

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.



SP models with pulse-in control.

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



ST models with pulse-in control and timer.

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



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

SP/ST/SA Series Flow Capacities and Pressure Ratings

| Model Number | Maximum Discharge Volume | | | Maximum Discharge Pressure | |
|--------------------------------|--------------------------|------|-------|----------------------------|-----|
| | ml/min | gph | lph | 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.

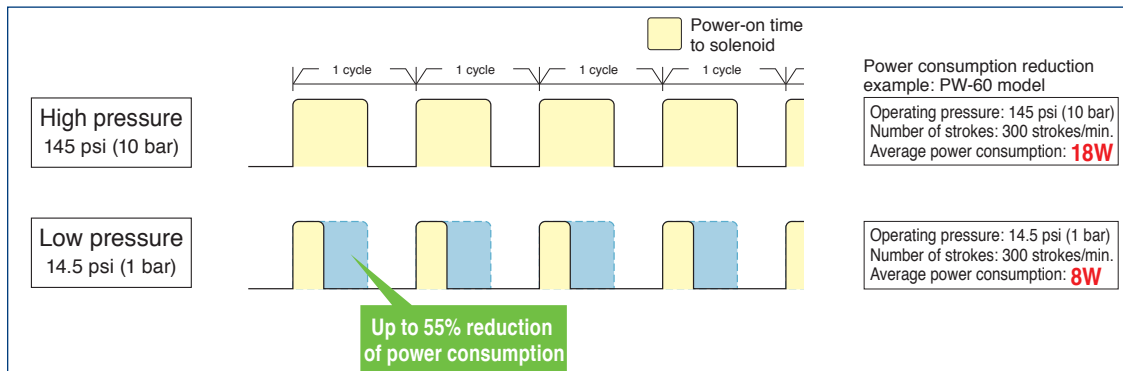


SP/ST/SA Models Special Features

“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

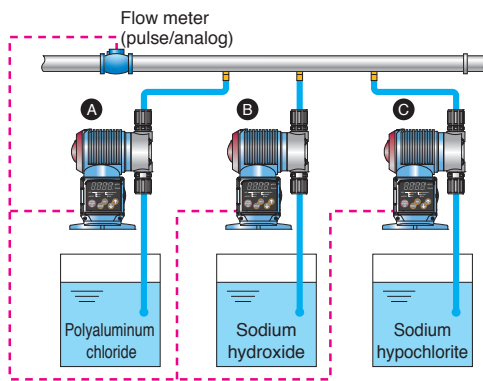
The pump can be turned on and off using an input signal from an external device.

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.

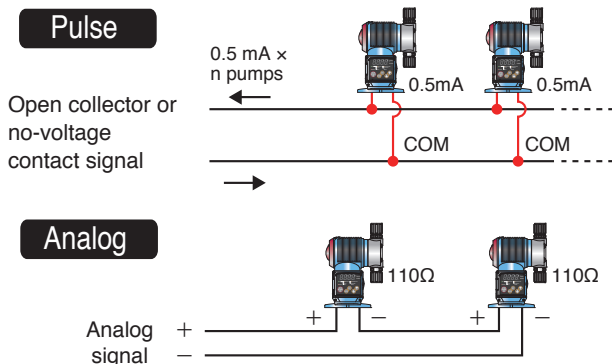
Synchronous Pulse Control

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.



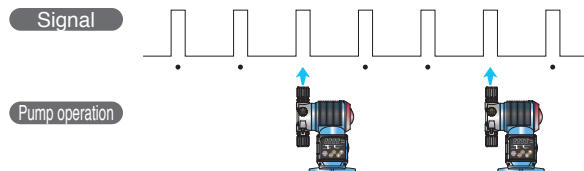
* The pumps operate in a linked manner. To operate pumps separately, install a signal distributor.

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).

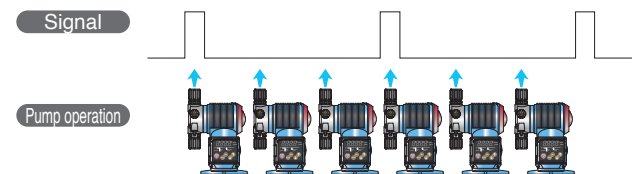
Setting example: n = 3



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).

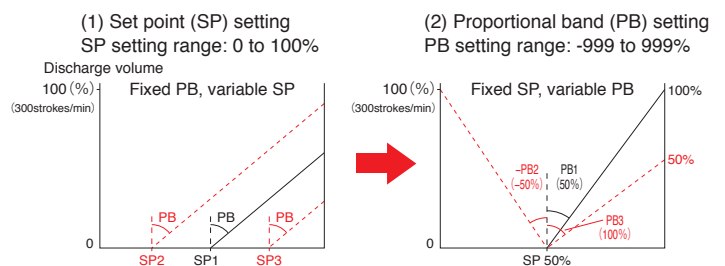
Setting example: n = 3



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).



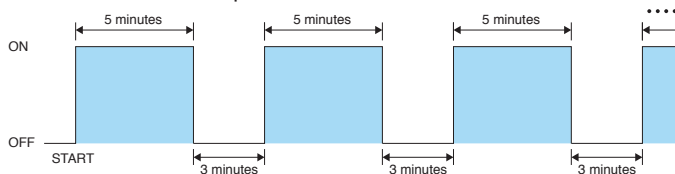
SP/ST/SA Models Special Features

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



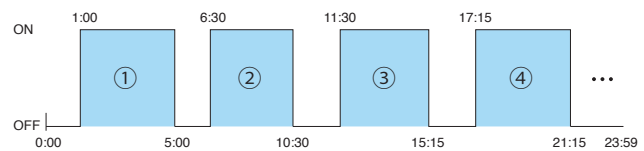
Week Mode

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.

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 ③ 11:30 ④ 17:15
OFF time: ① 5:00 ② 10:30 ③ 15:15 ④ 21:15



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.

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 | | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue |
|-----------------|-----|---------------|----------------|------|-------|------|-------|------|-------|------|
| | | 0:00 | 12:00 | 0:00 | 12:00 | 0:00 | 12:00 | 0:00 | 12:00 | 0:00 |
| No.1 | Mon | ON time 9:00 | OFF time 18:00 | | | | | | | |
| No.2 | Tue | ON time 9:00 | OFF time 24:00 | | | | | | | |
| No.3 | Wed | ON time 12:00 | OFF time 30:00 | | | | | | | |
| No.4 | Thu | ON time 9:00 | OFF time 36:00 | | | | | | | |
| No.5 | Fri | ON time 12:00 | OFF time 36:00 | | | | | | | |
| No.6 | Sat | ON time --:-- | OFF time --:-- | | | | | | | |
| No.7 | Sun | ON time 0:00 | OFF time 32:00 | | | | | | | |

Legend:
 Time that can be set for each program
 Pump operation time

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.



Air Release Knob
with Integral Air
Relief Valve

Air Release Port

- 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.

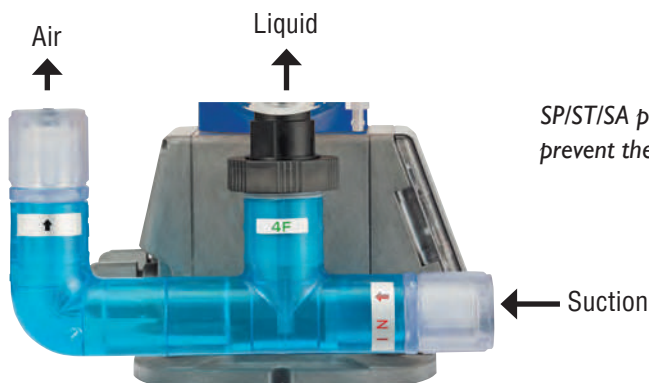
CN Acrylic pump head with integral air release valve



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.

CD Acrylic pump head with automatic degassing joint



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 0.48 gph 1.8 lph | 27 ml/min 0.43 gph 1.6 lph | 28 ml/min 0.44 gph 1.68 lph | 25 ml/min 0.40 gph 1.50 lph | 30 ml/min 0.48 gph 1.8 lph | 28 ml/min 0.44 gph 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 0.95 gph 3.6 lph | 55 ml/min 0.87 gph 3.3 lph | 60 ml/min 0.95 gph 3.6 lph | 60 ml/min 0.95 gph 3.6 lph | 60 ml/min 0.95 gph 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 1.59 gph 6.0 lph | 95 ml/min 1.51 gph 5.7 lph | 100 ml/min 1.59 gph 6.0 lph | 100 ml/min 1.59 gph 6.0 lph | 220 ml/min 3.49 gph 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 0.48 gph 1.8 lph | 30 ml/min 0.48 gph 1.8 lph | 60 ml/min 0.95 gph 3.6 lph | 60 ml/min 0.95 gph 3.6 lph | 90 ml/min 1.43 gph 5.4 lph | 90 ml/min 1.43 gph 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

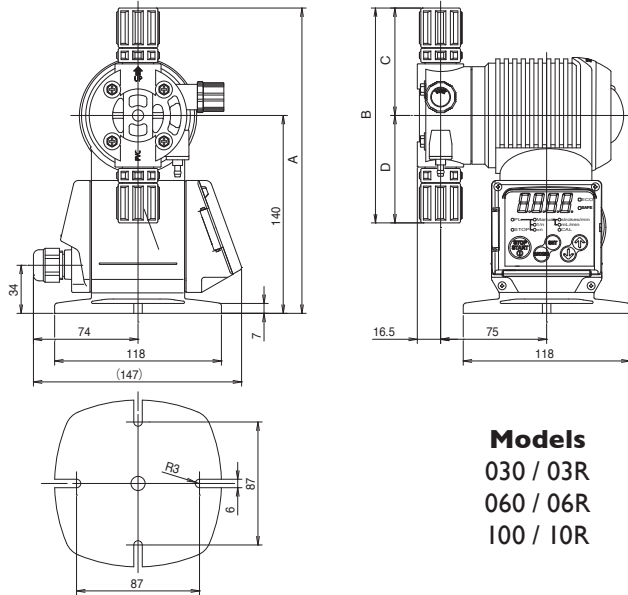
| | |
|---------------------------|---|
| Rated Voltage | AC 100 to 240 V (±10%) |
| Phase/Frequency | 1-phase/50 or 60 Hz |
| Maximum Current | 2.0 A (030 or 03R PVC, PVDF & 316SS models) |
| Maximum Current | 2.5 A (all other models) |
| Maximum Power Consumption | 250 VA |
| Average Power Consumption | 18 W |
| Cable | Cab-tire cable (ø 5 to 10) |

SP/ST/SA Models Pulse-in Control Specifications

Dimensions

All dimensions in millimeters (mm).

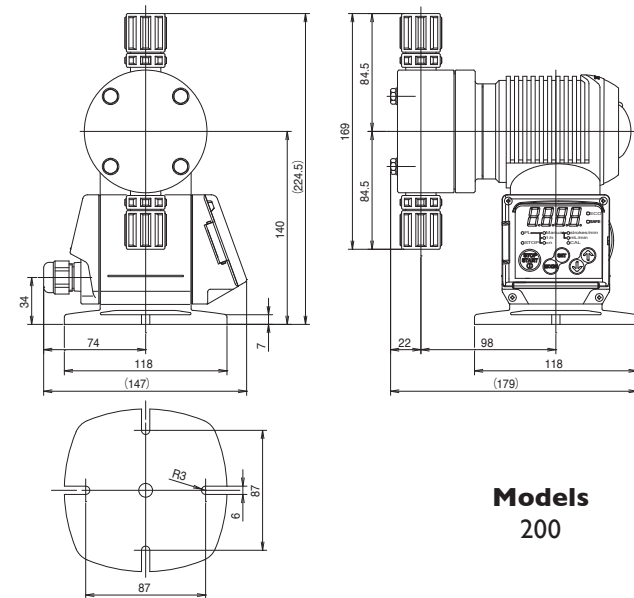
PVC & PVDF Pump Heads



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

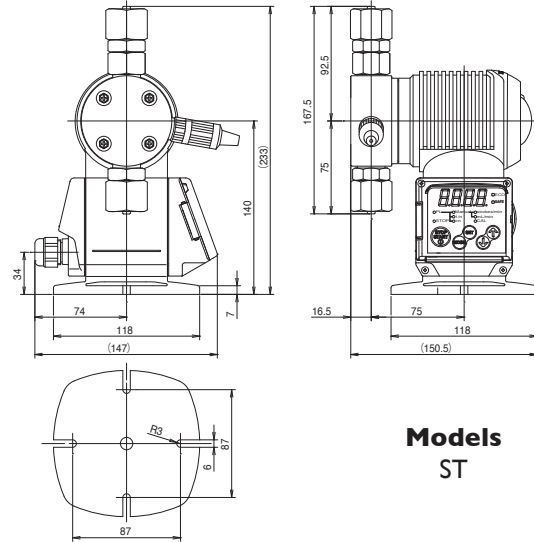
| Liquid End | Application | A | B | C | D |
|------------|-------------------------|-----|-------|------|------|
| PVC | General Chemicals | 216 | 152 | 76 | 76 |
| PVDF | General Chemicals | 237 | 195 | 97.5 | 97.5 |
| PVC | High-viscosity | 233 | 167.5 | 92.5 | 75 |
| PVC | High-pressure Boiler |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



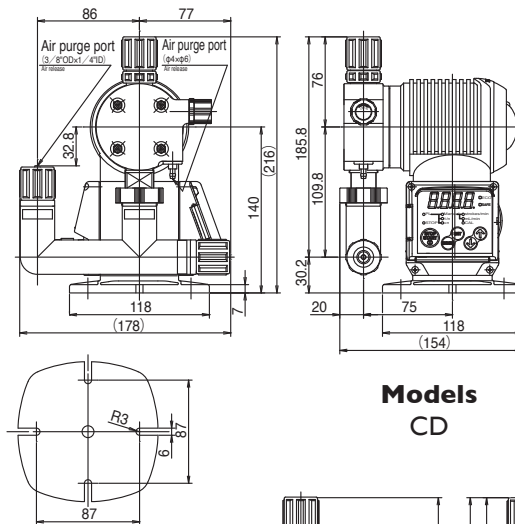
Models
200

316SS Pump Heads

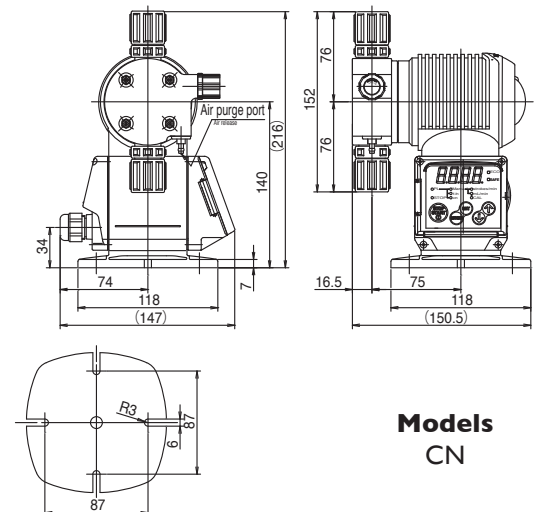


Models
ST

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 | Application |
|--------|-----------------------------------|--|--|
| 1 - 2 | SP | Pulse-input | Application General chemicals General chemicals General chemicals General chemicals General chemicals General chemicals Outgassing fluids without automatic degassing joint Outgassing fluids with automatic degassing joint High-pressure boiler applications High-pressure chemical applications High-viscosity fluids |
| | 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) | |
| | PE | PVC/EPDM/EPDM/PVC/PVC/PE (6 x 8) | |
| | PF | PVC/FKM/FKM/PVC/PVC/PE (6 x 8) | |
| | KE | PVDF/EPDM/EPDM/PVDF/PVDF/PE (6 x 8) (No 200 ml/min) | |
| | KF | PVDF/FKM/FKM/PVDF/PVDF/PE (6 x 8) (No 200 ml/min) | |
| | KP | PVDF/FKM/PTFE/PVDF/PTFE/FEP (6 x 8) (No 200 ml/min) | |
| | ST | 316SS/PTFE/-/Ceramic/PTFE/PTFE (6 x 8) 030, 060 and 100 models only | |
| | CN | Acrylic/FKM/FKM/PVC/PVC/PE (6 x 8) (No 200 ml/min) | |
| | CD | Acrylic/FKM/FKM/PVC/PVC - Hastelloy Spring/PE (6 x 8) (No 200 ml/min) | |
| | BH | PVC/EPDM/PTFE/PVC/PVC/PA (4 x 6) 030 and 03R models only | |
| | CH | PVC/EPDM/PTFE/PVC/PVC/PA (4 x 6) 030 models only | |
| | HV | PVC/FKM/-/PVC/-/PVC (12 x 18) 060 and 100 models only | |
| 8 | Power Plug | | |
| | S | North American Plug | Standard |
| | B | UK Plug | CE UK |
| | E | European Plug | CE Europe |
| | L | Asia | Lead wire only |