

"Pulseless" Metering Pumps

MT8 provides reliable and precision fluid metering for challenging applications

By: Chris Pasquali, CEO Factory Direct Pipeline Products, Inc.



A precision metering pump with a difference!

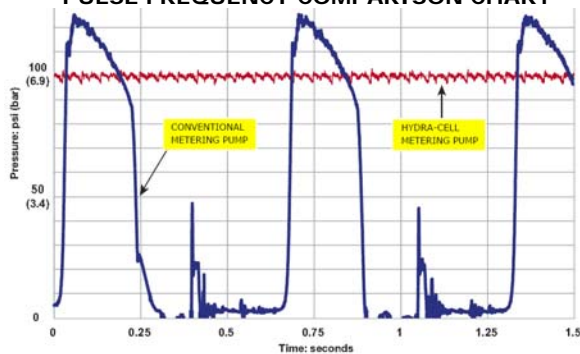
That is the best way to sum-up the MT8 metering pump manufactured by Wanner Engineering. Introduced in 2016, the MT8 has a triplex design pump head, which means it has three pump chambers with a common inlet and outlet manifold.

Smooth Flow

All positive displacement pumps have some form of pulsation and until now, most applications required pulsation dampeners to help optimize the dosage rate. The requirement for pulsation dampeners and the headaches associated with them disappear with the MT8 design due its high frequency pulse rate and patented hydraulic piston design. So, when we say "pulseless" we are referring to the observable flow and resulting performance appearing "pulseless".

The pulse frequency is related to the number of pump chambers; whereas conventional metering pumps have only one pump chamber the MT8 has three. Therefore, each shaft rotation results in six pulses because there is a pair of check valves controlling the flow for each chamber. Thus the frequency of pulses is dependent upon the gearbox used between the pump and motor. We offer ten standard ratios, equating to 1.8 - 36 pulses per second.

PULSE FREQUENCY COMPARISON CHART



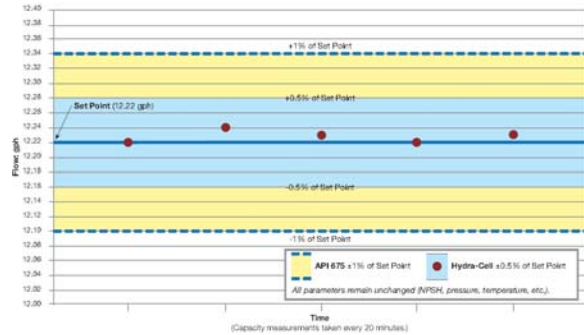
The blue line represents conventional simplex style metering pumps whereas the red line represents the Hydra-Cell triplex design.

The high frequency "pulseless" flow characteristic of the MT8 satisfies American Petroleum Institute (API) 675 standards for metering pump performance in terms of steady-state accuracy, linearity and repeatability.

Mechanically actuated (solenoid or motor driven) and

hydraulically balanced diaphragm style metering pumps require a replenishment of hydraulic actuation oil for proper functioning. The frequency and efficiency of replenishment corresponds to the accuracy of the volume displaced. The MT8's patented replenishment system outperforms conventional vacuum and mechanical actuated replenishment valves, optimizing accuracy.

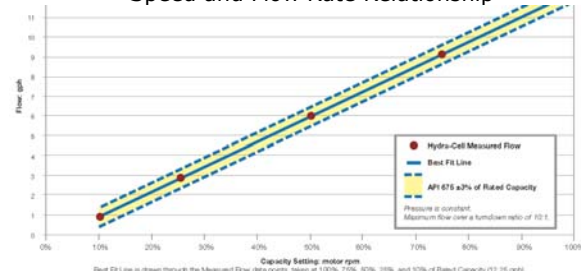
ACCURACY



The yellow area represents the accuracy requirements of $\pm 1\%$ per API 675 Metering Pump Standards and the blue area represents the $\frac{1}{2}\%$ range with the dots representing actual performance.

LINEARITY

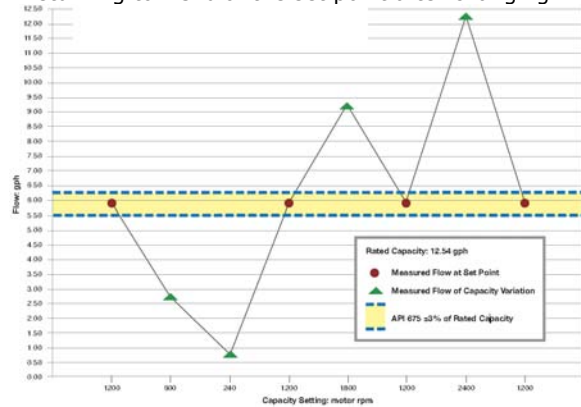
Speed and Flow Rate Relationship



The yellow area represents the API 675 $\pm 3\%$ requirement with the dots representing the actual performance.

REPEATABILITY

Returning to $\pm 3\%$ of the set point after changing RPM



The yellow area represents the API 675 standard and the dots represent the flow rate after decreases and increases to pump shaft speed.

Sealless Design

The Wanner Engineering MT8 sealless metering pump design has no leakage paths between the process fluid and mechanical portions of the pump, providing several

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advantages to its users, but namely reliability.

Piston style metering pumps have a plunger, which comes in direct contact with the pumped fluid and thus requires packing to create a seal between the hydraulic and process fluid sides of the pump. The plunger constantly slides through the packing, wearing it down, eventually providing a leakage path for contamination of the pumped fluid as well as fugitive emissions through the hydraulic end of the pump. Adjusting and replacing gland packing – along with that potential leakage path, is eliminated with the MT8 design.

Diaphragm style metering pumps such as the MT8 do not have a dynamic seal; the edges of the diaphragm are simply sandwiched between the pump body and pump head.

Plunger designs use packing and have two other weaknesses that the sealless MT8 does not:

1. Particulate within the fluid can accelerate wear of the plunger and that area of interface is an area where particulate can remain lodged.
2. The interface between the plunger and packing is dependent upon the fluid being pumped for cooling and lubrication, thus if the pump operates dry due to a system upset such as an empty feed tank, the resulting friction will significantly accelerate wear of the packing.

The MT8 can operate dry indefinitely and there are no leakage paths for particulate to accumulate.

Unlike mechanically actuated diaphragm designs (either solenoid or motor driven), the MT8 can operate with a restricted or blocked suction line because its design limits the position of the diaphragm, preventing it from moving too far forwards or backwards.

Specifications

- Flow range from 0.06 to 8.0 GPH
- Maximum inlet pressure 500 PSIG
- Maximum discharge pressure 3,500 PSIG
- Check valve materials:
 - 316SS
 - Hastelloy
 - Alloy 20
- Pump head materials:
 - 316SS
 - Hastelloy
 - Alloy 20
 - PVC
 - PVDF



Innovations

- Internal pressure relief valve
- One-piece check valve cartridge design for simplified maintenance
- Dual shaft gearbox enables two pumps controlled by a single motor
 - Double flow rate
 - Proportional injection of two fluids
 - Installed spare

Problem Solving Pump

The sealless design of the MT8 combined with its extreme accuracy has solved difficult metering pump applications involving sheer-sensitive fluids with suspended particles. Whether due to crystallization or improper mixing, if the particles are ≤ 200 microns in size it will not affect pump performance.

Examples of such applications include:

- Mixing polymers for water treatment
- Dosing phosphates, ammonia and other chemicals for boiler water treatment
- Metering methanol for wastewater nitrification
- High-pressure process chromatography
- Injection of additives in the plastics industry
- Production of polyurethane foam

Manual or Electronic Flow Adjustment

The flow rate of a metering pump is controlled by adjusting the stroke length, stroke speed or a combination thereof. Mechanical adjustment of the stroke length, whether via amplitude modulation or lost motion, increases the complexity of the pump design.

The reaction time for adjustments is typically 1 second per 1% of the stroke length, which is relatively "slow" when compared to electronic flow adjustment.

Variable frequency drives (VFDs) enable changing the speed of rotation instead of the stroke length. The response rate between zero and maximum RPM might range from 0.5 to 1.3 seconds – faster flow correction equates to increased long-term accuracy.

VFD's are easily tied-in to automation systems, accepting discreet input from flow meters, pressure transducers and thermometers to instantly adjust the pump flow accordingly.

While we do offer a manual stroke adjustment option for the MT8, most customers are automating their processes in support of electronic flow adjustment.

The following PDF file link contains the catalog pages for the MT8, application descriptions, performance data, the part numbering system and installation/operation/maintenance manual:

<http://www.innovativepumps.com/PDFs/MT8.PDF>

Our company, Factory Direct Pipeline Products Inc., is tasked with helping you solve difficult pumping applications. We are not just a "part number distributor" of many pumps; rather for the past 28 years we have specialized in the application of Wanner Engineering's sealless pumps. We assist customers by learning about their specific application and provide them with a detailed proposal for a pump system and accessories to achieve their pumping objective.

Visit us online at <http://www.innovativepumps.com> and let us assist you with your application!

Chris Pasquali has been trained by Wanner Engineering Inc, having provided sales and engineering support since 1991.