We put
our heart
into pumps

Verderflex Peristaltic Chemical Metering Systems

Peristaltic Chemical Feed
Accurate & Reliable

Clean Water Professionals
of Kentucky & Tennessee

VERDER
passion for pumps

Presentation Outline

- Verder Pump, Inc. – Company Background
- Metering Pump Technologies
- Verder – Peristaltic Pumps
- Questions?

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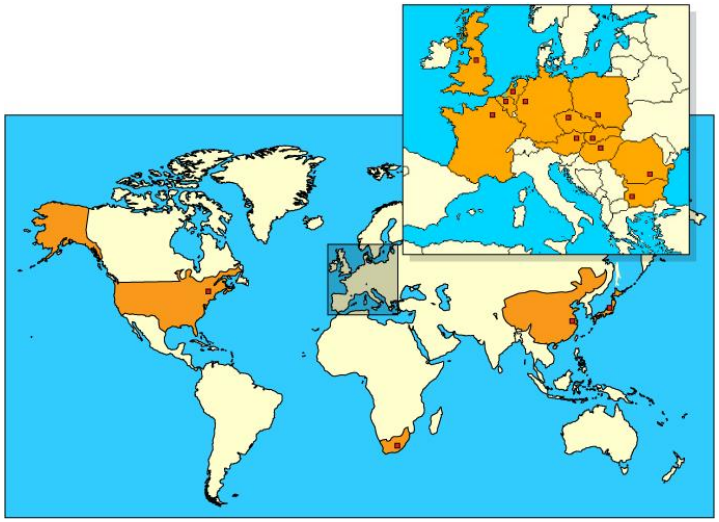
The Verder Group

- Founded in 1959
- Family owned – Andries Verder
- Pump manufacturing and distribution
- 24 Countries
- 1600 Employees

- Verder, Inc. – Macon, GA
  - United States HQ of the Verder Group



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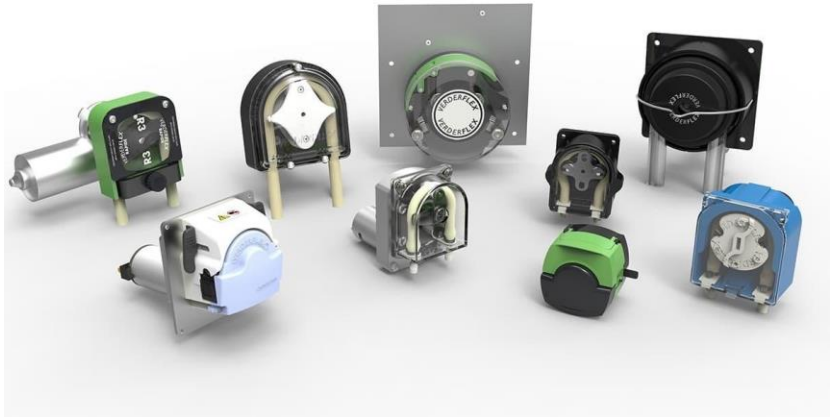
Verder Manufactures…



Verder, Inc. – Macon, GA

- North American HQ
- 30,000 sq. ft. facility
- 13 employees
- Engineering and sales

Verder, Inc. Macon, GA

- Manufacturing/Service
- Warehouse - $500k inventory
- Shipping and receiving
- Pump testing capabilities

Chemical Metering Pumps Should Be…

- Accurate – Precise / Repeatable
- Reliable – 24/365
- Durable
- Components Chemically Compatible
- Controllable – Changes w/ Flow Rate
- Field Serviceable
- Maintained Regularly
- Sufficient Range – Low / High Flows
- Optimize Chemical Usage $$

Pump Verbiage

- **Pump Curve –** A selection tool used to gauge a pumps ability to produce a desired flow against a certain head. Flow rate / Height
- **Head –** The height at which a pump can raise a fluid. 2.31 ft = 1 PSI
- **Pump Turndown –** An expression as a ratio over which you can adjust the output of a metering pump. If a pump is capable of 10 gallons per hour (GPH) maximum and it has a 10:1 turndown, it can be turned down to 1 gallon per hour.
- **Suction Lift –** The negative pressure / vacuum on the suction side of a pump. How far the fluid must be lifted from the storage source to the pump.
- **Carrier Water –** Using a stream of water to carry chemical to the application point.
- **MOC / Materials of Compatibility –** How the parts of the pump that come into contact with the chemical, react or can withstand chemical attack.
- **Off Gassing** – Vapors given off by certain chemicals as they break down that can affect the chemical feed system….Sodium Hypo Chlorite – Hydrogen Peroxide – Peracetic Acid.

Water Treatment Chemicals

Water

- **Coagulants** – Alum – Ferric - PAC
- **pH Adjustment** – Caustic – Lime – Soda Ash Solution
- **Corrosion Inhibitors** – Phosphates
- **Disinfectants** – Hypo – Hydrogen Peroxide – Chlorine Dioxide
- **Oxidizers** – Potassium & Sodium Permanganate
- **Filter Aids** – Polymers
- **Others -** Ammonia – Chloramines - Fluoride – HFS Acid – Sodium Fluoride Solution - Carbon – PAC Solution

Wastewater

- **Coagulants** – Alum – Ferric – Sodium Aluminate
- **pH Adjustment** – Caustic – Lime – Mag Hydroxide
- **Disinfectants** – Hypochlorite – Peracetic Acid
- **DeChlor Chemicals** – Sodium Bisulfite – Sodium Metabisulfite
- **Filter / Sludge Aids** – Polymers
- **Bio Filter Food Source** - Glycol – Methanol – Carbon Based Chemicals
- **Biological Food Source** – Molasses
- **Others** - Defoamer

Difficult to Feed Chemicals

- **Dry to Solution (high solids)** – Lime Slurry / Soda Ash Slurry / Carbon Slurry / Calcium Hypochlorite / Magnesium Hydroxide
- **Corrosive** – Ferric Chloride – Peracetic Acid – Chlorine Dioxide – HFS Acid (Fluoride)
- **Oxidizers** – 12% Sodium Hypochlorite – Potassium Permanganate – Sodium Permanganate
- **Polymers** – Neat Polymers – Activated Polymers
- **Others** – Molasses

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Chemical Application Data

- **Chemical Properties**
- Name of Chemical
- Flow Rate – GPM
- Temperature
- Shear Sensitive Y/N
- Viscosity – cps
- Solids Type
- Solids %
- Solids Size
- Specific Gravity

- **System Info**
- Suction Line Length – Ft
- Suction Line Diameter
- Suction Lift – Ft
- Discharge Line Length
- Discharge Line Dia.
- Discharge Head – PSI
- Cont. or Intermit. Duty
- Motor Classification
- Phase/Hz/Volts
- Dosing or Transfer

Types of Metering Pumps

- **Diaphragm – Solenoid / Mechanical / Hydraulic**
  - *Tubular Diaphragm*
- **Progressive Cavity Pumps**
- **Gear Pumps**
- **Piston Pumps**
- **Peristaltic Pumps**
  - *Tubing Pumps*
  - *Hose Pumps*
  - *Others*

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Diaphragm Metering Pumps
Chem Feed Archives!

Chem Feed Archives! Roto Dip

Chem Feed Archives! Roto Dip

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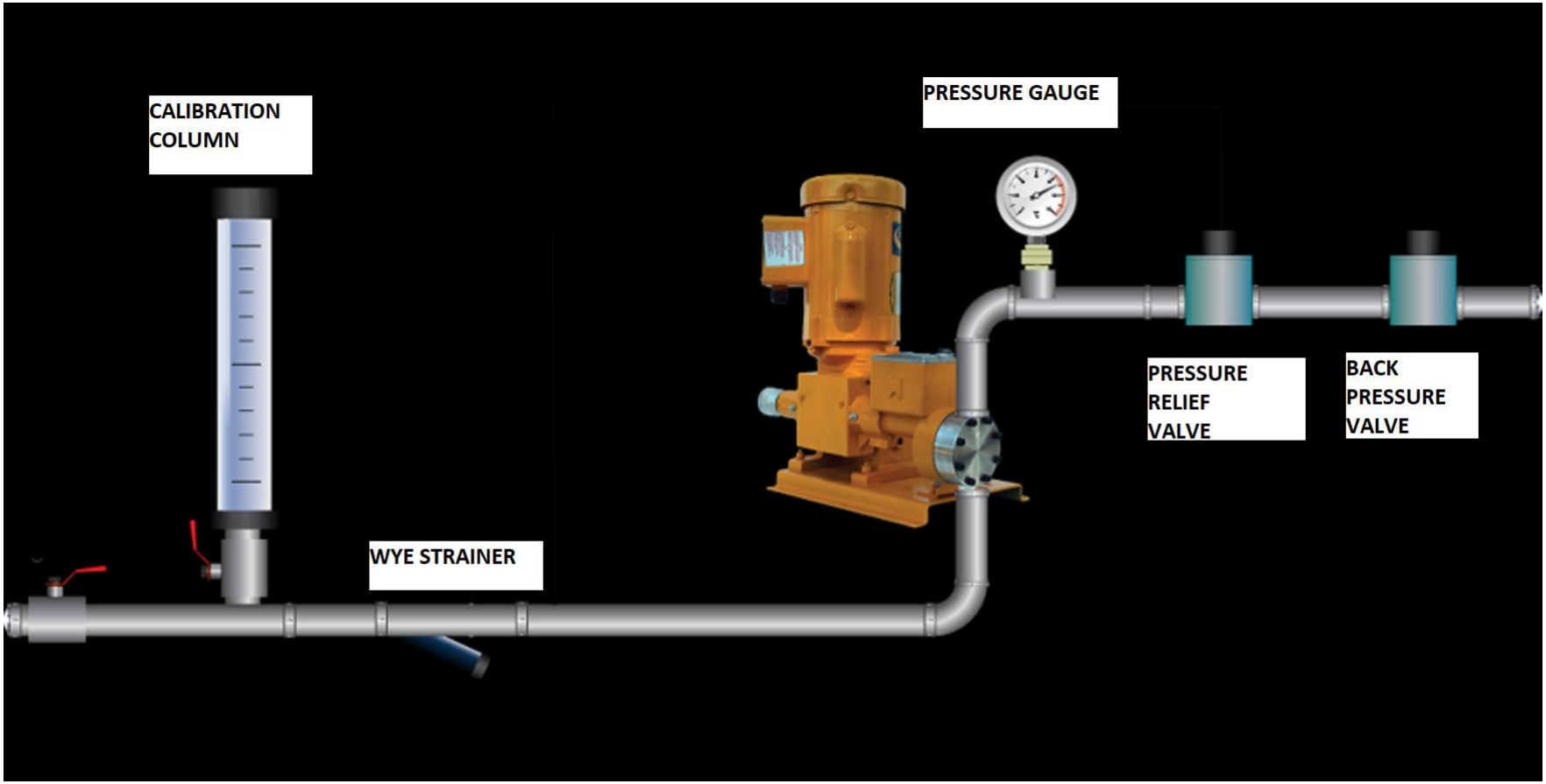
Typical Chemical Feed Arrangement
Diaphragm Metering Pumps



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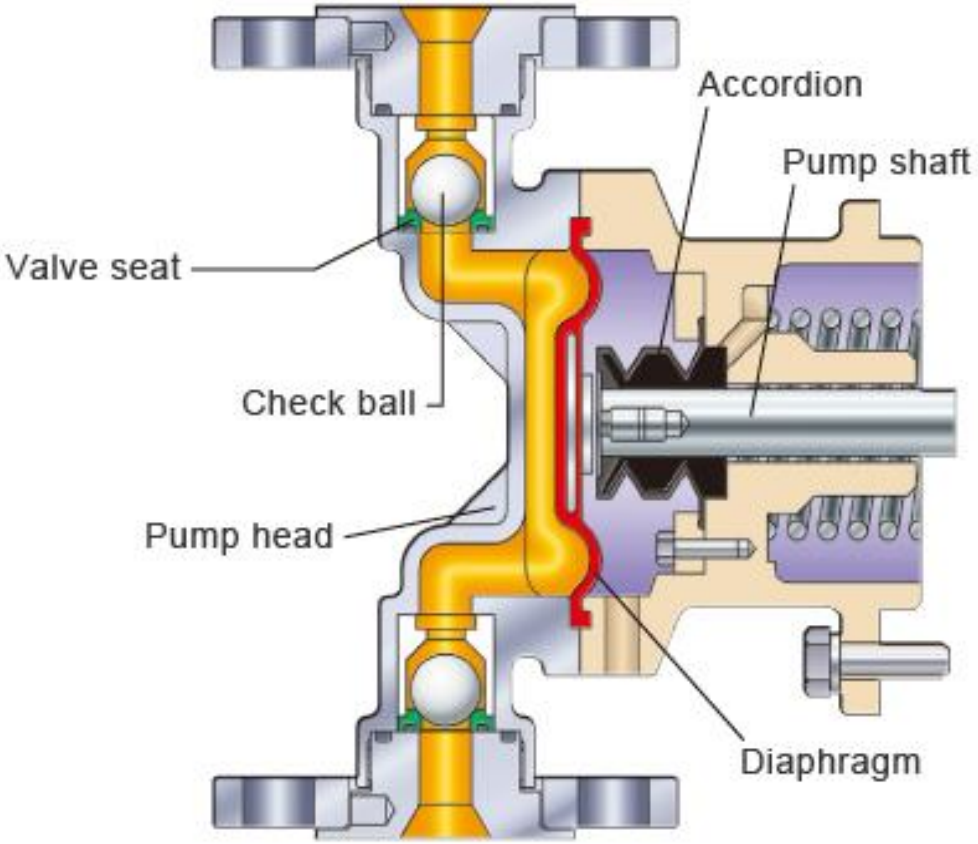
Diaphragm Pump Principle



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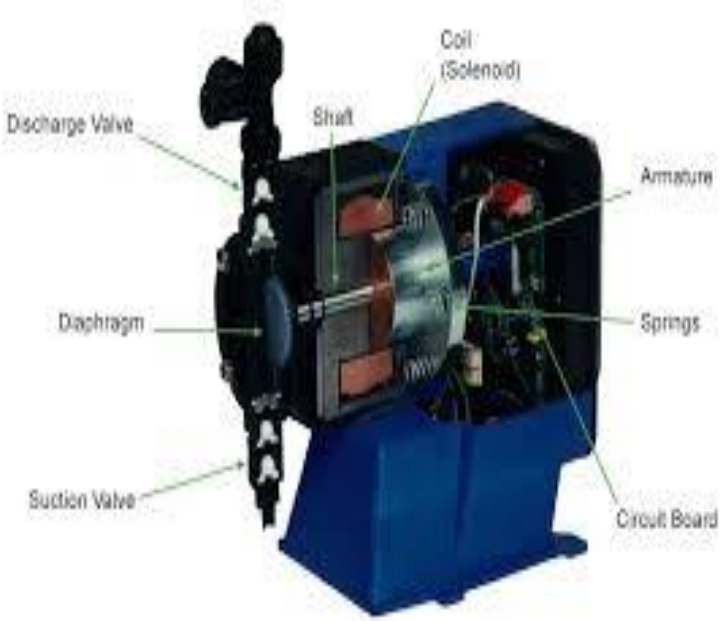
Solenoid Diaphragm Metering Pumps



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Mechanical Diaphragm Pumps

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Hydraulic Diaphragm Metering Pumps

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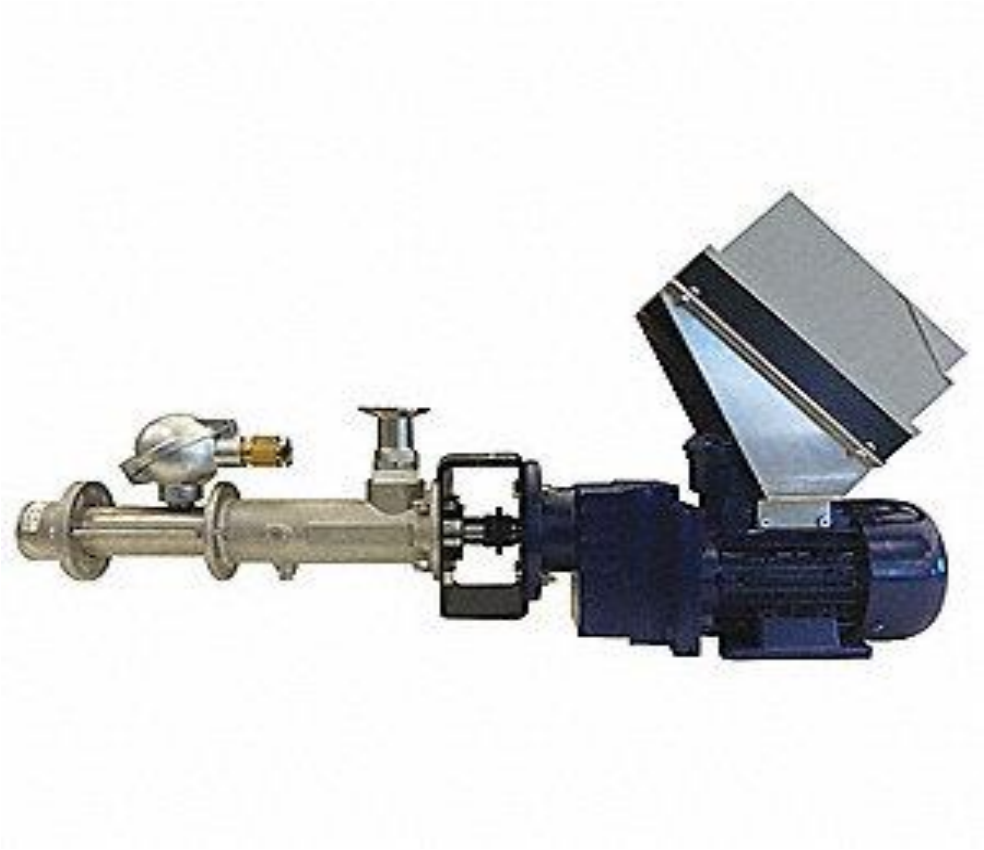
Progressive Cavity Chemical Pump



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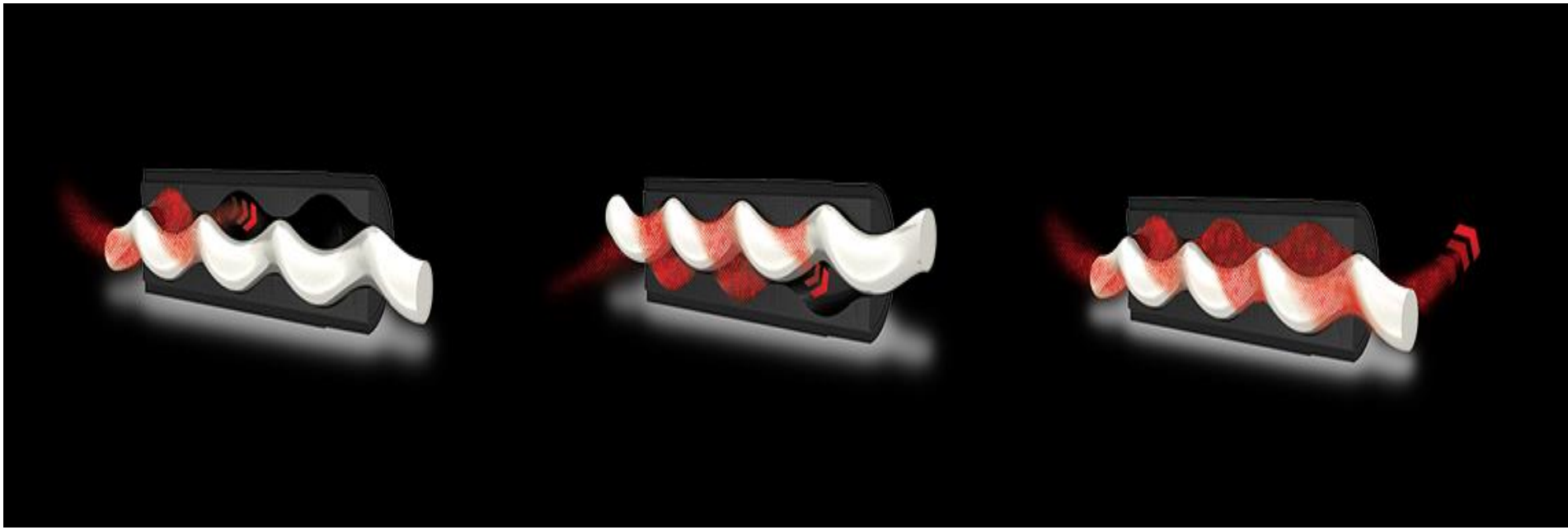
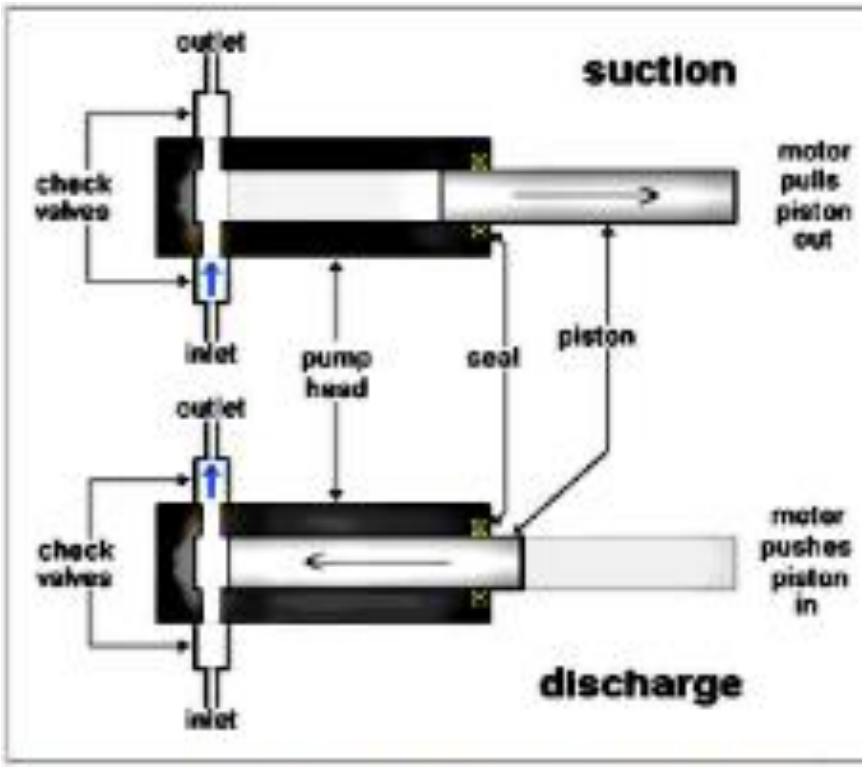
Progressive Cavity Principle



Piston Metering Principle & Pump



Cross-section of piston metering pump

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Gear Pump

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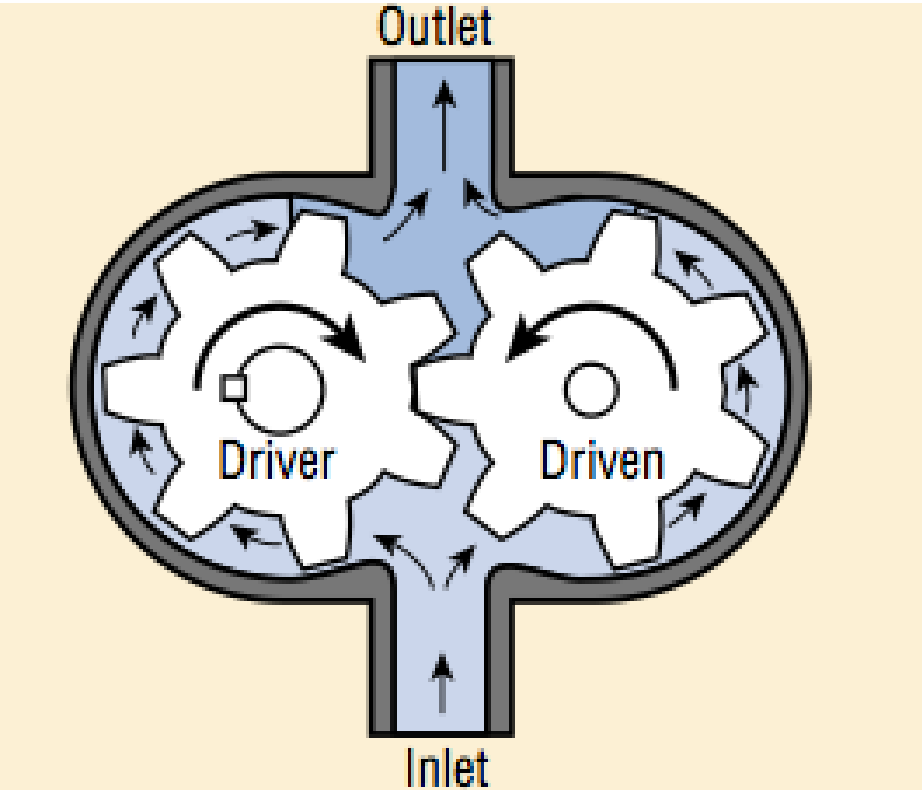
Gear Pump Principle



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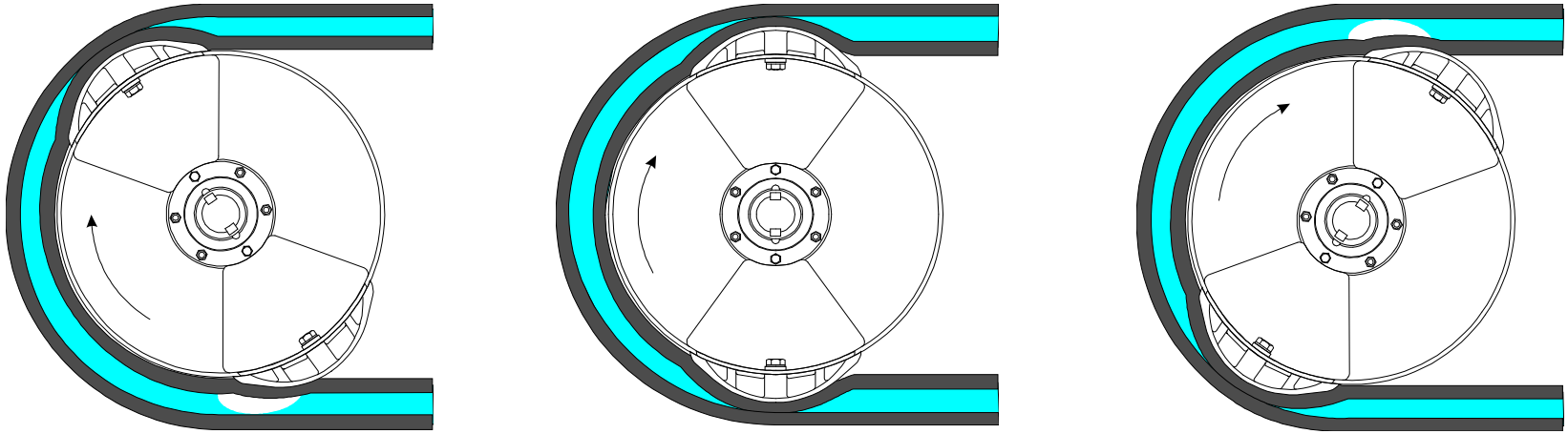
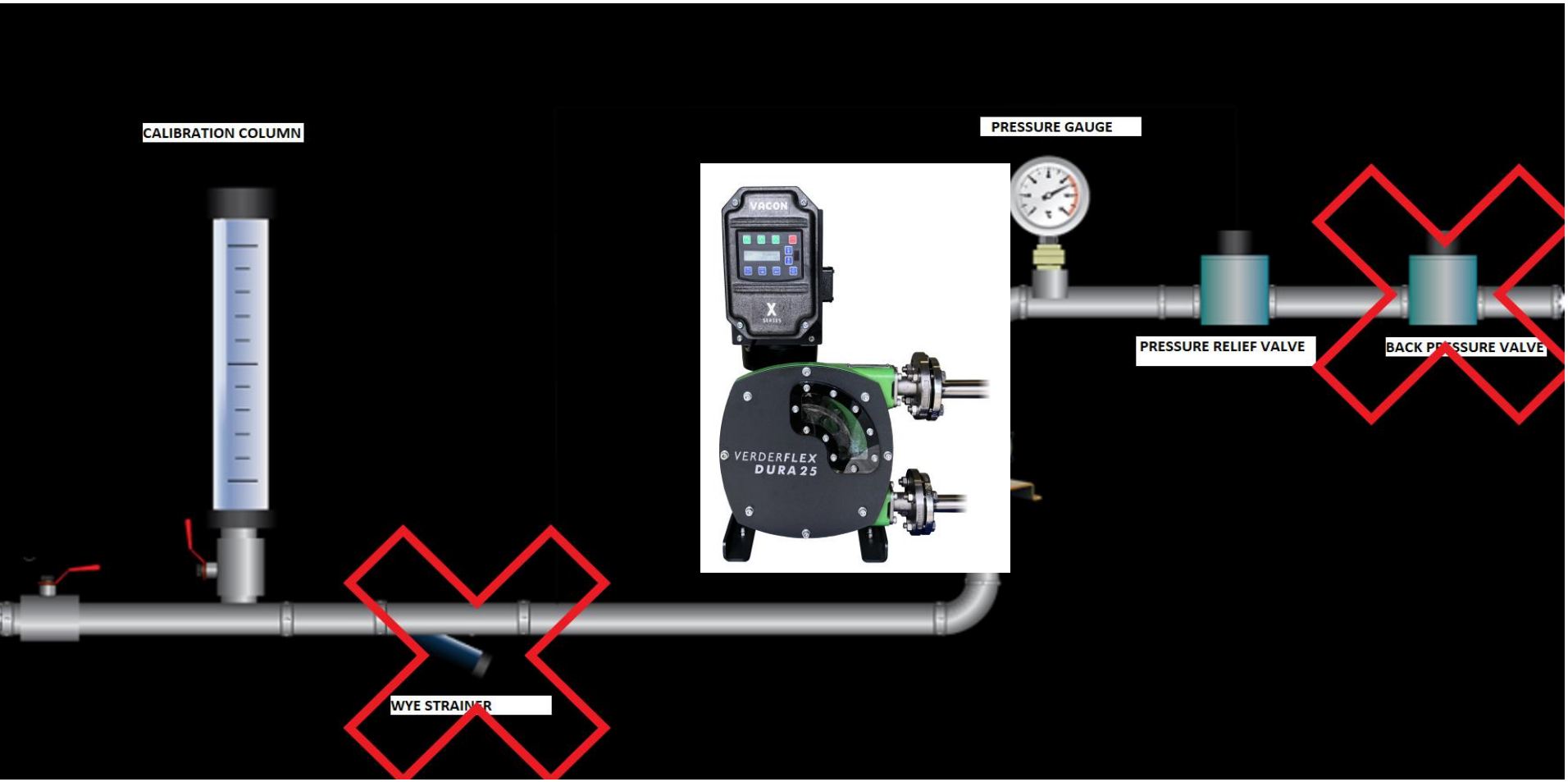
Peristaltic - Principle of Operation

A rotating assembly with 2-sliding shoes or rollers alternately compress and relax flexible tubing or hose providing accurate and wear resistant operation.



Peristaltic Chem Feed Arrangement



Peristaltic Hose Pump Advantages

- Abrasion resistant
  - Hose life is not related to a product's abrasive qualities
  - The hose fails due to fatigue or chemical action, not abrasion
- Solids Handling
  - Able to pump liquids containing up to 80% fine inorganic solids (Slurry)
  - Up to 10% sludge capabilities
- No moving parts in the liquid stream
  - No contamination of product, pump or gearbox
  - No metal to metal contact
  - Smooth liquid passage (no valves, dead corners, or mechanical parts)

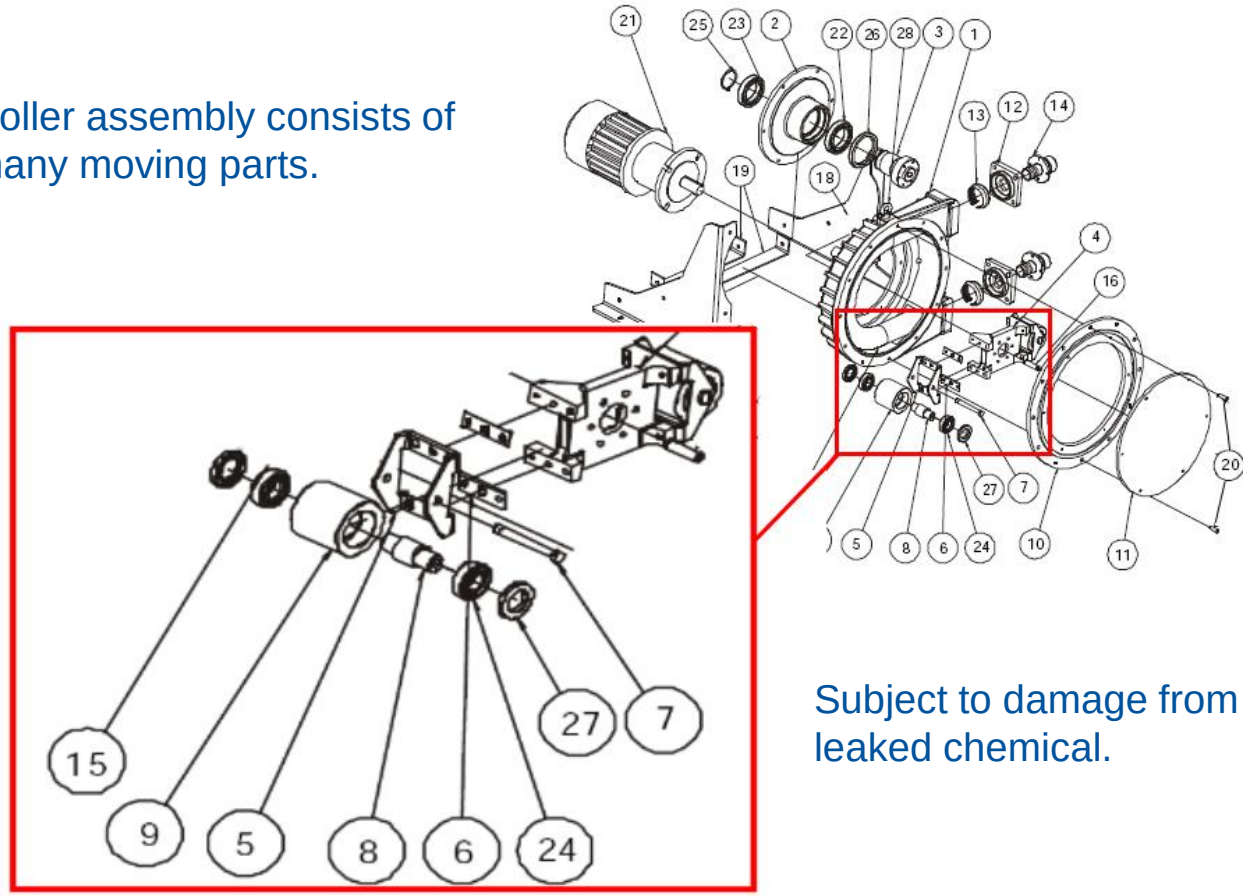
Rollers vs. Shoes

- Rollers are good for very low pressures with thin-walled tubing.
- The roller and it's associated bearing assembly form a complex rotating part.
- Difficulties arise on higher pressure applications or when hose failure occurs.

Typical Roller Assembly

- Pressing shoes are elliptical for gradual hose compression. Force is applied over a larger area generating less stress.

Roller assembly consists of many moving parts.



Subject to damage from leaked chemical.

Peristaltic Hose Pumps - Rollers

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Peristaltic Hose Pumps - Shoes

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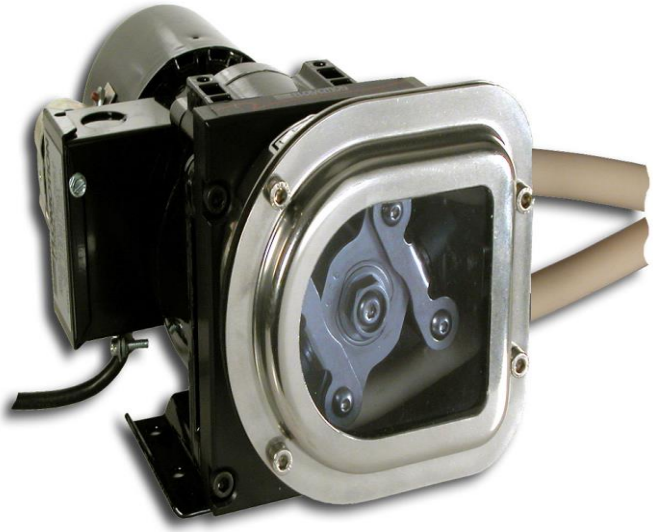
Mechanical Tubing Pumps



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Cased Drive Tubing Pumps

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VERDER Pump Technology

DURA Hose Pump

Vantage 5000 Tubing Pump

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Verderflex Peristaltic Pumps

- COMPLETE THE PACKAGE
  - **Vantage 5000:**
  - Flows up to 1 gpm
  - Lower Pressures <30PSI
  - **Water-type fluids**
  - **Dura Hose Pumps:**
  - Flows above 1 gpm
  - High pressure
  - High abrasion/solid content
  - **High viscosity/ solids type fluids**

Dura Hose Pump Range

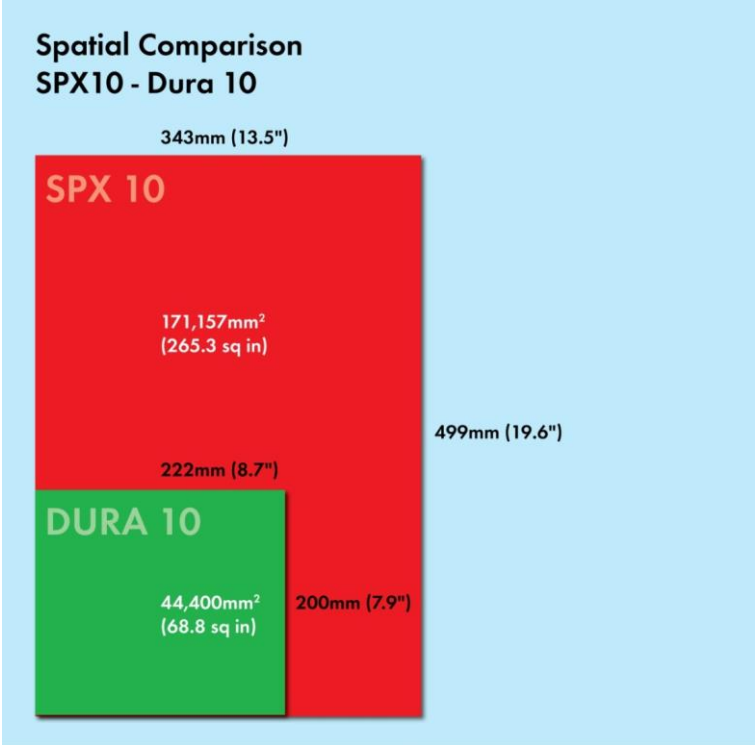
- Flows up to 78 GPM, Discharge Pressures up to 232 PSI,(Dura 5 – 25 up to 175 PSI)
- Long life high pressure hoses in Natural Rubber, EPDM, Nitrile Buna (NBR), Hypalon® (CSM) and Verderprene.
- 8 Sizes 5mm ID to 55mm ID

Verderflex Motor Mounted VFD

- Right Angle Drive
- **Vertical Motor**
- **NEMA4X Vacon Drive**

VERDERFLEX® DURA

The D10 requires ¼ of the footprint of SPX 10



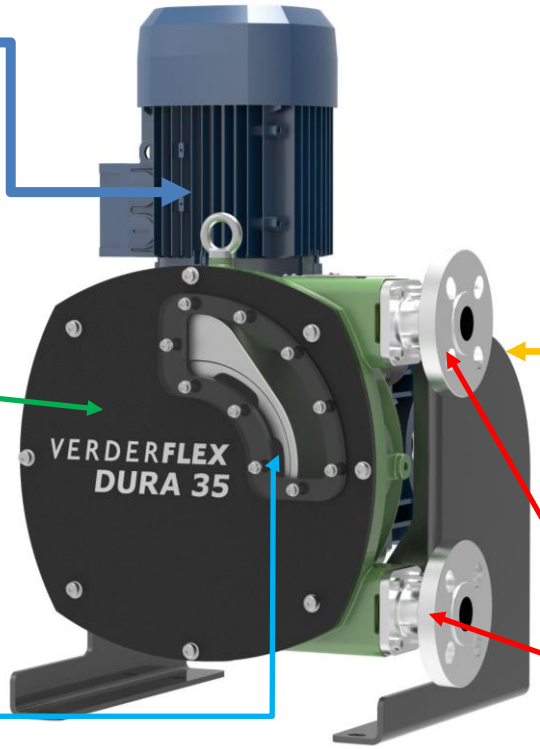
Vertical vs Horizontal Motors

DURA Hose Pump

Motor
(provides power to turn rotor on compressed hose

Pump Front Cover
(Dura & VF - Steel)
(RL – Plexiglass)

Rotor
(Dura & VF - Cast Iron)



Gearbox
(at rear - reduces high motor speed to low pump speed

Port Flanges
(Connects to pipework, Stainless Steel or PP or PVDF contact parts)

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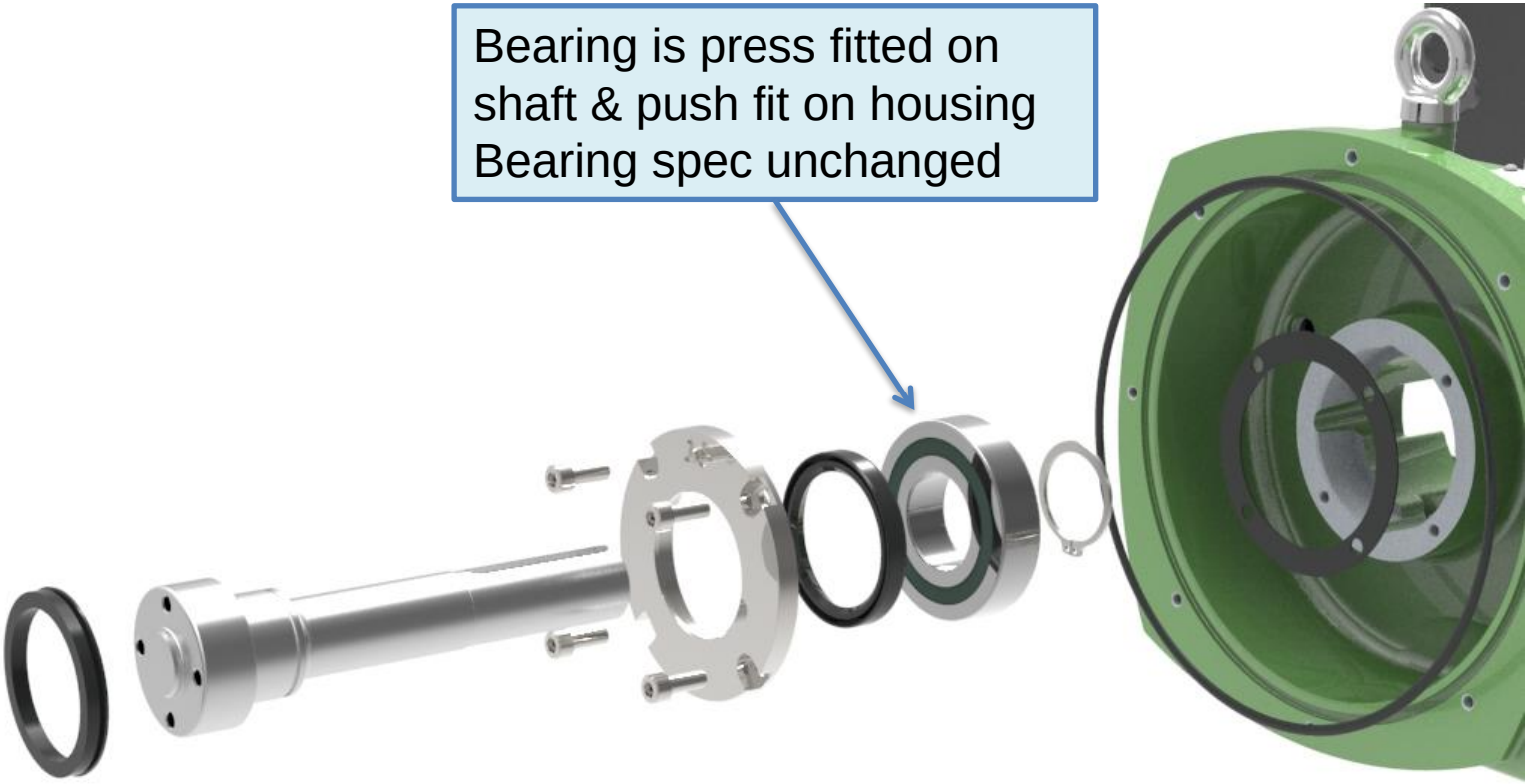
Enhanced Shaft Assembly

Bearing is press fitted on shaft & push fit on housing
Bearing spec unchanged



Additional V seal prevents shaft seal contamination & wear

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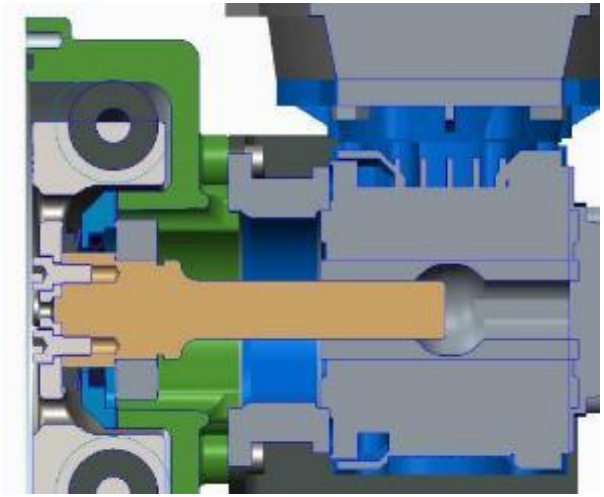
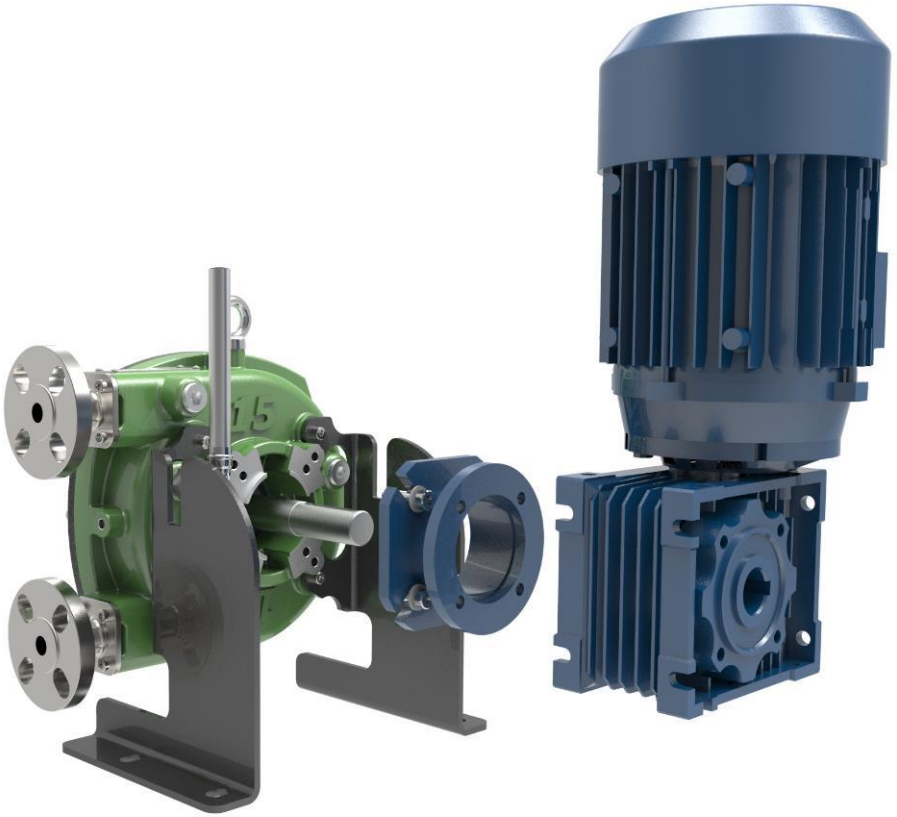
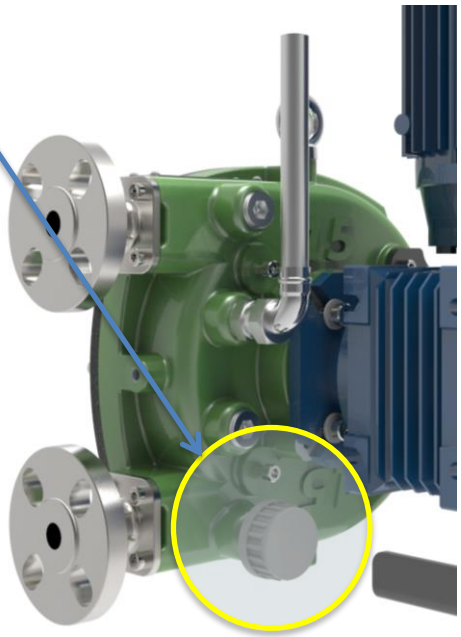
DURA Drive Assembly





Mounting Frame

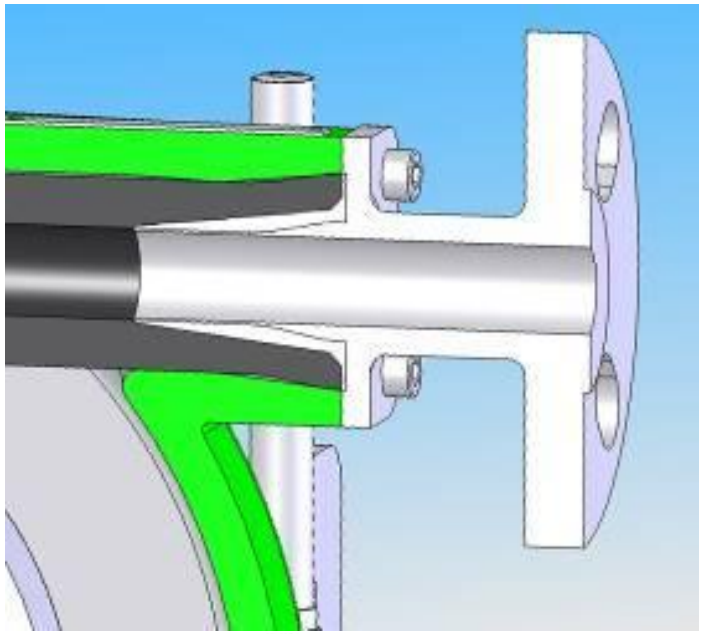
Easy access to drain plug



VerderLube - VerderSil

Improved Hose Clamping / Easier Hose Changes

- Tapered insert section of port flange compresses the hose against the casing for secure hose clamping
- Rated to 435 PSI
- Slotted ANSI standard flange
- Speeds up hose changes but still maintains hose enclosed in casing
- 316SS, polypropylene, and PVDF wetted materials available



VIDEO LINK

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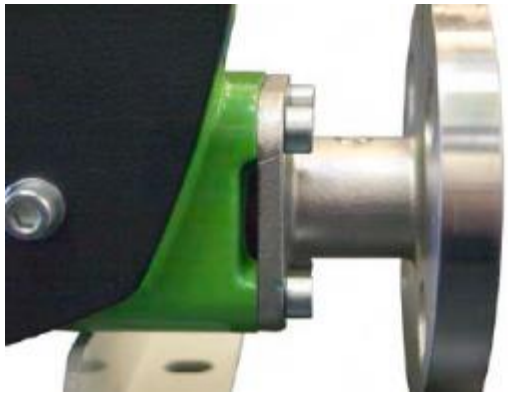
Hose Clamping

VERDERFLEX



Verderflex Dura's simple connection completely seals the pump housing

OTHER BRANDS

In the event of hose rupture, product is contained within the pump housing.

HOSES

the soul of Peristaltic Pumps

Hoses – The key to pump performance

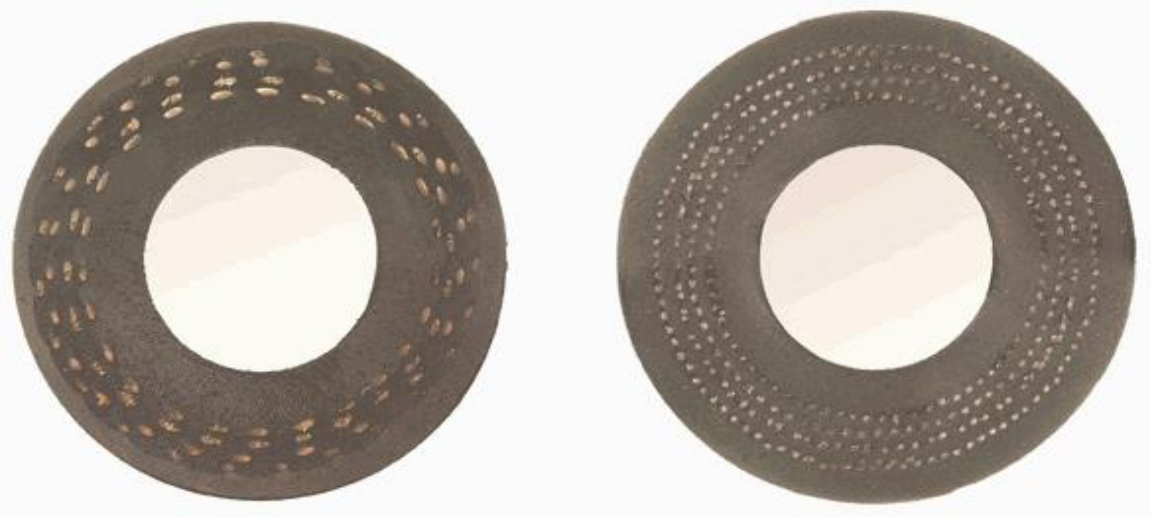
- Hoses are custom produced to very tight specifications
  - Natural Rubber
  - Buna Rubber
  - EPDM
  - Hypalon

- Hoses have been developed for increased **fatigue resistance** – the most likely cause of normal failure

Hose Distinctions

- Verderflex hoses have the most reinforcing fibers
  - The compressing load (to close the hose) is spread across these reinforcing fibers
  - The higher the number of fibers, the better the load distribution and reduction of load per fiber
  - Hence, better fatigue life

Cross-sectional views of standard Peristaltic Hoses



Competitor Hose

Verderflex Hose

What Factors Influence Hose Life?

- Speed
- Discharge pressure
- Chemical compatibility
- Duty cycle
- **Hose Manufacturing**

Sodium Hypochlorite Service
Cobb-Marietta Water

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DURA Hose Pumps

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DURA Hose Pumps – Mag Hydroxide
Replace Tubing Pumps

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Two Duplex DURA Hose Pump Skids

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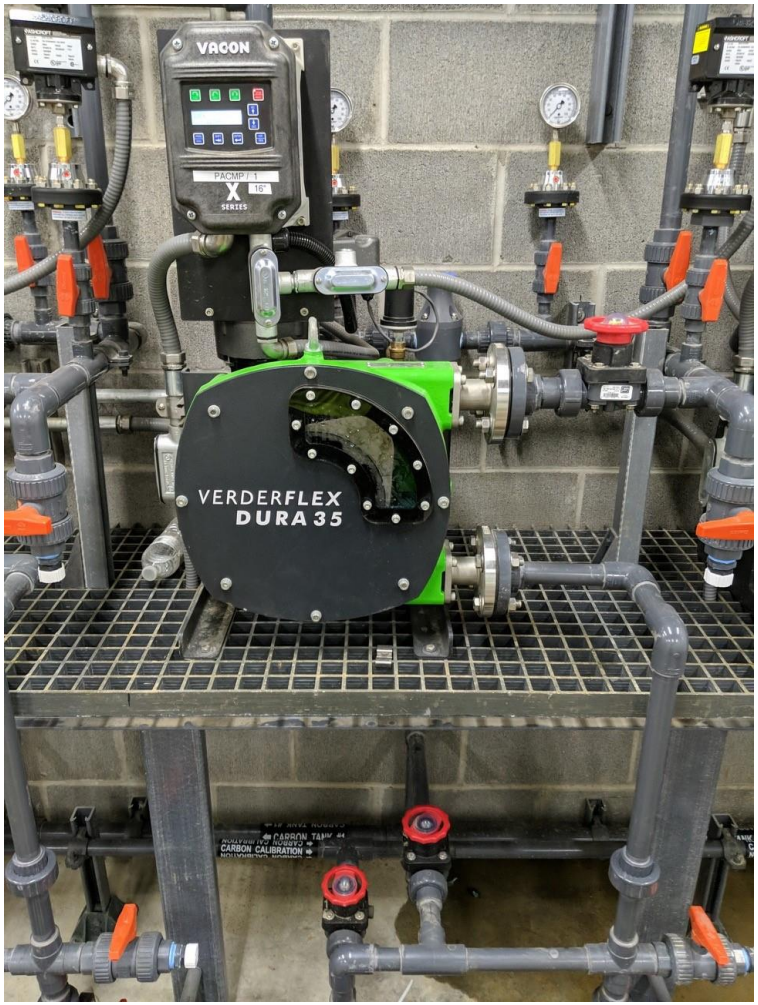
Kentucky American – (50) DURA Pumps



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DURA Hose Pumps - Fluoride

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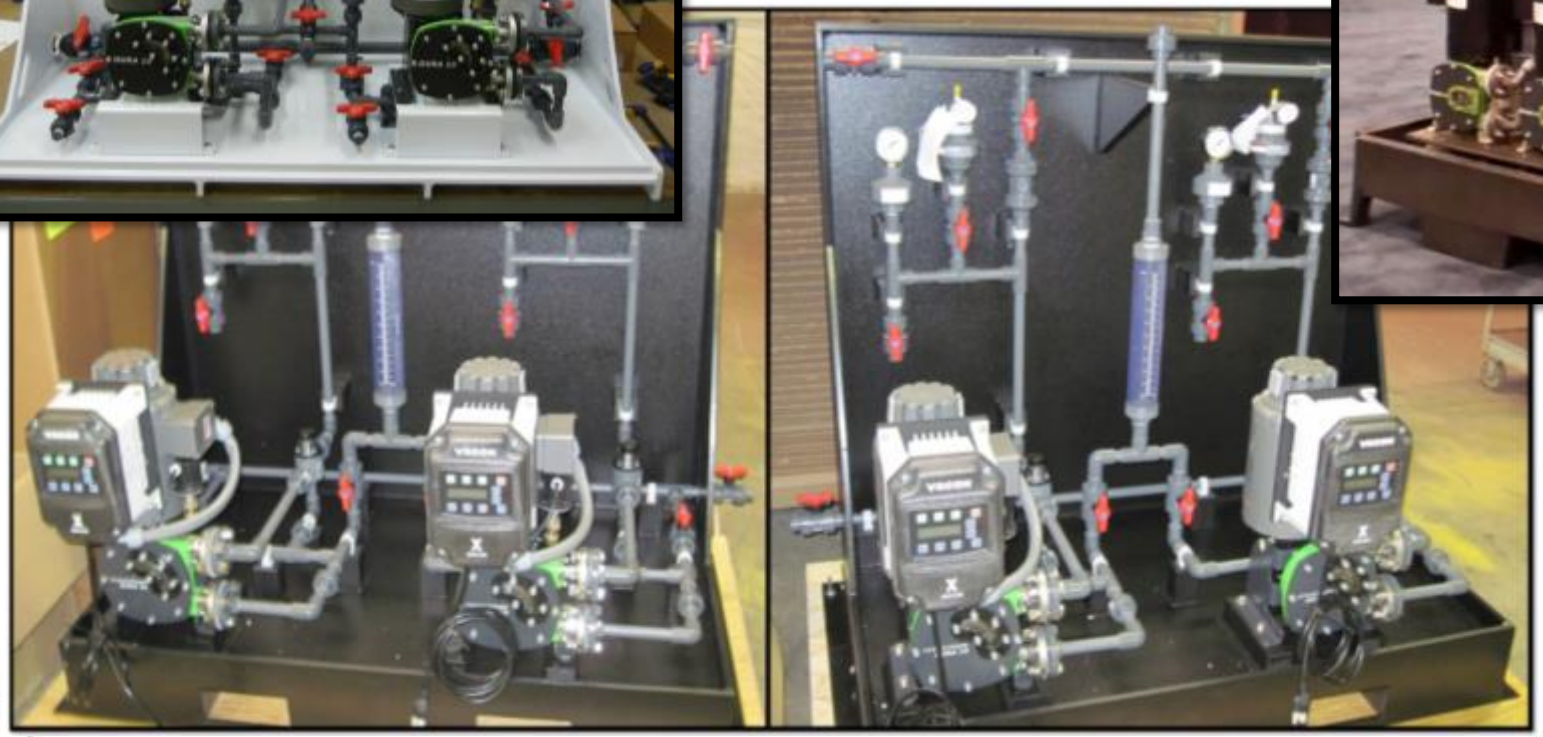
DURA Hose Pump Skids



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DURA 35 Transfer Pump

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VERDERFLEX®
VANTAGE 5000

AT THE CUTTING EDGE OF TECHNOLOGY

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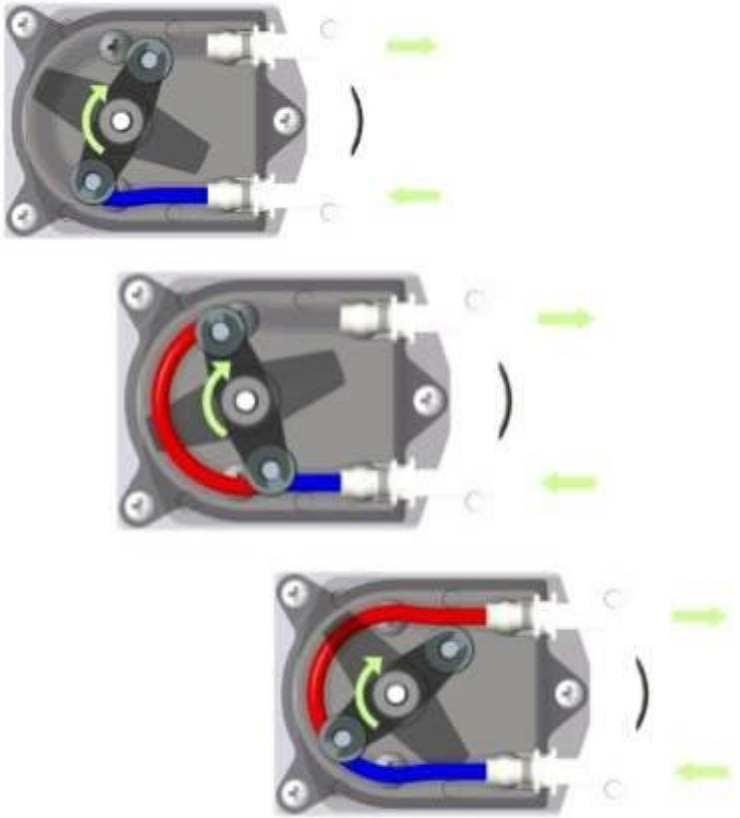
Peristaltic - Principle of Operation



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Vantage 5000 – Field Replaceable Components

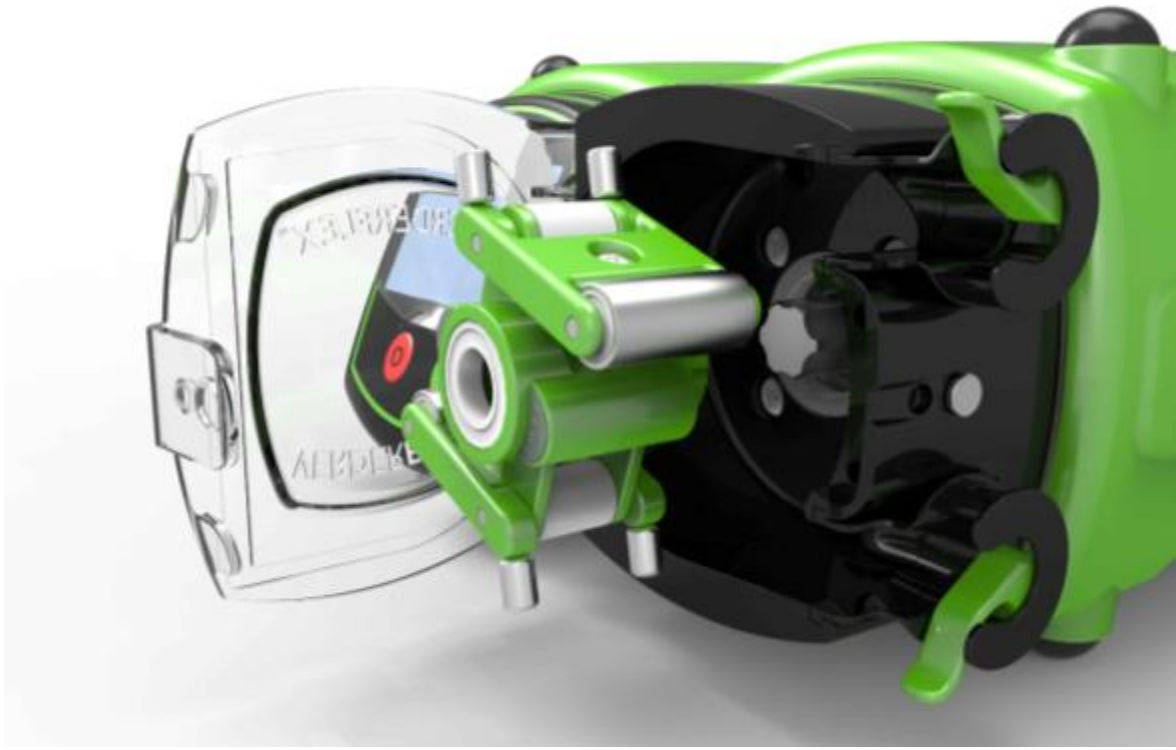
The Control Pod can be changed out in the field

Actual photograph of HMI screen.

Should the screen become damaged or lose function, a new HMI can be installed in the field without using tools.

Vantage 5000: Rotor Assembly

- Spring-loaded Rollers
  - Gradual compression/less stress on tube
  - Accounts for variability in tubing thickness
  - Increased tube life
- Two rollers
- Guide rollers/pins



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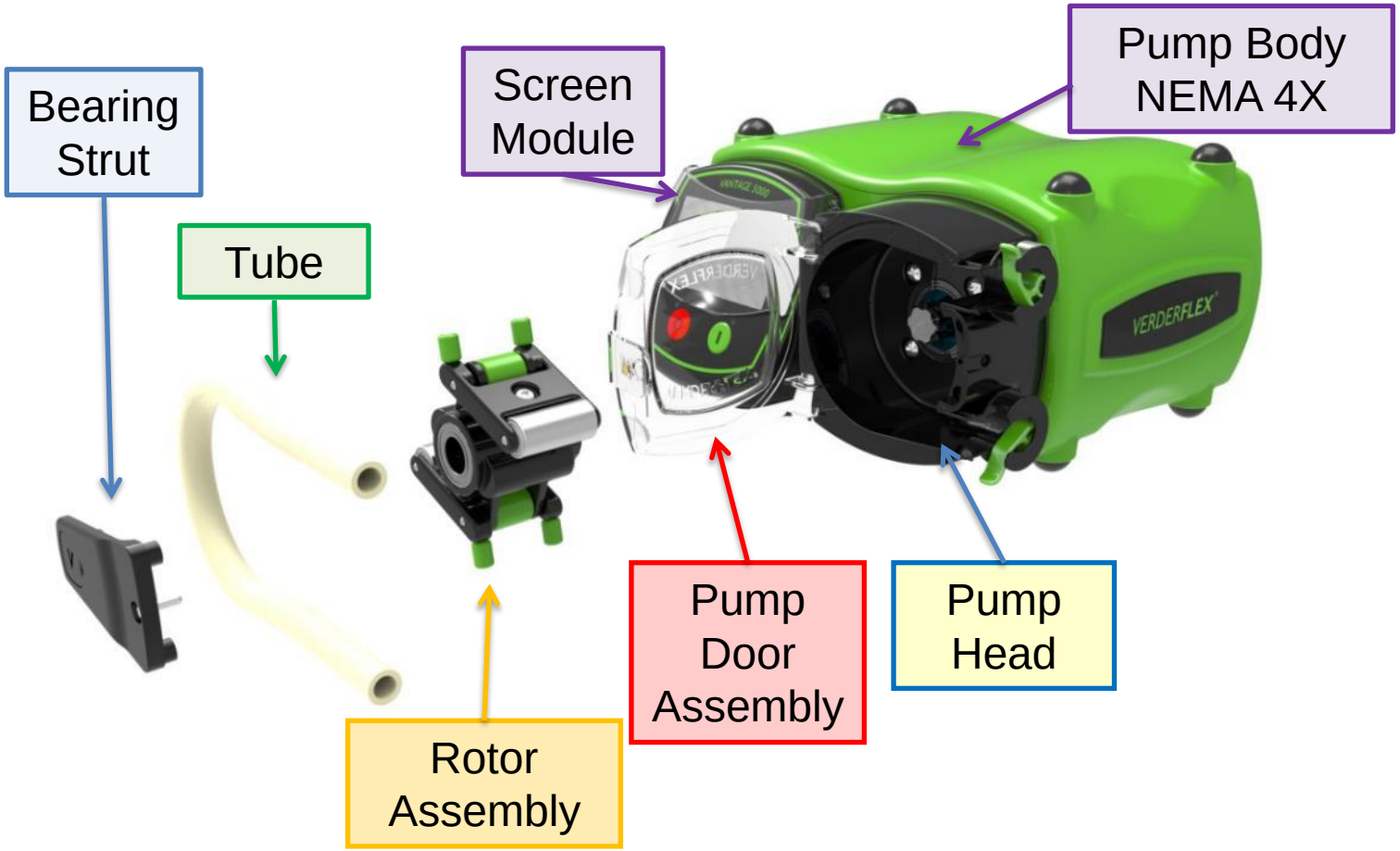

Bearing Strut
Tube
Screen Module
Pump Body NEMA 4X
Pump Door Assembly
Pump Head
Rotor Assembly
VERDERFLEX

Vantage 5000: Control Interface

- Industry first touchscreen HMI
  - Impact-resistant guard
- Lock-out option for safety
  - Optional PIN entry
- Run timer
  - Tracks run hours for maintenance planning
- Adjustable maximum speed

The Visible Difference

HMI Touch Screen

Current Flow Rate

Current Speed as % of Max Speed

Lock / Unlock & Main Menu Buttons

Decrease / Increase Speed
Note Does Not Update Active Job File

Direction of Rotation

System Menu Screen

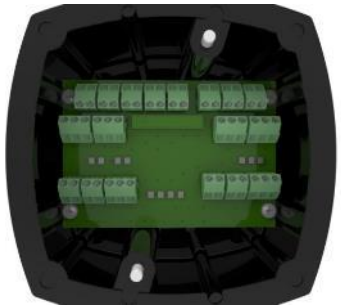
USB with Cover Removed

USB allows

- Pump Job Back Up
- Job File upload to another pump
- Event logs and histories downloaded
- Software updates installed

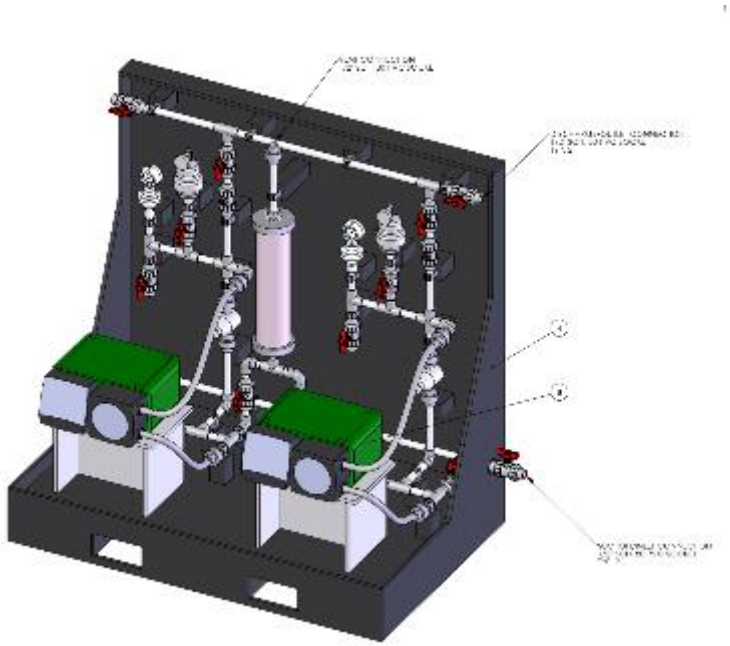
- Specification USB v2

SCADA Break Out Box



- Plug On Opto-isolation Module
- Solid State Barriers rated for either 24V DC or 115V AC
- Easy access screw terminals for plant wiring

Vantage 5000: Verder SKID

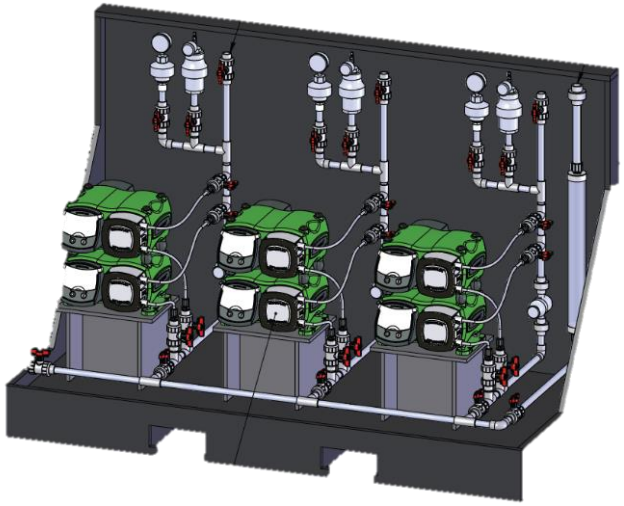


Vantage 5000 – Stacked Pumps

- Push in stacking feet allows 2 pumps to be stacked

Verderflex Vantage 5000

STACKABILITY



Vantage 5000
Metering Pumps

Two Vantage 5000 skids – Missouri WTP

We put
our heart
into pumps

QUESTIONS?

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