PUMP SELECTION
MOYNO® 500 PUMPS

The tables presented on these pages are designed to guide you in selecting the proper 500 pump to solve your fluid handling problem. Detailed specifications are available from your Distributor.

Fluid handling system parameters are the determining factors in choosing the proper pump series for a particular application. Static heads, line and fitting losses, fluid viscosity at pumping temperatures and other system characteristics must be examined to determine flow rates and pressures required from the pump. **Specifically, you will need to evaluate the following elements:**

1. *Capacity* — the flow rate desired in gallons per minute (GPM).
2. *Pressure Differential* — the difference in suction and discharge pressure requirements, expressed in pounds per square inch (PSI).
3. *Temperature* — maximum temperature of the fluid being pumped in degrees Fahrenheit (°F).
4. *Viscosity* — the resistance to flow, expressed in centipoise (CP). Seconds Saybolt Universal (SSU) units of measurement can be converted to approximate CP by using this equation: CP=SSU/5 x Specific Gravity.
5. *Abrasion* — abrasive characteristics of the fluid being pumped. These should be classified in broad terms in order to select appropriate pump speed and materials of construction. Classifications are:

   a. None — clean and uncontaminated fluid
   b. Light — contaminated or dirty water
   c. Medium — clay and gypsum slurries
   d. Heavy — heavy slurries, emery dust and lapping compounds

Viscosity. As fluid viscosity increases, pump RPM must be reduced to prevent decreasing volumetric efficiency due to cavitation of the fluid. This is a function of flow velocity through the pump, rather than a total flow rate from the pump. The flow velocity and corresponding RPM reduction is the same on all models of 500 pumps. Table 1 indicates **maximum** RPM levels that should be attempted to maintain volumetric efficiency.

Abrasion. Both pump speed and pressure should be reduced when handling abrasive fluids to ensure maximum pump life. Table 1 shows proper RPM for the broad abrasion classifications. When pumping medium abrasives, you need a pump with maximum pressure ratings that are twice the operating pressure. For heavy abrasives, maximum pump pressure capabilities should be four to six times greater than operating pressure.

Table 1. Pump Speeds for Viscous & Abrasive Fluids

VISCOSITY (CP)	100 to 300	300 to 500	500 to 1,000	1,000 to 2,000	2,000 to 5,000	5,000 to 10,000	10,000 to 20,000
MAX RPM	1400	1200	950	700	350	180	100
ABRASION	Light		Medium			Heavy	

Pump Performance. After determining any RPM limits due to viscosity and/or abrasion considerations, Table 2, **Pump Performance**, may be used to select the appropriate model for your application. Basic flow and pressure Capabilities are listed for each model, and the model number defines the operation characteristics of the pump. The data in Table 2 is presented in terms of performance of the pump in water at 1750 RPM. If your application requires a lower RPM due to viscosity or abrasion considerations, it would be helpful to convert your desired flow to an equivalent flow of water at 1750 RPM as follows:

$$\text{Equivalent flow of water at 1750 RPM} = \frac{\text{Desired flow x 1750 RPM}}{\text{Maximum RPM (from table 1)}}$$

Note: If fluids with viscosities over 200 cps are being pumped, increase equivalent by 20% for 200 and 300 series pumps.

Select a pump model from Table 2 that has the flow and pressure capabilities for your application. Since performance ranges overlap between the pump models shown, you may want to examine features and capabilities of the individual model most suitable for your application. In most instances, the lowest model number that meets your performance requirements will offer the most economical solution to your fluid handling problems.

Temperature. The primary effects of temperature occur on the elastomers used in pump construction, particularly for the stator. Extreme temperatures tend to destroy the resiliency of the elastomer, resulting in reduced operating life. The low operating temperature for the 500 pump is 10°F. High temperature limits are determined by the elastomer selected. Maximum allowable temperature for stators are:

*NBR	160°F
*EPDM	210°F
*FPM	240°F

Pump modifications will be required for higher operating temperatures.

*Refer to page 2 for material descriptions

Table 2. Pump Performance

Pump Models	Max Press. (PSI)	Cap @0 psi & 1750 RPM (GPM)	Cap @Max psi & 1750 RPM (GPM)
203	40	0.21	0.11
204	40	0.42	0.29
205	40	0.75	0.50
220	40	1.5	0.96
232	40	5.1	3.2
301	25	13	9.2
331	150	1.98	0.61
332	100	4.7	2.2
333	50	94	4.4
344	40	15.0	10.4
356	50	24	19.5
367	50	53.2	25
415	35	1.95	1.6
422	35	5.1	3.8
433	35	9.2	6.0
444	35	14.6	10.8
603	600	0.61	0.39
610	600	3.35	1.95
622	300	8.9	6.2
633	150	15.1	10.6
655	60	29.5	26.0

Chemical Resistance. When pumping fluids requiring special consideration due to corrosive or other chemical properties, the materials of construction for pump housing, rotor and stator must be carefully selected to ensure compatibility. The *Chemical Resistance Index,* Table 4, is provided for use at your own discretion in evaluating pump materials. This index is based on the results of laboratory tests, field tests and reference sources, but because of the many variables and unknown circumstances associated with individual applications, we cannot guarantee favorable results or assume any liability in connection with its use. When more than one material is shown to be suitable for an application, these should be weighed with other considerations, such as cost and availability, to facilitate selection of the most suitable pump.

Materials of Construction. Table 3 lists materials available for housing, rotor and stator in each 500 pump series. This provides a ready reference to determine if materials used in the series selected will meet performance requirements.

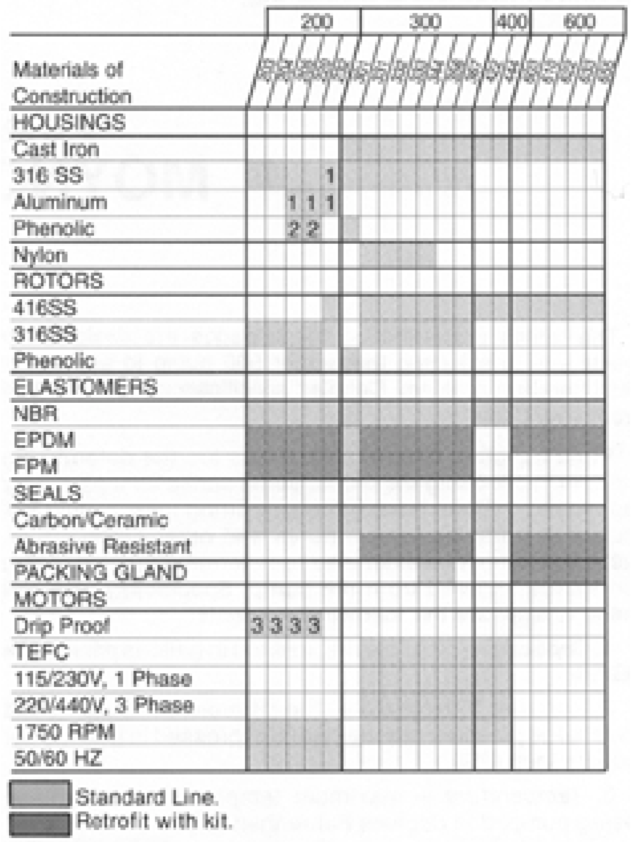
Standard Models are coded light gray in the Table. This is our standard line, suitable for most typical applications. These pumps are produced in volume, with stock availability at factory and distributor levels. They are assigned a Standard Model Number, and are constructed from uniform materials, e.g. pumps with NBR stators will also have NBR joint covers (if applicable), NBR elastomer parts in the seal; and 316SS housings, rotors, shafts, seals, etc.

Retrofit Options are coded dark gray, and are available in kit form. These options provide the necessary flexibility to satisfy most other applications at a reasonable cost. If these options do not meet your specifications, your Distributor has full engineering support from the factory to provide a design that meets your particular needs.

Chemical Resistance Index. Chemical resistance is categorized numerically in Table 4 for all materials used in constructing pump components. Characteristics of materials shown are as follows:

Aluminum. Silicon alloy with excellent corrosion resistance.

Table 3. Materials of Construction



1 Non-motorized Pump Only
2 Direct Coupled Motorized Units Only
3 110V 50/60 HZ

NBR. A copolymer of butadine and acrylonitrile with excellent resistance to petroleum, mineral and vegetable oils.

Cast Iron. Sand cast grey iron, suitable for most non-corrosive fluids, ASTM A25.

EPDM. An elastomer of ethylene propylene copolymer and terpolymer. Generally resistant to animal and vegetable oils, ozone, strong and oxidizing chemicals.

FPM. A fully saturated elastomer of fluorinated polymer. Generally resistant to all aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils.

Nylon Resin. An engineered thermoplastic having a broad range of outstanding properties, including high and low temperature toughness, resistance to abrasion, impact, solvents, oils and gasoline. Material used is glass-filled *Zytel®.

Phenolic. A thermoset phenolic which offers excellent chemical resistance.

Numerical Symbols used in Table 4 are:

1 Satisfactory.

2 May be suitable, depending on temperature and concentration. Slight swelling of rubber parts may occur, causing a change in performance.

3 Unsuitable

*Zytel is a registered trademark of E.I. DuPont De Nemours and Co.

Pump Selection Summarized

Follow these basic steps to select the pump most suitable for your particular application.

1. Determine operating RPM for volumetric efficiency, considering viscosity (see Table 1).
2. Determine operating RPM limits for pump life, considering abrasion (see Table 1).
3. Convert to an equivalent flow of water at 1750 RPM for use with Table 2 as follows.

$$\text{Equivalent flow of water at 1750 RPM} = \frac{\text{Desired flow x 1750}}{\text{Maximum RPM (from table 1)}}$$

Note: If fluids with viscosities over 200 cps are being pumped, increase equivalent by 20% for 200 and 300 series pumps.

4. Determine pump pressure capability required by considering system operating pressure and the effects of abrasion as necessary.
5. Select pump model which meet the calculated equivalent flow and pressure determined from Table 2.
6. Using Tables 3 and 4 and operating limits shown in the paragraph on Temperature, evaluate pump model selected for your specific fluid handling application.
7. Determination of model number, options and horsepower requirements are made from pump Specification Data Sheets and Service Manuals.

Pumped Fluid ↓ / Construction Materials →	Aluminum	NBR	Cast Iron	EPDM	FPM	Nylon Resin	Phenolic	316 SS	416 SS
Acetaldehyde	2	3	2	1	3	2	1	1	
Acetamide		1	3	1	2		3	1	
Acetic Acid (Glacial)	1	2	3	1	2	3	3	1	
Acetic Acid (R.T.)	2	2	2	2	3	3	3	1	1
Acetic Anhydride	3	3	3	2	3	3	1	1	
Acetone	1	3	1	2	3	2	1	1	
Acetophenone	1	3		1	3	1	3	1	
Acetyl Chloride	3				1	3		1	
Acid Mine Water	3	1	1			1	1	1	1
Alcohol (Ethyl)	1	1	1	1	3	2	1	1	1
Alcohol (Methyl)	1	1	1	1	3	2	1	1	1
Alum	2	1	2	1	1	3		1	2
Aluminum Acetate	1	2		1				1	1
Aluminum Chloride	1	1	3	1	1	3	1	3	3
Aluminum Floride	3	1		1	1	1			
Aluminum Hydroxide		1	1			1	3	1	1
Aluminum Nitrate	2	1		1		2			
Aluminum Phosphate		1		1	1				
Aluminum Sulfate	3	1	3	1	1	3	1	1	2
Ammonia (Anhydrous)	2	1		1	3	2	1	1	
Ammonium Bicarbonate	2	1	2				3		1
Ammonium Carbonate	2	3	2	1		1	3	1	1
Ammonium Chloride	3	1	3	1	1	2	1	1	
Ammonium Hydroxide	2	3	1	1	2	1	1	2	
Ammonium Nitrate	2	1	1	1		2	3	1	2
Ammonium Nitrite	1	1		1					
Ammonium Persulfate	3	3	3	1		3	2	1	1
Ammonium Phosphate	3	1	1	1	3	2	1	1	1
Ammonium Sulfate	2	1	1	1	3	3	1	1	2
Amyl Acetate	2	3	2	1	3	2	3	1	1
Amyl Alcohol	2	2	1	1	2		1		
Amyl Borate		1		3	1				
Amyl Chloronapthalene				3	1	3			
Amyl Napthalene		3		3	1				
Aniline	2	3		2	3	3		1	1
Aniline Dyes		3	2	2	3	3	3		
Aniline Hydrochloride	3	2		2	2			3	3
Aromatic Hydro Carbons:									
Benzene	1	3	1	2	3	1	1	1	1
Benzol	1	3	1				1	1	1
Cyclohexane		1	1	3	1	1		1	1
Napthalene	2	3	1	3	1	2	3	1	1
N-Hexane	2	1	1	3	1	2		1	1
Toulene	1	3	1	3	1	2		1	1
Xylene	2	3	1	3	1	1		1	1
Xylol	1	3	1	3	1			1	1
Asphalt	1	2	1	3	1	1	3	1	1
Barium Chloride	2	1	2	1	1	1	1	1	2
Barium Hydroxide	3	1	1	1	1	2	1	1	2
Barium Nitrate	1	1	1			2	3	1	2
Barium Sulfate	1	1		1	1	2		1	1
Barium Sulfide	3	1		1	1	2		1	1
Beer	1	1	1	1	1	2	1	1	1
Beet Sugar Liquor	1	1	1	1	1		1	1	1
Beet Wort	1	1					1	1	
Benzaldehyde	1	3	1	1	3	3	3	1	
Benzine		1	1	3	1		3	1	1
Benzyl Alcohol	1	3	1	2	1		1	1	
Benzoic Acid	2		3		1	3	2	1	
Bichoride of Mercury		1	3				1	1	
Black Sulfate Liquor		2		1	1		1	1	2
Boiler Feed Water	1	1	1				1	1	1
Boric Acid	2	1	3	1	1	2	1	1	2
Brine (Calcium Chloride)		1	3	1	1		1	1	2
Brine (Sodium Chloride)		1	1	1	1		1	1	2
Butyl Acetate	1			2	3	1		1	1
Butyl Alcohol	1	1		2	1	3	1		
Butyl Cellosolve	1	3	1	1	3	1		1	1
Calcium Chlorate	2	1	2			2		2	2
Calcium Chloride	3	1	2	1	1	2	1	1	3
Calcium Hydroxide	2	1	1	1	1	1	3	1	1
Calcium Hypochloride		3	1	1	1	2		1	3
Calcium Hypochlorite	2	2	3	1	1	2	3	1	2
Calcium Nitrate	2	1		1	1	3			
Calcium Sulfate	2	1	1			3	3	2	2
Calcium Sulfide	2	2		1	1				
Calgon		1	3				3	1	1
Carbon Disulfide	1	3	1	3	1	3		1	1
Carbolic Acid	2	3	1	2	1		3	1	1
Carbonic Acid	2	2	2	1	1	3	1	1	1
Castor Oil	1	1	1	2	1		1	1	1
Caustic Potash	3	2	2	1	3	3		1	1

Table 4. Chemical Resistance Index (Cont)

Pumped Fluid ↓ / Construction Materials →	Aluminum	NBR	Cast Iron	EPDM	FPM	Nylon Resin	Phenolic	316 SS	416 SS
Caustic Soda	3	2	1	1	2	2	2	1	1
Caustic Zinc Chloride	3	1	3	1	1		1	1	2
Cellosolve	1		1	2	3	1		1	1
Cellosolve Acetate		3		2	3				
Cellulose Acetate	1	3	2	1	1			1	1
Cellulose Nitrate	2	2	2					2	2
Chlorinated Hydrocarbons:									
Carbon Tetrachloride	1	2	2	3	1	3	3	1	1
Chloroform	1	3	3	3	1	3	1	1	1
Ethylene Dichloride	1	3	1	2	1	3	3	1	1
Methyl Chloride		2	1	2	1	3		1	1
Tri Chloroethylene	1	3	2	3	1		3	1	1
Chrome Acid (Dilute)	3	2	3	1	1		3	1	2
Citric Acid	2	1	2	1	1		1	1	2
Clay Slip	1	1		1	1		1	1	1
Coal Tar Oil	1	1	1	3	1			1	1
Coal Tar Solvent	1	1	1	3	1			1	1
Copper Acetate	3	2		1				1	
Copper Chloride	3	1	3	1	1		3	2	3
Copper Cyanide	3	1	3	1	1	2	1		
Copper Nitrate	3	1	3			3		1	2
Copper Sulfate	3	1	3	1	1	3	1	1	2
Corn Oil	1	1	1	2	1		1	1	1
Cotton Seed Oil	1	1	1	1	1	1	1	1	1
Creosote	2	1	1	3	1		1	1	1
Cresol	2	2	1	3	1		3	1	
Cresylic Acid	1	2	2	3	1		3	1	
Cyclohexane	1	1	1	3	1	1		1	1
Cyclohexanol	2	3		2	3	2		1	1
Cyclohexanone	1	2		3		1	3	1	1
Deionized Water	1	1	1	1	1		1	1	1
Developing Fluids		1	3	2	1			1	
Diesel Oil	1	1	1	3	1	1		1	1
Distillery Wort		1	2				1	1	1
Dowtherm Oil	1			3	1	1		1	1
Edible Oil	1	1	1				1	1	1
Epsom Salts	2	1	1	1	1		1	1	1
Ethyl Acetate	1	3	1	1	3	2	1	1	1
Ethyl Alcohol	1	1	1	1	1		1	1	1
Ethyl Chloride	3	1	2	1	1	1	1	1	3
Ethylene Glycol	2	1	2	1	1	2	1	1	1
Fatty Acids	1	2	2	3	1	2	3	1	2
Ferric Chloride	3	1	3	2	2	3	1	3	3
Ferric Nitrate		1		1	1	3		1	1
Ferric Sulfate		1	3		1	3		1	1
Ferrous Sulfate	3	1	3	1	1	3		2	3
Formaldehyde	3	2	2	1	1	3	3	1	1
Formic Acid	3	2	3	1	3	3		2	2
Fruit Juice	1	1	3					1	1
Fuel Oil	1	1		3	1	2		1	1
Fumaric Acid		1			1				
Fufural	2	3	1	2	3		3	1	1
Furan (Fufuran)	1	3		2			1	1	1
Fusel Oil	1	1	1					1	1
Gallic Acid	2	2		2	1	2		1	1
Gasoline	1	1	1	3	1	1	3	1	1
Glucose	1	1	1	1	1	2	1	1	1
Glue	1	1	1	1	1	2		1	1
Glycerin	1	1	1	1	1	2	1	1	1
Glycols	2	1	2	1	1			1	1
Green Sulfate Liquor		2		1	1				
Hops		1	1					1	1
Hydraulic Oil (Petro)		1	1	3	1	2	3	1	
Hydrobromic Acid	3	3	3	1	1	3	3	3	3
Hydrochloric Acid	3	2	3	1	1	3	1	2	3
Hydrocyanic Acid	1	2	1	1	1	3	3	1	3
Hydroflousilicic Acid	3	2	3	1	1	3	1	1	3
Hydrogen Peroxide	3	3	3	2	2	3	3	1	3
Hydrogen Sulfide	3	3	2	1	3	3	3	1	1
Hypoclorous Acid	3		3		2	1			
Isopropyl Acetate	1	3		1	3	2			
Isopropyl Alcohol	1	2	1	1	1	3	1	1	1
Kerosene	1	1	1	3	1	1		1	1
Lacquers	1	3	1	3	3	2	1	1	1
Lard	1	1	1	3	1	2	1	1	1
Lead Acetate	3	2		1		2			
Lead Nitrate	3	1		1					
Lead Sulfamate		2		1	1	2			
Lime Water	1	1	1	1	1		1	1	1
Linseed Oil	1	1	1		1	2	1	1	1
Lubricating Oils	1	1	1	3	1	2	1	1	1
Lye (Sodium Hydroxide)	3	2	2	1	2	3	2	1	2

Table 4. Chemical Resistance Index (Cont)

Pumped Fluid ↓ / Construction Materials →	Aluminum	NBR	Cast Iron	EPDM	FPM	Nylon Resin	Phenolic	316 SS	416 SS
Magnesium Chloride	3	1	1	1	1	2	1	1	1
Magnesium Hydroxide	2	1	1	1	1	3	3	1	
Magnesium Sulfate	2	1	1	1	1	2	1	1	2
Maleic Acid	2			2	1	3			
Maleic Anhydride				2	1				
Malic Acid	2	1		3	1	3		1	2
Mercuric Chloride	3	1	3	1	1	3	2	1	3
Mercury	3	1	1	1	1	1	3	2	2
Methyl Chloride	3	3	1	2	1	3			
Methylene Chloride	2	3	1	3	1	3			
Methyl Ethyl Ketone	1	3		1	3	2	1	1	1
Methyl Isobutyl Ketone	1	3		2	3	2	1	1	1
Milk	1	1	3	1	1	1		1	1
Milk of Lime [(CA(OH)$_2$) + H_2O]	2	1	1				1	1	
Mineral Oil	1	1	1	3	1	1	1	1	1
Molasses	1	1	1			2	1	1	1
Naptha	1	2	1	3	1	2	1	1	1
Napthalene	1	3	1	3*	1	2	1	1	1
Nickel Acetate	3								
Nickel Chloride	3	1	3	1	1		1	1	3
Nickel Sulfate	3	1	3	1	1	2	2	1	2
Nitric Acid (60%)	3	3	3	2	1	2	3	2	3
Nitrobenzene	1	3	2	3	2	3	3	1	1
Oil (Paraffin Base)	1	1	1			2		1	1
Oil (Vegetable)	1	1	1	1	1	2	1	1	1
Oxalic Acid	3	2	2	1	1	3		1	2
Paint	2	1	1				3	1	1
Palmitic Acid	2	1		2	1	2		2	2
Phenol	2	1	3	2	1		2	1	
Phosphoric Acid	3	2	3	1	2		3	1	2
Pickling Acid	3	3	3	2	2		3	3	
Potassium Acetate		2		1	3	2			
Potassium Carbonate	2	1	1			2	1	1	1
Potassium Chloride	3	1	1	1	1	2	1	1	1
Potassium Cyanide	3	1	1	1	1	2	3	1	1
Potassium Hydroxide	3	2	2	1	2	2	2	1	1
Potassium Nitrate	1	1	1	1	1	2		1	1
Potassium Sulfate	1	1	1	1	1	2	1	1	1
Printing Ink	1	1	1					1	1
Pyridine	1	3	1	2	3	3	3	1	1
Rosin	1	1				2		1	
Salt Brine (3%)	3	1	1	1	1		1	1	1
Salt Brine (30%)	3	1		1	1		1	1	3
Sea Water	3	1	1	1	1	1	1	1	3
Sewage	3	1	1	3	1		1	1	1
Shellac	1	1	1			2		1	1
Silver Nitrate	3	2	1	1	1	2	1	1	1
Soda	1	1	1	1	1			1	1
Sodium Aluminate	3	2	2			2		2	2
Sodium Bicarbonate	2	1	1	1	1	1	1	1	3
Sodium Bisulfite	2	2	1	1	1	2		1	1
Sodium Carbonate	2	1	1	1	1	2	1	1	1
Sodium Hydroxide	3	2	2	1	2	3	2	1	2
Sodium Nitrate	1	2	1	1		2	1	1	1
Sodium Silicate	2	1	1	1	1	2	1	1	1
Sodium Sulfate	2	1	1	1	1	1	1	1	1
Soybean Oil	1	1	1	3	1	2	1	1	1
Starch	1	1	1			2	1	1	1
Stearic Acid	1	2	1	2			1	1	
Sulfuric Acid (50%)	3	3	3	2	1	3	2	3	3
Sulfurous Acid	3	2	3	2	1	3	3	1	2
Tannic Acid	2	1	2	1	1	3		1	2
Tar	1	1	1	3	1	3	1	1	1
Tetraethyllead	1	2	1	3	1			1	
Titanium Chloride		1						1	
Toluene Diisoyanate	1			1					
Tung Oil	1	1		3	1	3		1	
Turpentine	1	1	1	3	1	2		1	1
Urine	3	1	1			2	1	1	1
Varnish	1	1	1	3	1	3	1	1	1
Vegetable Oil	1	1	1	1	1	2	1	1	1
Vinegar	3	1	3	1	1	3		1	3
Vitrol (Blue)		1						1	
Vitrol (Green)		1						1	
Whiskey	3	1	1	1	1	2	1	1	1
Wood Pulp		1	1					1	1
Yeast	1	1							1
Zinc Acetate	2	2		1	3				
Zinc Chloride	3	1	2	1	1	3	1	1	1
Zinc Nitrate	2	1	1					1	
Zinc Sulfate	3	1	2	1	1	2	1	1	1