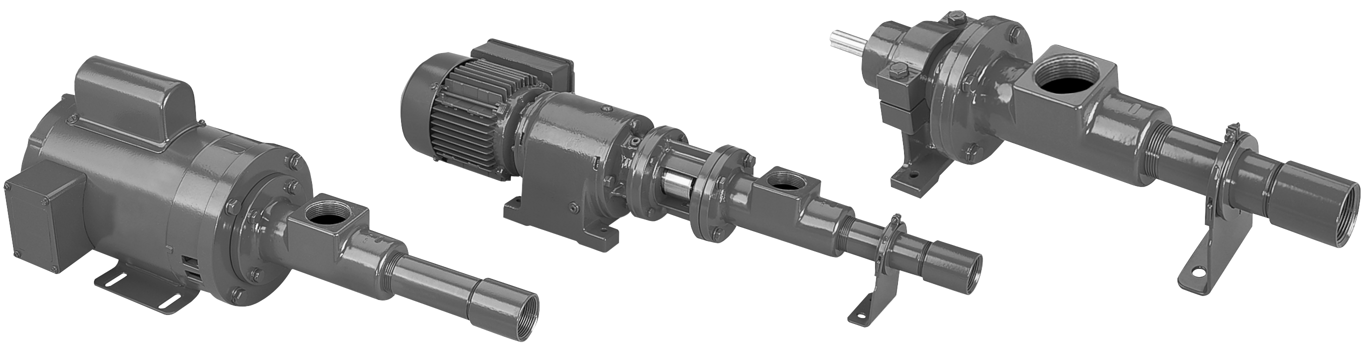
PUMP SELECTION

METERING/DOSING PUMP

PRECISE CONTROL FOR LOW FLOW METERING REQUIREMENTS



Moyno® Metering Pumps are identified by model numbers consisting of three groups of characters:

Design Characteristics

A Pump Configuration	4 Number of Stages	015 Element Size	A Drive Configuration

Materials of Construction

C Body Material	D Internal Parts Material	Q Stator Material

Trim Code

3 Version	S Sealing Variation	A Internal Variation	A Rotor Variation

Design Characteristics Identification. The design characteristics of a Moyno Metering Pump are identified by the first 6 characters of the model number. The model number consists of a letter and numbers (Example above: A).

The **first letter** represents the basic design configuration.

A = Standard flanged suction chamber design

B = Close-coupled design

C = Motorized design

The **first number** represents the number of stages in the pump elements.

4 = 4 stage pump

The **next numbers** represent the size of the rotor and stator (the pumping elements).

The **next letter** describes the drive configuration (see table on page 4). A = no drive, bare shaft unit. B thru X = Flange connections or drive motors.

Materials of Construction Identification. The materials of construction in Moyno Metering Pumps are identified by the next three letters of the model number (in the previous example, CDQ).

The **first letter** indicates the material for the suction chamber of the pump.

C = Cast iron

S = Stainless steel

The **second letter** indicates the material used for the internal parts of the pump.

D = Alloy steel or 416 stainless steel

S = 316 stainless steel

The **third letter** indicates the stator material.

Q = Nitrile synthetic rubber

R = Natural rubber

B = EPDM

F = Fluoroelastomer

The **next number** indicates the U.S. version with NPT ports or a metric version with metric ports.

3 = NPT

1 = Metric

The **next letter** indicates a mechanical seal or packed pump.

S = Single mechanical seal

D = Double mechanical seal

A = Packing

X = Special

The **next letter**, “A”, stands for standard internals, specials would be marked “X”.

The **last letter** covers rotor configurations.

A = Standard plated

B = Non-plated

X = Special

Therefore, the pump **A4015ACDQ3SAA** has the following design and material characteristics:

A = Standard bare shaft design

4 = Four-stage pumping element

015 = Capacity in gal/hr

A = Bare shaft (no drive)

C = Cast iron suction chamber

D = Alloy steel internal parts

Q = Nitrile synthetic rubber stator

3 = NPT threaded ports

S = Single mechanical seal

A = Standard internals

A = Standard rotor

NOTE: Metering pumps are designed to give repeatable performance for a constant set of parameters. To achieve and maintain specific flow rates and accuracies, a variable speed drive with speed regulation will be required. Contact the factory for information on open loop and closed loop drive packages.

Step 1. Materials of Construction Selection

The first step in selecting a Moyno Metering Pump is to determine materials of construction that will be compatible with the fluids to be pumped. Consider the following:

Suction chamber. Cast iron is least expensive and should be used if possible. For applications where the material being pumped is corrosive or must not be contaminated, cast 316 stainless steel can be used.

Internal parts. The wetted internal parts are available in either 416 stainless steel or 316 stainless steel. For corrosive liquids, 316 stainless steel is recommended. All rotors have a thick layer of hard chromium plating for abrasion resistance.

Stator. For most applications, nitrile synthetic rubber of 70 durometer hardness should be used. These stators are good for higher pressure applications and moderate abrasion. When compatible with the fluid being pumped, natural rubber of 55 durometer should be considered for handling abrasive materials. High fluid temperatures will affect the physical properties of the stator.

Maximum allowable fluid temperatures are:

Natural rubber 185˚F

Nitrile synthetic rubber 210˚F

EPDM 260˚F

Fluoroelastomer 350˚F

Elastomeric stators may be attacked by certain chemicals which cause swelling or deterioration. General characteristics of stator materials are shown in Table 1 below.

Step 2. Pumping Elements Selection

Determine the size of the pumping elements needed to deliver the required capacity at the viscosity involved. Be sure to select elements large enough to deliver more than the required capacity when operating at the maximum speed shown for that size. See Table 2.

NOTE: These figures are based on viscosities for true fluids and are not the same for slurries or emulsions which involve **two** viscosities: the fluid by itself, and the mixture of the fluid and the material suspended in it. The recommended pumping speed for a slurry will be between the speed recommended for the viscosity of the suspending fluid and the actual viscosity of the slurry.

Step 3. Speed Selection

Pump capacity is proportional to speed in progressing cavity pumps. Operating speed is affected by abrasion and viscosity, and has an exponential effect on wear. For example, this means that by reducing speed by half, pump life could be increased four times. Therefore, the more abrasive applications should be run at lower speeds.

Select the pumping elements from Table 2A that will deliver the desired capacity yet operate below the maximum operating speed indicated, based on the abrasive characteristics of the fluid being pumped. The following arbitrary grouping of abrasive characteristics will help in pump selection.

Example of no abrasion…………………………Clear water

Example of light abrasion………………Contaminated water

Example of medium abrasion……Clay or gypsum slurries

Table 1. General Characteristics of Stator Materials

Stator material	Generally resistant to:	Generally attacked by:
Natural rubber (R)	Most moderate chemicals, wet or dry organic acids, alcohols, ketones, aldehydes	Ozone, strong acids, fats, oils, greases, most hydrocarbons
Nitrile synthetic rubber (Q)	Many hydrocarbons, fats, oils, greases	Ozone, strong acids, ketones, esters, aldehydes, chlorinated and nitro hydrocarbons
EPDM (B)	Ozone, strong and oxidizing chemicals	Animal and vegetable fats, greases, oils, petroleum solvents, coal, tar, solvents, aromatic hydrocarbons
Fluoroelastomers (F)	Aliphatic, aromatic, and halogenated hydrocarbons	Ketones, low molecular weight esters and nitro-containing compounds

Table 2. Pump Speeds for Viscous Fluids

Viscosity		1	500	1000	2500	5000	10000	20000
Max. RPM		1800	1200	950	630	350	180	100
Size 015 *	GPH	18.5	9.6	7.1	4.4	N/A	N/A	N/A
	GPM	.31	.16	.12	.07	N/A	N/A	N/A
Size 100	GPH	99	51.5	38.0	23.6	13.0	6.8	3.8
	GPM	1.6	.86	.63	.39	.21	.11	.06
Size 190	GPH	196	102	76	47	26	13.5	7.5
	GPM	3.3	1.7	1.27	.78	.43	.23	.13

* Do not use PEC 449 for this size

Table 2A. Pump Speeds for Abrasive Fluids

Max. RPM	1800	950	350
Abrasion	None	Light	Medium

Step 4. Pressure Limits for Abrasion

Limit the pressure on the 015 and 100 elements to 300 PSI for no abrasion, 225 PSI for light abrasion, and 175 PSI for medium abrasion. The 190 element is limited to 175 PSI for no, light and medium abrasion.

Step 5. Particle Size Considerations

The capacity of a progressing cavity pump is largely determined by the volume of the cavities formed by the mating of the rotor and stator. The size of the cavity also determines the maximum particle size that will pass through the pump. The shape, flexibility, and settling characteristics of the solids also affect maximum particle size. Table 3 serves only as a guideline.

Find the element size selected for the application in Table 3. Determine if the pumping elements selected will handle the particle size requirement.

Step 6. Prime Mover Horsepower Selection

Now that the specific pump model has been determined, refer to the performance curves (not included in this bulletin) to determine initial drive horsepower requirements. Next, refer to Table 4 to determine the necessary increase in drive horsepower for higher viscosities.

1. Multiply the “Horsepower Additives Per 100 RPM” by the pump speed in hundreds of revolutions per minute.
2. Add the result to the initial prime mover horsepower figure from the performance curve.

Step 7. Minimum Horsepower Requirement

Fluid temperatures above 68˚ F may require increasing the drive horsepower or decreasing the rotor diameter.

For applications involving temperatures above 68˚ F, Table 5 provides multipliers required for standard size and undersize rotors.

Take the minimum recommended motor horsepower and multiply by the factor in table 5.

Compare this horsepower requirement with the one in Step 5 (added for viscosity) and use the larger of the two. Thermal expansion of the stator elastomer has little effect on running horsepower requirements. However, it can have considerable effect on starting torque.

Additional Considerations

Solids content and suction conditions can have a significant effect on the pump selection and on the motor horsepower requirements.

Solids — Fluids containing solids may require an adjustment to horsepower. Please refer to the pump performance curves for applications involving high solids content.

Suction Conditions — Published performance data assumes a flooded suction condition. For high suction lift applications, or for applications involving viscous fluids and net positive suction heads available at the pump that differ significantly from atmospheric pressure, it may be necessary to adjust the performance of the pump to compensate for these factors.

For these conditions, contact your Moyno representative.

Table 3. Maximum Particle Size (IN.)

Pumping Element Size	015	100	190
Maximum Particle Size	.06"	.12"	.16"

Table 4. Horsepower Additives Per 100 RPM

Size of Pumping Element	Viscosity (Centipoise)				
	1	2,500	5,000	10,000	20,000
015	0	.004	—	—	—
100	0	.006	.012	.018	.024
190	0	.016	.032	.048	.064

Table 5. Temperature Multipliers

Stator							
	Q, R	70.0˚ F	100.0˚ F	125.0˚ F	150.0˚ F	175.0˚ F	200.0˚ F
	B	70.0˚ F	108.0˚ F	140.0˚ F	170.0˚ F	200.0˚ F	232.0˚ F
	F	70.0˚ F	130.0˚ F	180.0˚ F	230.0˚ F	285.0˚ F	330.0˚ F
Standard Size Rotor		1.00	1.10	1.30	1.60	2.00	2.50
Undersize Rotor		.075	0.80	0.85	0.95	1.10	1.60

METERING/DOSING PUMP RANGE

	Description **Typical Model No.→**	**A**	**4**	**015**	**A**		**S**	**S**	**Q**	**3**	**S**	**A**	**A**
Type	Standard Bare Shaft	A											
	Close-Coupled	B											
	Motorized	C											
Stages	4-Stage		4										
Capacity, Size	15 GPH Max.			015									
	100 GPH Max.			100									
	190 GPH Max.			190									
Drive Options	None (Bare Shaft)				A								
	56C-Face (Close-Coupled)				B								
	140TC-Face (Close-Coupled)				C								
	SEW Eurodrive (Close-Coupled)				D								
	.5 HP DC-90V (Motorized)				E								
	1.0 HP DC-90V (Motorized)				F								
	.5 HP AC 230/460-3-60 (Motorized)				G								
	1.0 HP AC 230/460-3-60 (Motorized)				H								
	.5 HP AC 115/230-1-60 (Motorized)				J								
	1.0 HP AC 115/230-1-60 (Motorized)				K								
	Nord (Close-Coupled)				L								
	Special To Order				X								
Body Materials	Cast Iron						C						
	Stainless Steel						S						
Internal Materials	416 Stainless Steel							D					
	316 Stainless Steel							S					
Stator Materials	Nitrile								Q				
	Natural								R				
	EPDM								B				
	Fluoroelastomer								F				
Mark Number	U.S. Version, 1997									3			
	Metric Version, 1997									1			
Sealing	Single Mechanical Seal, Standard										S		
	Double Mechanical Seal (Close-Cpl., Bare Shaft Only)										D		
	Packing (Close-Coupled, Bare Shaft Only)										A		
	Special To Order										X		
Internal Variations	Standard Non-Plated Shaft											A	
	Special To Order											X	
Rotor Variations	Standard Plated												A
	Non-Plated												B
	Special To Order												X

Hopper Available for Open Throat Applications!

Printed in U.S.A.