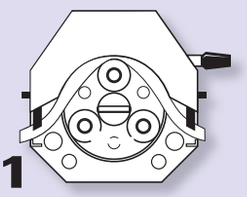
In pump technology comparisons,

MASTERFLEX® is A+ HEAD OF THE CLASS!

Precision, versatility, and ease of use make Masterflex® peristaltic pump technology the preferred solution to increasing numbers of applications in the processing industry and in the lab.

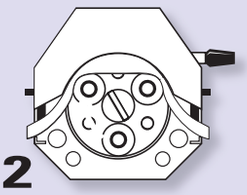
The following comparisons prove that under real-world conditions, Masterflex doesn't just make the grade, Masterflex sets the standard for excellence.

How Do Masterflex Pump Heads Work?



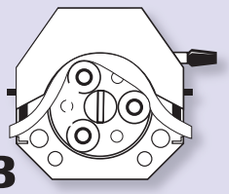
1

A pump head consists of only two parts: the rotor and the housing. The tubing is placed in the tubing bed—between the rotor and housing—where it is occluded (squeezed).



2

The rollers on the rotor move across the tubing, pushing the fluid. The tubing behind the rollers recovers its shape, creates a vacuum, and draws fluid in behind it.



3

A "pillow" of fluid is formed between the rollers. This is specific to the ID of the tubing and the geometry of the rotor. Flow rate is determined by multiplying speed by the size of the pillow. This pillow stays fairly constant except with extremely viscous fluids.

Gear Pumps vs Masterflex

Application

A pharmaceutical customer needs to draw a constant volume of 800 mL/min of water with particulates. The customer needs variable speed and is drawing the fluid through a particle sensor.

Gear Pump Disadvantages

- Does not handle particulates
- Difficult to clean
- Can't run dry
- Does not provide sterile conditions (fluid contacts internal pump parts)

Masterflex Advantages

- Handles particulates
- Easy to change out tubing and clean pump
- Runs dry
- Maintains sterility of fluid (fluid only contacts the tubing)

Diaphragm Pumps vs Masterflex

Application

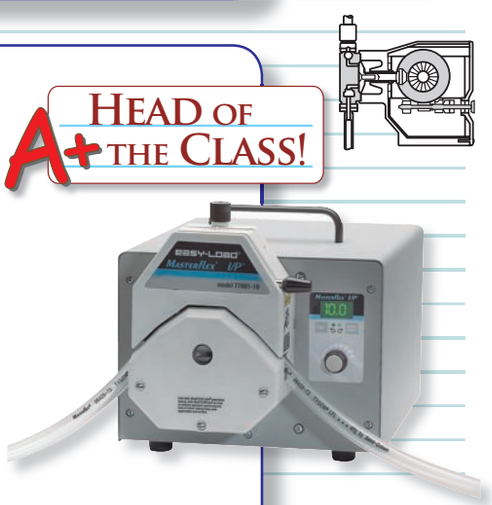
A manufacturer needs to pump ethylene glycol from a 55-gallon drum into six smaller containers. Once these six containers are filled with the ethylene glycol, they are used to lubricate needles for their process.

Diaphragm Pump Disadvantages

- Cannot handle high viscosities—the flow would be reduced by 75% due to the 450-cp viscosity of ethylene glycol
- Requires routine maintenance and difficult to clean
- Numerous replacement parts: diaphragms and internal valves

Masterflex Advantages

- Handles high viscosities well—improved customer's flow rate
- Fluid does not contact internal pump parts—only the tubing
- Easy tubing replacement; reduced maintenance time
- Excellent self-priming capabilities



Syringe Pumps vs Masterflex®

Application

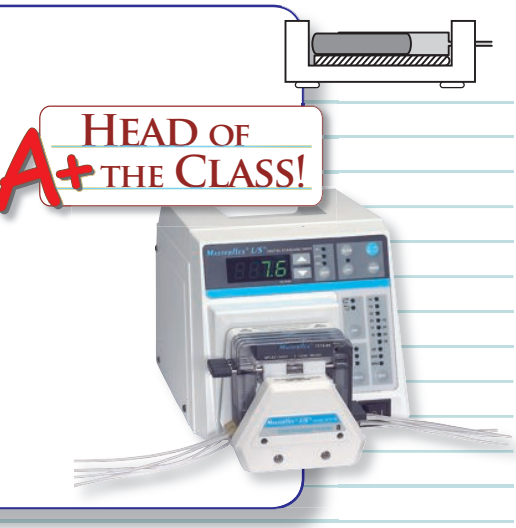
A university research lab needs to pump a fixative (formaldehyde and glutaraldehyde in a phosphate buffer) to preserve brain tissue for histological research. They are pumping at low flow rates (20 to 40 mL/min) with four channels pumped at one time.

Syringe Pump Disadvantages

- Does not handle viscous fluids
- Difficult to clean and maintain sterility
- Not self-priming
- Cannot pump any particulate matter
- Automated options are expensive at the lower flow rates

Masterflex Advantages

- Handles high viscosities well
- Easy to change out tubing and clean/sterilize tubing
- Excellent self-priming capabilities
- Able to pump particulates
- Multichannel capabilities
- Cost efficient



Piston Pumps vs Masterflex

Application

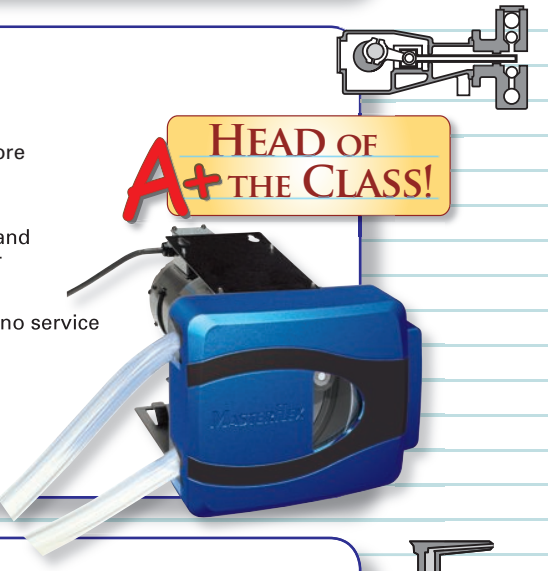
A rubber manufacturer needs to dispense 1-mL doses of Methyl Ethyl Ketone (MEK) as a primer in the first step of the vulcanization process (treating rubber to give it certain properties). They need a pump that is easy to operate.

Piston Pump Disadvantages

- Chemical compatibility is challenging
- Difficult to regulate the 1-mL doses
- Difficult to clean (internal parts of pump head and valves)
- Can't run dry

Masterflex Advantages

- Tubing formulations are more chemically compatible
- Simple to operate controls
- Easy to change out tubing and clean pump—reduces labor
- Runs dry to prime
- Maintenance is easier with no service kits or valves



Drum Pumps vs Masterflex

Application

A pharmaceutical customer needs to pump a disinfecting agent from a drum into an 8-gallon tank. They had been using a hand pump in the past but in order to reduce time and maintenance they would like an automated system.

Drum Pump Disadvantages

Hand Pump

- Manual, hard labor
- Not fast or efficient
- Risk of chemicals splashing on operator

Motorized Drum Pump

- Poor self-primers
- Doesn't remove all of the fluid in the drum
- Most models don't run dry
- Does not have a lot of automated features

Masterflex Advantages

- More efficient and fast at pumping fluids—reduces labor
- Excellent self-priming capabilities
- Empties entire tank/drum
- Runs dry
- Excellent chemical compatibility
- More automated features to program fluid flow—improved accuracy

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Centrifugal Pumps vs Masterflex®

Application

A food manufacturer needs to pump a high-viscosity glue (60,000 to 90,000 cp) into a labeler machine. The pump must be food-grade compatible. The glue is placed on a roller and then onto a palette, which places a thin layer of glue onto a bottle. The label is then placed onto the bottle by a separate machine.

Centrifugal Pump Disadvantages

- Does not handle high viscosities
- Difficult to clean
- Internal pump parts are not food-grade compatible
- Limited automated capabilities

Masterflex Advantages

- Handles high viscosities well
- Easy to change out tubing and clean pump—less maintenance
- Washdown models allow for quick and easy cleaning
- Tubing is food-grade compatible
- Has more automated capabilities

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Air-Operated Double Diaphragm Pumps vs Masterflex

Application

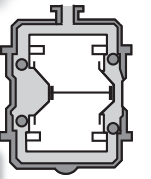
A cheese manufacturer needs to pump oil from a 55-gallon drum into small containers. Once placed in these containers, the oil is mixed with blocks of cheese and spices to create different flavors of cheeses. This company used an air-operated double diaphragm pump but was having difficulty with its operation.

Air-Operated Double Diaphragm Pump Disadvantages

- Difficult to control the flow rate
- Cavitation of the pump caused air bubbles within the flow path
- Difficult to clean and maintain sterility of internal parts of pump

Masterflex Advantages

- Easy to control flow with variable-speed drives—reduces manual operation
- Reduced cavitation problems
- Easy to change out tubing
- Easy to maintain sterility of tubing and fluid path
- Offer food-grade tubing
- No valves to clean or maintain



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Flexible Impeller Pumps vs Masterflex

Application

A research laboratory needs to pump dilute sulfuric acid and a copper sulfate solution continuously (24 hours a day) for five days in a row. They need to recirculate these two chemicals at 60°C for a cell lab. They need to be able to vary the flow rate with a maximum flow of 15 LPM at 15 psi.

Flexible Impeller Pump Disadvantages

- Does not handle higher pressures at higher flow rates well
- Difficult to find chemically compatible internal pump parts
- Cannot run dry
- Variable flow control is difficult
- Difficult to clean

Masterflex Advantages

- Handles higher pressures at higher flow rates
- Chemically compatible with a variety of tubing formulations
- Runs dry
- Easy to control flow with a variable-speed pump drive
- Easy to change out tubing and clean pump

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Rotary Lobe Pumps vs Masterflex®

Application

A university research facility needs to pump cell media into a system containing cells (the cells are living off of the media in the system). This system is used to simulate a human circulatory system for research purposes; therefore a constant flow rate needs to be maintained.

Rotary Lobe Pump Disadvantages

- Difficult to pump precise flow rates
- Does not self-prime
- Cannot handle particulates
- Difficult to clean

Masterflex Advantages

- Easily maintains a precise, constant flow rate
- Excellent self-priming capabilities
- Able to handle shear-sensitive particulates/fluids
- Easy to change out tubing and clean/sterilize pump

Frequently Asked Questions about Masterflex® Pumps

Flow Rates

What flow rates are attainable?
Depending on which series you select, our systems deliver flow rates from 0.0005 mL/min to 45 LPM.

What flow precision can I expect?
You can obtain a flow precision of up to ±0.5% with calibrated flow systems. For other systems, ±3% precision is possible for general transfer applications.

Are measured volumes repeatable?
Yes. Volumes are repeatable with accuracies of ±0.25% or better using calibrated systems.

What is the effect of viscosity on flow?
All flow rates are based on water. Increasing the fluid viscosity will decrease the flow rate.

Pump Heads

What is the maximum pressure?*
The maximum pressure using P/S® High-pressure tubing is 100 psi (6.8 bar); nominal pressure is 25 psi (1.7 bar).

What is the maximum inlet pressure?*
Typically 40 psi (2.7 bar), depending on tubing ID, wall thickness, and formulation.

What is the maximum suction lift?
The maximum suction lift is 8.8 m H_2O (29 ft H_2O).

Are check valves required?
No. Our unique designs eliminate this need.

Can Masterflex pumps run dry?†
Yes. They can pump gases, liquids, or mixed phases.

Are Masterflex pumps self-priming?
Yes. They can develop a vacuum in excess of 660 mm Hg (26" Hg).

Are Masterflex pumps positive-displacement type pumps? Yes. The flow rate with water is directly proportional to the rotor speed up to the maximum capabilities of the drive.

Are Masterflex pumps nonsiphoning?
Yes. One roller is always squeezing the tubing closed, so you don't get any backflow up to the rated pressure of the tubing/pump head.

Can slurries and abrasive solutions be pumped?
Yes. The limitations are viscosity and particle size relative to selected tubing ID.

Why are so many pump heads and tubing sizes offered?
To provide maximum flexibility in achieving desired flow at the optimal drive speed.

Is flow reversible?
Yes. All specifications apply in either clockwise or counterclockwise rotation.

Tubing

Is the tubing important?
Yes. The tubing is the pump chamber. The elasticity of the tubing provides suction lift; its strength provides pressure handling ability; its flexibility determines pumping life; its bore determines the flow rate; and its wall thickness determines pumping efficiency.

What are the temperature ranges of tubing?
The temperature range for tubing is from –73 to 232°C (–100 to 450°F).

What is the chemical resistance?
It depends on the tubing formulation you select.

How long will the tubing last?
Tubing life depends on pump speed and pressure, tubing material and chemical compatibility, and abrasiveness of the liquid (media) being pumped.

How does pump speed affect tubing life?
To put it simply, the lower the speed, the longer the life of the tubing.

What tubing formulation gives longest life?
In order, Norprene®, PharMed® BPT, PharmaPure®, Tygon® LFL, silicone, BioPharm Plus, C-FLEX®, Tygon®, and Viton® last the longest.

Is tubing available that is compatible for food and sterile applications?
Yes. Some tubing formulations meet NSF specifications, 3A, FDA, and USDA requirements for food handling. Many can be sterilized.

Is the tubing easy to replace?
Yes. The Easy-Load®, Easy-Load® II, Easy-Load® 3, High-performance, Multichannel cartridge, and Rapid-Load® pump heads make tubing changes quick and easy. Tubing in the Standard pump head is easy to change with the loading key provided.

Drives

Why are drives sold separately from pump heads in the P/S® and I/P® series?
The modular concept lets you customize your system for flexibility and economy.

Can a single drive run more than one pump head?
In many cases, two to four pump heads can be stacked in any combination up to the max torque capability of the drive.

Are drive systems other than those shown in this catalog available?
Yes. Our Engineering Department can customize, design, or modify a drive or drive package to your specifications for quantity purchases and OEM applications.

*PTFE-pump head can operate at pressures up to 100 psi.

†Except the PTFE-pump head which can overheat when run dry.