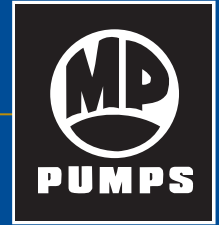


the **FRX Special Edition** Primer



S U M M E R I S S U E 2 0 0 7

FRX Series Pumps Are Here

The anticipated availability of the FRX series, a surname for fractional horsepower is here. The series will consist of five sizes ranging from 1/2" NPT to 1-1/4" NPT intake. Now that all of the AC motors have received their UL listing approval MP is ready to "release the hounds".

This expansion of 316 Stainless Steel offerings now gives MP performance coverage from the FRX 50 delivering a maximum flow of 12 gpm and shutoff head of 16 feet to the Chemflo Series with the maximum head of 460 feet and maximum flow of 480 gpm. This equates to sixteen stainless steel models, of which three are self-primers, a feat that is hard to rival in the pump industry.

The FRX is available in six (6) models:

- FRX 50
- FRX 50-R
- FRX 75 (formerly the Li'l Squirt)
- FRX 75-SP
- FRX 100
- FRX 125



The series will be supplied with both DC and AC motors in the FRX 50 and FRX 75 sizes and AC 56J frame in the FRX 100 and FRX 125 sizes. AC motor sizes are 1/2 thru 1 1/2 HP. DC motors are offered in both 12 and 24 volts.

Sales Brochures can be found in the New Product section of our website.

FRX Applications

Utility
Chemical Processing
Boiler Feed

General Transfer
Marine Applications
Boosters

Irrigation
Filtration
Cooling Towers

Chillers
Condensate Return
Fountains

Water Circulation
Spraying Systems
Aggressive Liquids



FRX 50 and FRX 50R

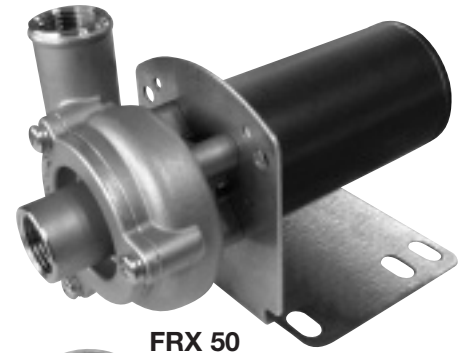
The FRX 50 maybe the smallest offering of the FRX series but its quality and durability are unquestioned. The housing and cover are constructed of 316 investment cast stainless steel while the semi-open impeller is sintered powdered metal

Model FRX50-R shares the same durability with the housing and cover molded in Polyphenylene Sulfide (PPS). This material was chosen as an alternative to stainless steel because it offers the same temperature range and compatibility rating as stainless steel while offering a lower cost alternative.

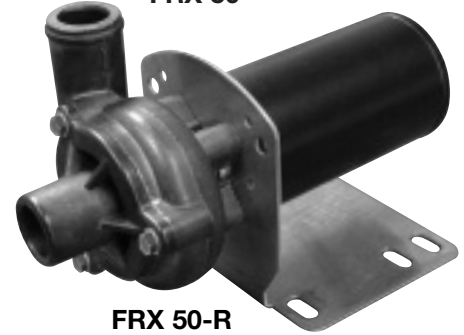
What makes this series unique to similar sizes from other manufacturers is that the FRX 50 is designed with a bellows type seal as compared to a lesser quality

o-ring type seal resulting in increased life. The seal is also hard-faced which means that special seal materials can be offered. The standard seal is carbon/ceramic/viton.

Of equal importance in the design criteria was to offer a broad spectrum of motors. Our AC motors are standard with 316 SS shafts (not 304 SS as most suppliers), thermal overloads and permanent split capacitors. There is no need to purchase an additional capacitor as an add-on. All motors are UL Listed as well as marine ignition protected. The 1/10th HP motors are available in single phase offerings of: 115V TENV, 208-230 50/60 TENV, and 115/230V, 50/60 TENV. In addition to the standard AC offerings, motors are also offered in 12V and 24V DC.



FRX 50



FRX 50-R



It is the policy of MP Pumps to satisfy customers by consistently supplying them with products that fully meet their requirements.

Customer Satisfaction Today, Tomorrow, Always.

Go to www.mppumps.com and take the Customer Survey to become eligible to Win Starbucks Gift Certificates.



FRX 75-SP

It will be quite difficult to locate a self-priming pump that can match the performance of the FRX 75-SP. When we began design our initial goal was to exceed the competitor's claim of 3 foot suction lift. When the design was completed we put the unit through the normal suction lift test and met the 3 foot benchmark in less than 30 seconds. The final result was a suction lift of 12 feet in a 3 minute time period. Much of this achievement is attributed to our unique viton flapper/o-ring design.

Like the FRX 50 and FRX 75, the housing and cover are 316 SS investment cast and powdered metal impeller. The motor options are shared with model FRX75 and include both AC and DC offerings. All AC motors are UL Listed and marine ignition protected. They include 115V ODP, 115V TENV, 208/230 50/60 TENV and 115/230V 50/60 TENV. AC motors are standard with 316 SS shafts, thermal overloads and permanent split capacitors.

The standard mechanical seal is hard-faced carbon/ceramic bellows type. Special seal are available upon request.



Did You KNOW?

Presidential Trivia

Richard Nixon is the only president to have won an Emmy award. He received the Best Spoken Word award for an album made from the soundtrack of his television interview with David Frost.

At the time President Abraham Lincoln was assassinated, the only money he had on his person was a \$5 Confederate note.

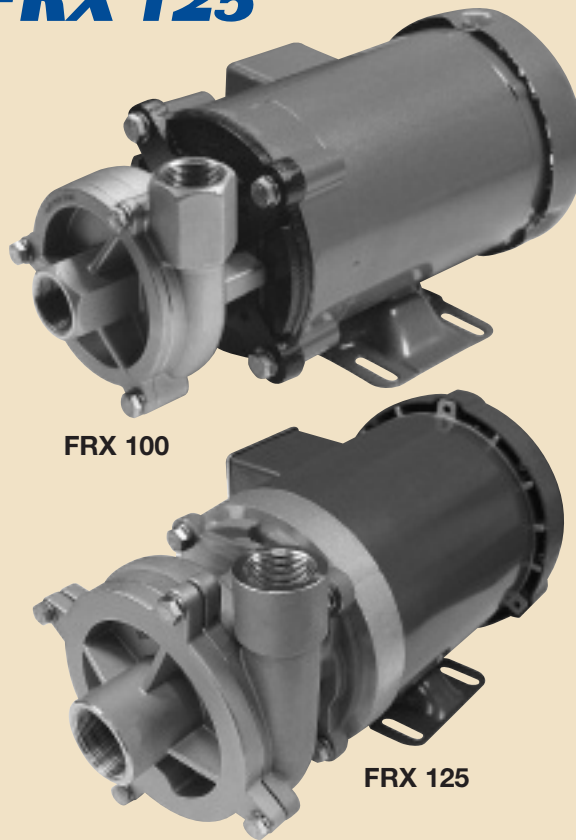
George Washington didn't have enough money to get to his own inauguration and was forced to borrow six hundred dollars from a neighbor.

FRX 100 and FRX 125

These two models bridge the performance gap between the Chemflo 1 and the FRX circulators. Both models are designed to mount to 56J threaded shaft electric motors and are designed with enclosed impellers for higher head performance. All stainless steel components are 316 investment cast.

Model FRX 100 is designed with 1" NPT ports and capable of operating with a 1/2 HP electric motor. Port sizes for model FRX 125 are 1-1/4" by 1". This model offers two impeller diameters with horsepower requirements from 3/4 to 1 on the standard diameter and 1-1/2 HPR for the "High Flow" impeller.

Some typical applications for these models include vapor degreasers, chillers, filter systems, water treatment systems, solvents, deionized water, chemical transfer, and heating & cooling.



What's Your STORY?

Our Pumps Don't Need A Break! But You Do!

Most of us learned how to share at the innocent age of two years old. By the time we were three, we were swapping toys and candy. Well, it's time to put these lessons to good use. Share with us how your MP Pump product solved a unique problem and we'll give you an even better swap. If we publish it, you'll also receive a \$250 gift certificate from Marriott hotels.

Now that's worth sharing!

Send your favorite MP Pumps success story to William Petersen, MP Pumps, 34800 Bennett Drive, Fraser, MI 48026-1686.

Understanding Viscosity And How It Affects Pump Performance



Dave DeClerk

Many people think of viscous fluids as "heavy" but actually the weight, density, or specific gravity are all more relevant to a heavy fluid. Viscous fluids may be light or heavy weight

fluids. **Viscosity** is a measure of the resistance of a fluid to deform under shear stress. It is commonly perceived as "thickness", or resistance to flow. A thick fluid will have high viscosity numbers such as molasses, honey, peanut butter and toothpaste. Thin fluids will have low viscosity numbers such as water, gasoline, and alcohol. Fluids may change viscosity greatly with temperature such as oil or grease where as the temperature rises the viscosity always drops. The common viscosity unit of measure is SSU (Saybolt Universal Seconds).

Viscous flow affects all types of pumps. The affects on centrifugal pumps will be our focus. The most comprehensive and widely used viscosity correction charts are from the Hydraulic Institute. The following below is an example courtesy of The McNally institute.

Here is what is going to change when you pump viscous fluids with a centrifugal pump:

- **The brake horsepower requirement will increase.**
 - **You will notice a reduction in the head the pump will produce.**
 - **Some reduction in capacity will occur with moderate and high viscosities.**
 - **The pump's efficiency will decrease.**
- The attached chart is typical of the charts supplied by the hydraulic Institute and other similar publications. You can use it to:
- **Act as an aid in selecting the pump you need for your application.**
 - **Determine the performance of a conventional centrifugal pump pumping a viscous fluid when its performance with only water is known.**

In this section we will address the first use of the chart and let it assist us in selecting the centrifugal pump for viscous fluids. Centrifugal pumps have been used with viscosities below 3,000 SSU (660 centistokes) and as high as 15,000 SSU (3,300 centistokes) but they are sensitive to changing viscosity.

Viscous fluids are very common in the petroleum industry so the chart on the back page was prepared using petroleum oils as the test fluid, and like all charts of this type the information is general.

If you need very accurate information you

will use this chart only as a guide and then conduct your own test with your specific fluid. This information will get you into the "ball park". Use the chart only for:

- **Conventional centrifugal pump hydraulic designs only.**
- **Pumps operating close to their BEP, and not at the far ends of the pump curve.**
- **Pumps operating with enough net positive suction head available (NPSHA) to prevent cavitation.**
- **Newtonian fluids. These are the type that do not change their viscosity with agitation. Non-Newtonian fluids can increase or decrease their viscosity with agitation. As an example if you agitate cream it will increase in viscosity and become butter.**
- **The information in the chart and formulas is generally valid for both open and closed impellers.**

We will be using the following conventional symbols in our formulas with the exception of the "N" for efficiency. The efficiency symbol used in most formulas is a Greek letter and looks a little different, but this is the best I can do at this time, so bear with me:

**Q_{vis} - Viscous capacity in gpm. (m³/hr).
The capacity when pumping a viscous fluid.**

**H_{vis} - Viscous head in feet (meters).
The head when pumping a viscous fluid.**

continued on page 4

N_{vis} - Viscous efficiency in percent. The efficiency when pumping a viscous fluid.

bhp_{vis} - Viscous brake horse power. The horsepower (Kilowatts) required by the pump for the viscous conditions.

Q_w - Water capacity in gpm.(m³/hr) The capacity when pumping water.

H_w - Water head in feet (meters). The head when pumping water.

N_w - Water efficiency in percent. The efficiency when pumping water.

S - Specific gravity.

C_q - Capacity correction factor.

C_h - Head correction factor.

C_n - Efficiency correction factor.

Q_{nw} - Water capacity at which maximum efficiency is obtained.

The following equations are used for determining the viscous performance when the water performance of the pump is known. As you can see they are not very hard to understand or calculate once you get the terms straight.

$$Q_w \text{ (approx)} = \frac{Q_{vis}}{C_q}$$

$$H_w \text{ (approx)} = \frac{H_{vis}}{C_h}$$

C_q, C_h and C_n are determined from the correction chart which is based on water performance. On the chart they are shown as **CQ, CH** and **CN**.

The following equations are used for approximating the water performance when the desired viscous capacity and head are given and the values of C_q and C_h must be estimated from the chart using Q_{vis} and H_{vis} as :

$$Q_{vis} = C_q \times Q_w$$

$$H_{vis} = C_h \times H_w$$

$$N_{vis} = C_n \times N_w$$

$$bhp_{vis} = \frac{Q_{vis} \times H_{vis} \times S}{3960 \times N_{vis}}$$

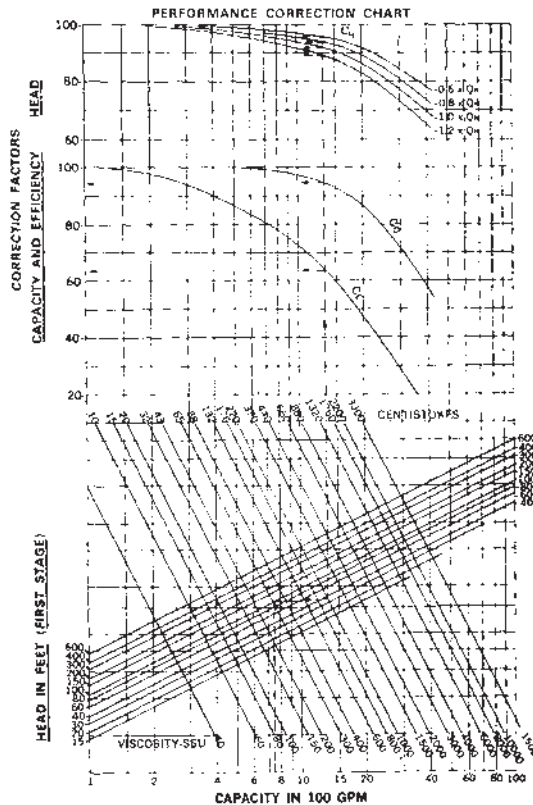
If you are not comfortable working with formulas all of these numbers look real scary, but the formulas are really quite basic and require nothing more than the ability to multiply and divide simple numbers.

Almost every calculation in the pump and seal business can be done with a low cost hand calculator. So jump right in and get wet.

With all of that said, we will use this information to select a pump for a given head-capacity-viscosity condition. The first two examples will be in inch units and then we will show an example in metric units.

We are looking for a pump to pump 750 gpm to a total head (this includes the static, pressure and friction heads combined) of 100 feet with a liquid having a viscosity of 1000 SSU and a specific gravity of 0.90 at the pumping temperature.

Please take a look at the following chart:



At the bottom of the chart enter at 750 go up to 100 feet, over to 1000 SSU and then up to the correction factors shown below :

- C_q = 0.95
- C_h = 0.92 (for 1.0 Q_{nw} water capacity)
- C_n = 0.635
- Q_w = 750/0.95 = 790 gpm (see the last formulas shown above)
- H_w = 100/0.92 = 108.8 or 109 feet head (see the formula above)
- S = 0.90

This means that you need a pump with a water capacity of 790 gpm. At a head of 109 feet.

If the pump selected has an efficiency of 81% when it is pumping water the efficiency pumping the viscous fluid will drop to N_{vis} = 0.635 x 81% = 51.5 percent efficient.

The brake horsepower for the viscous fluid will become:

$$bhp_{vis} = \frac{750 \times 100 \times 0.90}{3960 \times 0.515}$$

Link to Mc Nally home page www.mcnallyinstitute.com

Viscosity corrections may be neglected if the viscosity is below 300 SSU. Always use the viscosity data at the steady state temperature condition of the fluid being pumped but make sure that at short term higher viscosity conditions of a colder fluid will be below 3000 SSU and have the motor sized for short term considerations. The best centrifugal pump for viscous flow has an open/semi-open impeller that is running at a slow rotational speed.

For more information in the United States,
call 800-563-8006
 Outside the United States, call 586-293-8240



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