOO4356
	PVDF	---	PVDF	PTFE	---	Viton	1	AJE4360
	PVDF	---	PVDF	Ceramic	---	Hypalon	1	AKG4364
	PVDF	---	PVDF	Ceramic	---	Viton	1	ALI4368
Slurry	PVC	316SS	Ceramic	Polyuret.	---	Hypalon	1	AKG4374
Polymer	PVC	PVC	PVC	PTFE	Elgiloy	Viton	1	APQ4379

NOTE: § Each valve kit consists of two valve sets, one for suction and one for discharge. For double ball valves, order a quantity of two kits per head.

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

Table 6.1.2 - 1-3/8" Maintenance Kit Threaded Valves (Single Ball Only)

1-3/8"	Housing Material	Ball Material	Seat Material	O-Ring Material	Qty.	Part Number
Solution	PVC	Glass	PVC	Viton	1	AAA1130

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

ENCORE® 700 METERING PUMP

Table 6.1.3 - 2" Maintenance Kit, Cartridge Valves

2"	Guide Retainer Material	Guide Material	Seat Material	Ball Material	Spring Material	O-Ring Material	Qty.§	Part Number
Solution	PVC	---	316SS	316SS	---	Hypalon	1	AJE4773
	PVC	---	316SS	316SS	---	Viton	1	AIC4778
	PVC	---	PVC	PTFE	---	Hypalon	1	AJE4781
	PVC	---	PVC	PTFE	---	Viton	1	APQ4786
	PVC	---	PVC	Ceramic	---	Hypalon	1	ALI4789
	PVC	---	PVC	Ceramic	---	Viton	1	ALI4793
	PVDF	---	316SS	316SS	---	Hypalon	1	ANM4797
	PVDF	---	316SS	316SS	---	Viton	1	AMK4801
	PVDF	---	PVDF	PTFE	---	Hypalon	1	AKG4804
	PVDF	---	PVDF	PTFE	---	Viton	1	ANM4809
	PVDF	---	PVDF	Ceramic	---	Hypalon	1	ALI4812
	PVDF	---	PVDF	Ceramic	---	Viton	1	AIA4817
Slurry	PVC	316SS	Ceramic	Polyuret.	---	Hypalon	1	APQ4826
Polymer	PVC	PVC	PVC	PTFE	Elgiloy	Viton	1	APQ4379

NOTE: § Each valve kit consists of two valve sets, one for suction and one for discharge. For double ball valves, order a quantity of two kits per head.

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

Table 6.1.4 - 2" Maintenance Kit, Threaded Valves (Single Ball Only)

2"	Housing Material	Ball Material	Seat Material	O-Ring Material	Qty.	Part Number
Solution	PVC	Glass	PVC	Viton	1	AAA1133

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

ENCORE® 700 METERING PUMP

Table 6.1.5 - 3" Maintenance Kit, Cartridge Valves

3"	Guide Retainer Material	Guide Material	Seat Material	Ball Material	Spring Material	O-Ring Material	Qty.§	Part Number
Solution	PVC	---	316SS	316SS	---	Hypalon	1	AOO4862
	PVC	---	316SS	316SS	---	Viton	1	AIA4866
	PVC	---	PVC	PTFE	---	Hypalon	1	AMK4870
	PVC	---	PVC	PTFE	---	Viton	1	APS4873
	PVC	---	PVC	Ceramic	---	Hypalon	1	AKG4877
	PVC	---	PVC	Ceramic	---	Viton	1	AOO4881
	PVDF	---	316SS	316SS	---	Hypalon	1	ALI4884
	PVDF	---	316SS	316SS	---	Viton	1	AIC4887
	PVDF	---	PVDF	PTFE	---	Hypalon	1	AJE4891
	PVDF	---	PVDF	PTFE	---	Viton	1	APQ4896
	PVDF	---	PVDF	Ceramic	---	Hypalon	1	ALI4900
	PVDF	---	PVDF	Ceramic	---	Viton	1	AMK4904
Slurry	PVC	316SS	Ceramic	Polyuret.	---	Hypalon	1	ANM4908
Polymer	PVC	PVC	PVC	PTFE	Elgiloy	Viton	1	ALI4912

NOTE: § Each valve kit consists of two valve sets, one for suction and one for discharge. For double ball valves, order a quantity of two kits per head.

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

ENCORE® 700 METERING PUMP

Table 6.1.6 - 4" Maintenance Kit, Cartridge Valves

4"	Guide Retainer Material	Guide Material	Seat Material	Ball Material	Spring Material	O-Ring Material	Qty.§	Part Number
Solution	PVC	---	316SS	316SS	---	Hypalon	1	AJE5023
	PVC	---	316SS	316SS	---	Viton	1	AOO5028
	PVC	---	PVC	PTFE	---	Hypalon	1	APQ5032
	PVC	---	PVC	PTFE	---	Viton	1	AJE5036
	PVC	---	PVC	Ceramic	---	Hypalon	1	ALI5040
	PVC	---	PVC	Ceramic	---	Viton	1	AKG5045
	PVDF	---	316SS	316SS	---	Hypalon	1	AOO5051
	PVDF	---	316SS	316SS	---	Viton	1	AJE5057
	PVDF	---	PVDF	PTFE	---	Hypalon	1	AIA5160
	PVDF	---	PVDF	PTFE	---	Viton	1	APQ5164
	PVDF	---	PVDF	Ceramic	---	Hypalon	1	ALI5168
	PVDF	---	PVDF	Ceramic	---	Viton	1	AOO5172
Slurry	PVC	316SS	Ceramic	Polyuret.	---	Hypalon	1	AIA5176
Polymer	PVC	PVC	PVC	PTFE	Elgiloy	Viton	1	APQ5180

NOTE: § Each valve kit consists of two valve sets, one for suction and one for discharge. For double ball valves, order a quantity of two kits per head.

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

ENCORE® 700 METERING PUMP

Table 6.1.7 - 5" Maintenance Kit, Cartridge Valves

5"	Guide Retainer Material	Guide Material	Seat Material	Ball Material	Spring Material	O-Ring Material	Qty. §	Part Number
Solution	PVC	---	316SS	316SS	---	Hypalon	1	ANM5211
	PVC	---	316SS	316SS	---	Viton	1	APS5215
	PVC	---	PVC	PTFE	---	Hypalon	1	ALI5218
	PVC	---	PVC	PTFE	---	Viton	1	AKG5223
	PVC	---	PVC	Ceramic	---	Hypalon	1	AKG5228
	PVC	---	PVC	Ceramic	---	Viton	1	APQ5233
	PVDF	---	316SS	316SS	---	Hypalon	1	APS5237
	PVDF	---	316SS	316SS	---	Viton	1	ALI5242
	PVDF	---	PVDF	PTFE	---	Hypalon	1	AIC5272
	PVDF	---	PVDF	PTFE	---	Viton	1	AIA5276
	PVDF	---	PVDF	Ceramic	---	Hypalon	1	AJE5280
	PVDF	---	PVDF	Ceramic	---	Viton	1	AKG5283
Slurry	PVC	316SS	Ceramic	Polyuret.	---	Hypalon	1	AIC5287
Polymer	PVC	PVC	PVC	PTFE	Elgiloy	Viton	1	ALI5292

NOTE: § Each valve kit consists of two valve sets, one for suction and one for discharge. For double ball valves, order a quantity of two kits per head.

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

ENCORE® 700 METERING PUMP

Table 6.1.8 - 6-1/2" Maintenance Kit, Cartridge Valves

6-1/2"	Guide Retainer Material	Guide Material	Seat Material	Ball Material	Spring Material	O-Ring Material	Qty. §	Part Number
Solution	PVC	PVC	316SS	316SS	---	Hypalon	1	AAA4982
	PVC	PVC	316SS	316SS	---	Viton	1	AAA4985
	PVC	PVC	PVC	PTFE	---	Hypalon	1	AAA4988
	PVC	PVC	PVC	PTFE	---	Viton	1	AAA4991
	PVC	PVC	PVC	Ceramic	---	Hypalon	1	AAA4994
	PVC	PVC	PVC	Ceramic	---	Viton	1	AAA4997
Slurry	PVC	316SS	Ceramic	Polyuret.	---	Hypalon	1	AAA5024
Polymer	PVC	PVC	PVC	PTFE	Elgiloy	Viton	1	AAA5027

NOTE: § Each valve kit consists of two valve sets, one for suction and one for discharge. For double ball valves, order a quantity of two kits per head.

NOTE: Always change diaphragms and valves at the same time, annually, for optimum performance.

ENCORE® 700 METERING PUMP

Table 6.2 - Adapter and Bellow Seal Kit

Pump Size	Adapter With Pre-Installed Bellow Seal
1-3/8"	AAB9305
2"	AAB9302
3"	AAB9299
4"	AAB9308
5"	AAB9311
6-1/2"	AAB9314

Table 6.3 - Electric Motors

PART NO.	MOTOR DESCRIPTION	BALDOR MODEL TYPE
AAA3743	Motor, 56C, .25hp, 115/230Vac,60Hz, TEFC	3414LC
AAA3746	Motor, 56C, .25hp, 115/230Vac,60Hz, TENV	3421LC
AAA3749	Motor, 56C, .25hp, 115/230Vac,60Hz, XPFC	X3414L
AAA4361	Motor, 56C, .50hp, 115/230Vac,60Hz, TEFC	3424L
AAA4364	Motor, 56C, .50hp, 115/230Vac,60Hz, TENV	3528LC
AAA4367	Motor, 56C, .50hp, 115/230Vac,60Hz, XPFC	X3428L
AAA4370	Motor, 56C, .75hp, 115/230Vac,60Hz, TEFC	3528LC
AAA4373	Motor, 56C, .75hp, 115/230Vac,60Hz, TENV	3540LC
AAA4376	Motor, 56C, .75hp, 115/230Vac,60Hz, XPFC	X3535L
AAA3755	Motor, 56C, .50hp, 90Vdc, TEFC	3428P
AAA3758	Motor, 56C, .50hp, 90Vdc, XPFC	X3435P
AAA4379	Motor, 56C, .75hp, 90Vdc, TEFC	3435P
AAA4382	Motor, 56C, .75hp, 90Vdc, XPFC	X3536P
AAA4427	Motor, 56C, 1 hp, 90Vdc, TEFC	3536P
AAA4430	Motor, 56C, 1 hp, 90Vdc, XPFC	X3548P