# Hydra-Cell®
## METERING SOLUTIONS™

# Electronic Solenoid/Diaphragm Metering Pumps

## Economical & Eco-friendly



Wanner Engineering, Inc.

# Hydra-Cell® S Series Electronic Metering Pumps


*SM models are lower in cost and offer simple manual control.*


*More advanced control capability is offered with SP (pulse-input), ST (pulse input with timer) and SA (pulse-input/analog-input) models.*

## Contents



*Due to the Wanner Engineering Continuous Improvement Program, specifications and other data in this catalog are subject to change.*

# Hydra-Cell® S Series Overview

Hydra-Cell S Series electronic metering pumps provide an economical and environmentally-friendly choice for reliable chemical injection in metering applications.

Manual control as well as pulse/analog control models offer up to 300 strokes per minute. Maximum flow rates range from up to 25 ml/min (0.40 gph / 1.5 lph) to 220 ml/min (3.49 gph /13.2 lph) depending on model.

Several materials of construction choices and various design options result in pumps ideal for specific applications including chemical injection, high-pressure boiler, high-viscosity fluids, outgassing fluids and more.

## Versatile, Economical and Easy to Operate

- Manual-control SM models feature a simple hand-operated dial with stroke adjustment from 15 to 300 strokes per minute.
- SP, ST & SA models have pulse-in (SP), pulse-in with timer (ST) or pulse-in/analog-in (SA) control and stroke adjustment in 1-stroke increments up to 300 strokes per minute.
- For fine-tuning an application, the stroke length of SP, ST & SA models can be changed from 100% to as low as 50%.
- SP, ST & SA models also feature simple key operations and intuitive user interface - a bright, sharp LED display is clearly visible in lowlight as well as high-glare areas.
- "Eco-friendly" environmentally sound operation is standard with SP, ST & SA models - this feature can lower power consumption up to 55%.
- Double-ball check valve ensures accurate metering and reduces the chance of water hammer.
- PVC, PVDF, 316SS, and Acrylic liquid end component choices to match specific applications.
- Model available with a pump head that can be moved in three directions to provide flexibility of installation.
- Dust-proof and wash down capable (IP65) - ideal for indoor or outdoor use.
- Pump housing is molded from high-impact PPO, an engineered thermoplastic that provides dimensional stability and excellent resistance to heat.
- Power supply range for operation between AC100 and 240V (±10%) with plugs available for North America, Europe, UK, and Asia.
- Fast, easy maintenance as liquid-end parts can be disassembled and replaced by simply detaching four bolts.

*S Series electronic metering pumps are ideal for low-flow, low-pressure requirements. They will complement other Hydra-Cell Seal-less Pumps and Hydra-Cell Metering Solutions pumps in many installations for a variety of applications.*

## Typical Applications

- Chemical injection/metering
- Dosing detergent, foam, wax, and shine agents for car wash
- Injecting acid and liquid fertilizer for agriculture
- Food and beverage processing
- pH control for mining
- Colorant addition for paints and dyes
- Pulp and paper mills
- Pharmaceutical processing
- Ware wash (detergents)
- Municipal and industrial water purification and wastewater treatment
- Metering of chemicals for disinfection and pH neutralization for swimming pool treatment
- De-chlorination treatment for Reverse Osmosis (RO) film process
- Water treatment for cooling towers
- Special models for high-pressure boiler feed
- Special models for high-viscosity fluids
- Special models for outgassing fluids (including injection of Sodium Hypochlorite)

*See Chemical Compatibility Table on pages 27 through 29 for the S Series liquid-end models recommended based on the chemical being injected and the application.*

# Hydra-Cell® S Series Pump Features Checklist

| Performance Feature | SM Manual Control | SP Pulse-in Control | ST Pulse-in & Timer | SA Pulse-in & Analog-in |
|---|---|---|---|---|
| Stroke speed operation to 300 strokes/minute | ✔ | ✔ | ✔ | ✔ |
| LED touch-pad operation with digital readout | | ✔ | ✔ | ✔ |
| Pulse-input/output | | ✔ | ✔ | ✔ |
| Pulse-input/output & timer | | | ✔ | |
| Pulse-input/output & analog-input | | | | ✔ |
| “Eco-friendly” energy-saving mode | | ✔ | ✔ | ✔ |
| Protective secondary diaphragm | ✔ | ✔ | ✔ | ✔ |
| Key lock | ✔ | ✔ | ✔ | ✔ |
| Solenoid-operation sync signal output | ✔ | ✔ | ✔ | ✔ |
| Control stroke speed and length | | ✔ | ✔ | ✔ |
| External stop signal control | ✔ | ✔ | ✔ | ✔ |
| Alarm signal output (1) | | ✔ | ✔ | ✔ |
| Robust, high-impact PPO construction | ✔ | ✔ | ✔ | ✔ |
| IEC standard; IP65 or equivalent enclosures | ✔ | ✔ | ✔ | ✔ |
| Variety of liquid-end & elastomeric materials | ✔ | ✔ | ✔ | ✔ |
| Liquid end can be positioned 90˚ left or right | | ✔ | ✔ | ✔ |
| High-pressure/boiler feed models | ✔ | ✔ | ✔ | ✔ |
| High-viscosity models (2) | | ✔ | ✔ | ✔ |
| Ceramic double-ball check valve | ✔ | ✔ | ✔ | ✔ |
| Safe mode operation (3) | | ✔ | ✔ | ✔ |
| Abnormal pressure sensor | | ✔ | ✔ | ✔ |
| Manual air release valve | ✔ | ✔ | ✔ | ✔ |
| Optional integral relief valve (3) | ✔ | ✔ | ✔ | ✔ |
| Manual and automatic outgassing models | ✔ | ✔ | ✔ | ✔ |
| Piping/degassing tubing | ✔ | ✔ | ✔ | ✔ |
| Anti-siphon check valve (4) | ✔ | ✔ | ✔ | ✔ |
| Foot valve (4) | ✔ | ✔ | ✔ | ✔ |
| Ceramic weight (5) | ✔ | ✔ | ✔ | ✔ |
| Additional O-ring (6) | | ✔ | ✔ | ✔ |
| Welded casing and parts | | ✔ | ✔ | ✔ |
| Hexagonal head bolts with cross recess | | ✔ | ✔ | ✔ |
| Wide voltage supply range & power connection styles | ✔ | ✔ | ✔ | ✔ |

*(1) Not available with 200 models or outgassing models.*
*(2) Available on (SP/ST/SM) 060 and 100 models only.*
*(3) Not available with high-pressure/boiler feed models or 200 models.*
*(4) Not used for HV (high-viscosity) and CD (automatic degassing joint) models.*
*(5) For models with PE, PF (PVC) and KF, KE & KP (PVDF) pump heads only.*
*(6) O-ring to prevent chemical permeation from outside the pump.*

# Hydra-Cell® S Series Performance Benefits

## Safety Features to Handle Abnormal Conditions

**Safe Mode** - liquid transfer force is controlled during no-discharge operation to prevent abnormal pressure build-up. (Not available for SM models or boiler and high-pressure applications.)

**Integral Relief Valve** - releases abnormal pressure automatically if the pressure exceeds the set value. (Not available for boiler and high-pressure applications.)

**Air Release Valve** - "gas-lock" occurs when air enters the pump head and prevents chemicals from being discharged. Dead space inside the pump head is limited to avoid air entry and build-up. Should air enter the pump, an automatic air release valve on select models discharges the air; on other models, simply turn the air release knob.

**Abnormal Pressure Sensor** - alarm sounds if abnormal pressure builds up due to clogged pipes or if the discharge valve is closed. (Not available for SM models.)

## Waterproof and Dust-resistant Specifications

IEC standard; IP65 or equivalent. (Avoid condensation or immersion in water.)

## Robust, Resilient Construction

All S Series pumps are molded from high-impact PPO to provide superior resistance to heat and outstanding dimensional stability.

## Stability

A ceramic weight is supplied with all PVDF pump heads (KE, KF, and KP models). When a PE or FEP hose is used for the suction side of the pump, the ceramic weight is attached to straighten the tubing.

## Wide Voltage Range

All pumps can be used with AC100 to 240V (±10%) power supplies so there is no need to worry about site power supply voltage or voltage fluctuations. A variety of power plug types are available.

**Power Plug Options**

**S** North American Plug

**B** UK Plug

**E** European Plug

**L** Asia

## Materials of Construction Reference

| Order Code | Pump Head | O-Ring | Valve Seat | Joint | Valve or Ball Stop | Hose (I.D. x O.D. mm) | Application |
|---|---|---|---|---|---|---|---|
| PE | PVC | EPDM | EPDM | PVC | PVC | 6x8 PE | General Chemicals |
| PF | PVC | FKM | FKM | PVC | PVC | 6x8 PE | General Chemicals |
| KE | PVDF | EPDM | EPDM | PVDF | PVDF | 6x8 PE | General Chemicals |
| KF | PVDF | FKM | FKM | PVDF | PVDF | 6x8 PE | General Chemicals |
| KP | PVDF | FKM | PTFE | PVDF | PTFE | 6x8 FEP | General Chemicals |
| ST | 316SS | PFTE | – | Ceramic | PTFE | 6x8 PTFE | General Chemicals |
| CL | Acrylic | FKM | FKM | PVC | PVC | 6x8 PE | Outgassing Fluids |
| CA | Acrylic | FKM | FKM | PVC | PVC | 6x8 PE | Outgassing Fluids |
| CN | Acrylic | FKM | FKM | PVC | PVC | 6x8 PE | Outgassing Fluids |
| CD | Acrylic | FKM | FKM | PVC | PVC* | 6x8 PE | Outgassing Fluids |
| BH | PVC | EPDM | PTFE | PVC | PVC | 4x6 PA | High Pressure |
| CH | PVC | EPDM | PTFE | PVC | PVC | 4x6 PA | High Pressure |
| HV | PVC | FKM | – | PVC | – | 12x18 PVC | High Viscosity |

** (Hastelloy Spring)*

# Hydra-Cell® S Series Performance Benefits

## Extensive Range of Liquid End Materials

*PVC liquid end for transfer and injection of general chemicals. Also available for high-pressure applications or handling high-viscosity fluids.*

*PVDF liquid end for transfer and injection of general chemicals and highly corrosive fluids.*

*Transparent acrylic liquid end for handling outgassing fluids such as the injection of Sodium Hypochlorite.*

*316 Stainless Steel liquid end for transfer and injection of solvents and other chemicals when non-metallic materials are not suitable.*

## Liquid Ends Available As Spare Parts

### Pump Head Sets (without Relief Valve)

- Includes (1) Pump Head, (1) Air Release Knob Set, (1) Air Release Nozzle Spray, (1) Suction Side, (1) Display Side, and (4) Head Bolts.
- Available in PVC, PVDF, 316SS, and Acrylic for all flow capacities.
- Sets with CA Liquid End (SM models) also include (1) Air Release Side.
- Not available for high-pressure and high-viscosity models.
- Pump head O-ring is not needed for SM models.
- Pump head O-ring is not included on SP/ST/SA models.

### Pump Head Sets (with Integral Relief Valve)

- Includes (1) Pump Head, (1) Relief Valve Set, (1) Air Release Nozzle Spray, (1) Suction Side, (1) Display Side, and (4) Head Bolts.
- Available in PVC, PVDF, 316SS, and Acrylic for all flow capacities (except for 200 models).
- Not available for high-pressure and high-viscosity models.
- Pump head O-ring is not needed for SM models.
- Pump head O-ring is not included on SP/ST/SA models.

# Hydra-Cell® S Series Performance Benefits

## Component Valves for Added Safety

### Double-ball Check Valve

Controls valve opening and closing speeds to help ensure metering accuracy and reduce the possibility of water hammer.

### Anti-siphon Check Valve

Prevents clogging at the injection point and also aids in priming. Includes a duck-bill cap with Acrylic pump head models for injecting Sodium Hypochlorite. The chemical reacts with calcium in raw water to form crystals that flow through the main piping. The cap on the valve closes to prevent crystallization. (Note: anti-siphon check valve not used for high-viscosity models.)

### Foot Valve

Designed to prevent backflow into chemical injection systems. (Note: foot valve not used for high-viscosity models.)

### External Relief Valve

Safety valve that automatically releases excess pressure that builds up inside the discharge side pipes due to clogging or if the discharge valve is closed. It can prevent accidents such as damage to the pump or piping. Includes hose joints.

## Other Components for Efficiency

### Flow Checker (optional)

Allows the injection operation of the pump to be verified at low cost. Highly resistant to acids and alkalis. Features a pump-direct connection. (Note: flow checker not available for Acrylic pump head 200 models.)


### Hose/Tube Availability

- PE for PVC, PVDF and Acrylic models
- FEP for KP models
- PTFE for 316SS models
- PA for High-pressure models
- PVC for High-viscosity models
- Soft PVC for "R" models with integral relief valve air release
- Soft PVC for models equipped with automatic degassing joint

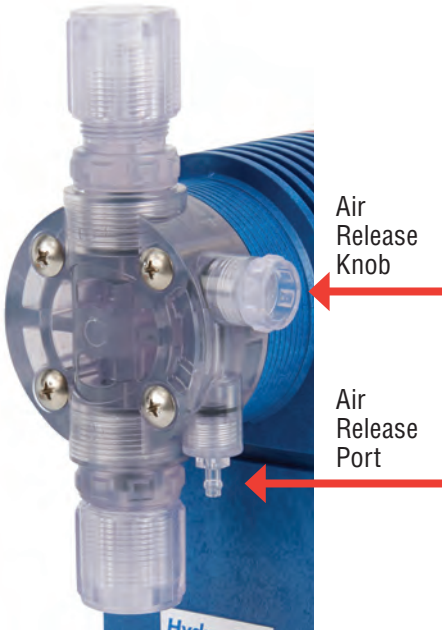
# S Series Performance Benefits

## Safety Mechanisms to Handle Air Build-up

S Series pumps feature an innovate design to minimize dead space and prevent air entry and build-up inside the pump. In case air or another gas does enter the pump and impede chemicals from being discharged, each S Series model has an easy-to-use mechanism to remove the air or gas.

### Manual Air Release Valve

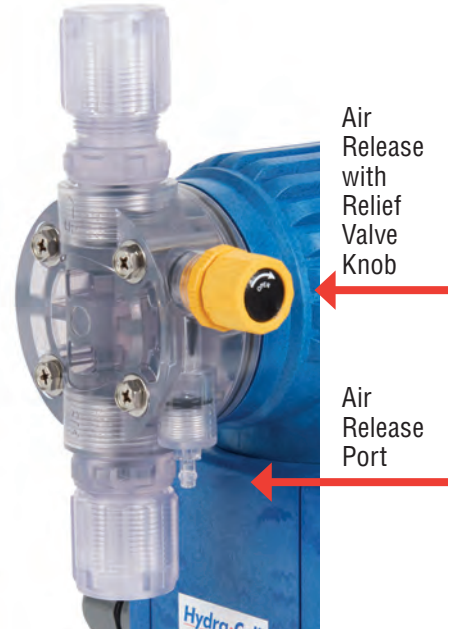
- With the pump turned off, attach one end of the appropriate tubing supplied with the pump to air release port and the other to the supply tank or other container.
- Switch the pump on to the maximum flow rate and then turn the air release knob counterclockwise 1 to 1-1/2 rotations.
- The air/liquid will exit the pump via the port and tubing. After the air is fully purged, turn the air release valve back clockwise until tight, and then switch off the pump.




*S Series models 030, 060, and 100 feature a manual air release valve.*

### Manual Air Release Valve with Integral Relief Valve Option

- The integral air release valve operates similar to the manual relief valve with one important difference: the knob is always turned clockwise.
- After switching off the pump, attaching the hose, releasing the discharge side pressure, and setting the flow rate on maximum, turn the air release knob clockwise approximately 90 degrees.
- There will be a gap between the knob and the retaining nut. Once the air is purged, turn the knob clockwise again until a "click" is heard. Then switch off the pump.




*S Series pump models 03R, 06R, and 10R are equipped with an integral air release valve and external knob.*

### Air Release for Stainless Steel Models

- Switch the pump off and then slightly loosen the air release nozzle, turning it counterclockwise. Make sure the nozzle does not disconnect from the pump.
- Connect the hose pump to the nozzle on one end and the tank or container on the other and then switch the pump on.
- After the air or chemical is expelled, switch off the pump, remove the hose, and then turn the nozzle clockwise until it is tight.


*S Series Stainless Steel models (ST type pump heads) feature an air release nozzle*

# S Series Solution Tanks

## Compact Systems for Chemical Injection

S Series solution tanks combine the pump with a tank unit to offer large capacity in a space-saving design. They are easy to install; simply connect the piping and power supply to begin operation. Available in three sizes. Optional accessories include a float switch, spare lid, and drain valve.

*30L (7.9 gal)*

*50L (13.2 gal)*

*120L (31.7 gal)*

### Float Switch

Will stop the pump and sound an alarm when the remaining volume of chemical liquid in the solution tank becomes low. Available in one-point and two-point type sensors.

### Tank Lid

Spare tank lids are available. One size fits all three solution tank models.

### Drain Valve

Drains the excess moisture from the system.

# SM Models Manual Control

## Practical Choice for Solenoid-driven Pumps

- Models for chemical injection, high-pressure boiler feed, and outgassing fluids.
- Temperatures ranges (ambient and transferring liquid) from 32˚F to 104˚F (0˚C to 40˚C).
- Light-weight models either 3.75 lbs. (1.7 kg) or 4.0 lbs. (1.8 kg).
- Low-noise, less than 85 dB.
- Stroke length fixed at 1.0 mm.
- Protective secondary diaphragm.

# SM Models Manual Control

## Low in Cost and Easy to Operate

SM models feature a simple hand-operated speed stroke dial. Each pump runs at a maximum of 300 strokes per minute and a minimum of 15 strokes per minute.

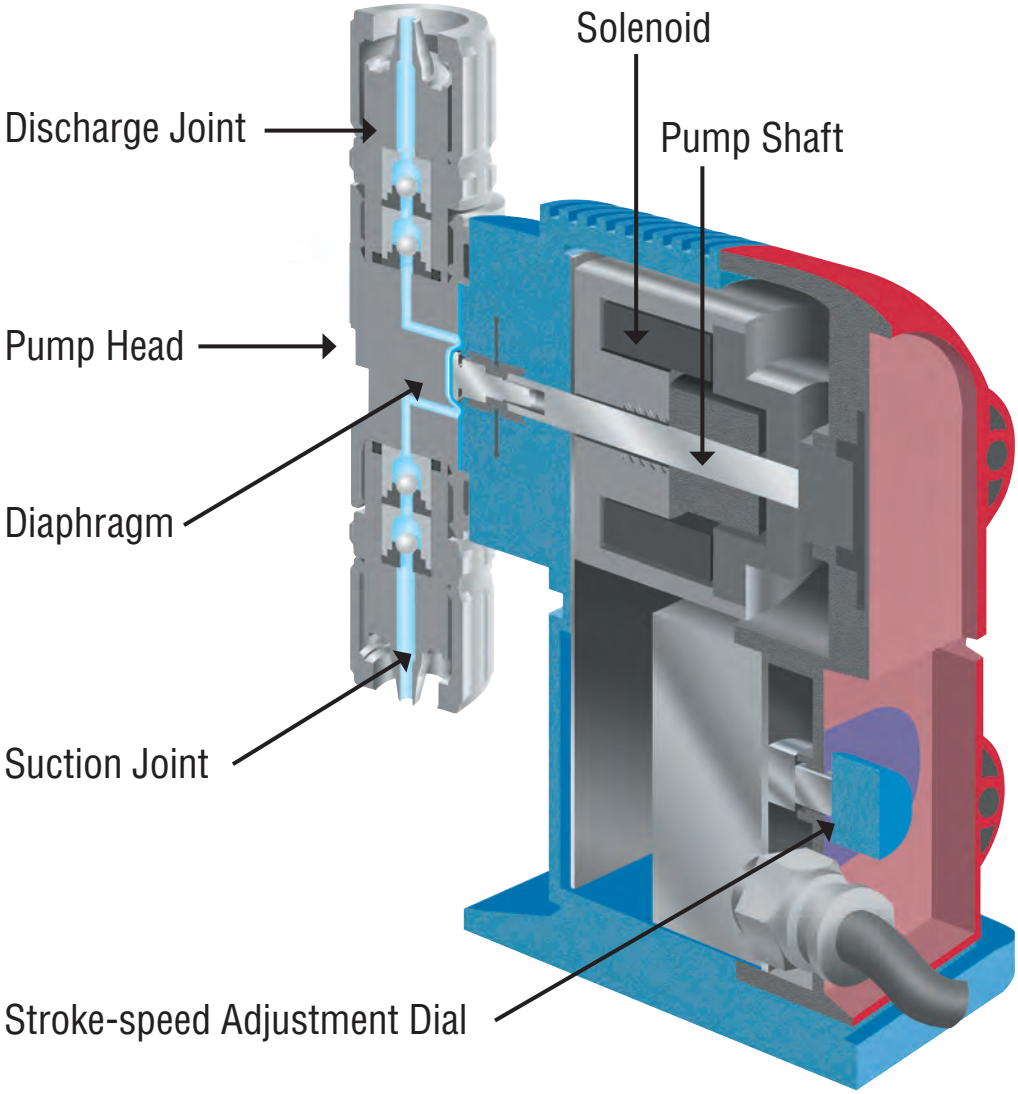
## SM Series Flow Capacities and Pressure Ratings

| Model Number | Maximum Discharge Volume ml/min | gph | lph | Maximum Discharge Pressure psi | bar |
|---|---|---|---|---|---|
| SM030 High Pressure | 28 | 0.44 | 1.68 | 217 | 15 |
| SM030 | 30 | 0.48 | 1.80 | 145 | 10 |
| SM060 | 60 | 0.95 | 3.60 | 116 | 8 |
| SM100 | 100 | 1.59 | 6.00 | 58 | 4 |
| SM03R* High Pressure | 28 | 0.44 | 1.68 | 217 | 15 |
| SM03R* | 30 | 0.48 | 1.80 | 102 | 7 |
| SM06R* | 60 | 0.95 | 3.60 | 102 | 7 |
| SM10R* | 100 | 1.59 | 6.00 | 58 | 4 |

**Models equipped with integral relief valve.*

# SM Models Special Features

## Minimal Parts for Easy Maintenance




## Spare Parts Kits to Extend Pump Service Life

Two kits are available to cover spare parts needs for SM models. Individual sets are also available as spare parts:

- Diaphragm Sets
- Relief Valve Sets
- Air Release Knob Sets
- Air Release Nozzle Sets
- Head Bolt Sets

# SM Models Special Features

## Safety Mechanisms to Prevent Air Lock

Outgassing results when the fluid pressure drops below the saturation pressure of a gas dissolved in a liquid. If this occurs, gas comes out of the solution and builds up inside the pump. When air enters the pump head, it prevents the chemicals from being discharged.

SM model pumps for outgassing fluids (e.g. Sodium Hypochlorite) feature an innovative design to minimize dead space and prevent air entry and build-up in the pump.

If air does enter the pump or if outgassing occurs, the CL and CA (Acrylic pump head) versions each feature mechanisms to combat air lock and outgassing.

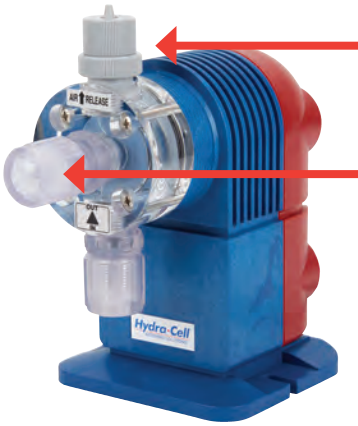
All CL and CA pump head models feature a transparent liquid end that enables the operator to see whether air is present in the pump head.


- SM CL models 030, 060, and 100 have a manual air release knob that functions in the same manner as other SM 030, 060, and 100 models.
- Switch off the pump; attach the supplied tubing to the air release port and tank or container; switch the pump on to the maximum flow rate; and turn the knob counterclockwise 1 to 1-1/2 rotations.
- After the air is fully purged, turn the knob clockwise until tight, and then switch off the pump.

*CL Acrylic pump head with manual air release knob and air release port*


- SM CL models 03R, 06R, and 10R have a manual air release knob that functions in the same manner as other SM 03R, 06R, and 10R models.
- Switch off the pump; attach the supplied tubing to the air release port and tank or container; switch the pump on to the maximum flow rate; and turn the knob clockwise approximately 90 degrees.
- After the air is fully purged, turn the knob clockwise again until a “click” is heard. Then switch off the pump.

*CL Acrylic pump head with integral air release valve*




- Air release with the CA version of SM model pumps is simple and automatic. Entrapped gas is discharged from the air release port on top, and the chemical is discharged through a center port.
- Bubbles or gas in the chemical tank or container are sucked into the pump head. They pass through the air release joint and are fed back to the chemical tank or container along the air release pump.
- After all of the bubbles or gas are discharged from the pump head, the chemical is discharged from the discharge side.

*CA Acrylic pump head with automatic degassing*

# SM Models Manual Control Specifications

## Chemical Injection

Including High-pressure Boiler Feed

| | 030 & 03R Models | | | 060 & 06R Models | | 100 & 10R Models | |
|---|---|---|---|---|---|---|---|
| **Liquid End** | PVC or PVDF | 316SS | PVC (High-pressure Boiler) | PVC or PVDF | 316SS | PVC or PVDF | 316SS |
| **Order Codes** | PE/PF/KE/KF/KP | ST | BH | PE/PF/KE/KF/KP | ST | PE/PF/KE/KF/KP | ST |
| **Maximum Discharge Volume** | 30 ml/min<br>0.48 gph<br>1.8 lph | 27 ml/min<br>0.43 gph<br>1.6 lph | 28 ml/min<br>0.44 gph<br>1.68 lph | 60 ml/min<br>0.95 gph<br>3.6 lph | 55 ml/min<br>0.87 gph<br>3.3 lph | 100 ml/min<br>1.59 gph<br>6.0 lph | 95 ml/min<br>1.51 gph<br>5.7 lph |
| **Maximum Discharge Pressure** | 145 psi (10 bar) | 73 psi (5 bar) | 217 psi (15 bar) | 145 psi (10 bar) | 73 psi (5 bar) | 145 psi (10 bar) | 73 psi (5 bar) |
| **Hose I.D. x O.D. mm** | 6 x 8 (PE)* | 6 x 8 (PTFE) | 4 x 6 (PA) | 6 x 8 (PE)* | 6 x 8 (PTFE) | 6 x 8 (PE)* | 6 x 8 (PTFE) |
| **Weight** | 3.75 lbs. (1.7 kg) | 3.75 lbs. (1.7 kg) | 3.75 lbs. (1.7 kg) | 3.75 lbs. (1.7 kg) | 3.75 lbs. (1.7 kg) | 3.75 lbs. (1.7 kg) | 3.75 lbs. (1.7 kg) |

**(FEP) for KP pump heads*

## Outgassing Fluids

Including Sodium Hypochlorite Injection

| | 030 Models | 03R Models | 060 Models | 06R Models | 100 & 10R Models |
|---|---|---|---|---|---|
| **Liquid End** | Acrylic | Acrylic | Acrylic | Acrylic | Acrylic |
| **Order Codes** | CL/CA | CL/CA | CL/CA | CL/CA | CL/CA |
| **Maximum Discharge Volume** | 30 ml/min<br>0.48 gph<br>1.8 lph | 30 ml/min<br>0.48 gph<br>1.8 lph | 60 ml/min<br>0.95 gph<br>3.6 lph | 60 ml/min<br>0.95 gph<br>3.6 lph | 100 ml/min<br>1.59 gph<br>6.0 lph |
| **Maximum Discharge Pressure** | 145 psi (10 bar) | 102 psi (7 bar) | 116 psi (8 bar) | 102 psi (7 bar) | 83 psi (4 bar) |
| **Hose I.D. x O.D. mm** | 6 x 8 (PE) | 6 x 8 (PE) | 6 x 8 (PE) | 6 x 8 (PE) | 6 x 8 (PE) |
| **Weight** | 3.75 lbs. (1.7 kg) | 3.75 lbs. (1.7 kg) | 4.0 lbs. (1.8 kg) | 4.0 lbs. (1.8 kg) | 4.0 lbs. (1.8 kg) |

**Notes:**

*All "R" models include a 4 x 6 soft PVC hose for the integral relief valve air release.*

*All models with a degassing joint include a 4 x 6 soft PVC hose for air release.*

# SM Models Manual Control Specifications

## General Specifications

| | |
|---|---|
| Stroke Speed | 15 to 300 strokes/minute (manual dial setting) |
| Stroke Length | Fixed at 1.0 mm |
| Maximum Allowable Viscosity | 50 mPa (50 cPs) |
| Temperature Ranges | Ambient: 32˚F to 104˚F (0˚C to 40˚C); Transferring Liquid: 32˚F to 104˚F (0˚C to 40˚C); no freezing allowed |
| Ambient Humidity | 35% to 85% RH |
| Environmental Protection | IEC standard; IP65 or equivalent (waterproof & dust-resistant) |
| Altitude of Installation Location | Less than 3,280 ft. (1,000 m) |
| Noise Level | Less than 85 dB |

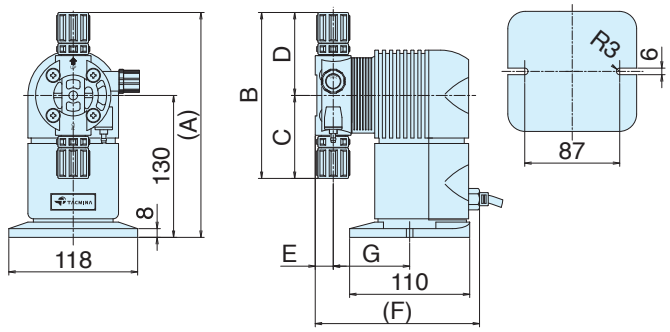
### Power Supply

| | |
|---|---|
| Rated Voltage | AC 100 to 240 V (±10%) |
| Phase/Frequency | 1-phase/50 or 60 Hz |
| Maximum Current | 2.0 A |
| Maximum Power Consumption | 200 VA |
| Average Power Consumption | 15 W |

## Dimensions

All dimensions in millimeters (mm).

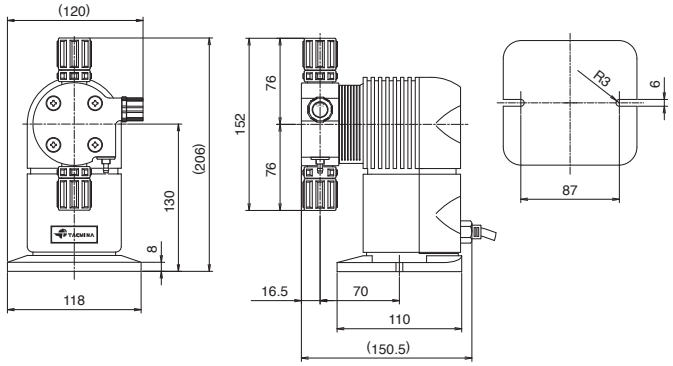
### PVC, PVDF & 316SS Pump Heads



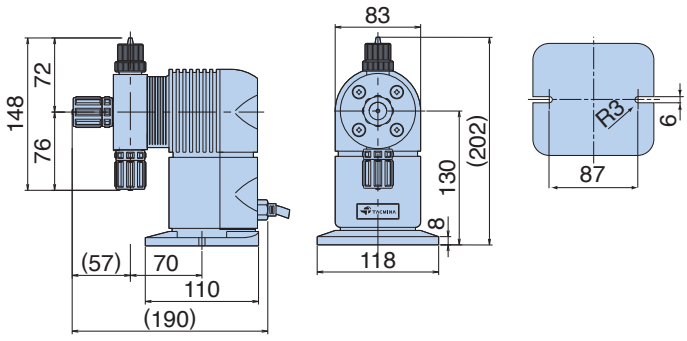

| Liquid End | (A) | B | C | D | E | (F) | G |
|---|---|---|---|---|---|---|---|
| PVC | 206 | 152 | 76 | 76 | 16.5 | 150.5 | 70 |
| PVDF | 227.5 | 195 | 97.5 | 97.5 | 17.5 | 142 | 69.5 |
| 316SS | 193 | 139 | 76 | 63 | 16.5 | 150.5 | 70 |

- The shape and dimensions differ slightly depending on the liquid-end material and connection type.
- The mounting pitch allows mounting from 87 to 110 mm.

### Acrylic Pump Heads




### PVC (High-pressure) Pump Heads




- The mounting pitch allows mounting from 87 to 110 mm.

# SM Models How to Order


*SM03RPES*


*SM03RKPS*


*SM03RCLS*


*SM030CAS*


*SM030STB*


*SM030KPE*

## How to Order

A complete pump order number contains 8 digits based on the specified pump materials listed below.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| S | M | | | | | | |

| Digits | Order Code | SM Series Solenoid Pump | |
|---|---|---|---|
| 1 - 2 | **SM** | Manual control with stroke speed dial | |
| 3-5 | **Flow Rate** | | |
| | **030** | 30 ml/min | |
| | **060** | 60 ml/min | |
| | **100** | 100 ml/min | |
| | **03R** | 30 ml/min with relief valve | |
| | **06R** | 60 ml/min with relief valve | |
| | **10R** | 100 ml/min with relief valve | |
| 6 - 7 | **Materials of Construction:** Head/O-ring/Valve Seat/Joint/Valve or Ball Stop/Hose (I.D. x O.D. mm) | | |
| | (All contain PTFE diaphragms and ceramic check valve balls) | | **Application** |
| | **PE** | PVC/EPDM/EPDM/PVC/PVC/PE (6 x 8) | General chemicals |
| | **PF** | PVC/FKM/FKM/PVC/PVC/PE (6 x 8) | General chemicals |
| | **KE** | PVDF/EPDM/EPDM/PVDF/PVDF/PE (6 x 8) | General chemicals |
| | **KF** | PVDF/FKM/FKM/PVDF/PVDF/PE (6 x 8) | General chemicals |
| | **KP** | PVDF/FKM/PTFE/PVDF/PTFE/FEP (6 x 8) | General chemicals |
| | **ST** | 316SS/PTFE/-/Ceramic/PTFE/PTFE (6 x 8) | General chemicals |
| | **CL** | Acrylic/FKM/FKM/PVC/PVC/PE (6 x 8) | Outgassing fluids without automatic air release |
| | **CA** | Acrylic/FKM/FKM/PVC/PVC - Hastelloy Spring/PE (6 x 8) **030, 060, and 100 models only** | Outgassing fluids with automatic air release |
| | **BH** | PVC/EPDM/PTFE/PVC/PVC/PA (4 x 6) **030 and 03R models only** | High-pressure boiler |
| 8 | **Power Plug** | | |
| | **S** | North American Plug | Standard |
| | **B** | UK Plug | CE UK |
| | **E** | European Plug | CE Europe |
| | **L** | Asia | Lead wire only |

# SP/ST/SA Models Pulse-input and Analog-input Control

## Smart and Intuitive Operation

- Simple key functions and user interface for ease of operation.
- Range can be set between 1 and 300 strokes per minute in 1-stroke units.
- Discharge volume can be set up to the maximum flow capacity in 0.1 ml/m units (with SP models).
- For fine-tuning an application, the stroke length can be changed from 100% to as low as 50%.

# SP/ST/SA Models Pulse-input and Analog-input Control

## Three Types of Control Functions

Simple key operations and user interface enable intuitive operation. The bright LED display is clearly visible even in low-light areas.

**Pulse-input Control** - offers pulse input with multiply and divide capability.

**Pulse-input Control with Timer** - also has settings that can be turned on or off in accordance with various intervals.

**Analog-input Control** - offers fixed or scalable 0-20mA input control.


*SP models with pulse-in control.*


*ST models with pulse-in control and timer.*


*SA models with pulse-in and analog-in control.*

## SP/ST/SA Series Flow Capacities and Pressure Ratings

| Model Number | Maximum Discharge Volume ml/min | gph | lph | Maximum Discharge Pressure psi | bar |
|---|---|---|---|---|---|
| SP, ST or SA030 High Pressure | 25 | 0.40 | 1.50 | 290 | 20 |
| SP, ST or SA030 | 30 | 0.48 | 1.80 | 145 | 10 |
| SP, ST or SA060 | 60 | 0.95 | 3.60 | 145 | 10 |
| SP, ST or SA100 | 100 | 1.59 | 6.00 | 58 | 4 |
| SP, ST or SA200 | 220 | 3.49 | 13.20 | 29 | 2 |
| SP, ST or SA03R* High Pressure | 28 | 0.44 | 1.68 | 217 | 15 |
| SP, ST or SA03R* | 30 | 0.48 | 1.80 | 145 | 10 |
| SP, ST or SA06R* | 60 | 0.95 | 3.60 | 102 | 7 |
| SP, ST or SA10R* | 100 | 1.59 | 6.00 | 102 | 7 |

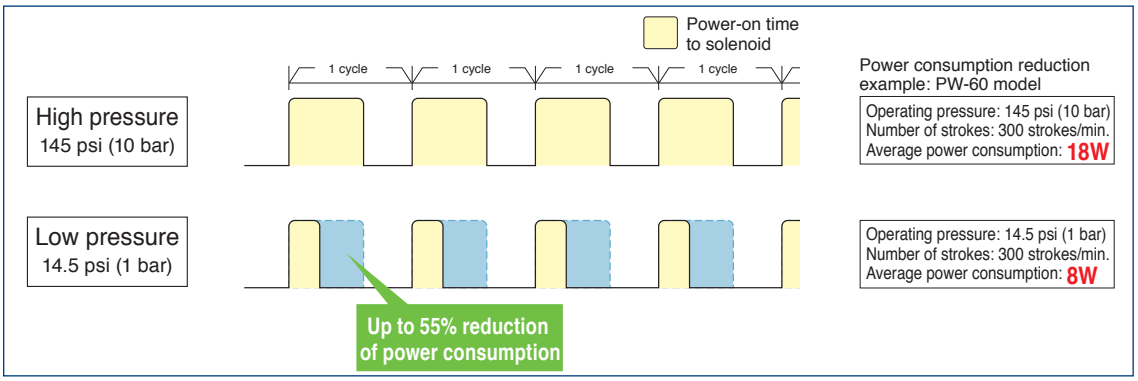
**Models equipped with integral relief valve.*

# SP/ST/SA Models Special Features

## "Eco-friendly" Mode Reduces Power Consumption up to 55%

Unlike conventional pumps that are always turned on for a specific time period regardless of the discharge pressure, S Series "Eco-friendly" pumps with pulse-in control automatically cut the power-on time in accordance with the discharge pressure.

The "Eco-friendly" mode of SP/ST/SA models always monitors operation conditions and automatically shortens the power-on time during low-pressure operation in order to reduce power consumption and operating costs.




## Signal/Control Functionality & Selection Guide

| Item | Type | Models SP | ST | SA |
|---|---|---|---|---|
| Input Signal | Stop Signal; Pulse Signal | 2 Pulse-input Ports | 2 Pulse-input Ports | 1 Analog-input Port & 1 Pulse-input Port |
| Output Signal | Sync Pulse; Alarm Output | 2 Pulse-output Ports | 2 Pulse-output Ports | 2 Pulse-output Ports |
| Control | Manual Operation* | 1 to 300 Strokes (in 1-stroke units) | | |
| | Pulse Proportion Control | Yes | Yes | No |
| | Analog Proportion Control | No | No | Yes |
| | Timer Control | No | Yes | No |
| | External Operation & Stop Input Signal | Yes | Yes | Yes |

** SP models offer 0.1 ml/min to their maximum discharge volume in 0.1 ml/min units.*

## Other Special Features:

- Back-up diaphragm
- Liquid end that can be positioned 90˚ left or right
- O-ring to prevent chemical permeation from outside the pump
- Welded casing and parts
- Hexagonal head bolts with cross recess

# SP/ST/SA Models Special Features

## Universal Functions

### Speed Settings

The stroke speed can be set from 1 to 300 strokes per minute in 1-stroke increments. (The discharge volume on SP models can be set in increments of 0.1 ml/min up to the maximum flow rate of the pump.)

### External Operation and Stop Control

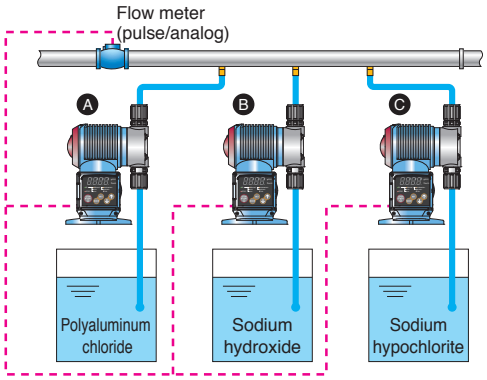
The pump can be turned on and off using an input signal from an external device.

### Alarm Output

When the pump is used in combination with a level meter and checker, an alarm sounds if there is abnormal pressure build-up.

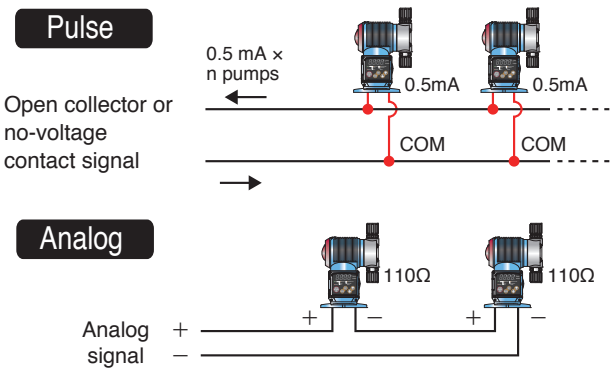
### Synchronous Pulse Control

A single pulse can be output for a single pump operation. The output pulse can then be input into a second pump to perform synchronous operation.




### Signal Distribution

Multiple instances of pumps can be connected in parallel with either a pulse or analog signal.

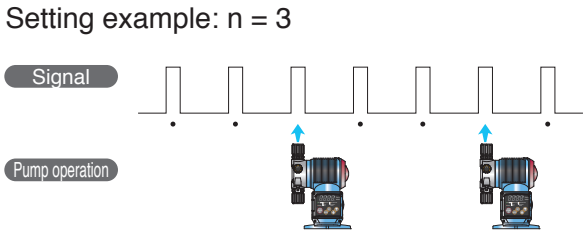



* The pumps operate in a linked manner.
To operate pumps separately, install a signal distributor.

## Pulse-input (SP & ST Models)

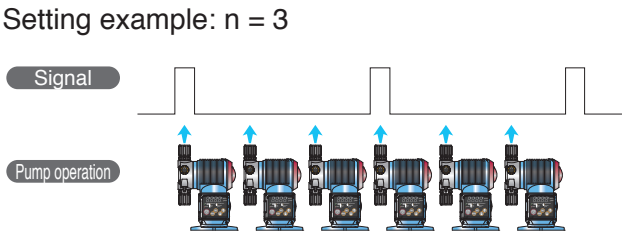
### Pulse Frequency/Division

The pump performs a single injection operation for "n" times of input pulse signals (within a setting range of n = 1 to 999).




### Pulse Frequency/Magnification

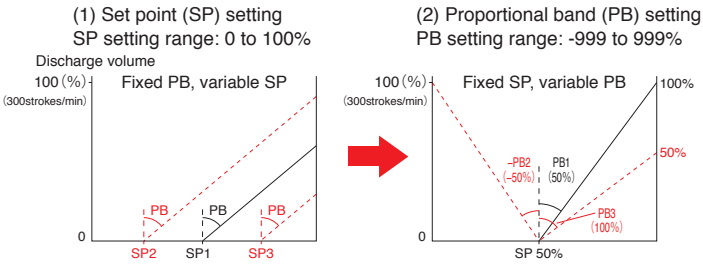
The pump performs the injection operation "n" times for a single input pulse signal (within a setting range of n = 1 to 999).




## Analog-input (SA Models)

### Automatic Operation

The pump operates for a specified number of strokes in the range of 0 to 300 strokes per minute in accordance with the setting value (set point, proportional band) upon receiving an analog input signal (4 to 20mA).



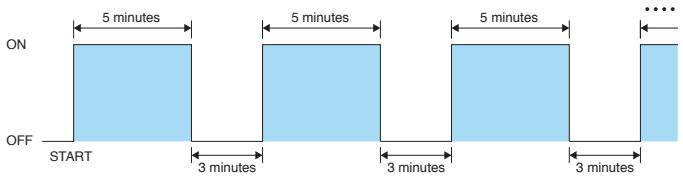
# SP/ST/SA Models Special Features

## Timer Control (ST Models)

### Interval Mode

Pump operation can be turned on and off in accordance with the setting of the timer. Any ON-OFF period for one pattern each in the range of 1 to 9,999 minutes can be set.

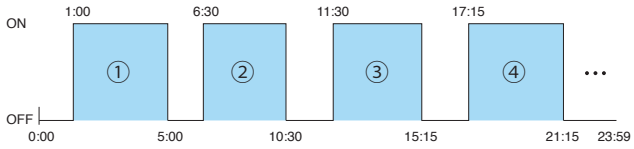
Setting example: ON period: 5 minutes
OFF period: 3 minutes




### Day Mode

The pump operates automatically every day using the same ON and OFF times set. Up to nine (9) program patterns can be set within the range of 0 to 24 hours in 1-minute units.

Setting example: ON time: ① 1:00 ② 6:30 ③11:30 ④17:15
OFF time: ①5:00 ②10:30 ③15: 15 ④21:15



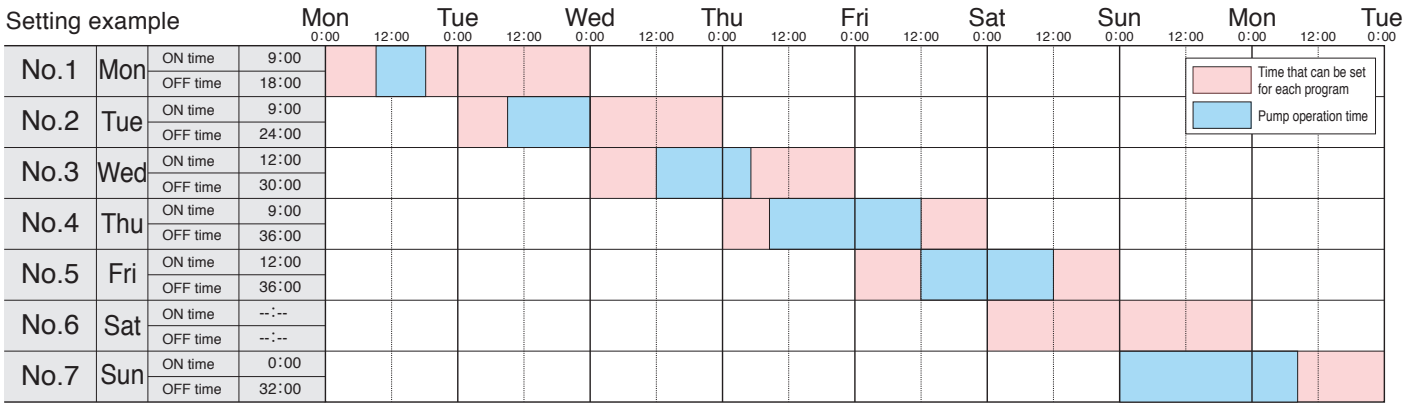

When both interval mode and pulse operation are simultaneously set, the pump will operate in accordance with pulse frequency-division or pulse frequency-magnification setting within the ON time set for the DAY mode and interval mode.

### Week Mode

The pump automatically operates every week at the same ON and OFF times set for that day of the week. Any ON time can be set for each day from 0:00 to 24:00. Any OFF time can be set within the range of 0:00 to 48:00 in 1-minute intervals.

**The Day Mode and Week Mode cannot be used together. The Interval Mode can be used with either the Day Mode or Week Mode.**

Setting example




## Spare Parts Kits to Extend Pump Service Life

Three kits are available to cover spare parts needs for SP/ST/SA models. Individual sets are also available as spare parts:

- Diaphragm Sets
- Relief Valve Sets
- Air Release Knob Sets
- Air Release Nozzle Sets
- Head Bolt Sets

# SP/ST/SA Models Special Features

## Safety Mechanisms to Prevent Air Lock

Outgassing results when the fluid pressure drops below the saturation pressure of a gas dissolved in a liquid. If this occurs, gas comes out of the solution and builds up inside the pump. When air enters the pump head, it prevents the chemicals from being discharged.

SP/ST/SA model pumps for Sodium Hypochlorite (CN and CD Acrylic pump heads) feature an innovative design to minimize dead space and prevent air entry and build-up in the pump.

If air does enter the pump or if outgassing occurs, the CN and CD pump versions each feature mechanisms to combat air lock and outgassing.

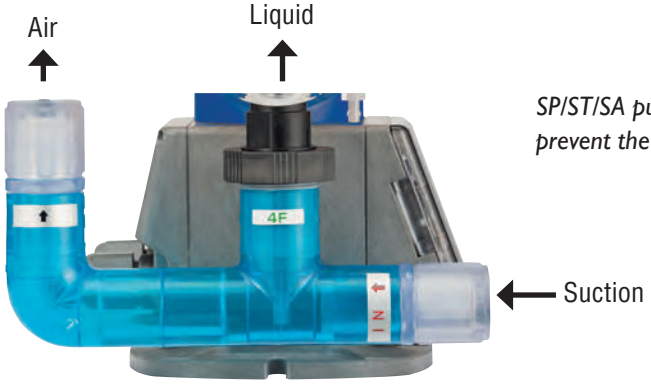
All CN and CD pump head models feature a transparent liquid end that enables the operator to see whether air is present in the pump head.


*CN Acrylic pump head with integral air release valve*

- Although dead space is minimized, the pump will immediately push out any air built up in the pump head.
- Air goes out through the discharge piping; no air-bleed piping is needed.


*CD Acrylic pump head with automatic degassing joint*

- The CD Acrylic pump head version of SP/ST/SA models eliminates virtually all imaginable causes of air entrapment.
- With the automatic degassing joint, more than 15 cc of air is purged by the pump without any air infiltrating the pump head.
- Air goes out through the discharge piping; no air-bleed piping is needed.




*SP/ST/SA pumps equipped with a degassing joint automatically prevent the intrusion of air that causes gas lock.*

# SP/ST/SA Models Pulse-in/Analog-in Control Specifications

## Chemical Injection

Including High-pressure Boiler Feed, High-pressure Chemical, and High-viscosity Fluids

| | 030 Models | | | | 03R Models | |
|---|---|---|---|---|---|---|
| **Liquid End** | PVC or PVDF | 316SS | PVC (High-pressure Boiler) | PVC (High-pressure Chemical) | PVC or PVDF | PVC (High-pressure Boiler) |
| **Order Codes** | PE/PF/KE/KF/KP | ST | BH | CH | PE/PF/KE/KF/KP | BH |
| **Maximum Discharge Volume** | 30 ml/min<br>0.48 gph<br>1.8 lph | 27 ml/min<br>0.43 gph<br>1.6 lph | 28 ml/min<br>0.44 gph<br>1.68 lph | 25 ml/min<br>0.40 gph<br>1.50 lph | 30 ml/min<br>0.48 gph<br>1.8 lph | 28 ml/min<br>0.44 gph<br>1.68 lph |
| **Maximum Discharge Pressure** | 145 psi (10 bar) | 73 psi (5 bar) | 217 psi (15 bar) | 290 psi (20 bar) | 145 psi (10 bar) | 217 psi (15 bar) |
| **Hose I.D. x O.D. mm** | 6 x 8 (PE)* | 6 x 8 (PTFE) | 4 x 6 (PA) | 4 x 6 (PA) | 6 x 8 (PE)* | 4 x 6 (PA) |
| **Weight** | 4.0 lbs. (1.8 kg) | 7.1 lbs. (3.2 kg) | 4.2 lbs. (1.9 kg) | 4.2 lbs. (1.9 kg) | 4.0 lbs. (1.8 kg) | 4.2 lbs. (1.9 kg) |

**(FEP) for KP pump heads*

| | 060 Models | | | 06R Models | |
|---|---|---|---|---|---|
| **Liquid End** | PVC or PVDF | 316SS | PVC (High-viscosity) | PVC or PVDF | PVC (High-viscosity) |
| **Order Codes** | PE/PF/KE/KF/KP | ST | HV | PE/PF/KE/KF/KP | HV |
| **Maximum Discharge Volume** | 60 ml/min<br>0.95 gph<br>3.6 lph | 55 ml/min<br>0.87 gph<br>3.3 lph | 60 ml/min<br>0.95 gph<br>3.6 lph | 60 ml/min<br>0.95 gph<br>3.6 lph | 60 ml/min<br>0.95 gph<br>3.6 lph |
| **Maximum Discharge Pressure** | 102 psi (7 bar) | 73 psi (5 bar) | 102 psi (7 bar) | 102 psi (7 bar) | 102 psi (7 bar) |
| **Hose I.D. x O.D. mm** | 6 x 8 (PE)* | 6 x 8 (PTFE) | 12 x 18 (PVC) | 6 x 8 (PE)* | 12 x 18 (PVC) |
| **Weight** | 4.2 lbs. (1.9 kg) | 7.3 lbs. (3.3 kg) | 4.2 lbs. (1.9 kg) | 4.2 lbs. (1.9 kg) | 4.2 lbs. (1.9 kg) |

**(FEP) for KP pump heads*

| | 100 Models | | | 10R Models | 200 Models |
|---|---|---|---|---|---|
| **Liquid End** | PVC or PVDF | 316SS | PVC (High-viscosity) | PVC or PVDF | PVC or PVDF |
| **Order Codes** | PE/PF/KE/KF/KP | ST | HV | PE/PF/KE/KF/KP | PF/PF/KE/KF/KP |
| **Maximum Discharge Volume** | 100 ml/min<br>1.59 gph<br>6.0 lph | 95 ml/min<br>1.51 gph<br>5.7 lph | 100 ml/min<br>1.59 gph<br>6.0 lph | 100 ml/min<br>1.59 gph<br>6.0 lph | 220 ml/min<br>3.49 gph<br>13.2 lph |
| **Maximum Discharge Pressure** | 102 psi (7 bar) | 73 psi (5 bar) | 102 psi (7 bar) | 102 psi (7 bar) | 29 psi (2 bar) |
| **Hose I.D. x O.D. mm** | 6 x 8 (PE)* | 6 x 8 (PTFE) | 12 x 18 (PVC) | 6 x 8 (PE)* | 6 x 8 (PE)* |
| **Weight** | 4.2 lbs. (1.9 kg) | 7.3 lbs. (3.3 kg) | 4.2 lbs. (1.9 kg) | 4.2 lbs. (1.9 kg) | 8.8 lbs. (4.0 kg) |

**(FEP) for KP pump heads*

**Note:**

*All "R" models include a 4 x 6 soft PVC hose for the integral relief valve air release.*

# SP/ST/SA Models Pulse-in/Analog-in Control Specifications

## Outgassing Fluids

Including Sodium Hypochlorite Injection

| | 030 Models | 03R Models | 060 Models | 06R Models | 100 & 10R Models | 100 & 10R Models |
|---|---|---|---|---|---|---|
| **Liquid End** | Acrylic | Acrylic | Acrylic | Acrylic | Acrylic | Acrylic |
| **Order Codes** | CN/CD | CN/CD | CN/CD | CN/CD | CN | CD |
| **Maximum Discharge Volume** | 30 ml/min<br>0.48 gph<br>1.8 lph | 30 ml/min<br>0.48 gph<br>1.8 lph | 60 ml/min<br>0.95 gph<br>3.6 lph | 60 ml/min<br>0.95 gph<br>3.6 lph | 90 ml/min<br>1.43 gph<br>5.4 lph | 90 ml/min<br>1.43 gph<br>5.4 lph |
| **Maximum Discharge Pressure** | 145 psi (10 bar) | 102 psi (7 bar) | 145 psi (10 bar) | 102 psi (7 bar) | 102 psi (7 bar) | 102 psi (7 bar) |
| **Hose I.D. x O.D. mm** | 6 x 8 (PE) | 6 x 8 (PE) | 6 x 8 (PE) | 6 x 8 (PE) | 6 x 8 (PE) | 6 x 8 (PE) |
| **Weight** | 4.0 lbs. (1.8 kg) | 4.4 lbs. (2.0 kg) | 4.2 lbs. (1.9 kg) | 4.6 lbs. (2.1 kg) | 4.2 lbs. (1.9 kg) | 4.6 lbs. (2.1 kg) |

**Notes:**

*All "R" models include a 4 x 6 soft PVC hose for the integral relief valve air release.*

*All models with a degassing joint include a 4 x 6 soft PVC hose for air release.*

## General Specifications

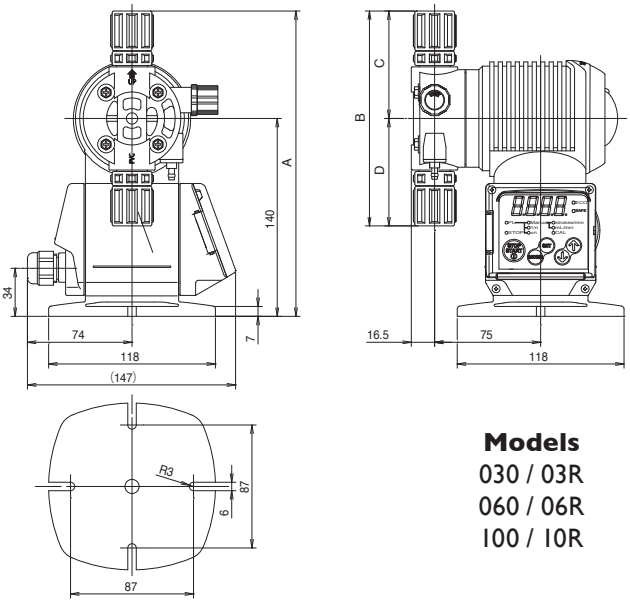
| | |
|---|---|
| Stroke Speed | 1 to 300 strokes/minute (enables setting in 1-stroke units) |
| Stroke Length | 0.5 mm to 1.0 mm (enables adjustment using the dial) |
| Maximum Allowable Viscosity | 3,000 mPa (3,000 cPs) - HV models only |
| Maximum Allowable Viscosity | 50 mPa (50 cPs) - all other models |
| Temperature Ranges | Ambient: 32˚F to 104˚F (0˚C to 40˚C); Transferring Liquid: 32˚F to 104˚F (0˚C to 40˚C); no freezing allowed |
| Ambient Humidity | 35% to 85% RH |
| Environmental Protection | IEC standard; IP65 or equivalent (waterproof & dust-resistant) |
| Insulation Class | B |
| **Power Supply** | |
| Rated Voltage | AC 100 to 240 V (±10%) |
| Phase/Frequency | 1-phase/50 or 60 Hz |
| Maximum Current | 2.0 A (030 or 03R PVC, PVDF & 316SS models) |
| Maximum Current | 2.5 A (all other models) |
| Maximum Power Consumption | 250 VA |
| Average Power Consumption | 18 W |
| Cable | Cab-tire cable (ø 5 to 10) |

# SP/ST/SA Models Pulse-in Control Specifications

## Dimensions

All dimensions in millimeters (mm).

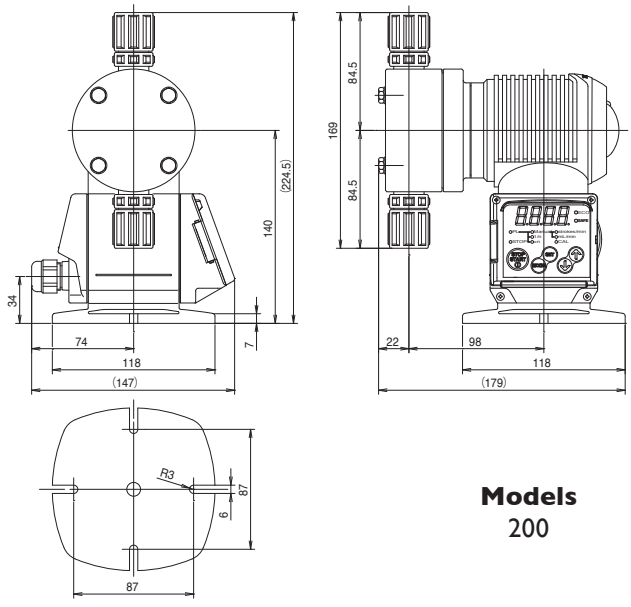
### PVC & PVDF Pump Heads




**Models**
030 / 03R
060 / 06R
100 / 10R

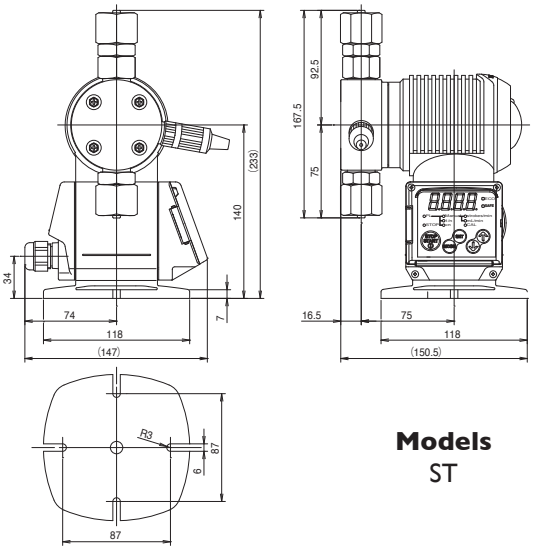
| Liquid End | Application | A | B | C | D |
|---|---|---|---|---|---|
| PVC | General Chemicals | 216 | 152 | 76 | 76 |
| PVDF | General Chemicals | 237 | 195 | 97.5 | 97.5 |
| PVC | High-viscosity | 233 | 167.5 | 92.5 | 75 |
| PVC | High-pressure Boiler | 230 | 166 | 90 | 76 |
| PVC | High-pressure Chemicals | 233 | 169 | 93 | 76 |

- The shape and dimensions differ slightly depending on the liquid-end material and connection type.



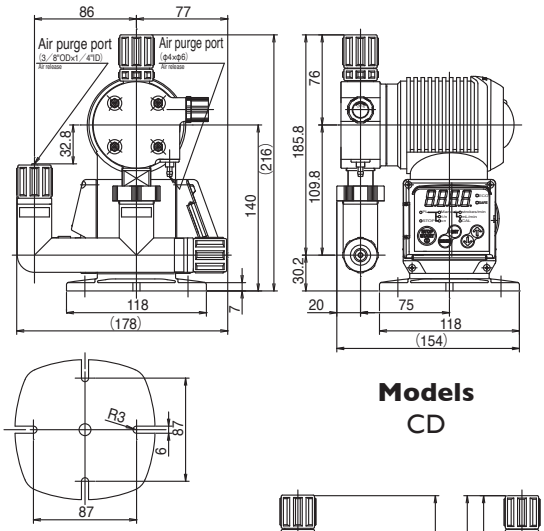

**Models**
200

### 316SS Pump Heads

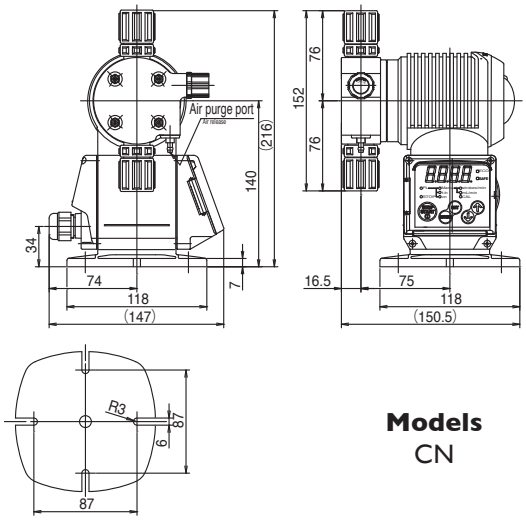



**Models**
ST

### Acrylic Pump Heads




**Models**
CD




**Models**
CN

# SP/ST/SA Models How to Order


*SP03RPES*


*ST03RPES*


*SA03RPES*


*SP060HVS*


*SP03RKPS*

## How to Order

A complete pump order number contains 8 digits based on the specified pump materials listed below.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| S | | | | | | | |

| Digits | Order Code | SP/ST/SA Series Solenoid Pump | |
|---|---|---|---|
| 1 - 2 | **SP** | Pulse-input | |
| | **ST** | Pulse-input with timer | |
| | **SA** | Pulse-input and analog-input | |
| 3-5 | **Flow Rate** | | |
| | **030** | 30 ml/min | |
| | **060** | 60 ml/min | |
| | **100** | 100 ml/min | |
| | **200** | 200 ml/min (only available as PE and PF) | |
| | **03R** | 30 ml/min with relief valve | |
| | **06R** | 60 ml/min with relief valve | |
| | **10R** | 100 ml/min with relief valve | |
| 6 - 7 | **Materials of Construction:** Head/O-ring/Valve Seat/Joint/Valve or Ball Stop/Hose (I.D. x O.D. mm) | | |
| | (All contain PTFE diaphragms and ceramic check valve balls) | | **Application** |
| | **PE** | PVC/EPDM/EPDM/PVC/PVC/PE (6 x 8) | General chemicals |
| | **PF** | PVC/FKM/FKM/PVC/PVC/PE (6 x 8) | General chemicals |
| | **KE** | PVDF/EPDM/EPDM/PVDF/PVDF/PE (6 x 8) **(No 200 ml/min)** | General chemicals |
| | **KF** | PVDF/FKM/FKM/PVDF/PVDF/PE (6 x 8) **(No 200 ml/min)** | General chemicals |
| | **KP** | PVDF/FKM/PTFE/PVDF/PTFE/FEP (6 x 8) **(No 200 ml/min)** | General chemicals |
| | **ST** | 316SS/PTFE/-/Ceramic/PTFE/PTFE (6 x 8) **030, 060 and 100 models only** | General chemicals |
| | **CN** | Acrylic/FKM/FKM/PVC/PVC/PE (6 x 8) **(No 200 ml/min)** | Outgassing fluids without automatic degassing joint |
| | **CD** | Acrylic/FKM/FKM/PVC/PVC - Hastelloy Spring/PE (6 x 8) **(No 200 ml/min)** | Outgassing fluids with automatic degassing joint |
| | **BH** | PVC/EPDM/PTFE/PVC/PVC/PA (4 x 6) **030 and 03R models only** | High-pressure boiler applications |
| | **CH** | PVC/EPDM/PTFE/PVC/PVC/PA (4 x 6) **030 models only** | High-pressure chemical applications |
| | **HV** | PVC/FKM/-/PVC/PVC (12 x 18) **060 and 100 models only** | High-viscosity fluids |
| 8 | **Power Plug** | | |
| | **S** | North American Plug | Standard |
| | **B** | UK Plug | CE UK |
| | **E** | European Plug | CE Europe |
| | **L** | Asia | Lead wire only |

# Chemical Compatibility Table

| Chemical | | Liquid-end Model(s) | Application(s) |
|---|---|---|---|
| Acetone | | ST | Low boiling point solvent |
| Acetic Acid | 80% | PV/HV/KF | Acetate & vinyl acetate |
| | Concentrate (75˚C/24˚C) | KP | Photography, reagent, medicine |
| Acetic Anhydride | | ST | |
| Agricultural Chemicals | | ST | |
| Aluminum Chloride | | PE/BH/CH/KE | Leather tanning |
| Aluminum Hydroxide | | PE/BH/CH/KE | Aluminum salts; reinforcing pigment for medical rubber |
| Aluminum Sulfate | | PE/BH/CH/KE | Papermaking, pigments, chemicals for ceramics, clay precipitation chemical |
| Amine | | ST | Medical products, dye intermediate products, rubber products, surfactant |
| Ammonia Water | 10% | PE/BH/CH/KE | Refrigerant, local stimulant, ammonia soap |
| Ammonium Acetate | | PE/BH/CH/KE | Medical raw materials, organic synthesis, dye retarding agent |
| Ammonium Carbonate | | PE/BH/CH/KE | Butter, smelling salt, leavening agent, cough syrup ingredient |
| Ammonium Chloride | | PE/BH/CH/KE | Fertilizers, plating, dye, tanning, photography, cement |
| Ammonium Oxalate | | PE/BH/CH/KE | |
| Ammonium sulfate | | PE/BH/CH/KE | Single manure, compound fertilizer, artificial silk industry, cellophane industry, raw materials for ammonia compound |
| Aniline | | ST | Dye, intermediate product, medical products, disinfectant, paint, varnish |
| Beer | | PE/BH/CH/KE | |
| Benzene | | ST | Dye as a synthesizing material, synthetic rubber, synthetic detergent, paint |
| Blood | | ST | |
| Boric Acid | | PE/BH/CH/KE | Glass, medicine, enamel, fire-retarding agent |
| Butyric Acid | | KP | Fragrance, butter, melon, candy, cream |
| Calcium Hypochlorite | | CL/CA/CN/CD | Pulp, fiber, decoloration of oils & fats; sterilization of swimming pools & wells |
| | | PV/HV for NCS-52 model | |
| Carbolic Acid (Phenol) | | ST | Disinfectant for dentistry, picric acid, salicylic acid, synthetic perfume |
| Chloroform | | ST | Medicine (anesthetic, sterilization), solvent, fluoro-resin, blood preservative |
| Chromic Acid Anhydride (Chromium Trioxide) | | KP | Catalyst for synthesizing & chrome plating |
| Citric Acid | | PE/BH/CH/KE | Soft drinks, pharmacy, medicine, flavor enhancer essence |
| Cresol | (75˚F/24˚C) | PE/BH/CH/KE | Disinfectant, dressing agent, varnish, agricultural chemicals, solvent |
| Cyclohexane | | ST | Organic solvent for adipic acid; stripping agents for paints & varnishes |
| Dextrose | | ST | Medicines, sweeteners |
| Developer | | PE/BH/CH/KE | Photographic development |
| Ethyl Acetate | | ST | Paint, printing ink, solvent |
| Ethyl Alcohol | | PV/HV/KF | Drinks, cosmetics, varnish, ink, antiseptic; washing agent |
| Ethyl Ether | | ST | Organic solvent, analytical agent |
| Ethylene Glycol | | ST | Raw materials for polyester fiber; paste for electrolytic capacitors; solvent |
| Ethylene Trichloride (Trichloro Ethylene) | | KP | Washing solvent for defatting; manufacturing of chlorofluorocarbon gas; refrigerant, insecticide |
| Ferric Chloride | | PE/BH/CH/KE | Nameplates, photomechanical process, condensation/precipitation agent & catalyst |
| Ferric Sulfate | | PE/BH/CH/KE | Factory wastewater treatment chemicals; condensation & precipitation agent for dyestuffs; waste water |
| Ferrous Chloride | | PE/BH/CH/KE | Dye, metallurgy, preparation of medicines |
| Ferrous Sulfate | | PE/BH/CH/KE | Dye, metallurgy, adjusting agent, manufacturing ferrous chloride |
| Fixer | | PE/BH/CH/KE | Photographic development |

*See Materials of Construction Reference on page 5 to match the S Series liquid-end models codes with the pump head and other materials.*

# Chemical Compatibility Table (continued)

| Chemical | | Liquid-end Model(s) | Application(s) |
|---|---|---|---|
| Formic Acid | 10% | PE/BH/CH/KE | Dye assistant, leather tanning, rubber coagulant, vitamins, perfume, solvent |
| | 100% | PE/BH/CH/KE | |
| Fruit Juice | | ST | |
| Fruit Sugar | | ST | Sweetener, wetting agent, nutritive |
| Galvanizing Liquid | | PE/BH/CH/KE | Various chemicals for the plating industry |
| Gasoline | | ST | Automobile fuel, aviation fuel, solvent |
| Glycerin | | PE/BH/CH/KE | Cosmetics, foodstuffs, perfume, antifreeze, medicine, soaps |
| Grape Acid | | PE/BH/CH/KE | |
| Gypsum (Calcium Sulfate) | | PE/BH/CH/KE | Sodium dehydrate, cement setting adjusting agent, chemical materials |
| Hydrazine | 2% | PE/BH/CH/KE | Boiler chemicals |
| Hydrochloric Acid | 10% | PE/BH/CH/KE | Sodium glutamate, medicines, intermediate products, dyes, perfume |
| | 30% | PV/HV/KF | |
| | Concentrate | PV/HV/KF | |
| Hydrogen Peroxide | 30% | PV/HV/KF | Bleaching agent, medicine, brewing, rocket fuel |
| | 90% | KP | |
| Ink | | ST | |
| Jet Fuel | | ST | Fuel engine |
| Kerosene | | ST | Kerosene |
| Ketone | | ST | Cellulose nitrate, various plastics & solvents for lacquer |
| Lactic Acid | | PE/BH/CH/KE | Brewing industry, for beverages, leather industry & textile finishing agent |
| Magnesium Carbonate | | PE/BH/CH/KE | Rubber reinforcing agent, fire-proof paint, tooth powder, medicine; fire resistance & heat retaining |
| Magnesium Hydroxide | | PE/BH/CH/KE | |
| Maleic Acid | | PE/BH/CH/KE | Preventing tobaccos from budding; preventing onions & potatoes from budding while held in storage |
| Malic Acid | | ST | Sourness additives for soft drinks & cold confectionery |
| Methyl Salicylate | | ST | Oral agent; additive for ointment & general perfume |
| Methyl Alcohol | | PV/HV/KF | Raw materials of formalin, methyl methacrylate |
| Milk | | ST | |
| Mineral Oil (Gasoline) | | ST | Petro-chemistry |
| Naphtha (Volatile oil) | | ST | Ethylene raw materials, petrochemical raw materials |
| Nicotine | | PE/BH/CH/KE | |
| Nitric Acid | 10% (73˚F/23˚C) | PV/HV/KF | Organic formation, nitro compound, gunpowder, dye, perfume, metallurgy |
| | 30% | KP | Dye, perfume, metallurgy |
| | 100% (77˚F/25˚C) | KP | |
| Nitrobenzene | | PE/BH/CH/KE | Fortifying agent; color former for meat; medicine, livestock forage |
| Oleic Acid | | ST | Raw materials for soaps, paint, leather & cutting oil |
| Oxalic Acid | | PE/BH/CH/KE | Manufacturing & analytical test of glutinous starch syrup; removing rust & stain |
| Perclene - Perchloroethylene | | ST | Dry cleaning solvent; raw wool washing soap |
| Phosphoric Acid | 10% | PE/BH/CH/KE | Plating, medicines, dye; oils & fats |
| | Concentrate | PE/BH/CH/KE | |
| Phosphorus Pentoxide | | PE/BH/CH/KE | Metal surface treatment, medicine, agricultural chemicals, oils & fats |
| Potassium Chromate | | PE/BH/CH/KE | Match head material, oxidizing agent, reagent, dye, preservative, printing ink |
| Potassium Ferrocyanide | | PE/BH/CH/KE | Medicine (anesthetic, sterilization), solvent, fluoro-resin & blood preservative |
| Potassium Permanganate | | PE/BH/CH/KE | Oxidizing agent, reagent, medicine & catalyst |

*See Materials of Construction Reference on page 5 to match the S Series liquid-end models codes with the pump head and other materials.*

# Chemical Compatibility Table (continued)

| Chemical | | Liquid-end Model(s) | Application(s) |
|---|---|---|---|
| Pulp Liquid | | PE/BH/CH/KE | |
| Red Prussiate (Potassium Ferricyanide) | | ST | Blueprint, blue pigments, dyeing wool, leather |
| Salicylic Acid | | PE/BH/CH/KE | Azo dye, preservative, perfume, medicine |
| Sea Water | | PE/BH/CH/KE | |
| Silicone Oil | | PE/BH/CH/KE | Automobile wax, paint, rubber, lubricant oil, inducing oil |
| Silver Nitrate | | PE/BH/CH/KE | Manufacturing silver salt; photograph photosensitizer |
| Slaked Lime (Calcium hydroxide) | | PE/BH/CH/KE | Fertilizer, bleaching powder, briquettes, pulp, papermaking, agricultural chemicals |
| Soapsuds | | PE/BH/CH/KE | Washing agent, emulsifying agent, cosmetics |
| Sodium Acetate | | PE/BH/CH/KE | Paint, medicine, color fixing agent, photography |
| Sodium Benzoate | | PE/BH/CH/KE | Food preservatives, medicine, vinyl polymerization promoter |
| Sodium Bicarbonate | | PE/BH/CH/KE | Reagent |
| Sodium Bichromate | | PE/BH/CH/KE | Chrome compounds, oxidizing agent, medicine, gunpowder |
| Sodium Carbonate | | PE/BH/CH/KE | Manufacturing glass products, sodium bicarbonate, water glass |
| Sodium Chlorate | | PE/BH/CH/KE | Herbicide, reagent, oxidizer, matches & fireworks |
| Sodium Chloride | | PE/BH/CH/KE | Table salt |
| Sodium Cyanide | | PE/BH/CH/KE | Refining of gold by cyanide, pigments, plating, photographic chemicals, medicine |
| Sodium Ferrocyanide | | PE/BH/CH/KE | Raw materials for pigment products, dyeing silk, dye assistant, photography, blueprint |
| Sodium Hydroxide | 40% | PE/BH/CH/KE | Dye, perfume, medicine, soap, artificial silk, cellophane, manufacturing of fibers |
| Sodium Hypochlorite | | CL/CA/CN/CD | Oxidizing agent; disinfectant for swimming pools, wells & other applications |
| Sodium Nitrite | | PE/BH/CH/KE | Potassium salts, diazotization of azo dye, decoloration, analytical agents |
| Sodium Phosphate | | PE/BH/CH/KE | Boiler chemicals, washing agent, sugar refining, photography |
| Sodium Sulfide | | PE/BH/CH/KE | Viscose artificial silk; desulfurization of staple fiber; manufacturing sulfurized dye |
| Sodium Sulfite | | PE/BH/CH/KE | Dechlorination, dye intermediate products, photography development |
| Sodium Thiosulfate | | PE/BH/CH/KE | Photographic fixing agent; dechlorination agent; decoloration of oils & fats |
| Solution of Salt | | PE/BH/CH/KE | |
| Stearic Acid | | PE/BH/CH/KE | For rubber industry, candles, crayons, cosmetics, PVC plasticizer |
| Sulfuric Acid | 10% | PE/BH/CH/KE | Fertilizer industry, textile and inorganic chemical industry |
| | 40% | PV/HV/KF | |
| | Concentrate | KP | |
| Tannic Acid | | PE/BH/CH/KE | Dye, pigments, leather & tanning |
| Tartaric Acid | | PE/BH/CH/KE | Soft drinks, confectionery, synthetic wine, photography, plating |
| Toluene | | ST | Dye, perfume, gunpowder, organic pigments, synthetic cresol solution, sweetener |
| Urea | | PE/BH/CH/KE | Single manure as a fertilizer; paints, adhesives |
| Whiskey | | PV/HV/KF | Drinks (wines & spirits) |
| Wine | | ST | |
| Xylene | | ST | Solvent, synthetic materials, isomeric separation |

*See Materials of Construction Reference on page 5 to match the S Series liquid-end models codes with the pump head and other materials.*

# Wanner Engineering Product Line

Hydra-Cell® Seal-less Pumps

www.Hydra-Cell.com

*Original F/M/D/H & G Series pumps*


*T100 Series high-horsepower triplex pumps*


*Q155 Series high-horsepower quintuplex pumps*

Hydra-Cell® METERING SOLUTIONS™

www.Hydra-Cell.com/metering

*P Series "pulse-less" metering pumps*

*MT8 Series "pulse-less" triplex metering pumps*

*S Series solenoid-diaphragm metering pumps*

STAN-COR

www.StancorPump.com

*Stan-Cor Series ANSI centrifugal pumps*

VECTOR

www.VectorPump.com

*Vector 2000, 3000 & 4000 Series peristaltic pumps*

# Hydra-Cell® Worldwide Sales and Service

Hydra-Cell pumps are sold and serviced worldwide by a comprehensive network of factory-trained pump distributors. As specialists in pump technologies, our distributor organizations offer you a vital local resource for technical expertise, product training, sales and service.

Hydra-Cell distributors are located in more than 70 countries worldwide. In North America specifically, there are more than 100 Hydra-Cell distributor locations to provide local availability for every major commercial, institutional, industrial, and municipal marketplace.

### World Headquarters & Manufacturing

- Minneapolis, Minnesota, USA

### Business Units

- Wichita Falls, Texas, USA
- Hampshire, United Kingdom
- Kowloon, Hong Kong
- Shanghai, China
- São Paulo, Brazil

## Contact us for the name and location of the authorized Hydra-Cell distributor nearest you:

Algeria
Argentina
Australia
Austria
Belarus
Belgium
Bolivia
Brazil
Bulgaria
Canada
Chile
China
Colombia
Costa Rica
Czech Republic
Denmark
Ecuador
Egypt
Estonia
Finland
France
Germany
Greece
Hong Kong
Hungary
India
Indonesia
Ireland
Israel
Italy
Japan
Kazakhstan
Kuwait
Latvia
Lithuania
Malaysia
Mexico
Mongolia
Morocco
Netherlands
New Zealand
Norway
Oman
Panama
Peru
Poland
Portugal
Puerto Rico
Qatar
Romania
Russia
Saudi Arabia
Serbia
Singapore
Slovakia
South Africa
South Korea
Spain
Sweden
Switzerland
Taiwan
Thailand
Tunisia
Turkey
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Venezuela
Viet Nam
Yemen

# Hydra-Cell®
## METERING SOLUTIONS™


**Wanner Engineering, Inc.**

**World Headquarters & Manufacturing**
Wanner Engineering, Inc.
1204 Chestnut Avenue
Minneapolis, MN 55403 USA
Phone: 612-332-5681 • Fax: 612-332-6937
Toll-Free Fax (USA): 800-332-6812
Email: sales@wannereng.com
www.Hydra-Cell.com

**Regional Office**
207 US Highway 281
Wichita Falls, TX 76310 USA
Phone: 940-322-7111
Toll-Free: 800-234-1384
Email: sales@wannereng.com
www.Hydra-Cell.com

**Latin American Office**
R. Álvaro Anes, 150 Bairro Campestre
Santo André/São Paulo, Brazil - CEP 09070-030
Phone: +55 (11) 4081-7098
Email: mmagoni@wannereng.com
www.Hydra-Cell.com

**Wanner International Ltd.**
Wanner International, Ltd.
Hampshire - United Kingdom
Phone: +44 (0) 1252 816847
Email: sales@wannerint.com
www.Hydra-Cell.eu

**Wanner Pumps Ltd.**
Wanner Pumps, Ltd.
Kowloon - Hong Kong
Phone: +852 3428 6534
Email: sales@wannerpumps.com
www.WannerPumps.com

Shanghai - China
Phone: +86-21-6876 3700
Email: sales@wannerpumps.com
www.WannerPumps.com